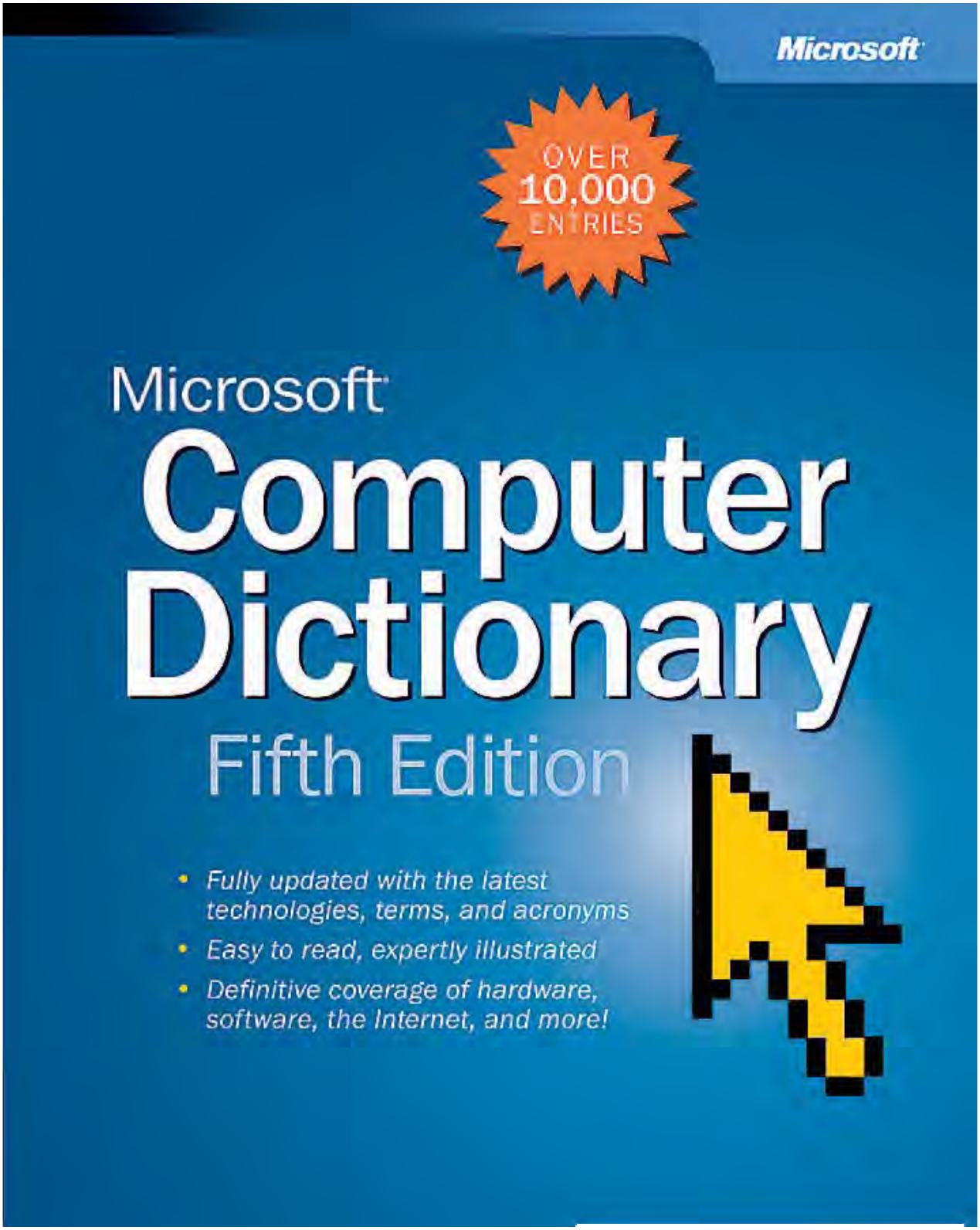

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Contents

Introduction

The *Microsoft Computer Dictionary, Fifth Edition* is designed to be a comprehensive and authoritative source of definitions for computer-related terms and abbreviations. The dictionary includes terms drawn from a wide variety of topics relevant to computer users, including software, hardware, networking, data storage, graphics, games, information processing, the Internet and the World Wide Web, gaming, history, jargon and slang, organizations, programming, and standards.

Although this book covers nearly every aspect of computing, it does not include entries on most companies or on most makes and models of computers, nor does it contain entries on most application software products. The few exceptions to this rule of thumb are key companies and products that have a historical or universal importance within the computing industry.

This dictionary emphasizes terminology that the average computer user will encounter in documentation, online help, computer manuals, marketing and sales materials, the popular media, and the computer trade press. Because most computer users operate personal computers and desktop systems at home, work, or both, the majority of the entries in this dictionary cover the terminology used in describing and working with these systems. However, some specialized or highly technical language is included that pertains to areas of industry, academia, software and hardware development, and research. These terms have been included because they have a bearing on more common computer terminology or because they are of historical significance.

Changes in the Fifth Edition

The fifth edition of the *Microsoft Computer Dictionary* has been revised and expanded to include over 10,000 entries, reflecting the many advances in the computer field and including several areas that have come into prominence in the public eye, such as networking, Web authoring, and new technologies, such as .NET. The content from the Year 2000 appendix has been integrated into the body of the dictionary and a new appendix on emoticons and instant messaging symbols has been added.

Order of Presentation

Entries are alphabetized by letter. Spaces are ignored, as are characters such as hyphens and slashes; for example, *Baudot code* falls between *baud* and *baud rate*, and *machine-independent* falls between *machine identification* and *machine instruction*. Numbers and symbols are located at the beginning of the book and are listed in ascending ASCII order. If an entry begins with a letter or letters but contains a number, it is listed alphabetically, according to the initial letter(s), and then according to ASCII order. Thus, V20 precedes V.2x, and both precede VAB.

Entries

Entries are of two types: main entries, which contain full definitions, and synonymous cross-references, which contain *See* references to the appropriate main entries. Synonymous cross-references are generally secondary or less common ways of referring to a main entry. The definition at the main entry can be substituted as a definition for the synonymous cross-reference.

Format

Information in each main entry is presented in a consistent format: entry name in boldface, spelling variants (if any), part of speech, definition, illustration or table reference (if any), acronym (if any), alternative names (if any), and cross-references (if any).

Main Entries

Entries that are acronyms or abbreviations for one or more words or concatenations of two or more words have those words spelled out at the beginning of the definition. The letters in these words or phrases that make up the acronym, abbreviation, or concatenation are in boldface.

When a main entry is spelled exactly the same as another main entry, the two entries are differentiated by the use of a superscript numeral after each term. These entries are called homographs, and they are generally different parts of speech. For example,

e-mail[1] *(noun)*
e-mail[2] *(verb)*

Spelling Variants

When a main entry has one or more variations in the way it is spelled, each spelling variant follows the main entry, after the word *or*.

Parts of Speech

Entries are broken down into four parts of speech, in addition to prefixes, abbreviated as follows:

n. noun
vb. verb
adj. adjective
adv. adverb

Definitions

Each of the more than 10,000 entries is written in clear, standard English. Many go beyond a simple definition to provide additional detail and to put the term in context for a typical computer user. When an entry has more than one sense or definition, the definitions are presented in a numbered list, to make it easier to distinguish the particular, sometimes subtle, variations in meaning.

Illustration and Table References

Some entries have affiliated illustrations or tables that aid in defining the entry. In most cases, illustrations and tables appear on the same page as the entries to which they apply. In some instances, however, page layout requirements have forced them to a subsequent page. Entries with illustrations or tables usually have references at the end of the definition for an entry, in the following formats:

See the illustration.
See the table.

Acronyms

Some terminology in the computer field, particularly computer standards and Internet slang, can be shortened to form acronyms. Sometimes the acronym is the more common way to refer to the concept or object; in these cases, the acronym is the main entry. In other cases, the acronym is not as commonly used as the words or phrase for which it stands. In these cases, the words or phrase constitute the main entry. The acronym is given after the definition for these entries in the following format:

Acronym:

Alternative Names

Some items or concepts in the computer field can be referred to by more than one name. Generally, though, one way is preferred. The preferred terminology is the main entry. Alternative names are listed after any acronyms; otherwise they are listed after the definition in the following format:

Also called:

Cross-References

Cross-references are of three types: *See*, *See also*, and *Compare*. A *See* reference is used in an entry that is a synonymous cross-reference and simply points to another entry that contains the information sought. A *See also* reference points to one or more entries that contain additional or supplemental information about a topic and follows any acronyms or alternative names after the definition. A *Compare* reference points to an entry or entries that offer contrast and follows any *See also* references; otherwise it follows any acronyms or alternative names after the definition.

Future Printings and Editions

Every effort has been made to ensure the accuracy and completeness of this book. If you find an error, think that an entry does not contain enough information, or seek an entry that does not appear in this edition, please let us know. Address your letter to: Dictionary Editor, Microsoft Press, One Microsoft Way, Redmond, WA 98052-6399. Or send e-mail to mspcd@microsoft.com.

Numbers and Symbols

$0.02 *n. See* my two cents.

& *n.* **1.** UNIX command suffix for running the preceding command as a background process. *See also* background[1]. **2.** In UNIX, a root user command suffix for starting a daemon that is to remain running after logout. *See also* daemon. **3.** The default character used to designate a character entity (special character) in an HTML or SGML document. *See also* HTML, SGML. **4.** In spreadsheet programs, an operator for inserting text into a formula specifying the relationship between cells.

***** *n.* **1.** A character used in applications and programming languages to signify multiplication. **2.** In Windows, MS-DOS, OS/2, and other operating systems, a wildcard character that can be used in place of one or more characters, as in *.*, which represents any combination of a filename and an extension. *See also* ?, *.*, wildcard character. **3.** In the C and C++ programming languages, the character used to dereference a pointer to a class or structure. *See also* dereference, pointer (definition 1).

. *n.* A file specification using the asterisk (star) wildcard, which means any combination of filename and extension in operating systems such as MS-DOS. *See also* asterisk (definition 2), wildcard character.

.. *n.* MS-DOS and UNIX syntax for the parent directory. A single dot refers to the current directory.

/ *n.* **1.** A character used to separate parts of a directory path in UNIX and FTP or parts of an Internet address (URL) in Web browsers. **2.** A character used to flag switches or parameters that control the execution of a program invoked through a command-line interface. *See also* command-line interface.

// *n.* Notation used with a colon to separate the URL protocol (such as http or ftp) from the URL host machine name, as in http://www.yahoo.com. *See also* URL.

: *n.* Colon, a symbol used after the protocol name (such as http or ftp) in a URL. *See also* URL.

<> *n.* **1.** Angle brackets, a pair of symbols used to enclose a keyword, comprising a tag in an HTML, SGML, or XML document. *See also* HTML, SGML, XML. **2.** In an Internet Relay Chat (IRC) or multiuser dungeon (MUD), a set of symbols used to designate some action or reaction, as in <chuckle>. *See also* emotag, IRC, MUD. **3.** A pair of symbols used to enclose a return address in an e-mail header.

> *n.* **1.** Right angle bracket, a symbol used in some operating systems, such as MS-DOS and UNIX, to direct the output resulting from some command into a file. **2.** A symbol commonly used in e-mail messages to designate text included from another message.

? *n.* In some operating systems and applications, a wildcard character often used to represent any other single character. The question mark is one of two wildcard characters supported by the MS-DOS, Windows NT, and OS/2 operating systems. *See also* *.

@ *n.* The separator between account names and domain names in Internet e-mail addresses. When spoken, @ is read as "at." Therefore, user@host.com would be read as "user at host dot com."

**** *n.* Back slash, a character used to separate directory names in MS-DOS and UNIX path specifications. When used as a leading character, it means that the path specification begins from the topmost level for that disk drive. *See also* path (definition 5).

0.07-micron *n.* A manufacturing technology with which 400 million transistors, with an effective channel length 1000 times thinner than a human hair, can be placed on a single chip. The extremely small sizes and faster speeds of 0.07-micron products can be used to create improved-performance microprocessors that may extend clock speeds beyond 10 GHz. Possible applications of 0.07-micron technology range from tiny hearing aids that can be implanted in the ear to hard disk drives that read gigabits of data per second.

0 wait state *n. See* zero wait state.

100Base-FX *n.* An Ethernet standard for baseband LANs (local area networks) using fiber optic cable carrying 100 Mbps (megabits per second). *Also called:* Fast Ethernet. *See also* Ethernet (definition 1).

100Base-T *n.* An Ethernet standard for baseband LANs (local area networks) using twisted-pair cable carrying 100 Mbps (megabits per second). The 100Base-T standard is comprised of 100Base-T4 (four pairs of medium-grade to high-grade twisted-pair cable) and 100Base-TX (two pairs of high-grade twisted-pair cable). *Also called:* Fast Ethernet. *See also* Ethernet (definition 1).

100Base-T4 *n. See* 100Base-T.

100Base-TX *n. See* 100Base-T.

100Base-VG *n.* An Ethernet standard for baseband LANs (local area networks) using voice-grade twisted-pair cable carrying 100 Mbps (megabits per second). Unlike other Ethernet networks, 100Base-VG relies on an access method called demand priority, in which nodes send requests to hubs, which in turn give permission to transmit based on the priority levels included with the requests. *Also called:* 100Base-VG-AnyLAN. *See also* Ethernet (definition 1).

100Base-VG-AnyLAN *n. See* 100Base-VG.

100Base-X *n.* Descriptor used for any of three forms of 100 Mbps Ethernet networks: 100Base-T4, 100Base-TX, or 100Base-FX. *Also called:* Fast Ethernet. *See also* 100Base-T, 100Base-FX, Ethernet (definition 1).

101-key keyboard *n.* A computer keyboard modeled after the enhanced keyboard; introduced by IBM for the IBM PC/AT. The 101-key keyboard and the enhanced keyboard are similar in the number and function of their keys; they may differ in the way the keys are laid out, the amount of tactile feedback expressed when a key is pressed, and the shape and feel of the keycaps. *See also* enhanced keyboard.

1024x768 *n.* A standard super VGA computer display having a resolution of 1024 columns of pixels by 768 rows of pixels. *See also* SVGA.

10Base2 *n.* The Ethernet and IEEE 802.3 standard for baseband LANs (local area networks) using a thin coaxial cable (3/16 inch) up to 200 meters long and carrying 10 Mbps (megabits per second) in a bus topology. A network node is connected to the cable by a BNC connector on the adapter card. *Also called:* Cheapernet, thin Ethernet, ThinNet, ThinWire. *See also* BNC connector, bus network, coaxial cable, Ethernet (definition 1), IEEE 802.x.

10Base5 *n.* The Ethernet and IEEE 802.3 standard for baseband LANs (local area networks) using a thick coaxial cable (3/8 inch) up to 500 meters long and carrying 10 Mbps (megabits per second) in a bus topology. A network node is equipped with a transceiver that plugs into a 15-pin AUI connector on the adapter card and taps into the cable. This form of Ethernet is generally used for network backbones. *Also called:* thick Ethernet, ThickNet, ThickWire. *See also* coaxial cable, Ethernet (definition 1), IEEE 802.x.

10Base-F *n.* The Ethernet standard for baseband LANs (local area networks) using fiber-optic cable carrying 10 Mbps (megabits per second) in a star topology. All nodes are connected to a repeater or to a central concentrator. A node is equipped with a fiber-optic transceiver that plugs into an AUI connector on the adapter card and attaches to the cable with an ST or SMA fiber-optic connector. The 10Base-F standard comprises 10Base-FB for a backbone, 10Base-FL for the link between the central concentrator and a station, and 10Base-FP for a star network. *See also* Ethernet (definition 1), fiber optics, star network.

10Base-FB *n. See* 10Base-F.

10Base-FL *n. See* 10Base-F.

10Base-FP *n. See* 10Base-F.

10Base-T *n.* The Ethernet standard for baseband LANs (local area networks) using twisted-pair cable carrying 10 Mbps (megabits per second) in a star topology. All nodes are connected to a central hub known as a multiport repeater. *See also* Ethernet (definition 1), star network, twisted-pair cable.

12-hour clock *n.* A clock that expresses the time within a 12-hour range, returning to 1:00 after 12:59 AM or PM. *Compare* 24-hour clock.

1.2M *adj.* Short for **1.2-m**egabyte. Refers to the storage capacity for high-density 5.25-inch floppy disks.

1394 *n. See* IEEE 1394.

14.4 *n.* A modem with a maximum data transfer rate of 14.4 Kbps (kilobits per second).

1.44M *adj.* Short for **1.44-m**egabyte. Refers to the storage capacity for high-density 3.5-inch floppy disks.

16-bit *adj. See* 8-bit, 16-bit, 32-bit, 64-bit.

16-bit application *n.* An application written to run on a computer with a 16-bit architecture or operating system, such as MS-DOS or Windows 3.*x*.

16-bit color *adj.* Of, pertaining to, or characteristic of a display that can produce 2^{16} (65,536) distinct colors. *Compare* 24-bit color, 32-bit color.

16-bit machine *n.* A computer that works with data in groups of 16 bits at a time. A computer may be considered a 16-bit machine either because its microprocessor operates internally on 16-bit words or because its data bus can transfer 16 bits at a time. The IBM PC/AT and similar models based on the Intel 80286 microprocessor are 16-bit machines in terms of both the word size of the microprocessor and the size of the data bus. The Apple Macintosh Plus and Macintosh SE use a microprocessor with a 32-bit word length (the Motorola 68000), but they have 16-bit data buses and are generally considered 16-bit machines.

16-bit operating system *n.* An operating system, now outdated, that can work with 2 bytes, or 16 bits, of information at one time. A 16-bit operating system, such as MS-DOS and Microsoft Windows 3.*x*, reflects the functionality of a 16-bit processor because the software and the chip must work together so closely. The main advantage of a 16-bit operating system over its earlier 8-bit predecessors (such as CP/M-80) was its ability to address more memory and use a larger (16-bit) bus. Sixteen-bit operating systems have since been eclipsed by 32-bit operating systems—such as the Macintosh operating system, Microsoft Windows NT, and Windows 9x—and by 64-bit operating systems, such as some versions of UNIX. *See also* 32-bit operating system.

/16 network *n.* IP address class B. This class has 16,382 networks available and more than sixty-five thousand hosts available. *See also* host, IP address classes, network.

1999 problem *n.* **1.** A variation on the Year 2000 problem in computer systems that have two-digit years in date fields and are used by companies and organizations in which the fiscal year 2000 begins before the end of calendar year 1999. These computer systems may interpret the fiscal year as the year 1900. **2.** A potential problem, if not corrected, with date fields in older code that were (sometimes) used to hold values with special meaning. For example, the date 9/9/99 was often used as an expiration date meaning "keep this information forever" or, worse, "destroy this document immediately."

1NF *n.* Short for **first n**ormal **f**orm. *See* normal form (definition 1).

2000 time problem *n. See* Year 2000 problem.

2038 limit *n.* A consideration in some PCs that use a signed 32-bit integer to represent date and time. Because such systems determine date and time as the number of seconds elapsed since midnight, January 1, 1970, they can handle a maximum of 2^{31} seconds, a number that will be reached at 3:14:07 a.m. on January 19, 2038. When the elapsed seconds exceed that maximum value, the clock will overflow, resulting in an incorrect date and time and, potentially, causing disruptions. Some organizations have defined Year 2000 compliant to mean a system that will have the correct date/time and do proper date handling up through the year 2038, although this is not universal. The extent of the potential problem, of course, is directly related to the number of such system solutions still in operation at the time. *See also* Year 2000 compliant.

24-bit color *n.* RGB color in which the level of each of the three primary colors in a pixel is represented by 8 bits of information. A 24-bit color image can contain over 16 million different colors. Not all computer monitors support 24-bit color, especially older models. Those that do not may use 8-bit color (256 colors) or 16-bit color (65,536 colors). *Also called:* true color. *See also* bit depth, pixel, RGB. *Compare* 16-bit color, 32-bit color.

24-hour clock *n.* A clock that expresses the time within a 24-hour range, from 0000 (midnight) to 2359 (one minute before the following midnight). *Compare* 12-hour clock.

2.4 kernel *n.* Update of the core of the Linux OS, released at the end of 2000. Features in the 2.4 kernel emphasize support for new buses, devices, and controllers; increased USB support; improved Web server performance; and increased symmetrical multiprocessing scalability.

/24 network *n.* IP address class A. This class has more than two million networks available and 254 hosts available. *See also* host, IP address classes, network.

256-bit *adj.* Having a data path that is 256 bits wide.

286 *n. See* 80286.

287 *n. See* 80287.

28.8 *n.* A modem with a maximum data transfer rate of 28.8 Kbps (kilobits per second).

2-digit year *n.* The capacity for storing only the last two digits of the year in a date. In such systems, the century for the date is not stored. *See also* two-digit date storage.

2G *n.* Acronym for **2**nd **G**eneration. The second generation of digital wireless technology, as defined by the International Telecommunications Union (ITU). Second generation technology delivers data transmission at speeds from 9.6 Kbps (kilobits per second) to 19.2 Kbps. Second generation technology provides greater data transmission capabilities and more efficient voice transmission than the analog technology first developed for wireless telecommunications.

2NF *n.* Short for **second n**ormal **f**orm. *See* normal form (definition 1).

2-nines availability *n. See* two-nines availability.

2.PAK *n.* An artificial intelligence programming language.

32-bit *adj. See* 8-bit, 16-bit, 32-bit, 64-bit.

32-bit application *n.* An application written to run on a computer with a 32-bit architecture or operating system, such as Mac OS or Windows 9x.

32-bit clean *adj.* **1.** Refers to Macintosh hardware designed to run in 32-bit mode, which can address up to 1 gigabyte of physical RAM under System 7. This includes all present Macintosh computers; some older models used 16-bit addressing. **2.** Refers to software written for 32-bit operation.

32-bit color *n.* RGB color that is similar to 24-bit color, with 8 additional bits used to allow for faster transfer of an image's color. *See also* bit depth, RGB. *Compare* 16-bit color, 24-bit color.

32-bit driver *n.* A software subsystem that controls either a hardware device (device driver) or another software subsystem. The 32-bit versions of this software take full advantage of the instruction sets of the 486 and Pentium processors for improved speed. *See also* driver, instruction set.

32-bit machine *n.* A computer that works with data in groups of 32 bits at a time. The Apple Macintosh II and higher models are 32-bit machines, in terms of both the word size of their microprocessors and the size of the data buses, as are computers based on the Intel 80386 and higher-level microprocessors.

32-bit operating system *n.* An operating system in which 4 bytes, or 32 bits, can be processed at one time. Windows 95, Windows 98, Windows NT, Linux, and OS/2 are examples. *See also* instruction set, protected mode.

33.6 *n.* A modem with a maximum data transfer rate of 33.3 Kbps (kilobits per second).

34010, 34020 *n.* Graphics coprocessors from Texas Instruments (TI), used mainly in high-end PC graphics boards, which have become a de facto standard for programmable graphics processors. Although both chips use 32-bit registers, the 34010 uses a 16-bit data bus and the 34020 uses a 32-bit bus. The 34020 is compatible with the earlier 34010, and both chips work with TIGA (Texas Instruments Graphical Architecture), a TI standard that allows a single application driver to be used with all boards based on the standard. *See also* de facto standard, TIGA, video graphics board.

3.5-inch floppy disk *n.* Used with the Macintosh and with IBM and compatible microcomputers. A microfloppy disk is a round piece of polyester film coated with ferric oxide and encased in a rigid plastic shell equipped with a sliding metal cover. On the Macintosh, a single-sided 3.5-inch floppy disk can hold 400 kilobytes (KB); a double-sided (standard) disk can hold 800 KB; and a double-sided high-density disk can hold 1.44 megabytes (MB). On IBM and compatible machines, a microfloppy can hold either 720 KB or 1.44 MB of information. *See also* floppy disk.

360K *adj.* Short for **360**-**k**ilobyte. The storage capacity for standard 5.25-inch floppy disks.

.386 *n.* A file extension for virtual device drivers under Windows 3.1. *See also* virtual device driver.

386 *n. See* 80386DX.

386BSD *n.* A version of BSD UNIX, different from BSD386 from Berkeley Software Development, Inc. Freely distributable, 386BSD was released in 1992 and is available in two newer versions: NetBSD and FreeBSD. *See also* BSD UNIX, FreeBSD, NetBSD.

386DX *n. See* 80386DX.

386SL *n. See* 80386SL.

386SX *n. See* 80386SX.

387 *n. See* 80387.

387SX *n. See* 80387SX.

3-D or **3D** *adj.* **1.** Short for **three-d**imensional. Of, pertaining to, or being an object or image having or appearing to have all three spatial dimensions (length, width, and depth). **2.** Having the illusion of depth or varying distances, as in 3-D audio.

3-D array *n. See* three-dimensional array.

3-D audio *n.* Short for **three-d**imensional **audio**. Recorded as stereo sound, 3-D audio enables the listener to feel immersed in the sound and to determine its exact location (up, down, left, right, forward, or backward). This technology is commonly used in video games and virtual-reality systems, as well as in some Internet applications. *Also called:* 3-D sound, binaural sound.

3-D graphic *n.* Any graphical image that depicts one or more objects in three dimensions—height, width, and depth. A 3-D graphic is rendered on a two-dimensional medium; the third dimension, depth, is indicated by means of perspective and by techniques such as shading or gradient use of color.

3-D metafile *n.* A device-independent file for storing a 3-D display. *See also* metafile.

3DMF *n. See* QuickDraw 3-D.

3-D model *n. See* three-dimensional model.

3-D sound *n. See* 3-D audio.

3-finger salute *n. See* three-finger salute.

3G *n.* Acronym for **3**rd **G**eneration. The third generation of digital wireless technology, as defined by the International Telecommunications Union (ITU). Third generation technology is expected to deliver data transmission speeds between 144 Kbps (kilobits per second) and 2 Mbps (megabits per second), compared to the 9.6 Kbps to 19.2 Kbps offered by second generation technology. Western Europe and Japan lead the world in adoption of 3G technology and services.

3GL *n.* Short for **third-g**eneration **l**anguage. A high-level programming language that was designed to run on the third generation of computer processors, built on integrated circuit technology roughly from 1965 to 1970. C, FORTRAN, Basic, and Pascal are examples of third-generation languages still in use today. *See also* high-level language, integrated circuit. *Compare* 4GL, low-level language.

3NF *n.* Short for **third n**ormal **f**orm. *See* normal form (definition 1).

3-nines availability *n. See* three-nines availability.

3Station *n.* A diskless workstation developed by Bob Metcalfe at 3Com Corporation. *See also* diskless workstation.

400 *n.* HTTP status code—Bad Request. A Hypertext Transfer Protocol message from an HTTP server indicating that a client request cannot be completed because the syntax of the request is incorrect. *See also* HTTP server (definition 1), HTTP status codes.

401 *n.* HTTP status code—Unauthorized. A Hypertext Transfer Protocol message from an HTTP server indicating that a client request cannot be completed because the transaction requires an Authorization header, which was not supplied. *See also* HTTP server (definition 1), HTTP status codes.

402 *n.* HTTP status code—Payment Required. A Hypertext Transfer Protocol message from an HTTP server indicating that a client request cannot be completed because the transaction requires a payment, and no ChargeTo header was supplied. *See also* HTTP server (definition 1), HTTP status codes.

403 *n.* HTTP status code—Forbidden. A Hypertext Transfer Protocol message from an HTTP server indicating that a client request cannot be completed because access is restricted. *See also* HTTP server (definition 1), HTTP status codes.

404 *n.* HTTP status code—Not Found. A Hypertext Transfer Protocol message from an HTTP server indicating that a client request cannot be completed because the server is unable to find an address that matches the URL requested. *See also* HTTP server (definition 1), HTTP status codes, URL.

486 *n. See* i486DX.

486DX *n. See* i486DX.

486SL *n. See* i486SL.

486SX *n. See* i486SX.

4-digit year *n.* The capacity for storing all four digits of the year in a date in hardware or firmware products.

4GL *n.* Short for **fourth-g**eneration **l**anguage. A programming language designed to mimic human language. The designation is often used to specify languages used with relational databases and is intended to imply that such languages are a step up from standard high-level programming languages such as C, Pascal, and COBOL. *See also* application development language, high-level language. *Compare* 3GL, assembly language.

4GL architecture *n. See* two-tier client/server.

4mm tape *n. See* digital audio tape.

4NF *n.* Short for fourth normal form. *See* normal form (definition 1).

4-nines availability *n. See* four-nines availability.

5.25-inch floppy disk *n.* Used with the Macintosh and with IBM and compatible microcomputers. A microfloppy disk is a round piece of polyester film coated with ferric oxide and encased in a rigid plastic shell equipped with a sliding metal cover. A floppy disk 5.25 inches in diameter is encased in a flexible plastic jacket and has a large hole in the center, which fits around a spindle in the disk drive; such a disk can hold from a few hundred thousand to over one million bytes of data. *See* floppy disk.

56flex *n. See* K56flex.

56K[1] *adj.* Having 56 kilobits per second (Kbps) available for traffic on a communications circuit. One voice channel can carry up to 64 Kbps (called a T0 carrier); 8 Kbps are used for signaling, leaving 56 Kbps available for traffic. *See also* T-carrier.

56K[2] *n. See* 56-Kbps modem.

56-Kbps modem *n.* An asymmetric modem that operates over POTS (Plain Old Telephone Service) to deliver data downstream at 56 Kbps, with upstream speeds of 28.8 and 33.6 Kbps. Earlier, slower modems invoke a two-conversion transmission process: digital data from a computer is converted into analog form for transmission over the telephone wire and is then reconverted to digital data by the receiving modem. In contrast, 56-Kbps modems achieve faster speeds by converting analog data to digital data only once, typically at the telephone company's switching office near the beginning of the transmission's journey. Designed to improve download times for Internet users, 56-Kbps modems rely on a public phone network that allows for a single conversion and on the availability of a digital connection, such as ISDN or T1, at the ISP (Internet Service Provider) location that provides the actual connection to the Internet. *See also* analog data, digital data transmission, modem, POTS.

586 *n.* The unofficial name used by industry analysts and by the computer trade press to describe Intel's successor to the i486 microprocessor prior to its release. In the interest of using a name that could be trademarked, however, Intel decided to name the microprocessor Pentium. *See also* Pentium.

5NF *n.* Short for **fifth n**ormal **f**orm. *See* normal form (definition 1).

5-nines availability *n. See* five-nines availability.

5x86 *n.* Cyrix Corporation's clone of the Intel Pentium CPU. *See also* 586, 6x86, central processing unit, clone, Pentium.

601 *n. See* PowerPC 601.

603 *n. See* PowerPC 603.

604 *n. See* PowerPC 604.

64-bit *adj.* Of, pertaining to, or descriptive of the amount of data—64 bits, or 8 bytes—that certain computer systems or programs can process at one time.

64-bit machine *n.* A computer that works with data in groups of 64 bits at a time. A computer may be considered a 64-bit machine either because its CPU operates internally on 64-bit words or because its data bus can transfer 64 bits at a time. A 64-bit CPU thus has a word size of 64 bits, or 8 bytes; a 64-bit data bus has 64 data lines, so it ferries information through the system in sets of 64 bits at a time. Examples of 64-bit architecture include the Alpha AXP from Digital Equipment Corporation, the Ultra workstation from Sun Microsystems, Inc., and the PowerPC 620 from Motorola and IBM.

64-bit operating system *n.* An operating system in which 8 bytes, or 64 bits, can be processed at one time. For Microsoft Windows, the 64-bit operating systems are Windows XP 64-Bit Edition, the 64-bit versions of Windows .NET Enterprise Server, and Windows .NET Datacenter Server. The IBM AS/400 uses a 64-bit operating system.

6502 *n.* The 8-bit microprocessor, developed by Rockwell International, that was used in the Apple II and Commodore 64 microcomputers.

65816 *n.* A 16-bit microprocessor from Western Digital Design used in the Apple IIGS. It can emulate the 6502, providing compatibility with all old Apple II software. *See also* 6502.

6800 *n.* An 8-bit microprocessor developed by Motorola in the early 1970s. It failed to gain wide acceptance.

68000 *n.* The original microprocessor in the 680x0 family from Motorola, introduced in 1979 and used in the first Apple Macintosh computers as well as the Apple LaserWriter IISC and Hewlett-Packard's LaserJet printers. The 68000 has 32-bit internal registers but transfers data over a

16-bit data bus. With 24-bit physical addressing, the 68000 can address 16 megabytes of memory—16 times as much memory as does the Intel 8088 found in the IBM PC. In addition, the 68000's architecture, in which addressing is linear (as opposed to the 8088's segmented addressing) and in which all address registers work the same way and all data registers work the same way, makes programming more straightforward. *See also* linear addressing architecture, segmented addressing architecture.

68020 *n.* A microprocessor in the 680x0 family from Motorola, introduced in 1984. This chip has 32-bit addressing and a 32-bit data bus and is available in speeds from 16 MHz to 33 MHz. The 68020 is found in the original Macintosh II and the LaserWriter IINT from Apple.

68030 *n.* A microprocessor in the 680x0 microprocessor family from Motorola, introduced in 1987. This chip has 32-bit addressing and a 32-bit data bus and is available in speeds from 20 MHz to 50 MHz. The 68030 has built-in paged memory management, precluding the need for supplemental chips to provide that function.

68040 *n.* A microprocessor in the 680x0 family from Motorola, introduced in 1990, with 32-bit addressing and a 32-bit data bus. The 68040 runs at 25 MHz and includes a built-in floating-point unit and memory management units, including independent 4-KB instruction and data caches, which eliminate the need for supplemental chips to provide these functions. In addition, the 68040 is capable of parallel instruction execution by means of multiple independent instruction pipelines, multiple internal buses, and separate caches for both data and instructions.

68060 *n.* The latest and fastest of the 680x0 microprocessors from Motorola, introduced in 1995. This chip has 32-bit addressing and a 32-bit data bus and is available in speeds from 50 MHz to 75 MHz. There was no 68050. The 68060 is probably the last in the 680x0 series from Motorola.

6845 *n.* A programmable video controller from Motorola used in IBM's Monochrome Display Adapter (MDA) and Color/Graphics Adapter (CGA). The 6845 became such an integral part of the IBM PC and compatibles that later generations of video adapters, such as EGA and VGA, continue to support the operations of the 6845. *See also* CGA, EGA, MDA, VGA.

68881 *n.* The floating-point coprocessor from Motorola for use with the 68000 and the 68020. The 68881 provides instructions for high-performance floating-point arithmetic, a set of floating-point data registers, and 22 built-in constants including p and powers of 10. The 68881 conforms to the ANSI/IEEE 754-1985 standard for binary floating-point arithmetic. The 68881 can produce a dramatic improvement in system performance when software takes advantage of it. *See also* floating-point processor.

68K *n. See* 68000.

6x86 *n.* An 8086-compatible microprocessor designed by Cyrix Corporation. It is socket-compatible with some Pentium microprocessors from Intel and can be used in their place. *See also* 8086, microprocessor, Pentium.

740 *n. See* PowerPC 740.

750 *n. See* PowerPC 750.

7-bit ASCII *n.* A 7-bit ASCII character set used for standard UNIX mail messages. The leftover eighth bit is a parity bit used for error correction. *See also* ASCII, parity bit.

7-track *n.* A tape storage scheme that places data on seven separate, parallel tracks on 1/2-inch reel-to-reel magnetic tape. This is an old recording format used with computers that transfer data 6 bits at a time. Data is recorded as 6 data bits and 1 parity bit. Some personal computers now use the 9-track tape storage scheme. *See also* 9-track.

80286 *n.* A 16-bit microprocessor from Intel, introduced in 1982 and included in the IBM PC/AT and compatible computers in 1984. The 80286 has 16-bit registers, transfers information over the data bus 16 bits at a time, and uses 24 bits to address memory locations. The 80286 operates in two modes: real mode, which is compatible with the 8086 and supports MS-DOS, and protected mode, which enables the CPU to access 16 megabytes of memory and protects the operating system from incorrect memory accesses by ill-behaved applications, which could crash a system in real mode. *Also called:* 286. *See also* protected mode, real mode.

80287 *n.* A floating-point coprocessor from Intel for use with the 80286 family of microprocessors. Available in speeds from 6 MHz to 12 MHz, the 80287 offers the same mathematical capabilities that the 8087 coprocessor provides to an 8086-based system. Because the 80287 conforms to the 80286 memory management and protection

schemes, it can be used in both the real and protected modes of the 80286. Also, if the computer manufacturer implements support for it in the motherboard design, the 80287 can be used in a system with an 80386 microprocessor. *See also* floating-point processor.

802.x standards *n. See* IEEE 802.x.

802.11 standards *n. See* IEEE 802.11.

80386 *n. See* 80386DX.

80386DX *n.* A 32-bit microprocessor from Intel, introduced in 1985. The 80386 is a full 32-bit microprocessor; that is, it has 32-bit registers, it can transfer information over its data bus 32 bits at a time, and it can use 32 bits to address memory. Like the earlier 80286, the 80386 operates in two modes: real mode, which is compatible with the 8086 chip and supports MS-DOS, and protected mode, which allows the CPU to access 4 GB of memory directly, supports multitasking, and protects the operating system from crashing as a result of an incorrect memory access caused by an application program error. The 80386 also includes a virtual 8086 mode (also called virtual real mode), which appears to software as an 8086 but whose 1-MB effective address space can be located anywhere in physical memory under the same safeguards as in protected mode. The virtual 8086 mode is the basis for the MS-DOS prompt available inside Windows. *Also called:* 386, 386DX, 80386. *See also* protected mode, real mode, virtual real mode.

80386SL *n.* A microprocessor from Intel intended for use in laptop computers. The 80386SL has similar features to the 80386SX, but it also has capabilities for reducing its power consumption. In particular, the 80386SL can reduce its clock speed to zero when not in use and return to full speed, with the contents of all its registers intact, when called on to perform another task. *Also called:* 386SL. *See also* 80386SX, green PC, i486SL.

80386SX *n.* A microprocessor from Intel, introduced in 1988 as a low-cost alternative to the 80386DX. The 80386SX is basically an 80386DX processor limited by a 16-bit data bus. The 16-bit design allows 80386SX systems to be configured from less expensive AT-class parts, resulting in a much lower total system price. The 80386SX offers improved performance over the 80286 and access to software designed for the 80386DX. The 80386SX also offers 80386DX features such as multitasking and virtual 8086 mode. *Also called:* 386SX. *See also* 80386DX.

80387 *n.* The floating-point coprocessor introduced by Intel for use with the 80386 microprocessors. Available in speeds from 16 MHz to 33 MHz, the 80387 offers the same mathematical capabilities that the 8087 provides for an 8086-based system, as well as transcendental operations for sine, cosine, tangent, arctangent, and logarithm calculations. The 80387 conforms to the ANSI/IEEE 754-1985 standard for binary floating-point arithmetic. The 80387 operates independently of the 80386's mode, and it performs as expected regardless of whether the 80386 is running in real, protected, or virtual 8086 mode. *Also called:* 387. *See also* 80386DX, floating-point processor.

80387SX *n.* The floating-point coprocessor from Intel for use with the 80386SX microprocessor. It provides the same capabilities that the 80387 does for an 80386-based system, but it is available only in a 16-MHz version. *Also called:* 387SX. *See also* 80386SX, floating-point processor.

80486 *n. See* i486DX.

80486SL *n. See* i486SL.

80486SX *n. See* i486SX.

8080 *n.* One of the first chips capable of serving as the basis of a personal computer, introduced by Intel in 1974 and used in the Altair 8800. The 8080 provided 8-bit data operations and 16-bit addressing and influenced the design of the Z80. Furthermore, the microprocessors of the 80x86 line, which serve as the foundation for the IBM PC and all its successors and compatibles, are all based on a set of registers organized similarly to the 8080's. *See also* Altair 8800, Z80.

8086 *n.* The original microprocessor in the 80x86 family from Intel, introduced in 1978. The 8086 has 16-bit registers, a 16-bit data bus, and 20-bit addressing, allowing access to 1 megabyte of memory. Its internal registers include a set that is organized in the same way as those of the 8080. Speeds range from 4.77 MHz to 10 MHz. *See also* 8080.

8087 *n.* A floating-point coprocessor from Intel for use with the 8086/8088 and 80186/80188 microprocessors. Available in speeds from 5 MHz to 10 MHz, the 8087 offers instructions, not found in the 8086/8088 instruction sets, for performing arithmetic, trigonometric, exponential, and logarithmic operations on 16-, 32-, and 64-bit integers; 32-, 64-, and 80-bit floating-point numbers; and 18-digit BCD (binary-coded decimal) operands. With

application software that takes advantage of these instructions, the 8087 can dramatically improve system performance. The 8087 conforms to the proposed IEEE 754 standard for binary floating-point arithmetic. *See also* 8086, 8088, floating-point processor.

8088 *n.* The microprocessor on which the original IBM PC was based. Released by Intel in 1978, the 8088 is identical to the 8086 but transfers information 8 bits at a time (through an 8-bit data bus) rather than 16 bits at a time (through a 16-bit data bus). *See also* 8086, bus.

80-character line length *n.* A standard line length for text mode displays. This length, found in the earliest IBM PCs and in professional terminals of the 1970s and 1980s, is a legacy of the punched card and of mainframe operating systems in which each line in a file as displayed on a terminal appeared to the computer as a card in a deck. Graphical user interfaces support longer or shorter lines depending on the fonts chosen. A message composed with longer lines using a graphical e-mail program appears broken up and difficult to read when viewed by a user with only a terminal emulation program and a shell account.

80x86 *n. See* 8086.

82385 *n.* A cache controller chip by Intel that allows modified cache blocks to be restored to main memory in parallel with cache accesses by the CPU (or DMA). *See also* cache, central processing unit, controller, direct memory access.

8.3 *n.* The standard format for filenames in MS-DOS/Windows 3.*x*: a filename with eight or fewer characters, followed by a period (“dot”), followed by a three-character file extension. *See also* extension. *Compare* long filenames.

8514/A *n.* A graphics adapter introduced by IBM in April 1987 and withdrawn in October 1991. The 8514/A was designed to increase the capability of the VGA adapter in some of IBM's PS/2 computers from a resolution of 640 by 480 pixels with 16 simultaneous colors to a resolution of 1024 by 768 pixels (almost quadrupling the amount of information displayed on the screen) with 256 simultaneous colors. The 8514/A worked only in Micro Channel Architecture-based PS/2 computers, and it used the interlacing method for display, which can cause a perceptible flicker at higher resolutions. Therefore, it never gained widespread popularity; the SVGA (Super VGA) adapter prevailed because it was designed to work with the more prevalent ISA and EISA bus architectures. *See also* EISA, interlacing, ISA, Micro Channel Architecture, noninterlaced, SVGA, VGA.

88000 *n.* A reduced instruction set computing (RISC) chip set from Motorola, introduced in 1988 and based on the Harvard architecture. The 20-MHz 88000 set includes one 88100 CPU and at least two 88200 CMMUs (cache memory management units)—one for data memory and one for instruction memory. The 88100 RISC CPU includes both integer and floating-point processors and has thirty-two 32-bit general-purpose registers, 21 control registers, and 32-bit data paths and addresses. The 88100 is capable of addressing 4 gigabytes of external data and 1 gigabyte of 32-bit instructions in memory space. Up to four chip sets can be set up to work with the same memory in a multiprocessing configuration. *See also* central processing unit, floating-point processor, Harvard architecture, RISC.

88100 *n. See* 88000.

88200 *n. See* 88000.

8-bit, 16-bit, 32-bit, 64-bit *adj.* **1.** Capable of transferring 8, 16, 32, or 64 bits, respectively, on data bus lines. For example, the IBM Micro Channel Architecture includes one or more 32-bit data buses with additional 16-bit and 8-bit data lines. *See also* 16-bit machine, 32-bit machine, 64-bit machine, 8-bit machine. **2.** Capable of transferring 8, 16, 32, or 64 bits, respectively, on the data path of a video adapter. An *n*-bit video adapter can display up to 2^n colors. For example, an 8-bit video adapter is capable of displaying up to 256 colors; a 16-bit adapter can display up to 65,536 colors; and a 24-bit adapter can display over 16 million colors. (A 24-bit video adapter has a 32-bit data path, although the upper 8 bits are not used directly to generate color.) *See also* alpha channel.

8-bit color *n.* A display setting that holds up to 256 specific color entries. Any color palette attached to a picture is by definition an 8-bit palette.

8-bit machine *n.* A computer that works with data in groups of 8 bits at a time. A computer may be considered an 8-bit machine either because its microprocessor operates internally on 8-bit words or because its data bus can transfer 8 bits at a time. The original IBM PC was based on a microprocessor (the 8088) that worked internally on 16-bit words but transferred them 8 bits at a time. Such machines are generally called 8-bit machines because the size of the data bus limits the machine's overall speed.

8mm tape *n.* A tape cartridge format used for data backups, similar to that used for some video cameras except that the tape is rated for data storage. The capacity is 5 GB (gigabytes) or more of (optionally compressed) data.

8-N-1 *n.* Short for **8** bits, **N**o parity, **1** stop bit. Typical default settings for serial communications, such as modem transmissions.

/8 network *n.* IP address class C. This class has 126 networks available and more than sixteen million hosts available. *See also* host, IP address classes, network.

9600 *n.* A modem with a maximum data transfer rate of 9600 bps (bits per second).

99 or **9999** *n.* A number sometimes given special meaning in older programs—for example, as an end-of-file indicator or as an expiration date that actually meant "do not allow to expire." Uncorrected programs may interpret that date as an end-of-file indicator or expiration date and cause problems. *See also* 1999 problem.

9/9/99 *n. See* 99 or 9999.

9-track *n.* A tape storage scheme that places data on nine separate parallel tracks (one track for each of 8 data bits of a byte and 1 parity bit) on 1/2-inch reel-to-reel magnetic tape. *See also* 7-track.

Å *n. See* angstrom.

A

Å *n. See* angstrom.

A or **a** *n. See* ampere.

A: or **a:** *n.* In Windows and some other operating systems, the identifier used for the first, or primary, floppy disk drive. Unless otherwise specified by changing the CMOS startup instructions, this is the drive the operating system checks first for startup instructions.

AAL *n. See* ATM Adaptation Layer.

abandonware *n.* Discontinued video or computer games. Abandonware is often collected and played by computer game enthusiasts on refurbished systems or on PCs running emulator software. *See also* arcade game, emulator, MAME.

ABC *n.* **1.** Acronym for **A**tanasoff-**B**erry **C**omputer. The first electronic digital computer, created by John Atanasoff and Clifford Berry of Iowa State University in 1942. **2.** Acronym for **a**utomatic **b**rightness **c**ontrol. A circuit that changes the luminance of a monitor to compensate for ambient lighting conditions. **3.** An imperative language and programming environment from CWI, Netherlands. This interactive, structured, high-level language is easy to learn and use. It is not a systems-programming language, but it is good for teaching or prototyping.

Abeline *n.* A high-performance network developed by Qwest Communications, Nortel, and Cisco Systems to provide a backbone network for the Internet2 project. Abeline interconnects the gigaPoPs created by the Internet2 project and its member institutions, enabling connected institutions to develop advanced network services and applications. *See also* gigaPoP, Internet2.

abend or **ABEND** *n.* Short for **ab**normal **end**. The premature ending of a program because of program error or system failure. *See also* abort, crash[1].

ABI *n. See* application binary interface.

ABIOS *n.* Acronym for **A**dvanced **B**asic **I**nput/**O**utput **S**ystem. A set of input/output service routines designed to support multitasking and protected mode that were built into IBM PS/2 PCs. *See also* BIOS.

abnormal end *n. See* abend.

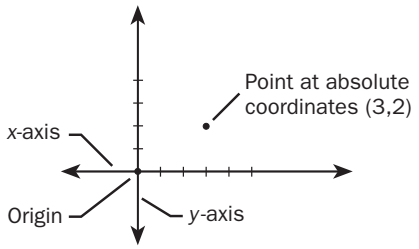
A-Bone *n.* The Asian-Pacific Internet backbone that connects users in East and South Asian countries and Australia at T1 speeds or better, without the need to send data through North American facilities. The A-Bone was launched by Asia Internet Holding Co., Ltd. in 1996. By 1998, a total of 13 countries were connected to the A-Bone's hub in Japan. A-Bone also includes links to both Europe and the United States. *See also* backbone.

abort *vb.* To terminate abruptly, often used in reference to a program or procedure in progress.

absolute address *n.* A means of specifying a precise memory location in a program by using its address (number) rather than an expression to calculate the address. *Also called:* direct address, machine address, real address. *See also* absolute coding. *Compare* relative address, virtual address.

absolute coding *n.* Program code that uses absolute addressing rather than indirect addressing. *See also* absolute address, relative address.

absolute coordinates *n.* Coordinates that are defined in terms of their distance from the origin, the point where the axes intersect. Graphs and computer graphics use absolute coordinates to locate points on a chart or display grid—for example, points in relation to the *x*- and *y*-axes on a graph or the *x*-, *y*-, and *z*-axes used to specify the location of a three-dimensional graphic object on the screen. See the illustration. *See also* Cartesian coordinates.



Absolute coordinates.

absolute link *n.* A hyperlink to the exact location of a file on a file server, the World Wide Web, or a company intranet. Absolute links use an exact path; if you move the file containing the hyperlink or a hyperlink destination, the link breaks.

absolute path *n.* A path to a file that begins with the drive identifier and root directory or with a network share and ends with the complete file name (for example, C:\docs\work\contract.txt or \\netshare\docs\work\contract.txt). *Also called:* full path. *See also* path (definition 2). *Compare* relative path.

absolute pointing device *n.* A mechanical or physical pointing device whose location is associated with the position of the on-screen cursor. For example, if the user of a graphics tablet places the pen on the upper right corner of the tablet, the cursor moves to the upper right corner of the screen or on-screen window associated with the pen. *See also* absolute coordinates. *Compare* relative pointing device.

absolute URL *n.* The full Internet address of a page or other World Wide Web resource. The absolute URL includes a protocol, such as "http," network location, and optional path and file name—for example, http://example.microsoft.com/.

absolute value *n.* The magnitude of a number, irrespective of its sign (+ or –). An absolute value is always greater than or equal to zero. For example, 10 is the absolute value of 10 and of –10. Programming languages and spreadsheet programs commonly include functions that return the absolute value of a number.

abstract[1] *adj.* **1.** In character recognition systems, of, pertaining to, or being a type of symbol that, unlike a letter or numeral, has no intrinsic meaning and must be defined before it can be interpreted. **2.** In programming, of, pertaining to, or being a data type defined by the operations that can be performed on objects of that type rather than by the properties of the objects themselves. *See also* abstract data type.

abstract[2] *n.* In information processing and library science, a summary typically consisting of a paragraph or a few paragraphs at the beginning of an investigative document, such as a scientific paper.

abstract class *n.* **1.** In object-oriented programming, a class in which no objects can be created. It is, however, used to defined subclasses, and objects are created from the subclasses. *See also* object (definition 2). *Compare* concrete class. **2.** In Java programming, a class that contains one or more abstract methods and therefore can never be instantiated. Abstract classes are defined so that other classes can extend them and make them concrete by implementing the abstract methods. *See also* class, instantiate, Java, method, object (definition 2). *Compare* concrete class.

abstract data type *n.* In programming, a data set defined by the programmer in terms of the information it can contain and the operations that can be performed with it. An abstract data type is more generalized than a data type constrained by the properties of the objects it contains—for example, the data type "pet" is more generalized than the data types "pet dog," "pet bird," and "pet fish." The standard example used in illustrating an abstract data type is the stack, a small portion of memory used to store information, generally on a temporary basis. As an abstract data type, the stack is simply a structure onto which values can be pushed (added) and from which they can be popped (removed). The type of value, such as integer, is irrelevant to the definition.The way in which the program performs operations on abstract data types is encapsulated, or hidden, from the rest of the program. Encapsulation enables the programmer to change the definition of the data type or its operations without introducing errors to the existing code that uses the abstract data type. Abstract data types represent an intermediate step between traditional programming and object-oriented programming. *See also* data type, object-oriented programming.

abstraction *n.* **1.** Broadly, the use of specialized software, such as an application programming interface (API), as a means of shielding software from device dependencies or the complexities of underlying software. For instance, hardware abstraction enables programs to focus on a task, such as communications, instead of on individual differences between communications devices. **2.** In object-oriented programming, the process of reducing an object to its essence so that only the necessary elements are represented. Abstraction defines an object in terms of its properties (attributes), behaviors (functionality), and interface (means of communicating with other objects).

abstract machine *n.* A design for a processor that is not meant for implementation but that represents a model for processing abstract machine language. Its instruction set can use instructions that more closely resemble the compiled language than the instructions used by an actual computer. It can also be used to make the implementation of the language more portable to other platforms.

abstract machine language *n.* **1.** An intermediate programming language used by an interpreter or compiler. **2.** *See* pseudocode (definition 1).

abstract syntax *n.* A data structure description that is independent of hardware structures and encodings.

Abstract Syntax Notation One *n.* The ISO standard notation for independent specification of data types and structures for syntax conversion. *Acronym:* ASN.1 *See also* data type, ISO, syntax.

abstract syntax tree *n.* A treelike representation of programs used in many integrated programming environments and structure-oriented editors.

Abstract Window Toolkit *n.* A library of Java GUIs (graphical user interfaces) that provides the connections between a Java application and the native GUI of the computer on which the application runs. *Also called:* AWT.

A/B switch box *n.* A switch box with two outputs. By flipping the switch, the user can select which to use. *See also* switch (definition 1), switch box.

AC *n. See* alternating current.

AC adapter *n.* An external power supply that converts from a 110 VAC or 220 VAC domestic electric supply ("house current" or "main power") to low-voltage DC, which is required to operate solid-state electronic equipment (such as a laptop computer) that does not include an internal power supply.

Accelerated Graphics Port *n. See* AGP.

accelerator *n.* **1.** In applications, a key or key combination used to perform a defined function. *Also called:* shortcut key. **2.** In hardware, a device that speeds or enhances the operation of one or more subsystems, leading to improved program performance. *See also* accelerator card, Windows-based accelerator.

accelerator board *n. See* accelerator card.

accelerator card *n.* A printed circuit board that replaces or augments the computer's main microprocessor, resulting in faster performance. *Also called:* accelerator board. *See also* expansion board, graphics accelerator.

acceptable use policy *n.* A statement issued by an ISP (Internet service provider) or an online information service that indicates what activities users may or may not engage in while logged into the service. For example, some providers prohibit users from engaging in commercial activity on the network. *Acronym:* AUP.*See also* ISP, online information service.

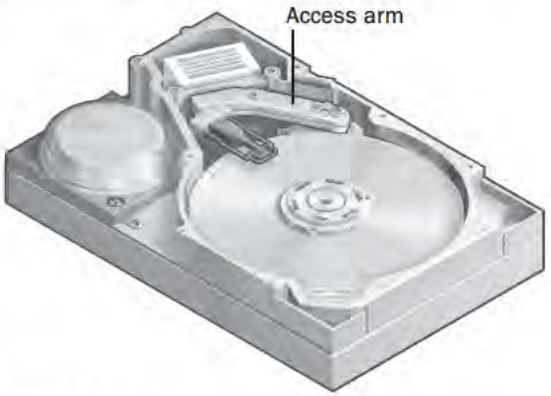
acceptance test *n.* A formal evaluation of a hardware product performed by the customer, usually at the factory, to verify that the product is performing according to specifications.

access[1] *n.* **1.** The act of reading data from or writing data to memory. **2.** Connection to the Internet or other network or system.

access[2] *vb.* To gain entry to memory in order to read or write data.

Access *n.* Microsoft's relational database–management software for the Windows desktop platform. Part of the family of Microsoft Office products, Access in its most recent version (Access 2002) supports Web technology for building, managing, and sharing data. Access 2002 also includes new and improved tools for accessing and viewing information and offers integration with Microsoft's BackOffice database product, SQL Server. *See also* Office.

access arm *n.* A mechanical arm that moves the read/write head(s) over the surface of a disk in a disk drive. See the illustration. *Also called:* head arm.



Access arm.

ACCESS.bus *n.* A bidirectional bus for connecting peripherals to a PC. The ACCESS.bus can connect up to 125 low-speed peripherals, such as printers, modems, mice, and keyboards, to the system through a single, general-purpose port. Peripherals that support the ACCESS.bus provide a connector or port connection that is similar to a phone-jack connector and are daisy-chained together. However, the PC communicates directly with each peripheral and vice versa. Connecting an ACCESS.bus device (for example, a printer) to a system results in the system

automatically identifying and configuring it for optimum performance. Peripherals can be connected while the computer is running (*hot plugging*) and are automatically assigned a unique address (auto-addressing). Developed from the I2 architecture designed jointly by Philips and Digital Equipment Corporation, the ACCESS.bus specification is controlled by the ACCESS.bus Industry Group and competes with Intel's USB. *See also* bidirectional, bus, daisy chain[1], hot plugging, input/output port, peripheral. *Compare* USB.

access code *n. See* password.

access control *n.* The mechanisms for limiting access to certain items of information or to certain controls based on users' identities and their membership in various predefined groups. Access control is typically used by system administrators for controlling user access to network resources, such as servers, directories, and files. *See also* access privileges, system administrator.

access control list *n.* A list associated with a file or a resource that contains information about which users or groups have permission to access a resource or modify the file. *Acronym:* ACL.

accessibility *n.* A quality of software, hardware, or a complete computer system that makes it usable by people with one or more physical disabilities, such as restricted mobility, blindness, or deafness.

accessibility aids *n.* Utilities that make computers easier to use for people with disabilities. Examples of accessibility aids include screen readers, speech recognition programs, and on-screen keyboards.

access key *n.* A key combination, such as ALT+F, that moves the focus to a menu, a command, or a control, without using the mouse.

access mechanism *n.* **1.** The disk drive components that move the read/write head(s) to the proper track of a magnetic disk or optical disc. *See also* disk controller. **2.** A circuit that allows one part of a computer system to send signals to another part. **3.** In programming, the means by which an application can read from or write to a resource. *Also called:* access method.

access method *n. See* access mechanism.

access number *n.* The telephone number used by a subscriber to gain access to an online service.

accessory *n. See* peripheral.

access path *n. See* search path.

access permission *n. See* permission.

access point *n.* In a wireless LAN (local area network), a transceiver that connects the LAN to a wired network. *See also* wireless LAN.

access privileges *n.* The type of operations permitted a given user for a certain system resource on a network or a file server. A variety of operations, such as the ability to access a server, view the contents of a directory, open or transfer files, and create, modify, or delete files or directories, can be allowed or disallowed by the system administrator. Assigning access privileges to users helps the system administrator to maintain security on the system, as well as the privacy of confidential information, and to allocate system resources, such as disk space. *Also called:* access rights. *See also* file protection, file server, permission, system administrator, write access.

access provider *n. See* ISP.

access rights *n. See* access privileges.

access speed *n. See* access time.

access time *n.* **1.** The amount of time it takes for data to be delivered from memory to the processor after the address for the data has been selected. **2.** The time needed for a read/write head in a disk drive to locate a track on a disk. Access time is usually measured in milliseconds and is used as a performance measure for hard disks and CD-ROM drives. *See also* read/write head, seek time, settling time, wait state. *Compare* cycle time.

account *n.* **1.** A record-keeping arrangement used by the vendor of an online service to identify a subscriber and to maintain a record of customer usage for billing purposes. **2.** The record-keeping mechanism used by networks and multiuser operating systems for keeping track of authorized users. Network accounts are created by network administrators and are used both to validate users and to administer policies—for example, permissions—related to each user.

accounting file *n.* A file generated by a printer controller that keeps track of the number of pages printed per job as well as the user that requested the print job.

accounting machine *n.* **1.** One of the earliest applications of automatic data processing, used in business accounting primarily during the 1940s and 1950s. The first accounting machines were nonelectronic and used punched cards and wires arranged in plugboard panels. **2.** A computer in which an accounting software package

starts up whenever the machine is turned on, the computer thus becoming a dedicated machine with accounting as its sole function.

account lockout *n.* A security feature in Windows XP that locks a user account if a number of failed logon attempts occur within a specified amount of time, based on security policy lockout settings. Locked accounts cannot log on.

account name *n.* The part of an e-mail address that identifies a user or an account on an e-mail system. An e-mail address on the Internet typically consists of an account name, followed by the @ (at) symbol, a host name, and a domain name. *See also* account (definition 2), domain name, e-mail address.

account policy *n.* On local area networks and multi-user operating systems, a set of rules governing whether a new user is allowed access to the system and whether an existing user's rights are expanded to include additional system resources. An account policy also generally states the rules with which the user must comply while using the system in order to maintain access privileges.

ACCU *n. See* Association of C and C++ Users.

accumulator *n.* A register used for logic or arithmetic, usually to count items or accumulate a sum. *See also* register.

accuracy *n.* The degree to which the result of a calculation or measurement approximates the true value. *Compare* precision (definition 1).

ACID *n.* Short for **A**tomicity, **C**onsistency, **I**solation, **D**urability. The four essential properties of an electronic transaction. Atomicity requires that a transaction be fully completed or else fully canceled. Consistency requires that resources used are transformed from one consistent state to another. Isolation requires all transactions to be independent of each other. Durability requires that the completed transaction be permanent, including survival through system failure. *See also* transaction.

ACIS *n.* Acronym for **A**ndy, **C**harles, **I**an's **S**ystem. An object-oriented geometric modeling toolkit owned by Spatial Technology. Designed for use as a "geometry engine" within 3-D modeling applications, ACIS provides an open architecture framework for wire-frame, surface, and solid modeling from a common, unified data structure. ACIS is generally considered the de facto standard for solids modeling in the CAM/CAE industries.

ACK *n.* Short for **ack**nowledgment. A message sent by the receiving unit to the sending station or computer indicating either that the unit is ready to receive transmission or that a transmission was received without error. *Compare* NAK.

ACL *n. See* access control list.

ACM *n. See* Association for Computing Machinery.

acoustic coupler *n.* An archaic device once used in computer communications. The coupler was a cradle-like instrument into which the headset of a telephone was placed. Its function was somewhat similar to the job now done by modems.

ACPI *n.* Acronym for **A**dvanced **C**onfiguration and **P**ower **I**nterface. An open specification developed jointly by Microsoft, Intel, and Toshiba for managing power consumption on mobile, desktop, and server computers. Unlike earlier, BIOS-based management solutions, ACPI provides a means of integrating power management through all parts of a PC, including applications, hardware, and the operating system (OS). ACPI enables an OS to control a computer's power state in response to input from the user, from an application, or from a device driver. For example, an ACPI-enabled OS could turn a CD-ROM drive, a printer, or even a television on or off as needed. ACPI is part of the industry-wide OnNow initiative that allows system manufacturers to deliver computers that start at the touch of a keyboard. *See also* plug and play, power management. *Compare* Advanced Power Management.

Acrobat *n.* A program from Adobe Systems, Inc., that converts a fully formatted document created on a Windows, Macintosh, MS-DOS, or UNIX platform into a Portable Document Format (PDF) file that can be viewed on several different platforms. Acrobat enables users to send documents that contain distinctive typefaces, color, graphics, and photographs electronically to recipients, regardless of the application used to create the originals. Recipients need the Acrobat Reader, which is available free, to view the files. Depending on version and platform, it also includes tools such as Distiller (which creates PDF files from PostScript files), Exchange (which is used for links, annotations, and security-related matters), and PDF Writer (which creates PDF files from files created with business software).

Acrobat Reader *n.* A free program produced and distributed by Adobe Systems, Inc., for displaying and printing documents that are in Portable Document Format (PDF).

ACSE *n. See* Association Control Service Element.

action query *n.* In Microsoft Access, a query that copies or changes data. Action queries include append, delete, make-table, and update queries. They are identified by an exclamation point (!) next to their name in the Database window.

action statement *n. See* statement.

activation *n.* In Sun Microsystem's J2EE network platform, the process of transferring an enterprise java bean (EJB) from secondary storage to memory. *See also* EJB, J2EE. *Compare* passivation.

activation record *n.* A data structure that represents the state of some construct (such as a procedure, a function, a block, an expression, or a module) of a running program. An activation record is useful for the run-time management of both data and sequencing. *See also* data structure.

active *adj*. Pertaining to the device, program, file, or portion of the screen that is currently operational or subject to command operations. Usually the cursor or a highlighted section shows the active element on the display screen.

Active Accessibility *n.* A Microsoft initiative, introduced in 1997, that consists of program files and conventions that make it easier for software developers to integrate accessibility aids, such as screen magnifiers or text-to-voice converters, into their application's user interface to make software easier for users with limited physical abilities to use. Active Accessibility is based on COM technologies and is supported by Windows 9x, Windows XP, Windows NT 4.0 and above, Internet Explorer 3 and above, and Office 2000 and above. *Acronym:* MSAA.*Also called:* Microsoft Active Accessibility.

active cell *n.* The highlighted cell on a spreadsheet display that is the current focus of operation. *Also called:* current cell, selected cell. *See also* range.

Active Channel *n.* A Web site described by a Channel Definition Format (CDF) file. Developers can use Active Channels to automatically download content to a user on a subscription basis, to send content to users on a regular schedule, to deliver personalized content to individual users, and to provide content to a Windows screen saver. Active Channels were introduced in Microsoft Internet Explorer 4 and can be used to deliver information through either the Internet or an intranet. *See also* pull, webcasting.

Active Client *n.* The client-side set of technologies in Microsoft's Active Platform for Web-oriented, cross-platform distributed computing. The chief features of the Active Client include support for HTML and dynamic HTML, language-independent scripting, Java applets, and ActiveX objects. Active Client is operating system–independent, so it runs on multiple platforms, including Microsoft Windows, UNIX, and Apple Macintosh. *See also* Active Platform, Active Server.

active content *n.* Material on a Web page that changes on the screen with time or in response to user action. Active content is implemented through ActiveX controls. *See also* ActiveX control.

Active data object *n.* An application programming interface (API) developed by Microsoft for applications that access databases. ADO is an easy-to-use interface to OLE Database (OLE DB), an API that accesses the data directly from a database. *Also called:* ActiveX data object.

Active Desktop *n.* The feature introduced with Microsoft's Internet Explorer 4 that enables end users to display active—that is, updateable, customizable—HTML content on the Windows desktop. Active content includes such items as channels, Web pages, ActiveX controls, and Java applets. *See also* Active Channel, ActiveX, HTML, Internet Explorer, Java.

Active Directory *n.* A Microsoft technology, part of the Active Platform, that is designed to enable applications to find, use, and manage directory resources (for example, user names, network printers, and permissions) in a distributed computing environment. Distributed environments are usually heterogeneous collections of networks that often run proprietary directory services from different providers. To simplify directory-related activities associated with locating and administering network users and resources, Active Directory presents applications with a single set of interfaces that eliminates the need to deal with differences between and among these proprietary services. Active Directory is a component of the Windows Open Services Architecture (WOSA). *See also* directory service, WOSA.

Active Directory Services Interface *n.* An administrative tool known as a Microsoft Management Console (MMC) snap-in that allows administrators to manage objects in the domain. *Acronym:* ADSI.

active file *n.* The file affected by a current command—typically a data file.

Active Framework for Data Warehousing *n.* A data warehousing solution developed by Microsoft and Texas Instruments that represents Microsoft's standard for managing metadata. *Acronym:* AFDW *See also* ActiveX, metadata.

active hub *n.* **1.** The central computer that regenerates and retransmits all signals in an active star network. *See also* active star. **2.** A type of hub used on ARCnet networks that both regenerates (boosts) signals and passes them along. *Compare* intelligent hub, passive hub.

active-matrix display *n.* A liquid crystal display (LCD) made from a large array of liquid crystal cells using active-matrix technology. The active matrix is a method of addressing an array of simple LC cells—one cell per pixel. In its simplest form there is one thin-film transistor (TFT) for each cell. Voltage applied selectively to these cells produces the viewable image. Active-matrix displays are often used in laptop and notebook computers because of their shallow depth and are notable for their high-quality color displays, which are viewable from wider angles than images produced by most passive-matrix displays. *Also called:* TFT, TFT display, TFT LCD. *See also* liquid crystal display, TFT. *Compare* passive-matrix display.

ActiveMovie *n.* Former name for the DirectX component now known as DirectShow. *Also called:* DirectShow. *See also* DirectX.

Active Platform *n.* A Microsoft development platform that offers a standardized approach to incorporating Internet and distributed computing technologies in client/server applications. Microsoft Windows 9x, Microsoft Windows NT, and Microsoft Internet Explorer 4.*x* (and later) provide the basis for the Active Platform. On the client side, users are given a consistent interface that enables them to easily access both local and remote information. On the server side, developers can take advantage of the tools and technologies that span the client and the server. Active Platform supports development of the modular object-oriented programs known as component software and allows creation of cross-platform applications that can run on multiple chips and operating systems. Active Platform includes support for HTML and the creation of small programs in several languages through client-side scripting. *See also* Active Desktop, Active Server, ActiveX.

active program *n.* The program currently in control of a microprocessor.

Active Server *n.* The server-based component of Microsoft's Active Platform. Comprised of a set of technologies that includes DCOM (distributed component object model), Active Server Pages, Microsoft Transaction Server, and message queues, Active Server provides support for developing component-based, scalable, high-performance Web applications on Microsoft Windows NT servers. Active Server is designed to allow developers to concentrate on creating Internet and intranet software in a variety of languages without having to focus on the intricacy of the network itself. *See also* Active Desktop, Active Platform, Active Server Pages, ActiveX.

Active Server Pages *n.* A Web-oriented technology developed by Microsoft that is designed to enable server-side (as opposed to client-side) scripting. Active Server Pages are text files that can contain not only text and HTML tags as in standard Web documents, but also commands written in a scripting language (such as VBScript or JavaScript) that can be carried out on the server. This server-side work enables a Web author to add interactivity to a document or to customize the viewing or delivery of information to the client without worrying about the platform the client is running. All Active Server Pages are saved with an .asp extension and can be accessed like standard URLs through a Web browser, such as Microsoft Internet Explorer or Netscape Navigator. When an Active Server Page is requested by a browser, the server carries out any script commands embedded in the page, generates an HTML document, and sends the document back to the browser for display on the requesting (client) computer. Active Server Pages can also be enhanced and extended with ActiveX components. *Acronym:* ASP *See also* Active Server, ActiveX.

active star *n.* A form of the star network topology in which the central computer actively regenerates and retransmits all signals. *See also* star network.

ActiveStore *n.* A Microsoft initiative, introduced in 1998, for supporting integration of applications used in retail environments regardless of the developing vendor. ActiveStore provides a common user interface, base system services (such as security and crash recovery), common access to data across applications, and communication between applications.

ActiveSync *n.* A Microsoft program that manages synchronization of information, including e-mail, schedules, and application files, between a handheld PC and a desktop computer.

active vision *n.* A branch of computer vision research that believes robotic vision problems can be solved by allowing a robot to collect and analyze a sequence of images dynamically from changing viewpoints. Not unlike human or animal vision, active vision uses the information derived from multiple viewpoints to gain a greater depth of perception, resolve haziness, and establish relationships between the visual representation of an action and the action itself. Active vision systems may be characterized by simple image-processing algorithms, little or no calibration, and fast real-time hardware. *See also* artificial intelligence, computer vision, robotics.

active window *n.* In an environment capable of displaying multiple on-screen windows, the window containing the display or document that will be affected by current cursor movements, commands, and text entry. *See also* graphical user interface. *Compare* inactive window.

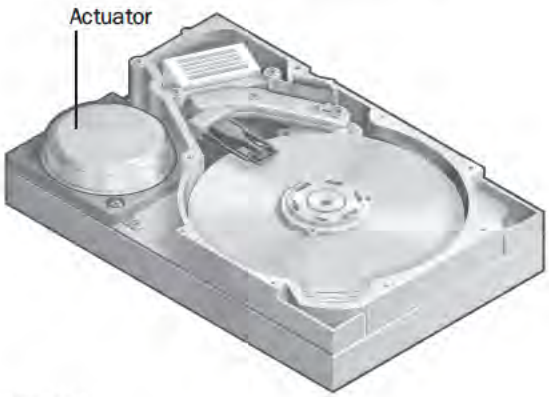
ActiveX *n.* A set of technologies that enables software components to interact with one another in a networked environment, regardless of the language in which the components were created. ActiveX, which was developed by Microsoft in the mid 1990s and is currently administered by the Open Group, is built on Microsoft's Component Object Model (COM). Currently, ActiveX is used primarily to develop interactive content for the World Wide Web, although it can be used in desktop applications and other programs. ActiveX controls can be embedded in Web pages to produce animation and other multimedia effects, interactive objects, and sophisticated applications. *See also* ActiveX control, COM. *Compare* applet, plug-in (definition 2).

ActiveX control *n.* A reusable software component based on Microsoft's ActiveX technology that is used to add interactivity and more functionality, such as animation or a popup menu, to a Web page, applications, and software development tools. An ActiveX control can be written in any of a number of languages, including Java, C++, and Visual Basic. *See also* ActiveX. *Compare* helper program.

activity ratio *n.* The number of records in use compared with the total number of records in a database file. *See also* database, record[1].

ACTOR *n.* An object-oriented language developed by The Whitewater Group, Ltd., designed primarily to facilitate Microsoft Windows programming. *See also* object-oriented programming.

actuator *n.* A disk drive mechanism for moving the read/write head(s) to the location of the desired track on a disk. See the illustration. *See also* disk drive, stepper motor, voice coil.



Actuator.

Ada *n.* A high-level programming language designed under the direction of the U.S. Department of Defense (DoD) in the late 1970s and intended to be the primary language for DoD software development. Originally based on Pascal, Ada supports real-time operations and multitasking. The language was named after Augusta Ada Byron, who assisted Charles Babbage in developing programs for his Analytical Engine, the first mechanical computer, in the nineteenth century. *See also* multitasking, Pascal, real-time.

adapter or **adaptor** *n.* A printed circuit board that enables a personal computer to use a peripheral device, such as a CD-ROM drive, modem, or joystick, for which it does not already have the necessary connections, ports, or circuit boards. Commonly, a single adapter card can have more than one adapter on it. *Also called:* interface card. *See also* controller, expansion board, network adapter, port[1], video adapter.

adapter card or **adaptor card** *n. See* adapter.

adaptive answering *n.* The ability of a modem to detect whether an incoming call is a fax or a data transmission and respond accordingly. *See also* modem.

adaptive delta pulse code modulation *n.* A class of compression encoding and decoding algorithms used in audio compression and other data compression applications. These algorithms store digitally sampled signals as a series of changes in value, adapting the range of the change with each sample as needed, thus increasing the effective bit resolution of the data. *Acronym:* ADPCM *See also* pulse code modulation. *Compare* adaptive differential pulse code modulation.

adaptive differential pulse code modulation *n.* A digital audio compression algorithm that stores a sample as the difference between a linear combination of previous samples and the actual sample, rather than the measurement itself. The linear combination formula is modified every few samples to minimize the dynamic range of the output signal, resulting in efficient storage. *See also* pulse code modulation. *Compare* adaptive delta pulse code modulation.

adaptive load balancing *n. See* load balancing.

adaptive routing *n. See* dynamic routing.

adaptive system *n.* An artificial intelligence system that is capable of altering its behavior based on certain features of its experience or environment. *See also* expert system.

ADB *n. See* Apple Desktop Bus.

ADC *n. See* analog-to-digital converter.

A-D converter *n. See* analog-to-digital converter.

adder *n.* **1.** A component of the CPU (central processing unit) that adds two numbers sent to it by processing instructions. *See also* central processing unit. **2.** A circuit that sums the amplitudes, or strength, of two input signals. *See also* full adder, half adder.

add-in *n. See* add-on.

addition record *n.* **1.** A file that describes new record entries (such as a new customer, employee, or product) in a database so that they can later be scrutinized and posted. **2.** A record in a change file specifying a new entry. *See also* change file.

add-on *n.* **1.** A hardware device, such as an expansion board or chip, that can be added to a computer to expand its capabilities. *Also called:* add-in. *See also* open architecture (definition 2). **2.** A supplemental program that can extend the capabilities of an application program. *See also* utility program.

address[1] *n.* **1.** A number specifying a location in memory where data is stored. *See also* absolute address, address space, physical address, virtual address. **2.** A name or token specifying a particular computer or site on the Internet or other network. **3.** A code used to specify an e-mail destination.

address[2] *vb.* To reference a particular storage location.

addressable cursor *n.* A cursor programmed so that it can be moved to any location on the screen, by means of the keyboard or a mouse.

address book *n.* **1.** In an e-mail program, a reference section listing e-mail addresses and individuals' names. **2.** As a Web page, an informal e-mail or URL phone book.

address bus *n.* A bus consisting of 20 to 64 separate hardware lines that is used to carry the signals specifying memory locations for data. *See also* bus.

address classes *n.* Predefined groupings of Internet addresses with each class defining networks of a certain size. The range of numbers that can be assigned for the first octet in the IP address is based on the address class. Class A networks (values 1 to 126) are the largest, with more than 16 million hosts per network. Class B networks (128 to 191) have up to 65,534 hosts per network, and Class C networks (192 to 223) can have up to 254 hosts per network.

address decoder *n.* An electronic device that converts a numeric address to the electrical signals needed to select a specific memory location on one or more RAM chips.

addressing *n.* The process of assigning or referring to an address. In programming, the address is typically a value specifying a memory location. *See also* address[1].

address mapping table *n.* A table used by routers or DNS (Domain Name System) servers to obtain the corresponding IP (Internet Protocol) address of a text name of a computer resource, such as the name of a host computer on the Internet. *Acronym:* AMT *See also* DNS server, IP address, router.

address mark *n. See* index mark.

address mask *n.* A number that, when compared by the computer with a network address number, will block out

all but the necessary information. For example, in a network that uses XXX.XXX.XXX.YYY and where all computers within the network use the same first address numbers, the mask will block out XXX.XXX.XXX and use only the significant numbers in the address, YYY. *See also* address[1] (definition 2).

address mode *n.* The method used to indicate an address in memory. *See also* absolute address, indexed address, paged address, relative address.

address modification *n.* The process of updating an address of a location in memory during computation.

address munging *n.* The practice of modifying an e-mail address in posts to newsgroups or other Internet forums to foil computer programs that gather e-mail addresses. The host name in an e-mail address is altered to create a fictitious address in such a way that a human can still easily determine the correct address. For example, a person with an e-mail address of Jane@myispoffers-usersfreeemail.com could modify, or "mung," her address to read Jane@remove-this-to-reply-myispoffersusers-freeemail.com. Address munging is generally used to prevent delivery of unsolicited junk e-mail or spam. *Also called:* munging. *See also* address[1] (definition 2), host name, mung, spam.

address register *n.* A register (a high-speed memory circuit) that holds an address where specific data can be found for the transfer of information. *See also* register.

address resolution *n.* The identification of a computer's IP (Internet Protocol) address by finding the corresponding match in an address mapping table. *See also* address mapping table.

Address Resolution Protocol *n. See* ARP.

address space *n.* The total range of memory locations addressable by a computer.

address translation *n.* The process of converting one kind of address to another, such as a virtual address to a physical address.

ad-hoc network *n.* A temporary network formed by communicating stations or computers in a wireless LAN. *See also* wireless LAN.

ADJ *n.* Short for **adj**acent. A Boolean qualifier to indicate cases where two instances are adjacent to each other. In the case of a search string, "Microsoft ADJ Word" would return only instances where "Microsoft" and "Word" are adjacent in the string.

administrative alerts *n.* Alerts that relate to server and resource use. They notify users about problems in areas such as security and access, user sessions, server shutdown due to power loss (when an uninterruptible power supply is available), directory replication, and printing. When a computer generates an administrative alert, a message is sent to a predefined list of users and computers. *See also* Alerter service.

ADN *n. See* Advanced Digital Network.

ADO *n. See* Active data object.

Adobe Type Manager *n.* Software from Adobe Systems, Inc., that manages PostScript fonts on a system. *Acronym:* ATM *See also* PostScript.

ADO.NET *n.* The suite of data access technologies included in the .NET Framework class libraries that provide access to relational data and XML. ADO.NET consists of classes that make up the DataSet (such as tables, rows, columns, relations, and so on), .NET Framework data providers, and custom type definitions (such as SqlTypes for SQL Server).

ADP *n. See* data processing.

ADPCM *n. See* adaptive delta pulse code modulation.

ADSL *n.* Acronym for **a**symmetric **d**igital **s**ubscriber **l**ine. Technology and equipment allowing high-speed digital communication, including video signals, across an ordinary twisted-pair copper phone line, with speeds up to 8 Mbps (megabits per second) downstream (to the customer) and up to 640 Kbps (kilobits per second) upstream. ADSL access to the Internet is offered by some regional telephone companies, offering users faster connection times than those available through connections made over standard phone lines. *Also called:* asymmetric digital subscriber loop. *Compare* SDSL.

Advanced Configuration and Power Interface *n. See* ACPI.

Advanced Digital Network *n.* A dedicated line service capable of transmitting data, video, and other digital signals with exceptional reliability, offered as a premier service by communications companies. Usually Advanced Digital Network refers to speeds at or above 56 kilobits per second (Kbps). *See also* dedicated line.

Advanced Encryption Standard *n. See* AES.

Advanced Interactive Executive *n. See* AIX.

Advanced Mobile Phone Service *n. See* AMPS.

Advanced Power Management *n.* An older power management technology used in mobile PCs before the implementation of Advanced Configuration and Power Interface (ACPI). Advanced Power Management is a software interface that functions between the BIOS power-management software that is specific to the hardware and a power-management policy driver that is run by the operating system. *Acronym:* APM.

Advanced Program-to-Program Communication *n. See* APPC.

Advanced Research Projects Agency Network *n. See* ARPANET.

Advanced RISC *n.* Short for **A**dvanced **r**educed **i**nstruction **s**et **c**omputing. A specification for a RISC microchip architecture and system environment designed by MIPS Computer Systems to provide binary compatibility among software applications. *See also* RISC.

Advanced RISC Computing Specification *n.* The minimum hardware requirements enabling a RISC-based system to comply with the Advanced Computing Environment standard. *See also* Advanced RISC.

Advanced RISC Machines *n. See* ARM.

Advanced SCSI Programming Interface *n.* An interface specification developed by Adaptec, Inc., for sending commands to SCSI host adapters. The interface provides an abstraction layer that insulates the programmer from considerations of the particular host adapter used. *Acronym:* ASPI.*See also* adapter, SCSI.

Advanced Streaming Format *n.* An open file format specification for streaming multimedia files containing text, graphics, sound, video, and animation. Advanced Streaming Format (ASF) does not define the format for any media streams within the file. Rather, it defines a standardized, extensible file "container" that is not dependent on a particular operating system or communication protocol, or on a particular method (such as HTML or MPEG-4) used to compose the data stream in the file. An ASF file consists of three objects: a Header object containing information about the file itself, a Data object containing the media streams, and an optional Index object that can help support random access to data within the file. The ASF specification has been submitted to the ISO (International Organization for Standardization) for consideration. *Acronym:* ASF *See also* streaming.

adventure game *n.* A role-playing computer game in which the player becomes a character in a narrative. In order to complete the game, the player must solve problems and avoid or overcome attacks and other forms of interference from the game's environment and other characters. The first adventure game was called "Adventure." It was developed in 1976 by Will Crowther of Bolt, Baranek & Newman. *See also* arcade game, computer game, role-playing game.

AE *n.* Acronym for **a**pplication **e**ntity. In the ISO/OSI reference model, one of the two software parties involved in a communications session. *See also* ISO/OSI reference model.

A/E/C SYSTEMS conference *n.* Annual conference of the architecture, engineering, and construction industry. The conference promotes the exchange of information on new techniques and technologies used by these industries.

.aero *n.* One of seven new top-level domain names approved in 2000 by the Internet Corporation for Assigned Names and Numbers (ICANN). .aero is meant for use with air-transport industry-related Web sites. The seven new domain names became available for use in the spring of 2001.

AES *n.* Acronym for **A**dvanced **E**ncryption **S**tandard. A cryptographic algorithm specified by the National Institute of Standards and Technology (NIST) to protect sensitive information. AES is specified in three key sizes: 128, 192, and 256 bits. AES replaces the 56-bit key Data Encryption Standard (DES), which was adopted in 1976. *See also* DES.

AFC *n. See* Application Foundation Classes.

AFDW *n. See* Active Framework for Data Warehousing.

affinity *n.* For Network Load Balancing, the method used to associate client requests to cluster hosts. When no affinity is specified, all network requests are load balanced across the cluster without respect to their source. Affinity is implemented by directing all client requests from the same IP address to the same cluster host. *See also* client request, IP address.

AFIPS *n.* Acronym for **A**merican **F**ederation of **I**nformation **P**rocessing **S**ocieties. An organization formed in 1961 for the advancement of computing and information-related

concerns. The U.S. representative of the International Federation of Information Processing, AFIPS was replaced by the Federation on Computing in the United States (FOCUS) in 1990.

AFK *adv.* Acronym for **a**way **f**rom **k**eyboard. A phrase occasionally seen in live chat services on the Internet and online information services as an indication that one is momentarily unable to answer. *See also* chat[1] (definition 1).

AFP *n.* Acronym for **A**ppleTalk **F**iling **P**rotocol. A remote filing system protocol that provides a standard means for a workstation on an AppleTalk network to access and manipulate files on an AFP-implemented server. *Also called:* AppleShare File Server.

AFS *n.* Acronym for **A**ndrew **F**ile **S**ystem. A distributed file system that allows clients and servers to share resources through local-area and wide-area networks. AFS is based on a distributed file system developed at Carnegie-Mellon University, and is named for the university's founders—Andrew Carnegie and Andrew Mellon. AFS is now maintained and supplied by Transarc Corporation. *See also* distributed file system.

agent *n.* **1.** A program that performs a background task for a user and reports to the user when the task is done or some expected event has taken place. **2.** A program that searches through archives or other repositories of information on a topic specified by the user. Agents of this sort are used most often on the Internet and are generally dedicated to searching a single type of information repository, such as postings on Usenet groups. Spiders are a type of agent used on the Internet. *Also called:* intelligent agent. *See also* spider. **3.** In client/server applications, a process that mediates between the client and the server. **4.** In Simple Network Management Protocol (SNMP), a program that monitors network traffic. *See also* SNMP.

aggregated links *n. See* link aggregation.

aggregation of links *n. See* link aggregation.

AGP *n.* Acronym for **A**ccelerated **G**raphics **P**ort. A high-performance bus specification designed for fast, high-quality display of 3-D and video images. Developed by Intel Corporation, AGP uses a dedicated point-to-point connection between the graphics controller and main system memory. This connection enables AGP-capable display adapters and compatible chip sets to transfer video data directly between system memory and adapter memory, to display images more quickly and smoothly than they can be displayed when the information must be transferred over the system's primary (PCI) bus. AGP also allows for storing complex image elements such as texture maps in system memory and thus reduces the need for large amounts of memory on the adapter itself. AGP runs at 66 MHz—twice as fast as the PCI bus—and can support data transfer speeds of up to 533 Mbps. *See also* PCI local bus.

AH *n.* **A**uthentication **H**eader. A form of IP packet authentication included in the IPSec security standard. AH attaches a header to the packet with authentication information but does not encrypt the packet data, which allows its use in cases where encryption is not allowed. *See also* ESP, IPSec.

AI *n. See* artificial intelligence.

.aiff *n.* The file extension that identifies audio files in the sound format originally used on Apple and Silicon Graphics (SGI) computers.

AIFF *n.* The sound format originally used on Apple and Silicon Graphics (SGI) computers. AIFF stores waveform files in an 8-bit monaural format. *See also* waveform.

AIM *n.* Acronym for **A**merica Online **I**nstant **M**essenger. A popular instant-messaging service provided for free by America Online. With the AIM service, instant messages can be sent over an Internet connection using the AIM software or directly from a Web browser using AIM Express. *See also* America Online, instant messaging. *Compare* ICQ, .NET Messenger Service, Yahoo! Messenger.

AirPort *n.* A wireless connectivity option introduced by Apple in 1999. AirPort provides wireless network and Internet communications to all AirPort card–equipped Macintosh computers within 150 feet of an AirPort base station. AirPort was developed around the IEEE 802.11 Direct Sequence Spectrum (DSSS) industry standard and is interoperable with other 802.11-based equipment.

AirSnort *n.* A hacking tool used to gather and decrypt passwords in data sent over wireless networks. AirSnort monitors wireless transmissions and collects packets of data. When it has collected enough data, AirSnort is able to compute the encryption key used in the transmission. AirSnort takes advantage of security flaws in the Wired Equivalent Protocol (WEP) standard. *See also* password sniffing.

AIX *n.* Acronym for **A**dvanced **I**nteractive E**x**ecutive. A version of the UNIX operating system developed and maintained by IBM for its UNIX workstations and PCs.

alarm *n.* A visual or auditory signal from a computer alerting the user to an error or a hazardous situation.

ALB *n. See* load balancing.

alert *n.* **1.** In many operating systems with GUIs (graphical user interfaces), an audible or visual alarm that signals an error or represents a warning of some sort. *See also* alert box. **2.** In programming, an asynchronous notification sent by one thread to another. The alert interrupts the recipient thread at defined points in its execution and causes it to execute an asynchronous procedure call. *See also* asynchronous procedure call, thread (definition 1).

alert box *n.* An on-screen box in a GUI (graphical user interface) that is used to deliver a message or warning. *Compare* dialog box.

Alerter service *n.* A service used by the server and other services to notify selected users and computers of administrative alerts that occur on a computer. The Alerter service requires the Messenger service. *See also* administrative alerts, Messenger service, service.

ALGOL *n.* Acronym for Algorithmic Language. The first structured procedural programming language, developed in the late 1950s and once widely used in Europe.

algorithm *n.* A finite sequence of steps for solving a logical or mathematical problem or performing a task.

algorithmic language *n.* A programming language, such as Ada, Basic, C, or Pascal, that uses algorithms for problem solving.

Algorithmic Language *n. See* ALGOL.

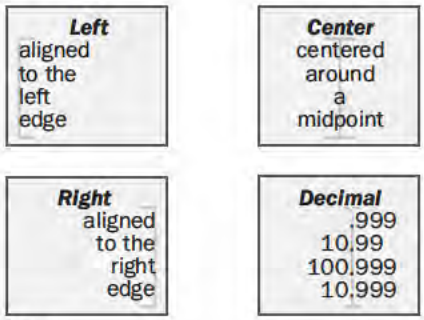
alias *n.* **1.** An alternative label for some object, such as a file or data collection. **2.** A name used to direct e-mail messages to a person or group of people on a network. **3.** A false signal that results from the digitization of an analog audio sample.

aliasing *n.* In computer graphics, the jagged appearance of curves or diagonal lines on a display screen, which is caused by low screen resolution. See the illustration.

Aliasing. *The lower resolution of the image on the right reveals the aliasing effect.*

aliasing bug *n.* A class of subtle programming errors that can arise in code that performs dynamic allocation. If several pointers address the same chunk of storage, the program may free the storage using one of the pointers but then attempt to use another one (an alias), which would no longer be pointing to the desired data. This bug is avoidable by the use of allocation strategies that never use more than one copy of a pointer to allocated core memory, or by the use of higher-level languages, such as LISP, which employ a garbage collection feature. *Also called:* stale pointer bug. *See also* alias, dynamic allocation, garbage collection.

align *vb.* **1.** In an application such as a word processor, to position lines of type relative to some point, such as the page margin. The most common types of alignment are left- and right-aligned and centered. See the illustration. **2.** To adjust some device to position it within specified tolerances, such as the read/write head relative to a track on a disk. **3.** In data handling, to store multiple-byte data units so that the respective bytes fall in corresponding locations of memory.



Align.

alignment *n.* The arrangement of objects in fixed or predetermined positions, rows, or columns. For example, the Macintosh Finder can do automatic alignment of icons in a folder or on the desktop.

Allegro *n.* Ported to a number of operating systems, Allegro is a freeware library of functions for use in programming computer games and graphics programs. It is written for the DJGPP compiler in a mixture of C and assembly language. The most recent release version is 4.0.0. *See also* assembly language, DJGPP.

allocate *vb.* To reserve a resource, such as sufficient memory, for use by a program. *Compare* deallocate.

allocation *n.* In operating systems, the process of reserving memory for use by a program.

allocation block size *n.* The size of an individual block on a storage medium, such as a hard drive, which is determined by factors such as total disk size and partitioning options.

allocation unit *n. See* cluster.

all points addressable *n.* The mode in computer graphics in which all pixels can be individually manipulated. *Acronym:* APA *See also* graphics mode.

ALOHA *n. See* ALOHAnet.

ALOHAnet *n.* The first wireless packet-switched network and the first large network to be connected to the ARPANET. ALOHAnet was built in 1970 at the University of Hawaii by Norm Abramson and was funded by Larry Roberts. ALOHAnet enabled computers at seven campuses on four different islands to communicate bidirectionally with the central computer on Oahu using a network of radio transmitters. The ALOHA protocol was the basis for Ethernet. *See also* ARPANET, Ethernet, network.

alpha[1] *adj.* Of or pertaining to software that is ready for initial testing.

alpha[2] *n.* A software product that is under development and has enough functionality to begin testing. An alpha is usually unstable and does not have all the features or functionality that the released product is to have. *Compare* beta[2].

Alpha *n.* **1.** Digital Equipment Corporation's (DEC) line of computers built on its 64-bit RISC-based microprocessor (Alphachip). **2.** DEC's internal name for a microprocessor product introduced in February 1992 as the DECchip 21064, which evolved into DEC's current Alphachips. *See also* Alphachip, DECchip 21064.

Alpha AXP *adj.* Of, pertaining to, or characteristic of Digital Equipment Corporation's 64-bit RISC-based microprocessor technology implemented in its DECchip product. The designation AXP is used by DEC in its personal computer products to indicate that a product has a DECchip microprocessor. *See also* Alpha, DECchip 21064, RISC.

alphabet *n.* In communications and data processing, the subset of a complete character set, including letters, numerals, punctuation marks, and other common symbols as well as the codes used to represent them. *See also* ASCII, CCITT, character set, EBCDIC, ISO.

alpha blending *n.* In 3-D computer game rendering and other digital animation applications, a graphics technique for creating realistic transparent and semi-transparent images. Alpha blending combines a transparent source color with a translucent destination color to realistically simulate effects such as smoke, glass, and water.

Alpha box *n.* A computer built around the DEC's DECchip 21064 processor (called Alpha internally at Digital Equipment Corporation). *See also* DECchip 21064.

alpha channel *n.* The high-order 8 bits of a 32-bit graphics pixel used to manipulate the remaining 24 bits for purposes of coloring or masking.

Alphachip *n.* A 64-bit RISC-based microprocessor from Digital Equipment Corporation. *See also* DECchip 21064, RISC.

alphageometric *adj.* In reference to computer graphics, especially videotext and teletext systems, pertaining to or being a display method that uses codes for alphanumeric characters and creates graphics using geometric primitives. Shapes such as horizontal and vertical lines and corners are alphageometric. *See also* alphamosaic.

alphamosaic *adj.* In reference to computer graphics, especially videotext and teletext systems, pertaining to or being a display technique that uses codes for alphanumeric characters and creates graphics using rectangular arrangements of elements to form a mosaic. *See also* alphageometric.

alphanumeric *adj.* Consisting of letters or digits, or both, and sometimes including control characters, space characters, and other special characters. *See also* ASCII, character set, EBCDIC.

alphanumeric display *n.* Electronic display on a wireless phone, pager, or handheld device capable of showing both text and numbers.

alphanumeric display terminal *n.* A terminal capable of displaying characters but not graphics.

alphanumeric messaging *n.* Ability to receive messages containing text and numbers on a pager or digital wireless phone. Also known as short message service (SMS).

alphanumeric mode *n. See* text mode.

alphanumeric sort *n.* A method of sorting data, such as a set of records, that typically uses the following order: punctuation marks, numerals, alphabetic characters (with

capitals preceding lowercase letters), and any remaining symbols.

alpha test *n.* The process of user testing that is carried out on a piece of alpha software.

Altair 8800 *n.* A small computer introduced in 1975 by Micro Instrumentation Telemetry Systems (MITS) of New Mexico and sold primarily in kit form. The Altair was based on the 8-bit Intel 8080 microprocessor, had 256 bytes of random access memory, received input through a bank of switches on the front panel, and displayed output via a row of light-emitting diodes. Although it was short-lived, the Altair is considered the first successful personal computer, which was then called a home computer.

AltaVista *n.* A World Wide Web search site and portal hosted by Digital Equipment Corporation. *See also* portal.

alternate circuit-switched voice/circuit-switched data *n.* A configuration option for ISDN B (bearer) channels that enables the digital transmission of either voice or data communications between two users for the duration of a call. *Acronym:* CSV/CSD *See also* B channel, circuit-switched data, circuit-switched voice, ISDN.

alternate key *n.* **1.** Any candidate key in a database not designated as the primary key. **2.** *See* Alt key.

alternating current *n.* Electric current that reverses its direction of flow (polarity) periodically according to a frequency measured in hertz, or cycles per second. *Acronym:* AC.*Compare* direct current.

Alt key *n.* A key included on PC and other standard keyboards that is used in conjunction with another key to produce some special feature or function and is typically marked with the letters Alt.

alt. newsgroups *n.* Internet newsgroups that are part of the alt. ("alternative") hierarchy and have the prefix alt. Unlike the seven Usenet newsgroup hierarchies (comp., misc., news., rec., sci., soc., talk.) that require formal votes among users in the hierarchy before official newsgroups can be established, anybody can create an alt. newsgroup. Therefore, newsgroups devoted to discussions of obscure or bizarre topics are generally part of the alt. hierarchy.

ALU *n. See* arithmetic logic unit.

always on *n.* An Internet connection that is maintained continuously, whether or not the computer user is on line. Always-on connections provide convenience to users who don't need to dial in or log on to access the Internet, but also provide more opportunities for hackers to attempt to access the system or use the computer to spread malicious programs.

AM *n. See* amplitude modulation.

AMD-K6 *n.* Family of x86-compatible processors introduced by Advanced Micro Devices, Inc. (AMD) in 1997. Comparable in performance to the Intel Pentium II, the AMD-K6 family is composed of Windows-compatible processors with MMX support that run 32-bit programs. They have 8.8 million transistors, include 64-KB (AMD-K6) L1 caches for faster execution, and are based on a technology known as RISC86 that converts x86 program instructions into RISC operations for execution. The AMD-K6 family ranges in speed from 166 to over 500 MHz. *See also* MMX, Pentium, RISC.

AMD-K7 *n. See* Athlon.

American Federation of Information Processing Societies *n. See* AFIPS.

American National Standards Institute *n. See* ANSI.

American Registry for Internet Numbers *n. See* ARIN.

American Standard Code for Information Interchange *n. See* ASCII.

America Online *n.* An online information service, based in Vienna, Virginia, that provides e-mail, news, educational and entertainment services, and Internet access. America Online is one of the largest American ISPs (Internet service providers). In 2000 America Online merged with media giant Time Warner Inc. to become AOL Time Warner Inc. Intended for mass-market delivery of branded content and communication services, the merged companies form a communication and media conglomerate with the Internet's largest user base and a wide range of entertainment, publishing, and cable properties. *Acronym:* AOL.

America Online Instant Messenger *n. See* AIM.

AMI BIOS *n.* A ROM BIOS developed and marketed by American Megatrends, Inc. (AMI), for use in IBM-compatible computers. A popular feature is that its configuration software is stored in the ROM chip along with the BIOS routines, so the user does not need a separate configuration disk to modify system settings, such as amount of memory installed and number and types of disk drives. *See also* BIOS, Phoenix BIOS, ROM BIOS.

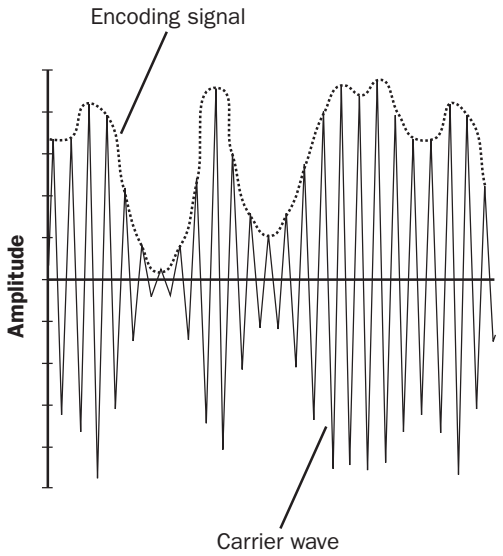
Amiga *n.* An operating system owned by Amiga, Inc. The Amiga model of desktop computer, which featured the Amiga operating system, was introduced by Commodore in 1985. The Amiga was especially strong in its ability to support sound and video, which made it popular among broadcast and multimedia producers, but it was overshadowed by the IBM Personal Computer (and its clones) and the Apple Macintosh. The ownership of the Amiga design has been through the hands of several companies in the United States and Germany.

amp *n. See* ampere.

ampere *n.* The basic unit of electric current. One ampere is equivalent to a flow of 1 coulomb per second. *Abbreviation:* a, A, amp.

amplitude *n.* A measure of the strength of a signal, such as sound or voltage, determined by the distance from the baseline to the peak of the waveform. *See also* waveform.

amplitude modulation *n.* A method of encoding information in a transmission, such as radio, using a carrier wave of constant frequency but of varying amplitude. See the illustration. *Acronym:* AM.*Compare* frequency modulation.



Amplitude modulation.

amplitude shift keying *n.* A form of amplitude modulation that uses two different wave heights to represent the binary values 1 and 0. *See also* amplitude modulation.

AMPS *n.* Acronym for **A**dvanced **M**obile **P**hone **S**ervice. The standard for analog cellular phone service, widely used in the United States and many other countries around the world. AMPS was introduced by AT&T in 1983. It relies on frequency division multiple access (FDMA) to divide frequencies in the 800 MHz to 900 MHz range into 30 KHz channels for sending and receiving calls. A form of AMPS based on a narrower bandwidth is known as N-AMPS. The comparable standard for digital cellular phones is known as D-AMPS. *See also* D-AMPS, N-AMPS.

AMPS/D-AMPS/N-AMPS *n. See* AMPS, D-AMPS, N-AMPS.

AMT *n. See* address mapping table.

Anaglyph *n.* A 3-D effect obtained by creating two overlapping images that appear as a single three dimensional image when viewed through special lenses. Anaglyph 3-D technologies are used on the Web to produce 3-D images for a variety of virtual reality, teaching, and research applications.

analog *adj.* Pertaining to or being a device or signal that is continuously varying in strength or quantity, such as voltage or audio, rather than based on discrete units, such as the binary digits 1 and 0. A lighting dimmer switch is an analog device because it is not based on absolute settings. *Compare* digital (definition 2).

analog channel *n.* A communications channel, such as a voice-grade telephone line, carrying signals that vary continuously and can assume any value within a specified range.

analog computer *n.* A computer that measures data varying continuously in value, such as speed or temperature.

analog data *n.* Data that is represented by continuous variations in some physical property, such as voltage, frequency, or pressure. *Compare* digital data transmission.

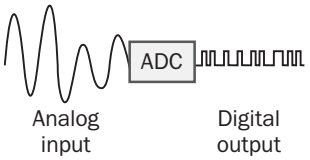
analog display *n.* A video display capable of depicting a continuous range of colors or shades rather than discrete values. *Compare* digital display.

analog line *n.* A communications line, such as a standard telephone line, that carries continuously varying (analog) signals.

analog modem *n. See* modem.

analog signal generator *n.* A device that generates continuously variable signals and is sometimes used to activate an actuator in a disk drive. *See also* actuator.

analog-to-digital converter *n.* A device that converts a continuously varying (analog) signal, such as sound or voltage, from a monitoring instrument to binary code for use by a computer. See the illustration.
Acronym: ADC.Also called: A-D converter. *See also* modem. *Compare* digital-to-analog converter.



Analog-to-digital converter.

analysis *n.* The evaluation of a situation or problem, including review from various aspects or points of view. In computing, analysis commonly involves such features as flow control, error control, and evaluation of efficiency. Often the overall problem is divided into smaller components that can be more easily dealt with. *See also* flow analysis, numerical analysis, systems analysis. *Compare* synthesis.

analysis graphics *n. See* presentation graphics.

Analytical Engine *n.* A mechanical calculating machine designed by British mathematician Charles Babbage in 1833 but never completed. It was the first general-purpose digital computer. *See also* Difference Engine.

anchor *n.* **1.** A format code in a desktop publishing or word processing document that keeps an element in the document, such as a figure or a caption or a label associated with the figure, in a certain position in the document. The anchored object is generally attached to another element in the document such as a piece of text (often a paragraph), a graphic, or a particular place in the document. As text and other objects are added to the document, the anchored object moves relative to the object to which it is anchored or remains stationary. **2.** A tag in an HTML document that defines a section of text, an icon, or other element as a link to another element in the document or to another document or file. *See also* hyperlink.

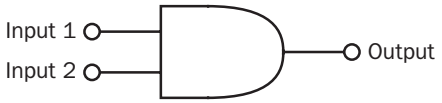
ancillary equipment *n. See* peripheral.

AND *n.* A logical operation combining the values of two bits (0, 1) or two Boolean values (false, true) that returns a value of 1 (true) if both input values are 1 (true) and returns a 0 (false) otherwise. See the table.

Table A.1 The Possible Combinations with a Boolean AND.

a	*b*	*a AND b*
0	0	0
0	1	0
1	0	0
1	1	1

AND gate *n.* A digital circuit whose output is a value of 1 only when all input values are 1. See the illustration. *See also* truth table.



AND gate.

Andrew File System *n. See* AFS.

angle bracket *n. See* <>.

angstrom *n.* A unit of measure equal to one 10-billionth (10^{-10}) of a meter or one 250-millionth of an inch. Light wavelength, for example, is commonly measured in angstroms. *Abbreviation:* Å.

animated cursors *n.* A Windows 95 and Windows NT feature that allows a series of frames, one after another, to appear at the mouse pointer location instead of a single image, thus producing a short loop of animation. The animated cursors feature is designated by the .ani suffix.

animated GIF *n.* A series of graphic images in GIF format, displayed sequentially in a single location to give the appearance of a moving picture. *See also* GIF.

animation *n.* The illusion of movement created by using a succession of static images. In computer graphics, the images can all be drawn separately, or starting and ending points can be drawn with the intervening images provided by software. *See also* 3-D graphic, surface modeling, tween, wire-frame model.

ANN *n. See* artificial neural network.

annotation *n.* A note or comment attached to some part of a document to provide related information. Some applications support voice annotations or annotations accessible by icons. *See also* comment.

annoybot *n.* A bot on an Internet Relay Chat (IRC) channel or a multiuser dungeon (MUD) that interacts with the user in an obnoxious manner. *See also* bot, IRC, MUD.

anode *n.* In electronics, the positively charged terminal or electrode toward which electrons flow. *Compare* cathode.

anonymity *n.* The ability to send an e-mail message or an article to a newsgroup without one's identity becoming known. Ordinarily, the e-mail address of the sender appears automatically in a message's header, which is created by the client software. To achieve anonymity, a message must be sent through an anonymous remailer—which, however, maintains a record of the sender's identity to enable replies. *See also* anonymous remailer.

anonymous *n.* On the Internet, the standard login name used to obtain access to a public FTP file archive. *See also* anonymous FTP.

anonymous FTP *n.* The ability to access a remote computer system on which one does not have an account, via the Internet's File Transfer Protocol (FTP). Users have restricted access rights with anonymous FTP and usually can only copy files to or from a public directory, often named */pub*, on the remote system. Users can also typically use FTP commands, such as listing files and directories. When using anonymous FTP, the user accesses the remote computer system with an FTP program and generally uses *anonymous* or *ftp* as a logon name. The password is usually the user's e-mail address, although a user can often skip giving a password or give a false e-mail address. In other cases, the password can be the word *anonymous*. Many FTP sites do not permit anonymous FTP access in order to maintain security. Those that do permit anonymous FTP sometimes restrict users to only downloading files for the same reason. *See also* FTP[1] (definition 1), logon, /pub.

anonymous post *n.* A message in a newsgroup or mailing list that cannot be traced to its originator. Generally this is accomplished by using an anonymous server for newsgroup posts or an anonymous remailer for e-mail. *See also* anonymous remailer.

anonymous remailer *n.* An e-mail server that receives incoming messages, replaces the headers that identify the original sources of the messages, and sends the messages to their ultimate destinations. The purpose of an anonymous remailer is to hide the identities of the senders of the e-mail messages.

anonymous server *n.* **1.** The software used by an anonymous remailer. *See also* anonymous remailer. **2.** Software that provides anonymous FTP service. *See also* anonymous FTP.

ANSI *n.* **1.** Acronym for **A**merican **N**ational **S**tandards **I**nstitute. A voluntary, nonprofit organization of business and industry groups formed in 1918 for the development and adoption of trade and communication standards in the United States. ANSI is the American representative of ISO (the International Organization for Standardization). Among its many concerns, ANSI has developed recommendations for the use of programming languages including FORTRAN, C, and COBOL, and various networking technologies. *See also* ANSI C, ANSI.SYS, SCSI. **2.** The Microsoft Windows ANSI character set. This set is includes ISO 8859/x plus additional characters. This set was originally based on an ANSI draft standard. The MS-DOS operating system uses the ANSI character set if ANSI.SYS is installed.

ANSI C *n.* A version of the C programming language standardized by ANSI. *See also* ANSI, K&R C.

ANSI/SPARC *n.* Acronym for **A**merican **N**ational **S**tandards **I**nstitute **S**tandards **P**lanning **a**nd **R**equirements **C**ommittee. The ANSI committee that, in the 1970s, proposed a generalized, three-schema architecture that is used as the foundation for some database management systems.

ANSI.SYS *n.* An installable device driver for MS-DOS computers that uses ANSI commands (escape sequences) to enhance the user's control of the console. *See also* ANSI, driver, escape sequence, install.

ANSI X3.30-1997 *n.* A standard entitled "Representation for Calendar Date and Ordinal Date for Information Interchange" from the American National Standards Institute (ANSI) that covers date formats. Many organizations, including the U.S. federal government, have standardized date formats using this standard to facilitate work on the Year 2000 problem.

answer mode *n.* A setting that allows a modem to answer an incoming call automatically. It is used in all fax machines. *Also called:* auto answer.

answer-only modem *n.* A modem that can receive but not originate calls.

answer/originate modem *n.* A modem that can both send and receive calls—the most common type of modem in use.

antialiasing *n.* A software technique for smoothing the jagged appearance of curved or diagonal lines caused by poor resolution on a display screen. Methods of anti-aliasing include surrounding pixels with intermediate shades and manipulating the size and horizontal alignment of pixels. See the illustration. *See also* dithering. *Compare* aliasing.

Antialiasing. *The image on the right shows the result of anti-aliasing through the use of higher resolution.*

antiglare or **anti-glare** *adj.* Pertaining to any measure taken to reduce reflections of external light on a monitor screen. The screen may be coated with a chemical (which may reduce its brightness), covered with a polarizing filter, or simply rotated so that external light is not reflected into the user's eye.

anti-replay *n.* An IP packet–level security feature that prevents packets that have been intercepted and changed from being inserted into the data stream. Anti-replay creates a security association between a source and destination computer, with each agreeing on a numbering sequence for transmitted packets. The anti-replay mechanism detects packets tagged with numbers that fall outside the accepted sequence, discards them, sends an error message, and logs the event. The anti-replay protocol is included as part of the IPSec standard. *See also* IPSec.

antistatic device *n.* A device designed to minimize shocks caused by the buildup of static electricity, which can disrupt computer equipment or cause data loss. An antistatic device may take the form of a floor mat, a wristband with a wire attached to the workstation, a spray, a lotion, or other special-purpose device. *See also* static[2], static electricity.

antivirus program *n.* A computer program that scans a computer's memory and mass storage to identify, isolate, and eliminate viruses, and that examines incoming files for viruses as the computer receives them.

anti-worm *n. See* automatic patching, do-gooder virus.

anycasting *n.* Communication between a single sender and the nearest receiver in a group. In IPv6, anycasting enables one host to initiate the updating of routing tables for a group of hosts. *See also* IPv6. *Compare* multicasting, unicast.

any key *n.* Any random key on a computer keyboard. Some programs prompt the user to "press any key" to continue. It does not matter which key the user presses. There is no key on the keyboard called Any.

any-to-any connectivity *n.* The property of an integrated computer network environment where it is possible to share data across multiple protocols, host types, and network topologies.

AOL *n. See* America Online.

AOL Instant Messenger *n. See* AIM.

AOL NetFind *n.* Resident Web-finding tool of America Online (AOL) information service. Searches by keyword and concept. Using Intelligent Concept Extraction (ICE) and Excite technology, this tool finds relationships between words and ideas; for example, between "elderly people" and "senior citizen." *See also* Excite, Intelligent Concept Extraction.

APA *n. See* all points addressable.

Apache *n.* A free open-source HTTP (Web) server introduced in 1995 by the Apache Group as an extension to, and improvement of, the National Center for Supercomputing Applications' earlier HTTPd (version 1.3). Apache is popular on UNIX-based systems, including Linux, and also runs on Windows NT and other operating systems, such as BeOS. Because the server was based on existing code with a series of patches, it became known as "A Patchy server," which led to the official name Apache. *See also* HTTPd.

Apache Group *n.* A non-profit organization of volunteers from around the world that operates and contributes to the Apache HTTP Server Project.

Apache HTTP Server Project *n.* A collaborative effort by the members of the Apache Group to design, develop, and maintain the Apache HTTP (Web) server. *See also* Apache, Apache Group.

Apache project *n. See* Apache HTTP Server Project.

APC *n. See* asynchronous procedure call.

aperture grill *n.* A type of CRT (cathode ray tube) used in computer monitors that uses thin, closely-spaced vertical wires to isolate the individual pixels. The first aperture grill CRT was the Sony Trinitron, but several other manufacturers also produce aperture grill CRTs. *See also* CRT.

APEX *n.* Acronym for **A**ssembly **P**rocess **Ex**hibition and Conference. Exhibition and conference for members of the electronics manufacturing industry. APEX features product exhibits, speeches, technical conferences, and forums on issues that affect the industry.

API *n. See* application programming interface.

APL *n.* Acronym for **A P**rogramming **L**anguage. A high-level language introduced in 1968 for scientific and mathematical applications. APL is a subprogram-based interpreted language that uses a large set of special characters and terse syntax and is available for use on PC-compatible machines. *See also* interpreted language.

APM *n. See* Advanced Power Management.

APNIC *n.* Acronym for **A**sian-**P**acific **N**etwork **I**nformation **C**enter, a nonprofit, voluntary membership organization covering the Asia/Pacific Rim region. APNIC, like its European counterpart RIPE and its American counterpart ARIN, devotes itself to matters related to the Internet, among them such tasks as registering new members, allocating IP addresses, and maintaining database information. *See also* ARIN, RIPE.

app *n. See* application.

APPC *n.* Acronym for **A**dvanced **P**rogram-to-**P**rogram **C**ommunication. A specification developed as part of IBM's SNA (Systems Network Architecture) model and designed to enable applications programs running on different computers to communicate and exchange data directly. APPC extends SNA to include minicomputers and PCs.

append *vb.* To place or insert as an attachment by adding data to the end of a file or database or extending a character string. *See also* file, string. *Compare* truncate.

Apple II *n.* The second computer introduced by the Apple Computer Corporation, in April 1977. The Apple II featured 4 K dynamic RAM, expandable to 48 K (with 16 K chips), and used the 6502 microprocessor. The Apple II was the first computer to offer a TV video adapter as an optional alternative to a color computer monitor. It also featured sound and eight expansion slots. *See also* 6502.

Apple Desktop Bus *n.* A serial communications pathway built into Apple Macintosh and Apple IIGS computers. Typically a flexible cord, it enables low-speed input devices, such as a keyboard or mouse, to communicate with the computer. The bus functions like a simple local area network that can connect up to 16 devices, such as light pens, trackballs, and graphics tablets, to the computer. Although there are only two external ports, more than two devices can be linked in a series called a daisy chain. *Acronym:* ADB.*See also* bus, daisy chain[2], device driver, input/output port, serial communication.

AppleDraw *n.* A shareware drawing application for Macintosh computers.

Apple Events *n.* A feature added to Mac OS System 7 that enables one application to send a command, such as save or open, to another application. *See also* Mac OS.

Apple Extended Keyboard *n.* A 105-key keyboard that works with the Macintosh SE, Macintosh II, and Apple IIGS computers. This keyboard marks Apple's first inclusion of function (F) keys, whose absence was long cited as a shortcoming of the Macintosh compared with IBM PCs and compatibles. This feature, along with other layout changes and the addition of new keys and lights, makes the Apple Extended Keyboard quite similar in form to the IBM enhanced keyboard. See the illustration. *See also* enhanced keyboard.

Apple Extended Keyboard.

Apple Filing Protocol *n. See* AFP.

Apple key *n.* A key on Apple keyboards labeled with an outline of the Apple logo. On the Apple Extended Keyboard, this key is the same as the Command key, which functions similarly to the Control key on IBM and compatible keyboards. It is generally used in conjunction with a character key as a shortcut to making menu selections or starting a macro.

Apple Macintosh *n. See* Macintosh.

Apple Newton *n. See* Newton.

AppleScript *n.* A script language developed by Apple Computer, Inc., for Macintosh computers running under the Mac OS to execute commands and automate functions. *See also* script.

AppleShare *n.* A file server software developed by Apple Computer, Inc., that works with the Mac OS and allows one Macintosh computer to share files with another on the same network. *See also* file server, Mac OS.

applet *n.* A program that can be downloaded over the Internet and executed on the recipient's machine. Applets are often written in the Java programming language and run within browser software, and they are typically used to customize or add interactive elements to a Web page.

AppleTalk *n.* An inexpensive local area network developed by Apple Computer, Inc., for Macintosh computers that can be used by Apple and non-Apple computers to communicate and share resources such as printers and file servers. Non-Apple computers must be equipped with AppleTalk hardware and suitable software. The network uses a layered set of protocols similar to the ISO/OSI reference model and transfers information in the form of packets called frames. AppleTalk supports connections to other AppleTalk networks through devices known as bridges, and it supports connections to dissimilar networks through devices called gateways. *See also* bridge, frame (definition 2), gateway.

AppleTalk Phase 2 *n.* The extended AppleTalk Internet model designed by Apple Computer, Inc., that supports multiple zones within a network and extended addressing capacity.

AppleWorks *n.* A suite of productivity applications, formerly known as ClarisWorks, distributed by Apple Computer, Inc., and shipped on the iMac computer. AppleWorks/ClarisWorks is an integrated product that includes support for word processing, spreadsheets, databases, drawing, painting, charting, and the Internet.

appliance *n.* **1.** *See* server appliance. **2.** *See* information appliance. **3.** A device with a single or limited purpose with functionality. This functionality is similar to a simple consumer appliance.

appliance server *n.* **1.** An inexpensive computing device used for specific tasks including Internet connectivity or file-and-print services. The server is usually easy to use but does not possess the capabilities or software of a typical server for general office use. **2.** *See* server appliance.

application *n.* A program designed to assist in the performance of a specific task, such as word processing, accounting, or inventory management. *Compare* utility.

application binary interface *n.* A set of instructions that specifies how an executable file interacts with the hardware

and how information is stored. *Acronym:* ABI.*Compare* application programming interface.

application-centric *adj.* Of, pertaining to, or characteristic of an operating system in which a user invokes an application to open or create documents (such as word processing files or spreadsheets). Command-line interfaces and some graphical user interfaces such as the Windows 3.*x* Program Manager are application-centric. *Compare* document-centric.

application developer *n.* An individual who designs and analyzes the appearance and operation of an application program.

application development environment *n.* An integrated suite of programs for use by software developers. Typical components of application development environments include a compiler, file browsing system, debugger, and text editor for use in creating programs.

application development language *n.* A computer language designed for creating applications. The term is usually restricted to refer to languages with specific high-level constructs geared toward record design, form layout, database retrieval and update, and similar tasks. *See also* 4GL, application, application generator.

application development system *n.* A programming environment designed for the development of an application, typically including a text editor, compiler, and linker, and often including a library of common software routines for use in the developed program.

application entity *n. See* AE.

application file *n. See* program file.

Application Foundation Classes *n.* A set of Java class libraries developed by Microsoft that provides developers with user-interface controls and graphics tools for creating and manipulating elements such as text and fonts. The Application Foundation Classes extend the capabilities of Java's Abstract Windowing Toolkit (AWT) and are used to facilitate and expedite the creation of Java applets and applications through the use of prebuilt, customizable development components. *Acronym:* AFC *See also* Internet Foundation Classes, Java, Java Foundation Classes, Microsoft Foundation Classes.

application gateway *n.* Software running on a machine that is intended to maintain security on a secluded network yet allow certain traffic to go between the private network and the outside world. *See also* firewall.

application generator *n.* Software for generating source or machine code for running an application based on a description of the desired functionality. Limited in scope, application generators are included with some database programs and use built-in instruction sets to generate program code. *See also* application.

application heap *n.* A block of RAM used by an application to store its code, resources, records, document data, and other information. *See also* heap (definition 1), RAM.

application layer *n.* The highest layer of standards in the Open Systems Interconnection (OSI) reference model. The application layer contains signals that perform useful work for the user, such as file transfer or remote access to a computer, as opposed to lower levels, which control the exchange of data between transmitter and receiver. See the illustration. *See also* ISO/OSI reference model.

ISO/OSI MODEL

ISO/OSI Layer	*Focus*
Application *(highest level)*	Program-to-program transfer of information
Presentation	Text formatting and display, code conversion
Session	Establishing, maintaining, and coordinating communication
Transport	Accurate delivery, service quality
Network	Transport routes, message handling and transfer
Data-link	Coding, addressing, and transmitting information
Physical	Hardware connections

Application layer. *The highest layer in the ISO/OSI reference model.*

application notification *n.* An application notification starts an application at a specified time or when a system event occurs. When an application starts as the result of a notification, the system specifies a command-line parameter that identifies the event that has occurred. *See also* Class A IP address, Class B IP address, Class C IP address.

application processor *n.* A processor dedicated to a single application.

application program *n. See* application.

application program interface. *n. See* application programming interface.

application programming interface *n.* A set of routines used by an application program to direct the performance of procedures by the computer's operating system. *Acronym:* API.*Also called:* application program interface.

application server *n.* **1.** A server program on a computer in a distributed network that handles the business logic between users and backend business applications or databases. Application servers also can provide transaction management, failover, and load balancing. An application server is often viewed as part of a three-tier application consisting of a front-end GUI server such as an HTTP server (first tier), an application server (middle tier), and a backend database and transaction server (third tier). *Also called:* appserver. *Compare* HTTP server (definition 1). **2.** Any machine on which an application-server program is running. *Also called:* appserver.

application service provider *n.* A third-party company or organization that hosts applications or services for individuals or business customers. The customer connects to a data center maintained by the application service provider (ASP) through Internet or private lines to access applications that would otherwise need to be housed on the customer's local servers or individual PCs. This arrangement allows the customer to free up disk space that would otherwise be taken by applications, as well as to access the most recent software updates. ASPs deliver solutions ranging from high-end applications to services for small and medium-sized businesses. *Acronym:* ASP.

application shortcut key *n.* A key or combination of keys that when pressed will quickly perform an action within an application that would normally require several user actions, such as menu selections. *Also called:* keyboard shortcut.

application software *n. See* application.

application-specific integrated circuit *n. See* gate array.

application suite *n. See* suite (definition 1).

appserver *n. See* application server.

Aqua *n.* The graphical user interface (GUI) of Macintosh OS X. Aqua was designed to maintain familiarity and a comfort level for users of the earlier Macintosh system while allowing access to newer Macintosh OS X capabilities. The Aqua GUI features updated versions of Macintosh staples such as the Finder alongside new features like the Dock, a new type of organizational tool. *See also* Dock, Macintosh OS X.

arbitration *n.* A set of rules for resolving competing demands for a machine resource by multiple users or processes. *See also* contention.

.arc *n.* The file extension that identifies compressed archive files encoded using the Advanced RISC Computing Specification (ARC) format. *See also* compressed file.

arcade game *n.* **1.** A coin-operated computer game for one or more players that features high-quality screen graphics, sound, and rapid action. **2.** Any computer game designed to mimic the style of a coin-operated arcade game, such as games marketed for the home computer. *See also* computer game.

Archie *n.* An Internet utility for finding files in public archives obtainable by anonymous FTP. The master Archie server at McGill University in Montreal downloads FTP indexes from participating FTP servers, merges them into a master list, and sends updated copies of the master list to other Archie servers each day. Archie is a shortened form of *archive*. *See also* anonymous FTP, FTP[1] (definition 1). *Compare* Jughead, Veronica.

Archie client *n. See* Archie.

Archie server *n.* On the Internet, a server that contains Archie indexes to the names and addresses of files in public FTP archives. *See also* Archie, FTP[1] (definition 1), server (definition 2).

architecture *n.* **1.** The physical construction or design of a computer system and its components. *See also* cache, CISC, closed architecture, network architecture, open architecture, pipelining, RISC. **2.** The data-handling capacity of a microprocessor. **3.** The design of application software incorporating protocols and the means for expansion and interfacing with other programs.

archive[1] *n.* **1.** A tape or disk containing files copied from another storage device and used as backup storage. **2.** A compressed file. **3.** A file directory on the Internet that is

available by File Transfer Protocol (FTP) or an Internet directory established for dissemination of stored files.

archive[2] *vb.* **1.** To copy files onto a tape or disk for long-term storage. **2.** To compress a file.

archive bit *n.* A bit that is associated with a file and is used to indicate whether the file has been backed up. *See also* back up, bit.

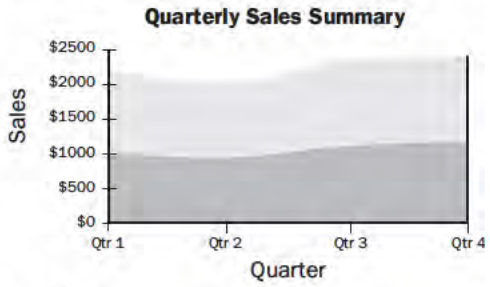
archive file *n.* A file that contains a set of files, such as a program with its documentation and example input files, or collected postings from a newsgroup. On UNIX systems, archive files can be created using the tar program; they can then be compressed using compress or gzip. PKZIP under MS-DOS and Windows and StuffIt under Mac OS create archive files that are already compressed. *See also* compress[1], gzip, PKZIP, StuffIt, tar[1].

archive site *n.* A site on the Internet that stores files. The files are usually accessed through one of the following ways: downloaded through anonymous FTP, retrieved through Gopher, or viewed on the World Wide Web. *See also* anonymous FTP, Gopher.

ARCnet *n.* Short for Attached Resource Computer Network. A form of token bus network architecture for PC-based LANs developed by Datapoint Corporation. ARCnet relies on a bus or star topology and can support up to 255 nodes. Different versions run at speeds of 1.5 Mbps, 20 Mbps (ARCnet Plus), and 100 Mbps.

ARCnet Plus *n. See* ARCnet.

area chart *n.* A graphical presentation, such as of quarterly sales figures, that uses shading or coloring to emphasize the difference between the line representing one set of data points and the line representing a separate but related set of data points. See the illustration.



Area chart.

area search *n.* In information management, the examination of a group of documents for the purpose of identifying those that are relevant to a particular subject or category.

arg *n. See* argument.

argument *n.* An independent variable, used with an operator or passed to a subprogram that uses the argument to carry out specific operations. *See also* algorithm, operator (definition 1), parameter, subprogram.

ARIN *n.* Acronym for American Registry for Internet Numbers. A nonprofit organization formed to register and administer Internet Protocol (IP) addresses in North and South America. The American Registry for Internet Numbers separates the allocation of IP addresses from the administration of top-level Internet domains, such as .com and .edu. Both of these tasks were previously managed by Network Solutions, Inc., as part of the InterNIC consortium. Its international counterparts are RIPE, in Europe, and APNIC, in Asia and the Pacific Rim. *See also* APNIC, InterNIC, IP address, RIPE.

arithmetic[1] *adj.* Pertaining to the mathematical operations of addition, subtraction, multiplication, and division.

arithmetic[2] *n.* The branch of mathematics dealing with the addition, subtraction, multiplication, and division of real numbers.

arithmetic expression *n.* A series of elements, including data labels and constants as well as numbers, that are joined by arithmetic operators, such as + and –, and can be calculated to produce a value.

arithmetic logic unit *n.* A component of a microprocessor chip used for arithmetic, comparative, and logical functions. *Acronym:* ALU *See also* gate (definition 1).

arithmetic operation *n.* Any of the standard calculations performed in arithmetic—addition, subtraction, multiplication, or division. The term is also used in reference to negative numbers and absolute values.

arithmetic operator *n.* An operator that performs an arithmetic operation: +, –, *, or /. An arithmetic operator usually takes one or two arguments. *See also* argument, binary[1], logical operator, operator (definition 1), unary.

.arj *n.* The MS-DOS file extension used with archive files created with the ARJ compression program.

ARM *n.* Short for Advanced RISC Machines. A name for any of a group of small, high-performance 32-bit RISC-based microprocessors licensed to various semiconductor manufacturers by designer ARM Limited. ARM chips are notable for their low cost and efficient use of power. They are used in a wide variety of products, including mobile phones, handheld computers, automotive and embedded solutions, and consumer electronics, including digital cameras and game systems. *See also* StrongARM.

ARP *n.* Acronym for Address Resolution Protocol. A TCP/IP protocol for determining the hardware address (or physical address) of a node on a local area network connected to the Internet, when only the IP address (or logical address) is known. An ARP request is sent to the network, and the node that has the IP address responds with its hardware address. Although ARP technically refers only to finding the hardware address, and RARP (for Reverse ARP) refers to the reverse procedure, ARP is commonly used for both senses. *See also* IP address, TCP/IP.

ARPANET *n.* A large wide area network created in the 1960s by the U.S. Department of Defense Advanced Research Projects Agency (ARPA, renamed DARPA in the 1970s) for the free exchange of information between universities and research organizations, although the military also used this network for communications. In the 1980s MILNET, a separate network, was spun off from ARPANET for use by the military. ARPANET was the network from which the Internet evolved. *See also* ALOHAnet, Internet, MILNET.

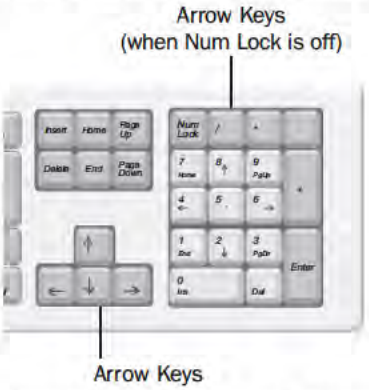
ARP request *n.* Short for Address Resolution Protocol request. An ARP packet containing the Internet address of a host computer. The receiving computer responds with or passes along the corresponding Ethernet address. *See also* ARP, Ethernet, IP address, packet.

array *n.* In programming, a list of data values, all of the same type, any element of which can be referenced by an expression consisting of the array name followed by an indexing expression. Arrays are part of the fundamentals of data structures, which, in turn, are a major fundamental of computer programming. *See also* array element, index[1], record[1], vector.

array element *n.* A data value in an array.

array processor *n.* A group of interconnected, identical processors operating synchronously, often under the control of a central processor.

arrow key *n.* Any of four keys labeled with arrows pointing up, down, left, and right, used to move the cursor vertically or horizontally on the display screen or, in some programs, to extend the highlight. See the illustration.



Arrow key. *When Num Lock is off, the arrow keys on the number keypad can be used.*

ART *n.* Acronym for Adaptive Resonance Theory. First introduced as a theory of human information processing by Stephen Grossberg, ART has evolved into several classes of self-organizing neural networks that use two layers of ideal cases to predict outcome. It is a form of cluster analysis where data is classified or matched to the previously stored pattern it most closely resembles. This data is said to *resonate* with the ideal case layer, which is then updated to reflect the new information. The constant recategorization of input results in a powerful autonomous neural network. *See also* artificial intelligence, cluster analysis, neural network.

article *n.* A message that appears in an Internet newsgroup. *Also called:* post. *See also* newsgroup.

articulation *n.* A series of adjustments applied by a synthesizer to the pitch, volume, and other parameters of an instrument sound to make it more realistic.

artifact *n.* A visible imperfection or distortion in a digital image. Artifacts may be caused by hardware/software limitations or may be a byproduct of compression.

artificial intelligence *n.* The branch of computer science concerned with enabling computers to simulate such aspects of human intelligence as speech recognition, deduction, inference, creative response, the ability to learn

from experience, and the ability to make inferences given incomplete information. Two common areas of artificial-intelligence research are expert systems and natural-language processing. *Acronym:* AI *See also* expert system, natural-language processing.

artificial life *n.* The study of computer systems that simulate some aspects of the behavior of living organisms. Artificial life includes systems in which programs intended to perform some particular task compete for survival and reproduction based on their performance; the offspring can combine pieces of code and undergo random variations, and the programs so modified compete in turn, until an optimal solution is found.

artificial neural network *n.* A form of computer artificial intelligence that uses software based on concepts understood from biological neural networks to adaptively perform a task. *Acronym:* ANN.

AS *n. See* autonomous system.

.asc *n.* A file name extension most commonly indicating that the file contains ASCII text that can be processed by all types of word processing software, including MS-DOS Edit, Windows Notepad, Windows 9x or Windows NT WordPad, and Microsoft Word. Some systems may use this extension to indicate that a file contains image information. *See also* ASCII.

ascender *n.* The portion of a lowercase letter that extends above the main body (x-height) of the letter. See the illustration. *See also* base line, x-height. *Compare* descender.

Ascender.

ascending order *n.* The arrangement of a sequence of items from lowest to highest, such as from 1 to 10 or from A to Z. The rules for determining ascending order in a particular application can be very complicated: capital letters before lowercase letters, extended ASCII characters in ASCII order, and so on.

ascending sort *n.* A sort that results in the arrangement of items in ascending order. *See also* alphanumeric sort, ascending order. *Compare* descending sort.

ascii *n.* In an FTP client program, the command that instructs the FTP server to send or receive files as ASCII text. *See also* ASCII, FTP client. *Compare* binary[2].

ASCII *n.* Acronym for **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange. A coding scheme using 7 or 8 bits that assigns numeric values to up to 256 characters, including letters, numerals, punctuation marks, control characters, and other symbols. ASCII was developed in 1968 to standardize data transmission among disparate hardware and software systems and is built into most minicomputers and all PCs. ASCII is divided into two sets: 128 characters (standard ASCII) and an additional 128 (extended ASCII). *See also* ASCII file, character, character code, control character, extended ASCII, standard ASCII. *Compare* EBCDIC.

ASCII character set *n.* A standard 7-bit code for representing ASCII characters using binary values; code values range from 0 to 127. Most PC-based systems use an 8-bit extended ASCII code, with an extra 128 characters used to represent special symbols, foreign-language characters, and graphic symbols. *See also* ASCII, character, EBCDIC, extended ASCII, standard ASCII.

ASCII EOL value *n.* The sequence of bytes that indicates the end of a line of text. For Windows and MS-DOS systems, this is the hexadecimal sequence 0D 0A or the decimal sequence 13 10. Data files imported from other kinds of computers might not display correctly if the software used is not capable of recognizing these differences and adjusting for them. *See also* ASCII, EOL.

ASCII file *n.* A document file in ASCII format, containing characters, spaces, punctuation, carriage returns, and sometimes tabs and an end-of-file marker, but no formatting information. *Also called:* ASCII file, text file, text-only file. *See also* ASCII, text file. *Compare* binary file.

ASCII transfer *n.* The preferred mode of electronic exchange for text files. In ASCII mode, character conversions to and from the network-standard character set are performed. *See also* ASCII. *Compare* binary transfer.

ASCIIZ string *n.* In programming, an ASCII string terminated by the NULL character (a byte containing the character whose ASCII value is 0). *Also called:* null-terminated string.

ASF *n. See* Advanced Streaming Format.

Asian-Pacific Network Information Center *n. See* APNIC.

ASIC *n.* Acronym for **a**pplication-**s**pecific **i**ntegrated **c**ircuit. *See also* gate array.

ASK *n. See* amplitude shift keying.

ASN *n.* Acronym for **a**utonomous-**s**ystem **n**umber. *See* autonomous system.

ASN.1 *n. See* Abstract Syntax Notation One.

.asp *n.* A file extension that identifies a Web page as an Active Server Page.

ASP *n.* **1.** *See* Active Server Pages. **2.** *See* application service provider.

aspect ratio *n.* In computer displays and graphics, the ratio of the width of an image or image area to its height. An aspect ratio of 2:1, for example, indicates that the image is twice as wide as it is high. The aspect ratio is an important factor in maintaining correct proportions when an image is printed, rescaled, or incorporated into another document.

ASPI *n. See* Advanced SCSI Programming Interface.

ASP.NET *n.* A set of technologies in the Microsoft .NET Framework for building Web applications and XML Web services. ASP.NET pages execute on the server and generate markup (such as HTML, WML, or XML) that is sent to a desktop or mobile browser. ASP.NET pages use a compiled, event-driven programming model that improves performance and enables the separation of application logic and user interface. ASP.NET pages and XML Web services files created using ASP.NET contain server-side (rather than client-side) logic written in Visual Basic .NET, C# .NET, or any .NET-compatible language. Web applications and XML Web services take advantage of the features of the common language runtime, such as type safety, inheritance, language interoperability, versioning, and integrated security.

ASP.NET server control *n.* A server-side component that encapsulates user-interface and related functionality. An ASP.NET server control derives directly or indirectly from the System.Web.UI.Control class. The superset of ASP.NET server controls includes Web server controls, HTML server controls, and mobile controls. The page syntax for an ASP.NET server control includes a runat="server" attribute on the control's tag. See also Web server control, HTML server control, validation server controls.

ASP.NET Web application *n.* An application that processes HTTP requests (Web requests) and executes on top of the ASP.NET runtime. An ASP.NET application can include ASP.NET pages, XML Web services, HTTP handlers, and HTTP modules.

ASR *n.* **1.** *See* automatic system reconfiguration. **2.** Acronym for **A**utomatic **S**peech **R**ecognition. Technology which allows machines to recognize and respond to human voice commands. ASR systems may be used to control a computer or to operate word processing and similar applications. Many ASR products are designed for use by users with disabilities who might have difficulty using a keyboard or mouse.

assemble *vb.* In programming, to convert an assembly language program to equivalent machine language instructions called object code. *See also* assembler, assembly language, linker, object code.

assembler *n.* A program that converts assembly language programs, which are understandable by humans, into executable machine language. *See also* assemble, assembly language, assembly listing, compiler (definition 2), machine code.

assembly *n.* A collection of one or more files that are versioned and deployed as a unit. An assembly is the primary building block of a .NET Framework application. All managed types and resources are contained within an assembly and are marked either as accessible only within the assembly or as accessible from code in other assemblies. Assemblies also play a key role in security. The code access security system uses information about the assembly to determine the set of permissions that code in the assembly is granted.

assembly cache *n.* A machine-wide code cache used for side-by-side storage of assemblies. There are two parts to the cache: the global assembly cache contains assemblies that are explicitly installed to be shared among many applications on the computer; the download cache stores code downloaded from Internet or intranet sites, isolated to the application that triggered the download so that code downloaded on behalf of one application/page does not impact other applications. *See also* global assembly cache.

assembly language *n.* A low-level programming language using abbreviations or mnemonic codes in which each statement corresponds to a single machine instruction. An assembly language is translated to machine language by the assembler and is specific to a given

processor. Advantages of using an assembly language include increased execution speed and direct programmer interaction with system hardware. *See also* assembler, compiler, high-level language, low-level language, machine code.

assembly listing *n.* A file created by an assembler that includes the statements of an assembly language program, the machine language generated by the assembler, and a list of the symbols used in the program. *See also* assembler, assembly language.

assertion *n.* A Boolean statement used in a program to test a condition that, if the program is operating correctly, should always evaluate as true; otherwise the program will typically terminate with an appropriate error message. Assertions are used for debugging programs and for documenting how a program should operate.

assignment operator *n.* An operator used to assign a value to a variable or data structure. *See also* assignment statement, operator (definition 1).

assignment statement *n.* A programming language statement used to assign a value to a variable. It usually consists of three elements: an expression to be assigned, an assignment operator (typically a symbol such as = or :=), and a destination variable. On execution of the assignment statement, the expression is evaluated and the resulting value is stored in the specified destination. *See also* assignment operator, expression, variable.

associate *vb.* To inform the operating system that a particular file name extension is linked to a specific application. When a file is opened that has an extension associated with a given application, the operating system automatically starts the application and loads the file.

Association Control Service Element *n.* An Open Systems Interconnection (OSI) method to establish a call between two applications by checking the identities and contexts of the application entities and performing an authentication security check. *Acronym:* ACSE *See also* ISO/OSI reference model.

Association for Computing Machinery *n.* A membership society founded in 1947 and devoted to the advancement of knowledge and technical proficiency of information processing professionals. *Acronym:* ACM.

Association of C and C++ Users *n.* An organization of people interested in the programming language C and its variants. Members of the association include professional programmers, manufacturers and vendors of compilers, and nonprofessional programming enthusiasts. *Acronym:* ACCU.

associative storage *n.* A memory-based storage method in which data items are accessed not on the basis of a fixed address or location but by analysis of their content. *Also called:* content-addressed storage.

associativity *n. See* operator associativity.

asterisk *n. See* *.

asymmetrical transmission *n.* A form of transmission used by high-speed modems, typically those that operate at rates of 9600 bps or more, that allows simultaneous incoming and outgoing transmission by dividing a telephone line bandwidth into two channels: one in the range of 300 to 450 bps and one at a speed of 9600 bps or more.

asymmetric digital subscriber line *n. See* ADSL.

asymmetric digital subscriber loop *n. See* ADSL.

asymmetric modem *n.* A modem that transmits data to the telephone network and receives data from the network at different speeds. Most commonly, an asymmetric modem will have a maximum download speed substantially higher than its upload speed. *See also* modem.

asynchronous *adj.* Pertaining to, being, or characteristic of something that is not dependent on timing. For example, asynchronous communications can start and stop at any time instead of having to match the timing governed by a clock.

asynchronous chip *n.* A microprocessor chip that does not need to operate in sync with a system clock. Asynchronous chip operations do not need to be timed to clock speed and draw power only when operations are in progress. This allows asynchronous chips the potential for greater computational speed and lower power consumption than traditional chips.

asynchronous communications *n.* Computer-to-computer communications in which the sending and receiving computers do not rely on timing as a means of determining where transmissions begin and end. *Compare* synchronous communications.

asynchronous device *n.* A device whose internal operations are not synchronized with the timing of any other part of the system.

asynchronous operation *n.* An operation that proceeds independently of any timing mechanism, such as a clock.

For example, two modems communicating asynchronously rely upon each sending the other start and stop signals in order to pace the exchange of information. *Compare* synchronous operation.

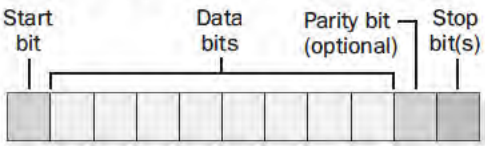
asynchronous procedure call *n.* A function call that executes separately from an executing program when a set of enabling conditions exist. After the conditions have been met, the operating system's kernel issues a software interrupt and directs the executing program to execute the call. *Acronym:* APC *See also* function call.

Asynchronous Protocol Specification *n.* The X.445 standard. *See also* X series.

asynchronous static RAM *n.* A type of static RAM (SRAM) that is not synchronized with the system clock. Like static RAM in general, asynchronous static RAM, or async SRAM, is used in a computer's L2 cache—the special portion of memory used for storing frequently accessed information. Because this type of static RAM is not synchronized with the clock, the CPU must wait for data requested from the L2 cache. Asynchronous static RAM is faster than main memory but not as fast as synchronous burst static RAM or pipeline burst static RAM. *Also called:* async SRAM. *See also* L2 cache, static RAM. *Compare* dynamic RAM, pipeline burst static RAM, synchronous burst static RAM.

Asynchronous Transfer Mode *n. See* ATM (definition 1).

asynchronous transmission *n.* In modem communication, a form of data transmission in which data is sent intermittently, one character at a time, rather than in a steady stream with characters separated by fixed time intervals. Asynchronous transmission relies on the use of a start bit and stop bit(s), in addition to the bits representing the character (and an optional parity bit), to distinguish separate characters. See the illustration.



Asynchronous transmission. *The coding of a typical character sent in asynchronous transmission.*

async SRAM *n. See* asynchronous static RAM.

AT&T System V *n. See* System V.

ATA *n.* Acronym for Advanced Technology Attachment. ANSI group X3T10's official name for the disk drive interface standard for integrating drive controllers directly on disk drives. The original ATA standard is commonly known as Integrated Drive Electronics (IDE). Later ATA versions include ATA-2, ATA-3, and Ultra-ATA. See the table. *Also called:* AT attachment. *See also* direct memory access, EIDE, IDE, logical block addressing, PIO, SMART system.

Table A.2 ATA Specifications.

ATA Specification	*Also Called*	*Features*
ATA	IDE	Supports PIO (Programmed Input/Output), which transfers data through the CPU. Data transfer rates are 3.3 mbps, 5.2 mbps, and 8.3 mbps.
ATA-2	Fast ATA, Enhanced IDE (EIDE)	Supports faster PIO rates and DMA (direct memory access), which bypasses the CPU. Data transfer rates are between 4 mbps and 16.6 mbps. It also supports LBA (logical block addressing), which allows support for drives larger than 528 MB.
ATA-3		Revision of ATA-2 with SMART (self-monitoring analysis and reporting technology) for greater reliability.
Ultra-ATA	ATA-33, DMA-33, Ultra-DMA, UDMA	Supports DMA burst mode (roughly, all-at-once) data transfers of 33.3 mbps.

ATA hard disk drive card *n.* Expansion card used to control and interface with an ATA hard disk drive. These cards are usually ISA cards. *See also* ATA, ISA.

ATA/IDE hard disk drive *n.* ATA (Advanced Technology Attachment) and IDE (Integrated Drive Electronics—or numerous other interpretations) are one and the same thing: a disk drive implementation designed to integrate

the controller onto the drive itself, thereby reducing interface costs and making firmware implementations easier.

ATAPI *n.* The interface used by the IBM PC AT system for accessing CD-ROM devices.

AT Attachment *n. See* ATA.

AT bus *n.* The electric pathway used by IBM AT and compatible computers to connect the motherboard and peripheral devices. The AT bus supports 16 bits of data, whereas the original PC bus supports only 8 bits. *Also called:* expansion bus. *See also* EISA, ISA, Micro Channel Architecture.

aTdHvAaNnKcSe *n. See* TIA.

ATDP *n.* Acronym for **At**tention **D**ial **P**ulse, a command that initiates pulse (as opposed to touch-tone) dialing in Hayes and Hayes-compatible modems. *Compare* ATDT.

ATDT *n.* Acronym for **At**tention **D**ial **T**one, a command that initiates touch-tone (as opposed to pulse) dialing in Hayes and Hayes-compatible modems. *Compare* ATDP.

Athlon *n.* Family of x86-compatible processors introduced by Advanced Micro Devices, Inc. (AMD) in 1999. Athlon, which was code-named AMD-K7, is a successor to the AMD-K6 family. Comparable to upper-end Intel Pentium III processors in performance, Athlon is distinguished by over 22 million transistors; a fully pipelined, superscalar floating-point engine, which enhances performance of graphics and multimedia programs, Internet streaming applications, and games; a 200-MHz system bus; and a 128-KB L1 cache. Although the L2 cache is 512 KB in size, the Athlon can support L2 cache sizes up to 8 MB. The first Athlon releases featured clock speeds of 500 to 650 MHz; 800-MHz and faster versions are now available. Athlon, which runs 32-bit programs, is compatible with most PC operating systems, including Microsoft Windows, Linux, OS/2 Warp, and NetWare. *See also* AMD-K6.

ATM *n.* **1.** Acronym for **A**synchronous **T**ransfer **M**ode. A network technology capable of transmitting data, voice, audio, video, and frame relay traffic in real time. Data, including frame relay data, is broken into packets containing 53 bytes each, which are switched between any two nodes in the system at rates ranging from 1.5 Mbps to 622 Mbps (over fiber optic cable). The basic unit of ATM transmission is known as a cell, a packet consisting of 5 bytes routing information and a 48-byte payload (data). These cells are transmitted to their destination, where they are reassembled into the original traffic. During transmission, cells from different users may be intermixed asynchronously to maximize utilization of network resources. ATM is defined in the broadband ISDN protocol at the levels corresponding to levels 1 and 2 of the ISO/OSI reference model. It is currently used in LANs (local area networks) involving workstations and personal computers, but it is expected to be adopted by the telephone companies, which will be able to charge customers for the data they transmit rather than for their connect time. *See also* broadband, ISDN, ISO/OSI reference model. **2.** Acronym for **a**utomated **t**eller **m**achine. A special-purpose terminal that bank customers can use to make deposits, obtain cash, and perform other transactions. **3.** *See* Adobe Type Manager.

ATM Adaptation Layer *n.* The ATM layer that mediates between higher-level and lower-level services, converting different types of data (such as audio, video, and data frames) to the 48-byte payloads required by ATM. *Acronym:* AAL *See also* ATM (definition 1).

ATM Forum *n.* Forum created in 1991 and including more than 750 companies related to communications and computing, as well as government agencies and research groups. The forum aims to promote Asynchronous Transfer Mode for data communication. *See also* ATM (definition 1).

Atomicity, Consistency, Isolation, Durability *n. See* ACID.

atomic operation *n.* An operation considered or guaranteed to be indivisible (by analogy with an atom of matter, once thought to be indivisible). Either the operation is uninterruptible or, if it is aborted, a mechanism is provided that ensures the return of the system to its state prior to initiation of the operation.

atomic transaction *n.* A set of operations that follow an "all or nothing" principle, in which either all of the operations are successfully executed or none of them is executed. Atomic transactions are appropriate for order entry and fulfillment or for money transfers to ensure that information is fully updated. For example, if funds are transferred between accounts on two databases, one account cannot be credited if the other is not debited by the same amount. An atomic transaction would involve both recording the credit in one database and recording the corresponding debit in the other. If any operation in the transaction fails, the transaction is aborted and any infor-

mation changes are undone. *See also* Distributed Computing Environment, TP monitor, transaction processing.

at sign *n. See* @.

attach *vb.* To include an external document, a file, or an executable program with an e-mail message.

attached document *n.* An ASCII text file or a binary file, such as a document created in a word processing system, that is included with an e-mail message as an attachment. *See also* ASCII, attachment, binary file, BinHex[1], MIME, uuencode.

attached file *n. See* attachment.

attached processor *n.* A secondary processor attached to a computer system, such as a keyboard or video subsystem processor.

Attached Resource Computer Network *n. See* ARCnet.

attachment *n.* A file that accompanies an e-mail message. As transmitted, an attached file is an exact copy of the original file located on the sender's computer. The file can be a document, an executable program, or a compressed file containing more than one item, among other types of files. The file is not part of the actual e-mail message, and it is generally encoded using uuencoding, MIME, or BinHex. Most e-mail programs automatically encode an attached document for transmission with a message. The recipient of the message must have an e-mail program capable of decoding the attached document or use a separate utility to decode it in order to read the document. Some gateways prohibit transmission of files over a certain size. Most e-mail systems permit more than one file to be attached to an e-mail message at a time.

attachment unit interface *n. See* AUI.

attenuation *n.* The weakening of a transmitted signal, such as the distortion of a digital signal or the reduction in amplitude of an electrical signal, as it travels farther from its source. Attenuation is usually measured in decibels and is sometimes desirable, as when signal strength is reduced electronically, for example, by a radio volume control, to prevent overloading.

atto- *prefix* Metric prefix meaning 10^{-18} (one quintillionth).

attract mode *n.* In commercial arcade games, when a coin-operated game is not in use, the screen will rotate through "attract mode." The aim is to both tempt prospective players and demonstrate game play or rules. Also, by constantly changing the screen image, attract mode avoids screen burn in. *See also* arcade game, burn in.

attribute *n.* **1.** In a database record, the name or structure of a field. For example, the files LASTNAME, FIRSTNAME, and PHONE would be attributes of each record in a PHONELIST database. The size of a field or the type of information it contains would also be attributes of a database record. **2.** In screen displays, an element of additional information stored with each character in the video buffer of a video adapter running in character mode. Such attributes control the background and foreground colors of the character, underlining, and blinking. **3.** In markup languages such as SGML and HTML, a name-value pair within a tagged element that modifies certain features of that element. *See also* HTML, SGML.

attribution line *n.* In newsgroups, e-mail, and other Internet-based communications, an identification line added to material quoted from earlier postings. Some mail and messaging software will add an attribution line automatically, which might read something like "News King wrote:" and usually appears immediately before the quoted text.

ATX *n.* A specification for PC motherboard architectures with built-in audio and video capabilities, introduced by Intel in 1995. ATX supports USB and full-length boards in all sockets. *See also* board, motherboard, specification, USB.

audio *adj.* Relating to frequencies within the range of perception by the human ear—from about 15 to 20,000 hertz (cycles per second). *See also* audio response, synthesizer.

audio board *n. See* sound card.

audio card *n. See* sound card.

audiocast *n.* The transmission of an audio signal using IP protocols. *See also* IP.

audio compression *n.* A method of reducing the overall loudness of an audio signal. This is accomplished by limiting the amount of apparent distortion when the signal is played back through a speaker or transmitted through a communications link.

audio output *n. See* audio response.

audio output port *n.* A circuit consisting of a digital-to-analog converter that transforms signals from the computer to audible tones. It is used in conjunction with an amplifier and a speaker. *See also* digital-to-analog converter.

audio response *n.* Any sound produced by a computer; specifically, spoken output produced by a computer in response to some specific type of input. Such output may be generated using a combination of words from a digitized vocabulary or through the synthesis of words from tables of phonemes. *See also* frequency response, phoneme.

audiotex *n.* An application allowing users to send and receive information by telephone. Users typically call an audiotex system and are presented with a series of choices or a series of questions through a voice mail system. When users select choices by pressing the buttons on the phone (rotary dial phones cannot be used for audiotex) or by speaking aloud, a database host responds by sending information to the voice mail system, which then converts the data to a spoken message for the user, or it responds by receiving and storing the information entered by the user. *Also called:* audiotext. *See also* voice mail.

audiotext *n. See* audiotex.

Audio Video Interleaved *n. See* AVI.

audiovisual *adj.* Relating to or being any material that uses a combination of sight and sound to present information.

audit *n.* In reference to computing, an examination of equipment, programs, activities, and procedures to determine how efficiently the overall system is performing, especially in terms of ensuring the integrity and security of data.

auditing *n.* The process an operating system uses to detect and record security-related events, such as an attempt to create, to access, or to delete objects such as files and directories. The records of such events are stored in a file known as a security log, whose contents are available only to those with the proper clearance. *See also* security log.

audit policy *n.* A policy that determines the security events to be reported to the network administrator.

audit trail *n.* In reference to computing, a means of tracing all activities affecting a piece of information, such as a data record, from the time it is entered into a system to the time it is removed. An audit trail makes it possible to document, for example, who made changes to a particular record and when.

AUI *n.* **1.** Acronym for attachment unit interface. A 15-pin (DB-15) connector commonly used to connect a network interface card to an Ethernet cable. **2.** *See* aural user interface.

AUI cable *n.* Short for Attachment Unit Interface cable. A transceiver cable used to connect a host adapter within a computer to an Ethernet (10base5 or 10BaseF) network. *See also* 10Base5, 10Base-F, Ethernet (definition 1), transceiver cable.

AUP *n. See* acceptable use policy.

aural user interface *n.* Voice-activated interface that allows users to issue spoken commands to electronic devices. The aural user interface is used with features such as voice recognition for computers and voice-activated dialing for wireless phones. *Acronym:* AUI.

authentication *n.* In a multiuser or network operating system, the process by which the system validates a user's logon information. A user's name and password are compared against an authorized list, and if the system detects a match, access is granted to the extent specified in the permission list for that user. *See also* logon, password, permission, user account, user name.

authentication center *n.* Secure database used to identify and prevent wireless phone fraud. Authentication centers verify whether a wireless phone is registered with a wireless carrier's network.

Authentication Header *n. See* AH.

Authenticode *n.* A security feature of Microsoft Internet Explorer. Authenticode allows vendors of downloadable executable code (plug-ins or ActiveX controls, for example) to attach digital certificates to their products to assure end users that the code is from the original developer and has not been altered. Authenticode lets end users decide for themselves whether to accept or reject software components posted on the Internet before downloading begins. *See also* ActiveX control, Internet Explorer, security.

author[1] *vb.* **1.** To create a product for implementation via computer technology. **2.** To write a computer program. **3.** To assemble multimedia components, such as graphics, text, audio, and animation, in a publication or product, for delivery on a CD-ROM or DVD or on line, to be viewed on a computer. **4.** To create Web pages. Traditionally, to author meant to write a literary work or journalistic piece; in the cyberworld, to write is "to provide content"; thus, to author in the traditional sense is to be a "content provider."

author[2] *n. See* Web author.

authoring language *n.* A computer language or application development system designed primarily for creating programs, databases, and materials for computer-aided instruction (CAI). A familiar example in relation to microcomputers is PILOT, a language used to create lessons. *See also* CAI, PILOT.

authoring software *n.* A type of computer program used for creating Web pages and other hypertext and multimedia applications. Authoring software provides a way to define relationships between different types of objects, including text, graphics, and sound, and to present them in a desired order. This type of program is sometimes known as authorware, although the latter name is generally associated with a specific product from Macromedia. *Also called:* authoring tool.

authoring system *n.* Application software that enables the operator to create and format a document for a specific kind of computer environment. An authoring system, especially for multimedia work, often consists of several applications within the framework of a single, controlling application. *See also* authoring language.

authority *n.* A DNS server responsible for resolving names and IP addresses of sites and resources on the Internet at a particular level of authority: top-level domain, second-level domain, or subdomain.

authorization *n.* In reference to computing, especially remote computers on a network, the right granted an individual to use the system and the data stored on it. Authorization is typically set up by a system administrator and verified by the computer based on some form of user identification, such as a code number or password. *Also called:* access privileges, permission. *See also* network, system administrator.

authorization code *n. See* password.

autoanswer *n. See* answer mode.

autoassociative *adj.* In data reduction or clustering, autoassociative models use the same set of variables as both predictors and targets. In autoassociative neural networks, each pattern presented serves as both the input and output pattern. Autoassociative networks are typically used for tasks involving pattern completion. *See also* artificial intelligence, cluster analysis, neural networks, operator associativity, pattern recognition.

autoattendant *adj.* A term used to describe a store-and-forward computer system that replaces the traditional switchboard operator, directing telephone calls to their correct extensions or voice mail. Autoattendant systems may implement voice prompts, touch-tone menus, or voice recognition features to send calls to their proper destinations. *Compare* interactive voice response systems.

AutoCorrect *n.* A function in Microsoft Word for Windows that automatically corrects errors and makes other substitutions as soon as a user types text. For example, AutoCorrect can be set up to fix misspellings, such as *teh* for *the*, or to change "straight" (" ") quotation marks to "smart" (“ ”) quotation marks. The user can select which AutoCorrect features to enable. *See also* smart quotes.

autodial *n.* A feature enabling a modem to open a telephone line and initiate a call by transmitting a stored telephone number as a series of pulses or tones.

AUTOEXEC.BAT *n.* A special-purpose batch file (set of commands) that is automatically carried out by the MS-DOS operating system when the computer is started or restarted. Created by the user or (in later versions of MS-DOS) by the operating system at system installation, the file contains basic startup commands that help configure the system to installed devices and to the user's preferences.

AutoIP *n.* Short for **auto**matic **I**nternet **P**rotocol addressing. A technique used by a device to obtain a valid IP address without a DHCP server or other IP-configuration authority. With AutoIP, a device randomly chooses an IP address from a set of reserved addresses and queries the local network to determine whether another client already is using that address. The device repeats the steps of picking and verifying until an unused address is found. AutoIP, based on an Internet Engineering Task Force (IETF) Internet Draft, is used in Universal Plug and Play (UPnP) networking. *See also* UPnP networking.

autokey *n. See* typematic.

autoload *vb.* To make some type of resource available without it having to be specifically requested. A program, for example, might autoload fonts or files as they are needed. Similarly, a CD-ROM drive might autoload audio discs or automatically start a setup program on a software CD-ROM. *See also* AutoPlay.

autoloader *n.* A device that automatically prepares a diskette, CD, or other storage medium for use.

automagic *adj.* Slang for a process performed in some unexplained (but not inexplicable) way by a computer. An automagic process might either be too complicated to explain (such as a complex spreadsheet calculation), or it might be a complex process made to appear simple to the user (such as clicking on a heading to arrange the items in a list in alphabetical or chronological order). *Compare* black box.

automata theory *n.* **1.** The study of computing processes and their capabilities and limitations; that is, how systems receive and process input and produce output. *See also* cellular automata. **2.** The study of the relationship between behavioral theories and the operation of automated devices.

automated home *n. See* smart home.

automated office *n.* A broad term used to refer to an office where work is carried out with the aid of computers, telecommunications facilities, and other electronic devices.

automated teller machine *n. See* ATM (definition 2).

automatic answering *n. See* answer mode.

automatic data processing *n. See* data processing.

automatic dialing *n. See* auto dial.

automatic error correction *n.* A process that, upon detection of an internal processing or data transmission error, invokes a routine designed to correct the error or retry the operation.

automatic IP addressing *n. See* AutoIP.

automatic patching *n.* A process in which vulnerabilities caused by a destructive computer virus infection are tracked down and corrected by a do-gooder virus or other anti-virus program. Automatic patching may be initiated by the user, or may be done by a virus entering a back door left by a malicious virus, without the consent of the user. *See also* anti-worm, do-gooder virus.

Automatic Private IP Addressing *n.* A feature of Windows XP TCP/IP that automatically configures a unique IP address from the range 169.254.0.1 through 169.254.255.254 and a subnet mask of 255.255.0.0 when the TCP/IP protocol is configured for dynamic addressing and Dynamic Host Configuration Protocol (DHCP) is not available. *Acronym:* APIPA *See also* DHCP server, Dynamic Host Configuration Protocol (DHCP), IP address, Transmission Control Protocol/Internet Protocol (TCP/IP).

Automatic Sequence Controlled Calculator *n. See* Mark I.

automatic speech recognition *n. See* ASR (definition 2).

automatic system reconfiguration *n.* Automation of configuration by the system to accommodate some change in either the software or the hardware. *Acronym:* ASR.

Automation *n.* **1.** The implementation of a mechanical or electronic system or tool to automatically complete a task, thereby reducing or eliminating human intervention. **2.** Formerly known as OLE Automation, a Microsoft-designed technology that enables an application to expose objects and their properties for use by other applications. This allows a word processor to display and manipulate a spreadsheet program, for instance. The application that exposes an object for use is called the server; the application that manipulates the object is called the client. Automation can be either local or remote (on a computer elsewhere on a network). It is intended primarily for use by high-level languages such as Microsoft Visual Basic and Microsoft Visual C++. *See also* ActiveX control, OLE.

automonitor *n.* A process or system feature capable of assessing the status of its own internal environment.

autonomous agent *n.* A software or robotic entity that is capable of independent action in open, unpredictable environments. Often referred to as an intelligent agent, or simply agent, autonomous agents complete some kind of automatic process that can communicate with other agents or perform different kinds of directed tasks. Autonomous agents are currently being applied in areas as diverse as computer games, interactive cinema, information retrieval and filtering, user interface design, electronic commerce, auto piloting of vehicles and spacecraft, and industrial process control. *Also called:* intelligent agent. *See also* agent (definition 2).

autonomous-system number *n. See* autonomous system.

autonomous system *n.* A group of routers or networks controlled by a single administrative authority using a common Interior Gateway Protocol (IGP) for routing

packets. Each autonomous system is assigned a globally unique number called an autonomous-system number (ASN). *Acronym:* AS. *Also called:* routing domain. *See also* IGP.

Auto PC *n.* An information and entertainment system for use in automobiles. Developed by Microsoft and powered by Microsoft Windows CE (a Windows-compatible operating system designed for embedded applications), Auto PC implements speech-recognition technology to enable individuals to rely on hands-free, spoken commands for tasks such as accessing a contact database (names, addresses, numbers), calling up e-mail or traffic reports, controlling an audio system, or obtaining destination directions. The Auto PC fits into the dashboard, in the space normally occupied by a radio. *See also* voice recognition, Windows.

AutoPlay *n.* A feature in Windows 9x and later that allows it to automatically operate a CD-ROM. When a CD is inserted into a CD-ROM drive, Windows looks for a file called AUTORUN.INF on the CD. If the file is found, Windows will open it and carry out its instructions, which are usually to set up an application from the CD-ROM on the computer's hard disk or to start the application once it has been installed. If an audio CD is inserted into the drive, Windows will automatically launch the CD Player application and play it.

autopolling *n.* The process of periodically determining the status of each device in a set so that the active program can process the events generated by each device, such as whether a mouse button was pressed or whether new data is available at a serial port. This can be contrasted with event-driven processing, in which the operating system alerts a program or routine to the occurrence of an event by means of an interrupt or message rather than having to check each device in turn. *Also called:* polling. *Compare* event-driven processing, interrupt-driven processing.

autorepeat *n. See* typematic.

autoresponder *n.* E-mail utility that replies automatically to an incoming e-mail. Typically, an autoresponder sends a standard, pre-written message confirming the receipt of the original e-mail.

autorestart *n.* A process or system feature that can automatically restart the system after the occurrence of certain type of errors or a power system failure.

AUTORUN.INF *n.* A file that when present on removable media, such as CD-ROMs, triggers the AutoPlay feature in Windows 9x and Windows NT. The file, located in the root directory of the inserted medium, contains information on what action the operating system is to take on the CD-ROM—generally, an instruction to run an installation program.

autosave *n.* A program feature that automatically saves an open file to a disk or other medium at defined intervals or after a certain number of keystrokes to ensure that changes to a document are periodically saved.

autosizing *n.* The ability of a monitor to accept signals at one resolution and display the image at a different resolution. A monitor capable of autosizing maintains the aspect ratio of an image but enlarges or reduces the image to fit in the space available. *See also* monitor, resolution (definition 1).

autostart routine *n.* A process by which a system or device is automatically prepared for operation with the occurrence of powering up, or turning the system on, or some other predetermined event. *See also* AUTOEXEC.BAT, autorestart, boot[2], power up.

autostereogram *n.* A computer-generated image, popularized in books and posters, that looks like an abstract design, but which emerges as a three-dimensional picture when the user looks beyond the image, without trying to focus on the hidden picture itself. Autostereograms in which the overlying design consists of a repetitive pattern are known as Single Image Stereograms (SIS). Those in which the design looks like a random pattern of colored dots are called Single Image Random Dot Stereograms, or SIRDS. *Also called:* stereogram.

autotrace *n.* A drawing program feature that draws lines along the edges of a bitmapped image to convert the image to an object-oriented one. *See also* bitmapped graphics, object-oriented graphics.

AUX *n.* The logical device name reserved by MS-DOS for an auxiliary device, or peripheral. AUX usually refers to a system's first serial port, also known as COM1.

A/UX *n.* A version of the multiuser, multitasking UNIX operating system provided by Apple Computer for various Macintosh computers and based on the AT&T System V, release 2.2 of UNIX with some enhancements. A/UX incorporates a number of Apple features, including support for the Macintosh Toolbox, so that applications can

provide users with the graphics-based interface characteristic of that computer. *See also* System V.

auxiliary device *n. See* peripheral.

auxiliary equipment *n. See* peripheral.

auxiliary storage *n.* Any storage medium, such as disk or tape, not directly accessed by a computer's microprocessor, as is random access memory (RAM). In current usage, such media are typically referred to as *storage* or *permanent storage*, and the RAM chips that the microprocessor uses directly for temporary storage are referred to as *memory*.

availability *n.* **1.** In processing, the accessibility of a computer system or resource, such as a printer, in terms of usage or of the percentage of the total amount of time the device is needed. **2.** A measure of the fault tolerance of a computer and its programs. A highly available computer runs 24 hours a day, 7 days a week. *See also* fault tolerance.

available time *n. See* uptime.

avalanche ad *n.* One of several larger formats for online ads developed to replace traditional banner ads on the Internet. Avalanche ads are generally 120 x 800 pixels in size. *See also* skyscraper ad.

avatar *n.* In virtual-reality environments such as certain types of Internet chat rooms, a graphical representation of a user. An avatar typically is a generic picture or animation of a human of either gender, a photograph or caricature of the user, a picture or animation of an animal, or an object chosen by the user to depict his or her virtual-reality "identity." *See* superuser.

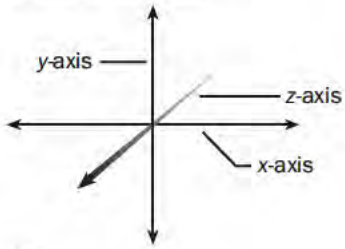
.avi *n.* The file extension that identifies an audiovisual interleaved data file in the Microsoft RIFF format.

AVI *n.* Acronym for Audio Video Interleaved. A Windows multimedia file format for sound and moving pictures that uses the Microsoft RIFF (Resource Interchange File Format) specification.

awk *n.* A UNIX-based language designed for file processing applications, awk is a part of the POSIX Command Language and Utilities standard. It is considered a subset of PERL.

AWT *n. See* Abstract Window Toolkit.

axis *n.* In a chart or other two-dimensional system using coordinates, the horizontal line (*x*-axis) or vertical line (*y*-axis) that serves as a reference for plotting points. In a three-dimensional coordinate system, a third line (*z*-axis) is used to represent depth. See the illustration. *See also* Cartesian coordinates.



Axis.

B

b[1] *adj.* Short for **b**inary.

b[2] *n.* **1.** Short for **b**it. **2.** Short for **b**aud.

B *n.* Short for **b**yte.

B: or **b:** *n.* **1.** Identifier for a second floppy disk drive on MS-DOS and other operating systems. **2.** Identifier for a single disk drive when used as the secondary drive.

B1FF *n.* Slang for a new online user who is prone to making mistakes in e-mail, newsgroup articles, or chats that show his or her inexperience. Examples of typical mistakes made by B1FFs include sentences ending with multiple exclamation points (!!!!) and messages typed in ALL CAPS. Although it's spelled B-1(one)-F-F, the term is pronounced "bif."

B2B *n.* Short for **b**usiness-**to**-**b**usiness. The electronic exchange of products and services between businesses without the direct involvement of consumers. B2B's effects on business include streamlining purchasing, accounting, and other administrative functions; lowering transaction costs; and simplifying the sale of excess inventory. Related businesses have collaborated on the creation of Internet-based supply-chain networks.

B2C *n.* Short for **b**usiness-**to**-**c**onsumer. The direct electronic exchange of products and services between businesses and consumers. B2C's effects on business include improving the efficiency in delivering goods and services to consumers.

backbone *n.* **1.** A network of communication transmission that carries major traffic between smaller networks. The backbones of the Internet, including communications carriers such as Sprint and MCI, can span thousands of miles using microwave relays and dedicated lines. **2.** The smaller networks (compared with the entire Internet) that perform the bulk of the packet switching of Internet communication. Today these smaller networks still consist of the networks that were originally developed to make up the Internet—the computer networks of the educational and research institutions of the United States—especially NSFnet, the computer network of the National Science Foundation in Oak Ridge, Tennessee. *See also* NSFnet, packet switching. **3.** The wires that carry major communications traffic within a network. In a local area network, a backbone may be a bus. *Also called:* collapsed backbone.

backbone cabal *n.* On the Internet, a term for the group of network administrators responsible for naming the hierarchy of Usenet newsgroups and devising the procedures for creating new newsgroups. The backbone cabal no longer exists.

back door *n.* A means of gaining access to a program or system by bypassing its security controls. Programmers often build back doors into systems under development so that they can fix bugs. If the back door becomes known to anyone other than the programmer, or if it is not removed before the software is released, it becomes a security risk. *Also called:* trapdoor.

back end *n.* **1.** In a client/server application, the part of the program that runs on the server. *See also* client/server architecture. *Compare* front end. **2.** In networking, a server computer or the processing that takes place on it. **3.** The part of a compiler that transforms source code (human-readable program statements) into object code (machine-readable code). *See also* compiler (definition 2), object code, source code.

back-end processor *n.* **1.** A slave processor that performs a specialized task such as providing rapid access to a database, freeing the main processor for other work. Such a task is considered "back-end" because it is subordinate to the computer's main function. **2.** A processor that manipulates data sent to it from another processor; for example, a high-speed graphics processor dedicated to painting images on a video display operates in response to commands passed "back" to it by the main processor. *Compare* coprocessor.

background[1] *adj.* In the context of processes or tasks that are part of an operating system or program, operating without interaction with the user while the user is working on another task. Background processes or tasks are

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assigned a lower priority in the microprocessor's allotment of time than foreground tasks and generally remain invisible to the user unless the user requests an update or brings the task to the foreground. Generally, only multitasking operating systems are able to support background processing. However, some operating systems that do not support multitasking may be able to perform one or more types of background tasks. For example, in the Apple Macintosh operating system running with multitasking turned off, the Background Printing option can be used to print documents while the user is doing other work. *See also* multitasking. *Compare* foreground[1].

background[2] *n.* **1.** The color against which characters and graphics are displayed, such as a white background for black characters. *Compare* foreground[2] (definition 1). **2.** The colors, textures, patterns, and pictures that comprise the surface of the desktop, upon which icons, buttons, menu bars, and toolbars are situated. *See also* wallpaper. **3.** The colors, textures, patterns, and pictures that comprise the surface of a Web page, upon which text, icons, graphics, buttons, and other items are situated. *See also* wallpaper. **4.** The condition of an open but currently inactive window in a windowing environment. *See also* inactive window. *Compare* foreground[2] (definition 2).

background noise *n.* The noise inherent in a line or circuit, independent of the presence of a signal. *See also* noise.

background printing *n.* The process of sending a document to a printer at the same time that the computer is performing one or more other tasks.

background processing *n.* The execution of certain operations by the operating system or a program during momentary lulls in the primary (foreground) task. An example of a background process is a word processor program printing a document during the time that occurs between the user's keystrokes. *See also* background[1].

background program *n.* A program that can run or is running in the background. *See also* background[1].

background task *n. See* background[1].

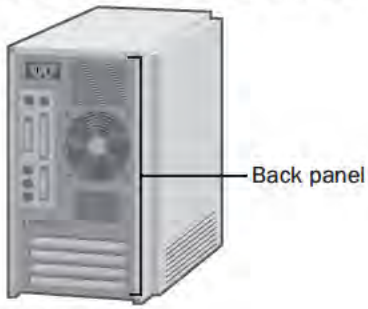
back-lit or **backlit** *adj.* Having a source of light, such as a lamp or LED behind a (usually translucent) viewing surface, in order to illuminate the surface.

back-lit display or **backlit display** *n.* Something illuminated from behind, rather than by a light source above or to the front.

BackOffice *n.* A suite of software developed by Microsoft that provides certain network services. Designed to work with Windows NT and Windows 2000, BackOffice includes such services as e-mail (Exchange), intranet capabilities (Site Server), network management (Systems Management Server), and high-end database development (SQL Server), among others.

Back Orifice *n.* A hostile application tool used by hackers to gain control of a remote computer. Back Orifice consists of client and server applications. The client application is used to control a computer running the server application. A target computer is taken over after an executable file, typically delivered by an e-mail attachment or a removable disk, is opened. Back Orifice then copies itself to the Windows System directory and transfers control to the machine running the client application. Back Orifice first appeared in the summer of 1998 and was quickly contained through updated security software. Its name is a play on words for the Microsoft BackOffice suite of servers.

back panel *n.* The panel at the rear of a computer cabinet through which most of the connections to outside power sources and peripherals are made. See the illustration.



Back panel.

backplane *n.* A circuit board or framework that supports other circuit boards, devices, and the interconnections among devices, and provides power and data signals to supported devices.

backslash *n. See* \.

Backspace key *n.* **1.** A key that, on IBM and compatible keyboards, moves the cursor to the left, one character at a time, usually erasing each character as it moves. **2.** On Macintosh keyboards, a key (called the Delete key on some Macintosh keyboards) that erases currently selected text or, if no text is selected, erases the character to the left of the insertion point (cursor). See the illustration.

Backspace key.

backtracking *n.* The ability of an expert system to try alternative solutions in an attempt to find an answer. The various alternatives can be viewed as branches on a tree: in backtracking, the program follows one branch and, if it reaches the end without finding what it seeks, backs up and tries another branch.

back up *vb.* **1.** To make a duplicate copy of a program, a disk, or data. *See also* backup. **2.** To return to a previous stable state, such as one in which a database is known to be complete and consistent.

backup *n.* A duplicate copy of a program, a disk, or data, made either for archiving purposes or for safeguarding valuable files from loss should the active copy be damaged or destroyed. A backup is an "insurance" copy. Some application programs automatically make backup copies of data files, maintaining both the current version and the preceding version on disk. *Also called:* backup copy, backup file.

backup and recovery *n.* A strategy available in many database management systems that allows a database to be restored to the latest complete unit of work (transaction) after a software or hardware error has rendered the database unusable. The process starts with the latest backup copy of the database. The transaction log, or change file, for the database is read, and each logged transaction is recovered through the last checkpoint on the log. *See also* backup, checkpoint, log (definition 1).

backup and restore *n.* The process of maintaining backup files and putting them back onto the source medium if necessary.

backup copy *n. See* backup.

backup file *n. See* backup.

Backus-Naur form *n.* A metalanguage used for defining the syntax of formal languages, both for the developer of the language and for the user. A language is defined by a set of statements, in each of which a language element known as a metavariable, written in angle brackets, is defined in terms of actual symbols (called terminals) and other metavariables (including itself if necessary). See the illustration. *Acronym:* BNF. *See also* metalanguage, normal form (definition 2).

```
<number>::=<unsigned number> |
                <sign> <unsigned number>
<unsigned     number>::=<digit>|<digit>
<unsigned
                    number>
<digit>::=0|1|2|3|4|5|6|7|8|9
<sign>::=+|
```

Backus-Naur form.

backward chaining *n.* In expert systems, a form of problem solving that starts with a statement and a set of rules leading to the statement and then works backward, matching the rules with information from a database of facts until the statement can be either verified or proved wrong. *Compare* forward chaining.

bacterium *n.* A type of computer virus that repeatedly replicates itself, eventually taking over the entire system. *See also* virus.

BAD *adj.* Acronym for broken as designed. Derogatory jargon for a product or device that consistently fails to work.

bad block *n.* A faulty memory location. A bad block is identified by the computer's memory controller in the self-test procedure when the computer is turned on or is rebooted. *See* bad sector.

bad sector *n.* A disk sector that cannot be used for data storage, usually because of media damage or imperfections. Finding, marking, and avoiding bad sectors on a disk is one of the many tasks performed by a computer's operating system. A disk-formatting utility can also find and mark the bad sectors on a disk.

bad track *n.* A track on a hard disk or floppy disk that is identified as containing a faulty sector and consequently is bypassed by the operating system. *See also* bad sector.

.bak *n.* An auxiliary file, created either automatically or upon command, that contains the second-most-recent version of a file and that bears the same file name, with the extension .bak. *See also* backup.

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balanced line *n.* A transmission line, such as twisted-pair cabling, that contains two conductors capable of carrying equal voltages and currents of opposite polarity and direction.

Balloon Help *n.* An on-screen help feature in the form of a cartoon dialog balloon on the Mac OS developed by Apple Computer, Inc. After activating this feature by clicking on the balloon icon on the toolbar, the user can position the cursor over an icon or other item, and a dialog balloon will appear that describes the function of the item.

balloons *n.* In print layout view or Web layout view, markup balloons show markup elements, such as comments and tracked changes, in the margins of your document. Use these balloons to easily see and respond to reviewers' changes and comments.

ball printer *n.* An impact printer that uses a small ball-shaped print head that bears fully formed characters in raised relief on its surface. The printer rotates and tilts the ball to line up characters and then strikes the ball against a ribbon. This method was used in the IBM Selectric typewriter.

band *n.* **1.** In printing graphics, a rectangular portion of a graphic sent by the computer to a printer. The technique of dividing a graphic into bands prevents a printer from having to reconstruct an entire image in memory before printing it. **2.** In communications, a contiguous range of frequencies used for a particular purpose, such as radio or television broadcasts.

bandpass filter *n.* An electronic circuit that passes signals that are within a certain frequency range (band) but blocks or attenuates signals above or below the band. *See also* attenuation. *Compare* highpass filter, lowpass filter.

bandwidth *n.* **1.** The difference between the highest and lowest frequencies that an analog communications system can pass as measured in Hertz (Hz) or cycles per second. For example, a telephone accommodates a bandwidth of 3000 Hz: the difference between the lowest (300 Hz) and highest (3300 Hz) frequencies it can carry. **2.** The data transfer capacity, or speed of transmission, of a digital communications system as measured in bits per second (bps).

bandwidth allocation *n. See* bandwidth reservation.

bandwidth brokerage *n. See* bandwidth trading.

bandwidth exchange *n. See* bandwidth trading.

bandwidth management *n.* The analysis and control of traffic on WAN (wide area network) and Internet links to prioritize bandwidth and improve quality of service (QoS). *See also* quality of service (definition 2), traffic shaping.

bandwidth on demand *n.* In telecommunications, the capability of increasing throughput, in increments, as required by the channel to be serviced. *See also* bandwidth, channel (definition 2), throughput.

bandwidth reservation *n.* Process of assigning in advance a percentage of bandwidth to each user or application served by a network. Bandwidth reservation optimizes the use of available traffic by prioritizing time-critical packets. *Also called:* bandwidth allocation, custom queuing. *See also* bandwidth management, traffic shaping.

bandwidth shaping *n. See* traffic shaping.

bandwidth test *n.* A benchmark test that determines the speed of a network connection. Bandwidth tests estimate the downstream and upstream speeds by sending a series of packets over the network and measuring how many packets are received in a given amount of time. *Also called:* throughput test. *See also* benchmark[1], throughput (definition 1).

bandwidth trading *n.* The exchange of excess bandwidth capacity. Although considered a possible commodity market, bandwidth trading currently lacks standardized contracts and instantaneous provisioning needed to simplify the trading process. *Also called:* bandwidth brokerage, bandwidth exchange.

bang *n.* The pronunciation for an exclamation point, particularly when the exclamation point is used in a file name or in a path on UNIX systems. *See also* bang path.

bang path *n.* Slang for an older form of e-mail address used in UUCP (UNIX-to-UNIX copy). A bang address supplies the path that the message needs to take to reach its destination, including the name of each host through which the message is to be passed. Exclamation points called "bangs" separate the elements of the e-mail address, such as the user account and host names. The address name!location, where "name" is the user account and "location" is the host name, would be spoken as "name bang location."

bank *n.* **1.** Any group of similar electrical devices connected together for use as a single device. For example, transistors may be connected in a row/column array inside

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a chip to form memory, or several memory chips may be connected together to form a memory module such as a SIMM. *See also* SIMM. **2.** A section of memory, usually of a size convenient for a CPU to address. For example, an 8-bit processor can address 65,536 bytes of memory; therefore, a 64-kilobyte (64-KB) memory bank is the largest that the processor can address at once. To address another 64-KB bank of memory requires circuitry that fools the CPU into looking at a separate block of memory. *See also* bank switching, page (definition 2).

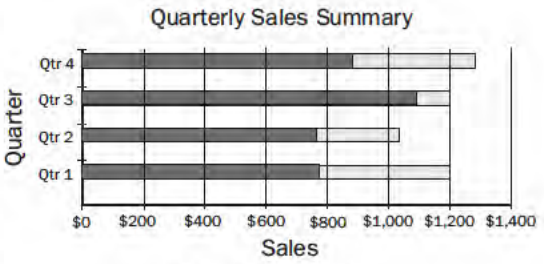
bank switching *n.* A method of expanding a computer's available random access memory (RAM) by switching between banks of RAM chips that share a range of memory addresses, which is set aside before switching begins. Only one bank is directly accessible at a time; when a bank is not active, it retains whatever is stored in it. Before another bank can be used, the operating system, driver, or program must explicitly issue a command to the hardware to make the switch. Because switching between banks takes time, memory-intensive operations take longer with bank-switched memory than with main memory. Bank-switched memory typically takes the form of an expansion card that plugs into a slot on the motherboard.

banner *n.* A section of a Web page containing an advertisement that is usually an inch or less tall and spans the width of the Web page. The banner contains a link to the advertiser's Web site. *See also* Web page, Web site.

banner page *n.* **1.** The title page that may be added to printouts by most print spoolers. Such a page typically incorporates account ID information, job length, and print spooler information, and is used primarily to separate one print job from another. *See also* print spooler. **2.** In software, an initial screen used to identify a product and credit its producers.

bar chart *n.* A type of graphic in which data items are shown as rectangular bars. The bars may be displayed either vertically or horizontally and may be distinguished from one another by color or by some type of shading or pattern. Positive and negative values may be shown in relation to a zero baseline. Two types of bar charts are common: a standard bar chart, in which each value is represented by a separate bar, and a stacked bar chart, in which several data points are "stacked" to produce a single bar. See the illustration. *Also called:* bar graph.

Vertical bar chart



Stacked bar chart

Bar chart. *Two common types of bar chart.*

bar code *n.* The special identification code printed as a set of vertical bars of differing widths on books, grocery products, and other merchandise. Used for rapid, error-free input in such facilities as libraries, hospitals, and grocery stores, bar codes represent binary information that can be read by an optical scanner. The coding can include numbers, letters, or a combination of the two; some codes include built-in error checking and can be read in either direction.

bar code reader *n. See* bar code scanner.

bar code scanner *n.* An optical device that uses a laser beam to read and interpret bar codes, such as the Universal Product Codes found on grocery products and other retail items. *See also* bar code, Universal Product Code.

bare board *n.* A circuit board with no chips on it; most commonly, a memory board not populated with memory chips.

bare bones[1] *adj.* Purely functional; stripped or otherwise clean of features. Bare bones applications provide only the most basic functions necessary to perform a given task. By

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the same token, a bare bones computer provides a minimal amount of hardware or is sold at retail with no peripherals and just the operating system (and no other software).

bare bones[2] *n.* **1.** An application that provides only the most basic functions necessary to perform a given task. **2.** A computer consisting only of motherboard (equipped with CPU and RAM), cabinet, power supply, floppy disk drive, and keyboard, to which the user must add hard disk, video adapter, monitor, and any other peripherals. *See also* motherboard, peripheral.

bar graph *n. See* bar chart.

base *n.* **1.** In mathematics, a number that is raised to the power specified by an exponent. For example, in $2^3 = 2 \times 2 \times 2 = 8$, the base is 2. **2.** In mathematics, the number of digits in a particular numbering system. With microcomputers, four numbering systems are commonly used or referred to—binary, octal, decimal, and hexadecimal—and each is based on a different number of digits. The binary, or base-2, numbering system, which is used to discuss the states of a computer's logic, has two digits, 0 and 1. Octal, or base-8, has eight digits, 0 through 7. The familiar decimal, or base-10, numbering system has ten digits, 0 through 9. Hexadecimal, or base-16, has sixteen digits, 0 through 9 and A through F. When numbers are written in a particular base, the base is often subscripted and enclosed in parentheses after the number, as in 24AE(16) = 9,390. *Also called:* radix. *See also* binary[1], decimal, hexadecimal, octal. **3.** One of three terminals (emitter, base, and collector) in a bipolar transistor. The current through the base controls the current between the emitter and the collector. *See also* transistor. **4.** The insulating foundation of a printed circuit board. *See also* circuit board.

base 10 *adj. See* decimal.

base 16 *adj. See* hexadecimal.

base 2 *adj. See* binary[1].

base 8 *adj. See* octal.

base address *n.* The part of a two-part memory address that remains constant and provides a reference point from which the location of a byte of data can be calculated. A base address is accompanied by an offset value that is added to the base to determine the exact location (the absolute address) of the information. The concept is similar to a street address system. For example, "2010 Main Street" consists of a base (the 2000 block of Main Street) plus an offset (10 from the beginning of the block). Base addresses are known as segment addresses in IBM PCs and compatibles; data in these computers is identified by its position as a relative offset from the start of the segment. *See also* absolute address, offset, relative address, segment.

baseband *adj.* Of or relating to communications systems in which the medium of transmission (such as a wire or fiber-optic cable) carries a single message at a time in digital form. Baseband communication is found in local area networks such as Ethernet and Token Ring. *See also* Ethernet, fiber optics, Token Ring network. *Compare* broadband.

baseband network *n.* A type of local area network in which messages travel in digital form on a single transmission channel between machines connected by coaxial cable or twisted-pair wiring. Machines on a baseband network transmit only when the channel is not busy, although a technique called *time-division multiplexing* can enable channel sharing. Each message on a baseband network travels as a packet that contains information about the source and destination machines as well as message data. Baseband networks operate over short distances at speeds ranging from about 50 kilobits per second (50 Kbps) to 16 megabits per second (16 Mbps). Receiving, verifying, and converting a message, however, add considerably to the actual time, reducing throughput. The maximum recommended distance for such a network is about 2 miles, or considerably less if the network is heavily used. *See also* coaxial cable, multiplexing, packet (definition 2), throughput, time-division multiplexing, twisted-pair cable. *Compare* broadband network.

base class *n.* In C++, a class from which other classes have been or can be derived by inheritance. *See also* class, derived class, inheritance, object-oriented programming.

base line or **baseline** *n.* In the printing and display of characters on the screen, an imaginary horizontal line with which the base of each character, excluding descenders, is aligned. See the illustration. *See also* ascender, descender, font.

Base line.

base memory *n. See* conventional memory.

base RAM *n. See* conventional memory.

base station *n.* Transmission tower for wireless phone signals. Commonly known as cell towers, base stations also encompass the radio antennas and electronics that handle wireless calls. Base stations relay conversations into and out of the wired phone network and between wireless phones. Each base station covers a limited area known as a cell.

base style *n.* The underlying or original style on which other styles in a document are dependent. When you change a formatting element of the base style in a document, all other styles that originate from the base style will also reflect the change.

Basic or **BASIC** *n.* Acronym for **B**eginner's **A**ll-purpose **S**ymbolic **I**nstruction **C**ode, a high-level programming language developed in the mid-1960s by John Kemeny and Thomas Kurtz at Dartmouth College. It is widely considered one of the easiest programming languages to learn. *See also* True BASIC, Visual BASIC.

Basic Rate Interface *n. See* BRI.

Basic Service Set *n.* The communicating stations, or nodes, on a wireless LAN. *See also* wireless LAN.

bastion host *n.* A computer which provides security by serving as a gateway between an internal network and external systems. All outside traffic attempting to connect to the internal network is routed through the bastion host, which defends against potential attacks by intercepting and screening incoming packets. The bastion host may be part of a larger security system providing multiple layers of protection.

.bat *n.* The file extension that identifies a batch program file. In MS-DOS, .bat files are executable files that contain calls to other program files. *See also* batch file.

batch *n.* A group of documents or data records that are processed as a unit. *See also* batch job, batch processing.

batch file *n.* An ASCII text file containing a sequence of operating-system commands, possibly including parameters and operators supported by the batch command language. When the user types a batch file name at the command prompt, the commands are processed sequentially. *Also called:* batch program. *See also* AUTOEXEC.BAT, .bat.

batch file transmission *n.* The transmission of multiple files as the result of a single command. *Acronym:* BFT.

batch job *n.* A program or set of commands that runs without user interaction. *See also* batch processing.

batch processing *n.* **1.** Execution of a batch file. *See also* batch file. **2.** The practice of acquiring programs and data sets from users, running them one or a few at a time, and then providing the results to the users. **3.** The practice of storing transactions for a period of time before they are posted to a master file, typically in a separate operation undertaken at night. *Compare* transaction processing.

batch program *n.* A program that executes without interacting with the user. *See also* batch file. *Compare* interactive program.

batch system *n.* A system that processes data in discrete groups of previously scheduled operations rather than interactively or in real time.

batch total *n.* A total calculated for an element common to a group (batch) of records, used as a control to verify that all information is accounted for and has been entered correctly. For example, the total of a day's sales can be used as a batch total to verify the records of all individual sales.

battery *n.* Two or more cells in a container that produce an electrical current when two electrodes within the container touch an electrolyte. In personal computers, batteries are used as an auxiliary source of power when the main power is shut off, as a power source for laptop and notebook computers (rechargeable batteries, such as nickel cadmium, nickel metal hydride, and lithium ion, are used), and as a method to keep the internal clock and the circuitry responsible for the part of RAM that stores important system information always powered up. *See also* lead ion battery, lithium ion battery, nickel cadmium battery, nickel metal hydride battery, RAM.

battery backup *n.* **1.** A battery-operated power supply used as an auxiliary source of electricity in the event of a power failure. **2.** Any use of a battery to keep a circuit running when the main power is shut off, such as powering a computer's clock/calendar and the special RAM that stores important system information between sessions. *See also* UPS.

battery meter *n.* A device used to measure the current (capacity) of an electrical cell.

baud *n.* One signal change per second, a measure of data transmission speed. Named after the French engineer and telegrapher Jean-Maurice-Emile Baudot and originally used to measure the transmission speed of telegraph equipment, the term now most commonly refers to the data transmission speed of a modem. *See also* baud rate.

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Baudot code *n.* A 5-bit coding scheme used principally for telex transmissions, originally developed for telegraphy by the French engineer and telegrapher Jean-Maurice-Emile Baudot. Sometimes it is equated, although inaccurately, with the International Alphabet Number 2 proposed by the Comité Consultatif Internationale Télégraphique et Téléphonique (CCITT).

baud rate *n.* The speed at which a modem can transmit data. The baud rate is the number of events, or signal changes, that occur in one second—not the number of bits per second (bps) transmitted. In high-speed digital communications, one event can actually encode more than one bit, and modems are more accurately described in terms of bits per second than baud rate. For example, a so-called 9600-baud modem actually operates at 2400 baud but transmits 9600 bits per second by encoding 4 bits per event (2400 x 4 = 9600) and thus is a 9600-bps modem. *Compare* bit rate, transfer rate.

bay *n.* A shelf or opening used for the installation of electronic equipment—for example, the space reserved for additional disk drives, CD-ROM drives, or other equipment in the cabinets of microcomputers. *See also* drive bay.

bayonet-Neill-Concelman *n. See* BNC.

BBL *n.* Acronym for **b**e **b**ack **l**ater. An expression used commonly on live chat services on the Internet and online information services to indicate that a participant is temporarily leaving the discussion forum but intends to return at a later time. *See also* chat[1] (definition 1).

BBS *n.* **1.** Acronym for **b**ulletin **b**oard **s**ystem. A computer system equipped with one or more modems or other means of network access that serves as an information and message-passing center for remote users. Often BBSs are focused on special interests, such as science fiction, movies, Windows software, or Macintosh systems, and can have free or fee-based access, or a combination. Users dial into a BBS with their modems and post messages to other BBS users in special areas devoted to a particular topic, in a manner reminiscent of the posting of notes on a cork bulletin board. Many BBSs also allow users to chat online with other users, send e-mail, download and upload files that include freeware and shareware software, and access the Internet. Many software and hardware companies run proprietary BBSs for customers that include sales information, technical support, and software upgrades and patches. **2.** Acronym for **b**e **b**ack **s**oon. A shorthand expression often seen in Internet discussion groups by a participant leaving the group who wishes to bid a temporary farewell to the rest of the group.

bcc *n.* Acronym for **b**lind **c**ourtesy **c**opy. A feature of e-mail programs that allows a user to send a copy of an e-mail message to a recipient without notifying other recipients that this was done. Generally, the recipient's address is entered into a field called "bcc:" in the mail header. *Also called:* blind carbon copy. *See also* e-mail[1] (definition 1), header (definition 1). *Compare* cc.

BCD *n. See* binary-coded decimal.

bCentral *n.* A Web site for small businesses that provides online subscription services for customer management, financial management, and e-commerce. BCentral is part of the Microsoft .NET initiative. *See also* MSN, .NET.

B channel *n.* Short for **b**earer **channel**. One of the 64-Kbps communications channels that carry data on an ISDN circuit. A BRI (Basic Rate Interface) ISDN line has two B channels and one D (data) channel. A PRI (Primary Rate Interface) ISDN line has 23 B channels (in North America) or 30 B channels (in Europe) and one D channel. *See also* BRI, D channel, ISDN.

BCNF *n.* Acronym for **B**oyce-**C**odd **n**ormal **f**orm. *See* normal form (definition 1).

beacon *n.* On an FDDI network, a special frame generated and passed along when a node detects a problem. *See also* frame (definition 2).

beam *vb.* To transfer information from one device to another through an infrared wireless connection. The term typically refers to data sharing using handheld devices such as Palm organizers, Pocket PCs, mobile phones, and pagers.

bearer channel *n. See* B channel.

BeBox *n.* A high-performance multiprocessor computer (RISC-based PowerPC) made by Be, Inc., and loaded with Be's operating system, BeOS. Be discontinued production of the BeBox in January 1997 in order to focus on software (BeOS) development. *See also* BeOS, PowerPC, RISC.

BEDO DRAM *n.* Acronym for **B**urst **E**xtended **D**ata **O**ut **D**ynamic **RAM**. A type of EDO (extended-data-out) dynamic RAM (DRAM) that handles memory transfers in

bursts of four items in order to speed the process of returning data to a computer's CPU. BEDO DRAM takes advantage of the fact that memory requests typically refer to sequential addresses. BEDO DRAM does not function well with bus speeds above 66 MHz. However, once it has accessed the first memory address, it can process the remaining three items in the burst at 10 ns (nanoseconds) each. *Also called:* BEDO RAM. *See also* dynamic RAM, EDO DRAM.

Beginner's All-purpose Symbolic Instruction Code *n. See* Basic.

beginning-of-file *n.* **1.** A code placed by a program before the first byte in a file, used by the computer's operating system to keep track of locations within a file with respect to the first byte (character) in it. **2.** The starting location of a file on a disk relative to the first storage location on the disk. A data directory or catalog contains this location. *Acronym:* BOF. *Compare* end-of-file.

Bell communications standards *n.* A series of data transmission standards originated by AT&T during the late 1970s and early 1980s that, through wide acceptance in North America, became de facto standards for modems. Bell 103, now mostly obsolete, governed transmission at 300 bits per second (bps) with full-duplex, asynchronous communications over dial-up telephone lines using frequency-shift keying (FSK). Bell 212A governed modem operations at 1200 bps with full-duplex, asynchronous communications over dial-up telephone lines using phase-shift keying (PSK). An international set of transmission standards, known as the CCITT recommendations, has become generally accepted as the primary source of standardization, especially for communications at speeds greater than 1200 bps. *See also* CCITT V series, FSK, phase-shift keying.

Bell-compatible modem *n.* A modem that operates according to the Bell communications standards. *See also* Bell communications standards.

Bellman-Ford distance-vector routing algorithm *n.* An algorithm that helps to determine the shortest route between two nodes on a network. The Routing Information Protocol (RIP) is based on the Bellman-Ford distance-vector routing algorithm. *See also* RIP (definition 2).

bells and whistles *n.* Attractive features added to hardware or software beyond basic functionality, comparable to accessories such as electric door locks and air conditioning added to an automobile. Products, especially computer systems, without such adornments are sometimes called "plain vanilla."

benchmark[1] *n.* A test used to measure hardware or software performance. Benchmarks for hardware use programs that test the capabilities of the equipment—for example, the speed at which a CPU can execute instructions or handle floating-point numbers. Benchmarks for software determine the efficiency, accuracy, or speed of a program in performing a particular task, such as recalculating data in a spreadsheet. The same data is used with each program tested, so the resulting scores can be compared to see which programs perform well and in what areas. The design of fair benchmarks is something of an art, because various combinations of hardware and software can exhibit widely variable performance under different conditions. Often, after a benchmark has become a standard, developers try to optimize a product to run that benchmark faster than similar products run it in order to enhance sales. *See also* sieve of Eratosthenes.

benchmark[2] *vb.* To measure the performance of hardware or software.

benign virus *n.* A program that exhibits properties of a virus, such as self-replication, but does not otherwise do harm to the computer systems that it infects.

BeOS *n.* An operating system developed by Be, Inc., that runs on PowerPC systems and, until they were discontinued, the company's original BeBox computers. Designed as a "media OS," the BeOS was created to support the large file sizes and high-performance processing demands of digital media and the Internet. It is an object-oriented, multithreaded operating system and can be run on symmetric multiprocessing systems containing two or more processors. Like many other operating systems, the BeOS provides preemptive multitasking, virtual memory, and memory protection. It also provides high-performance input/output capabilities, a 64-bit file system that can support terabyte-sized files, and a number of Internet-related features including built-in mail and Web services. *See also* BeBox.

Beowulf *n.* Name for a class of virtual supercomputer created by linking numerous PCs through network connections into a single high-performance unit based on inexpensive, x86-based hardware and publicly available software, such as some versions of UNIX. This clustering technique can provide performance comparable to a traditional supercomputer at approximately 10 percent of the

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cost. The first Beowulf cluster was assembled at NASA's Goddard Space Flight Center in 1994. The origin of the name comes from Beowulf, the hero who fought and killed the monster Grendel in an eighth-century Old English saga.

Beowulf-class computing *n. See* Beowulf.

Berkeley Internet Name Domain *n. See* BIND.

Berkeley Sockets API *n. See* sockets API.

Bernoulli box *n.* A removable floppy disk drive for personal computers that uses a nonvolatile cartridge and has high storage capacity. Named after Daniel Bernoulli, an eighteenth-century physicist who first demonstrated the principle of aerodynamic lift, the Bernoulli box uses high speed to bend the flexible disk close to the read/write head in the disk drive. *See also* read/write head.

Bernoulli distribution *n. See* binomial distribution.

Bernoulli process *n.* A mathematical process involving the Bernoulli trial, a repetition of an experiment in which there are only two possible outcomes, such as success and failure. This process is used mostly in statistical analysis. *See also* Bernoulli sampling process, binomial distribution.

Bernoulli sampling process *n.* In statistics, a sequence of *n* independent and identical trials of a random experiment, with each trial having one of two possible outcomes. *See also* Bernoulli process, binomial distribution.

best of breed *adj.* A term used to describe a product that is the best in a particular category of products.

beta[1] *adj.* Of or relating to software or hardware that is a beta. *See also* beta[2]. *Compare* alpha[1].

beta[2] *n.* A new software or hardware product, or one that is being updated, that is ready to be released to users for beta testing in real-world situations. Usually betas have most or all of the features and functionality implemented that the finished product is to have. *See also* beta test. *Compare* alpha[2].

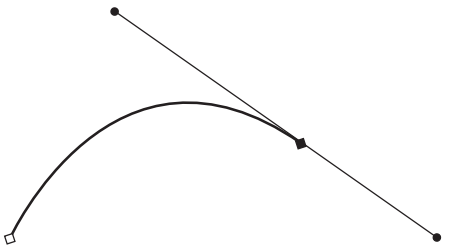
beta site *n.* An individual or an organization that tests software before it is released to the public. The company producing the software usually selects these beta sites from a pool of established customers or volunteers. Most beta sites perform this service free of charge, often to get a first look at the software and to receive free copies of the software once it is released to the public.

beta test *n.* A test of software that is still under development, accomplished by having people actually use the software. In a beta test, a software product is sent to selected potential customers and influential end users (known as beta sites), who test its functionality and report any operational or utilization errors (bugs) found. The beta test is usually one of the last steps a software developer takes before releasing the product to market; however, if the beta sites indicate that the software has operational difficulties or an extraordinary number of bugs, the developer may conduct more beta tests before the software is released to customers.

betweening *n. See* tween.

bezel *n.* In arcade games, the bezel refers to the glass located around the monitor. It is often silk-screened with artwork relating to the game. *See also* arcade game.

Bézier curve *n.* A curve that is calculated mathematically to connect separate points into smooth, free-form curves and surfaces of the type needed for illustration programs and CAD models. Bézier curves need only a few points to define a large number of shapes—hence their usefulness over other mathematical methods for approximating a given shape. See the illustration. *See also* CAD.



Bézier curve.

BFT *n. See* batch file transmission, binary file transfer.

BGP *n. See* Border Gateway Protocol.

bias *n.* **1.** A uniform or systematic deviation from a point of reference. **2.** In mathematics, an indication of the amount by which the average of a group of values deviates from a reference value. **3.** In electronics, a voltage applied to a transistor or other electronic device to establish a ref-

erence level for its operation. **4.** In communications, a type of distortion in the length of transmitted bits, caused by a lag that occurs as voltage builds up or falls off each time the signal changes from 0 to 1 or vice versa.

bidirectional *adj.* Operating in two directions. A bidirectional printer can print from left to right and from right to left; a bidirectional bus can transfer signals in both directions between two devices.

bidirectional parallel port *n.* An interface that supports two-way parallel communication between a device, such as a printer, and a computer. *See also* interface (definition 3), parallel port.

bidirectional printing *n.* The ability of an impact or ink-jet printer to print from left to right and from right to left. Bidirectional printing improves speed substantially because no time is wasted returning the print head to the beginning of the next line, but it may lower print quality.

bi-endian *adj.* Of, pertaining to, or characteristic of processors and other chips that can be switched to work in big endian or little endian mode. The PowerPC chip has this ability, which allows it to run the little endian Windows NT or the big endian MacOS/PPC. *See also* big endian, little endian, PowerPC.

BIFF *n.* Short for **B**inary **I**nterchange **F**ile **F**ormat. The native file format used by Microsoft Excel.

biff *n.* **1.** A BSD utility that issues a signal when new mail has arrived. Biff was named after a University of California graduate student's dog who had a habit of barking at the mailman at the time the utility was developed. **2.** *See* B1FF.

biff *vb.* To provide notification of new (incoming) e-mail.

bifurcation *n.* A split that results in two possible outcomes, such as 1 and 0 or on and off.

Big 5 *n.* Traditional Chinese encoding.

Big Blue *n.* The International Business Machines (IBM) Corporation. This nickname comes from the corporate color used on IBM's early mainframes and still used in the company logo.

big endian *adj.* Storing numbers in such a way that the most significant byte is placed first. For example, given the hexadecimal number A02B, the big endian method would cause the number to be stored as A02B, and the little endian method would cause the number to be stored as 2BA0. The big endian method is used by Motorola microprocessors; Intel microprocessors use the little endian method. The term *big endian* is derived from Jonathan Swift's *Gulliver's Travels*, in which the Big-Endians were a group of people who opposed the emperor's decree that eggs should be broken at the small end before they were eaten. *Compare* little endian.

bigint data type *n.* In an Access project, a data type of 8 bytes (64 bits) that stores whole numbers in the range of –2^63 (–9,223,372,036,854,775,808) through 2^63–1 (9,223,372,036,854,775,807).

big iron *n.* One or more large, fast, and expensive computers, such as a Cray supercomputer or a room-filling mainframe system.

big red switch *n.* The power on/off switch of a computer, thought of as a kind of interrupt or last resort. On the original IBM PC and many other computers, it was indeed big and red. Using the switch is an interrupt of last resort because it deletes all the data in RAM and can also damage the hard drive. *Acronym:* BRS.

billboard *n.* A primitive inserted into a 3-D scene that is oriented so that one face is toward the viewer. A texture, usually an animated sprite, is applied to the billboard to give the appearance of a 3-D object in the scene.

billion *n.* **1.** In American usage (as is usual with microcomputers), a thousand million, or 10^9. Computer terminology uses the prefixes *giga-* for 1 billion and *nano-* for 1 billionth. **2.** In British usage, a million million, or 10^{12}, which is a *trillion* in American usage.

billisecond *n.* *See* nanosecond.

bimodal virus *n.* *See* multipartite virus.

.bin *n.* A file name extension for a file encoded with MacBinary. *See also* MacBinary.

binary[1] *adj.* Having two components, alternatives, or outcomes. The binary number system has 2 as its base, so values are expressed as combinations of two digits, 0 and 1. These two digits can represent the logical values *true* and *false* as well as numerals, and they can be represented in an electronic device by the two states *on* and *off*, recognized as two voltage levels. Therefore, the binary number system is at the heart of digital computing. Although ideal for computers, binary numbers are usually difficult for people to interpret because they are repetitive strings of 1s

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and 0s. To ease translation, programmers and others who habitually work with the computer's internal processing abilities use hexadecimal (base-16) or octal (base-8) numbers. See Appendix E. *See also* base (definition 2), binary-coded decimal, binary number, bit, Boolean algebra, byte, cyclic binary code, digital computer, dyadic, logic circuit. *Compare* ASCII, decimal, hexadecimal, octal.

binary[2] *n.* In an FTP client program, the command that instructs the FTP server to send or receive files as binary data. *See also* FTP client, FTP server. *Compare* ascii.

binary chop *n. See* binary search.

binary-coded decimal *n.* A system for encoding decimal numbers in binary form to avoid rounding and conversion errors. In binary-coded decimal coding, each digit of a decimal number is coded separately as a binary numeral. Each of the decimal digits 0 through 9 is coded in 4 bits, and for ease of reading, each group of 4 bits is separated by a space. This format is also called 8-4-2-1, after the weights of the four bit positions, and uses the following codes: 0000 = 0; 0001 = 1; 0010 = 2; 0011 = 3; 0100 = 4; 0101 = 5; 0110 = 6; 0111 = 7; 1000 = 8; 1001 = 9. Thus, the decimal number 12 is 0001 0010 in binary-coded decimal notation. *Acronym:* BCD. *See also* base (definition 2), binary[1], binary number, decimal, EBCDIC, packed decimal, round.

binary compatibility *n.* Portability of executable programs (binary files) from one platform, or flavor of operating system, to another. *See also* flavor, portable (definition 1).

binary conversion *n.* The conversion of a number to or from the binary number system. See Appendix E. *See also* binary[1].

binary device *n.* Any device that processes information as a series of on/off or high/low electrical states. *See also* binary[1].

binary digit *n.* Either of the two digits in the binary number system, 0 and 1. *See also* bit.

binary file *n.* A file consisting of a sequence of 8-bit data or executable code, as distinguished from files consisting of human-readable ASCII text. Binary files are usually in a form readable only by a program, often compressed or structured in a way that is easy for a particular program to read. *Compare* ASCII file.

binary file transfer *n.* Transfer of a file containing arbitrary bytes or words, as opposed to a text file containing only printable characters (for example, ASCII characters with codes 10, 13, and 32–126). On modern operating systems a text file is simply a binary file that happens to contain only printable characters, but some older systems distinguish the two file types, requiring programs to handle them differently. *Acronym:* BFT.

binary format *n.* Any format that structures data in 8-bit form. Binary format is generally used to represent object code (program instructions translated into a machine-readable form) or data in a transmission stream. *See also* binary file.

binary notation *n.* Representation of numbers using the binary digits, 0 and 1. *Compare* floating-point notation.

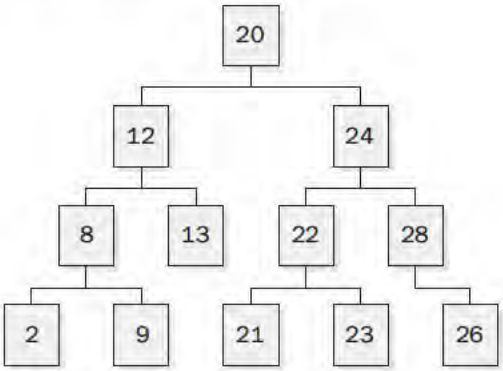
binary number *n.* A number expressed in binary form, or base 2. Binary numbers are composed of zeros and ones. See Appendix E. *See also* binary[1].

binary search *n.* A type of search algorithm that seeks an item, with a known name, in an ordered list by first comparing the sought item to the item at the middle of the list's order. The search then divides the list in two, determines in which half of the order the item should be, and repeats this process until the sought item is found. *Also called:* binary chop, dichotomizing search. *See also* search algorithm. *Compare* hash search, linear search.

binary synchronous protocol *n. See* BISYNC.

binary transfer *n.* The preferred mode of electronic exchange for executable files, application data files, and encrypted files. *Compare* ASCII transfer.

binary tree *n.* In programming, a specific type of tree data structure in which each node has at most two subtrees, one left and one right. Binary trees are often used for sorting information; each node of the binary search tree contains a key, with values less than that key added to one subtree and values greater than that key added to the other. See the illustration. *See also* binary search, tree.



Binary tree.

binaural sound *n. See* 3-D audio.

bind *vb.* To associate two pieces of information with one another. The term is most often used with reference to associating a symbol (such as the name of a variable) with some descriptive information (such as a memory address, a data type, or an actual value). *See also* binding time, dynamic binding, static binding.

BIND *n.* Acronym for **B**erkeley **I**nternet **N**ame **D**omain. A domain name server originally written for the BSD version of UNIX developed at the Berkeley campus of the University of California but now available for most versions of UNIX. As a domain name server, BIND translates between human-readable domain names and Internet-friendly, numeric IP addresses. It is widely used on Internet servers. *See also* DNS, DNS server, IP address.

Binder *n.* A Microsoft Office program that you can use to organize related documents. You can check spelling, number pages consecutively across all documents in the binder, and print the documents.

binding *n.* The process by which protocols are associated with one another and the network adapter to provide a complete set of protocols needed for handling data from the application layer to the physical layer. *See also* ISO/OSI reference model.

binding time *n.* The point in a program's use at which binding of information occurs, usually in reference to program elements being bound to their storage locations and values. The most common binding times are during compilation (compile-time binding), during linking (link-time binding), and during program execution (run-time binding). *See also* bind, compile-time binding, link-time binding, run-time binding.

BinHex[1] *n.* **1.** Short for **bin**ary to **hex**adecimal. A format for converting binary data files into ASCII text so they can be transmitted via e-mail to another computer or in a newsgroup post. This method can be used when standard ASCII characters are needed for transmission, as they are on the Internet. BinHex is used most frequently by Mac users. *See also* MIME. **2.** An Apple Macintosh program for converting binary data files into ASCII text and vice versa using the BinHex format. *Compare* uudecode[1], uuencode[1].

BinHex[2] *vb.* To convert a binary file into printable 7-bit ASCII text or to convert the resulting ASCII text file back to binary format using the BinHex program. *Compare* uudecode[2], uuencode[2].

binomial distribution *n.* In statistics, a list or a function that describes the probabilities of the possible values of a random variable chosen by means of a Bernoulli sampling process. A Bernoulli process has three characteristics: each trial has only two possible outcomes—success or failure; each trial is independent of all other trials; and the probability of success for each trial is constant. A binomial distribution can be used to calculate the probability of getting a specified number of successes in a Bernoulli process. For example, the binomial distribution can be used to calculate the probability of getting a 7 three times in 20 rolls of a pair of dice. *Also called:* Bernoulli distribution.

BioAPI *n.* An open system specification for use in biometric security and authentication technologies. BioAPI supports a wide range of biometric technology, from handheld devices to large-scale networks, and applications include fingerprint identification, facial recognition, speaker verification, dynamic signatures, and hand geometry. BioAPI was developed for the BioAPI Consortium, a group of organizations with ties to biometrics. BioAPI incorporates compatibility with existing biometric standards such as HA-API, which allows applications to operate BioAPI-compliant technologies without modification.

biometrics *n.* Traditionally, the science of measuring and analyzing human biological characteristics. In computer technology, biometrics relates to authentication and secu-

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rity techniques that rely on measurable, individual biological stamps to recognize or verify an individual's identity. For example, fingerprints, handprints, or voice-recognition might be used to enable access to a computer, to a room, or to an electronic commerce account. Security schemes are generally categorized into three levels: level 1 relies on something the person carries, such as an ID badge with a photo or a computer cardkey; level 2 relies on something the person knows, such as a password or a code number; and level 3, the highest level, relies on something that is a part of the person's biological makeup or behavior, such as a fingerprint, the pattern of blood vessels in a retina, or a signature. *See also* fingerprint reader, handwriting recognition (definition 1), voice recognition.

bionics *n.* The study of living organisms, their characteristics, and the ways they function, with a view toward creating hardware that can simulate or duplicate the activities of a biological system. *See also* cybernetics.

BIOS *n.* Acronym for **b**asic **i**nput/**o**utput **s**ystem. On PC-compatible computers, the set of essential software routines that tests hardware at startup, starts the operating system, and supports the transfer of data among hardware devices, including the date and time. The operating system date is initialized from the BIOS or Real Time Clock date when the machine is booted. Many older PCs, particularly those dating before 1997, have BIOSs that store only 2-digit years and thus may have suffered from Year 2000 problems. The BIOS is stored in read-only memory (ROM) so that it can be executed when the computer is turned on. Although critical to performance, the BIOS is usually invisible to computer users. *See also* AMI BIOS, CMOS setup, Phoenix BIOS, ROM BIOS. *Compare* Toolbox.

BIOS test *n.* A test to see if a PC will make the transition to the year 2000 and keep the correct date. The test can range from resetting the system time in the BIOS and rebooting to running a program or software routine specially designed to uncover Year 2000 problems.

bipartite virus *n. See* multipartite virus.

bipolar *adj.* **1.** Having two opposite states, such as positive and negative. **2.** In information transfer and processing, pertaining to or characteristic of a signal in which opposite voltage polarities represent on and off, true and false, or some other pair of values. *See also* nonreturn to zero. *Compare* unipolar. **3.** In electronics, pertaining to or characteristic of a transistor having two types of charge carriers. *See also* transistor.

BIS *n. See* business information system.

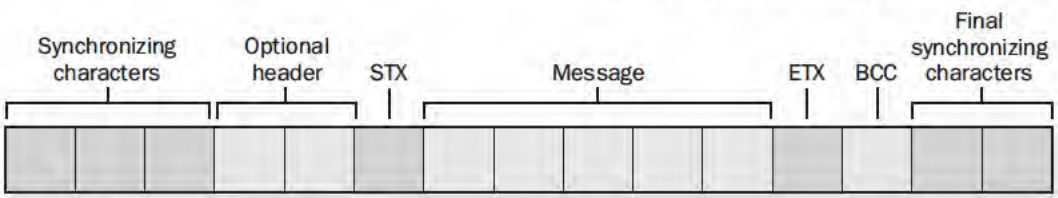
BISDN *n. See* broadband ISDN.

bistable *adj.* Of, pertaining to, or characteristic of a system or device that has two possible states, such as on and off. *See also* flip-flop.

bistable circuit *n.* Any circuit that has only two stable states. The transition between them must be initiated from outside the circuit. A bistable circuit is capable of storing 1 bit of information.

bistable multivibrator *n. See* flip-flop.

BISYNC *n.* Short for **bi**nary **sync**hronous communications protocol. A communications standard developed by IBM. BISYNC transmissions are encoded in either ASCII or EBCDIC. Messages can be of any length and are sent in units called frames, optionally preceded by a message header. BISYNC uses synchronous transmission, in which message elements are separated by a specific time interval, so each frame is preceded and followed by special characters that enable the sending and receiving machines to synchronize their clocks. STX and ETX are control characters that mark the beginning and end of the message text; BCC is a set of characters used to verify the accuracy of transmission. See the illustration. *Also called:* BSC.



BISYNC. *The structure of a BISYNC frame.*

bit *n.* Short for **bi**nary digi**t**. The smallest unit of information handled by a computer. One bit expresses a 1 or a 0 in a binary numeral, or a true or false logical condition, and is represented physically by an element such as a high or low voltage at one point in a circuit or a small spot on a disk magnetized one way or the other. A single bit conveys little information a human would consider meaningful. A group of 8 bits, however, makes up a byte, which can be used to represent many types of information, such as a letter of the alphabet, a decimal digit, or other character. *See also* ASCII, binary[1], byte.

bit block *n.* In computer graphics and display, a rectangular group of pixels treated as a unit. Bit blocks are so named because they are, literally, blocks of bits describing the pixels' display characteristics, such as color and intensity. Programmers use bit blocks and a technique called bit block transfer (bitblt) to display images rapidly on the screen and to animate them. *See also* bit block transfer.

bit block transfer *n.* In graphics display and animation, a programming technique that manipulates blocks of bits in memory that represent the color and other attributes of a rectangular block of pixels forming a screen image. The image described can range in size from a cursor to a cartoon. Such a bit block is moved through a computer's video RAM as a unit so that its pixels can be rapidly displayed in a desired location on the screen. The bits can also be altered; for example, light and dark portions of an image can be reversed. Successive displays can thus be used to change the appearance of an image or to move it around on the screen. Some computers contain special graphics hardware for manipulating bit blocks on the screen independently of the contents of the rest of the screen. This speeds the animation of small shapes, because a program need not constantly compare and redraw the background around the moving shape. *Also called:* bitblt. *See also* sprite.

bitblt *n. See* bit block transfer.

bit bucket *n.* An imaginary location into which data can be discarded. A bit bucket is a null input/output device from which no data is read and to which data can be written without effect. The NUL device recognized by MS-DOS is a bit bucket. A directory listing, for example, simply disappears when sent to NUL.

bit data type *n.* In an Access project, a data type that stores either a 1 or 0 value. Integer values other than 1 or 0 are accepted, but are always interpreted as 1.

bit density *n.* A measure of the amount of information per unit of linear distance or surface area in a storage medium or per unit of time in a communications pipeline.

bit depth *n.* The number of bits per pixel allocated for storing indexed color information in a graphics file.

bit flipping *n.* A process of inverting bits—changing 1s to 0s and vice versa. For example, in a graphics program, to invert a black-and-white bitmapped image (to change black to white and vice versa), the program could simply flip the bits that compose the bit map.

bit image *n.* A sequential collection of bits that represents in memory an image to be displayed on the screen, particularly in systems having a graphical user interface. Each bit in a bit image corresponds to one pixel (dot) on the screen. The screen itself, for example, represents a single bit image; similarly, the dot patterns for all the characters in a font represent a bit image of the font. In a black-and-white display each pixel is either white or black, so it can be represented by a single bit. The "pattern" of 0s and 1s in the bit image then determines the pattern of white and black dots forming an image on the screen. In a color display the corresponding description of on-screen bits is called a pixel image because more than one bit is needed to represent each pixel. *See also* bitmap, pixel image.

bit manipulation *n.* An action intended to change only one or more individual bits within a byte or word. Manipulation of the entire byte or word is much more common and generally simpler. *See also* mask.

bitmap *n.* A data structure in memory that represents information in the form of a collection of individual bits. A bit map is used to represent a bit image. Another use of a bit map in some systems is the representation of the blocks of storage on a disk, indicating whether each block is free (0) or in use (1). *See also* bit image, pixel image.

bitmapped font *n.* A set of characters in a particular size and style in which each character is described as a unique bit map (pattern of dots). Macintosh screen fonts are examples of bitmapped fonts. See the illustration. *See also*

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downloadable font, outline font, TrueType. *Compare* PostScript font, vector font.

Bitmapped font. *Each character is composed of a pattern of dots.*

bitmapped graphics *n.* Computer graphics represented as arrays of bits in memory that represent the attributes of the individual pixels in an image (one bit per pixel in a black-and-white display, multiple bits per pixel in a color or gray-scale display). Bitmapped graphics are typical of paint programs, which treat images as collections of dots rather than as shapes. *See also* bit image, bit map, pixel image. *Compare* object-oriented graphics.

bit mask *n.* A value used with bit-wise operators (And, Eqv, Imp, Not, Or, and Xor) to test, set, or reset the state of individual bits in a bit-wise field value.

BITNET *n.* Acronym for **B**ecause **I**t's **T**ime **Net**work. A WAN (wide area network) founded in 1981 and operated by the Corporation for Research and Educational Networking (CREN) in Washington, D.C. Now defunct, BITNET provided e-mail and file transfer services between mainframe computers at educational and research institutions in North America, Europe, and Japan. BITNET used the IBM Network Job Entry (NJE) protocol rather than TCP/IP, but it could exchange e-mail with the Internet. The listserv software for maintaining mailing lists was originated on BITNET.

bit. newsgroups *n.* A hierarchy of Internet newsgroups that mirror the content of some BITNET mailing lists. *See also* BITNET.

bit-oriented protocol *n.* A communications protocol in which data is transmitted as a steady stream of bits rather than as a string of characters. Because the bits transmitted have no inherent meaning in terms of a particular character set (such as ASCII), a bit-oriented protocol uses special sequences of bits rather than reserved characters for control purposes. The HDLC (high-level data link control) defined by ISO is a bit-oriented protocol. *Compare* byte-oriented protocol.

bit parallel *adj.* Transmitting simultaneously all bits in a set (such as a byte) over separate wires in a cable. *See also* parallel transmission.

bit pattern *n.* **1.** A combination of bits, often used to indicate the possible unique combinations of a specific number of bits. For example, a 3-bit pattern allows 8 possible combinations and an 8-bit pattern allows 256 combinations. **2.** A pattern of black and white pixels in a computer system capable of supporting bitmapped graphics. *See also* pixel.

bitplane *n.* **1.** One of a set of bit maps that collectively make up a color image. Each bit plane contains the values for one bit of the set of bits that describe a pixel. One bit plane allows two colors (usually black and white) to be represented; two bit planes, four colors; three bit planes, eight colors; and so on. These sections of memory are called bit planes because they are treated as if they were separate layers that stack one upon another to form the complete image. By contrast, in a chunky pixel image, the bits describing a given pixel are stored contiguously within the same byte. The use of bit planes to represent colors is often associated with the use of a color look-up table, or color map, which is used to assign colors to particular bit patterns. Bit planes are used in the EGA and VGA in 16-color graphics modes; the four planes correspond to the 4 bits of the IRGB code. *See also* color look-up table, color map, EGA, IRGB, layering, VGA. *Compare* color bits. **2.** Rarely, one level of a set of superimposed images (such as circuit diagrams) to be displayed on the screen.

bit rate *n.* **1.** The speed at which binary digits are transmitted. *See also* transfer rate. **2.** The streaming speed of digital content on a network. Bit rate is usually measured in kilobits per second (Kbps).

bit serial *n.* The transmission of bits in a byte one after another over a single wire. *See also* serial transmission.

bit slice microprocessor *n.* A building block for microprocessors that are custom-developed for specialized uses. These chips can be programmed to handle the same tasks as other CPUs but they operate on short units of information, such as 2 or 4 bits. They are combined into processors that handle the longer words.

bits per inch *n.* A measure of data storage capacity; the number of bits that fit into an inch of space on a disk or a tape. On a disk, bits per inch are measured based on inches of circumference of a given track. *Acronym:* BPI. *See also* packing density.

bits per pixel *n.* Also known as color depth or bit depth. The term refers to the number of bits (8, 16, 24, or 32) used to store and display the color data for a single pixel. The number of bits per pixel determines the range of color available to an image. *Acronym:* bpp.

bits per second *n. See* bps.

bit stream *n.* **1.** A series of binary digits representing a flow of information transferred through a given medium. **2.** In synchronous communications, a continuous flow of data in which characters in the stream are separated from one another by the receiving station rather than by markers, such as start and stop bits, inserted into the data.

bit stuffing *n.* The practice of inserting extra bits into a stream of transmitted data. Bit stuffing is used to ensure that a special sequence of bits appears only at desired locations. For example, in the HDLC, SDLC, and X.25 communications protocols, six 1 bits in a row can appear only at the beginning and end of a frame (block) of data, so bit stuffing is used to insert a 0 bit into the rest of the stream whenever five 1 bits appear in a row. The inserted 0 bits are removed by the receiving station to return the data to its original form. *See also* HDLC, SDLC, X.25.

bit transfer rate *n. See* transfer rate.

bit twiddler *n.* Slang for someone devoted to computers, particularly one who likes to program in assembly language. *See also* hacker.

BIX *n.* Acronym for **B**YTE **I**nformation E**x**change. An online service originated by *BYTE* magazine, now owned and operated by Delphi Internet Services Corporation. BIX offers e-mail, software downloads, and conferences relating to hardware and software.

.biz *n.* One of seven new top-level domain names approved in 2000 by the Internet Corporation for Assigned Names and Numbers (ICANN), .biz is meant for use in business-related Web sites.

biz. news groups *n.* Usenet newsgroups that are part of the biz. hierarchy and have the prefix of biz. These newsgroups are devoted to discussions related to business. Unlike most other newsgroup hierarchies, biz. newsgroups permit users to post advertisement and other marketing material. *See also* newsgroup, traditional newsgroup hierarchy.

BizTalk Server *n.* An application developed by Microsoft Corporation to streamline business processes within a large company's internal network and between business partners over the Internet. BizTalk Server enables the integration of business applications written in different computer languages and running on various operating systems.

BlackBerry *n.* A wireless handheld device that allows mobile users to send and receive e-mail, as well as view appointment calendars and contact lists. The BlackBerry features a display screen and a built-in keyboard operated by pressing the keys with the thumbs. BlackBerry's ease of use and its ability to send and receive messages silently have made it a popular device for wireless text messaging in a business environment.

black box *n.* A unit of hardware or software whose internal structure is unknown but whose function is documented. The internal mechanics of the function do not matter to a designer who uses a black box to obtain that function. For example, a memory chip can be viewed as a black box. Many people use memory chips and design them into computers, but generally only memory chip designers need to understand their internal operation.

black box testing *n.* An approach to testing software in which the tester treats the software as a black box—that is, the testing focuses on the program's functionality rather than on its internal structure. Black box testing is thus user oriented, in that the primary concern is whether the program works, not how it is constructed. Black box testing is generally performed on software that is under development. *Compare* white box testing.

black hat *n.* A hacker who operates with malicious or criminal intent. A black hat will break into a system to alter or damage data or to commit theft. *Compare* white hat.

black hole *n.* A mysterious "place" on a computer network where messages, such as e-mail and news items, disappear without a trace. The usage is derived from stellar black holes, which have such strong gravitational fields that even light cannot escape them. The term is sometimes also used to refer to projects that consume vast amounts of time with no apparent product.

blackout *n.* A condition in which the electricity level drops to zero; a complete loss of power. A number of factors cause a blackout, including natural disasters, such as a storm or an earthquake, or a failure in the power company's

equipment, such as a transformer or a power line. A blackout might or might not damage a computer, depending on the state of the computer when the blackout occurs. As with switching a computer off before saving any data, a blackout will cause all unsaved data to be irretrievably lost. The most potentially damaging situation is one in which a blackout occurs while a disk drive is reading information from or writing information to a disk. The information being read or written will probably become corrupted, causing the loss of a small part of a file, an entire file, or the entire disk; the disk drive itself might suffer damage as a result of the sudden power loss. The only reliable means of preventing damage caused by a blackout is to use a battery-backed uninterruptible power supply (UPS). *See also* UPS. *Compare* brownout.

blank[1] *n.* The character entered by pressing the spacebar. *See also* space character.

blank[2] *vb.* To not show or not display an image on part or all of the screen.

blanking *n.* The brief suppression of a display signal as the electron beam in a raster-scan video monitor is moved into position to display a new line. After tracing each scan line, the beam is at the right edge of the screen and must return to the left (horizontal retrace) to begin a new line. The display signal must be turned off during the time of the retrace (horizontal blanking interval) to avoid overwriting the line just displayed. Similarly, after tracing the bottom scan line, the electron beam moves to the top left corner (vertical retrace), and the beam must be turned off during the time of this retrace (vertical blanking interval) to avoid marking the screen with the retrace path.

blast *vb. See* burn (definition 1).

bleed *n.* In a printed document, any element that runs off the edge of the page or into the gutter. Bleeds are often used in books to mark important pages so they are easier to find. *See also* gutter.

blend[1] *n.* A photo or graphic created with a software blending process.

blend[2] *vb.* In illustration and other graphics software, to create a new combined graphic from two or more separate graphic elements. Photos, art, colors, shapes, and text may be blended together digitally. Graphic elements may be blended for artistic effect, or may be realistic enough to appear as a single photo or graphic.

blind carbon copy *n. See* bcc.

blind courtesy copy *n. See* bcc.

blind search *n.* A search for data in memory or on a storage device with no foreknowledge as to the data's order or location. *See also* linear search. *Compare* binary search, indexed search.

blink *vb.* To flash on and off. Cursors, insertion points, menu choices, warning messages, and other displays on a computer screen that are intended to catch the eye are often made to blink. The rate of blinking in a graphical user interface can sometimes be controlled by the user.

blink speed *n.* The rate at which the cursor indicating the active insertion point in a text window, or other display element, flashes on and off.

blip *n.* A small, optically sensed mark on a recording medium, such as microfilm, that is used for counting or other tracking purposes.

blit *vb.* To render a glyph/bitmap to the display. *Also called:* blitting. *See also* bit block transfer.

blitter *n.* A function that copies a bitmap from memory onto the screen.

bloatware *n.* Software whose files occupy an extremely large amount of storage space on a user's hard disk, especially in comparison with previous versions of the same product.

block[1] *n.* **1.** Generally, a contiguous collection of similar things that are handled together as a whole. **2.** A section of random access memory temporarily assigned (allocated) to a program by the operating system. **3.** A group of statements in a program that are treated as a unit. For example, if a stated condition is true, all of the statements in the block are executed, but none are executed if the condition is false. **4.** A unit of transmitted information consisting of identification codes, data, and error-checking codes. **5.** A collection of consecutive bytes of data that are read from or written to a device (such as a disk) as a group. **6.** A rectangular grid of pixels that are handled as a unit. **7.** A segment of text that can be selected and acted upon as a whole in an application. **8.** In the Java programming language, any code between matching braces constitutes a block. For example, { x = 1; }. *See also* code, Java.

block[2] *vb.* **1.** To distribute a file over fixed-size blocks in storage. **2.** To prevent a signal from being transmitted.

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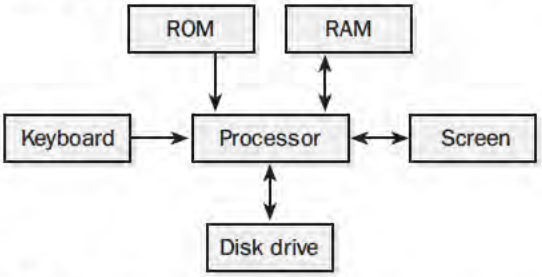
3. To select a segment of text, by using a mouse, menu selection, or cursor key, to be acted upon in some way, such as to format or to delete the segment.

block cipher *n.* A private key encryption method that encrypts data in blocks of a fixed size (usually 64 bits). The encrypted data block contains the same number of bits as the original. *See also* encryption, private key.

block cursor *n.* An on-screen cursor that has the same width and height in pixels as a text-mode character cell. A block cursor is used in text-based applications, especially as the mouse pointer when a mouse is installed in the system. *See also* character cell, cursor (definition 1), mouse pointer.

block device *n.* A device, such as a disk drive, that moves information in blocks—groups of bytes—rather than one character (byte) at a time. *Compare* character device.

block diagram *n.* A chart of a computer or other system in which labeled blocks represent principal components and lines and arrows between the blocks show the pathways and relationships among the components. A block diagram is an overall view of what a system consists of and how it works. To show the various components of such a system in more detail, different types of diagrams, such as flowcharts or schematics, are used. See the illustration. *Compare* bubble chart, flowchart.



Block diagram.

block gap *n.* The unused physical space that separates blocks of data or physical records on a tape or formatted sectors on a disk. *Also called:* IBG, interblock gap.

block header *n.* Information that appears at the beginning of a block of data and serves such purposes as signaling the beginning of the block, identifying the block, providing error-checking information, and describing such characteristics as the block length and the type of data contained in the block. *See also* header (definition 2).

blocking factor *n.* **1.** The size of the chunks in which data is transferred to or from a block device such as a disk. If fewer bytes are requested, the disk drive will still read the whole block. Common blocking factors on personal computers are 128, 256, and 512 bytes. **2.** The number of file records in one disk block. If the record length for a file is 170 bytes, a block on the disk contains 512 bytes, and records do not span blocks, then the blocking factor is 3, and each block contains 510 (170 x 3) bytes of data and 2 unused bytes.

block length *n.* The length, usually in bytes, of a block of data. Block length typically ranges from 512 bytes through 4096 kilobytes (KB), depending on the purpose for which the block is used.

block move *n.* Movement of a number of items of data together to a different location, as in reorganizing documents with a word processor or moving the contents of cell ranges in a spreadsheet. Most CPUs have instructions that easily support block moves.

block size *n.* The declared size of a block of data transferred internally within a computer, via FTP, or by modem. The size is usually chosen to make the most efficient use of all the hardware devices involved. *See also* FTP[1] (definition 1).

block structure *n.* The organization of a program into groups of statements called *blocks*, which are treated as units. Programming languages such as Ada, C, and Pascal were designed around block structure. A block is a section of code surrounded by certain delimiters (such as BEGIN and END or { and }), which signify that the intervening code can be treated as a related group of statements. For example, in C, each function is a separate block. Block structure also limits the scope of constants, data types, and variables declared in a block to that block. *See also* function (definition 2), procedure, scope (definition 1).

block transfer *n.* The movement of data in discrete blocks (groups of bytes).

blog[1] *n. See* weblog.

blog[2] *vb.* To create or maintain a weblog.

blogger *n.* One who creates or maintains a weblog.

blow *vb. See* burn (definition 1).

blow up *vb.* To terminate abnormally, as when a program crosses some computational or storage boundary and cannot handle the situation on the other side, as in, "I tried to

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draw outside the window, and the graphics routines blew up." *See also* abend, abort.

blue screen *n.* A technique used in film matte special effects, in which one image is superimposed on another image. Action or objects are filmed against a blue screen. The desired background is filmed separately, and the shot containing the action or objects is superimposed onto the background. The result is one image where the blue screen disappears.

Blue Screen of Death *n.* In a Microsoft Windows computer environment, a semi-humorous reference to the result of a fatal error in which the screen turns blue and the computer crashes. Recovery from a Blue Screen of Death error typically requires the user to reboot the computer. *Acronym:* BSOD. *Also called:* blue-screen error. *See also* fatal error.

Bluetooth *n.* Technology protocol developed to wirelessly connect electronic devices such as wireless phones, personal digital assistants (PDAs), and computers. Devices equipped with Bluetooth chips can exchange information within about a 30-foot range via radio waves in the 2.45 gigahertz (GHz) spectrum. Bluetooth was developed by the Bluetooth Special Interest Group, a consortium of telecommunications, computing, consumer electronics, and related industry groups.

Bluetooth Special Interest Group *n.* A group of companies from the telecommunications, computing, and networking industries that promotes the development and deployment of Bluetooth technology. *See also* Bluetooth.

Bluetooth wireless technology *n.* A specification for radio links between mobile PCs, mobile phones, and other portable devices. These radio links are small-form factor, low cost, and short range.

.bmp *n.* The file extension that identifies raster graphics stored in bit map file format. *See also* bit map.

BNC *n.* Acronym for bayonet-Neill-Concelman. Named for Paul Neill of Bell Labs and Carl Concelman (affiliation unknown), who developed two earlier types of coaxial connectors known as the N connector and C connector, BNC is a type of connector used to join segments of coaxial cable. When one connector is inserted into another and rotated 90 degrees, they lock. BNC connectors are often used with closed-circuit television. The letters BNC are sometimes also considered an acronym for British Naval Connector. See the illustration. *Also called:* BNC connector. *See also* coaxial cable.

BNC connector. *Male (left) and female (right) BNC connector.*

BNC connector *n. See* BNC.

board *n.* An electronic module consisting of chips and other electronic components mounted on a flat, rigid substrate on which conductive paths are laid between the components. A personal computer contains a main board, called the motherboard, which usually has the microprocessor on it and slots into which other, smaller boards, called cards or adapters, can be plugged to expand the functionality of the main system, allowing connections to monitors, disk drives, or a network. *See also* adapter, card (definition 1), motherboard.

board computer *n. See* single-board.

board level *n.* A level of focus in troubleshooting and repair that involves tracking down a problem in a computer to a circuit board and replacing the board. This is in contrast to the component level, which involves repairing the board itself. In many cases board-level repairs are made in order to quickly restore the device to working condition; the boards replaced are then repaired and tested for use in later board-level repairs. *See also* circuit board.

body *n.* **1.** In e-mail and Internet newsgroups, the content of a message. The body of a message follows the header, which contains information about the sender, origin, and destination of the message. *See also* header (definition 1). **2.** In HTML, SGML, and XML, a section of a document that contains the content of the document, along with tags describing characteristics of the content—for example, format. **3.** A segment of a data packet containing the actual data.

body face *n.* A typeface suitable for the main text in a document rather than for headings and titles. Because of their readability, fonts having serifs, such as Times and Palatino, are good body faces, although sans serif faces can also be used as body text. *See also* sans serif, serif. *Compare* display face.

BOF *n.* Acronym for birds of a feather. Meetings of special interest groups at trade shows, conferences, and conventions. BOF sessions provide an opportunity for people

working on the same technology at different companies or research institutions to meet and exchange their experiences. *See* beginning-of-file.

boilerplate *n.* Recyclable text; a piece of writing or code, such as an organization's mission statement or the graphics code that prints a software company's logo, which can be used over and over in many different documents. The size of boilerplate text can range from a paragraph or two to many pages. It is, essentially, generic composition that can be written once, saved on disk, and merged, either verbatim or with slight modification, into whatever documents or programs later require it.

boldface *n.* A type style that makes the text to which it is applied appear darker and heavier than the surrounding text. Some applications allow the user to apply a "Bold" command to selected text; other programs require that special codes be embedded in the text before and after words that are to be printed in boldface. **This sentence appears in boldface.**

bomb[1] *n.* A program planted surreptitiously, with intent to damage or destroy a system in some way—for example, to erase a hard disk or cause it to be unreadable to the operating system. *See also* Trojan horse, virus, worm.

bomb[2] *vb.* To fail abruptly and completely, without giving the user a chance to recover from the problem short of restarting the program or system. *See also* abend, bug (definition 1), crash[2] (definition 1), hang.

bonding *n.* **1.** Acronym for **B**andwidth **On D**emand **In**teroperability **G**roup. **2.** The process of combining two or more ISDN B (bearer) channels to form a single channel with a bandwidth greater than the standard B channel bandwidth of 64 Kbps. Bonding two B channels, for example, provides a bandwidth of 128 Kbps, which is four times faster than a 28.8 Kbps modem. Such high-speed channels are ideal for video conferencing, imaging, and transferring large-scale data. *See also* B channel, BRI, ISDN.

bonding *vb. See* link aggregation.

bookmark *n.* **1.** A marker inserted at a specific point in a document to which the user may wish to return for later reference. **2.** In Netscape Navigator, a link to a Web page or other URL that a user has stored in a local file in order to return to it later. *See also* Favorites folder, hotlist, URL.

bookmark file *n.* **1.** A Netscape Navigator file containing the addresses of preferred Web sites. It is synonymous with the Favorites folder in Internet Explorer and the hotlist in Mosaic. *See also* Favorites folder, hotlist, Internet Explorer, Mosaic. **2.** A rendering of such a file in HTML format, generally posted on a Web page for the benefit of other people. *See also* HTML.

Boolean *adj.* Of, pertaining to, or characteristic of logical (true, false) values. Many languages directly support a Boolean data type, with predefined values for true and false; others use integer data types to implement Boolean values, usually (although not always) with 0 equaling false and "not 0" equaling true. *See also* Boolean algebra, Boolean operator.

Boolean algebra *n.* An algebra, fundamental to computer operations but developed in the mid-nineteenth century by English mathematician George Boole, for determining whether logical propositions are true or false rather than for determining the values of numerical expressions. In Boolean algebra, variables must have one of only two possible values, *true* or *false*, and relationships between these variables are expressed with logical operators, such as AND, OR, and NOT. Given these two-state variables and the relationships they can have to one another, Boolean algebra produces such propositions as **C** = *A* AND *B*, which means that *C* is *true* if and only if both *A* is *true* and *B* is *true*; thus, it can be used to process information and to solve problems. Furthermore, Boolean logic can be readily applied to the electronic circuitry used in digital computing. Like the binary numbers 1 and 0, *true* and *false* are easily represented by two contrasting physical states of a circuit, such as voltages, and computer circuits known as logic gates control the flow of electricity (bits of data) so as to represent AND, OR, NOT, and other Boolean operators. Within a computer, these logic gates are combined, with the output from one becoming the input to another so that the final result (still nothing more than sets of 1s and 0s) is meaningful data, such as the sum of two numbers. See the illustration. *See also* adder (definition 1), binary[1], Boolean operator, gate (definition 1), logic circuit, truth table.

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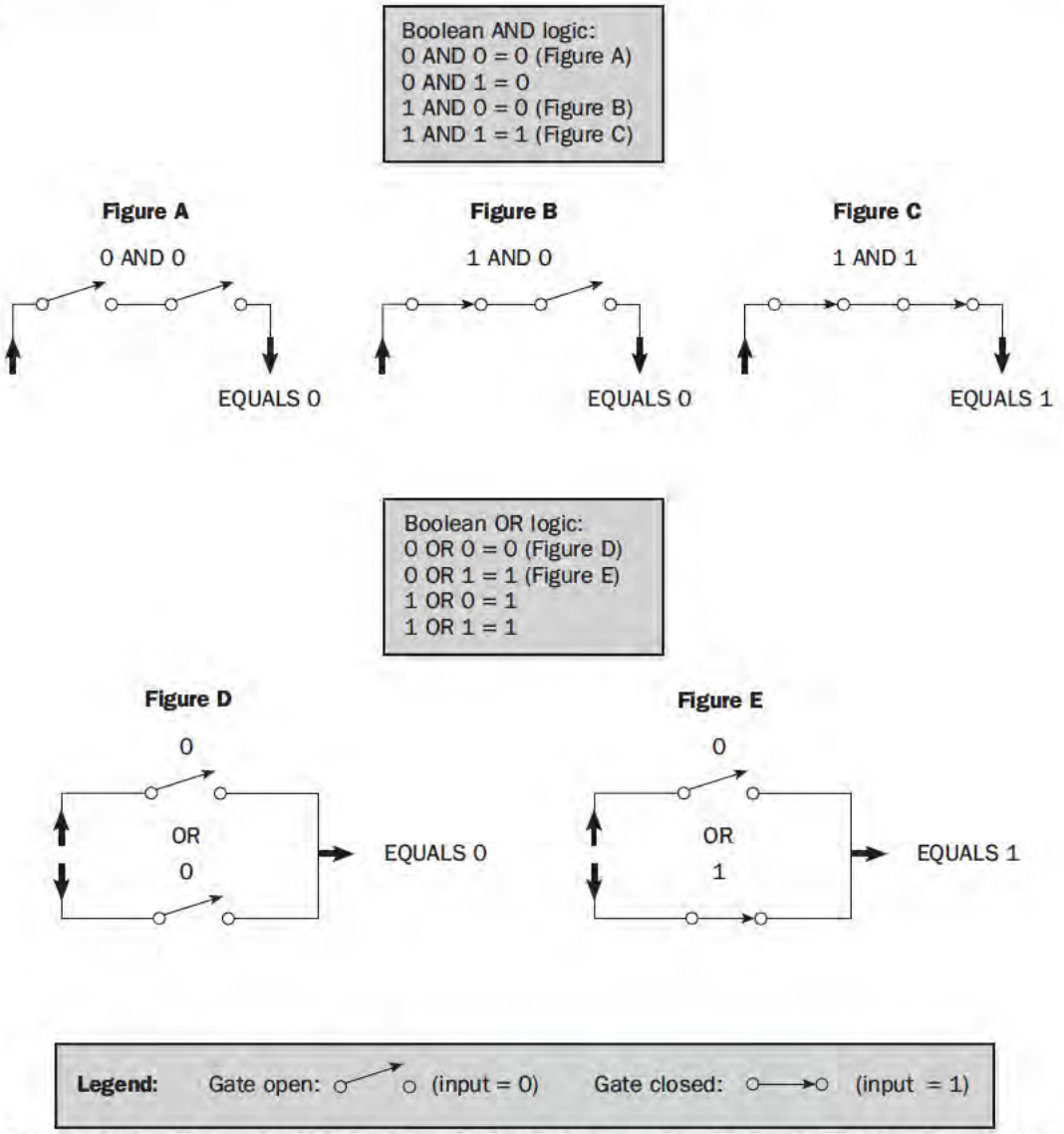

Boolean algebra. *The ways in which circuits can simulate Boolean operations. The boxed tables show the possible results of various input combinations.*

Boolean expression *n.* An expression that yields a Boolean value (*true* or *false*). Such expressions can involve comparisons (testing values for equality or, for non-Boolean values, the < [less than] or > [greater than] relation) and logical combination (using Boolean operators such as AND, OR, and XOR) of Boolean expressions. *Also called:* conditional expression, logical expression. *See also* Boolean, Boolean algebra, Boolean operator, relational operator.

Boolean logic *n. See* Boolean algebra.

Boolean operator *n.* An operator designed to work with Boolean values. The four most common Boolean operators in programming use are AND (logical conjunction), OR (logical inclusion), XOR (exclusive OR), and NOT (logical negation). Boolean operators are often used as qualifiers in database searches—for example, *find all records where DEPARTMENT = "marketing" OR DEPARTMENT = "sales" AND SKILL = "word processing"*. *Also called:* logical operator. *See also* AND, exclusive OR, NOT, OR.

Boolean search *n.* A database search that uses Boolean operators. *See also* Boolean operator.

boost *vb.* To strengthen a network signal before it is transmitted further.

boot[1] *n.* The process of starting or resetting a computer. When first turned on (*cold boot*) or reset (*warm boot*), the computer executes the software that loads and starts the computer's more complicated operating system and prepares it for use. Thus, the computer can be said to pull itself up by its own bootstraps. *Also called:* bootstrap. *See also* BIOS, bootstrap loader, cold boot, warm boot.

boot[2] *vb.* **1.** To start or reset a computer by turning the power on, by pressing a reset button on the computer case, or by issuing a software command to restart. *Also called:* bootstrap, boot up. *See also* reboot. **2.** To execute the bootstrap loader program. *Also called:* bootstrap. *See also* bootstrap loader.

bootable *adj.* Containing the system files necessary for booting a PC and running it. *See also* boot[2].

bootable disk *n. See* boot disk.

boot block *n.* A portion of a disk that contains the operating-system loader and other basic information that enables a computer to start up. *See also* block[1] (definition 5).

boot disk *n.* A floppy disk that contains key system files from a PC-compatible operating system and that can boot, or start, the PC. A boot disk must be inserted in the primary floppy disk drive (usually drive A:) and is used when there is some problem with starting the PC from the hard disk, from which the computer generally boots. *Also called:* bootable disk. *See also* A:, boot[2], boot drive, hard disk.

boot drive *n.* In a PC-compatible computer, the disk drive that the BIOS uses to automatically load the operating system when the computer is turned on. Generally, the default boot drive is the primary floppy disk drive A: in PC-compatible computers with MS-DOS, Windows 3*x*, or Windows 9x operating systems. If a floppy disk is not found in that drive, the BIOS will check the primary hard disk next, which is drive C:. The BIOS for these operating systems can be reconfigured to search drive C: first by using the BIOS setup program. *See also* A:, BIOS, disk drive, hard disk.

boot failure *n.* The inability of a computer to locate or activate the operating system and thus boot, or start, the computer. *See also* boot[2].

boot files *n.* The system files needed to start Microsoft Windows. The boot files include Ntldr and Ntdetect.com. *See also* partition boot sector.

boot loader *n. See* bootstrap loader.

BOOTP *n. See* Bootstrap Protocol.

boot partition *n.* The partition on a hard disk that contains the operating system and support files that the system loads into memory when the computer is turned on or restarted.

boot record *n.* The section of a disk that contains the operating system.

boot sector *n.* The portion of a disk reserved for the bootstrap loader (the self-starting portion) of an operating system. The boot sector typically contains a short machine language program that loads the operating system.

bootstrap[1] *n. See* boot[1].

bootstrap[2] *vb. See* boot[2].

bootstrap loader *n.* A program that is automatically run when a computer is switched on (booted). After first performing a few basic hardware tests, the bootstrap loader loads and passes control to a larger loader program, which typically then loads the operating system. The bootstrap loader typically resides in the computer's read-only memory (ROM).

Bootstrap Protocol *n.* A protocol used primarily on TCP/IP networks to configure diskless workstations. RFCs 951 and 1542 define this protocol. DHCP is a later boot configuration protocol that uses this protocol. The

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Microsoft DGCP service provided limited support for BOOTP service. *Acronym:* BOOTP. *Also called:* Boot Protocol. *See also* boot[2], DHCP, RFC, TCP/IP.

boot up *vb. See* boot[2].

border *n.* **1.** In programs and working environments that feature on-screen windows, the edge surrounding the user's workspace. Window borders provide a visible frame around a document or graphic. Depending on the program and its requirements, they can also represent an area in which the cursor or a mouse pointer takes on special characteristics. For example, clicking the mouse on a window border can enable the user to resize the window or split the window in two. **2.** In printing, a decorative line or pattern along one or more edges of a page or illustration.

Border Gateway Protocol *n.* A protocol used by NSFnet that is based on the External Gateway Protocol. *Acronym:* BGP. *See also* External Gateway Protocol, NSFnet.

boss screen *n.* A false display screen usually featuring business-related material that can be substituted for a game display when the boss walks by. Boss screens were popular with MS-DOS games, where it was difficult to switch to another application quickly. However, games designed for the Mac or Windows 9x generally don't need them because it is easy to switch to a different screen or application to hide the fact that one is playing a game.

bot *n.* **1.** Short for ro**bot**. A displayed representation of a person or other entity whose actions are based on programming. **2.** A program that performs some task on a network, especially a task that is repetitive or time consuming. **3.** On the Internet, a program that performs a repetitive or time-consuming task, such as searching Web sites and newsgroups for information and indexing them in a database or other record-keeping system (called *spiders*); automatically posting one or more articles to multiple newsgroups (often used in spamming and called *spambots*); or keeping IRC channels open. *Also called:* Internet robot. *See also* IRC, newsgroup, spam, spambot, spider.

bottom-up design *n.* A program development design methodology in which the lower-level tasks of a program are defined first; the design of the higher-level functions proceeds from the design of the lower-level ones. *See also* bottom-up programming, top-down programming. *Compare* top-down design.

bottom-up programming *n.* A programming technique in which lower-level functions are developed and tested first; higher-level functions are then built using the lower-level functions. Many program developers believe that the ideal combination is top-down design and bottom-up programming. *See also* top-down design. *Compare* object-oriented programming, top-down programming.

bounce *vb.* To return to the sender, used in reference to undeliverable e-mail.

BounceKeys *n.* A feature in Windows 9x that instructs the processor to ignore double strokes of the same key and other unintentional keystrokes.

bound[1] *adj.* Limited in performance or speed; for example, an input/output-bound system is limited by the speed of its input and output devices (keyboard, disk drives, and so on), even though the processor or program is capable of performing at a higher rate.

bound[2] *n.* The upper or lower limit in a permitted range of values.

bounding box *n. See* graphic limits.

Bourne shell *n.* The first major shell, or command interpreter, for UNIX and part of the AT&T System V release. The Bourne shell scripting language, developed at AT&T Bell Laboratories by Steve Bourne in 1979, was one of the original command languages for the UNIX operating system. While the Bourne shell lacks some features common in other UNIX shells, such as command-line editing and recall of previously issued commands, it is the one that the majority of shell scripts adhere to. *Also called:* sh. *See also* shell[1], shell script, System V, UNIX. *Compare* C shell, Korn shell.

boutique reseller *n.* A type of VAR (value-added reseller) that specializes in providing customized software, hardware, and services to vertical, or niche, markets. In the VAR environment, boutique resellers are distinguished from master resellers, or systems integrators, which offer a much wider variety of products and services. *See also* value-added reseller.

box *n.* **1.** Container for a piece of electronic equipment. **2.** Slang term for a computer; more specifically the unit holding the central processing unit, or CPU, and other "guts" of the system, as in "bet that new high-performance box really screams." *See also* central processing unit.

3. An IBM front-end processor. **4.** A rectangular—actually, diamond-shaped—symbol, usually called a decision box, used in flowcharting to represent a point at which a process branches into more than one possible outcome, as in a yes/no situation. *See also* decision box. **5.** The boundary around a graphic image on screen. *See also* graphic limits.

box-top license *n. See* shrinkwrap agreement.

Boyce-Codd normal form *n. See* normal form (definition 1).

bozo *n.* A slang term used frequently on the Internet, particularly in newsgroups, for a foolish or eccentric person.

bozo filter *n.* On the Internet, slang for a feature in some e-mail clients and newsgroup readers or a separate utility that allows the user to block, or filter out, incoming e-mail messages or newsgroup articles from specified individuals. Generally these individuals are ones that the user does not want to hear from, such as bozos. *Also called:* kill file. *See also* bozo.

BPI *n. See* bits per inch, bytes per inch.

bpp *n. See* bits per pixel.

bps *n.* Short for **b**its **p**er **s**econd. The measure of transmission speed used in relation to networks and communication lines. Although bps represents the basic unit of measure, networks and communications devices, such as modems, are so fast that speeds are usually given in multiples of bps—Kbps (kilobits, or thousands of bits, per second), Mbps (megabits, or millions of bits, per second), and Gbps (gigabits, or billions of bits, per second). Speed in bps is not the same as the baud rate for a modem. *See also* baud rate.

braindamaged *adj.* Performing in an erratic or destructive manner. A braindamaged application or utility program is characterized by some or all of the following traits: a mysterious and unintuitive user interface, failure to respond predictably to commands, failure to release unused memory, failure to close open files, and use of "reserved" elements of the operating system that can result in a fatal error in a program or the operating system. Braindamaged programs are also often responsible for causing problems across local area networks. *Compare* kludge.

brain dump *n.* A large, unorganized mass of information, presented in response to a query via e-mail or a newsgroup article, that is difficult to digest or interpret.

branch *n.* **1.** A node intermediate between the root and the leaves in some types of logical tree structure, such as the directory tree in Windows or a tape distribution organization. **2.** Any connection between two items such as blocks in a flowchart or nodes in a network. *See* branch instruction.

branch instruction *n.* An assembly- or machine-level instruction that transfers control to another instruction, usually based on some condition (that is, it transfers if a specific condition is true or false). Branch instructions are most often relative transfers, jumping forward or backward by a certain number of bytes of code. *See also* GOTO statement, jump instruction.

branchpoint *n.* The location at which a given branch instruction occurs if the attendant condition (if any) is true. *See also* branch instruction.

branch prediction *n.* A technique used in some processors with an instruction called prefetch to guess whether or not a branch will be taken in a program, and to fetch executable code from the appropriate location. When a branch instruction is executed, it and the next instruction executed are stored in a buffer. This information is used to predict which way the instruction will branch the next time it is executed. When the prediction is correct (as it is over 90 percent of the time), executing a branch does not cause a pipeline break, so the system is not slowed down by the need to retrieve the next instruction. *See also* branch instruction, buffer[1], central processing unit, pipeline processing.

BRB *n.* Acronym for (I'll) **b**e **r**ight **b**ack. An expression used commonly on live chat services on the Internet and online information services by participants signaling their temporary departure from the group. *See also* chat[1] (definition 1).

breadboard *n.* A blank, perforated board used to support prototype electronic circuits. Experimenters would put components on one side of the board and run the leads through the perforations to be connected by wires running along the underside. Today a circuit designer's breadboard is made of plastic. Its holes are small and closely spaced to accommodate the pins of chips, and connections are made by metal strips plugged into the holes. See the illustration. *Compare* wire-wrapped circuits.

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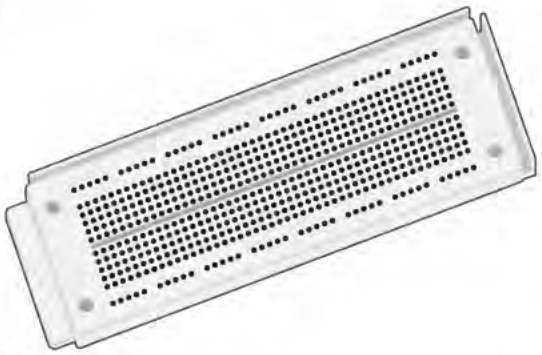
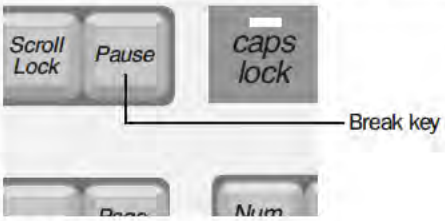


Breadboard.

break[1] *n.* **1.** Interruption of a program caused by the user pressing the Break key or its equivalent. **2.** Interruption of a communications transmission that occurs when the receiving station interrupts and takes over control of the line or when the transmitting station prematurely halts transmission. **3.** In the Java programming language, a keyword used to resume program execution at the next statement following the current statement. If the keyword is followed by a label, the program resumes at the indicated labeled statement. *See also* execute, statement.

break[2] *vb.* **1.** To interrupt execution at a given spot, usually for the purpose of debugging. *See also* breakpoint. **2.** To cause a routine, module, or program that had previously worked to cease working correctly.

Break key *n.* A key or combination of keys used to tell a computer to halt, or break out of, whatever it is doing. On IBM PCs and compatibles under DOS, pressing the Pause/Break or Scroll Lock/Break key while holding down the Ctrl key issues the break command (as does Ctrl-C). On Macintosh computers, the key combination that sends a break code is Command-period. See the illustration.



Break key.

break mode *n.* A temporary suspension of program execution while in the development environment. In break mode, you can examine, debug, reset, step through, or continue program execution.

breakout box *n.* A small hardware device that can be attached between two devices normally connected by a cable (such as a computer and a modem) to display and, if necessary, change the activity through individual wires of the cable.

breakpoint *n.* A location in a program at which execution is halted so that a programmer can examine the program's status, the contents of variables, and so on. A breakpoint is set and used within a debugger and is usually implemented by inserting at that point some kind of jump, call, or trap instruction that transfers control to the debugger. *See also* debug, debugger.

BRI *n.* Acronym for **B**asic **R**ate **I**nterface. An ISDN subscriber service that uses two B (64 Kbps) channels and one D (64 Kbps) channel to transmit voice, video, and data signals. *See also* ISDN.

bridge *n.* In terms of the Year 2000 problem, a program, routine, or other conversion mechanism that converts date formats from 2-digit years to 4-digit years and vice versa. A bridge is used as a remedy for literally bridging the 2-digit/4-digit format gap between programs or systems.

bridge *n.* **1.** A device that connects networks using the same communications protocols so that information can be passed from one to the other. *Compare* gateway. **2.** A device that connects two LANs (local area networks), whether or not they use the same protocols, and allows information to flow between them. The bridge operates at the ISO/OSI data-link layer. *Also called:* layer switch. *See also* data-link layer. *Compare* router.

bridge page *n. See* doorway page.

bridge router *n.* A device that supports the functions of both a bridge and router. A bridge router links two segments of a local or wide area network, passing packets of data between the segments as necessary, and uses Level 2 addresses for routing. *Also called:* Brouter. *See also* bridge (definition 2), router.

bridgeware *n.* Hardware or software designed to convert application programs or data files to a form that can be used by a different computer.

Briefcase *n.* A system folder in Windows 9x used for synchronizing files between two computers, usually between desktop and laptop computers. The Briefcase can be transferred to another computer via disk, cable, or network. When files are transferred back to the original computer, the Briefcase updates all files to the most recent version.

brightness *n.* The perceived quality of radiance or luminosity of a visible object. Brightness is literally in the eye (and mind) of the beholder; a candle in the night appears brighter than the same candle under incandescent lights. Although its subjective value cannot be measured with physical instruments, brightness can be measured as luminance (radiant energy). The brightness component of a color is different from its color (the hue) and from the intensity of its color (the saturation). *See also* color model, HSB.

British Naval Connector *n. See* BNC.

broadband *adj.* Of or relating to communications systems in which the medium of transmission (such as a wire or fiber-optic cable) carries multiple messages at a time, each message modulated on its own carrier frequency by means of modems. Broadband communication is found in wide area networks. *Compare* baseband.

broadband ISDN *n.* Next-generation ISDN based on ATM (Asynchronous Transfer Mode) technology. Broadband ISDN divides information into two categories: interactive services, which are controlled by the user, and distributed (or distribution) services that can be broadcast to the user. *Acronym:* BISDN. *See also* ATM (definition 1), ISDN.

broadband modem *n.* A modem for use on a broadband network. Broadband technology allows several networks to coexist on a single cable. Traffic from one network does not interfere with traffic from another, since the conversations happen on different frequencies, rather like the commercial radio system. *See also* broadband network.

broadband network *n.* A local area network on which transmissions travel as radio-frequency signals over separate inbound and outbound channels. Stations on a broadband network are connected by coaxial or fiber-optic cable, which can carry data, voice, and video simultaneously over multiple transmission channels that are distinguished by frequency. A broadband network is capable of high-speed operation (20 megabits or more), but it is more expensive than a baseband network and can be difficult to install. Such a network is based on the same technology used by cable television (CATV). *Also called:* wideband transmission. *Compare* baseband network.

broadcast[1] *adj.* Sent to more than one recipient. In communications and on networks, a broadcast message is one distributed to all stations. *See also* e-mail[1] (definition 1).

broadcast[2] *n.* As in radio or television, a transmission sent to more than one recipient.

broadcast publishing point *n.* A type of publishing point that streams content in such a way that the client cannot control (start, stop, pause, fast forward, or rewind) the content. Content streamed from a broadcast publishing point can be delivered as a multicast or unicast stream. Formerly called a station.

broadcast storm *n.* A network broadcast that causes multiple hosts to respond simultaneously, overloading the network. A broadcast storm may occur when old TCP/IP routers are mixed with routers that support a new protocol. *See also* communications protocol, router, TCP/IP.

broken as designed *adj. See* BAD.

Brouter *n. See* bridge router.

brownout *n.* A condition in which the electricity level is appreciably reduced for a sustained period of time. In contrast to a blackout, or total loss of power, a brownout continues the flow of electricity to all devices connected to electrical outlets, although at lower levels than the normally supplied levels (120 volts in the United States). A brownout can be extremely damaging to sensitive electronic devices, such as computers, because the reduced and often fluctuating voltage levels can cause components to operate for extended periods of time outside the range they were designed to work in. On a computer, a brownout is characterized by a smaller, dimmer, and somewhat fluctuating display area on the monitor and potentially erratic behavior by the system unit. The only reliable means of preventing damage caused by a brownout condition is to use a battery-backed uninterruptible power supply (UPS). *See also* UPS. *Compare* blackout.

browse *vb.* To scan a database, a list of files, or the Internet, either for a particular item or for anything that seems to be of interest. Generally, browsing implies observing, rather than changing, information. In unauthorized computer hacking, browsing is a (presumably) nondestructive

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means of finding out about an unknown computer after illegally gaining entry.

browser *n. See* Web browser.

browser box *n. See* WebTV.

browser CLUT *n.* A color look-up table consisting of the 216 colors deemed safe when viewed with most Web browsers on most computer operating systems. *See also* CLUT, Web safe palette.

BRS *n. See* big red switch.

brush *n.* A tool used in paint programs to sketch or fill in areas of a drawing with the color and pattern currently in use. Paint programs that offer a variety of brush shapes can produce brushstrokes of varying width and, in some cases, shadowing or calligraphic effects.

brute force *adj.* In general, any process that essentially involves "doing it the hard way." In computer technology, however, brute force typically refers to a programming style that relies on the computer's processing power rather than on skill and planning to create or find a more elegant solution to a problem. Brute-force programming also ignores available information on how similar situations were handled in the past and might depend on outmoded design methodologies. For example, a program using brute force to crack passwords might try all the words in a dictionary (which would require huge amounts of computing power). Instead, more elegant programming would involve using special rules, history, statistics, and other available techniques or information to limit the number and types of words to try first.

BSC *n. See* BISYNC.

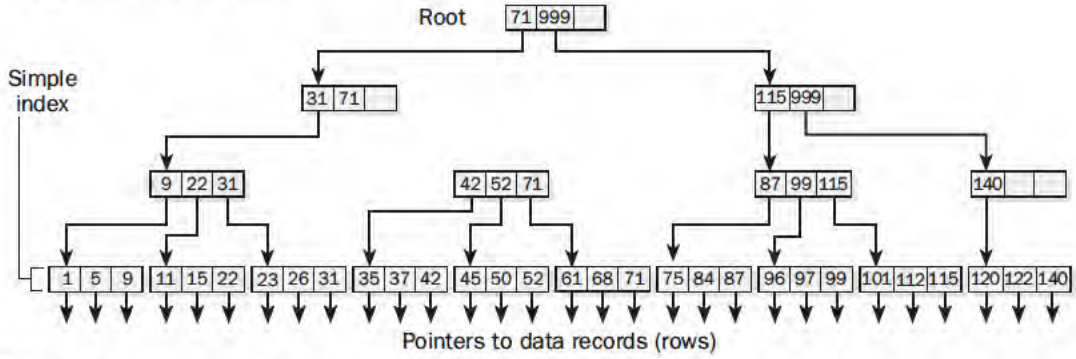
BSD/OS *n.* A version of the UNIX operating system based on BSD UNIX and sold by Berkeley Software Design, Inc. *See also* BSD UNIX.

BSD UNIX *n.* Acronym for Berkeley Software Distribution UNIX. A UNIX version developed at the University of California at Berkeley, providing additional capabilities such as networking, extra peripheral support, and use of extended filenames. BSD UNIX was instrumental in gaining widespread acceptance of UNIX and in getting academic institutions connected to the Internet. BSD UNIX is now being developed by Berkeley Software Design, Inc. *Also called:* Berkeley UNIX. *See also* BSD/OS, UNIX.

BSOD *n. See* Blue Screen of Death.

BSS *n. See* Basic Service Set.

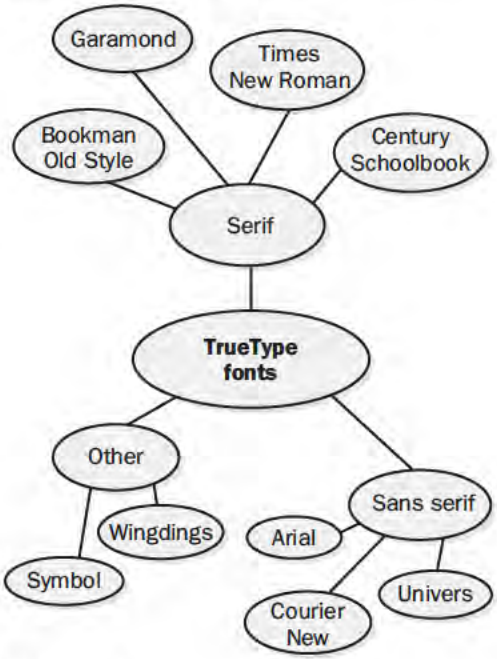
B-tree or **btree** *n.* A tree structure for storing database indexes. Each node in the tree contains a sorted list of key values and links that correspond to ranges of key values between the listed values. To find a specific data record given its key value, the program reads the first node, or root, from the disk and compares the desired key with the keys in the node to select a subrange of key values to search. It repeats the process with the node indicated by the corresponding link. At the lowest level, the links indicate the data records. The database system can thus rapidly skip down through the levels of the tree structure to find the simple index entries that contain the location of the desired records or rows. See the illustration.



B-tree. *A B-tree index structure.*

BTW or **btw** *n.* Acronym for by the way. An expression often used to preface remarks in e-mail and Internet newsgroup articles.

bubble chart *n.* A chart in which annotated ovals (bubbles) representing categories, operations, or procedures are connected by lines or arrows that represent data flows or other relationships among the items represented by bubbles. In systems analysis, bubble charts, rather than block diagrams or flowcharts, are used to describe the connections between concepts or parts of a whole, without emphasizing a structural, sequential, or procedural relationship between the parts. See the illustration. *Compare* block diagram, flowchart.

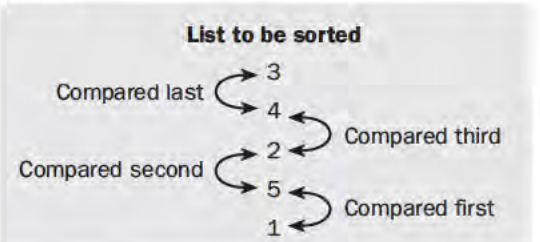


Bubble chart.

bubble-jet printer *n.* A form of nonimpact printer that uses a mechanism similar to that used by an ink-jet printer to shoot ink from nozzles to form characters on paper. A bubble-jet printer uses special heating elements to prepare the ink, whereas an ink-jet printer uses piezoelectric crystals. *See also* ink-jet printer, nonimpact printer. *Compare* laser printer.

bubble memory *n.* Memory formed by a series of persistent magnetic "bubbles" in a thin film substrate. In contrast to ROM, information can be written to bubble memory. In contrast to RAM, data written to bubble memory remains there until it is changed, even when the computer is turned off. For this reason, bubble memory has had some application in environments in which a computer system must be able to recover with minimal data loss in the event of a power failure. The use of and demand for bubble memory has all but disappeared because of the introduction of flash memory, which is less expensive and easier to produce. *See also* flash memory, nonvolatile memory.

bubble sort *n.* A sorting algorithm that starts at the end of a list with *n* elements and moves all the way through, testing the value of each adjacent pair of items and swapping them if they aren't in the right order. The entire process is then repeated for the remaining $n - 1$ items in the list, and so on, until the list is completely sorted, with the largest value at the end of the list. A bubble sort is so named because the "lightest" item in a list (the smallest) will figuratively "bubble up" to the top of the list first; then the next-lightest item bubbles up to its position, and so on. See the illustration. *Also called:* exchange sort. *See also* algorithm, sort. *Compare* insertion sort, merge sort, quicksort.



List after first pass	List after second pass
1	1
3	2
4	3
2	4
5	5

Bubble sort.

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bubble storage *n. See* bubble memory.

bucket *n.* A region of memory that is addressable as an entity and can be used as a receptacle to hold data. *See also* bit bucket.

bucket brigade attack *n. See* man-in-the-middle attack.

buffer[1] *n.* A region of memory reserved for use as an intermediate repository in which data is temporarily held while waiting to be transferred between two locations or devices. For instance, a buffer is used while transferring data from an application, such as a word processor, to an input/output device, such as a printer.

buffer[2] *vb.* To use a region of memory to hold data that is waiting to be transferred, especially to or from input/output (I/O) devices such as disk drives and serial ports.

buffer pool *n.* A group of memory or storage-device locations that are allocated for temporary storage, especially during transfer operations.

buffer storage *n.* **1.** The use of a special area in memory to hold data temporarily for processing until a program or operating system is ready to deal with it. **2.** An area of storage that is used to hold data to be passed between devices that are not synchronized or have different bit transfer rates.

bug *n.* **1.** An error in coding or logic that causes a program to malfunction or to produce incorrect results. Minor bugs, such as a cursor that does not behave as expected, can be inconvenient or frustrating, but do not damage information. More severe bugs can require the user to restart the program or the computer, losing whatever previous work had not been saved. Worse yet are bugs that damage saved data without alerting the user. All such errors must be found and corrected by the process known as *debugging*. Because of the potential risk to important data, commercial application programs are tested and debugged as completely as possible before release. After the program becomes available, further minor bugs are corrected in the next update. A more severe bug can sometimes be fixed with a piece of software called a *patch*, which circumvents the problem or in some other way alleviates its effects. *See also* beta test, bomb[2], crash[2] (definition 1), debug, debugger, hang, inherent error, logic error, semantic error, syntax error. **2.** A recurring physical problem that prevents a system or set of components from working together properly. While the origin of this definition is in some dispute, computer folklore attributes the first use of bug in this sense to a problem in the Harvard Mark I or the Army/University of Pennsylvania ENIAC that was traced to a moth caught between the contacts of a relay in the machine (although a moth is not entomologically a true bug).

buggy *adj.* Full of flaws, or bugs, in reference to software. *See also* bug (definition 1).

building-block principle *n. See* modular design.

built-in check *n. See* hardware check, power-on self test.

built-in font *n. See* internal font.

built-in groups *n.* The default groups provided with Microsoft Windows NT and Windows NT Advanced Server. A group defines a collection of rights and permissions for the user accounts that are its members. Built-in groups are therefore a convenient means of providing access to commonly used resources. *See also* group[1].

bulk eraser *n.* A device for eliminating all information from a storage medium, such as a floppy disk or a tape, by generating a strong magnetic field that scrambles the alignment of the ferrous materials in the media that encode stored data.

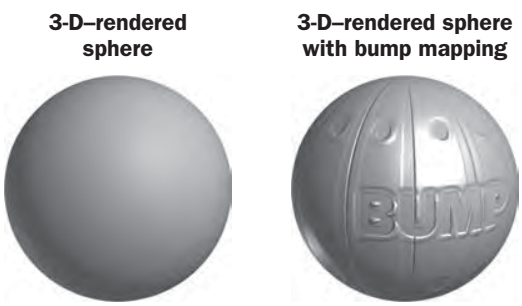
bulk storage *n.* Any medium capable of containing large quantities of information, such as tape, fixed disk, or optical disc.

bullet *n.* A typographical symbol, such as a filled or empty circle, diamond, box, or asterisk, used to set off a small block of text or each item in a list. Round and square bullets are used to set off different levels of information. *See also* dingbat.

bulletin board system *n. See* BBS.

bulletproof *adj.* Capable of overcoming hardware problems that, in another system, could lead to interruption of the task in progress.

bump mapping *n.* In 3D computer game rendering and other digital animation applications, a graphic technique in which a texture is added to the surface of an image to increase the perceived detail of the object. Bump mapping gives each pixel a texture, which is calculated by the computer's video card to respond to changes in surroundings, allowing a more realistic interpretation of objects. See the illustration.



Bump mapping. *A 3-D–rendered sphere showing bump mapping.*

bundle *vb.* To combine products for sale as a lot. Frequently, operating system software and some widely used applications are bundled with a computer system for sale.

bundled software *n.* **1.** Programs sold with a computer as part of a combined hardware/software package. **2.** Smaller programs sold with larger programs to increase the latter's functionality or attractiveness.

burn *vb.* **1.** To write data electronically into a programmable read-only memory (PROM) chip by using a special programming device known variously as a PROM programmer, PROM blower, or PROM blaster. *Also called:* blast, blow. *See also* PROM. **2.** To create read-only memory compact discs (CD-ROMs). **3.** To write data electronically on a flash memory chip or a PC Card Type III. Unlike PROM chips or CD-ROM, flash memory media can be burned, or flashed, repeatedly with new information. *Also called:* flash.

burn in *vb.* **1.** To keep a new system or device running continuously so that any weak elements or components will fail early and can be found and corrected before the system becomes an integral part of the user's work routine. Such a test is often performed at the factory before a device is shipped. **2.** To make a permanent change in the phosphor coating on the inside of a monitor screen by leaving the monitor on and keeping a bright, unchanging image on the screen for extended periods. Such an image will remain visible after the monitor is turned off. Burning in was a danger with older PC monitors; it is no longer a concern with most new PC monitors. *Also called:* ghosting.

burst[1] *n.* Transfer of a block of data all at one time without a break. Certain microprocessors and certain buses have features that support various types of burst transfers. *See also* burst speed (definition 1).

burst[2] *vb.* To break fanfold continuous-feed paper apart at its perforations, resulting in a stack of separate sheets.

burster *n.* A device used to burst, or break apart at the perforations, fanfold continuous-feed paper.

burst extended-data-out RAM *n. See* BEDO DRAM.

burst mode *n.* A method of data transfer in which information is collected and sent as a unit in one high-speed transmission. In burst mode, an input/output device takes control of a multiplexer channel for the time required to send its data. In effect, the multiplexer, which normally merges input from several sources into a single high-speed data stream, becomes a channel dedicated to the needs of one device until the entire transmission has been sent. Burst mode is used both in communications and between devices in a computer system. *See also* burst[1].

burst rate *n. See* burst speed (definition 1).

burst speed *n.* **1.** The fastest speed at which a device can operate without interruption. For example, various communications devices (as on networks) can send data in bursts, and the speed of such equipment is sometimes measured as the burst speed (the speed of data transfer while the burst is being executed). *Also called:* burst rate. **2.** The number of characters per second that a printer can print on one line without a carriage return or linefeed. Burst speed measures the actual speed of printing, without consideration of the time taken to advance paper or to move the print head back to the left margin. Almost always, the speed claimed by the manufacturer is the burst speed. By contrast, *throughput* is the number of characters per second when one or more entire pages of text are being printed and is a more practical measurement of printer speed in real-life situations.

bursty *adj.* Transmitting data in spurts, or bursts, rather than in a continuous stream.

bus *n.* A set of hardware lines (conductors) used for data transfer among the components of a computer system. A bus is essentially a shared highway that connects different parts of the system—including the processor, disk-drive controller, memory, and input/output ports—and enables them to transfer information. The bus consists of specialized groups of lines that carry different types of information. One group of lines carries data; another carries memory addresses (locations) where data items are to be found; yet another carries control signals. Buses are characterized by the number of bits they can transfer at a single

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time, equivalent to the number of wires within the bus. A computer with a 32-bit address bus and a 16-bit data bus, for example, can transfer 16 bits of data at a time from any of 2^{32} memory locations. Most PCs contain one or more expansion slots into which additional boards can be plugged to connect them to the bus.

bus enumerator *n.* A device driver that identifies devices located on a specific bus and assigns a unique identification code to each device. The bus enumerator is responsible for loading information about the devices onto the hardware tree. *See also* bus, device driver, hardware tree.

bus extender *n.* **1.** A device that expands the capacity of a bus. For example, IBM PC/AT computers used a bus extender to add onto the earlier PC bus and allow the use of 16-bit expansion boards in addition to 8-bit boards. *See also* bus. **2.** A special board used by engineers to raise an add-on board above the computer's cabinet, making it easier to work on the circuit board.

business graphics *n. See* presentation graphics.

business information system *n.* A combination of computers, printers, communications equipment, and other devices designed to handle data. A completely automated business information system receives, processes, and stores data; transfers information as needed; and produces reports or printouts on demand. *Acronym:* BIS. *See also* management information system.

business logic *n.* A set of rules and calculations built into a business information application. The application uses business logic to sort incoming information and respond accordingly. Business logic functions as a set of guidelines that ensure the application's actions conform to the specific needs of a business.

business software *n.* Any computer application designed primarily for use in business, as opposed to scientific use or entertainment. In addition to the well-known areas of word processing, spreadsheets, databases, and communications, business software for microcomputers also encompasses such applications as accounting, payroll, financial planning, project management, decision and support systems, personnel record maintenance, and office management.

Business Software Alliance *n.* International organization of computer software companies that promotes the interests of the software industry. This alliance focuses on educating the public on the importance of software, advancing free and open world trade, and supporting legislation opposing software piracy and Internet theft. The Business Software Alliance has offices in the United States, Europe, and Asia, with members in more than 60 nations around the world. *Acronym:* BSA.

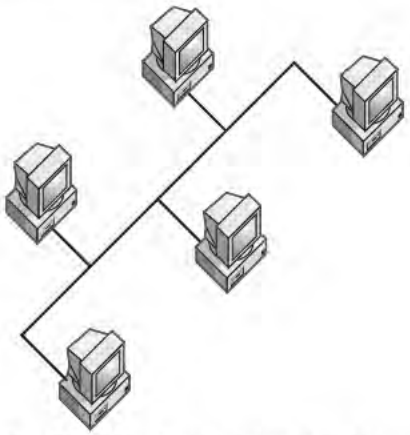
business-to-business *n. See* B2B.

business-to-consumer *n. See* B2C.

bus mastering *n.* In modern bus architectures, the ability of a device controller card—a network adapter or a disk controller, for example—to bypass the CPU and work directly with other devices to transfer data into and out of memory. Enabling devices to take temporary control of the system bus for data transfer and bus mastering frees the CPU for other work. This in turn improves performance in tasks, such as video replay and multiple-user queries to large databases, that require simultaneous data access and intensive processing. The technology known as direct memory access (DMA) is a well-known example of bus mastering. *See also* bus, controller, direct memory access. *Compare* PIO.

bus mouse *n.* A mouse that attaches to the computer's bus through a special card or port rather than through a serial port. *See also* mouse. *Compare* serial mouse.

bus network *n.* A topology (configuration) for a LAN (local area network) in which all nodes are connected to a main communications line (bus). On a bus network, each node monitors activity on the line. Messages are detected by all nodes but are accepted only by the node(s) to which they are addressed. A malfunctioning node ceases to communicate but does not disrupt operation (as it might on a ring network, in which messages are passed from one node to the next). To avoid collisions that occur when two or more nodes try to use the line at the same time, bus networks commonly rely on collision detection or token passing to regulate traffic. See the illustration. *Also called:* bus topology, linear bus. *See also* collision detection, contention, CSMA/CD, token bus network, token passing. *Compare* ring network, star network.



Bus network. *A bus network configuration.*

bus system *n.* The interface circuitry that controls the operations of a bus and connects it with the rest of the computer system. *See also* bus.

bus topology *n. See* bus network.

button *n.* **1.** A graphic element in a dialog box that, when activated, performs a specified function. The user activates a button by clicking on it with a mouse or, if the button has the focus, by hitting the Return or Enter key. **2.** On a mouse, a movable piece that is pressed to activate some function. Older mouse models have only one button; newer models typically have two or more buttons.

button bomb *n.* A button on Web pages with the image of a bomb.

button help *n.* Help information displayed via the selection of buttons or icons. Applications such as the World Wide Web, multimedia kiosks, and computer-aided instruction often use button help icons to ease system navigation.

bypass *n.* In telecommunications, the use of communication pathways other than the local telephone company, such as satellites and microwave systems.

byte *n.* Short for **b**inary **te**rm. A unit of data, today almost always consisting of 8 bits. A byte can represent a single character, such as a letter, a digit, or a punctuation mark. Because a byte represents only a small amount of information, amounts of computer memory and storage are usually given in kilobytes (1024 bytes), megabytes (1,048,576 bytes), or gigabytes (1,073,741,824 bytes). *Abbreviation:* B. *See also* bit, gigabyte, kilobyte, megabyte. *Compare* octet, word.

bytecode *n.* An encoding of a computer program that a compiler produces when the original source code is processed. This encoding is in an abstract, processor-independent form that cannot be directly executed by most CPUs but is highly suitable for further analysis (for example, compiler optimization), for processing by interpreters (for example, executing Java applets within Web browsers), or for use in generation of binary instructions for the target computer's CPU. Intermediate bytecode production is a feature of the compilers for the Pascal and Java programming languages. *See also* central processing unit, compiler (definition 2), interpreter, Java, Java applet, Pascal.

BYTE Information Exchange *n. See* BIX.

byte-oriented protocol *n.* A communications protocol in which data is transmitted as a string of characters in a particular character set, such as ASCII, rather than as a stream of bits as in a bit-oriented protocol. To express control information, a byte-oriented protocol relies on control characters, most of which are defined by the coding scheme used. The asynchronous communications protocols commonly used with modems and IBM's BISYNC protocol are byte-oriented protocols. *Compare* bit-oriented protocol.

bytes per inch *n.* The number of bytes that fit into an inch of length on a disk track or a tape. *Acronym:* BPI.

C

C *n.* A programming language developed by Dennis Ritchie at Bell Laboratories in 1972. It is so named because its immediate predecessor was the B programming language. Although C is considered by many to be more a machine-independent assembly language than a high-level language, its close association with the UNIX operating system, its enormous popularity, and its standardization by the American National Standards Institute (ANSI) have made it perhaps the closest thing to a standard programming language in the microcomputer/workstation marketplace. C is a compiled language that contains a small set of built-in functions that are machine dependent. The rest of the C functions are machine independent and are contained in libraries that can be accessed from C programs. C programs are composed of one or more functions defined by the programmer; thus C is a structured programming language. *See also* C++, compiled language, library, Objective-C, structured programming.

C++ *n.* An object-oriented version of the C programming language, developed by Bjarne Stroustrup in the early 1980s at Bell Laboratories and adopted by a number of vendors, including Apple Computer, Inc. and Sun Microsystems, Inc. *See also* C, Objective-C, object-oriented programming.

C2 *n.* A security class of the U.S. Department of Defense Trusted Computer System Evaluation Criteria (DOD 4200.28.STD). C2 is the lowest level of security in the U.S. National Computer Security Center's hierarchy of criteria for trusted computer systems, requiring user logon with password and a mechanism for auditing. The C2 level is outlined in the Orange Book. *See also* Orange Book (definition 1).

CA *n. See* certificate authority.

.cab *n.* File extension for cabinet files, which are multiple files compressed into one and extractable with the extract.exe utility. Such files are frequently found on Microsoft software (for example, Windows 9x) distribution disks.

cabinet *n.* The box in which the main components of a computer (CPU, the hard drive, floppy and CD-ROM drives, and expansion slots for peripheral devices, such as monitors) are located. *See also* CPU, expansion slot.

cable[1] *n.* A collection of wires shielded within a protective tube, used to connect peripheral devices to a computer. A mouse, a keyboard, and a printer might all be connected to a computer with cables. Printer cables typically implement a serial or a parallel path for data to travel along. See the illustration.

Cable.

cable[2] *adj.* Pertaining to the cable television (CATV) distribution system. For example, a cable modem is a modem that sends and receives digital data through a connection to a cable TV system. Because cable TV is a broadband service, it can carry data (such as an Internet connection) at a very high speed. *See also* CATV.

cable connector *n.* The connector on either end of a cable. *See also* DB connector, DIN connector, RS-232-C standard, RS-422/423/449.

cable matcher *n.* A device that allows the use of a cable that has slightly different wire connections from those required by the devices to which it is attached.

cable modem *n.* A modem that sends and receives data through a coaxial cable television network instead of telephone lines, as with a conventional modem. Cable modems, which have speeds of 500 kilobits per second (Kbps), can generally transmit data faster than current conventional modems. However, cable modems do not operate at the same rate upstream (when sending information) and downstream (when receiving information). Upstream rates vary from about 2 Mbps to 10 Mbps,

downstream rates from about 10 Mbps to 36 Mbps. *See also* coaxial cable, modem.

cable telephony *n.* Telephone service provided over a cable TV connection rather than over traditional telephone lines. Although service is delivered over cable rather than telephone wire, the end user perceives no difference between cable telephony and normal telephone service. Proponents of cable telephony see it as part of the eventual integration of Internet, television, and telephone services into a single communication/entertainment unit.

cable television *n. See* CATV.

cabling diagram *n.* A plan that shows the path of cables that attach computer system components or peripherals. Cabling diagrams are particularly important for explaining the connection of disk drives to a disk controller.

cache *n.* A special memory subsystem in which frequently used data values are duplicated for quick access. A memory cache stores the contents of frequently accessed RAM locations and the addresses where these data items are stored. When the processor references an address in memory, the cache checks to see whether it holds that address. If it does hold the address, the data is returned to the processor; if it does not, a regular memory access occurs. A cache is useful when RAM accesses are slow compared with the microprocessor speed because cache memory is always faster than main RAM memory. *See also* disk cache, wait state.

cache card *n.* An expansion card that increases a system's cache memory. *See also* cache, expansion board.

Cache-Coherent Non-Uniform Memory Access *n. See* ccNUMA.

cache farm *n.* A group of servers that save copies of Web pages to caches to fulfill successive requests without calling the pages up repeatedly from the Web server. In essence, the servers are dedicated to caching. By saving Web pages where they can be accessed without increasing traffic on the Web site, the cache farm allows higher-performance Web access for the end user and a reduction in network congestion and volume. *See also* cache.

cache memory *n. See* cache.

cache poisoning *n.* Deliberate corruption of Internet Domain Name System (DNS) information through alteration of data that equates host names with their IP addresses. Misleading information of this type, when cached (saved) by one DNS server and later passed to another, exposes DNS servers to attacks in which data sent from one host to another can be accessed or corrupted. Cache poisoning has been used to redirect network requests from a legitimate server to an alternate Web site. *See also* DNS.

CAD *n.* Acronym for **c**omputer-**a**ided **d**esign. A system of programs and workstations used in designing engineering, architectural, and scientific models ranging from simple tools to buildings, aircraft, integrated circuits, and molecules. Various CAD applications create objects in two or three dimensions, presenting the results as wire-frame "skeletons," as more substantial models with shaded surfaces, or as solid objects. Some programs can also rotate or resize models, show interior views, generate lists of materials required for construction, and perform other allied functions. CAD programs rely on mathematics, often requiring the computing power of a high-performance workstation. *See also* CAD/CAM, I-CASE.

CAD/CAM *n.* Acronym for **c**omputer-**a**ided **d**esign/**c**omputer-**a**ided **m**anufacturing. The use of computers in both the design and manufacture of a product. With CAD/CAM, a product, such as a machine part, is designed with a CAD program and the finished design is translated into a set of instructions that can be transmitted to and used by the machines dedicated to fabrication, assembly, and process control. *See also* CAD, I-CASE.

CADD *n.* A system of hardware and software similar to CAD but with additional features related to engineering conventions, including the ability to display dimension specifications and other notes. *Acronym:* CADD. *See also* CAD.

caddy *n.* A plastic carrier that holds a CD-ROM and is inserted into a CD-ROM drive. Some PCs, especially older models, have CD-ROM drives that require the use of a caddy. Most current CD-ROM drives do not require a caddy.

CAE *n.* Acronym for **c**omputer-**a**ided **e**ngineering. An application that enables the user to perform engineering tests and analyses on designs created with a computer. In some instances, capabilities such as logic testing that are generally attributed to CAE applications are also part of CAD programs, so the distinction between CAD and CAE is not a hard-and-fast one. *See also* CAD, I-CASE.

C

CAI *n.* Acronym for **c**omputer-**a**ided (or **c**omputer-**a**ssisted) **i**nstruction. An educational program designed to serve as a teaching tool. CAI programs typically use tutorials, drills, and question-and-answer sessions to present a topic and to test the student's comprehension. CAI programs are excellent aids for presenting factual material and for allowing students to pace their learning speed. Subjects and complexity range from beginning arithmetic to advanced mathematics, science, history, computer studies, and specialized topics. *Also called:* CAL, CAT, computer-aided learning, computer-aided teaching, computer-assisted learning, computer-assisted teaching, computer-augmented learning. *See also* I-CASE. *Compare* CBT, CMI.

CAL *n.* **1.** Acronym for **c**omputer-**a**ssisted (or **c**omputer-**a**ugmented) **l**earning. *See* CAI. **2.** Acronym for **C**ommon **A**pplication **L**anguage. An object-oriented communications language for controlling home-networking products. CAL, originally part of the CEBus (Consumer Electronic Bus) standard for home automation, can be implemented with various communication protocols, home-networking standards, and home electronic products. *See also* CEBus, home automation.

calculator *n.* Broadly, any device that performs arithmetic operations on numbers. Sophisticated calculators can be programmed for certain functions and can store values in memory, but they differ from computers in several ways: they have a fixed set of commands, they do not recognize text, they cannot retrieve values stored in a data file, and they cannot find and use values generated by a program such as a spreadsheet.

calendar program *n.* An application program in the form of an electronic calendar, commonly used for highlighting dates and scheduling appointments. Some calendar programs resemble wall calendars, displaying dates in blocks labeled with the days of the week; others display dates day by day and enable the user to enter appointments, notes, and other memoranda. A day-of-the-week type of calendar program could, for example, be used to find out that Christmas 2003 will be on a Saturday. Depending on its capabilities, such a program might cover only the current century, or it might cover hundreds of years and even allow for the change (in 1582) from the Julian to the Gregorian calendar. A calendar/scheduler program might show blocks of dates or, like an appointment book, single days divided into hours or half hours, with room for notes. Some programs allow the user to set an alarm to go off at an important point in the schedule. Other programs can coordinate the calendars of different people on the same network so that a person entering an appointment into his or her calendar also enters the appointment into a colleague's calendar.

call[1] *n.* In a program, an instruction or statement that transfers program execution to some section of code, such as a subroutine, to perform a specific task. Once the task is performed, program execution resumes at the calling point in the program. *See also* calling sequence.

call[2] *vb.* **1.** To establish a connection through a telecommunications network. **2.** To transfer program execution to some section of code (usually a subroutine) while saving the necessary information to allow execution to resume at the calling point when the called section has completed execution. Some languages (such as FORTRAN) have an explicit CALL statement; others (such as C and Pascal) perform a call when the name of a procedure or function appears. In assembly language, there are various names for a CALL instruction. When a subroutine call occurs in any language, one or more values (known as arguments or parameters) are often passed to the subroutine, which can then use and sometimes modify these values. *See also* argument, parameter.

callback or **callback security** *n.* A security feature used to authenticate users calling in to a network. During callback, the network validates the caller's username and password, hangs up, and then returns the call, usually to a preauthorized number. This security measure usually prevents unauthorized access to an account even if an individual's logon ID and password have been stolen. *See also* authentication, preset-to callback, remote access server.

callback modem *n.* A modem that, instead of answering an incoming call, requires the caller to enter a touch-tone code and hang up so that the modem can return the call. When the modem receives the caller's code, it checks the code against a stored set of phone numbers. If the code matches an authorized number, the modem dials the number and then opens a connection for the original caller. Callback modems are used when communications lines must be available to outside users but data must be protected from unauthorized intruders.

calling sequence *n.* In a program when a subroutine call occurs, an agreement between the calling routine and the called routine on how arguments will be passed and in what order, how values will be returned, and which routine

will handle any necessary housekeeping (such as cleaning up the stack). The calling sequence becomes important when the calling and called routines were created with different compilers or if either was written in assembly language. Two common calling sequences are the C calling sequence and the Pascal calling sequence. In the C calling sequence, the calling routine pushes any arguments included in the call on the stack in reverse order (right to left) and performs any stack cleanup; this permits a varying number of arguments to be passed to a given routine. In the Pascal calling sequence, the calling routine pushes any included arguments on the stack in the order in which they appear (left to right), and the called routine is expected to clean up the stack. *See also* argument, call[1], stack.

CALL instruction *n.* A type of programming instruction that diverts program execution to a new area in memory (sequence of directives) and also allows eventual return to the original sequence of directives.

CALS *n.* Acronym for **C**omputer-Aided **A**cquisition and **L**ogistics **S**upport. A U.S. Department of Defense standard for electronic exchange of data with commercial suppliers.

CAM *n.* **1.** Acronym for **c**omputer-**a**ided **m**anufacturing. The use of computers in automating the fabrication, assembly, and control aspects of manufacturing. CAM applies to the manufacture of products ranging from small-scale production to the use of robotics in full-scale assembly lines. CAM relates more to the use of specialized programs and equipment than it does to the use of microcomputers in a manufacturing environment. *See also* CAD/CAM, I-CASE. **2.** *See* Common Access Method.

camera-ready *adj.* In publishing, of or pertaining to the stage at which a document, with all typographic elements and graphics in place, is suitably prepared to be sent to a printing service. The printing service photographs the camera-ready copy and then uses the photograph to make plates for printing. Some applications are advertised as being able to bring documents to the camera-ready stage, eliminating the need for manual layout and pasteup of elements onto boards.

campuswide information system *n.* Information and services distributed on a college or university campus through computer networks. Campuswide information system services typically include student and faculty directories, calendars of campus events, and access to databases. *Acronym:* CWIS.

cancel *n.* A control character used in communication with printers and other computers, commonly designated as CAN. It usually means that the line of text being sent should be canceled. In ASCII, which is the basis of character sets used by most microcomputers, this is represented internally as character code 24.

cancelbot *n.* Short for **cancel** ro**bot**. A program that identifies articles in newsgroups based on a set of criteria and cancels the distribution of those articles. Although the criteria for cancellation is set by the owner of the cancelbot, most cancelbots exist to identify and eliminate spam messages posted to dozens or hundreds of newsgroups. *See also* spam.

cancel message *n.* A message sent to Usenet news servers indicating that a certain article is to be canceled, or deleted, from the server. *See also* article, news server, Usenet.

candidate key *n.* A unique identifier for a tuple (row) within a relation (database table). The candidate key may be either simple (a single attribute) or composite (two or more attributes). By definition, every relation must have at least one candidate key, but it is possible for a relation to have more than one candidate key. If there is only one candidate key, it automatically becomes the primary key for the relation. If there are multiple candidate keys, the designer must designate one as the primary key. Any candidate key that is not the designated primary key is an alternate key. *See also* key (definition 2), primary key.

canned program *n. See* canned software.

canned routine *n.* A previously written routine that is copied into a program and used as is, without modification. *See also* library routine.

canned software *n.* Off-the-shelf software, such as word processors and spreadsheet programs.

canonical form *n.* In mathematics and programming, the standard or prototypical form of an expression or a statement.

canonical name *n.* An object's distinguished name presented with the root first and without the LDAP attribute tags (such as: CN=, DC=). The segments of the name are delimited with forward slashes (/). For example, CN=MyDocuments,OU=MyOU,DC=Microsoft,DC=Com is presented as microsoft.com/MyOU/MyDocuments in canonical form. *See also* Lightweight Directory Access Protocol.

C

capacitance *n.* The ability to store an electric charge. Capacitance is measured in farads. A capacitance of 1 farad will hold 1 coulomb of charge at a potential of 1 volt. In practical use, a farad is an extremely large amount of capacitance; typical capacitors have values of microfarads (10^{-6}) or picofarads (10^{-12}). *See also* capacitor.

capacitor *n.* A circuit component that provides a known amount of capacitance (ability to store an electric charge). A capacitor typically consists of two conductive plates separated by an insulating (dielectric) material. If other factors remain constant, capacitance increases as the plates are made larger or brought closer together. A capacitor blocks direct current but passes alternating current to an extent that depends on its capacitance and on the frequency of the current. *See also* capacitance.

capacity *n.* The amount of information a computer or an attached device can process or store. *See also* computer.

caps *n.* Short for **cap**ital letters. *Compare* lowercase.

Caps Lock key *n.* A toggle key that, when on, shifts the alphabetic characters on the keyboard to uppercase. The Caps Lock key does not affect numbers, punctuation marks, or other symbols. See the illustration.

Caps Lock key.

capstan *n.* On a tape recorder, a polished metal post against which a turning rubber wheel (called a pinch roller) presses to move a length of magnetic tape placed between the wheel and the post. The capstan controls the speed of the tape as it moves past the recording head. *See also* pinch roller.

capture *vb.* In communications, to transfer received data into a file for archiving or later analysis.

capture board *n. See* video capture card.

capture card *n. See* video capture card.

Carbon *n.* Code name for the Application Program Interfaces (API) and shared libraries used to write applications for Macintosh OS X. Since Macintosh OS X is an entirely different system rather than an update of the previous Macintosh OS, Carbon bridges the gap between the systems, allowing developers to rewrite their programs to OS X without rewriting the code for the entire application. Carbon allows OS X native applications to run under earlier versions of the Macintosh OS without modification but with OS X advantages.

carbon copy *n. See* cc.

carbonize *vb.* To update a Macintosh application for OS X. Although older versions of Macintosh applications will run under OS X, only those that have been carbonized will be able to use OS X–specific advantages.

carbon ribbon *n.* A ribbon used with impact printers, especially daisy-wheel printers, and with typewriters for highest-quality output. A carbon ribbon is made of a thin strip of Mylar coated on one side with a carbon film. Characters printed with a carbon ribbon are extremely crisp and free from the fuzziness that can be associated with an inked cloth ribbon. *Also called:* film ribbon, Mylar ribbon. *See also* daisy-wheel printer. *Compare* cloth ribbon.

card *n.* **1.** A printed circuit board or adapter that can be plugged into a computer to provide added functionality or new capability. These cards provide specialized services, such as mouse support and modem capabilities, that are not built into the computer. *See also* adapter, board, printed circuit board. **2.** In programs such as the HyperCard hypertext program, an on-screen representation of an index card on which information can be stored and "filed" (saved) for future reference. *See also* hypertext. **3.** A manila card about 3 inches high by 7 inches long on which 80 columns of data could be entered in the form of holes punched with a keypunch machine. The punched holes corresponded to numbers, letters, and other characters and could be read by a computer that used a punched-card reader. *Also called:* punched card. *See also* card reader (definition 2).

card cage *n.* An enclosure area for holding printed circuit boards (cards). Most computers have an area with protective metal and mounting brackets where cards are installed. The term originally came from an external box that held rack-mounted cards or peripherals and resembled a cage.

carder *n.* A person who engages in online credit card fraud. Specifically, a carder steals credit card numbers, either to purchase merchandise (often computer-related) from Web-based stores or to trade the stolen numbers with like-minded individuals—again, over the Internet. Carders

generally obtain credit card numbers through conventional means, such as "trashing" (searching through trash) or calling individuals and posing as bank officers. *See also* hacker (definition 2).

cardinal number *n.* A number that indicates how many items there are in a set—for example, "There are 27 names on that list." *Compare* ordinal number.

card punch *n. See* keypunch.

card reader *n.* **1.** An input device used chiefly for identification purposes that reads information that has been magnetically encoded, usually in two tracks, on a plastic card, such as a credit card or an employee badge. **2.** A mechanical apparatus that reads computer data from punched cards. No longer in widespread use, card readers allow computer data to be created off line and then input to the computer for processing. This need for offline data creation was because of limited CPU resources. Reading batches of punched cards was a better use of CPU time than waiting for a human operator to key data directly into the computer's memory. *Also called:* punched-card reader.

caret *n.* The small, upward-pointing symbol (^) typically found over the 6 key on the top row of a microcomputer keyboard. In some programming languages, the caret is used as an exponentiation operator. For example, the expression 3 ^ 2 represents the number 3 raised to the second power. The caret is also used to represent the Control key on the keyboard. For example, ^Z means "hold the Control key down and press the Z key."

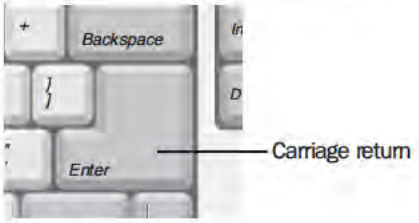
careware *n.* Software developed by an individual or a small group and distributed freely, with the proviso that users make a donation to a charity if they continue to use the software after trying it out. The charity is one usually designated by the software creator.

Carnivore *n.* Digital wiretap technology developed by the U.S. Federal Bureau of Investigation. Carnivore's purpose is to track and capture e-mail and other Internet-based communications sent from and received by a suspect. Carnivore copies all of an ISP's network traffic into a collection system where a filter sifts through all communications, disregarding all data but that related to the suspect.

carpal tunnel syndrome *n.* A form of repetitive strain injury to the wrist and hand. Making the same small motions over and over can cause swelling and scarring of the soft tissue of the wrist, which then compresses the main nerve leading to the hand. Symptoms of carpal tunnel syndrome include pain and tingling in the fingers, and in advanced cases, carpal tunnel syndrome can lead to loss of functionality of the hands. Typing at a computer keyboard without proper wrist support is a common cause of carpal tunnel syndrome. *Acronym:* CTS. *See also* repetitive strain injury, wrist support.

carriage *n.* The assembly that holds the platen of a typewriter or a typewriterlike printer. On a standard typewriter, the platen and carriage move past a fixed position within the typewriter housing, where the keys strike the paper; the platen rotates to advance the paper held in the carriage. On most impact printers for computers, however, the print head moves back and forth across a platen, which rotates but does not move horizontally; in such machines, the assembly that carries the print head is often called the print-head carriage assembly. *See also* carriage return, platen.

carriage return *n.* A control character that tells a computer or printer to return to the beginning of the current line. A carriage return is similar to the return on a typewriter but does not automatically advance to the beginning of a new line. For example, a carriage-return character alone, received at the end of the words *This is a sample line of text* would cause the cursor or printer to return to the first letter of the word *This*. In the ASCII character set, the carriage-return character has the decimal value of 13 (hexadecimal 0D). See the illustration.



Carriage return.

carrier *n.* **1.** In communications, a specified frequency that can be modulated to convey information. **2.** A company that provides telephone and other communications services to consumers.

Carrier Detect *n. See* CD (definition 2).

carrier frequency *n.* A radio-frequency signal, such as those used with modems and on networks, used to transmit information. A carrier frequency is a signal that vibrates at a fixed number of cycles per second, or hertz (Hz), and is modulated (changed) in either frequency or amplitude to enable it to carry intelligible information.

carrier sense multiple access with collision detection *n. See* CSMA/CD.

C

carrier signal *n. See* carrier frequency.

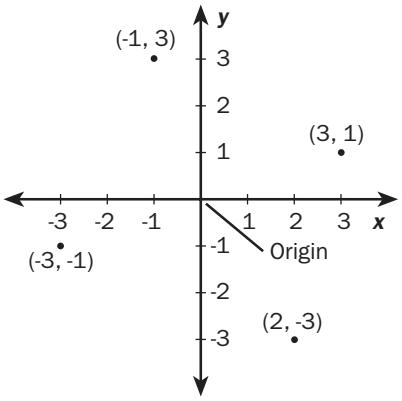
carrier system *n.* A communications method that uses different carrier frequencies to transfer information along multiple channels of a single path. Transmission involves modulating the signal on each frequency at the originating station and demodulating the signal at the receiving station.

carry *n.* In arithmetic, the process of moving a digit to the next higher position when the sum of two numbers is greater than the largest digit in the number system being used. Computers, based on logic circuits, and often able to add all digits in two numbers simultaneously (do parallel addition), perform carries in several exotic ways. For example, they perform complete carries, in which one carry is allowed to propagate—that is, to generate other carries in other digit positions. They can also perform partial carries, in which carries resulting from parallel addition are stored temporarily.

carry bit *n.* The bit, associated with an adder circuit, that indicates that an addition operation has produced a carry (as in 9 + 7). *Also called:* carry flag.

carry flag *n. See* carry bit.

Cartesian coordinates *n.* Points on a plane (two dimensions) or in space (three dimensions) that are located by their positions in relation to intersecting axes; named after the French mathematician René Descartes, who introduced the system in the seventeenth century. In two dimensions, points are described by their positions in relation to the two familiar axes, *x* (usually horizontal) and *y* (usually vertical). In three dimensions, a third axis, *z*, is added to the *x*- and *y*-axes. See the illustration. *See also* *x*-*y*-*z* coordinate system. *Compare* polar coordinates.



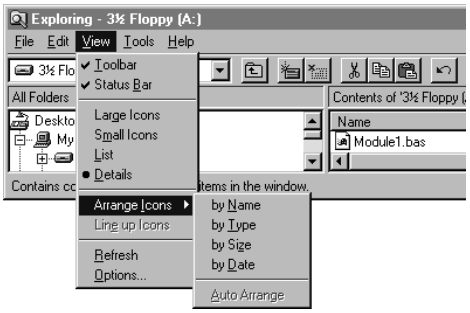
Cartesian coordinates.

Cartesian product *n. See* product (definition 1).

cartridge *n.* Any of various container devices that usually consist of some form of plastic housing. *See also* disk cartridge, ink cartridge, memory cartridge, ribbon cartridge, ROM cartridge, tape cartridge, toner cartridge.

cartridge font *n.* A font contained in a plug-in cartridge and used to add fonts to laser, ink-jet, or high-end dot-matrix printers. Cartridge fonts are distinguished both from internal fonts, which are contained in ROM in the printer and are always available, and from downloadable (soft) fonts, which reside on disk and which can be sent to the printer as needed. *See also* font cartridge. *Compare* internal font.

cascade *n.* **1.** Additional elements displayed by a menu item or list box from which the user can choose in order to interact with other screen elements. See the illustration. **2.** In newsgroup articles, the accumulation of quotation marks (often angle brackets) added by newsgroup readers each time an article is replied to. Most newsgroup readers will copy the original article in the body of the reply; after several replies, the original material will have several quotation marks. *See also* article, newsgroup, newsreader.



Cascade.

cascade connection *n. See* pipe (definition 1).

cascaded star topology *n.* A star network in which nodes connect to hubs and hubs connect to other hubs in a hierarchical (cascaded) parent/child relationship. This topology is characteristic of 100Base-VG networks.

cascading hubs *n.* A network configuration in which hubs are connected to other hubs. *See also* hub.

cascading menu *n.* A hierarchical graphical menu system in which a side menu of subcategories is displayed when the pointer is placed on the main category.

Cascading Style Sheet mechanism *n. See* cascading style sheets.

cascading style sheets *n.* A Hypertext Markup Language (HTML) specification developed by The World Wide Web Consortium (W3C) that allows authors of HTML documents and users to attach style sheets to HTML documents. The style sheets include typographical information on how the page should appear, such as the font of the text in the page. This specification also directs the way in which the style sheets of the HTML document and the user's style will blend. Cascading style sheets have been proposed for the HTML 3.2 standard. *Acronym:* CSS. *Also called:* Cascading Style Sheet mechanism**,** CSS1**.** *See also* HTML, style sheet (definition 2).

cascading windows *n.* A sequence of successive, overlapping windows in a graphical user interface, displayed so that the title bar of each is visible. *Also called:* overlaid windows.

case *n.* In text processing, an indication of whether one or more alphabetic characters are capitalized (uppercase) or not (lowercase). A case-sensitive program or routine distinguishes between uppercase and lowercase letters and treats the word *cat* as totally distinct from either *Cat* or *CAT*. A case-sensitive program that also separates capitalized and lowercased words would list *Arkansas* before *aardvark* or *antimony*, even though its alphabetic position follows both lowercased words.

CASE *n.* Acronym for **c**omputer-**a**ided **s**oftware **e**ngineering. A comprehensive label for software designed to use computers in all phases of computer program development, from planning and modeling through coding and documentation. CASE represents a working environment consisting of programs and other development tools that help managers, systems analysts, programmers, and others to automate the design and implementation of programs and procedures for business, engineering, and scientific computer systems.

case-sensitive search *n.* A search in a database in which capitalization of key words must exactly match the capitalization of words in the database. A case-sensitive search for "north and south" would fail to find a database entry for "North and South."

case sensitivity *n.* Discrimination between lowercase and uppercase characters in a program or a programming language. *See also* case.

case statement *n.* In programming languages such as Ada, Pascal, and C, a type of control statement that executes one of several sets of instructions based on some key value. Case statements are used in evaluating situations that can have a number of different results. "Case" in this sense refers to a refinement of a basic IF-THEN type of conditional statement (if A is true, then do B), but a case statement functions more like a series of nested IFs (if A, then do this; else if B, then do that; else . . .). In a case evaluation, a variable (such as a number or a string of characters) is compared against one after another of a series of constants assigned by the programmer. Each constant represents a different case and defines an action to be carried out. When the program finds a constant that matches the variable, it carries out whatever action is dictated by the case in which the match occurs. *See also* constant, control statement, variable.

cassette *n.* The unit consisting of both the plastic case and the magnetic tape it contains. Cassette tapes are used for backing up large amounts of computer data.

cassette tape *n.* **1.** The tape within a cassette. **2.** The unit consisting of both the plastic cassette case and the tape it contains.

cast *n.* A programmer-specified data conversion from one type to another, such as a conversion from integer to floating point. *Also called:* coercion. *See also* data type.

CAT *n.* **1.** Acronym for **c**omputer-**a**ided **t**esting. A procedure used by engineers for checking or analyzing designs, especially those created with CAD programs. Computer-aided testing is also used by software developers for automated regression testing. **2.** Acronym for **c**omputer-**a**ssisted **t**eaching or **c**omputer-**a**ided **t**eaching. *See* CAI. **3.** Acronym for **c**omputerized **a**xial **t**omography. A medical procedure in which a computer is used to generate a three-dimensional image of a body part from a series of X-rays taken as cross sections along a single axis. *See* CAI.

catalog *n.* **1.** In a computer, a list containing specific information, such as name, length, type, and location of files or of storage space. **2.** In a database, the data dictionary. *See also* data dictionary.

catch *n.* A keyword in the Java programming language used to declare a block of statements to be executed in the event that a Java exception or runtime error occurs in a preceding "try" block. *See also* block, exception, keyword, runtime, try.

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Category 3 cable *n.* Network cable that supports frequencies up to 16 MHz and transmission speeds up to 10 Mbps (standard Ethernet). Category 3 cable has four unshielded twisted pairs (UTPs) of copper wire and RJ-45 connectors, and is used in voice and 10Base-T applications. *Also called:* Cat 3 cable.

Category 4 cable *n.* Network cable that supports frequencies up to 20 MHz and transmission speeds up to 16 Mbps. Category 4 cable has four unshielded twisted pairs (UTPs) of copper wire and RJ-45 connectors. Less popular than Category 3 and Category 5 cables, it is used primarily for token ring networks. *Also called:* Cat 4 cable.

Category 5 cable *n.* Network cable that supports frequencies up to 100 MHz and transmission speeds up to 100 Mbps (using two pairs) or 1000 Mbps (using four pairs and called gigabit over copper). Category 5 cable has four unshielded twisted pairs (UTPs) of copper wire and RJ-45 connectors, and is used for 10/100/1000 Base-T, ATM, and token ring networks. *Also called:* Cat 5 cable.

Category 5e cable *n.* Network cable that supports frequencies up to 100 MHz and transmission speeds up to 1000 Mbps (half-duplex mode) or 2000 Mbps (full-duplex mode). Category 5e cable has four unshielded twisted pairs (UTPs) of copper wire, RJ-45 connectors, and enhanced shielding to prevent signal degradation. Category 5e cable can be used for 10/100/1000 Base-T, ATM, and token ring networks. *Also called:* Cat 5e cable. *See also* duplex[2] (definition 1), half-duplex transmission.

catena *n.* A series of items in a chained list—that is, a list in which one item points to the next in sequence. *See also* linked list.

cathode *n.* **1.** The terminal or electrode that is negatively charged and from which electrons flow. **2.** The electron-emitting electrode in a vacuum tube. **3.** The negative terminal of a battery. *Compare* anode.

cathode-ray oscilloscope *n. See* oscilloscope.

cathode-ray tube *n. See* CRT.

CATV *n.* Acronym for **c**ommunity **a**ntenna **t**ele**v**ision or **ca**ble **t**ele**v**ision. A television broadcasting system that uses coaxial or fiber-optic cable to distribute a broadband signal containing many separate television program channels. CATV systems are also increasingly being used to carry digital data—for example, Internet connections—to and from subscribers.

CatXML *n.* Acronym for **Cat**alogue **XML**. An open standard for using XML in catalogue information exchanges over the Internet. CatXML uses a flexible XML schema with multiple profiles that can be adapted to meet the needs of individual businesses. CatXML supports existing information structures and provides distributed query information grid models and dynamic output formats.

cavity virus *n.* A type of virus that overwrites and hides within a section of the file it has infected. A cavity virus overwrites only a part of the host file filled with a constant, allowing the file to continue to function.

CBEMA *n.* Acronym for **C**omputer and **B**usiness **E**quipment **M**anufacturers **A**ssociation. An organization of hardware vendors and manufacturers in the United States involved in standardizing information processing and related equipment.

CBL *n.* Acronym for **c**omputer-**b**ased **l**earning. Applies to either computer-aided instruction (CAI), which focuses primarily on education, or computer-based training (CBT), which is application-specific or job-oriented teaching. *See also* CAI, CBT.

CBT *n.* Acronym for **c**omputer-**b**ased **t**raining. The use of computers and specially developed tutorial programs for teaching. CBT uses color, graphics, and other attention-getting aids to help maintain interest, and it has both simple and sophisticated applications. A software developer, for example, might include a series of CBT lessons with an application to give new users a hands-on feel for the program; a consultant might use a longer and more detailed CBT program as a tool in a management-training seminar.

cc *n.* Acronym for **c**ourtesy **c**opy. A directive to an e-mail program to send a complete copy of a given piece of mail to another individual. The use of cc mail addressing, as opposed to directly addressing the mail to a person, generally implies that the recipient is not required to take any action; the message is for informational purposes only. In a cc directive, the fact that this recipient received the mail is printed in the mail header and is thus known to all other recipients. *Also called:* carbon copy. *See also* e-mail[1] (definition 1), header. *Compare* bcc.

CCC *n.* Acronym for **C**omputer **C**ontrolled **C**haracter. CCC is generally used in role-playing computer games like MUD. It refers to a character that is not played by a

human player but is actually a computer-generated character built into the game itself. *See also* computer game, MUD, role-playing game.

CCD *n. See* charge-coupled device.

CCI *n. See* Common Client Interface.

CCITT *n.* Acronym for **C**omité **C**onsultatif **I**nternational **T**élégraphique et **T**éléphonique, now called the International Telecommunication Union-Telecommunication Standardization Sector (ITU-TSS, often abbreviated as ITU-T). CCITT was the organization that performed the standardization functions for the International Telecommunication Union (ITU). Following a reorganization of the ITU in 1992, CCITT ceased to exist as a separate body, although several standards are still known by the CCITT prefix. *See also* ITU.

CCITT Groups 1–4 *n.* A set of four standards recommended by the Comité Consultatif International Télégraphique et Téléphonique (International Telegraph and Telephone Consultative Committee) for the encoding and transmission of images over fax machines. Groups 1 and 2 relate to analog devices and are generally out of use. Groups 3 and 4, which deal with digital devices, are outlined below. Group 3 is a widespread standard that supports standard images of 203 horizontal dots per inch (dpi) by 98 vertical dpi and fine images of 203 horizontal dpi by 198 vertical dpi; supports two methods of data compression, one (based on the Huffman code) reducing an image to 10 to 20 percent of the original, the second (READ, for relative element address designate) compressing images to 6 to 12 percent of the original; and provides for password protection and for polling so that a receiving machine can request transmission as appropriate. Group 4, a newer standard, supports images of up to 400 dpi; supports data compression based on a beginning row of white pixels (dots), with each succeeding line encoded as a series of changes from the line before, compressing images to 3 to 10 percent of the original; does not include error-correction information in the transmission; and requires an Integrated Services Digital Network (ISDN) phone line rather than a dial-up line.

CCITT V series *n. See* V series.

CCITT X series *n. See* X series.

cc:Mail *n.* An e-mail program originally introduced by cc:mail, Inc., and currently produced by the Lotus Development Corporation. Lotus cc:Mail runs on multiple networking platforms and the Internet and is closely integrated with Lotus Notes collaborative software.

ccNUMA *n.* Acronym for **C**ache-**C**oherent **N**on-**U**niform **M**emory **A**ccess. A technology that enables many symmetric multiprocessing systems to be connected by high-speed/wide-bandwidth interconnect hardware so that they function as one machine. *See also* symmetric multiprocessing.

CCP *n.* Acronym for **C**ertificate in **C**omputer **P**rogramming. A senior-level programming credential awarded by the Institute for Certification of Computer Professionals to individuals who pass an extensive set of programming examinations.

cd *n.* Acronym for **c**hange **d**irectory. In MS-DOS, UNIX, and FTP client programs, the command that changes the current directory to the directory whose path follows *cd* in the command. *See also* directory, path (definition 5).

CD *n.* **1.** An individual compact disc, such as a CD-ROM. *See also* CD-ROM, compact disc (definition 2). **2.** Acronym for **C**arrier **D**etect, a signal sent from a modem to the attached computer to indicate that the modem is on line. *See also* DCD.

CD burner *n. See* CD recorder.

CD drive *n. See* CD-ROM drive.

CD-E *n.* Acronym for **c**ompact **d**isc-**e**rasable. A technological improvement in CDs (compact discs) whereby information can be repeatedly changed on the CD. Contemporary CDs are "write once, read many," in that the information originally written cannot be changed.

cdev *n.* Short for **c**ontrol panel **dev**ice. A Macintosh utility that allows basic system settings to be customized. In Macintosh computers running System 6, a cdev is a utility program placed in the system folder. Keyboard and mouse cdevs are preinstalled. Other cdevs are provided with software packages and utilities. In System 7, cdevs are called control panels. *See also* control panel, system folder. *Compare* INIT.

CDF *n. See* Channel Definition Format.

CDFS *n.* **1.** Acronym for **CD**-ROM **F**ile **S**ystem. A 32-bit protected-mode file system that controls access to the contents of CD-ROM drives in Windows 9x. *See also* protected mode. **2.** A designation used with UNIX computers to indicate that a file system resides on a read-only removable medium (that is a CD-ROM). This usually implies

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that the compact disc is compliant with the ISO 9660 standard. CDFS is also used as a part of commands that mount media (hard drives, tape drives, remote networked drives, and CD-ROMs) for use on a computer. *See also* CD-ROM, ISO 9660.

CD-I *n.* Acronym for compact disc-interactive. A hardware and software standard for a form of optical disc technology that can combine audio, video, and text on high-capacity compact discs. CD-I includes such features as image display and resolution, animation, special effects, and audio. The standard covers methods of encoding, compressing, decompressing, and displaying stored information. *See also* CD-ROM.

CDMA *n. See* Code Division Multiple Access.

CDN *n.* Acronym for content delivery network. A service that caches the pages of a Web site on geographically dispersed servers to enable faster delivery of Web pages. When a page is requested at a URL that is content delivery–enabled, the content delivery network routes the user's request to a cache server close to the user. *See also* content delivery.

CDP *n.* Acronym for Certificate in Data Processing. A certificate awarded by the Institute for Certification of Computer Professionals to individuals who pass a set of examinations on computers and related areas, including programming, software, and systems analysis.

CDPD *n. See* Cellular Digital Packet Data.

CD player *n.* Short for compact disc player. A device that reads the information stored on a CD. A CD player contains the optical equipment necessary for reading a disc's contents and the electronic circuitry for interpreting the data as it is read.

CD Plus *n.* A compact disc encoding format that allows mixing of audio recordings and computer data on the same CD, without the possibility of audio equipment becoming damaged by attempting to play the data sections.

CD-R *n.* Acronym for compact disc-recordable. A type of CD-ROM that can be written on a CD recorder and read on a CD-ROM drive. *See also* CD recorder, CD-ROM.

CD-R/E *adj.* Acronym for compact disc-recordable and erasable. Of or pertaining to hardware and software for interfacing computers with both CD-R (compact disc-recordable) and CD-E (compact disc-erasable) devices. *See also* CD-R.

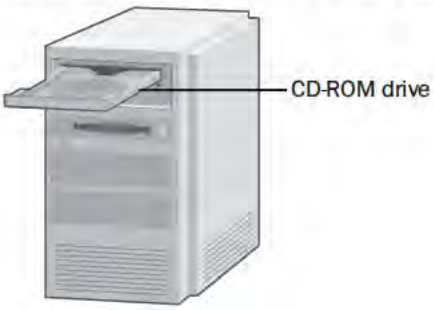
CD recorder *n.* A device used to write CD-ROMs. Because a disc can be written only once on these machines, they are used most commonly to create CD-ROMs for data archives or to produce CD-ROM masters that can be duplicated for mass distribution. *Also called:* CD-R machine, CD-ROM burner. *See also* CD-ROM.

CD-R machine *n. See* CD recorder.

CD-ROM *n.* **1.** Acronym for compact disc read-only memory. A form of storage characterized by high capacity (roughly 650 megabytes) and the use of laser optics rather than magnetic means for reading data. Although CD-ROM drives are strictly read-only, they are similar to CD-R drives (write once, read many), optical WORM devices, and optical read-write drives. *See also* CD-I, CD-R, WORM. **2.** An individual CD (compact disc) designed for use with a computer and capable of storing up to 650 megabytes of data. *See also* CD, disc.

CD-ROM burner *n. See* CD recorder.

CD-ROM drive *n.* An electromechancial device that reads data on CD-ROMs. Most CD-ROM drives have a SCSI interface, although some are connected to a PC via a controller for a disk drive. Data is read through a small laser that is focused on the surface of the CD-ROM through optical mirrors in the read/write head. A spindle and drive motor revolve the CD-ROM, so all data, which is stored in spirals from the center, can be read. CD-ROM drives vary in the access time to locate a track on the CD-ROM and the seek time to move the read/write head. See the illustration. *Also called:* CD drive. *See also* CD-ROM, compact disc.



CD-ROM drive.

CD-ROM Extended Architecture *n. See* CD-ROM/XA.

CD-ROM File System *n. See* CDFS (definition 1).

CD-ROM jukebox *n.* A CD-ROM player that can contain up to 200 CD-ROMs and is connected to a CD-ROM drive in a personal computer or workstation. A user can request data from any of the CD-ROMs in the jukebox, and the device will locate and play the disk that contains the data. Although only one CD-ROM can be played at a time, if multiple CD-ROM jukeboxes are each connected to separate CD-ROM drives that are daisy-chained together to the computer, more than one CD-ROM can be used at a time. *See also* CD-ROM, CD-ROM drive, daisy chain.

CD-ROM/XA *n.* Short for **CD**-**ROM** E**x**tended **A**chitecture. An extended CD-ROM format developed by Philips, Sony, and Microsoft. CD-ROM/XA is consistent with the ISO 9660 (High Sierra) standard, with further specification of ADPCM (adaptive differential pulse code modulation) audio, images, and interleaved data. *See also* adaptive differential pulse code modulation, CD-ROM, High Sierra specification.

CD-RW *n.* Acronym for **c**ompact **d**isc-**r**e**w**ritable. The technology, equipment, software, and media used in the production of multiple-write CDs (compact discs).

CDS *n. See* Circuit Data Services.

CDV *n.* **1.** Acronym for **c**ompressed **d**igital **v**ideo. The compression of video images for high-speed transmission. **2.** Acronym for **c**ompact **d**isc **v**ideo. A 5-inch videodisc. *See also* videodisc.

CD Video *n. See* CDV (definition 2).

CeBIT *n.* One of the world's leading tradeshows for the information technology, telecommunications, and office automation industries. Held annually in Hannover, Germany, CeBIT attracts hundreds of thousands of visitors and exhibitors from more than 60 countries.

CEBus *n.* Short for **C**onsumer **E**lectronic **Bus**. CEBus is an open architecture set of specification documents that define protocols for how to make products communicate through power line wires, low voltage twisted pairs, coax, infrared, RF, and fiber optics. Anyone, anywhere can get a copy of the plans and develop products that work with the CEBus standard.

Celeron *n.* Intel's family of budget-priced microprocessors introduced in 1998. Celeron chips are based on the same P6 microarchitecture as the Pentium II processor. They include an integrated 128-KB L2 cache and support Intel's MMX technology. Celeron chips have speeds of up to 1.3 GHz in early 2002. *See also* Pentium.

cell *n.* **1.** The intersection of a row and a column in a spreadsheet. Each row and column in a spreadsheet is unique, so each cell can be uniquely identified—for example, cell B17, at the intersection of column B and row 17. Each cell is displayed as a rectangular space that can hold text, a value, or a formula. **2.** An addressable (named or numbered) storage unit for information. A binary cell, for example, is a storage unit that can hold 1 bit of information—that is, it can be either on or off. **3.** A fixed-length packet, the basic transmission unit on high-speed networks, such as ATM. *See also* ATM. **4.** Coverage area for wireless phones served by a single base station (cell tower), usually surrounded by six other cells. As a wireless phone moves across the boundary between cells, the conversation is handed from one cell to the next. Cells may be less than a half mile or more than 15 miles in radius, depending on the volume of wireless calls or the presence of large buildings or terrain that might interfere with signals.

cell animation or **cel animation** *n.* A process performed by software that emulates traditional cell animation, which uses transparent celluloid sheets ("cells" or "cels" for short) to overlay active elements in an animation frame onto a static background. Computer cell animation is quite efficient because images can be quickly reproduced and manipulated.

cell padding *n.* The space between the contents and the inside edges of a table cell.

cell reference *n.* The set of coordinates that a cell occupies on a worksheet. For example, the reference of the cell that appears at the intersection of column B and row 3 is B3.

cell relay *n.* A form of packet switching in which information is multiplexed onto a carrier and transferred in fixed-length packets (cells).

cellular automata *n.* **1.** In computer science, theoretical models of parallel computers. They enable the investigation of parallel computers without the need to actually build them. The cellular automaton is composed of a network of multiple cells, each representing a processor in the parallel computer. The cells must be identical, and they must have a finite amount of available memory. Each cell outputs a value calculated from the input values it

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receives from its neighboring cells, and all cells output their values simultaneously. **2.** Systems in which rules are applied to multiple cells and their neighbors in a regular spatial lattice or grid that advances through time. Usually, each cell in a cellular automaton has any one state out of a finite number of states. The state changes discretely in time according to rules that depend on the condition of the individual cell and its neighbors. Thus, an individual cell in a cellular automaton takes a neighbor cell's state as input before outputting its own state. Additionally, all the cells in the lattice are updated simultaneously, while the state of the entire lattice also advances discretely in time. Many computer simulations of cellular automata are demonstrated on Web sites; the best known Web example is J.H. Conway's Game of Life.

Cellular Digital Packet Data *n.* A wireless standard providing two-way, 19.2-Kbps packet data transmission over existing cellular telephone channels. *Acronym:* CDPD. *See also* packet, wireless.

Cellular Telecommunications and Internet Association *n.* Association based in Washington, D.C. that represents the wireless telecommunications industry and its equipment manufacturers. *Acronym:* CTIA.

censorship *n.* The action of preventing material that a party considers objectionable from circulating within a system of communication over which that party has some power. The Internet as a whole is not censored, but some parts of it come under varying degrees of control. A news server, for example, often is set to exclude any or all of the alt. newsgroups, such as alt.sex.* or alt.music.white-power, which are unmoderated and tend to be controversial. A moderated newsgroup or mailing list might be considered to be "censored" because the moderator will usually delete highly controversial and obscene content or content that is on a different topic from that followed by the newsgroup. Online services have identifiable owners, who often take some share of responsibility for what reaches their users' computer screens. In some countries, censorship of certain political or cultural Web sites is a matter of national policy.

censorware *n.* Software that imposes restrictions on what Internet sites, newsgroups, or files may be accessed by the user.

center *vb.* To align characters around a point located in the middle of a line, page, or other defined area; in effect, to place text an equal distance from each margin or border. *See also* align (definition 1).

centi- *prefix* **1.** One hundred. **2.** One hundredth, as in *centimeter*—one hundredth of a meter.

centralized network *n.* A network in which nodes connect to and use resources on a single central computer, typically a mainframe.

centralized processing *n.* The location of computer processing facilities and operations in a single (centralized) place. *Compare* decentralized processing, distributed processing.

central office *n.* In communications, the switching center where interconnections between customers' communications lines are made.

central office exchange service *n. See* Centrex.

central processing unit *n. See* CPU.

Centrex *n.* An option offered by some phone companies in which up-to-date phone facilities are available to business customers, giving the customer access to a complete range of phone services without having to purchase or maintain the necessary equipment. Customers can purchase just the lines and services they will use. The name *central office exchange* refers to the fact that the phone facilities for Centrex services, particularly switching services, are generally maintained at the offices of the local or central phone company. Since Centrex offers a wider range of services, it is replacing PBX for businesses. *See also* switching. *Compare* PBX.

Centronics parallel interface *n.* A de facto standard for parallel data exchange paths between computers and peripherals, originally developed by the printer manufacturer Centronics, Inc. The Centronics parallel interface provides eight parallel data lines plus additional lines for control and status information. *See also* parallel interface.

CERN *n.* Acronym for **C**onseil **E**uropéen pour la **R**echerche **N**ucléaire (the European Laboratory for Particle Physics). CERN, a physics research center located in Geneva, Switzerland, is where the original development of the World Wide Web took place by Tim Berners-Lee in 1989 as a method to facilitate communication among members of the scientific community. *See also* NCSA (definition 1).

CERN server *n.* One of the first Hypertext Transfer Protocol (HTTP) servers, developed at CERN by Tim Berners-Lee. The CERN server is still in wide use and is free of charge. *See also* CERN, HTTP server (definition 1).

CERT *n.* Acronym for **C**omputer **E**mergency **R**esponse **T**eam. An organization that provides a round-the-clock

security consultation service for Internet users and provides advisories whenever new virus programs and other computer security threats are discovered.

certificate *n.* A certificate is sent when a message is digitally signed. The certificate proves the sender's identity and supplies the recipient with a public key with which to decrypt the sender's encrypted messages. *Also called:* digital certificate.

certificate authority *n.* An issuer of digital certificates, the cyberspace equivalent of identity cards. A certificate authority may be an external issuing company (such as VeriSign) or an internal company authority that has installed its own server (such as the Microsoft Certificate Server) for issuing and verifying certificates. A certificate authority is responsible for providing and assigning the unique strings of numbers that make up the "keys" used in digital certificates for authentication and to encrypt and decrypt sensitive or confidential incoming and outgoing online information. *Acronym:* CA. *See also* digital certificate, encryption.

Certificate in Computer Programming *n. See* CCP.

Certificate in Data Processing *n. See* CDP.

certificate revocation list *n.* A document maintained and published by a certification authority that lists certificates that have been revoked. *Acronym:* CRL. *See also* certificate, certification authority.

certificate trust list *n.* A signed list of root certification authority certificates that an administrator considers reputable for designated purposes, such as client authentication or secure e-mail. *Acronym:* CTL. *See also* certificate, certificate authority, root certificate.

certification *n.* **1.** The act of awarding a document to demonstrate a computer professional's competence in a particular field. Some hardware and software suppliers, such as Microsoft and Novell, offer certification in the use of their products; other organizations, such as the Institute for Certification of Computer Professionals (ICCP) and the Computing Technology Industry Association (CompTIA), offer more general certification. **2.** The act of awarding a document to demonstrate that a hardware or software product meets some specification, such as being able to work with a certain other hardware or software product. **3.** The issuance of a notice that a user or site is trusted for the purpose of security and computer authentication. Often certification is used with Web sites.

certification authority *n.* An organization that assigns encryption keys. *See also* certificate authority.

CFML *n.* Acronym for **C**old **F**usion **M**arkup **L**anguage. A programming environment and proprietary, tag-based markup language for server-side processing.

CGA *n.* Acronym for **C**olor/**G**raphics **A**dapter. A video adapter board introduced by IBM in 1981. The CGA is capable of several character and graphics modes, including character modes of 40 or 80 horizontal characters (columns) by 25 vertical lines with 16 colors, and graphics modes of 640 horizontal pixels by 200 vertical pixels with 2 colors, or 320 horizontal pixels by 200 vertical pixels with 4 colors. *See also* graphics adapter, video adapter.

CGI *n.* **1.** Acronym for **C**ommon **G**ateway **I**nterface. The specification that defines communications between information servers (such as HTTP servers) and resources on the server's host computer, such as databases and other programs. For example, when a user submits a form through a Web browser, the HTTP server executes a program (often called a CGI script) and passes the user's input information to that program via CGI. The program then returns information to the server via CGI. Use of CGI can make a Web page much more dynamic and add interactivity for the user. *See also* CGI script, HTTP server (definition 1). **2.** *See* Computer Graphics Interface.

cgi-bin *n.* Short for **C**ommon **G**ateway **I**nterface-**bin**aries. A file directory that holds external applications to be executed by HTTP servers via CGI. *See also* CGI (definition 1).

CGI program *n. See* CGI script.

CGI script *n.* Short for **C**ommon **G**ateway **I**nterface **script**. An external application that is executed by an HTTP server machine in response to a request by a client, such as a Web browser. Generally, the CGI script is invoked when the user clicks on some element in a Web page, such as a link or an image. Communication between the CGI script and the server is carried out via the CGI specification. CGI scripts can be written in many programming languages, including C, C++, and Visual Basic. However, the most commonly used language for CGI scripts is Perl because it is a small but robust language and it is common on UNIX, which is the platform on which the majority of Web sites run. CGI scripts don't necessarily need to be scripts; they can also be batch programs or compiled programs. CGI scripts are used to provide interactivity on a

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Web page, including such features as providing a form that users can fill out, image maps that contain links to other Web pages or resources, and links that users can click on to send e-mail to a specified address. ActiveX controls and Java applets can provide much the same functionality as CGI scripts, through different means. *See also* CGI (definition 1), cgi-bin, image map, Perl. *Compare* ActiveX control, Java applet.

CGM *n. See* Computer Graphics Metafile.

chad *n.* The paper removed when a hole is punched in a card, in a tape, or at the perforated edge of continuous-form paper—the computer equivalent of a doughnut hole.

chaining *n.* **1.** In computers, the linking of two or more entities so that they are dependent upon one another for operation. **2.** In programming, the linking of two or more programs so that the first program causes the second program to begin executing. **3.** In programming, linking program statements so that each statement, except for the first, relies on the previous statement for input. **4.** With batch files, linking two or more batch files so that the completion of the first batch file causes the second batch file to begin executing. **5.** With data storage, linking two or more individual units of storage. For example, a single file on a disk may actually be stored on several different sectors of the disk, each of which points to the next sector containing a piece of that file. These sectors are said to be chained together, or, more literally, to be a chain of clusters. **6.** *See* daisy chaining.

chain printer *n. See* line printer.

chalkware *n. See* vaporware.

Challenge Handshake Authentication Protocol *n.* An authentication scheme used by PPP servers to validate the identity of the originator of a connection, upon connection or any time later. *Acronym:* CHAP. *See also* authentication, PPP.

change directory *n. See* cd.

change file *n.* A file that records transactional changes occurring in a database, providing a basis for updating a master file and establishing an audit trail. *Also called:* transaction log. *See also* addition record.

change management *n.* **1.** The process of tracking and controlling updates, revisions, and other changes to a hardware or software product or project. **2.** The process of managing change during a company's restructuring or reengineering.

channel *n.* **1.** A path or link through which information passes between two devices. A channel can be either internal or external to a microcomputer. **2.** In communications, a medium for transferring information. Depending on its type, a communications channel can carry information (data, sound, and/or video) in either analog or digital form. A communications channel can be a physical link, such as the cable connecting two stations in a network, or it can consist of some electromagnetic transmission on one or more frequencies within a bandwidth in the electromagnetic spectrum, as in radio and television, or in optical, microwave, or voice-grade communication. *Also called:* circuit, line. *See also* analog, band, bandwidth, digital, electromagnetic spectrum, frequency. **3.** A single color within a digital color space. For example, the RGB color space contains three channels—red, green, and blue—and all colors within the RGB color space are created with a combination of one or more of those three color channels. In CMYK there are four channels—cyan, magenta, yellow, and black. Color management and graphics applications rely on control and manipulation of individual color channels. *See also* color space.

channel access *n.* **1.** A method used in networked systems to gain access to the data communication channel that links two or more computers. Common methods of channel access are contention, polling, and the token ring network. *See also* channel, contention, polling, token ring network. **2.** In wireless technology, an access method such as CDMA (Code Division Multiple Access). *See also* Code Division Multiple Access.

channel adapter *n.* A device that enables hardware using two different types of communications channels to communicate.

channel aggregator *n. See* content aggregator.

channel capacity *n.* The speed at which a communications channel can transfer information, measured in bits per second (bps) or in baud.

Channel Definition Format *n.* A file format based on XML that describes a channel—a collection of Web pages—on a server. The Channel Definition Format is used with the Active Channel feature in Microsoft Internet Explorer to deliver selected, often personalized, information to individuals on a subscription basis. *See also* Active Channel, webcasting.

channel hop *vb.* To switch repeatedly from one IRC channel to another. *See also* IRC.

channel op *n.* Short for **channel op**erator. A user on an IRC channel who has the privilege of expelling undesirable participants. *See also* IRC.

channel operator *n. See* channel op.

Channel Service Unit *n. See* DDS.

CHAP *n. See* Challenge Handshake Authentication Protocol.

character *n.* A letter, number, punctuation mark, or other symbol or control code that is represented to a computer by one unit—1 byte—of information. A character is not necessarily visible, either on the screen or on paper; a space, for example, is as much a character as is the letter *a* or any of the digits 0 through 9. Because computers must manage not only so-called printable characters but also the look (formatting) and transfer of electronically stored information, a character can additionally indicate a carriage return or a paragraph mark in a word-processed document. It can be a signal to sound a beep, begin a new page, or mark the end of a file. *See also* ASCII, control character, EBCDIC.

character cell *n.* A rectangular block of pixels that represents the space in which a given character is drawn on the screen. Computer displays use different numbers of pixels as character cells. Character cells are not always the same size for a given font, however; for proportionally spaced fonts, such as those commonly displayed on the Apple Macintosh, the height within a given font remains the same, but the width varies with each character.

character code *n.* A specific code that represents a particular character in a set, such as the ASCII character set. The character code for a given key depends on whether another key, such as Shift, is pressed at the same time. For example, pressing the A key alone normally generates the character code for a lowercase *a*. Pressing Shift plus the A key normally generates the character code for an uppercase *A*. *Compare* key code.

character definition table *n.* A table of patterns that a computer can hold in memory and use as a reference for determining the arrangement of dots used to create and display bitmapped characters on the screen. *See also* bitmapped font.

character density *n.* In printing or screen display, a measure of the number of characters per unit of area or of linear distance. *See also* pitch (definition 1).

character device *n.* **1.** A computer device, such as a keyboard or printer, that receives or transmits information as a stream of characters, one character at a time. The characters can be transferred either bit by bit (serial transmission) or byte by byte (parallel transmission) but are not moved from place to place in blocks (groups of bytes). *Compare* block device. **2.** In reference to video displays, a device that handles text but not graphics. *See also* text mode.

character entity *n.* In HTML and SGML, the notation for a special character. A character entity begins with an & (ampersand), followed by either a string of letters or of numbers, and ends with a semicolon. The special characters represented by character entities include acute and grave accents, the tilde, and Greek letters, among others. *Also called:* named entity.

character generator *n.* A program or a hardware device that translates a given character code, such as an ASCII code, into a matching pixel pattern for display on the screen. Such devices are typically limited in the number and range of styles of fonts they support, as compared to machines that support bitmapped characters. *Compare* bitmapped font.

character image *n.* A set of bits arranged in the shape of a character. Each character image exists within a rectangular grid, or *character rectangle*, that defines its height and width. *See also* bitmapped font.

characteristic *n.* In mathematics, the exponent of a floating-point number (the portion following the *E* that indicates the position of the decimal point) or the integer portion of a logarithm. *See also* floating-point notation, logarithm.

character map *n.* In text-based computer graphics, a block of memory addresses that correspond to character spaces on a display screen. The memory allocated to each character space is used to hold the description of the character to be displayed in that space. *See also* alphageometric.

character mode *n. See* text mode.

character-oriented protocol *n. See* byte-oriented protocol.

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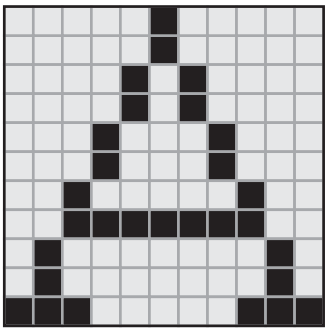
character printer *n.* **1.** A printer that operates by printing one character at a time, such as a standard dot-matrix printer or a daisy-wheel printer. *Compare* line printer, page printer. **2.** A printer that cannot print graphics, such as a daisy-wheel printer or even a dot-matrix or laser printer that lacks a graphics mode. Such a printer simply receives character codes from the controlling system and prints the appropriate characters. *Compare* graphics printer.

character recognition *n.* The process of applying pattern-matching methods to character shapes that have been read into a computer to determine which alphanumeric characters or punctuation marks the shapes represent. Because different typefaces and text treatments, such as bold and italic, can make big differences in the way characters are shaped, character recognition can be prone to error. Some systems work only with known typefaces and sizes, with no text treatments. These systems achieve very high accuracy levels, but they can work only with text specifically printed for them. Other systems use extremely sophisticated pattern-matching techniques to learn new typefaces and sizes, achieving fairly good accuracy. *See also* magnetic-ink character recognition, optical character recognition, pattern recognition (definition 1).

character rectangle *n.* The space taken up by the graphical representation (bit map) of a character. See the illustration. *See also* bit map.



Character rectangle.

character set *n.* A grouping of alphabetic, numeric, and other characters that have some relationship in common. For example, the standard ASCII character set includes letters, numbers, symbols, and control codes that make up the ASCII coding scheme.

characters per inch *n.* A measurement for the number of characters of a particular size and font that can fit into a line one inch long. This number is affected by two attributes of the type: its point size and the width of the letters in the particular font being measured. In monospace fonts, characters have a constant width; in proportional fonts, characters have varying widths. Thus, measurements of the number of characters per inch must be averaged. *Acronym:* cpi. *See also* monospace font, pitch (definition 1), proportional font.

characters per second *n.* **1.** A measure of the speed of a nonlaser printer, such as a dot-matrix or an ink-jet printer. **2.** A measure of the rate at which a device, such as a disk drive, can transfer data. In serial communications, the speed of a modem in bits per second can generally be divided by 10 for a rough determination of the number of characters per second transmitted. *Acronym:* CPS.

character string *n.* A set of characters treated as a unit and interpreted by a computer as text rather than numbers. A character string can contain any sequence of elements from a given character set, such as letters, numbers, control characters, and extended ASCII characters. *Also called:* string. *See also* ASCII, control character, extended ASCII.

character style *n.* Any attribute, such as boldface, italic, underline, or small caps, applied to a character. Depending on the operating system or program considered, the range of character styles of text might or might not include the font, which refers to the design of a group of characters in a given size. *See also* font family.

character user interface *n.* A user interface that displays only text characters. *Acronym:* CUI. *See also* user interface. *Compare* graphical user interface.

charge *n.* A property of subatomic particles, which can have either a negative charge or a positive charge. In electronics, a charge consists of either an excess of electrons (a negative charge) or a deficiency of electrons (a positive charge). The unit of charge is the *coulomb*, which corresponds to 6.26×10^{18} electrons.

charge-coupled device *n.* A device in which individual semiconductor components are connected so that the electrical charge at the output of one device provides the input to the next. The light-detecting component of digital cameras and many video cameras is a charge-coupled device. *Acronym:* CCD.

chart *n.* A graphic or diagram that displays data or the relationships between sets of data in pictorial rather than numeric form.

chassis *n.* A metal frame on which electronic components, such as printed circuit boards, fans, and power supplies, are mounted. See the illustration.

Chassis.

chat[1] *n.* **1.** Real-time conversation via computer. When a participant types a line of text and then presses the Enter key, that participant's words appear on the screens of the other participants, who can then respond in kind. Most online services support chat; on the Internet, IRC is the usual system. *See also* IRC. **2.** An Internet utility program that supports chat. IRC has largely superseded it.

chat[2] *vb.* To carry on a real-time conversation with other users by computer. *See also* IRC.

chat room *n.* The informal term for a data communication channel that links computers and permits users to "converse" by sending text messages to one another in real time. Similar to the channels provided by IRC (Internet Relay Chat), chat rooms are available through online services and some electronic bulletin board systems (BBSs). Chat rooms are often devoted to a particular subject or are conducted on a certain schedule. *See also* BBS, chat, IRC, room.

Cheapernet *n. See* 10Base2.

cheat code *n.* In computer games, a secret keyboard sequence or code that gives a player an advantage in the game. For example, cheat codes often confer more ammunition, lives, or the ability to fly or walk through obstacles. *See also* adventure games, computer games.

check bit *n.* One of a set of bits that are added to a data message at its origin and scrutinized by the receiving process to determine whether an error has occurred during transmission. The simplest example is a parity bit. *See also* data integrity, parity bit.

check box *n.* An interactive control often found in graphical user interfaces. Check boxes are used to enable or disable one or more features or options from a set. When an option is selected, an x or a check mark appears in the box. *See also* control (definition 2). *Compare* radio button.

check digit *n.* A digit added to an account number or other identifying key value and then recomputed when the number is used. This process determines whether an error occurred when the number was entered. *See also* checksum.

checkpoint *n.* **1.** A processing juncture at which the normal operation of a program or system is momentarily suspended in order to determine its environmental status. **2.** A file containing information that describes the state of the system (the environment) at a particular time.

checksum *n.* A calculated value that is used to test data for the presence of errors that can occur when data is transmitted or when it is written to disk. The checksum is calculated for a given chunk of data by sequentially combining all the bytes of data with a series of arithmetic or logical operations. After the data is transmitted or stored, a new checksum is calculated in the same way using the (possibly faulty) transmitted or stored data. If the two checksums do not match, an error has occurred and the data should be transmitted or stored again. Checksums cannot detect all errors, and they cannot be used to correct erroneous data. *See also* error-correction coding.

Cheese worm *n.* An Internet worm that patches security holes created by the Lion worm. The Cheese worm searches out and infects Linux-based systems that were previously compromised by the Lion worm, repairing vulnerabilities and closing a back door left by the earlier infection. It then uses the healed computer to scan for other vulnerable computers connected to the Internet and sends itself to them.

Chernobyl packet *n.* A form of network attack in which a data packet sent by a hacker activates every available option for the protocol in use on the receiving system. The Chernobyl packet will cause a packet storm that will eventually overload and crash the network. *Also called:* kamikaze packet.

Chernobyl virus *n. See* CIH virus.

chiclet keyboard *n.* A microcomputer keyboard used on the first version of the IBM PCjr home computer. Chiclet keys are small and square, resembling the chewing gum

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pieces, and they act like pushbuttons, without the resistance and clear feedback of traditional keys. They are also much smaller and typically are spread out, so touch typing is more difficult than on a conventional keyboard.

child *n.* **1.** A process initiated by another process (the parent). This initiating action is frequently called a *fork*. The parent process often sleeps (is suspended) until the child process stops executing. **2.** In a tree structure, the relationship of a node to its immediate predecessor. *See also* generation (definition 2), tree structure.

child directory *n. See* subdirectory.

child menu *n. See* submenu.

child process *n. See* child (definition 1).

Children's Online Privacy Protection Act *n. See* COPPA.

chimes of doom *n.* In Macintosh computers, a series of chimes that sound as a result of serious system failure.

chip *n. See* integrated circuit.

chip card *n. See* smart card.

chip set or **chipset** *n.* A collection of chips designed to function as a unit in the performance of some common task. The term is most commonly used to refer to the set of integrated circuits, such as the programmable interrupt controller, that support a CPU together with the CPU itself. Often a chip set will fit on one chip. *See also* CPU, integrated circuit, programmable interrupt controller.

choke *n. See* inductor.

choose *vb.* To pick a command or an option from within a graphical user interface, as by clicking a button in a dialog box or pulling down a menu and then releasing the mouse button on one of its options. Although *select* is often used instead of *choose* to describe the same action, *choose* is the preferred term because *select* has specific connotations within computing. *See also* select.

Chooser *n.* On the Apple Macintosh, a desk accessory that allows the user to select a printer or a device on a network, such as a file server or a printer.

Chooser extension *n.* A program that adds items to the Macintosh Chooser desk accessory. At system startup, Chooser adds to its menu of options from the extensions available in the system extensions folder. For example, if you want to use a particular printer with your Mac OS, you must have the right Chooser extension for that printer in the extensions folder when the computer is turned on. *See also* Chooser, extension (definition 4).

chroma *n.* The quality of a color that combines hue and saturation. *See also* hue, saturation.

CHRP *n. See* Common Hardware Reference Platform.

churn rate *n.* The rate of customer subscription turnover. In beeper, cell phone, and online businesses, it is common for customers to drop their monthly subscriptions, creating a churn rate as high as 2 or 3 percent per month. High churn rates are costly to companies because attracting new subscribers through advertising and promotion is expensive.

CIDR *n. See* classless interdomain routing.

CIFS *n. See* Common Internet File System.

CIH virus *n.* A highly destructive virus that first appeared in early 1998. When activated, the CIH virus code will attempt to overwrite the flash BIOS of infected machines, rendering the computer unbootable. The CIH virus is also known as the Chernobyl virus because in its original form it was set to activate on the anniversary of the Chernobyl nuclear accident. Although the CIH virus lacks stealth or sophisticated replication capabilities and is easily detected by current virus security programs, it continues to appear regularly. *Also called:* Chernobyl virus. *See also* virus.

CIM *n.* **1.** Acronym for **C**ommon **I**nformation **Mo**del. A conceptual specification supported by the Desktop Management Task Force (DMTF) for applying an object-oriented, Web-based model to describing management data in an enterprise network. Part of the DMTF's Web-Based Enterprise Management initiative, CIM is a system-independent and application-independent common framework for describing and sharing management information. It is based on a three-tiered model based on schemas—sets of classes: the Core Schema covers all areas of management; Common Schemas cover specific management areas, such as networks, applications, and devices; and Extension Schemas cover specific technologies, such as operating systems and applications. CIM is supported by a number of industry vendors, including Sun, IBM, Microsoft, and Cisco. *See also* DMTF, WBEM. **2.** Acronym for **c**omputer-**i**ntegrated **m**anufacturing. The use of computers, communication lines, and specialized software to automate both the managerial functions and the operational activities involved in the manufacturing process. A common database is used in all aspects of the process, from design through assembly, accounting, and resource management. Advanced CIM

systems integrate computer-aided design and engineering (CAD/CAE), material requirements planning (MRP), and robotic assembly control to provide "paperless" management of the entire manufacturing process. **3.** Acronym for computer-input microfilm. A process in which information stored on microfilm is scanned and the data (both text and graphics) converted into codes that can be used and manipulated by a computer. Computer-input microfilm is similar to processes such as optical character recognition, in which images on paper are scanned and converted to text or graphics. *Compare* COM (definition 4).

CIP *n.* **1.** Short for Commerce Interchange Pipeline. A Microsoft technology that provides for secure routing of business data between applications over a public network such as the Internet. CIP is independent of data format and supports encryption and digital signatures, as well as various transport protocols including SMTP, HTTP, DCOM, and EDI value-added networks. Typically, data such as invoices and purchase orders travel over a network through a transmit pipeline and are read from the network by a receive pipeline that decodes and prepares the data for the receiving application. **2.** Short for Common Indexing Protocol. A protocol defined by the Internet Engineering Task Force (IETF) for enabling servers to share indexing information. CIP was developed to provide servers with a standard means of sharing information about the contents of their databases. With such sharing, a server unable to resolve a particular query would be able to route the query to other servers that might contain the desired information—for example, to find the e-mail address of a particular user on the Web.

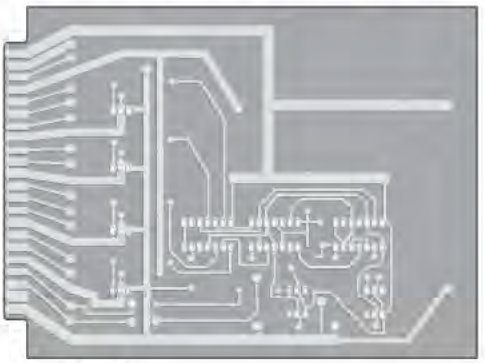
cipher *n.* **1.** A code. **2.** An encoded character. **3.** A zero.

ciphertext *n.* The scrambled or otherwise encoded text of an encrypted message. *See also* encryption.

circuit *n.* **1.** Any path that can carry electrical current. **2.** A combination of electrical components interconnected to perform a particular task. At one level, a computer consists of a single circuit; at another, it consists of hundreds of interconnected circuits.

circuit analyzer *n.* Any device for measuring one or more characteristics of an electrical circuit. Voltage, current, and resistance are the characteristics most commonly measured. Oscilloscopes are circuit analyzers.

circuit board *n.* A flat piece of insulating material, such as epoxy or phenolic resin, on which electrical components are mounted and interconnected to form a circuit. Most modern circuit boards use patterns of copper foil to interconnect the components. The foil layers may be on one or both sides of the board and, in more advanced designs, in several layers within the board. A printed circuit board is one in which the pattern of copper foil is laid down by a printing process such as photolithography. See the illustration. *See also* board, printed circuit board.



Circuit board.

circuit breaker *n.* A switch that opens and cuts off the flow of current when the current exceeds a certain level. Circuit breakers are placed at critical points in circuits to protect against damage that could result from excessive current flow, which is typically caused by component failure. Circuit breakers are often used in place of fuses because they need only to be reset rather than replaced. *Compare* surge protector.

circuit card *n. See* circuit board.

Circuit Data Services *n.* A GTE service that uses circuit switching technology to provide fast data transfer using a laptop computer and cellular telephone. *Acronym:* CDS. *See also* circuit switching.

circuit-switched data *n.* An ISDN option that can be specified for B (bearer) channels that enables an ISDN user to transmit digital data over the channel at 64 Kbps along a point-to-point, dedicated connection for the duration of a call. *Acronym:* CSD. *See also* alternate circuit-switched voice/circuit-switched data, B channel, ISDN. *Compare* circuit-switched voice.

circuit-switched voice *n.* An ISDN option that can be specified for B (bearer) channels that uses the channel to set up a point-to-point, dedicated connection for the digital transmission of voice communications for the duration of a call. *Acronym:* CSV. *See also* alternate circuit-switched

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voice/circuit-switched data, B channel, ISDN. *Compare* circuit-switched data.

circuit switching *n.* A method of opening communications lines, as through the telephone system, by creating a physical link between the initiating and receiving parties. In circuit switching, the connection is made at a switching center, which physically connects the two parties and maintains an open line between them for as long as needed. Circuit switching is typically used on the dial-up telephone network, and it is also used on a smaller scale in privately maintained communications networks. Unlike other methods of transmission, such as packet switching, it requires the link to be established before any communication can take place. *Compare* message switching, packet switching.

circular list *n.* A linked or chained list in which processing continues through all items, as in a ring, and returns to the starting point, no matter where that point is located in the list. *See also* linked list.

CIS *n.* **1.** Acronym for **C**ompuServe **I**nformation **S**ervice *See* CompuServe. **2.** Short for **c**ontact **i**mage **s**ensor. A light-sensitive mechanism used in scanners and fax machines. A CIS scanner reflects light from a row of light-emitting diodes (LEDs) onto a document or other object and converts the reflected light to digital images. CIS sensors are smaller and lighter than the charge-coupled devices (CCDs) traditionally used in scanners, but the image quality they produce is not as good as the image quality produced by CCDs. *See also* light-emitting diode, scanner. *Compare* charge-coupled device.

CISC *n.* Acronym for **c**omplex **i**nstruction **s**et **c**omputing. The implementation of complex instructions in a microprocessor design so that they can be invoked at the assembly language level. The instructions can be very powerful, allowing for complicated and flexible ways of calculating such elements as memory addresses. All this complexity, however, usually requires many clock cycles to execute each instruction. *Compare* RISC.

CIX *n. See* Commercial Internet Exchange.

CKO *n.* Acronym for **C**hief **K**nowledge **O**fficer. A corporate executive in charge of management and distribution of all the business and technical knowledge of a company. The CKO maximizes the value of stored knowledge by ensuring that employees have access, and by avoiding knowledge loss caused by technology-based changes and upgrades in databases and other storage.

ClariNet *n.* A commercial service that distributes news articles from United Press International (UPI) and other news agencies in newsgroups that are part of the clari. hierarchy. Unlike most other newsgroups, access to the clari. newsgroups is restricted to Internet service providers who pay a subscription fee to ClariNet.

clari. newsgroups *n.* Internet newsgroups maintained by ClariNet Communications, Inc. ClariNet newsgroups contain news articles obtained from the Reuters and United Press International wire services, SportsTicker, Commerce Business Daily, and other sources. Unlike most other newsgroups, ClariNet groups are only accessible through Internet service providers who purchase the service. *See also* ClariNet, ISP, newsgroup.

ClarisWorks *n. See* AppleWorks.

class *n.* **1.** In object-oriented programming, a generalized category that describes a group of more specific items, called *objects*, that can exist within it. A class is a descriptive tool used in a program to define a set of attributes or a set of services (actions available to other parts of the program) that characterize any member (object) of the class. Program classes are comparable in concept to the categories that people use to organize information about their world, such as *animal*, *vegetable*, and *mineral*, that define the types of entities they include and the ways those entities behave. The definition of classes in object-oriented programming is comparable to the definition of types in languages such as C and Pascal. *See also* object-oriented programming. **2.** For hardware, the method for grouping particular types of devices and buses according to the basic ways that they can be installed and managed by the operating system. The hardware tree is organized by device class, and Windows uses class installers to install drivers for all hardware classes.

Class A IP address *n.* A unicast IP address that ranges from 1.0.0.1 through 126.255.255.254. The first octet indicates the network, and the last three octets indicate the host on the network. *See also* Class B IP address, Class C IP address, IP address classes.

Class A network *n.* An Internet network that can define a maximum of 16,777,215 hosts. Class A networks use the first byte of an IP address to designate the network, with the first (high-order) bit set to 0. The host is designated by the last 3 bytes. Class A addressing currently allows for a maximum of 128 networks. Class A networks are best suited for sites with few networks but numerous hosts and

are usually designated for use by large government or educational institutions. *See also* host, IP address.

Class B IP address *n.* A unicast IP address that ranges from 128.0.0.1 through 191.255.255.254. The first two octets indicate the network, and the last two octets indicate the host on the network. *See also* Class A IP address, Class C IP address, IP address classes.

Class C IP address *n.* A unicast IP address that ranges from 192.0.0.1 to 223.255.255.254. The first three octets indicate the network, and the last octet indicates the host on the network. *See also* Class A IP address, Class B IP address, IP address classes.

classful IP addressing *n.* An IP addressing scheme where IP addresses are organized into classes: Class A, Class B, and Class C. *See also* IP address classes.

Classic *n.* An environment within Mac OS X that allows a user to run legacy software. Classic emulates the earlier Macintosh operating system chosen by the user and provides support for programs that aren't compatible with Mac OS X architecture. *See also* Carbon, Cocoa, Mac OS X.

classless interdomain routing *n.* An address scheme that uses aggregation strategies to minimize the size of top-level Internet routing tables. Routes are grouped with the objective of minimizing the quantity of information carried by core routers. The main requirement for this scheme is the use of routing protocols that support it, such as Border Gateway Protocol (BGP) version 4 and RIP version 2. *Acronym:* CIDR. *See also* Border Gateway Protocol, communications protocol, RIP, router, supernetting.

class library *n.* A collection of standard routines and sub-programs that a programmer can use in object-oriented programs. A typical class library for a graphical user interface might include routines for buttons and scroll bars; or a class library for a communications program might include a routine for dialing a telephone line through a modem. *See also* class, object-oriented programming.

classpath *n.* In Java programming, a classpath is an environmental variable that tells the Java Virtual Machine (JVM) and Java programs where to find class libraries, including user-defined class libraries. *See also* class, class library, Java Virtual Machine.

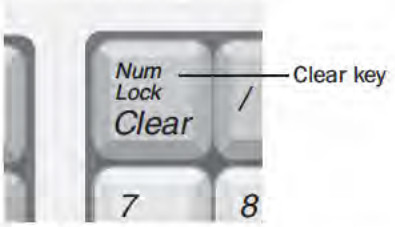
clean boot *n.* Booting or starting a computer using the minimum system files in the operating system. The clean boot is used as a troubleshooting method for isolating problems associated with software that may be calling on the same system resources at the same time, causing conflicts that lower the performance of the system, make some programs inoperable, or crash the computer. *See also* boot[1], crash[1] (definition 1), operating system.

clean install *n.* Reinstallation of software in a manner that ensures that no application or system files from a previous installation will remain. The procedure prevents smart installer programs from skipping file installations where a file already exists, which could potentially keep a problem from being removed.

clean interface *n.* A user interface with simple features and intuitive commands. *See also* user interface.

clean room *n.* A room in which dust and other small particles are filtered from the air and in which protective clothing is worn to avoid contaminating electronic components and other delicate, sensitive equipment.

Clear key *n.* A key in the upper left corner of the numeric keypad on some keyboards. In many applications, it clears the currently selected menu choice or deletes the current selection. See the illustration.



Clear key.

clear memory *vb.* A process that erases all data stored in RAM.

Clear To Send *n. See* CTS.

ClearType *n.* A Microsoft font technology that improves the resolution of text on LCD displays, such as those used on laptop computers. ClearType technology uses proprietary signal processing and the properties of LCD displays to produce clearer, more detailed characters and spacing, and thus significantly increase readability.

CLEC *n.* Acronym for Competitive Local Exchange Carrier. A company that sells access to the public switched telephone network, or other last mile network connections, in competition with a traditional telephone company. *See also* ILEC, last mile.

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click *vb.* To press and release a mouse button once without moving the mouse. Clicking is usually performed to select or deselect an item or to activate a program or program feature. *See also* right click. *Compare* double-click, drag.

clickable maps *n. See* image map.

click rate *n. See* clickthrough rate.

clicks and mortar *n.* A business that combines an online presence with traditional "bricks and mortar" outlets.

click speed *n.* The maximum interval between the first and second time a user presses a button on a mouse or other pointing device that will still identify these actions as a double-click to the computer as opposed to two single-clicks. *See also* double-click, mouse, pointing device.

clickstream *n.* The path a user takes while browsing a Web site. Each distinct selection made on a Web page adds one click to the stream. The further down the clickstream the user goes without finding the sought item, the more likely he or she is to depart to another Web site. Analysis of usage patterns helps Web site designers create user-friendly site structures, links, and search facilities. *See also* Web site.

clickthrough *n.* The number of times that visitors to a Web site click on an advertising banner within a specified period of time. Clickthrough is one of the elements that Web site producers use to decide how much to charge advertisers. *See also* clickthrough rate.

clickthrough rate *n.* The proportion of visitors to a Web site who click on a banner advertisement there, expressed as a percentage of total visitors to the Web site. *Also called:* click rate. *See also* clickthrough.

clickwrap agreement *n.* A contract or license in software or on a Web site that sets forth conditions for use of the software or for goods and services distributed through the Web site. Users must agree to the terms in a clickwrap agreement—typically by clicking on a button that states "I Agree" or "Agree"—before they can install the software or utilize goods or services. A clickwrap agreement is an electronic version of an End-User License Agreement. *Also called:* clickwrap license. *See also* End-User License Agreement. *Compare* shrinkwrap agreement.

clickwrap license *n. See* clickwrap agreement.

client *n.* **1.** In object-oriented programming, a member of a class (group) that uses the services of another class to which it is not related. *See also* inheritance (definition 1). **2.** A process, such as a program or task, that requests a service provided by another program—for example, a word processor that calls on a sort routine built into another program. The client process uses the requested service without having to "know" any working details about the other program or the service itself. *Compare* child (definition 1), descendant (definition 2). **3.** On a local area network or the Internet, a computer that accesses shared network resources provided by another computer (called a *server*). *See also* client/server architecture, server.

client error *n.* A problem reported by the Hypertext Transfer Protocol (HTTP) client module as the result of difficulty in interpreting a command or the inability to connect properly to a remote host.

client/server architecture *n.* An arrangement used on LANs (local area networks) that makes use of distributed intelligence to treat both the server and the individual workstations as intelligent, programmable devices, thus exploiting the full computing power of each. This is done by splitting the processing of an application between two distinct components: a "front-end" client and a "back-end" server. The client component is a complete, standalone personal computer (not a "dumb" terminal), and it offers the user its full range of power and features for running applications. The server component can be a personal computer, a minicomputer, or a mainframe that provides the traditional strengths offered by minicomputers and mainframes in a time-sharing environment: data management, information sharing between clients, and sophisticated network administration and security features. The client and server machines work together to accomplish the processing of the application being used. Not only does this increase the processing power available over older architectures but it also uses that power more efficiently. The client portion of the application is typically optimized for user interaction, whereas the server portion provides the centralized, multiuser functionality. *See also* distributed intelligence. *Compare* peer-to-peer network.

client/server network *n. See* client/server architecture.

client-side image maps *n.* An image map that performs the processing completely within the client program (i.e., Web browser) itself. Early Web implementations of image maps (circa 1993) transmitted user mouse click coordinates to the Web server for processing. Generally client-side image maps improve the speed of response to the user. *See also* image map.

client-side program *n.* On the Internet, a program that is run on a client computer rather than on a server computer.

clip *vb.* **1.** To cut off the portion of a displayed image that lies beyond a certain boundary, such as the edge of a window. Certain graphics programs also support clipping as a means of masking everything but a certain object so that painting tools, for example, can be applied to the object alone. **2.** To cut a photograph, drawing, or other illustration from a clip art collection—either in a book or on a disk. *See also* clip art. **3.** To cut off the peaks of a signal in an electronic circuit.

clip art *n.* A collection—either in a book or on a disk—of proprietary or public-domain photographs, diagrams, maps, drawings, and other such graphics that can be "clipped" from the collection and incorporated into other documents.

clipboard *n.* **1.** A special memory resource maintained by windowing operating systems. The clipboard stores a copy of the last information that was copied or cut. A paste operation passes data from the clipboard to the current program. A clipboard allows information to be transferred from one program to another, provided the second program can read data generated by the first. Data copied using the clipboard is static and will not reflect later changes. *See also* cut and paste, DDE. *Compare* scrap. **2.** A computer that uses a pen as the primary input device. *See also* clipboard computer, pen computer.

clipboard computer *n.* A portable computer whose overall appearance and operation resembles that of a traditional clipboard. A clipboard computer has an LCD or similar flat display and has a pen for user input instead of a keyboard, mouse, or other input device; the user operates the computer by touching the pen to the display. Data entered in a clipboard computer is generally transferred to another computer via a cable or a modem. A clipboard computer is used as a traditional clipboard is used, as in field work, data collection, or meetings. *See also* pen computer, portable computer.

Clipper Chip *n.* An integrated circuit that implements the SkipJack algorithm, an encryption algorithm created by the National Security Agency that encrypts 64-bit blocks of data with an 80-bit key. The Clipper Chip is manufactured by the U.S. government to encrypt telephone data. It has the added feature that it can be decrypted by the U.S. government, which has tried unsuccessfully to make the chip compulsory in the United States. *See also* encryption.

clipping path *n.* A polygon or curve that is used to mask an area in a document. Only what is inside the clipping path appears when the document is printed. *See also* PostScript.

clip source tag *n.* Computer coding tag that locates a streaming digital media image for use on a Web page. The clip source tag includes the pathway to the image, which may be stored on a Web server, a Web site, or on the computer where the Web page is displayed.

clobber *vb.* To destroy data, generally by inadvertently writing other data over it.

clock *n.* **1.** The electronic circuit in a computer that generates a steady stream of timing pulses—the digital signals that synchronize every operation. The system clock signal is precisely set by a quartz crystal, typically at a specific frequency between 1 and 50 megahertz. The clock rate of a computer is one of the prime determinants of its overall processing speed, and it can go as high as the other components of the computer allow. *Also called:* system clock. **2.** The battery-backed circuit that keeps track of the time and date in a computer—not the same as the system clock. *Also called:* clock/calendar.

clock/calendar *n.* An independent timekeeping circuit used within a microcomputer to maintain the correct time and calendar date. A clock/calendar circuit is battery powered, so it continues running even when the computer is turned off. The time and date kept by the clock/calendar can be used by the operating system (for example, to "stamp" files with the date and time of creation or revision) and by application programs (for example, to insert the date or time in a document). *Also called:* clock, internal clock.

clock doubling *n.* A technology employed by some Intel microprocessors that enables the chip to process data and instructions at twice the speed of the rest of the system. *See also* i486DX2.

clocking *n. See* synchronization (definition 3).

clockless chip *n. See* asynchronous chip.

clock pulse *n.* An electronic pulse generated periodically by a crystal oscillator to synchronize the actions of a digital device.

clock rate *n.* The speed at which the internal clock in an electronic device oscillates. In computers, each tick (oscillation) of the clock is called a cycle, and the clock rate is measured in megahertz, or millions of cycles per second. Also called clock speed, the clock rate determines how

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quickly the CPU can execute basic instructions, such as adding two numbers, and it is used to synchronize the activities of various components in the system. Between 1981, when the IBM PC was released, and early 2002, typical clock rates for personal computers increased about 1000-fold, from 4.77 MHz to 2 GHz and faster. *Also called:* clock speed, hertz time. *See also* clock (definition 1).

clock speed *n. See* clock rate.

clock tick *n. See* CPU cycle (definition 2).

clone[1] *n.* A copy; in microcomputer terminology, a look-alike, act-alike computer that contains the same microprocessor and runs the same programs as a better-known, more prestigious, and often more expensive machine.

clone[2] *vb.* To copy or replicate the entire contents of a hard disk drive, including the operating system, configuration settings, and programs, by creating an image of the hard disk drive. Hard disk drives are often cloned for batch installation on other computers, particularly those on a network, or for use as backups.

close[1] *n.* An FTP command that instructs the client to close the current connection with a server. *See also* FTP[1] (definition 1), Web site.

close[2] *vb.* **1.** To end an application's relationship with an open file so that the application will no longer be able to access the file without opening it again. **2.** To end a computer's connection with another computer on a network.

close box *n.* In the Macintosh graphical user interface, a small box in the left corner of a window's title bar. Clicking on the box closes the window. *Compare* close button.

close button *n.* In the graphical user interface for Windows 9x, Windows NT, and the X Window System, a square button in the right corner (left corner in X Windows) of a window's title bar with an x mark on it. Clicking on the button closes the window. *Also called:* X button. *Compare* close box.

closed architecture *n.* **1.** Any computer design whose specifications are not freely available. Such proprietary specifications make it difficult or impossible for third-party vendors to create ancillary devices that work correctly with a closed-architecture machine; usually only its original maker can build peripherals and add-ons for such a machine. *Compare* open architecture (definition 1). **2.** A computer system that provides no expansion slots for adding new types of circuit boards within the system unit. The original Apple Macintosh was an example of a closed architecture. *Compare* open architecture (definition 2).

closed file *n.* A file not being used by an application. An application must open such a file before reading or writing to it and must close it afterward. *Compare* open file.

closed shop *n.* A computer environment in which access to the computer is restricted to programmers and other specialists. *Compare* open shop.

closed system *n. See* closed architecture (definition 2).

cloth ribbon *n.* An inked ribbon generally used with impact printers and typewriters. The print element strikes the ribbon and drives it against the paper so as to transfer ink; then the ribbon advances slightly to make fresh ink available. A cloth ribbon is wrapped onto a spool or loaded into a cartridge that is made to fit the printer used. Cloth ribbon, although adequate for most tasks, is sometimes replaced by film ribbon when the crispest possible output is called for. However, a cloth ribbon, which re-inks itself by capillary action, is usable for multiple impressions, unlike a film ribbon. *Compare* carbon ribbon.

CLS *n.* Acronym for **C**ommon **L**anguage **S**pecification. A subset of language features supported by the .NET common language runtime, comprised of features common to several object-oriented programming languages. CLS-compliant components and tools are guaranteed to interoperate with other CLS-compliant components and tools.

cluster *n.* **1.** An aggregation, such as a group of data points on a graph. **2.** A communications computer and its associated terminals. **3.** In data storage, a disk-storage unit consisting of a fixed number of sectors (storage segments on the disk) that the operating system uses to read or write information; typically, a cluster consists of two to eight sectors, each of which holds a certain number of bytes (characters). **4.** A group of independent network servers that operate—and appear to clients—as if they were a single unit. A cluster network is designed to improve network capacity by, among other things, enabling the servers within a cluster to shift work in order to balance the load. By enabling one server to take over for another, a cluster network also enhances stability and minimizes or eliminates downtime caused by application or system failure. *See also* client/server architecture.

cluster analysis *n.* A technique used in data mining and knowledge discovery to group observations by identifying and extracting like or similar group conditions. Cluster analysis aims to describe the structure of a complex data set. *See also* ART, data mining.

cluster controller *n.* An intermediary device that is situated between a computer and a group (cluster) of subsidiary devices, such as terminals on a network, and is used to control the cluster.

clustering *n.* The grouping of multiple servers in a way that allows them to appear to be a single unit to client computers on a network. Clustering is a means of increasing network capacity, providing live backup in case one of the servers fails, and improving data security. *See also* cluster (definition 4), server.

cluster network *n.* *See* cluster (definition 4).

cluster virus *n.* A type of virus that infects once but gives the appearance of infecting every application launched. A cluster virus modifies the file system so that it is loaded before any application that the user attempts to open. Because the virus is also run when running any program, it appears that every program on the disk is infected.

CLUT *n.* Acronym for Color Look Up Table. In digital graphics applications, a specific set of colors used in the creation of graphics. When a graphic is created or edited, the user may specify a CLUT that corresponds with the needs of print, Web, or other destination media. In Web design, a specific CLUT of browser-safe colors is used to be certain graphics and designs will display consistently across different platforms and with different browsers. *See also* browser CLUT, websafe palette.

CMI *n.* Acronym for computer-managed instruction. Any type of teaching that uses computers as educational tools. *See also* CAI, CBT.

CMOS *n.* **1.** Acronym for complementary metal-oxide semiconductor. A semiconductor technology in which pairs of metal-oxide semiconductor field-effect transistors (MOSFETs), one N-type and one P-type, are integrated on a single silicon chip. Generally used for RAM and switching applications, these devices have very high speed and extremely low power consumption. They are, however, easily damaged by static electricity. *See also* MOSFET, N-type semiconductor, P-type semiconductor. **2.** The battery-backed memory used to store parameter values needed to boot PCs, such as the type of disks and the amount of memory, as well as the clock/calendar time.

CMOS RAM *n.* Short for random access memory made using complementary metal-oxide semiconductor technology. CMOS chips consume extremely little power and have high tolerance for noise from the power supply. These characteristics make CMOS chips, including CMOS RAM chips, very useful in hardware components that are powered by batteries, such as most microcomputer clocks and certain types of scratchpad RAM that are maintained by the operating system. *See also* CMOS (definition 1), parameter RAM, RAM.

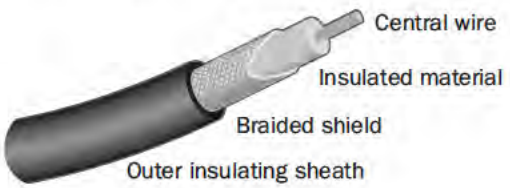
CMOS setup *n.* A system configuration utility, accessible at boot time, for setting up certain system options, such as the date and time, the kind of drives installed, and port configuration. *See also* CMOS (definition 2).

CMS *n.* *See* color management system.

CMY *n.* Acronym for cyan-magenta-yellow. A model for describing colors that are produced by absorbing light, as by ink on paper, rather than by emitting light, as on a video monitor. The three kinds of cone cells in the eye respond to red, green, and blue light, which are absorbed (removed from white light) by cyan, magenta, and yellow pigments, respectively. Percentages of pigments in these subtractive primary colors can therefore be mixed to get the appearance of any desired color. Absence of any pigment leaves white unchanged; adding 100 percent of all three pigments turns white to black. *Compare* CMYK, RGB.

CMYK *n.* Acronym for cyan-magenta-yellow-black. A color model that is similar to the CMY color model but produces black with a separate black component rather than by adding 100 percent of cyan, magenta, and yellow. *See also* CMY.

coaxial cable *n.* A round, flexible, two-conductor cable consisting of—from the center outwards—a copper wire, a layer of protective insulation, a braided metal mesh sleeve, and an outer shield, or jacket of PVC or fire-resistant material. The shield prevents signals transmitted on the center wire from affecting nearby components and prevents external interference from affecting the signal carried on the center wire. Coaxial cable is widely used in networks. It is the same type of wiring as that used for cable television. See the illustration. *Compare* fiberoptic cable, twisted-pair wiring.



Coaxial cable.

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COBOL *n.* Acronym for **Co**mmon **B**usiness-**O**riented **L**anguage. A verbose, English-like compiled programming language developed between 1959 and 1961 and still in widespread use today, especially in business applications typically run on mainframes. A COBOL program consists of an Identification Division, which specifies the name of the program and contains any other documentation the programmer wants to add; an Environment Division, which specifies the computers being used and the files used in the program for input and output; a Data Division, which describes the format of the data structures used in the program; and a Procedure Division, which contains the procedures that dictate the actions of the program. *See also* compiled language.

cobweb site *n.* A Web site that is far out of date. *See also* Web site.

Cocoa *n.* A set of object-oriented development tools and interfaces available on Mac OS X. Cocoa contains a set of frameworks, software components, and development tools used to construct applications for Mac OS X and provides programming interfaces in Java and Objective-C. Cocoa is based on NeXT's OpenStep and is integrated with Apple technologies.

CODASYL *n.* Acronym for **Co**nference on **Da**ta **Sy**stems **L**anguages. An organization founded by the U.S. Department of Defense. CODASYL is dedicated to the development of data-management systems and languages, among them the widely used COBOL.

code[1] *n.* **1.** Program instructions. Source code consists of human-readable statements written by a programmer in a programming language. Machine code consists of numerical instructions that the computer can recognize and execute and that were converted from source code. *See also* data, program. **2.** A system of symbols used to convert information from one form to another. A code for converting information in order to conceal it is often called a *cipher*. **3.** One of a set of symbols used to represent information.

code[2] *vb.* To write program instructions in a programming language. *See also* program.

code access security *n.* A mechanism provided by the runtime whereby managed code is granted permissions by security policy and these permissions are enforced, limiting what operations the code will be allowed to perform. To prevent unintended code paths from exposing a security vulnerability, all callers on the call stack must be granted the necessary permissions (possibly subject to override by assertion or denial).

codec *n.* **1.** Short for **co**der/**dec**oder. Hardware that can convert audio or video signals between analog and digital forms. **2.** Short for **co**mpressor/**dec**ompressor. Hardware or software that can compress and uncompress audio or video data. *See also* compress[2], uncompress. **3.** Hardware that combines the functions of definitions 1 and 2.

code conversion *n.* **1.** The process of translating program instructions from one form into another. Code may be converted at the source-language level (for example, from C to Pascal), at the hardware-platform level (for example, from working on the IBM PC to working on the Apple Macintosh), or at the language level (for example, from source code in C to machine code). *See also* code[1] (definition 1). **2.** The process of transforming data from one representation to another, such as from ASCII to EBCDIC or from two's complement to binary-coded decimal.

Code Division Multiple Access *n.* A form of multiplexing in which the transmitter encodes the signal, using a pseudo-random sequence that the receiver also knows and can use to decode the received signal. Each different random sequence corresponds to a different communication channel. Motorola uses Code Division Multiple Access for digital cellular phones. *Acronym:* CDMA. *Also called:* spread spectrum. *See also* multiplexing, transmitter.

code page *n.* In MS-DOS versions 3.3 and later, a table that relates the binary character codes used by a program to keys on the keyboard or to the appearance of characters on the display. Code pages are a means of providing support for character sets and keyboard layouts used in different countries. Devices such as the display and the keyboard can be configured to use a specific code page and to switch from one code page (such as United States) to another (such as Portugal) at the user's request.

code profiler *n.* A tool designed to aid developers in identifying and eliminating the code inefficiencies that cause bottlenecks and degrade performance in their applications. Code profilers analyze an executing application to determine both how long functions take to execute and how often they are called. Using a code profiler is a repetitive process in that the tool must be reused after each section of inefficient code has been found and corrected.

coder *n.* *See* programmer.

Code Red worm *n.* A fast-spreading and pernicious Internet worm first discovered in mid-2001. The Code Red

worm propagates quickly, and any machine that was infected once is potentially vulnerable to re-infection. The Code Red worm is time sensitive, spreading in propagation mode from the 1st to the 19th of each month, attacking in flood mode from the 20th to the 27th, and finally hiding in hibernation mode until the 1st of the next month when the cycle begins again. The worm maintains a list of all computers previously infected, and all these computers will be attacked each month by every newly infected machine. This makes total eradication of the worm difficult because a single machine remaining infected from earlier propagation/attack cycles can potentially re-infect every machine on the list, and each computer might be subject to multiple attacks. At least three versions of the Code Red worm are known to exist. The Code Red worm was named for a caffeinated soft drink by the security team that first tracked the worm.

code segment *n.* **1.** A memory segment containing program instructions. **2.** A named and segregated portion of a program's code typically performing a specific class of operations. Code segments in this sense are often loaded into memory as memory segments. The main program segment is kept in memory, and auxiliary segments are loaded only when they are required.

code signing *n.* The process of adding a digital signature to additions and updates made to source code and applications published on the Internet. Code signing is intended to provide a level of security and trust to Internet software distribution. *See also* digital signature.

code snippet *n.* **1.** In a graphical user interface, programming instructions embedded in a menu option or button defined by the user. The snippet—consisting of one or more lines of source code—determines what the option or button does when chosen or clicked. **2.** A small piece of programming code that is part of a larger program. Usually the code snippet performs a specific function or task.

coding form *n.* A sheet of paper ruled with horizontal and vertical lines to aid in writing source code for older languages that have position-dependent syntax (such as FORTRAN). Most programmers now use graph paper if they use paper at all.

coercion *n. See* cast.

Coffee Pot Control Protocol *n. See* HTCPCP.

coherence *n.* **1.** In raster-scan technology, the assignment of the value of one pixel to the pixel next to it. **2.** In optics, the property of some electromagnetic waves of being in phase with one another, as in light from a laser.

cold boot *n.* A startup process that begins with turning on the computer's power. Typically, a cold boot involves some basic hardware checking by the system, after which the operating system is loaded from disk into memory. *See also* boot[1]. *Compare* warm boot.

cold fault *n.* A fatal error that occurs immediately upon or shortly after startup as a result of the misalignment of components in the system. The process of running and shutting down any computer induces a series of thermal expansions and contractions in its internal components. Over time, these changes in the dimensions of components can create a microscopic crack in a chip or loosen a pin in a socket; thus, the system crashes when cold, but the problem seems to disappear after the machine is warm. For this reason, some users leave the system unit (but not the monitor) of a computer running from day to day, rather than turn the machine on only when needed.

cold link *n.* A link established upon a request for data. Once the request is filled, the link is broken. The next time data is required, a link from the client to the server must be reestablished. In a client/server architecture, cold links are useful when the linked item consists of a large amount of data. Dynamic Data Exchange (DDE), used in applications such as Microsoft Excel, uses cold links for data exchange. *See also* client/server architecture, DDE. *Compare* hot link.

cold start *n. See* cold boot.

collaboration data object *n.* Microsoft Exchange Server technology for creating messaging and collaboration applications. A collaboration data object consists of a scripting interface added to Microsoft Messaging Application Programming Interface (MAPI). *Acronym:* CDO.

collaborative filtering *n.* A means of deriving information from the experiences and opinions of a number of people. The term was coined by Doug Terry at Xerox PARC, who first used the technique by allowing users to annotate documents as they read them and to choose which documents to read next based not only on their content but also on what others wrote about them. A common use of collaborative filtering is the creation of lists of World Wide Web pages of interest to particular people; by documenting the experiences of several people, a list of interesting Web sites can be "filtered." Collaborative filtering is also used as a marketing research tool; by keeping a

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database of opinions and ratings regarding several products, researchers can predict which new products the people contributing to the database will like.

collapsed backbone *n. See* backbone (definition 3).

collate *vb.* In data handling, to merge items from two or more similar sets to create a combined set that maintains the order or sequence of items in the original sets.

collating sort *n.* A sort that proceeds by continuous merging of two or more files to produce a certain sequence of records or data items.

collation sequence *n.* The ordering relationship (sequence) among objects that is to be established by a collating sort. *See also* collating sort.

collector *n.* The region of a bipolar transistor into which charge carriers flow under normal operating conditions. The output of the transistor is usually taken from the collector. With respect to the base and emitter, the collector is positive in an NPN transistor and negative in a PNP transistor. *See also* NPN transistor, PNP transistor. *Compare* base (definition 3), emitter.

collision *n.* The result of two devices or network workstations trying to transmit signals at the exact same time on the same channel. The typical outcome is a garbled transmission.

collision detection *n.* **1.** The process by which a node on a local area network monitors the communications line to determine when a collision has occurred; that is, when two nodes have attempted to transmit at the same time. Although network stations usually avoid collisions by monitoring the line and waiting for it to clear before transmitting, the method is not foolproof. When a collision does occur, the two nodes involved usually wait a random amount of time before attempting to retransmit. *See also* contention, CSMA/CD. **2.** The process by which a game or simulation program determines whether two objects on the screen are touching each other. This is a time-consuming, often complicated procedure; some computers optimized for graphics and games, such as the Amiga, have special hardware built in specifically to detect collisions.

colocation or **co-location** *n.* The operation of a server, router, or other device in a facility that provides a dedicated Internet connection, physical space in a secured cage, and regulated power. Colocation services often include fire detection and extinguishing, backup power, technical support, and additional security measures to ensure high availability.

color *n.* In physics, the component of the human perception of light that depends on frequency. For light of a single frequency, color ranges from violet at the high-frequency end of the visible-light band (a small portion of the total electromagnetic spectrum) to red at the low-frequency end. In computer video, color is produced by a combination of hardware and software. Software manipulates combinations of bits that represent the distinct shades of color that are destined for particular positions on the screen (characters or individual dots, called pixels). The video adapter hardware translates these bits into electrical signals, which in turn control the brightnesses of different-colored phosphors at the corresponding positions on the screen of the monitor CRT. The user's eye unites the light from the phosphors to perceive a single color. *See also* color model, color monitor, CRT, HSB, monitor, RGB, video, video adapter.

color bits *n.* A predetermined number of bits assigned to each displayable pixel that determine the pixel's color when it is displayed on a monitor. For example, two color bits are required for four colors; eight color bits are required for 256 colors. *See also* pixel image. *Compare* bit plane.

color box *n.* In the Windows NT and Windows 9x Paint accessory, a graphic screen element in the form of a paint box that is used to select foreground and background colors.

color burst *n.* A technique used to encode color in a composite video signal, originally developed so that black-and-white television monitors could display programs broadcast in color. The color burst consists of a combination of the red, green, and blue intensities (used by black-and-white displays) and two color-difference signals that determine separate red, green, and blue intensities (used by color displays). *See also* color look-up table.

color cycling *n.* A technique used in computer graphics for changing the color of one or more pixels on the screen by changing the color palette used by the video adapter rather than by changing the color bits for each pixel. For example, to cause a red circle to fade away to a black background color, the program need only change the set of signal values corresponding to "red" in the video adapter's color look-up table, periodically making it darker until it matches the black background. At each step, the apparent color of the whole circle changes instantly; it appears to fade rather than to be painted over and over. The speed at which and the degree to which the circle fades are entirely up to the programmer.

color depth *n.* The number of color values that can be assigned to a single pixel in an image. Also known as bit depth, color depth can range from 1 bit (black and white) to 32 bits (over 16.7 million colors). *See also* bit depth.

color gamut *n.* The particular range of colors that a device is able to produce. A device such as a scanner, monitor, or printer can produce a unique range of colors, which is determined by the characteristics of the device itself. *See also* rendering intent.

Color/Graphics Adapter *n. See* CGA.

colorimeter *n.* A device that evaluates and identifies colors in terms of a standard set of synthesized colors.

color look-up table *n.* A table stored in a computer's video adapter, containing the color signal values that correspond to the different colors that can be displayed on the computer's monitor. When color is displayed indirectly, a small number of color bits are stored for each pixel and are used to select a set of signal values from the color look-up table. *Also called:* color map, color table, video look-up table. *See also* color bits, palette (definition 2), pixel.

Color Look Up Table *n. See* CLUT.

color management *n.* The process of producing or reproducing accurate, consistent color across any of a variety of color input, output, and display devices. Color management includes, but is not limited to, accurate conversion of RGB input from input devices such as a scanner or a camera or from display devices such as a monitor to CMYK output for an output device such as a printer. Color management also encompasses application of a device profile, which contains information on color behavior for the printer or other device on which the image will be reproduced, and allowance for environmental variations such as humidity and lighting. *See also* CMYK, RGB.

color management system *n.* A technology designed to calibrate, characterize, and process color production and reproduction across a variety of color input, output, and display devices. *See also* color management.

color map *n. See* color look-up table.

color model *n.* Any method or convention for representing color in desktop publishing and graphic arts. In the graphic arts and printing fields, colors are often specified with the Pantone system. In computer graphics, colors can be described using any of several different color systems: HSB (hue, saturation, and brightness), CMY (cyan, magenta, and yellow), and RGB (red, green, and blue). *See also* CMY, HSB, Pantone Matching System, process color, RGB, spot color.

color monitor *n.* A video display device designed to work with a video card or an adapter to produce text or graphics images in color. A color monitor, unlike a monochrome display, has a screen coated internally with patterns of three phosphors that glow red, green, and blue when struck by an electron beam. To create colors such as yellow, pink, and orange, the three phosphors are lighted together in varying degrees. A video card that uses large groups of bits (6 or more) to describe colors and that generates analog (continuously variable) signals is capable of generating an enormous potential range of colors on a color monitor. *See also* color, color model, Cycolor.

color palette *n. See* palette (definition 1).

color plane *n. See* bit plane.

color printer *n.* A computer printer that can print full-color output. Most color printers can also produce black-and-white output.

color saturation *n.* The amount of a hue contained in a color; the more saturation, the more intense the color. *See also* color model, HSB.

color scanner *n.* A scanner that converts images to a digitized format and is able to interpret color. Depth of color depends on the scanner's bit depth—its ability to transform color into 8, 16, 24, or 32 bits. High-end color scanners, commonly used when output is to be printed, are able to encode information at a high resolution or number of dots per inch (dpi). Low-end color scanners encode information at a resolution of 72 dpi and are commonly used for computer screen images not intended for printing. *See also* resolution (definition 1), scanner.

color separation *n.* **1.** The process of printing the colors in a document as separate output files, each of which is to be printed using a different-colored ink. There are two types of color separation: spot color separation and process color separation. *See also* color model, process color, spot color. **2.** One of the output files produced by a color document, to be printed in its own color of ink.

color space *n.* A means of describing color in digital environments. RGB is the most common color space on the Web, and with other color, the most common color space viewed on computer displays, while CMYK is the main color space for desktop publishing and other digital print media.

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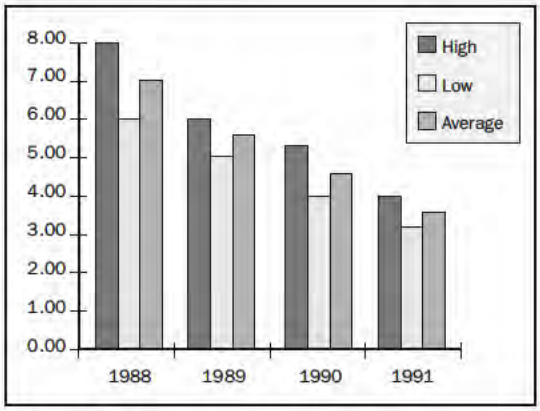
color supertwist nematic display *n. See* supertwist display.

color table *n. See* color look-up table.

column *n.* **1.** A series of items arranged vertically within some type of framework—for example, a continuous series of cells running from top to bottom in a spreadsheet, a set of lines of specified width on a printed page, a vertical line of pixels on a video screen, or a set of values aligned vertically in a table or matrix. *Compare* row. **2.** In a relational database management system, the name for an attribute. The collection of column values that form the description of a particular entity is called a *tuple* or *row*. A column is equivalent to a field in a record in a nonrelational file system. *See also* entity, field (definition 1), row, table (definition 2).

column chart *n.* A bar chart in which values are displayed and printed as vertical bars. See the illustration. *See also* bar chart.



Column chart.

.com *n.* **1.** In the Internet's Domain Name System, the top-level domain that identifies addresses operated by commercial organizations. The domain name .com appears as a suffix at the end of the address. *See also* DNS (definition 1), domain (definition 3). *Compare* .edu, .gov, .mil, .net, .org. **2.** In MS-DOS, the file extension that identifies a command file. *See also* COM (definition 3).

COM *n.* **1.** A name reserved by the MS-DOS operating system for serial communications ports. For example, if a modem is connected to one serial port and a serial printer to another, the devices are identified as COM1 and COM2 by the operating system. **2.** Acronym for Component Object Model. A specification developed by Microsoft for building software components that can be assembled into programs or add functionality to existing programs running on Microsoft Windows platforms. COM components can be written in a variety of languages, although most are written in C++, and can be unplugged from a program at runtime without having to recompile the program. COM is the foundation of the OLE (object linking and embedding), ActiveX, and DirectX specifications. *See also* ActiveX, component (definition 2), DirectX, OLE. **3.** The extension reserved by MS-DOS for a type of executable binary (program) file limited to a single 64-kilobyte (KB) segment. COM files are often used for utility programs and short routines. They are not supported in OS/2. **4.** Acronym for computer-output microfilm. Microfilm that can record data from a computer.

COM1 *n.* A serial communications port in Wintel systems. COM1 is usually specified by the I/O range 03F8H, is usually associated with interrupt request line IRQ4, and in many systems is used to connect an RS232 serial mouse. *See also* IRQ.

COM2 *n.* A serial communications port in Wintel systems. COM2 is usually specified by the I/O range 02F8H, is usually associated with interrupt request line IRQ3, and in many systems is used to connect a modem. *See also* IRQ.

COM3 *n.* A serial communications port in Wintel (Windows running on an Intel chip) systems. COM3 is usually specified by the I/O range 03E8H, is usually associated with interrupt request line IRQ4, and in many systems is used as an alternative to COM1 or COM2 if the latter is being used by some other peripheral. *See also* IRQ, port, Wintel.

combinatorial explosion *n.* A condition inherent in certain types of mathematical problems in which small increases in the problem's size (number of data items or parameters of the operation) lead to enormous increases in the time required to obtain a solution. *See also* combinatorics.

combinatorics *n.* A branch of mathematics related to probability and statistics, involving the study of counting, grouping, and arrangement of finite sets of elements. Combinatorics involves the two concepts of combinations and permutations. A combination is the grouping of elements taken from a larger set without regard to the order of the elements in each group; for example, taking two elements at a time from a set of four objects (A, B, C, and D) creates six combinations of objects: AB, AC, AD, BC, BD, and

CD. A permutation is a grouping of elements taken from a larger set with regard to the order of the elements. For example, in making permutations of two objects from the same set of four objects, there would be four candidates to choose from for the first selection (A), and three left over to choose from for the second selection (B), or 12 permutations in all: AB, AC, AD, BA, BC, BD, CA, CB, CD, DA, DB, DC. *See also* combinatorial explosion.

COM callable wrapper *n.* A proxy object generated by the runtime so that existing COM applications can use managed classes, including .NET Framework classes, transparently. *Acronym:* CCW.

COMDEX *n.* Any of a series of annual computer trade shows operated by Softbank COMDEX, Inc. One of these shows takes place in Las Vegas each November and is the largest computer trade show in the United States.

Comité Consultatif International Télégraphique et Téléphonique *n. See* CCITT.

comma-delimited file *n.* A data file consisting of fields and records, stored as text, in which the fields are separated from each other by commas. Use of comma-delimited files allows communication between database systems that use different formats. If the data in a field contains a comma, the field is further surrounded with quotation marks.

command *n.* An instruction to a computer program that, when issued by the user, causes an action to be carried out. Commands are usually either typed at the keyboard or chosen from a menu.

command buffer *n.* An area in memory in which commands entered by the user are kept. A command buffer can enable the user to repeat commands without retyping them completely, edit past commands to change some argument or correct a mistake, undo commands, or obtain a list of past commands. *See also* history, template (definition 4).

command button *n.* A control shaped like a pushbutton in a dialog box in a graphical user interface. By clicking a command button, the user causes the computer to perform some action, such as opening a file that has just been selected using the other controls in the dialog box.

COMMAND.COM *n.* The command interpreter for MS-DOS. *See also* command interpreter.

command-driven *adj.* Accepting commands in the form of code words or letters, which the user must learn. *Compare* menu-driven.

command-driven system *n.* A system in which the user initiates operations by a command entered from the console. *Compare* graphical user interface.

command interpreter *n.* A program, usually part of the operating system, that accepts typed commands from the keyboard and performs tasks as directed. The command interpreter is responsible for loading applications and directing the flow of information between applications. In OS/2 and MS-DOS, the command interpreter also handles simple functions, such as moving and copying files and displaying disk directory information. *See also* shell[1].

Command key *n.* On the original Macintosh keyboard, a key labeled with the special symbol, sometimes called the propeller or puppy foot. This key is found on one or both sides of the Spacebar, depending on the version of the Apple keyboard. The key serves some of the same functions as the Control key on IBM keyboards. *See also* Control key.

command language *n.* The set of keywords and expressions that are accepted as valid by the command interpreter. *See also* command interpreter.

command line *n.* A string of text written in the command language and passed to the command interpreter for execution. *See also* command language.

command-line interface *n.* A form of interface between the operating system and the user in which the user types commands, using a special command language. Although systems with command-line interfaces are usually considered more difficult to learn and use than those with graphical interfaces, command-based systems are usually programmable; this gives them flexibility unavailable in graphics-based systems that do not have a programming interface. *Compare* graphical user interface.

command mode *n.* A mode of operation in which a program waits for a command to be issued. *Compare* edit mode, insert mode.

command processing *n. See* command-driven system.

command processor *n. See* command interpreter.

command prompt window *n.* A window displayed on the desktop used to interface with the MS-DOS operating

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system. MS-DOS commands are typed at an entry point identified by a blinking cursor. *See also* MS-DOS.

command shell *n. See* shell[1].

command state *n.* The state in which a modem accepts commands, such as a command to dial a telephone number. *Compare* online state.

comment *n.* Text embedded in a program for documentation purposes. Comments usually describe what the program does, who wrote it, why it was changed, and so on. Most programming languages have a syntax for creating comments so that they can be recognized and ignored by the compiler or assembler. *Also called:* remark. *See also* comment out.

comment out *vb.* To disable one or more lines of code from a program temporarily by enclosing them within a comment statement. *See also* comment, conditional compilation, nest.

Commerce Interchange Pipeline *n. See* CIP.

commerce server *n.* An HTTP server designed for conducting online business transactions. Data is transferred between the server and Web browser in an encrypted form to keep information such as credit card numbers reasonably secure. Commerce servers are typically used by online stores and companies that are set up for mail order business. The wares or services offered by the store or company are described and displayed in photographs on the store or company Web site and users can order directly from the site using their Web browser. A number of companies market commerce servers, including Netscape, Microsoft, and Quarterdeck. *See also* HTTP server (definition 1), Secure Sockets Layer, Web browser.

commercial access provider *n. See* ISP.

Commercial Internet Exchange *n.* A nonprofit trade organization of public Internet service providers. In addition to the usual representational and social activities, the organization also operates an Internet backbone router that is accessible to its members. *Acronym:* CIX. *See also* backbone (definition 1), ISP, router.

commercial off-the-shelf board *n.* A hardware board or platform that is readily available in the industry for purchase and can be used for development or test purposes. *Also called:* COTS board.

Common Access Method *n.* A standard developed by Future Domain and other SCSI vendors allowing SCSI adapters to communicate with SCSI peripherals regardless of the particular hardware used. *See also* SCSI.

Common Application Language *n. See* CAL.

common carrier *n.* A communications company (e.g., a telephone company) that provides service to the public and is regulated by governmental organizations.

Common Client Interface *n.* A control interface begun with the X Windows version of NCSA Mosaic whereby other programs can control the local copy of a Web browser. The X Windows and Windows versions of NCSA Mosaic can communicate with other programs via TCP/IP. The Windows version is also capable of OLE communication. *Acronym:* CCI. *See also* Mosaic, OLE, TCP/IP, X Window System.

Common Gateway Interface *n. See* CGI (definition 1), CGI script.

Common Hardware Reference Platform *n.* A specification describing a family of machines, based on the PowerPC processor, that are capable of booting multiple operating systems, including Mac OS, Windows NT, AIX, and Solaris. *Acronym:* CHRP. *See also* PowerPC.

Common Indexing Protocol *n. See* CIP.

Common Information Model *n. See* CIM (definition 1).

Common Internet File System *n.* A standard proposed by Microsoft that would compete directly with Sun Microsystems' Web Network File System. A system of file sharing of Internet or intranet files. *Acronym:* CIFS.

common language runtime *n.* The engine at the core of managed code execution. The runtime supplies managed code with services such as cross-language integration, code access security, object lifetime management, and debugging and profiling support.

common language runtime host *n.* An unmanaged application that uses a set of APIs, called the hosting interfaces, to integrate managed code into the application. Common language runtime hosts often require a high degree of customization over the runtime that is loaded into the process. The hosting interfaces allow common language runtime hosts to specify settings that configure the garbage collector, select the appropriate build for their

environment (server versus workstation), and so on. Common language runtime hosts often support an extensibility model that allows the end user to dynamically add new pieces of functionality, such as a new control or a user-written function. These extensions are typically isolated from each other in the process using application domains and custom security settings. Examples of common language runtime hosts include ASP.NET, Microsoft Internet Explorer, and a host to run executables launched from the Windows Shell.

Common Language Specification *n. See* CLS.

Common LISP *n.* Short for **Common Lis**t **P**rocessing. A formalized and standardized version of the LISP programming language. Because LISP is in the public domain, a number of different versions of the language have evolved, and Common LISP was made a standard to give programmers a definitive source for LISP. *See also* LISP, programming language, standard (definition 1).

Common Object Request Broker Architecture *n. See* CORBA.

common type system *n.* The specification that determines how the runtime defines, uses, and manages types.

Common User Access *n.* A set of standards for management of user interfaces as part of IBM's Systems Application Architecture (SAA). Common User Access is designed to facilitate development of applications that are compatible and consistent across different platforms. *Acronym:* CUA. *See also* standard (definition 1), user interface.

communications *n.* The vast discipline encompassing the methods, mechanisms, and media involved in information transfer. In computer-related areas, communications involves data transfer from one computer to another through a communications medium, such as a telephone, microwave relay, satellite link, or physical cable. Two primary methods of computer communications exist: temporary connection of two computers through a switched network, such as the public telephone system, and permanent or semipermanent linking of multiple workstations or computers in a network. The line between the two is indistinct, however, because microcomputers equipped with modems are often used to access both privately owned and public-access network computers. *See also* asynchronous transmission, CCITT, channel (definition 2), communications protocol, IEEE, ISDN, ISO/OSI model, LAN, modem, network, synchronous transmission. *Compare* data transmission, telecommunications, teleprocess.

Communications Act of 1934 *n. See* FCC.

Communication Satellite Corporation *n.* Corporation created by the U.S. government to provide international satellite services for telecommunications. *Acronym:* COMSAT.

communications channel *n. See* channel (definition 2).

communications controller *n.* A device used as an intermediary in transferring communications to and from the host computer to which it is connected. By relieving the host computer of the actual tasks of sending, receiving, deciphering, and checking transmissions for errors, a communications controller helps to make efficient use of the host computer's processing time—time that might be better used for noncommunications tasks. A communications controller can be either a programmable machine in its own right or a nonprogrammable device designed to follow certain communications protocols. *See also* front-end processor (definition 2).

communications link *n.* The connection between computers that enables data transfer.

communications network *n. See* network.

communications parameter *n.* Any of several settings required in order to enable computers to communicate. In asynchronous communications, for example, modem speed, number of data bits and stop bits, and type of parity are parameters that must be set correctly to establish communication between two modems.

communications port *n. See* COM.

communications program *n.* A software program that enables a computer to connect with another computer and to exchange information. For initiating communications, communications programs perform such tasks as maintaining communications parameters, storing and dialing phone numbers automatically, recording and executing logon procedures, and repeatedly dialing busy lines. Once a connection is made, communications programs can also be instructed to save incoming messages on disk or to find and transmit disk files. During communication, these types of programs perform the major, and usually invisible, tasks of encoding data, coordinating transmissions to and from the distant computer, and checking incoming data for transmission errors.

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communications protocol *n.* A set of rules or standards designed to enable computers to connect with one another and to exchange information with as little error as possible. The protocol generally accepted for standardizing overall computer communications is a seven-layer set of hardware and software guidelines known as the OSI (Open Systems Interconnection) model. A somewhat different standard, widely used before the OSI model was developed, is IBM's SNA (Systems Network Architecture). The word *protocol* is often used, sometimes confusingly, in reference to a multitude of standards affecting different aspects of communication, such as file transfer (for example, XMODEM and ZMODEM), handshaking (for example, XON/XOFF), and network transmissions (for example, CSMA/CD). *See also* ISO/OSI model, SNA.

communications satellite *n.* A satellite stationed in geosynchronous orbit that acts as a microwave relay station, receiving signals sent from a ground-based station (earth station), amplifying them, and retransmitting them on a different frequency to another ground-based station. Initially used for telephone and television signals, communications satellites can also be used for high-speed transmission of computer data. Two factors affecting the use of satellites with computers, however, are propagation delay (the time lag caused by the distance traveled by the signal) and security concerns. *See also* downlink, uplink.

communications server *n.* A gateway that translates packets on a local area network (LAN) into asynchronous signals, such as those used on telephone lines or in RS-232-C serial communications, and allows all nodes on the LAN access to its modems or RS-232-C connections. *See also* gateway, RS-232-C standard.

communications slot *n.* On many models of the Apple Macintosh, a dedicated expansion slot for network interface cards. *Acronym:* CS.

communications software *n.* The software that controls the modem in response to user commands. Generally such software includes terminal emulation as well as file transfer facilities. *See also* modem, terminal emulation.

communications system *n.* The combination of hardware, software, and data transfer links that make up a communications facility.

Communications Terminal Protocol *n.* A terminal protocol that enables a user at a remote location to access a computer as if the remote computer were directly connected (hardwired) to the computer. *Acronym:* CTERM.

community antenna television *n. See* CATV.

COMNET Conference & Expo *n.* Conference and exposition for the communications networking industry. The conference features educational sessions and exhibitions on technical and business issues affecting communications networks.

compact disc *n.* **1.** An optical storage medium for digital data, usually audio. A compact disc is a nonmagnetic, polished metal disc with a protective plastic coating that can hold up to 74 minutes of high-fidelity recorded sound. The disk is read by an optical scanning mechanism that uses a high-intensity light source, such as a laser, and mirrors. *Also called:* optical disc. **2.** A technology that forms the basis of media such as CD-ROM, CD-ROM/XA, CD-I, CD-R, DVI, and PhotoCD. These media are all compact disc–based but store various types of digital information and have different read/write capabilities. Documentation for compact disc formats can be found in books designated by the color of their covers. For example, documentation for audio compact discs is found in the Red Book. *See also* CD-I, CD-R, CD-ROM, CD-ROM/XA, DVI, Green Book (definition 2), Orange Book (definition 2), PhotoCD, Red Book (definition 2). **3.** *See* CD.

compact disc-erasable *n. See* CD-E.

compact disc-interactive *n. See* CD-I.

compact disc player *n. See* CD player.

compact disc-recordable *n. See* CD-R.

compact disc-recordable and erasable *adj. See* CD-R/E.

compact disc-rewritable *n. See* CD-RW.

CompactFlash *n.* Plug-in memory devices designed by the CompactFlash Association for use in digital cameras and, eventually, other devices for storing and transporting digital data, sound, images, and video. CompactFlash devices are small cards 1.7 x 1.4 x 0.13 inches (43 x 36 x 3.3 mm) in size. They are based on nonvolatile flash technology, so they do not rely on batteries or other power to retain information. *See also* digital camera.

CompactFlash Association *n.* A nonprofit association that developed and promotes the CompactFlash specification. Founded in October 1995, it has a membership that includes 3COM, Eastman Kodak Company, Hewlett-Packard, IBM, and NEC, among other corporations. *See also* CompactFlash.

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compaction *n.* The process of gathering and packing the currently allocated regions of memory or auxiliary storage into as small a space as possible, so as to create as much continuous free space as possible. *Compare* dispersion, file fragmentation (definition 1).

compact model *n.* A memory model of the Intel 80x86 processor family. The compact model allows only 64 kilobytes (KB) for the code of a program but up to 1 megabyte (MB) for the program's data. *See also* memory model.

CompactPCI *n.* An open bus specification for industrial computing needs developed by the PCI Industrial Computer Manufacturers Group (PICMG). CompactPCI is based on the desktop-computing PCI bus but differs in a number of respects, including a pin-and-socket connector and a design that allows for front loading and removal of cards. CompactPCI is intended for applications such as industrial automation, military systems, and real-time data acquisition. It is suitable for high-speed communications devices, such as routers, and allows for hot-plugging. *See also* hot plugging, PCI local bus.

comparator *n.* A device for comparing two items to determine whether they are equal. In electronics, for example, a comparator is a circuit that compares two input voltages and indicates which is higher.

compare *vb.* To check two items, such as words, files, or numeric values, so as to determine whether they are the same or different. In a program, the outcome of a compare operation often determines which of two or more actions is taken next.

comparison criteria *n.* A set of search conditions that is used to find data. Comparison criteria can be a series of characters that you want to match, such as "Northwind Traders", or an expression, such as ">300".

compatibility *n.* **1.** The degree to which a computer, an attached device, a data file, or a program can work with or understand the same commands, formats, or language as another. True compatibility means that any operational differences are invisible to people and programs alike. **2.** The extent to which two machines can work in harmony. Compatibility (or the lack thereof) between two machines indicates whether, and to what degree, the computers can communicate, share data, or run the same programs. For example, an Apple Macintosh and an IBM PC are generally incompatible because they cannot communicate freely or share data without the aid of hardware and/or software that functions as an intermediary or a converter. **3.** The extent to which a piece of hardware conforms to an accepted standard (for example, IBM-compatible or Hayes-compatible). In this sense, compatibility means that the hardware ideally operates in all respects like the standard on which it is based. **4.** In reference to software, harmony on a task-oriented level among computers and computer programs. Computers deemed software-compatible are those that can run programs originally designed for other makes or models. Software compatibility also refers to the extent to which programs can work together and share data. In another area, totally different programs, such as a word processor and a drawing program, are compatible with one another if each can incorporate images or files created using the other. All types of software compatibility become increasingly important as computer communications, networks, and program-to-program file transfers become near-essential aspects of microcomputer operation. *See also* downward compatibility, upward-compatible.

compatibility box *n. See* DOS box (definition 1).

compatibility mode *n.* A mode in which hardware or software in one system supports operations of software from another system. The term often refers to the ability of advanced operating systems designed for Intel microprocessors (for example, OS/2 and Windows NT) to run MS-DOS software or to the ability of some UNIX workstations and of some Apple Macintosh systems to run MS-DOS software.

Competitive Local Exchange Carrier *n. See* CLEC.

compile *vb.* To translate all the source code of a program from a high-level language into object code prior to execution of the program. Object code is executable machine code or a variation of machine code. More generally, *compiling* is sometimes used to describe translating any high-level symbolic description into a lower-level symbolic or machine-readable format. A program that performs this task is known as a *compiler*. *See also* compiler (definition 2), compile time, high-level language, machine code, source code. *Compare* interpret.

compile-and-go *adj.* Of, pertaining to, or characteristic of a development environment that automatically runs a program after compiling it. *See also* compile, execute.

compiled Basic *n.* Any version of Basic that is translated into machine code prior to execution by a compiler. Basic has traditionally been an interpreted language (translated and executed statement by statement); because compiled

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Basic generally produces faster-executing programs, it is the technology of choice for professional Basic programmers. *See also* Basic, compiled language, interpreted language.

compiled language *n.* A language that is translated into machine code prior to any execution, as opposed to an interpreted language, which is translated and executed statement by statement. *See also* compiler (definition 2). *Compare* interpreted language.

compiler *n.* **1.** Any program that transforms one set of symbols into another by following a set of syntactic and semantic rules. **2.** A program that translates all the source code of a program written in a high-level language into object code prior to execution of the program. *See also* assembler, compile, high-level language, interpreted language, language processor, object code.

compile time *n.* **1.** The amount of time required to perform a compilation of a program. Compile time can range from a fraction of a second to many hours, depending on the size and complexity of the program, the speed of the compiler, and the performance of the hardware. *See also* compiler (definition 2). **2.** The point at which a program is being compiled (i.e., most languages evaluate constant expressions at compile time but evaluate variable expressions at run time). *See also* link time, run time.

compile-time binding *n.* Assignment of a meaning to an identifier (such as a function name or a constant) in a program at the time the program is compiled rather than at the time it is run. *Compare* run-time binding.

complement *n.* Loosely, a number that can be thought of as the mirror image of another number written to the same base, such as base 10 or base 2. Complements are commonly used to represent negative numbers. Two types of complements are encountered in computer-related contexts: radix-minus-1 complements and true complements. A radix-minus-1 complement is known in the decimal system as a nine's complement and in the binary system as a one's complement. True complements are known in the decimal system as ten's complement and in binary as two's complement—a form commonly used to represent negative numbers in processing. *See also* complementary operation, nine's complement, one's complement, ten's complement, two's complement.

complementary metal-oxide semiconductor *n. See* CMOS.

complementary operation *n.* In Boolean logic, an operation that produces the opposite result from that of another operation performed on the same data. For example, if A is true, NOT A (its complement) is false. *See also* Boolean algebra.

completeness check *n.* A survey to determine that all data required in a record is present. *Compare* consistency check.

complex instruction set computing *n. See* CISC.

complex number *n.* A number of the form $a + bi$, where a and b are real numbers and i is the square root of -1, called the imaginary unit. Complex numbers can be plotted as points on a two-dimensional plane called the complex plane. The a number is plotted along the plane's horizontal axis (the real axis), and the b number is plotted along the vertical axis (the imaginary axis). *Compare* real number.

comp. newsgroups *n.* Usenet newsgroups that are part of the comp. hierarchy and have the prefix comp. These newsgroups are devoted to discussions of computer hardware, software, and other aspects of computer science. Comp. newsgroups are one of the seven original Usenet newsgroup hierarchies. The other six are misc., news., rec., sci., soc., and talk. *See also* newsgroup, traditional newsgroup hierarchy, Usenet.

component *n.* **1.** A discrete part of a larger system or structure. **2.** An individual modular software routine that has been compiled and dynamically linked, and is ready to use with other components or programs. *See also* compile, component software, link (definition 1), program, routine. **3.** In Sun Microsystem's J2EE network platform, an application-level software unit supported by a container. Components are configurable at deployment time. The J2EE platform defines four types of components: enterprise java beans, Web components, applets, and application clients. *See also* applet, container (definition 3), Enterprise JavaBeans, J2EE.

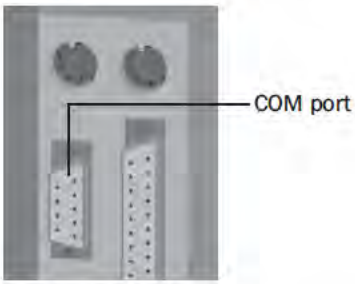
Component Object Model *n. See* COM (definition 2).

Component Pascal *n.* A Pascal derivative designed for programming software components for .NET and JVM platforms. *See also* Oberon, Pascal.

component software *n.* Modular software routines, or components, that can be combined with other components to form an overall program. A programmer can use and reuse an existing component and not have to understand its inner workings, just how to have another program or component call it and pass data to and from it. *Also called:* componentware. *See also* component, program, routine.

componentware *n. See* component software.

COM port or **comm port** *n.* Short for communications port, the logical address assigned by MS-DOS (versions 3.3 and later) and Microsoft Windows (including Windows 9x and Windows NT) to each of the four serial ports on an IBM Personal Computer or a PC compatible. COM ports also have come to be known as the actual serial ports on a PC's CPU where peripherals, such as printers, scanners, and external modems, are plugged in. See the illustration. *See also* COM (definition 1), input/output port, serial port.



COM port.

composite display *n.* A display, characteristic of television monitors and some computer monitors, that is capable of extracting an image from a composite signal (also called an *NTSC signal*). A composite display signal carries on one wire not only the coded information required to form an image on the screen but also the pulses needed to synchronize horizontal and vertical scanning as the electron beam sweeps back and forth across the screen. Composite displays can be either monochrome or color. A composite color signal combines the three primary video colors (red, green, and blue) in a color burst component that determines the shade of color displayed on the screen. Composite color monitors are less readable than either monochrome monitors or the RGB color monitors that use separate signals (and wires) for the red, green, and blue components of the image. *See also* color burst, color monitor, monochrome display, NTSC, RGB monitor.

composite key *n.* A key whose definition consists of two or more fields in a file, columns in a table, or attributes in a relation.

composite video display *n.* A display that receives all encoded video information (including color, horizontal synchronization, and vertical synchronization) in one signal. A composite video signal under NTSC (National Television System Committee) standards is generally required for television sets and videotape recorders. *See also* NTSC. *Compare* RGB monitor.

compound document *n.* A document that contains different types of information, each type created with a different application; for example, a report containing both charts (created with a spreadsheet) and text (created with a word processor) is a compound document. Although a compound document is visually a single, seamless unit, it is actually formed of discrete objects (blocks of information) that are created in their own applications. These objects can either be physically *embedded* in the destination document, or they can be *linked* to it while remaining in the originating file. Both embedded and linked objects can be edited. Linked objects, however, can be updated to reflect changes made to the source file. *See also* ActiveX, OLE, OpenDoc.

compound statement *n.* A single instruction composed of two or more individual instructions.

compress[1] *n.* A proprietary UNIX utility for reducing the size of data files. Files compressed with this utility have the extension .Z added to their names.

compress[2] *vb.* To reduce the size of a set of data, such as a file or a communications message, so that it can be stored in less space or transmitted with less bandwidth. Data can be compressed by removing repeated patterns of bits and replacing them with some form of summary that takes up less space; restoring the repeated patterns decompresses the data. Lossless compression methods must be used for text, code, and numeric data files; lossy compression may be used for video and sound files. *See also* lossless compression, lossy compression.

compressed digital video *n. See* CDV (definition 1).

compressed disk *n.* A hard disk or floppy disk whose apparent capacity to hold data has been increased through the use of a compression utility, such as Stacker or Double Space. *See also* data compression.

compressed drive *n.* A hard disk whose apparent capacity has been increased through the use of a compression utility, such as Stacker or Double Space. *See also* compressed disk, data compression.

compressed file *n.* A file whose contents have been compressed by a special utility program so that it occupies less space on a disk or other storage device than in its uncompressed (normal) state. *See also* installation program, LHARC, PKUNZIP, PKZIP, utility program.

Compressed Read-Only File System *n. See* cramfs.

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Compressed SLIP *n.* Short for **Compressed S**erial **L**ine **I**nternet **P**rotocol. A version of SLIP using compressed Internet address information, thereby making the protocol faster than SLIP. *Acronym:* CSLIP. *See also* SLIP.

compression *n. See* data compression.

compressor *n.* A device that limits some aspect of a transmitted signal, such as volume, in order to increase efficiency.

CompuServe *n.* An online information service that is a subsidiary of America Online. CompuServe provides information and communications capabilities, including Internet access. It is primarily known for its technical support forums for commercial hardware and software products and for being one of the first large commercial online services. CompuServe also operates various private network services.

computational intelligence *n.* The study of the design of intelligent agents whose reasoning is based on computational methods. The central scientific goal of computational intelligence is to understand the principles that make intelligent behavior possible, in natural or artificial systems. An intelligent agent is flexible to changing environments and changing goals—it learns from experience, and it makes appropriate choices given perceptual limitations and finite computation. The central engineering goal of computational intelligence is to specify methods for the design of useful, intelligent artifacts. *See also* agents (definition 2), artificial intelligence, autonomous agent.

computation-bound *adj*. Of, pertaining to, or characteristic of a situation in which the performance of a computer is limited by the number of arithmetic operations the microprocessor must perform. When a system is computation-bound, the microprocessor is overloaded with calculations. *Also called:* CPU-bound.

compute *vb.* **1.** To perform calculations. **2.** To use a computer or cause it to do work.

computer *n.* Any device capable of processing information to produce a desired result. No matter how large or small they are, computers typically perform their work in three well-defined steps: (1) accepting input, (2) processing the input according to predefined rules (programs), and (3) producing output. There are several ways to categorize computers, including class (ranging from microcomputers to supercomputers), generation (first through fifth generation), and mode of processing (analog versus digital). See the table. *See also* analog, digital (definition 2), integrated circuit, large-scale integration, very-large-scale integration.

Table C.1 Ways to Categorize Computers

Class	Computers can be classified as supercomputers, mainframes, superminicomputers, minicomputers, workstations, microcomputers, or PDAs. All other things (for example, the age of the machine) being equal, such a categorization provides some indication of the computer's speed, size, cost, and abilities.
Generation	First-generation computers of historic significance, such as UNIVAC, introduced in the early 1950s, were based on vacuum tubes. Second-generation computers, appearing in the early 1960s, were those in which transistors replaced vacuum tubes. Third-generation computers, dating from the 1960s, were those in which integrated circuits replaced transistors. Fourth-generation computers, appearing in the mid-1970s, are those, such as microcomputers, in which large-scale integration (LSI) enabled thousands of circuits to be incorporated on one chip. Fifth-generation computers are expected to combine very-large-scale integration (VLSI) with sophisticated approaches to computing, including artificial intelligence and true distributed processing.
Mode of processing	Computers are either analog or digital. Analog computers, generally used in scientific pursuits, represent values by continuously variable signals that can have any of an infinite number of values within a limited range at any particular time. Digital computers, the type most people think of as computers, represent values by discrete signals—the bits representing the binary digits 0 and 1.

computer-aided design *n. See* CAD.

computer-aided design and drafting *n. See* CADD.

computer-aided design/computer-aided manufacturing *n. See* CAD/CAM.

computer-aided engineering *n. See* CAE.

computer-aided instruction *n. See* CAI.

computer-aided learning *n. See* CAL.

computer-aided manufacturing *n. See* CAM (definition 1).

computer-aided testing *n. See* CAT (definition 1).

Computer and Business Equipment Manufacturers Association *n. See* CBEMA.

computer art *n.* A broad term that can refer either to art created on a computer or to art generated by a computer, the difference being whether the artist is human or electronic. When created by human beings, computer art is done with painting programs that offer a range of line-drawing tools, brushes, shapes, patterns, and colors. Some programs also offer predrawn figures and animation capabilities.

computer-assisted diagnosis *n.* The use of computers by physicians in diagnosing patient conditions. Medical application programs can help to determine the cause, symptoms, and treatment of a problem as well as to maintain a record of a patient's medical history and test results. *See also* expert system.

computer-assisted instruction *n. See* CAI.

computer-assisted learning *n. See* CAL.

computer-assisted teaching *n. See* CAI.

computer-augmented learning *n. See* CAL.

computer-based learning *n. See* CBL.

computer-based training *n. See* CBT.

computer center *n.* A centralized location that contains computers, such as mainframes or minicomputers, along with associated equipment for providing data processing services to a group of people.

computer conferencing *n.* Person-to-person interaction through the use of computers located in different places but connected through communications facilities.

computer control console *n. See* system console.

computer crime *n.* The illegal use of a computer by an unauthorized individual, either for pleasure (as by a computer hacker) or for profit (as by a thief). *See also* hacker (definition 2).

computer-dependent *adj. See* hardware-dependent.

Computer Emergency Response Team *n. See* CERT.

computer engineering *n.* The discipline that involves the design and underlying philosophies involved in the development of computer hardware.

computer family *n.* A term commonly used to indicate a group of computers that are built around the same microprocessor or around a series of related microprocessors and that share significant design features. For example, the Apple Macintosh computers, from the original Macintosh (introduced in 1984) to the Quadra, represent a family designed by Apple around the Motorola 68000, 68020, 68030, and 68040 microprocessors. Computer families tend to parallel microprocessor families, but this is not always the case. For instance, Macintoshes are no longer made with 680x0 processors, and the Macintosh family has "extended" to another generation: the Power Macs, based on the PowerPC microprocessor.

computer game *n.* A class of computer program in which one or more users interacts with the computer as a form of entertainment. Computer games run the gamut from simple alphabet games for toddlers to chess, treasure hunts, war games, and simulations of world events. The games are controlled from a keyboard or with a joystick or other device and are supplied on disks, on CD-ROMs, as game cartridges, on the Internet, or as arcade devices.

computer graphics *n.* The display of "pictures," as opposed to only alphabetic and numeric characters, on a computer screen. Computer graphics encompasses different methods of generating, displaying, and storing information. Thus, computer graphics can refer to the creation of business charts and diagrams; the display of drawings, italic characters, and mouse pointers on the screen; or the way images are generated and displayed on the screen. *See also* graphics mode, presentation graphics, raster graphics, vector graphics.

Computer Graphics Interface *n.* A software standard applied to computer graphics devices, such as printers and plotters. Computer Graphics Interface is an offshoot of a widely recognized graphics standard called GKS (Graphical Kernel System), which provides applications programmers with standard methods of creating, manipulating, and displaying or printing computer graphics. *Acronym:* CGI. *See also* Graphical Kernel System.

Computer Graphics Metafile *n.* A software standard related to the widely recognized GKS (Graphical Kernel

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System) that provides applications programmers with a standard means of describing a graphic as a set of instructions for re-creating it. A graphics metafile can be stored on disk or sent to an output device; Computer Graphics Metafile provides a common language for describing such files in relation to the GKS standard. *Acronym:* CGM. *See also* Graphical Kernel System.

computer-independent language *n.* A computer language designed to be independent of any given hardware platform. Most high-level languages are intended to be computer-independent; actual implementations of the languages (in the form of compilers and interpreters) tend to have some hardware-specific features and aspects. *See also* computer language.

computer-input microfilm *n. See* CIM (definition 2).

computer instruction *n.* **1.** An instruction that a computer can recognize and act on. *See also* machine instruction. **2.** The use of a computer in teaching. *See also* CAI.

computer-integrated manufacturing *n. See* CIM (definition 1).

computer interface unit *n. See* interface (definition 3).

computerized axial tomography *n. See* CAT (definition 3).

computerized mail *n. See* e-mail[1].

computer language *n.* An artificial language that specifies instructions to be executed on a computer. The term covers a wide spectrum, from binary-coded machine language to high-level languages. *See also* assembly language, high-level language, machine code.

computer letter *n. See* form letter.

computer literacy *n.* Knowledge and an understanding of computers combined with the ability to use them effectively. On the least specialized level, computer literacy involves knowing how to turn on a computer, start and stop simple application programs, and save and print information. At higher levels, computer literacy becomes more detailed, involving the ability of power users to manipulate complex applications and, possibly, to program in languages such as Basic or C. At the highest levels, computer literacy leads to specialized technical knowledge of electronics and assembly language. *See also* power user.

computer-managed instruction *n. See* CMI.

computer name *n.* In computer networking, a name that uniquely identifies a computer to the network. A computer's name cannot be the same as any other computer or domain name on the network. It differs from a user name in that the computer name is used to identify a particular computer and all its shared resources to the rest of the system so that they can be accessed. *Compare* alias (definition 2), user name.

computer network *n. See* network.

computer-output microfilm *n. See* COM (definition 4).

computerphile *n.* A person who is immersed in the world of computing, who collects computers, or whose hobby involves computing.

computer power *n.* The ability of a computer to perform work. If defined as the number of instructions the machine can carry out in a given time, computer power is measured in millions of instructions per second (MIPS) or millions of floating-point operations per second (MFLOPS). Power is measured in other ways too, depending on the needs or objectives of the person evaluating the machine. By users or purchasers of computers, power is often considered in terms of the machine's amount of random access memory (RAM), the speed at which the processor works, or the number of bits (8, 16, 32, and so on) handled by the computer at one time. Other factors enter into such an evaluation, however; two of the most important are how well the components of the computer work together and how well they are matched to the tasks required of them. For example, no matter how fast or powerful the computer, its speed will be hampered during operations involving the hard disk if the hard disk is slow (for example, with an access time of 65 milliseconds or higher). *See also* access time (definition 2), benchmark[1], MFLOPS, MIPS.

Computer Press Association *n.* A trade organization of journalists, broadcasters, and authors who write or report about computer technology and the computer industry.

Computer Professionals for Social Responsibility *n. See* CPSR.

computer program *n.* A set of instructions in some computer language intended to be executed on a computer so as to perform some task. The term usually implies a self-contained entity, as opposed to a routine or a library. *See also* computer language. *Compare* library (definition 1), routine.

computer-readable *adj.* Of, pertaining to, or characteristic of information that can be interpreted and acted on by a computer. Two types of information are referred to as computer-readable: bar codes, magnetic tape, magnetic-ink characters, and other formats that can be scanned in some way and read as data by a computer; and machine code, the form in which instructions and data reach the computer's microprocessor.

computer revolution *n.* The societal and technological phenomenon involving the swift development and widespread use and acceptance of computers—specifically single-user personal computers. The impact of these machines is considered revolutionary for two reasons. First, their appearance and success were rapid. Second, and more important, their speed and accuracy produced a change in the ways in which information can be processed, stored, and transferred.

computer science *n.* The study of computers, including their design, operation, and use in processing information. Computer science combines both theoretical and practical aspects of engineering, electronics, information theory, mathematics, logic, and human behavior. Aspects of computer science range from programming and computer architecture to artificial intelligence and robotics.

computer security *n.* The steps taken to protect a computer and the information it contains. On large systems or those handling financial or confidential data, computer security requires professional supervision that combines legal and technical expertise. On a microcomputer, data protection can be achieved by backing up and storing copies of files in a separate location, and the integrity of data on the computer can be maintained by assigning passwords to files, marking files read-only to avoid changes to them, physically locking a hard disk, storing sensitive information on floppy disks kept in locked cabinets, and installing special programs to protect against viruses. On a computer that many people have access to, security can be maintained by requiring personnel to use passwords and by granting only approved users access to sensitive information. *See also* bacterium, encryption, virus.

computer simulation *n. See* simulation.

computer system *n.* The configuration that includes all functional components of a computer and its associated hardware. A basic microcomputer system includes a console, or system unit, with one or more disk drives, a monitor, and a keyboard. Additional hardware, called *peripherals*, can include such devices as a printer, a modem, and a mouse. Software is usually not considered part of a computer system, although the operating system that runs the hardware is known as system software.

computer telephone integration *n.* A process allowing computer applications to answer incoming calls, provide database information on-screen at the same time the call comes in, automatically route and reroute calls by drag-and-drop, automatically dial and speed-dial outgoing calls from a computer-resident database, and identify incoming customer calls and transfer them to predetermined destinations. *See also* drag-and-drop.

Computer Telephony Expo *n. See* CT Expo.

computer typesetting *n.* Typesetting operations that are partially or totally controlled by computers. Partial control can involve the transmittal of text directly from the source to the typesetter, without a paste-up stage. Full computerization can include the digitization of all graphics, which would then also be transmitted directly to the typesetter and regenerated without paste-up.

computer users' group *n. See* user group.

computer utility *n. See* utility.

computer virus *n. See* virus.

computer vision *n.* The processing of visual information by a computer. Computer vision is a form of artificial intelligence that creates a symbolic description of images that are generally input from a video camera or sensor in order to convert the images to digital form. Computer vision is often associated with robotics. *Acronym:* CV. *See also* artificial intelligence, robotics.

Computer Vision Syndrome *n.* A change in a user's vision caused by prolonged exposure to computer monitors. Symptoms of Computer Vision Syndrome (CVS) can include blurred vision, dry, burning eyes, focusing problems, and headaches. CVS may be controlled with regular breaks from the computer, use of monitor filters or color adjustments, or adjustments to eyeglass prescriptions. *Acronym:* CVS.

COM recorder *n.* Short for **c**omputer **o**utput **m**icrofilm **recorder**. A device that records computer information on microfilm.

COMSAT *n. See* Communication Satellite Corporation.

CON *n.* The logical device name for *console*; reserved by the MS-DOS operating system for the keyboard and the screen. The input-only keyboard and the output-only

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screen together make up the console and represent the primary sources of input and output in an MS-DOS computer system.

concatenate *vb.* To join sequentially (for example, to combine the two strings "hello" and "there" into the single string "hello there"). *See also* character string.

concatenated data set *n.* A group of separate sets of related data treated as a single unit for processing.

concentrator *n.* A communications device that combines signals from multiple sources, such as terminals on a network, into one or more signals before sending them to their destination. *Compare* multiplexer (definition 2).

conceptual schema *n.* In a database model that supports a three-schema architecture (such as that described by ANSI/X3/SPARC), a description of the information contents and structure of a database. A conceptual schema (also known as a *logical schema*) provides a model of the total database, thus acting as an intermediary between the two other types of schemas (internal and external) that deal with storing information and presenting it to the user. Schemas are generally defined using commands from a DDL (data definition language) supported by the database system. *See also* internal schema, schema.

concordance *n.* A list of words that appear in a document, along with the contexts of the appearances.

concrete class *n.* In object-oriented programming, a class in which objects can be created. *See also* class (definition 1). *Compare* abstract class.

concurrent *adj.* Of, pertaining to, or characteristic of a computer operation in which two or more processes (programs) have access to the microprocessor's time and are therefore carried out nearly simultaneously. Because a microprocessor can work with much smaller units of time than people can perceive, concurrent processes appear to be occurring simultaneously but in reality are not.

concurrent execution *n.* The apparently simultaneous execution of two or more routines or programs. Concurrent execution can be accomplished on a single process or by using time-sharing techniques, such as dividing programs into different tasks or threads of execution, or by using multiple processors. *Also called:* parallel execution. *See also* parallel algorithm, processor, sequential execution, task, thread (definition 1), time-sharing.

concurrent operation *n. See* concurrent.

concurrent processing *n. See* concurrent.

concurrent program execution *n. See* concurrent.

Concurrent Versions System *n. See* CVS (definition 2).

condensed *adj.* Of, pertaining to, or characteristic of a font style, supported in some applications, that reduces the width of each character and then sets the characters closer together than their normal spacing. Many dot-matrix printers have a feature that causes the printer to reduce the width of each character and print them closer together, resulting in more characters fitting on a single line. *Compare* expanded.

condition *n.* The state of an expression or a variable (for example, when a result can be either true or false, or equal or not equal).

conditional *adj.* Of, pertaining to, or characteristic of an action or operation that takes place based on whether or not a certain condition is true. *See also* Boolean expression, conditional statement.

conditional branch *n.* In a program, a branch instruction that occurs when a particular condition code is true or false. The term is normally used in relation to low-level languages. *See also* branch instruction, condition code.

conditional compilation *n.* Selective compilation or translation of source code of a program based on certain conditions or flags; for example, sections of a program specified by the programmer might be compiled only if a DEBUG flag has been defined at compilation time. *See also* comment out.

conditional expression *n. See* Boolean expression.

conditional jump *n.* In a program, a jump instruction that occurs when a particular condition code is true or false. The term is normally used in relation to low-level languages. *See also* condition code, jump instruction.

conditional statement *n.* A programming-language statement that selects an execution path based on whether some condition is true or false (for example, the IF statement). *See also* case statement, conditional, IF statement, statement.

conditional transfer *n.* A transfer of the flow of execution to a given location in a program based on whether a particular condition is true. The term is usually used in relation to high-level languages. *See also* conditional statement.

condition code *n.* One of a set of bits that are set *on* (1, or true) or *off* (0, or false) as the result of previous machine instructions. The term is used primarily in assembly or

machine language situations. Condition codes are hardware-specific but usually include carry, overflow, zero result, and negative result codes. *See also* conditional branch.

conditioning *n.* The use of special equipment to improve the ability of a communications line to transmit data. Conditioning controls or compensates for signal attenuation, noise, and distortion. It can be used only on leased lines, where the path from sending to receiving computer is known in advance.

conductor *n.* A substance that conducts electricity well. Metals are good conductors, with silver and gold being among the best. The most commonly used conductor is copper. *Compare* insulator, semiconductor.

Conference on Data Systems Languages *n. See* CODASYL.

CONFIG.SYS *n.* A special text file that controls certain aspects of operating-system behavior in MS-DOS and OS/2. Commands in the CONFIG.SYS file enable or disable system features, set limits on resources (for example, the maximum number of open files), and extend the operating system by loading device drivers that control hardware specific to an individual computer system.

configuration *n.* **1.** In reference to a single microcomputer, the sum of a system's internal and external components, including memory, disk drives, keyboard, video, and generally less critical add-on hardware, such as a mouse, modem, or printer. Software (the operating system and various device drivers), the user's choices established through configuration files such as the AUTOEXEC.BAT and CONFIG.SYS files on IBM PCs and compatibles, and sometimes hardware (switches and jumpers) are needed to "configure the configuration" to work correctly. Although system configuration can be changed, as by adding more memory or disk capacity, the basic structure of the system—its architecture—remains the same. *See also* AUTOEXEC.BAT, CONFIG.SYS. **2.** In relation to networks, the entire interconnected set of hardware, or the way in which a network is laid out—the manner in which elements are connected.

configuration file *n.* A file that contains machine-readable operating specifications for a piece of hardware or software or that contains information on another file or on a specific user, such as the user's logon ID.

congestion *n.* The condition of a network when the current load approaches or exceeds the available resources and bandwidth designed to handle that load at a particular location in the network. Packet loss and delays are associated with congestion.

connect charge *n.* The amount of money a user must pay for connecting to a commercial communications system or service. Some services calculate the connect charge as a flat rate per billing period. Others charge a varying rate based on the type of service or the amount of information being accessed. Still others base their charges on the number of time units used, the time or distance involved per connection, the bandwidth of each connected session, or some combination of the preceding criteria. *See also* connect time.

connection *n.* A physical link via wire, radio, fiberoptic cable, or other medium between two or more communications devices.

connection-based session *n.* A communications session that requires a connection to be established between hosts prior to an exchange of data.

connectionism *n.* A model in artificial intelligence that advocates using highly parallel, specialized processes that compute simultaneously and are massively connected. Thus, the connectionist approach would not use a single high-speed processor to compute an algorithm, but would break out many simple specialized processing elements that are highly connected. Neural networks are classic examples of connectionism in that each "neuron" in the network may be assigned to a single processor. *See also* algorithm, artificial intelligence, neural network.

connectionless *adj.* In communications, of, pertaining to, or characteristic of a method of data transmission that does not require a direct connection between two nodes on one or more networks. Connectionless communication is achieved by passing, or routing, data packets, each of which contains a source and destination address, through the nodes until the destination is reached. *See also* node (definition 2), packet (definition 2). *Compare* connection-oriented.

connectionless session *n.* A communications session that does not require a connection to be established between hosts prior to an exchange of data.

connection-oriented *adj.* In communications, of, pertaining to, or characteristic of a method of data transmission that requires a direct connection between two nodes on one or more networks. *Compare* connectionless.

connection pooling *n.* A resource optimization feature of ODBC (Open Database Connectivity) 3 that results in

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more efficient sharing of database connections and objects. Connection pooling maintains open collections (pools) of database connections that can be used and reused by applications without the need to open and close a connection for each request. This is particularly important for Web-based applications. Connection pooling enables sharing among different components, maximizes performance, and minimizes the number of idle connections. *See also* ODBC.

connectivity *n.* **1.** The nature of the connection between a user's computer and another computer, such as a server or a host computer on the Internet or a network. This may describe the quality of the circuit or telephone line, the degree of freedom from noise, or the bandwidth of the communications devices. **2.** The ability of hardware devices or software packages to transmit data between other devices or packages. **3.** The ability of hardware devices, software packages, or a computer itself to work with network devices or with other hardware devices, software packages, or a computer over a network connection.

connectoid *n.* In Windows 9x and Windows NT, an icon representing a dial-up networking connection that will also execute a script for logging onto the network dialed.

connector *n.* **1.** In hardware, a coupler used to join cables or to join a cable to a device (for example, an RS-232-C connector used to join a modem cable to a computer). Most connector types are available in one of two genders—male or female. A male connector is characterized by one or more exposed pins; a female connector is characterized by one or more receptacles—sockets or jacks—designed to accept the pins on the male connector. *See also* DB connector, DIN connector. **2.** In programming, a circular symbol used in a flowchart to indicate a break, as to another page.

connect time *n.* The amount of time during which a user is actively connected to a remote computer. On commercial systems, the connect time is one means of calculating how much money the user must pay for using the system. *See also* connect charge.

consistency check *n.* A survey to verify that items of data conform to certain formats, bounds, and other parameters and are not internally contradictory. *Compare* completeness check.

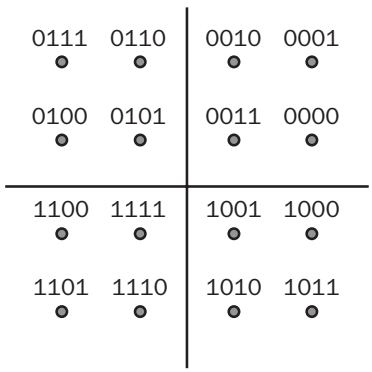
console *n.* **1.** A control unit, such as a terminal, through which a user communicates with a computer. In microcomputers, the console is the cabinet that houses the main components and controls of the system, sometimes including the screen, the keyboard, or both. With the MS-DOS operating system, the console is the primary input (keyboard) and primary output device (screen), as evidenced by the device name CON. *See also* CON, system console. **2.** *See* game console.

console game *n.* A special-purpose computer system designed specifically for the home user to play video games. A game console typically includes a CPU, one or more game controllers, audio output, and a video output that connects to a television set. Individual games and memory cards are supplied on plug-in cartridges or compact discs. Many recent versions are 128-bit systems and also include a modem for online gaming over the Internet. Well-known console games include Microsoft Xbox, Sony PlayStation 2, Nintendo GameCube, and Sega Dreamcast. *Also called:* game console. *Compare* arcade game. *See also* computer game, Dreamcast, GameCube, PlayStation, Xbox.

constant *n.* A named item that retains a consistent value throughout the execution of a program, as opposed to a variable, which can have its value changed during execution. *Compare* variable.

constant expression *n.* An expression that is composed only of constants and, hence, whose value does not change during program execution. *Compare* variable expression.

constellation *n.* In communications, a pattern representing the possible states of a carrier wave, each of which is associated with a particular bit combination. A constellation shows the number of states that can be recognized as unique changes in a communications signal and thus the maximum number of bits that can be encoded in a single change (equivalent to 1 baud, or one event). See the illustration.



Constellation.

constraint *n.* In programming, a restriction on the solutions that are acceptable for a problem.

consultant *n.* A computer professional who deals with client firms as an independent contractor rather than as an employee. Consultants are often engaged to analyze user needs and develop system specifications.

Consumer Electronics Show *n.* Annual tradeshow of the consumer electronics industry, held in Las Vegas, Nevada. CES features exhibits of the latest consumer electronics products and conference events that focus on consumer trends and business strategies. *Acronym:* CES.

contact manager *n.* A type of specialized database that allows a user to maintain a record of personal communication with others. Contact managers are widely used by salespeople and others who want to keep track of conversations, e-mail, and other forms of communication with a large number of current and prospective customers or clients. *See also* database.

container *n.* **1.** In OLE terminology, a file containing linked or embedded objects. *See also* OLE. **2.** In SGML, an element that has content as opposed to one consisting solely of the tag name and attributes. *See also* element, SGML, tag. **3.** In Sun Microsystem's J2EE network platform, an entity that provides life cycle management, security, deployment, and runtime services to components such as beans, Web components, applets, and application clients. Each type of container created (for example, EJB, Web, JSP, servlet, applet, and application client) also provides component-specific services. *See also* applet, component (definition 3), enterprise java bean, JSP, servlet.

container object *n.* An object that can logically contain other objects. For example, a folder is a container object. *See also* noncontainer object, object.

content *n.* **1.** The data that appears between the starting and ending tags of an element in an SGML, XML, or HTML document. The content of an element may consist of plain text or other elements. *See also* element (definition 2), HTML, SGML, tag (definition 3). **2.** The message body of a newsgroup article or e-mail message. **3.** The "meat" of a document, as opposed to its format or appearance.

content-addressed storage *n. See* associative storage.

content aggregator *n.* **1.** Broadly, an organization or business that groups Internet-based information by topic or area of interest—for example, sports scores, business news, or online shopping—to provide users with a means of accessing that content from a single location. **2.** In terms of push technology and multicasting, a service business that mediates between subscribers ("customers") and content providers by gathering and organizing information for broadcast over the Internet. Content aggregators supply subscribers with client software through which content providers broadcast (push) information via "channels" that allow users both to choose the kind of information they receive and to decide when they want it updated. *Also called:* channel aggregator. *See also* push, webcasting. *Compare* content provider.

content caching *n. See* content delivery.

content delivery *n.* The process of caching the pages of a Web site on geographically dispersed servers to enable faster delivery of Web pages. When a page is requested at a URL that is content-delivery enabled, the content-delivery network routes the user's request to a cache server closer to the user. Content delivery frequently is used for high-traffic Web sites or for specific high-traffic events. *Also called:* content distribution, content caching.

content distribution *n. See* content delivery.

contention *n.* On a network, competition among nodes for the opportunity to use a communications line or network resource. In one sense, contention applies to a situation in which two or more devices attempt to transmit at the same time, thus causing a collision on the line. In a somewhat different sense, contention also applies to a free-for-all method of controlling access to a communications line, in which the right to transmit is awarded to the station that wins control of the line. *See also* CSMA/CD. *Compare* token passing.

Content Management Server *n.* Automated software application developed by Microsoft Corporation to assist nontechnical users in creating, tracking, and publishing content for Web sites. A workflow system delineates the tasks each user can perform, assigns content to individuals or groups, and allows users to monitor the status of content with which they are associated.

Content Protection for Recordable Media *n. See* CPRM.

content provider *n.* **1.** Broadly, an individual, group, or business that provides information for viewing or distribution on the Internet or on private or semiprivate intranets or extranets. Content in this sense includes not only information but also video, audio, software, listings of Web sites, and product-specific materials such as online catalogs. **2.** A service business that makes Internet information

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resources available to users. Content providers include online services such as America Online and CompuServe, Internet service providers (ISPs), and an increasing number of media companies representing television, long-distance telephone, and publishing industries. *See also* ISP, online information service. *Compare* content aggregator.

Content Scrambling System *n. See* CSS.

contents directory *n.* A series of queues that contain the descriptors and addresses of routines located within a region of memory.

context-dependent *adj.* Of, pertaining to, or characteristic of a process or a set of data characters whose meaning depends on the surrounding environment.

context-sensitive help *n.* A form of assistance in which a program that provides on-screen help shows information to the user concerning the current command or operation being attempted.

context-sensitive menu *n.* A menu that highlights options as available or unavailable depending on the context in which the option is called. The menus on Windows' menu bar, for example, are context sensitive; options such as copy are grayed out if nothing is selected.

context switching *n.* A type of multitasking; the act of turning the central processor's "attention" from one task to another, rather than allocating increments of time to each task in turn. *See also* multitasking, time slice.

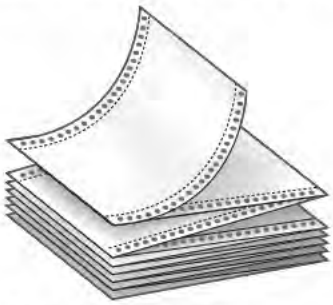
contextual search *n.* A search operation in which the user can direct a program to search specified files for a particular set of text characters.

contiguous *adj.* Having a shared boundary; being immediately adjacent. For example, contiguous sectors on a disk are data-storage segments physically located next to one another.

contiguous data structure *n.* A data structure, such as an array, that is stored in a consecutive set of memory locations. *See also* data structure. *Compare* noncontiguous data structure.

continuous carrier *n.* In communications, a carrier signal that remains on throughout the transmission, whether or not it is carrying information.

continuous-form paper *n.* Paper in which each sheet is connected to the sheets before and after it, for use with most impact and ink-jet printers and some other printing devices designed with an appropriate paper-feed mechanism. The paper usually has holes punched along each side so that it can be pulled by a tractor-feed device. See the illustration. *See also* pin feed, sprocket feed, tractor feed.



Continuous-form paper.

continuous processing *n.* The processing of transactions as they are input to the system. *Compare* batch processing (definition 3).

continuous speech recognition *n.* A type of automatic speech recognition (ASR) technology that responds to strings of words. Continuous speech recognition allows a user to speak in a natural voice without the need to slow down and enunciate each word separately. Continuous speech recognition software takes advantage of context in recognizing words, and thus will not operate at full efficiency if each word is spoken with distinct separation. *See also* ASR (definition 2).

continuous-tone image *n.* An image, such as a photograph, in which color or varying shades of gray are reproduced as gradients rather than as clustered or variably sized dots, as in traditional book or newspaper printing. Continuous-tone images can be viewed on an analog monitor (such as a television monitor), which accepts input as a continuously variable signal. They cannot be viewed on a digital monitor, which requires input broken into discrete units, nor can they be printed in books or newspapers, which represent illustrations as groups of dots. *See also* scan (definition 2), video digitizer. *Compare* halftone.

continuous-tone printer *n.* A printer that produces an image using smoothly blended levels of continuous ink for gradations of gray or color. *Compare* dithering.

contouring *n.* **1.** In computer graphics, such as CAD models, the representation of the surface of an object—its bumps and crannies. See the illustration. **2.** In image processing, the loss of detail that occurs in a shaded image when too few gradations of gray are used to reproduce a graphic, such as a photograph. In photography and graphic arts, this phenomenon is sometimes called *posterization*.

Contouring.

contrast *n.* **1.** The degree of difference between light and dark extremes of color on a monitor or on printed output. **2.** The control knob by which the contrast of a monitor is changed.

control *n.* **1.** Management of a computer and its processing abilities so as to maintain order as tasks and activities are carried out. Control applies to measures designed to ensure error-free actions carried out at the right time and in the right order relative to other data-handling or hardware-based activities. In reference to hardware, control of system operations can reside in a data pathway called a *control bus*. In reference to software, *control* refers to program instructions that manage data-handling tasks. **2.** In a graphical user interface, an object on the screen that can be manipulated by the user to perform an action. The most common controls are buttons, which allow the user to select options, and scroll bars, which allow the user to move through a document or position text in a window.

control break *n.* A transition in control of the computer that typically gives control of the CPU (central processing unit) to the user console or to some other program.

Control-Break *n. See* Break key.

control bus *n.* The set of lines (conductors) within a computer that carry control signals between the CPU (central processing unit) and other devices. For example, a control bus line is used to indicate whether the CPU is attempting to read from memory or to write to it; another control bus line is used by memory to request an interrupt in case of a memory error.

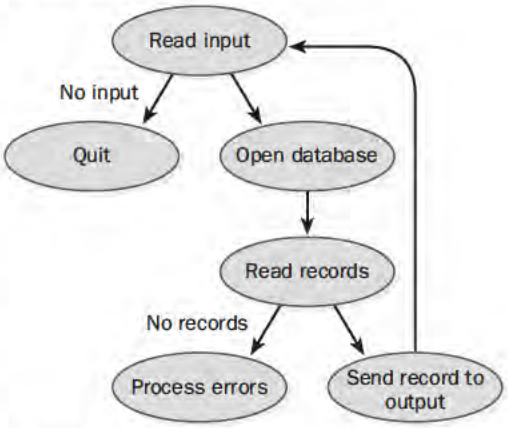
control character *n.* **1.** Any of the first 32 characters in the ASCII character set (0 through 31 in decimal representation), each of which is defined as having a standard control function, such as carriage return, linefeed, or backspace. **2.** Any of the 26 characters Control-A through Control-Z (1 through 26 in decimal representation) that can be typed at the keyboard by holding the Control key down and typing the appropriate letter. The six remaining characters with control functions, such as Escape (ASCII 27), cannot be typed using the Control key. *Compare* control code.

control code *n.* One or more nonprinting characters used by a computer program to control the actions of a device, used in printing, communications, and management of display screens. Control codes are mainly employed by programmers or by users to control a printer when an application program does not support the printer or one of its specialized features. In video, control codes are sent from a computer to a display unit to manipulate the appearance of text or a cursor on the screen. Popular video control code sets are ANSI and VT-100. *Also called:* escape sequence, setup string. *See also* control character.

control console *n. See* console.

control data *n.* Data that consists of information about timing and switching, used to synchronize and route other data or to manage the operation of a device such as a bus or a port.

control flow *n.* The tracing of all possible execution paths in a program, often represented in the form of a diagram. See the illustration.



Control flow.

Control key *n.* A key that, when pressed in combination with another key, gives the other key an alternative meaning. In many application programs, Control (labeled CTRL or Ctrl on a PC keyboard) plus another key is used as a command for special functions. See the illustration. *See also* control character (definition 2).

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***Control* key.**

controller *n.* A device that other devices rely on for access to a computer subsystem. A disk controller, for example, controls access to one or more disk drives, managing physical and logical access to the drive or drives.

control logic *n.* The electronic circuitry that generates, interprets, and uses control data.

control panel *n.* In Windows and Macintosh systems, a utility that allows the user to control aspects of the operating system or hardware, such as system time and date, keyboard characteristics, and networking parameters.

control panel device *n. See* cdev.

control sequence *n. See* control code.

control signal *n.* An electronic signal used to control internal or external devices or processes.

control statement *n.* A statement that affects the flow of execution through a program. Control statements include conditional statements (CASE, IF-THEN-ELSE), iterative statements (DO, FOR, REPEAT, WHILE), and transfer statements (GOTO). *See also* conditional statement, iterative statement, statement, transfer statement.

control strip *n.* **1.** An equipment calibration tool used to determine the corrections needed to restore accuracy by comparing recorded data against known values. **2.** A utility that groups shortcuts to commonly used items or information, such as time, battery power level, desktop items, and programs, in an easily accessible place. *See also* shortcut.

control structure *n.* A portion of a program defined by the relationship between the statements, used in structured programming. There are three basic control structures: sequence, where one statement simply follows another; selection, where program flow depends on which criteria are met; and iteration, where an action is repeated until some condition occurs.

control unit *n.* A device or circuit that performs an arbitrating or regulating function. For example, a memory controller chip controls access to a computer's memory and is the control unit for that memory.

control variable *n.* In programming, the variable in a control statement that dictates the flow of execution. For example, the index variable in a FOR loop controls the number of times a group of statements are executed. *See also* control statement.

convenience adapter *n. See* port replicator.

convention *n.* Any standard that is used more or less universally in a given situation. Many conventions are applied to microcomputers. In programming, for example, a language such as C relies on formally accepted symbols and abbreviations that must be used in programs. Less formally, programmers usually adopt the convention of indenting subordinate instructions in a routine so that the structure of the program is more easily visualized. National and international committees often discuss and arbitrate conventions for programming languages, data structures, communication standards, and device characteristics. *See also* CCITT, ISO, NTSC, standard (definition 1).

conventional memory *n.* The amount of RAM addressable by an IBM PC or compatible machine operating in real mode. This is typically 640 kilobytes (KB). Without the use of special techniques, conventional memory is the only kind of RAM accessible to MS-DOS programs. *See also* protected mode, real mode. *Compare* expanded memory, extended memory.

convergence *n.* A coming together. Convergence can occur between different disciplines and technologies, as when telephone communications and computing converge in the field of telecommunications. It can also occur within a program, such as a spreadsheet, when a circular set of formulas are repeatedly recalculated (iterated), with the results of each iteration coming closer to a true solution.

conversational *adj.* Of, pertaining to, or characteristic of the mode of operation, typical of microcomputers, in which the computer user and the system engage in a dialogue of commands and system responses. *See also* interactive.

conversational interaction *n.* Interaction in which two or more parties alternately transmit and receive messages from each other. *See also* interactive processing.

conversational language *n.* Any programming language that allows the programmer to instruct the computer in a conversational mode, as opposed to more formal, structured languages. For example, in a COBOL program, in order to execute a procedure called CHECK 10 times, a

program would use the following statement: PERFORM CHECK 10 TIMES.

conversational mode *n. See* conversational.

conversion *n.* The process of changing from one form or format to another; where information is concerned, a changeover that affects form but not substance. Types of conversion include data (changing the way information is represented), file (changing a file from one format to another), hardware (changing all or part of a computer system), media (transferring data from one storage media to another), software (changing a program designed for one platform so that it runs on another), and system (changing from one operating system to another).

conversion table *n.* A table listing a set of characters or numbers and their equivalents in another coding scheme. Common examples of conversion tables include ASCII tables, which list characters and their ASCII values, and decimal-to-hexadecimal tables. Several conversion tables are in Appendixes A-E.

converter *n.* Any device that changes electrical signals or computer data from one form to another. For example, an analog-to-digital converter translates analog signals to digital signals.

converter box *n. See* converter.

cookbook[1] *adj*. Of, pertaining to, or characteristic of a book or manual that presents information using a step-by-step approach. For example, a cookbook approach to programming might present a series of sample programs that the reader could analyze and adapt to his or her own needs.

cookbook[2] *n.* A computer book or manual that presents information using a step-by-step approach. Most often, *cookbook* refers to a programming guide, but it can refer to a book that shows how to accomplish specialized tasks in an application.

cooked mode *n.* One of two forms (the other being raw mode) in which an operating system such as UNIX or MS-DOS "sees" the handle, or identifier, for a character-based device. If the handle is in cooked mode, the operating system stores each character in a buffer and gives special treatment to carriage returns, end-of-file markers, and linefeed and tab characters, sending a line of data to a device, such as the screen, only after it reads a carriage-return or end-of-file character. In cooked mode, characters read from standard input are often automatically echoed (displayed) on the screen. *Compare* raw mode.

cookie *n.* **1.** A block of data that a server returns to a client in response to a request from the client. **2.** On the World Wide Web, a block of data that a Web server stores on a client system. When a user returns to the same Web site, the browser sends a copy of the cookie back to the server. Cookies are used to identify users, to instruct the server to send a customized version of the requested Web page, to submit account information for the user, and for other administrative purposes. **3.** Originally an allusion to fortune cookie, a UNIX program that outputs a different message, or "fortune," each time it is used. On some systems, the cookie program is run during user logon.

cookie filtering tool *n.* A utility that prevents a cookie on a Web browser from relaying information about the user requesting access to a Web site. *See also* cookie (definition 2).

cookies policy *n.* A statement that describes a Web site's policy regarding cookies. The policy usually defines a cookie, explains the types of cookies used by the Web site, and describes how the Web site uses the information stored in the cookies.

.coop *n.* One of seven new top-level domain names approved in 2000 by the Internet Corporation for Assigned-Names and Numbers (ICANN), .coop is meant for use with the Web sites of nonprofit cooperatives. The seven new domain names became available for use in the spring of 2001.

cooperative multitasking *n.* A type of multitasking in which one or more background tasks are given processing time during idle times in the foreground task only if the foreground task allows it. This is the primary mode of multitasking in the Macintosh operating system. *See also* background[1], context switching, foreground[1], multitasking, time slice. *Compare* preemptive multitasking.

cooperative processing *n.* A mode of operation characteristic of distributed systems in which two or more computers, such as a mainframe and a microcomputer, can simultaneously carry out portions of the same program or work on the same data. *Compare* distributed processing.

coordinate *n.* Any element in a group of references to a particular location, such as the intersection of a certain row and column. In computer graphics and displays,

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coordinates specify such elements as points on a line, the corners of a square, or the location of a pixel on the screen. In other computer applications, coordinates specify cells on a spreadsheet, data points on a graph, locations in memory, and so on. *See also* Cartesian coordinates, polar coordinates.

coordinate dimensioning *n.* A form of spatial positioning in which a point is described, relative to a fixed reference, in terms of its distance and direction along predefined axes. *See also* Cartesian coordinates, three-dimensional model, two-dimensional model.

coordinated universal time format *n. See* Universal Time Coordinate.

coordinate pair *n.* A pair of values representing the x-coordinate and y-coordinate of a point that are stored in a two-dimensional array that can contain coordinates for many points.

COPPA *n.* Acronym for **C**hildren's **O**nline **P**rivacy **P**rotection **A**ct. A U.S. federal law enacted in April 2000 and designed to protect the online privacy of children under the age of 13. COPPA requires Web sites that collect personal information from children under 13 to receive permission from parents or guardians first, and to monitor and supervise children's experiences with interactive Web elements such as chat rooms and e-mail.

copper chip *n.* A microprocessor that uses copper (rather than the more common aluminum) to connect transistors in a computer chip. Copper chip technology, which was developed by IBM and introduced in 1997, can be expected to boost the speed of a microprocessor by as much as 33 percent.

coprocessor *n.* A processor, distinct from the main microprocessor, that performs additional functions or assists the main microprocessor. The most common type of coprocessor is the floating-point coprocessor, also called a numeric or math coprocessor, which is designed to perform numeric calculations faster and better than the general-purpose microprocessors used in personal computers. *See also* floating-point processor.

copy *vb.* To duplicate information and reproduce it in another part of a document, in a different file or memory location, or in a different medium. A copy operation can affect data ranging from a single character to large segments of text, a graphics image, or from one to many data files. Text and graphics, for example, can be copied to another part of a document, to the computer's memory (by means of a temporary storage facility such as the Windows or Macintosh Clipboard), or to a different file. Similarly, files can be copied from one disk or directory to another, and data can be copied from the screen to a printer or to a data file. In most cases, a copy procedure leaves the original information in place. *Compare* cut and paste, move.

copy disk *n.* An MS-DOS command to duplicate the contents of a floppy disk on a second disk. *See also* floppy disk, MS-DOS.

copy holder *n.* An inclined clipboard or other such device designed to hold printed material so that it can be easily viewed by someone working at a computer keyboard.

copyleft *n. See* General Public License.

copy program *n.* **1.** A program designed to duplicate one or more files to another disk or directory. **2.** A program that disables or circumvents the copy-protection device on a computer program so that the software can be copied, often illegally, to another disk. *See also* copy protection.

copy protection *n.* A software lock placed on a computer program by its developer to prevent the product from being copied and distributed without approval or authorization.

copyright *n.* A method of protecting the rights of an originator of a creative work, such as a text, a piece of music, a painting, or a computer program, through law. In many countries the originator of a work has copyright in the work as soon as it is fixed in a tangible medium (such as a piece of paper or a disk file); that rule applies in the United States for works created after 1977. Registration of a copyright, or the use of a copyright symbol, is not needed to create the copyright but does strengthen the originator's legal powers. Unauthorized copying and distribution of copyrighted material can lead to severe penalties, whether done for profit or not. Copyrights affect the computer community in three ways: the copyright protection of software, the copyright status of material (such as song lyrics) distributed over a network such as the Internet, and the copyright status of original material distributed over a network (such as a newsgroup post). The latter two involve electronic media that are arguably not tangible, and legislation protecting the information disseminated through electronic media is still evolving. *See also* fair use, General Public License.

CORBA *n.* Acronym for **C**ommon **O**bject **R**equest **B**roker **A**rchitecture. A specification developed by the Object Management Group in 1992 in which pieces of programs (objects) communicate with other objects in other programs, even if the two programs are written in different programming languages and are running on different platforms. A program makes its request for objects through an *object request broker*, or *ORB*, and thus does not need to know the structure of the program from which the object comes. CORBA is designed to work in object-oriented environments. *See also* IIOP, object (definition 2), Object Management Group, object-oriented.

core *n.* One of the types of memory built into computers before random access memory (RAM) was available or affordable. Some people still use the term to refer to the main memory of any computer system, as in the phrase *core dump*—a listing of the raw contents of main memory at the moment of a system crash. *Compare* RAM.

core class *n.* In the Java programming language, a public class or interface that is a standard member of the language. Core classes, at minimum, are available on all operating systems where the Java platform runs. A program written entirely in the Java programming language relies only on core classes. *See also* class (definition 1), object, object-oriented programming.

core program *n.* A program or program segment that is resident in random access memory (RAM).

coresident *adj.* Of or pertaining to a condition in which two or more programs are loaded in memory at the same time.

corona wire *n.* In laser printers, a wire though which high voltage is passed to ionize the air and transfer a uniform electrostatic charge to the photosensitive medium in preparation for the laser.

coroutine *n.* A routine that is in memory at the same time as, and frequently executed concurrently with, another.

corrective maintenance *n.* The process of diagnosing and correcting computer problems after they occur. *Compare* preventive maintenance.

correspondence quality *n. See* print quality.

corruption *n.* A process wherein data in memory or on disk is unintentionally changed, with its meaning thereby altered or obliterated.

cost-benefit analysis *n.* The comparison of benefits to costs for a particular item or action. Cost-benefit analysis is often used in MIS or IS departments to determine such things as whether purchasing a new computer system is a good investment or whether hiring more staff is necessary. *See also* IS, MIS.

coulomb *n.* A unit of electrical charge equivalent to roughly 6.26×10^{18} electrons, with a negative charge being an excess of electrons and a positive charge being a deficiency of electrons.

counter *n.* **1.** In programming, a variable used to keep count of something. **2.** In electronics, a circuit that counts a specified number of pulses before generating an output. **3.** A device that keeps track of the number of visitors to a World Wide Web site.

counting loop *n.* In a program, a group of statements that are repeated, thereby incrementing a variable used as a counter (for example, a program might repeat a counting loop that adds 1 to its counter until the counter equals 10). *See also* loop[1] (definition 1).

country code *n. See* major geographic domain.

country-specific *adj.* Of, pertaining to, or characteristic of hardware or software that uses characters or conventions unique to a particular country or group of countries. *Country-specific* does not necessarily refer to spoken languages, although it does allow for special characters (such as accent marks) that are language-specific. Generally, the features considered country-specific include keyboard layout (including special-character keys), time and date conventions, financial and monetary symbols, decimal notation (decimal point or comma), and alphabetic sorting order. Such features are handled either by a computer's operating system (for example, by the Keyboard and Country commands in MS-DOS) or by application programs that offer options for tailoring documents to a particular set of national or international conventions.

courseware *n.* Software dedicated to education or training.

courtesy copy *n. See* cc.

CPA *n. See* Computer Press Association.

CPCP *n. See* HTCPCP.

cpi *n. See* characters per inch.

CP/M *n.* Acronym for **C**ontrol **P**rogram/**M**onitor. A line of operating systems from Digital Research, Inc. (DRI),

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for microcomputers based on Intel microprocessors. The first system, CP/M-80, was the most popular operating system for 8080- and Z80-based microcomputers. Digital Research also developed CP/M-86 for 8086/8088-based computers, CP/M-Z8000 for Zilog Z8000-based computers, and CP/M-68K for Motorola 68000-based computers. When the IBM PC and MS-DOS were introduced, common use of CP/M by end users dwindled. DRI continues to enhance the CP/M line, supporting multitasking with the Concurrent CP/M and MP/M products. *See also* MP/M.

CPM *n. See* critical path method.

CPRM *n.* Acronym for Content Protection for Recordable Media. Technology developed to control the use of copyrighted digital music and video material by blocking the transfer of protected files to portable media such as zip disks and smart cards. CPRM would be added to storage devices and provide data scrambling and identification codes to block the copying of copyrighted files.

cps *n. See* characters per second.

CPSR *n.* Acronym for Computer Professionals for Social Responsibility. A public advocacy organization of computer professionals. CPSR was originally formed out of concern over the use of computer technology for military purposes but has extended its interest to such issues as civil liberties and the effect of computers on workers.

CPU *n.* Acronym for central processing unit. The computational and control unit of a computer. The CPU is the device that interprets and executes instructions. Mainframes and early minicomputers contained circuit boards full of integrated circuits that implemented the CPU. Single-chip central processing units, called *microprocessors*, made possible personal computers and workstations. Examples of single-chip CPUs are the Motorola 68000, 68020, and 68030 chips and the Intel 8080, 8086, 80286, 80386, and i486 chips. The CPU—or microprocessor, in the case of a microcomputer—has the ability to fetch, decode, and execute instructions and to transfer information to and from other resources over the computer's main data-transfer path, the bus. By definition, the CPU is the chip that functions as the "brain" of a computer. In some instances, however, the term encompasses both the processor and the computer's memory or, even more broadly, the main computer console (as opposed to peripheral equipment). See the illustration. *See also* microprocessor.

CPU.

CPU-bound *adj. See* computation-bound.

CPU cache *n.* A section of fast memory linking the CPU (central processing unit) and main memory that temporarily stores data and instructions the CPU needs to execute upcoming commands and programs. Considerably faster than main memory, the CPU cache contains data that is transferred in blocks, thereby speeding execution. The system anticipates the data it will need through algorithms. *Also called:* cache memory, memory cache. *See also* cache, CPU, VCACHE.

CPU cycle *n.* **1.** The smallest unit of time recognized by the CPU (central processing unit)—typically a few hundred-millionths of a second. **2.** The time required for the CPU to perform the simplest instruction, such as fetching the contents of a register or performing a no-operation instruction (NOP). *Also called:* clock tick.

CPU fan *n.* An electric fan usually placed directly on a CPU (central processing unit) or on the CPU's heat sink to help dissipate heat from the chip by circulating air around it. *See also* CPU, heat sink.

CPU speed *n.* A relative measure of the data-processing capacity of a particular CPU (central processing unit), usually measured in megahertz. *See also* CPU.

CPU time *n.* In multiprocessing, the amount of time during which a particular process has active control of the CPU (central processing unit). *See also* CPU, multiprocessing.

CR *n. See* carriage return.

crack *vb.* **1.** To gain unauthorized access to a network by breaching its security. **2.** To decipher encrypted information.

cracker *n.* A person who overcomes the security measures of a computer system and gains unauthorized access. The goal of some crackers is to obtain information ille-

gally from a computer system or use computer resources. However, the goal of the majority is only to break into the system. *See also* hacker (definition 2).

cradle *n.* A receptacle used to recharge the batteries in some handheld or palm-size PCs or PDAs (personal digital assistants). Some cradles also serve as a means to connect these smaller devices with a desktop PC. Not all of these devices require a cradle to recharge or connect to a desktop system. *Also called:* dock, docking station.

cramfs *n.* Short for **C**ompressed **R**ead-**O**nly **F**ile **S**ystem and **cram** a **f**ile**s**ystem onto a small ROM. A filesystem feature available with Linux version 2.4 systems. Cramfs are used in handheld Linux devices to compress and write applications to ROM or Flash memory.

crash[1] *n.* The failure of either a program or a disk drive. A program crash results in the loss of all unsaved data and can leave the operating system unstable enough to require restarting the computer. A disk drive crash, sometimes called a disk crash, leaves the drive inoperable and can cause loss of data. *See also* abend, head crash.

crash[2] *vb.* **1.** For a system or program, to fail to function correctly, resulting in the suspension of operation. *See also* abend. **2.** For a magnetic head, to hit a recording medium, with possible damage to one or both.

crash recovery *n.* The ability of a computer to resume operation after a disastrous failure, such as the failure of a hard drive. Ideally, recovery can occur without any loss of data, although usually some, if not all, data is lost. *See also* crash[1].

crawl *vb.* To compile and organize entries for a search engine by reading Web pages and related information. Crawling is typically performed by programs called "spiders."

crawler *n. See* spider, Web browser.

Cray-1 *n.* An early supercomputer developed in 1976 by Seymour Cray. Extremely powerful in its day, the 64-bit Cray-1 ran at 75 MHz and was capable of executing 160 million floating-point operations per second. *See also* supercomputer.

CRC *n.* Acronym for **c**yclical (or **c**yclic) **r**edundancy **c**heck. A procedure used in checking for errors in data transmission. CRC error checking uses a complex calculation to generate a number based on the data transmitted. The sending device performs the calculation before transmission and includes it in the packet that it sends to the receiving device. The receiving device repeats the same calculation after transmission. If both devices obtain the same result, it is assumed that the transmission was error free. The procedure is known as a redundancy check because each transmission includes not only data but extra (redundant) error-checking values. Communications protocols such as XMODEM and Kermit use cyclical redundancy checking.

create method *n.* In Java programming, a method defined in the home interface and invoked by a client to create an enterprise java bean. *See also* enterprise java bean, method.

creator *n.* On the Apple Macintosh, the program that creates a file. Files are linked to their creators by creator codes; this link enables the operating system to open the creator application when a document file is opened.

credentials *n.* A set of information that includes identification and proof of identification that is used to gain access to local and network resources. Examples of credentials are user names and passwords, smart cards, and certificates.

creeping featurism *n.* The process by which features are added to a new version of a program by software developers until the program becomes unduly cumbersome and difficult to use. Generally, creeping featurism occurs as developers attempt to enhance the competitiveness of the program with each new release by adding new features.

crippled version *n.* A scaled-down or functionally reduced version of hardware or software, distributed for demonstration purposes. *See also* demo.

critical error *n.* An error that suspends processing until the condition can be corrected either by software or by user intervention (for example, an attempt to read to a nonexistent disk, an out-of-paper condition on the printer, or a checksum fault in a data message).

critical-error handler *n.* A software routine that attempts to correct or achieve a graceful exit from a critical or threatening error. *See also* critical error, graceful exit.

critical path method *n.* A means of evaluating and managing a large project by isolating tasks, milestone events, and schedules and by showing interrelationships among them. The critical path for which this method is named is a line connecting crucial events, any of which, if delayed, affects subsequent events and, ultimately, completion of the project. *Acronym:* CPM.

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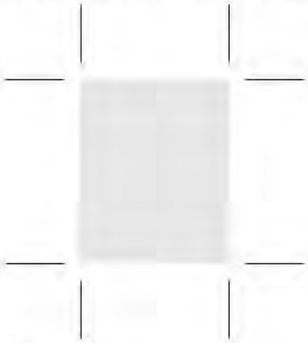
crop *vb.* In computer graphics, to cut off part of an image, such as unneeded sections of a graphic or extra white space around the borders. As in preparing photographs or illustrations for traditional printing, cropping is used to refine or clean up a graphic for placement in a document.

crop marks *n.* **1.** Lines drawn at the edges of pages to mark where the paper will be cut to form pages in the final document. See the illustration. *See also* registration marks. **2.** Lines drawn on photographs or illustrations to indicate where they will be cropped, or cut. *See also* crop.



Crop marks.

cross-assembler *n.* An assembler that executes on one hardware platform but generates machine code for another. *See also* assembler, compiler, cross-compiler, cross development.

cross-check *vb.* To check the accuracy of a calculation by using another method to verify the result. *Compare* cross-foot.

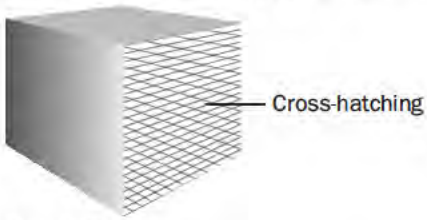
cross-compiler *n.* A compiler that executes on one hardware platform but generates object code for another. *See also* assembler, compiler (definition 2), cross-assembler, cross development.

cross development *n.* The use of one system to develop programs for a different type of system, often because the software development tools of the development system are superior to those of the target system.

cross-foot *vb.* To check the accuracy of a total, as on a ledger sheet, by adding across columns and down rows, all figures contributing to the total.

cross hairs *n.* Intersecting lines used by some computer input devices to locate a particular *x*-*y*-coordinate.

cross-hatching *n.* Shading made up of regularly spaced, intersecting lines. Cross-hatching is one of several methods for filling in areas of a graphic. See the illustration.



Cross-hatching.

cross-linked files *n.* In Windows 9x, Windows 3.*x*, and MS-DOS, a file-storage error occurring when one or more sections, or *clusters*, of the hard drive or a floppy disk have been erroneously allocated to more than one file in the file allocation table. Like lost clusters, cross-linked files can result from the ungraceful exit (messy or abrupt termination) of an application program. *See also* file allocation table, lost cluster.

crossover cable *n.* A cable used to connect two computers together for file sharing and personal networking. Crossover cables may be connected to Ethernet or FireWire ports.

cross-platform *adj.* Of, pertaining to, or characteristic of a software application or hardware device that can be run or operated on more than one system platform.

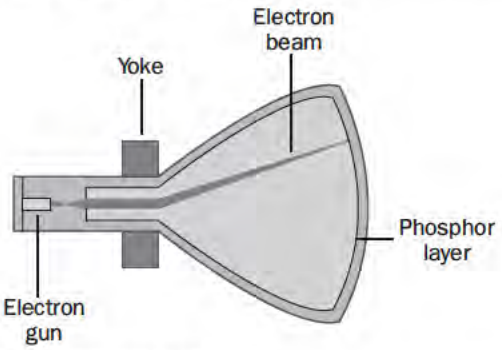
cross-post *vb.* To copy a message or news article from one newsgroup, conference topic, e-mail system, or other communications channel to another—for example, from a Usenet newsgroup to a CompuServe forum or from e-mail to a newsgroup.

cross-site scripting *n.* A security vulnerability of dynamic Web pages generated from a database in response to user input. With cross-site scripting, a malicious user introduces unwanted executable script or code into another user's Web session. Once running, this script could allow others to monitor the user's Web session, change what is displayed on the screen, or shut down the Web browser. Web sites that allow visitors to add comments or make other additions or changes to the pages are the most vulnerable to this flaw. Cross-site scripting is not restricted to the products of a particular vendor or a particular operating system. *See also* script.

crosstab query *n.* A query that calculates a sum, an average, a count, or other type of total on records, and then groups the result by two types of information—one down the left side of the datasheet and the other across the top.

crosstalk *n.* Interference caused by a signal transferring from one circuit to another, as on a telephone line.

CRT *n.* Acronym for cathode-ray tube. The basis of the television screen and the standard microcomputer display screen. A CRT display is built around a vacuum tube containing one or more electron guns whose electron beams rapidly sweep horizontally across the inside of the front surface of the tube, which is coated with a material that glows when irradiated. Each electron beam moves from left to right, top to bottom, one horizontal scan line at a time. To keep the screen image from flickering, the electron beam refreshes the screen 30 times or more per second. The clarity of the image is determined by the number of pixels on the screen. See the illustration. *See also* pixel, raster, resolution (definition 1).



CRT. *Cutaway view of a CRT.*

CRT controller *n.* The part of a video adapter board that generates the video signal, including the horizontal and vertical synchronization signals. *See also* video adapter.

cruise *vb. See* surf.

crunch *vb.* To process information. *See also* number crunching.

cryoelectronic *adj.* Involving the use of superconducting electronics kept in a cryogenic environment at very low temperatures.

crypto *n. See* cryptography.

cryptoanalysis *n.* The decoding of electronically encrypted information for the purpose of understanding encryption techniques. *See also* cryptography, encryption.

CryptoAPI *n.* An application programming interface (API) that is provided as part of Microsoft Windows. CryptoAPI provides a set of functions that allows applications to encrypt or digitally sign data in a flexible manner while providing protection for the user's sensitive private key data. Actual cryptographic operations are performed by independent modules known as cryptographic service providers (CSPs). *See also* application programming interface (API), cryptographic service provider, private key.

cryptographic service provider *n.* An independent module that performs cryptographic operations, such as creating and destroying keys. A cryptographic service provider consists of, at a minimum, a DLL and a signature file. *Acronym:* CSP.

cryptography *n.* The use of codes to convert data so that only a specific recipient will be able to read it using a key. The persistent problem of cryptography is that the key must be transmitted to the intended recipient and may be intercepted. Public key cryptography is a recent significant advance. *Also called:* crypto. *See also* code[1](definition 2), encryption, PGP, private key, public key.

CSD *n. See* circuit-switched data.

C shell *n.* One of the command-line interfaces available under UNIX. The C shell is very usable but is not on every system. *Compare* Bourne shell, Korn shell.

CSLIP *n. See* Compressed SLIP.

CSMA/CA *n.* Acronym for Carrier Sense Multiple Access with Collision Avoidance, a protocol for controlling network access similar to CSMA/CD, in that nodes (stations) listen to the network and transmit only when it is free. But in CSMA/CA, nodes avoid data collisions by signaling their intention with a brief Request to Send (RTS) signal and then waiting for acknowledgment before actually transmitting.

CSMA/CD *n.* Acronym for Carrier Sense Multiple Access with Collision Detection. A network protocol for handling situations in which two or more nodes (stations) transmit at the same time, thus causing a collision. With CSMA/CD, each node on the network monitors the line and transmits when it senses that the line is not busy. If a collision occurs because another node is using the same

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opportunity to transmit, both nodes stop transmitting. To avoid another collision, both then wait for differing random amounts of time before attempting to transmit again. *Compare* token passing.

CSO *n.* Acronym for **C**omputing **S**ervices **O**ffice. An Internet directory service that matches users' own names with e-mail addresses, generally at colleges and universities. The CSO service, which can be reached through Gopher, was originally developed at the Computing Services Office at the University of Illinois.

CSO name server *n.* A facility that provides e-mail directory information through the CSO system. *See also* CSO.

CSR *n. See* continuous speech recognition.

CSS *n.* **1.** *See* cascading style sheets. **2.** Acronym for **C**ontent **S**crambling **S**ystem. An encryption feature added to DVDs distributed with approval of the MPAA. CSS looks for a matching region code on the DVD and the playback device. If the codes do not match (such as for a DVD purchased in Japan and a DVD player purchased in the United States), CSS will not allow the DVD to play. CSS also will not allow a DVD to be played on playback equipment not approved by the MPAA. *See also* deCSS, region code.

CSS1 *n. See* cascading style sheets.

CSTN display *n. See* supertwist display.

CSU *n. See* DDS.

.csv *n.* The file extension for a comma-delimited text file.

CSV *n.* **1.** *See* circuit-switched voice. **2.** *See* alternate circuit-switched voice/circuit-switched data. **3.** Acronym for **c**omma **s**eparated **v**alues. Filename extension assigned to text files containing tabular data of the sort stored in database fields. As the name indicates, individual data entries are separated by commas. *Compare* TSV.

CTERM *n. See* Communications Terminal Protocol.

CT Expo *n.* Acronym for **C**omputer **T**elephony **Expo**. Annual exposition on data and communications issues involving the computer, telecommunications, and Internet industries. Held in Los Angeles, California, CT Expo features exhibits by hundreds of companies displaying their latest products and services, as well as conferences on a range of subjects affecting computer telephony.

CTI *n.* Acronym for **c**omputer-**t**elephony **i**ntegration. The practice of using a computer to control one or more telephone and communications functions.

CTIA *n. See* Cellular Telecommunications and Internet Association.

CTIA Wireless *n.* Annual conference of the wireless data, mobile Internet, and handheld computing industries. Sponsored by the Cellular Telecommunications and Internet Association, CTIA Wireless showcases products and technical developments in the field of wireless communications and data.

CTL *n.* Short for **c**on**t**ro**l**. *See* control character (definition 2), Control key.

CTO *n.* Acronym for **C**hief **T**echnology **O**fficer. A corporate executive in charge of managing a company's information technology (IT) architecture and other technological assets. The CTO's responsibilities may include oversight of IT centers, networks and intranet, applications, databases, Web presence, and other technological resources.

CTRL or **Ctrl** *n.* Short for **c**on**t**ro**l**. A designation used to label the Control key on computer keyboards. *See also* control character (definition 2), Control key.

Ctrl+Alt+Delete *n.* A three-key combination used with IBM and compatible computers to restart (reboot) the machine. Pressing Ctrl+Alt+Delete (Control+Alternate+Delete) causes a warm boot in MS-DOS—the computer restarts but does not go through all of the internal checks involved when power to the system is switched on (cold boot). In Windows 9x and Windows NT, Ctrl+Alt+Delete provides a dialog box from which the user may choose to shut down the computer or end any current tasks.

Ctrl+C *n.* **1.** In UNIX, the key combination used to break out of a running process. **2.** The keyboard shortcut recognized by many programs (as in Windows) as an instruction to copy the currently selected item.

Ctrl+S *n.* **1.** On systems in which a software handshake is used between terminals and a central computer, the key combination used to suspend output. Ctrl+Q will resume output after a Ctrl-S suspension. *See also* software handshake, XON/XOFF. **2.** A keyboard shortcut recognized by many programs as an instruction to save the current document or file.

CTS *n.* Acronym for **C**lear **T**o **S**end. In serial communications, a signal sent, as from a modem to its computer, to indicate that transmission can proceed. CTS is a hardware signal sent over line 5 in RS-232-C connections. *Compare* RTS.

CUA *n. See* Common User Access.

cube *n.* An OLAP data structure. A cube contains dimensions (like Country/Region/City) and data fields (like Sales Amount). Dimensions organize types of data into hierarchies with levels of detail, and data fields measure quantities.

Cube *n.* A personal computer design introduced by Apple in 2000. The Cube featured a unique 8-by-8-by-8-inch transparent curved cube shape with the power supply outside the chassis to create a small and extremely quiet computer. The Cube offered the same G4 processor and features available on other Macintosh computers, but with fewer expansion options. Although the unique design drew notice for innovation, Apple discontinued manufacture of the Cube in 2001 after only one year of production.

CUI *n. See* character user interface.

CUL8R *n.* A fanciful shorthand notation meaning "See you later," sometimes seen in Internet discussion groups as a farewell by a participant temporarily leaving the group.

curly quotes *n. See* smart quotes.

current *n.* The flow of electric charge through a conductor, or the amount of such flow. Current is measured in amperes. *See also* ampere, coulomb. *Compare* volt.

current cell *n. See* active cell.

current directory *n.* The disk directory at the end of the active directory path—the directory that is searched first for a requested file, and the one in which a new file is stored unless another directory is specified. *See also* path (definition 2).

current drain *n.* **1.** The current taken from a voltage source by its load (the object receiving the current). *Also called:* drain. **2.** The load itself. For example, a flashlight bulb takes current from the battery; this current is the drain on the battery, and the bulb itself may also be called the drain.

current location counter *n. See* program counter.

current-mode logic *n.* A type of circuit design in which the transistors operate in unsaturated (amplifying) mode.

cursor *n.* **1.** A special on-screen indicator, such as a blinking underline or rectangle, that marks the place at which a keystroke will appear when typed. **2.** In reference to digitizing tablets, the stylus (pointer or "pen"). **3.** In applications and operating systems that use a mouse, the arrow or other on-screen icon that moves with movements of the mouse.

cursor blink speed *n.* The rate at which a cursor on a screen flashes on and off. *See also* cursor (definition 1).

cursor control *n.* The ability of a computer user to move the cursor to a specified location on the screen. Keys dedicated to cursor control include the left, right, up, and down arrow keys and certain others, such as Backspace, Home, and End. Pointing devices such as the mouse can also control cursor movements, often helping the user move the cursor long distances from place to place in a document.

cursor key *n. See* arrow key.

CUSeeMe *n.* A video conferencing program developed at Cornell University. It was the first program to give Windows and Mac OS users the ability to engage in real-time video conferencing over the Internet, but it requires a lot of bandwidth (at least 128 Kbps speed) to function properly.

custom control *n.* A control authored by a user or a third-party software vendor that does not belong to the .NET Framework class library. This is a generic term that includes user controls. A custom server control is used in Web Forms (ASP.NET pages). A custom client control is used in Windows Forms applications.

customize *vb.* To modify or assemble hardware or software to suit the needs or preferences of the user. Traditionally, hardware customizing ranges from designing an electronic circuit for a particular customer to putting together a computer facility tailored to a customer's special need. Software customizing usually means modifying or designing software for a specific customer.

custom queuing *n.* A form of queuing on Cisco routers where the wide area network (WAN) link is divided into micropipes based on a percentage of the total bandwidth available on the pipe. *See also* bandwidth reservation.

custom software *n.* Any type of program developed for a particular client or to address a special need. Certain products, such as dBASE and Lotus 1-2-3, are designed to provide the flexibility and tools required for producing tailor-made applications. *See also* CASE.

cut *vb.* To remove part of a document, usually placing it temporarily in memory so that the cut portion can be inserted (pasted) elsewhere. *Compare* delete.

cut and paste *n.* A procedure in which the computer acts as an electronic combination of scissors and glue for reorganizing a document or for compiling a document from different sources. In cut and paste, the portion of a document

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to be moved is selected, removed to storage in memory or on disk, and then reinserted into the same or a different document.

cut-through switch *n.* A network switch that routes packets immediately to the port associated with the packet's recipient. *See also* packet.

CV *n. See* computer vision.

CVS *n.* **1.** *See* Computer Vision Syndrome. **2.** Acronym for **C**oncurrent **V**ersions **S**ystem. An open-source network-transparent version control system which allows multiple developers to view and edit code simultaneously. Popular because the client-server function allows operation over the Internet. CVS maintains a single copy of the source code with a record of who initiated changes and when the changes were made. CVS was developed for the UNIX operating system and is commonly used by programmers working with Linux, Mac OS X, and other UNIX-based environments.

CWIS *n. See* campuswide information system.

cXML *n.* Acronym for **c**ommerce **XML**. A set of document definitions for Extensible Markup Language (XML) developed for use in business-to-business e-commerce. cXML defines standards for product listings, allows for electronic requests and responses between procurement applications and suppliers, and provides for secure financial transactions via the Internet.

cyber- *prefix* A prefix attached to "everyday" words in order to give them a computer-based or online meaning, as in cyberlaw (the practice of law either in relation to or through the use of the Internet) and cyberspace (the virtual online world). The prefix is derived from the word *cybernetics*, which refers to the study of mechanisms used to control and regulate complex systems, either human or machine.

cyberart *n.* The artwork of artists who use computers to create or distribute their efforts.

cybercafe or **cyber café** *n.* **1.** A coffee shop or restaurant that offers access to PCs or other terminals that are connected to the Internet, usually for a per-hour or per-minute fee. Users are encouraged to buy beverages or food to drink or eat while accessing the Internet. **2.** A virtual café on the Internet, generally used for social purposes. Users interact with each other by means of a chat program or by posting messages to one another through a bulletin board system, such as in a newsgroup or on a Web site.

cybercash *n. See* e-money.

cyberchat *n. See* IRC.

cybercop *n.* A person who investigates criminal acts committed on line, especially fraud and harassment.

cyberculture *n.* The behavior, beliefs, customs, and etiquette that characterize groups of individuals who communicate or socialize over computer networks, such as the Internet. The cyberculture of one group can be vastly different from the cyberculture of another.

Cyberdog *n.* Apple's Internet suite for Web browsing and e-mail, based on OpenDoc for easy integration with other applications. *See also* OpenDoc.

cyberlawyer *n.* **1.** An attorney whose practice involves the law related to computers and online communication, including elements of communications law, intellectual property rights, privacy and security issues, and other specialties. **2.** An attorney who advertises or distributes information over the Internet and the World Wide Web.

cyberlife *n.* In the gaming world, a technology that mimics biological DNA. *See also* digital DNA.

cybernaut *n.* One who spends copious time on line, exploring the Internet. *Also called:* Internaut. *See also* cyberspace.

cybernetics *n.* The study of control systems, such as the nervous system, in living organisms and the development of equivalent systems in electronic and mechanical devices. Cybernetics compares similarities and differences between living and nonliving systems (whether those systems comprise individuals, groups, or societies) and is based on theories of communication and control that can be applied to either living or nonliving systems or both. *See also* bionics.

cyberpunk *n.* **1.** A genre of near-future science fiction in which conflict and action take place in virtual-reality environments maintained on global computer networks in a worldwide culture of dystopian alienation. The prototypical cyberpunk novel is William Gibson's *Neuromancer* (1982). **2.** A category of popular culture that resembles the ethos of cyberpunk fiction. **3.** A person or fictional character who resembles the heroes of cyberpunk fiction.

cybersex *n.* Communication via electronic means, such as e-mail, chat, or newsgroups, for the purpose of sexual stimulation or gratification. *See also* chat[1] (definition 1), newsgroup.

cyberspace *n.* **1.** The advanced shared virtual-reality network imagined by William Gibson in his novel *Neuromancer* (1982). **2.** The universe of environments, such as the Internet, in which persons interact by means of connected computers. A defining characteristic of cyberspace is that communication is independent of physical distance.

cyberspeak *n.* Terminology and language (often jargon, slang, and acronyms) relating to the Internet (computer-connected) environment, that is, cyberspace. *See also* cyberspace.

cybersquatter *n.* A person who registers company names and other trademarks as Internet domain names in order to force the named companies or owners of the trademarks to buy them at an inflated price.

cyberwidow *n.* The spouse of a person who spends inordinate amounts of time on the Internet.

cybrarian *n.* Software used at some libraries that allows one to query a database through the use of an interactive search engine.

cycle power *vb.* To turn the power to a machine off and back on in order to clear something out of memory or to reboot after a hung or crashed state.

cycle time *n.* The amount of time between a random access memory (RAM) access and the earliest time a new access can occur. *See also* access time (definition 1).

cyclical redundancy check *n. See* CRC.

cyclic binary code *n.* A binary representation of numbers in which each number differs from the one that precedes it by one unit (bit), in one position. Cyclic binary numbers differ from "plain" binary numbers, even though both are based on two digits, 0 and 1. The numbers in the cyclic binary system represent a code, much like Morse code, whereas "plain" binary numbers represent actual values in the binary number system. Because sequential numbers differ by only 1 bit, cyclic binary is used to minimize errors in representing unit measurements. See the table.

Table C.2 Cyclic Binary Code Compared to Other Numeral Systems

Cyclic binary	*"Plain" binary*	*Decimal*
0000	0000	0
0001	0001	1
0011	0010	2
0010	0011	3
0110	0100	4
0111	0101	5
0101	0110	6
0100	0111	7
1100	1000	8
1101	1001	9

Cycolor *n.* A color printing process that uses a special film embedded with millions of capsules filled with cyan, magenta, and yellow dyes. When exposed to red, green, or blue light, the respective capsules become hard and unbreakable. The film is then pressed against specially treated paper, and the capsules that have not hardened in the previous process break, releasing their colors onto the paper. *See also* CMY.

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DA *n. See* desk accessory.

DAC *n. See* digital-to-analog converter.

DACL *n. See* discretionary access control list.

daemon *n.* A program associated with UNIX systems that performs a housekeeping or maintenance utility function without being called by the user. A daemon sits in the background and is activated only when needed, for example, to correct an error from which another program cannot recover.

daisy chain[1] *n.* A set of devices connected in series. In order to eliminate conflicting requests to use the channel (bus) to which all the devices are connected, each device is given a different priority. SCSI (**S**mall **C**omputer **S**ystem **I**nterface) and the newer USB (**U**niversal **S**erial **B**us) both support daisy-chained devices. *See also* SCSI, USB.

daisy chain[2] *vb.* To connect a series of devices, one to another, like daisies in a chain of flowers.

daisy wheel *n.* A print element consisting of a set of formed characters with each character mounted on a separate type bar, all radiating from a center hub. *See also* daisy-wheel printer, thimble, thimble printer.

daisy-wheel printer *n.* A printer that uses a daisy-wheel type element. Daisy-wheel output is crisp and slightly imprinted, with fully formed characters resembling typewriter quality. Daisy-wheel printers were standard for high-quality printing until being superseded by laser printers. *See also* daisy wheel, thimble, thimble printer.

damping *n.* A technique for preventing overshoot (exceeding the desired limit) in the response of a circuit or device.

D-AMPS *n.* Acronym for **D**igital **A**dvanced **M**obile **P**hone **S**ervice. The digital form of the analog AMPS cellular phone service. D-AMPS, sometimes spelled DAMPS, differs from AMPS in being digital and in tripling the number of available channels by using time division multiple access (TDMA) to divide each of the 30 AMPS channels into three separate channels. *See also* AMPS, FDMA, TDMA.

DAO *n. See* Data Access Objects.

DAP *n. See* Directory Access Protocol.

DaratechSUMMIT *n.* Conference on emerging engineering and technology developments in the information technology industry. The DaratechSUMMIT focuses on how information technology affects business practices and assists in manufacturing and production.

dark fiber *n.* Unused capacity in fiber-optic communications.

Darlington circuit *n.* An amplifier circuit made of two transistors, often mounted in the same housing. The collectors of the two transistors are connected, and the emitter of the first is connected to the base of the second. Darlington circuits provide high-gain amplification. *Also called:* Darlington pair.

Darlington pair *n. See* Darlington circuit.

DARPA *n. See* Defense Advanced Research Projects Agency.

DARPANET *n.* Short for **D**efense **A**dvanced **R**esearch **P**rojects **A**gency **Net**work. *See* ARPANET.

Darwin *n.* Apple Computer's open-source operating system, which forms the core of Mac OS X. Darwin is a processor-independent BSD UNIX operating system based on FreeBSD and Mach 3.0 technologies. Darwin offers advanced networking, protected memory, preemptive multitasking, and support for Macintosh and UNIX file systems. Darwin can be run on both the Power PC Macintosh and Intel processor–based computers. *See also* Mac OS X.

DAS *n. See* dual attachment station.

DASD *n.* Acronym for **d**irect **a**ccess **s**torage **d**evice. A data storage device by which information can be accessed directly, instead of by passing sequentially through all storage areas. For example, a disk drive is a DASD, but a tape unit is not, because, with a tape unit, the data is stored as a linear sequence. *See also* direct access. *Compare* sequential access.

.dat *n.* A generic file extension for a data file.

DAT *n. See* digital audio tape, dynamic address translation.

data *n.* Plural of the Latin *datum*, meaning an item of information. In practice, *data* is often used for the singular as well as the plural form of the noun. *See also* datum. *Compare* information.

Data Access Objects *n.* A data access interface that communicates with Microsoft Jet and ODBC-compliant data sources to connect to, retrieve, manipulate, and update data and the database structure. *Acronym:* DAO.

data acquisition *n.* The process of obtaining data from another source, usually one outside a specific system.

data aggregate *n.* A collection of data records. It usually includes a description of the placement of the data blocks and their relation to the entire set.

data attribute *n.* Structural information about data that describes its context and meaning.

data bank *n.* Any substantial collection of data.

database *n.* A file composed of records, each containing fields together with a set of operations for searching, sorting, recombining, and other functions. *Acronym:* DB.

database administrator *n.* One who manages a database. The administrator determines the content, internal structure, and access strategy for a database, defines security and integrity, and monitors performance. *Acronym:* DBA. *Also called:* database manager.

database analyst *n.* One who provides the analytic functions needed to design and maintain applications requiring a database.

database designer *n.* One who designs and implements functions required for applications that use a database.

database engine *n.* The program module or modules that provide access to a database management system (DBMS).

database machine *n.* **1.** A peripheral that executes database tasks, thereby relieving the main computer from performing them. **2.** A database server that performs only database tasks.

database management system *n.* A software interface between the database and the user. A database management system handles user requests for database actions and allows for control of security and data integrity requirements. *Acronym:* DBMS. *Also called:* database manager. *See also* database engine.

database manager *n. See* database administrator, database management system.

database publishing *n.* The use of desktop publishing or Internet technology to produce reports containing information obtained from a database.

database server *n.* A network node, or station, dedicated to storing and providing access to a shared database. *Also called:* database machine.

database structure *n.* A general description of the format of records in a database, including the number of fields, specifications regarding the type of data that can be entered in each field, and the field names used.

data bit *n.* In asynchronous communications, one of a group of from 5 to 8 bits that represents a single character of data for transmission. Data bits are preceded by a start bit and followed by an optional parity bit and one or more stop bits. *See also* asynchronous transmission, bit, communications parameter.

data buffer *n.* An area in memory where data is temporarily stored while being moved from one location to another. *See also* buffer[1].

data bus *n. See* bus.

data cable *n.* Fiber-optic or wire cable used to transfer data from one device to another.

data capture *n.* **1.** The collection of information at the time of a transaction. **2.** The process of saving on a storage medium a record of interchanges between a user and a remote information utility.

data carrier *n. See* carrier (definition 1).

Data Carrier Detected *n. See* DCD (definition 1).

data chaining *n.* The process of storing segments of data in noncontiguous locations while retaining the ability to reconnect them in the proper sequence.

data channel *n. See* channel (definition 1).

data closet *n. See* wiring closet.

data collection *n.* **1.** The process of acquiring source documents or data. **2.** The grouping of data by means of classification, sorting, ordering, and other organizing methods.

datacom *n.* Short for **data com**munications. *See* communications.

data communications *n. See* communications.

data compaction *n. See* data compression.

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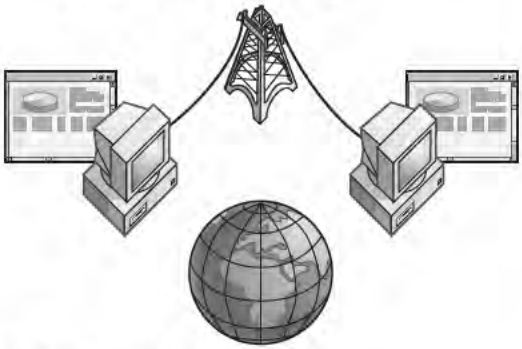
data compression *n.* A means of reducing the amount of space or bandwidth needed to store or transmit a block of data, used in data communications, facsimile transmission, file storage and transfer, and CD-ROM publishing. *Also called:* data compaction.

data conferencing *n.* Simultaneous data communication among geographically separated participants in a meeting. Data conferencing involves whiteboards and other software that enable a single set of files at one location to be accessed and modified by all participants. See the illustration. *See also* desktop conferencing, whiteboard. *Compare* video conferencing.



Data conferencing.

data control *n.* The aspect of data management concerned with tracking how and by whom data is used, accessed, altered, owned, and reported on.

data conversion *n.* Changing the way information is represented in a document or file—for instance, changing binary representation to decimal or hexadecimal.

data corruption *n. See* corruption.

data declaration *n.* A statement in a program that specifies the characteristics of a variable. The requirements for data declarations vary among different programming languages but can include such values as variable name, data type, initial value, and size specification. *See also* array, data type, record[1], variable.

data definition language *n.* A language that defines all attributes and properties of a database, especially record layouts, field definitions, key fields, file locations, and storage strategy. *Acronym:* DDL.

data description language *n.* A language designed specifically for declaring data structures and files. *See also* data definition language.

data dictionary *n.* A database containing data about all the databases in a database system. Data dictionaries store all the various schema and file specifications and their locations. They also contain information about which programs use which data and which users are interested in which reports.

data directory *n. See* catalog, data dictionary.

data-driven attack *n.* A form of attack in which malicious code is hidden in a program or other innocuous data. When the data is executed, the virus or other destructive code is activated. A data-driven attack is typically used to bypass a firewall or other security measures.

data-driven processing *n.* A form of processing where the processor or program must wait for data to arrive before it can advance to the next step in a sequence. *Compare:* demand-driven processing.

data element *n.* A single unit of data. *Also called:* data item. *See also* data field.

data encapsulation *n.* A method of dealing with computers with Year 2000 problems that entailed modifying the input and output logic of a program, leaving the actual data unchanged as it was processed. The input logic was modified to reflect a date in the past that the computer could handle that paralleled the current calendar. When output was generated, the output logic changed the data to reflect the correct date.

data encryption *n. See* encryption.

data encryption key *n.* A sequence of secret information, such as a string of decimal numbers or binary digits, that is used to encrypt and decrypt data. *Acronym:* DEK. *See also* decryption, encryption, key (definition 3).

data encryption standard *n. See* DES.

data entry *n.* The process of writing new data to computer memory.

data/fax modem *n.* A modem that can handle both serial data and facsimile images to either send or receive transmissions.

data field *n.* A well-defined portion of a data record, such as a column in a database table.

data field masking *n.* The process of filtering or selecting part of a data field to control the way it is returned and displayed.

data file *n.* A file consisting of data in the form of text, numbers, or graphics, as distinct from a program file of commands and instructions. *Compare* program file.

data flow or **dataflow** *n.* **1.** The movement of data through a system, from entry to destination. **2.** In parallel processing, a design in which a calculation is made either when all necessary data is available (data-driven processing) or when other processors request the data (demand-driven processing). *See also* parallel processing.

data fork *n.* In Macintosh files, the part of a stored document that contains user-supplied information, such as the text of a word-processing document. A Macintosh file can have a data fork, a resource fork (which contains information such as program code, font data, digitized sound, or icons), and a header. All three parts are used by the operating system in file management and storage. *See also* resource (definition 2), resource fork.

data format *n.* The structure applied to data by an application program to provide a context in which the data can be interpreted.

data frame *n.* A packet of information transmitted as a unit on a network. Data frames are defined by the network's data-link layer and exist only on the wire between network nodes. *See also* data-link layer, frame (definition 2).

data glove *n.* A data input device or controller in the form of a glove fitted with sensors that convert movement of the hand and fingers into commands. *See also* virtual reality.

datagram *n.* One packet, or unit, of information, along with relevant delivery information such as the destination address, that is sent through a packet-switching network. *See also* packet switching.

data independence *n.* The separation of data in a database from the programs that manipulate it. Data independence makes stored data as accessible as possible.

data integrity *n.* The accuracy of data and its conformity to its expected value, especially after being transmitted or processed.

data interchange format *n.* A format consisting of ASCII codes in which database, spreadsheet, and similar documents can be structured to facilitate their use by and transfer to other programs. *Acronym:* DIF. *See also* ASCII.

data item *n.* *See* data element.

data library *n.* A cataloged collection of data files on disk or in another storage medium.

data link *n.* A connection between any two devices capable of sending and receiving information, such as a computer and a printer or a main computer and a terminal. Sometimes the term is extended to include equipment, such as a modem, that enables transmission and receiving. Such devices follow protocols that govern data transmission. *See also* communications protocol, data-link layer, DCE (definition 1), DTE.

Data Link Connection Identifier *n.* A virtual circuit on frame relay networks that permanently identifies the path to a particular destination. *See also* frame relay, virtual circuit.

Data Link Control *n.* *See* DLC.

data link escape *n.* In data transmission, a control character that changes the meaning of the characters immediately following it.

data-link layer *n.* The second of seven layers in the ISO/OSI reference model for standardizing computer-to-computer communications. The data-link layer is one layer above the physical layer. Its concern is packaging and addressing data and managing the flow of transmissions. It is the lowest of the three layers (data-link, network, and transport) involved in actually moving data between devices. See the illustration. *See also* ISO/OSI reference model.

ISO/OSI MODEL

ISO/OSI Layer	*Focus*
Application *(highest level)*	Program-to-program transfer of information
Presentation	Text formatting and display, code conversion
Session	Establishing, maintaining, and coordinating communication
Transport	Accurate delivery, service quality
Network	Transport routes, message handling and transfer
Data-link	Coding, addressing, and transmitting information
Physical	Hardware connections

Data-link layer on ISO/OSI reference model.

data management *n.* The control of data from acquisition and input through processing, output, and storage. In microcomputers, hardware manages data by gathering it, moving it, and following instructions to process it. The operating system manages the hardware and ensures that

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the parts of the system work in harmony so that data is stored safely and accurately. Application programs manage data by receiving and processing input according to the user's commands, and sending results to an output device or to disk storage. The user also is responsible for data management by acquiring data, labeling and organizing disks, backing up data, archiving files, and removing unneeded material from the hard disk.

data manipulation *n.* The processing of data by means of programs that accept user commands, offer ways to handle data, and tell the hardware what to do with the data.

data manipulation language *n.* In database management systems, a language that is used to insert data in, update, and query a database. Data manipulation languages are often capable of performing mathematical and statistical calculations that facilitate generating reports. *Acronym:* DML. *See also* structured query language.

data mart *n.* A scaled-down version of a data warehouse that is tailored to contain only information likely to be used by the target group. *See also* data warehouse.

data medium *n.* The physical material on which computer data is stored.

data migration *n.* **1.** The process of moving data from one repository or source, such as a database, to another, usually via automated scripts or programs. Often data migration involves transferring data from one type of computer system to another. **2.** In supercomputing applications, the process of storing large amounts of data off line while making them appear to be on line as disk-resident files.

data mining *n.* The process of identifying commercially useful patterns, problems, or relationships in a database, a Web server, or other computer repository through the use of advanced statistical tools. Some Web sites use data mining to monitor the efficiency of site navigation and to determine changes in the Web site's design based on how consumers are using the site.

data model *n.* A collection of related object types, operators, and integrity rules that form the abstract entity supported by a database management system (DBMS). Thus, one speaks of a relational DBMS, a network DBMS, and so on, depending on the type of data model a DBMS supports. In general, a DBMS supports only one data model as a practical rather than a theoretical restriction.

data network *n.* A network designed for transferring data encoded as digital signals, as opposed to a voice network, which transmits analog signals.

Data Over Cable Service Interface Specification *n. See* DOCSIS.

data-overrun error *n.* An error that occurs when more data is being acquired than can be processed. *See also* bps.

data packet *n. See* packet.

data path *n.* The route that a signal follows as it travels through a computer network.

data point *n.* Any pair of numeric values plotted on a chart.

data processing *n.* **1.** The general work performed by computers. **2.** More specifically, the manipulation of data to transform it into some desired result. *Acronym:* DP. *Also called:* ADP, automatic data processing, EDP, electronic data processing. *See also* centralized processing, decentralized processing, distributed processing.

Data Processing Management Association *n. See* DPMA.

data projector *n.* A device, similar to a slide projector, that projects the video monitor output of a computer onto a screen.

data protection *n.* The process of ensuring the preservation, integrity, and reliability of data. *See also* data integrity.

data rate *n.* The speed at which a circuit or communications line can transfer information, usually measured in bits per second (bps).

data record *n. See* record[1].

data reduction *n.* The process of converting raw data to a more useful form by scaling, smoothing, ordering, or other editing procedures.

data segment *n.* The portion of memory or auxiliary storage that contains the data used by a program.

Data Service Unit *n. See* DDS.

data set *n.* **1.** A collection of related information made up of separate elements that can be treated as a unit in data handling. **2.** In communications, a modem. *See also* modem.

Data Set Ready *n. See* DSR.

data sharing *n.* The use of a single file by more than one person or computer. Data sharing can be done by physically transferring a file from one computer to another, or, more commonly, by networking and computer-to-computer communications.

data signal *n.* The information transmitted over a line or circuit. It consists of binary digits and can include actual information or messages and other elements such as control characters or error-checking codes.

data sink *n.* **1.** Any recording medium where data can be stored until needed. **2.** In communications, the portion of a Data Terminal Equipment (DTE) device that receives transmitted data.

data source *n.* **1.** The originator of computer data, frequently an analog or digital data collection device. **2.** In communications, the portion of a Data Terminal Equipment (DTE) device that sends data.

data stream *n.* An undifferentiated, byte-by-byte flow of data.

data structure *n.* An organizational scheme, such as a record or array, that can be applied to data to facilitate interpreting the data or performing operations on it.

data switch *n.* A device in a computer system that routes incoming data to various locations.

Data Terminal Equipment *n. See* DTE.

Data Terminal Ready *n. See* DTR.

data traffic *n.* The exchange of electronic messages—control and data—across a network. Traffic capacity is measured in bandwidth; traffic speed is measured in bits per unit of time.

data transfer *n.* The movement of information from one location to another, either within a computer (as from a disk drive to memory), between a computer and an external device (as between a file server and a computer on a network), or between separate computers.

data transfer rate *n. See* data rate.

data transmission *n.* The electronic transfer of information from a sending device to a receiving device.

data type *n.* In programming, a definition of a set of data that specifies the possible range of values of the set, the operations that can be performed on the values, and the way in which the values are stored in memory. Defining the data type allows a computer to manipulate the data appropriately. Data types are most often supported in high-level languages and often include types such as real, integer, floating point, character, Boolean, and pointer. How a language handles data typing is one of its major characteristics. *See also* cast, constant, enumerated data type, strong typing, type checking, user-defined data type, variable, weak typing.

data validation *n.* The process of testing the accuracy of data.

data value *n.* The literal or interpreted meaning of a data item, such as an entry in a database, or a type, such as an integer, that can be used for a variable.

data warehouse[1] *n.* A database, frequently very large, that can access all of a company's information. While the warehouse can be distributed over several computers and may contain several databases and information from numerous sources in a variety of formats, it should be accessible through a server. Thus, access to the warehouse is transparent to the user, who can use simple commands to retrieve and analyze all the information. The data warehouse also contains data about how the warehouse is organized, where the information can be found, and any connections between data. Frequently used for decision support within an organization, the data warehouse also allows the organization to organize its data, coordinate updates, and see relationships between information gathered from different parts of the organization. *See also* database, decision support system, server (definition 1), transparent (definition 1).

data warehouse[2] *vb.* To acquire, collect, manage, and disseminate information gathered from various sources into a single location; or to implement an informational database used to store sharable data. Data warehousing is a four-step process: gathering data; managing the data in a centralized location; providing access to the data along with tools for interpreting, analyzing, and reporting on the data; and producing reports on the data to be used for decision making. *See also* downflow, inflow, metaflow, upflow.

date and time stamp *n. See* time stamp.

date counter overflow *n.* A problem that may occur in systems or programs when the value in a date variable exceeds allowable values. A date counter overflow can occur when an incremental date produces a number that the system interprets as zero or a negative number. This is likely to cause the system or program to post an error message in turn or to revert to the original starting point. Although this was largely considered a Year 2000 problem, such an error is not necessarily confined to the year 2000.

date dependency *n.* In terms of the Year 2000 problem, the need many programs have for date-related input or output data and the way dates are represented in that data. This dependency affects whether the program can run correctly when the turn of the century is reached.

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date expansion *n.* A method of dealing with programs with Year 2000 problems that entails changing data, data descriptions, and (if necessary) program logic that pertains to dates by expanding date fields from two digits to four digits—for example, from DDMMYY to DDMMYYYY.

date format *n.* The manner in which dates are formatted in a computer system or program. While some organizations require that the same format be used throughout their systems and programs, many organizations have not, which can make tracking down potential date problems, such as the Year 2000 problem, difficult. In addition, date formats can vary widely from organization to organization, although many have opted to standardize on formats specified in ANSI X3.30-1997 or ISO8601:1988.

date horizon *n.* A period of time that a program uses to determine the beginning or ending point in performing its functions. A program that tracks inventory may have one date horizon that trails the current date by two months (a trailing date horizon) to process returned merchandise and another that precedes it by another two months (a leading date horizon) for planning purposes. If the program logic doesn't account for any date horizons it may have, for example, if the year was 1999, the program could experience Year 2000 problems when the leading date horizon enters January 1, 2000. *See also* event horizon.

date-in-key problem *n.* A potential problem in computer systems that depend on indexed files using a two-digit date as part of the key, such as certain databases. If the files need to be in chronological order, the files beginning with the year 2000 will be out of sequence—for example, (19)99 would be interpreted as more recent than (20)00.

date rollover *n. See* Year 2000 rollover.

date stamp *n. See* time stamp.

date stamping *n.* A software feature that automatically inserts the current date into a document.

datum *n.* Singular of *data*; a single item of information. *See also* data.

daughterboard *n.* A circuit board that attaches to another, such as the main system board (motherboard), to add extra capabilities. *See also* motherboard.

DAV connector *n. See* digital audio/video connector.

day-of-the-week problem *n.* A reference to an inaccuracy that may occur after the Year 2000 in computers that calculate the day of the week based on the last two digits of the year, assuming that the dates they calculate fall in the 1900s. Because January 1, 1900 was a Monday, but January 1, 2000 will be a Saturday, those computers may not be able to correctly determine the day of the week. This is particularly problematic in computers that regulate timed systems based on the business week, such as a door or vault that unlocks during business hours.

DB *n. See* database.

dB *n. See* decibel.

DBA *n. See* database administrator.

DB connector *n.* Any of various connectors that facilitate parallel input and output. The initials DB (for data bus) are followed by a number that indicates the number of lines (wires) within the connector. For example, a DB-9 connector has nine pins and supports up to nine lines, each of which can connect to a pin on the connector.

.dbf *n.* A file extension for a dBASE database file.

DBMS *n. See* database management system.

DBS *n. See* direct broadcast satellite.

dbXML *n.* Acronym for **d**ata**b**ase **XML**. A native XML database server designed to manage large collections of XML documents. dbXML may be embedded in custom applications or run as a stand-alone database.

DC *n. See* direct current.

DCA *n.* **1.** Acronym for **D**ocument **C**ontent **A**rchitecture. A formatting guideline used in IBM's Systems Network Architecture (SNA) that enables the exchange of text-only documents between differing types of computers. DCA provides for two types of document formatting: Revisable-Form-Text DCA (RFTDCA), which allows for modification of formatting, and Final-Form-Text DCA (FFTDCA), which cannot be modified. *See also* DIA, SNA.
2. Acronym for **D**irectory **C**lient **A**gent. *See* DUA.

DCD *n.* **1.** Acronym for **D**ata **C**arrier **D**etected. A signal in serial communications that is sent from a modem to its computer to indicate that the modem is ready for transmitting. *Also called:* RLSD. *See also* RS-232-C standard.
2. Acronym for **D**ocument **C**ontent **D**escription. A specification governing the rules for defining the structure and content of XML documents. The specification was created by IBM and Microsoft in 1998 and was submitted to the World Wide Web Consortium for approval. *See also* XML.

DCE *n.* **1.** Acronym for **D**ata **C**ommunications **E**quipment. The term used in RS-232 and X.25 specifications for a device, such as a modem, that provides another device (known as the Data Terminal Equipment or DTE) with access to a communications line. A DCE is an intermediary device that often transforms input from a DTE before sending it to a recipient. *See also* RS-232-C standard, X series. *Compare* DTE. **2.** *See* Distributed Computing Environment.

D channel *n.* Short for **d**ata **channel**. In the ISDN communications architecture, the channel dedicated to carrying control signals, such as packet-switching information; and user-related data, such as phone numbers. The basic ISDN connection, called the Basic Rate Interface (BRI), is composed of two B (bearer) channels, which carry as much as 64 Kbps of actual data each, and one D channel, which transmits at either 16 Kbps or 64 Kbps. The faster Primary Rate Interface (PRI) is composed of one 64-Kbps D channel and either 23 or 30 B channels operating at 64 Kbps. *See also* B channel, BRI, ISDN.

DCOM *n.* Acronym for **D**istributed **C**omponent **O**bject **M**odel. The version of Microsoft's Component Object Model (COM) specification that stipulates how components communicate over Windows-based networks. It permits the distribution of different components for a single application across two or more networked computers, running an application distributed across a network so that the distribution of components is not apparent to the user, and remotely displaying an application. *Also called:* Distributed COM. *See also* COM (definition 2), component (definition 2).

DCS *n.* Acronym for **D**esktop **C**olor **S**eparation. The primary format for preparing digital publication text and graphics for printing. DCS layouts consist of five files, one for each of the CMYK colors, and a master file which, includes the display version of the page and information on the other four files. *See also* OPI.

DCTL *n. See* direct-coupled transistor logic.

DDBMS *n. See* distributed database management system.

DDC *n.* Acronym for **D**isplay **D**ata **C**hannel. A VESA standard that allows software control of graphical computer monitors. Under DDC, monitor characteristics are provided to the graphics subsystem, which uses the data to configure the display and provide a bidirectional communication channel between the monitor and computer. *Also called:* VESA DDC. *See also* VESA^2.

DDCP *n. See* direct digital color proof.

DDE *n.* Acronym for **D**ynamic **D**ata **E**xchange. An interprocess communication method featured in Microsoft Windows and OS/2. DDE allows two or more programs that are running simultaneously to exchange data and commands. In Windows 3.1, DDE was largely supplanted by OLE, which is an extension of DDE. In Windows 95 and Windows NT, OLE and ActiveX are more commonly used. *See also* ActiveX, interprocess communication, OLE.

DDK *n.* Acronym for **D**river **D**evelopment **K**it. A set of tools used to create software that enables an operating system to work with hardware devices. With a DDK, a software developer can build drivers to support network, storage, print, sound, video, input, and other devices. *Also called:* Device Driver Kit, Device Driver Developer Kit. *See also* driver.

DDL *n. See* data definition language.

DDoS *n.* Acronym for **d**istributed **d**enial of **s**ervice attack. A form of denial of service attack (DoS) originating from several computers that seeks to disrupt Web access by overwhelming a target with connection requests that cannot be completed. A DDoS attack involves cracking into a number of computers and planting programs that lie dormant until sent a signal to attack. At that point the computers send a steady stream of data packets to the targeted Web site, overwhelming the ability of the Web server to respond. Because the attack is coming from many computers, security features that might otherwise recognize the attack and stop accepting data packets from a single source are unable to shut down connections to all the attackers. *See also* DoS, packet, zombie.

DDR SDRAM *n.* Short for **D**ouble **D**ata **R**ate **S**ynchronous **D**ynamic **RAM** (SDRAM). A form of SDRAM that essentially doubles memory throughput to 200 megahertz or better. DDR SDRAM gets a boost in data transfer rates by producing output on both the rising and falling of the system clock—that is, twice for each clock cycle. *See also* SDRAM.

DDS *n.* Acronym for **d**igital **d**ata **s**ervice, a dedicated communications line that provides transmission at speeds up to 56 Kbps. DDS lines use a device known as a CSU/DSU rather than a modem for connecting two networks. The CSU, or Channel Service Unit, connects the network to the transmission line; the DSU, or Data Service Unit, converts data for transmission by the CSU and controls data flow.

D

dead code *n.* Program code that never gets executed, possibly because the programmer has eliminated all references to it, or possibly because the program is written in such a way that the instruction(s) will never be needed—for example, an ELSE statement would never be needed in an IF condition that always proved to be true. Dead code can slow program execution and increase the size of the program in memory. *Also called:* grunge, software rot.

dead halt *n.* A machine stop with no hope of recovery by either the program or the operating system. The only choice after a dead halt is to reboot. *Also called:* drop-dead halt. *See also* hang. *Compare* reboot.

dead key *n.* A key used with another key to create an accented character. When pressed, a dead key produces no visible character (hence its name) but indicates that the accent mark it represents is to be combined with the next key pressed. *See also* key (definition 1).

dead-letter box *n.* In e-mail or message systems, a file to which undeliverable messages are sent.

deadlock *n.* **1.** A situation that occurs when two programs or devices are each waiting for a response from the other before continuing. *Also called:* deadly embrace. **2.** In operating systems, a situation in which two or more processes are prevented from continuing while each waits for resources to be freed by the continuation of the other. **3.** In computer games, a deadlock occurs when the resources needed to continue the game become unavailable to the player. The deadlock condition could be intentional, such as a loss condition, or a design error on the part of the game developer. *See also* computer games.

deadly embrace *n. See* deadlock.

deallocate *vb.* To free previously allocated memory. *See also* pointer. *Compare* allocate.

deblock *vb.* To remove one or more logical records (units of stored information) from a block. Application or database systems must often deblock information to make specific units of information available for processing. *Compare* block[2] (definition 1).

debounce algorithm *n.* A set of instructions that makes an assumption about how fast a user can press and release a switch and then ensures that only one press is registered in the time specified.

debug *vb.* To detect, locate, and correct logical or syntactical errors in a program or malfunctions in hardware. In hardware contexts, the term *troubleshoot* is the term more often used, especially when the problem is a major one. *See also* bug, debugger.

debugger *n.* A program designed to aid in debugging another program by allowing the programmer to step through the program, examine the data, and monitor conditions such as the values of variables. *See also* bug (definition 1), debug.

deca- *prefix* Metric prefix meaning 10—that is, 10 to the first power, or 10^1.

decay *n.* A decrease in the amplitude of a signal over time.

DECchip 21064 *n.* A Digital Equipment Corporation microprocessor introduced in February 1992. The DECchip 21064 is a 64-bit, RISC-based, superscalar, superpipelined chip with 64-bit registers, a 64-bit data bus, a 64-bit address bus, and a 128-bit data path between the microprocessor and memory. It also has a built-in 8-KB instruction cache, a built-in 8-KB data cache, and a floating-point processor. The DECchip 21064 contains 1.7 million transistors and operates at 3.3 volts. The 200-MHz version runs at a peak rate of 400 MPS. The chip's architecture is SMP compliant, so that several chips can be used in a parallel (multiprocessor) configuration. *See also* floating-point processor, MIPS, pipelining (definition 1), RISC, superpipelining, superscalar.

deceleration time *n.* The time required for an access arm to come to a stop as it approaches the desired portion of a disk. The faster the arm moves, the more momentum it gains and the greater the deceleration time.

decentralized processing *n.* The distribution of computer processing facilities in more than one location. Decentralized processing is not the same as distributed processing, which assigns multiple computers to the same task to increase efficiency.

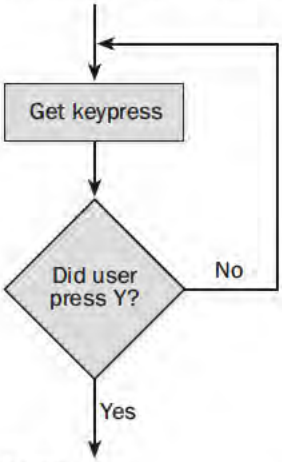
deci- *prefix* Metric prefix meaning 10^{-1} (one-tenth).

decibel *n.* One tenth of a bel (named after Alexander Graham Bell), a unit used in electronics and other fields to measure the strength of a sound or signal. Decibel measurements fall on a logarithmic scale and compare the measured quantity against a known reference. The following formula gives the number of decibels between

two values: dB = n log (x/r) where x is the measured quantity, r is the reference quantity, and n is 10 for voltage and current measurements and 20 for power measurements. *Abbreviation:* dB.

decimal *n.* The base-10 numbering system. *See also* base (definition 2).

decision box *n.* A diamond-shaped flowchart symbol denoting a decision that results in a branching in the process being considered. See the illustration.

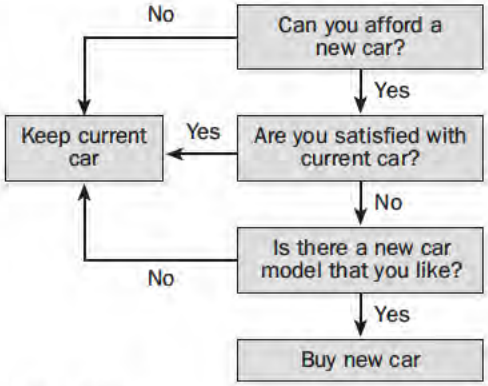


Decision box.

decision support system *n.* A set of programs and related data designed to help with analysis and decision making. A decision support system provides more help in formulating decisions than a management information system (MIS) or an executive information system (EIS). It includes a database, a body of knowledge about the subject area, a "language" used to formulate problems and questions, and a modeling program for testing alternative decisions. *Acronym:* DSS. *Compare* executive information system, management information system.

decision table *n.* A tabular listing of possible conditions (inputs) and the desired result (output) corresponding to each condition. A decision table may be used in the preliminary analysis of program flow, or it may be converted and incorporated into the program itself.

decision tree *n.* Similar to a decision table, an analysis instrument where possible outcomes of some condition are represented as branches, which may in turn generate other branches. See the illustration. *See also* branch, tree structure.



Decision tree.

deck *n.* A storage device, such as a tape deck, or a group of such devices.

declaration *n.* A binding of an identifier to the information that relates to it. For example, to make a declaration of a constant means to bind the name of the constant with its value. Declaration usually occurs in a program's source code; the actual binding can take place at compile time or run time. *See also* bind, constant, data declaration, data type, identifier, instruction, routine, type declaration, variable.

declarative markup language *n.* In text processing, a system of text-formatting codes that indicates only that a unit of text is a certain part of a document. Document formatting is then done by another program, called a parser. SGML and HTML are examples of declarative markup languages. *Acronym:* DML. *Also called:* data manipulation language. *See also* HTML, SGML.

declare *vb.* To specify the name and type of a variable that will be used in a program. In most high-level programming languages, variables are declared at the beginning of sections of code. *See also* variable.

DECnet *n.* A hardware, software, and protocol stack designed by Digital Equipment Corporation for its Digital Network Architecture (DNA).

decoder *n.* **1.** A device or program routine that converts coded data back to its original form. This can mean changing unreadable or encrypted codes into readable text or changing one code to another, although the latter type of decoding is usually referred to as conversion. *Compare* conversion. **2.** In electronics and hardware, a type of circuit that produces one or more selected output signals based on the combination of input signals it receives.

decollate *vb.* To separate copies in a multipart continuous paper form.

decompiler *n.* A program that attempts to generate high-level source code from assembly language code or machine code. This can be a difficult task, as some assembly language code has no corresponding high-level source code. *See also* disassembler. *Compare* compiler (definition 2).

decompress *vb. See* uncompress.

decrement[1] *n.* The amount by which a number is decreased. *Compare* increment[1].

decrement[2] *vb.* To decrease a number by a given amount. *Compare* increment[2].

decryption *n.* The process of restoring encrypted data to its original form. *See also* data encryption key. *Compare* encryption.

deCSS *n.* Decrypt CSS. A utility capable of cracking the CSS encryption system used on DVD discs. By decrypting the CSS code, DVD movies and other copyrighted material can be used with any DVD playback device without regard to license or region coding. The origin of deCSS can be traced to a number of individuals interested in creating a DVD player for the Linux OS. The term deCSS is sometimes used generically for any software capable of defeating CSS technology. *See also* CSS, region code.

DECstation *n.* **1.** A small computer system used primarily for word processing, introduced by Digital Equipment Corporation in 1978. **2.** A personal computer, part of a series, introduced by Digital Equipment Corporation in 1989. **3.** A single-user UNIX workstation introduced by Digital Equipment Corporation in 1989 and based on RISC processors. *See also* RISC.

dedicated *adj*. Of, pertaining to, or being a device, program, or procedure devoted to a single task or function.

dedicated channel *n.* A communications link reserved for a particular use or a particular user.

dedicated circuit *n. See* dedicated line.

dedicated connection *n. See* dedicated line.

dedicated line *n.* **1.** A communications channel that permanently connects two or more locations. Dedicated lines are private or leased lines, rather than public ones. T1 lines, which are used by many organizations for Internet connectivity, are examples of dedicated lines. *Also called:* dedicated connection, leased line, private line. *Compare* switched line. **2.** A telephone line that is used for one purpose only, such as to receive or send faxes or to serve as a modem line.

dedicated server *n.* A computer—usually quite powerful—that is used solely as a network server. *See also* server. *Compare* nondedicated server.

deep copy *n.* A copy of the contents of a data structure, including all its substructures.

deep hack *n.* A state of total concentration on and preoccupation with a programming effort. *Also called:* deep hack mode.

de facto standard *n.* A design, program, or language that has become so widely used and imitated that it has little competition, but whose status has not been officially recognized as standard by an organization such as the American National Standards Institute (ANSI) or the International Organization for Standardization (ISO). *See also* standard. *Compare* de jure standard.

default[1] *n.* A choice made by a program when the user does not specify an alternative. Defaults are built into a program when a value or option must be assumed for the program to function.

default[2] *vb.* In reference to programs, to make a choice when the user does not specify an alternative.

default button *n.* The control that is automatically selected when a window is introduced by an application or operating system, typically activated by pressing the Enter key.

default drive *n.* The disk drive that an operating system reads to and writes from when no alternative is specified.

default home page *n.* On a Web server, the file that is returned when a directory is referenced without a specific filename. This is specified by the Web server software and is typically the file called index.html or index.htm.

default printer *n.* The printer to which a computer sends documents for printing unless an alternative is specified.

Defense Advanced Research Projects Agency *n.* The U.S. government agency that provided the original support for the development of the interconnected networks that later grew into the Internet. *Acronym:* DARPA. *See also* ARPANET.

deferral time *n.* The length of time that nodes on a CSMA/CD network wait before trying to retransmit after a collision. *See also* CSMA/CD.

deferred address *n.* An indirect address (memory location) whose calculation is delayed until a program is run. *See also* relative address.

deferred processing *n.* Processing of data after it has been received and stored in blocks. *Compare* direct processing.

deflection coils *n. See* yoke.

deflection routing *n. See* hot potato routing.

deformation *n.* In multimedia and computer-aided design applications, the process of altering a model via certain tools, such as stretch, shatter, bend, and twist. *See also* CAD, multimedia.

defrag *vb.* Slang for defragment. To rearrange data on a disk drive so that whole files are stored in contiguous sectors and the drive heads do not have to travel to scattered locations on the disk in order to read or write portions of a particular file. *See also* defragmentation.

defragger *n.* A software utility for reuniting parts of a file that have become fragmented through rewriting and updating. A defragger physically restores the file to contiguous sectors on a hard disk to speed up access as much as 75 percent. *See also* defragmentation, fragmentation, optimizer.

defragmentation *n.* The process of rewriting parts of a file to contiguous sectors on a hard disk to increase the speed of access and retrieval. When files are updated, the computer tends to save these updates on the largest continuous space on the hard disk, which is often on a different sector than the other parts of the file. When files are thus "fragmented," the computer must search the hard disk each time the file is accessed to find all of the file's parts, which slows down response time. *See also* optimization (definition 1). *Compare* fragmentation.

degausser *n.* A device used to remove magnetization from a video monitor or tape recorder head and to erase information from magnetic storage media, such as tapes and disks.

degradation *n.* **1.** In communications, a deterioration of signal quality, as from line interference. **2.** In computer systems, a reduction in level of performance or service. Degradation in microcomputer performance is indicated by slow response times or frequent pauses for disk access because memory is insufficient to hold an entire program plus the data the program is using.

deinstall *vb. See* uninstall.

deinterlace *n.* To combine two interlaced fields into a single frame that is not interlaced. Deinterlacing is done to remove artifacts and improve the quality of encoded video.

dejagging *n.* Smoothing of the jagged, "stairstep" appearance of diagonal lines and curves in graphical images. *Also called:* anti-aliasing. *Compare* aliasing.

de jure standard *n.* A standard for hardware or software development that has been issued or approved through a formal process by a standards organization. *See also* standard. *Compare* de facto standard.

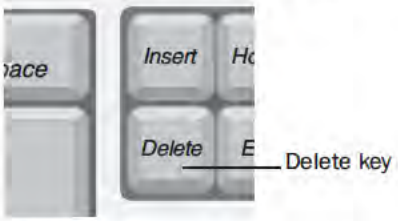
DEK *n. See* data encryption key.

deka- *prefix See* deca-.

delay distortion *n. See* envelope delay.

delete *vb.* To eliminate text, a file, or part of a document with the intention of removing the information permanently. There are several ways to delete. On-screen characters and parts of documents can be deleted with the Delete key, the Backspace key, or with a program's Delete command. Files can be deleted through a command to the operating system.

Delete key *n.* **1.** On IBM and PC-compatible computers, a key whose function changes depending on the application program. Usually it erases the character under the cursor, although in some applications it can erase selected text or graphics. See the illustration. *Also called:* Del key. **2.** On Apple Macintosh computers, a key on the ADB and Extended keyboards that erases the character preceding the insertion point or erases highlighted text or graphics.



Delete key.

deletia *n.* Omitted material. The term is used in responses to Usenet or mailing list messages to indicate that some unnecessary material has been excluded from the incorporated message being answered.

delimit *vb.* To set the limits of some entity, generally by using a special symbol called a delimiter. Programming languages typically delimit such variable-length elements as comments, strings, and program blocks. *See also* delimiter.

D

delimiter *n.* A special character that sets off, or separates, individual items in a program or set of data. Special characters often used include commas, semi-colons, tabs, and paragraph marks. *See also* delimit, field (definition 1), record[1].

Del key *n. See* Delete key.

delta channel *n. See* ISDN.

demand-driven processing *n.* The processing of data immediately as it becomes available or ready. Such real-time processing avoids the need to store data that has not been processed. *Compare* data-driven processing.

demand paging *n.* The most common implementation of virtual memory, in which pages of data are read into main memory from an auxiliary storage device only in response to interrupts that result when software requests a memory location that the system has saved to auxiliary storage and reused for other purposes. *See also* paging, swap (definition 2), virtual memory.

demand priority *n.* A network access method in which hubs control network access; a feature of 100Base-VG Ethernet networks. With demand priority, nodes send requests to hubs and the hubs give permission to transmit based on priority levels assigned to the requests by the nodes. *See also* 100Base-VG.

demand publishing *n.* Producing print copies of publications on an as-needed basis rather than in a single long press run. Demand publishing is a by-product of desktop publishing and advancements in printer capabilities.

demo *n.* **1.** Short for **demo**nstration. A partial or limited version of a software package distributed free of charge for advertising purposes. Demos often consist of animated presentations that describe or demonstrate the program's features. *See also* crippled version. **2.** A computer in a store that is available for customers to test, to see if they wish to buy it.

demodulation *n.* In communications, the means by which a modem converts data from modulated carrier frequencies (waves that have been modified in such a way that variations in amplitude and frequency represent meaningful information) over a telephone line. Data is converted to the digital form needed by a computer to which the modem is attached, with as little distortion as possible. *Compare* modulation (definition 1).

demon dialer *n. See* war dialer.

demonstration program or **demo program** *n.* **1.** A prototype that shows the on-screen look and sometimes the proposed capabilities of a program under development. *See also* prototyping. **2.** A scaled-down version of a proprietary program offered as a marketing tool.

denial of service attack *n. See* DoS.

denizen *n.* A participant in a Usenet newsgroup.

dense wavelength division multiplexing *n.* A data transmission technique in which multiple optical signals, each assigned to a separate color (wavelength frequency), are multiplexed onto a single strand of optical fiber. Because each signal travels separately in its own color band on the fiber, dense wavelength division multiplexing allows for the simultaneous transmission of different types of signals, such as SONET and ATM, each traveling at its own rate of speed. Dense wavelength division multiplexing can greatly increase the carrying capacity of a single optical fiber. Depending on the number, type, and rate of the signals involved, bandwidth can range from more than 40 Gbps to projected highs of 200 Gbps or more. *Acronym:* DWDM. *Also called:* wave divisision multiplexing, WDM. *Compare* time division multiple access.

dependence *n.* The state in which one entity relies upon specific hardware, software, or specific events for its own definition or functionality. *See also* context-dependent, dependent variable, device dependence, hardware-dependent, software-dependent.

dependent variable *n.* A variable in a program whose value relies on the outcome of another operation.

deployment descriptor *n.* In the Java J2EE network platform, a deployment descriptor is an XML file provided for each module or application describing how it should be deployed. The deployment descriptor directs a deployment tool to deploy a module or application with specific container options. It also describes the specific configuration requirements that an administrator must resolve when installing modules and J2EE applications into an operational environment. *See also* container, J2EE, module, XML.

depth queuing *vb.* **1.** In computer graphics and modeling, giving a two-dimensional object a three-dimensional appearance through such techniques as shading and hidden-

line removal. **2.** Drawing objects from background to foreground to ease in the task of hidden-line removal.

deque *n.* Short for **d**ouble-**e**nded **que**. A form of the queue data structure that can have elements added to or removed from either end of the list. *See also* queue.

dequeue *vb.* To remove from a queue. *See also* queue.

dereference *vb.* In programming, to access information at the address contained by a pointer. The syntax for dereferencing varies among computer languages. *See also* double-dereference, handle (definition 1), pointer.

derived class *n.* In object-oriented programming, a class created from another class, called the base class. A derived class inherits all the features of its base class. It can then add data elements and routines, redefine routines from the base class, and restrict access to base-class features. *See also* base class, class, inheritance (definition 1), object-oriented programming.

derived font *n.* A font that has been scaled or modified from a previously existing font. For example, the Macintosh operating system can generate characters in font sizes other than the installed range of sizes. *See also* font. *Compare* intrinsic font.

derived relation *n.* A relation produced as the result of one or more relational-algebra operations on other relations. *See also* relational algebra, view[1] (definition 2).

DES *n.* Acronym for **D**ata **E**ncryption **S**tandard. A specification for encryption of computer data developed by IBM and adopted by the U.S. government as a standard in 1976. DES uses a 56-bit key. *See also* encryption, key (definition 3).

descendant *n.* **1.** In object-oriented programming, a class (group) that is a more specialized form of another, higher-level class. *See also* class, object-oriented programming. **2.** In computing, a process (roughly, a program or task) that is called by another process and inherits certain of the originator's properties, such as open files. *See also* child (definition 1), inheritance (definition 2). *Compare* client (definition 2).

descendent key *n.* All the subkeys that appear when a key in the registry is expanded. A descendent key is the same as a subkey. *Also called:* descendant key. *See also* key, subkey.

descender *n.* The portion of a lowercase letter that falls below the baseline. See the illustration. *See also* baseline, x-height. *Compare* ascender.

Descender.

descending sort *n.* A sort that arranges items in descending order—for example, with Z preceding A and higher numbers preceding lower ones. *See also* alphanumeric sort. *Compare* ascending sort.

descriptor *n.* **1.** In information retrieval, a word, similar to an index entry in a book, that identifies a significant topic or element in a stored document or group of documents. It is used as a key in rapid search and retrieval of information. *See also* keyword (definition 1). **2.** In programming, a piece of stored information used to describe something else, often in terms of structure, content, or some other property. *Compare* identifier.

deselect *vb.* To reverse the action of selecting an option, a range of text, a collection of graphical objects, and so on. *Compare* select.

deserialize *vb.* To change from serial (by bit) to parallel (by byte); to convert a single (serial) stream of bits to parallel streams representing the same information. *Compare* serialize.

Design by Contract *n.* An approach to building reusable systems where a software system is viewed as a set of communicating components whose interaction is based on precisely defined specifications of the mutual obligations, also known as contracts.

design cycle *n.* All the phases involved in developing and producing new hardware or software, including product specification, creation of prototypes, testing, debugging, and documentation.

desk accessory *n.* A type of small program on Macintosh computers and in windowing programs for IBM and PC-compatible machines that acts as the electronic equivalent of a clock, calendar, calculator, or other small appliance found on a typical desktop. Desk accessories are conveniences that can be activated when needed and then either put away or moved to a small part of the screen. A special type of desk accessory, a control panel, provides the user with the ability to change the date and time as

well as to control screen colors, mouse movements, and other parameters. *Acronym:* DA. *Also called:* desktop accessory. *See also* control panel.

D

desktop *n.* An on-screen work area that uses icons and menus to simulate the top of a desk. A desktop is characteristic of the Apple Macintosh and of windowing programs such as Microsoft Windows. Its intent is to make a computer easier to use by enabling users to move pictures of objects and to start and stop tasks in much the same way as they would if they were working on a physical desktop. *See also* graphical user interface.

desktop accessory *n. See* desk accessory.

Desktop Color Separation *n. See* DCS.

desktop computer *n.* A computer that fits conveniently on the surface of a business desk. Most personal computers as well as some workstations can be considered desktop computers. *Compare* portable computer.

desktop conferencing *n.* The use of computers for simultaneous communication among geographically separated participants in a meeting. This communication may include input to and display from application programs as well as audio and video communication. *See also* data conferencing, teleconferencing, video conferencing.

desktop enhancer *n.* Software that adds functionality to a windows-based operating system such as Microsoft Windows or Mac OS—for example, an enhanced file browser, clipboard, or multimedia player.

desktop environment *n.* The appearance and user interface of a computer operating system (OS). An OS may offer the user opportunities to customize the desktop environment, or sometimes a choice of alternate desktop environments, with the OS underneath remaining the same.

Desktop file *n.* A hidden file maintained on a particular volume (roughly equivalent to a disk) by the Macintosh operating system for storing information about the files on it, such as version data, lists of icons, and file references.

Desktop Management Interface *n. See* DMI.

desktop publishing *n.* The use of a computer and specialized software to combine text and graphics to create a document that can be printed on either a laser printer or a typesetting machine. Desktop publishing is a multiple-step process involving various types of software and equipment. The original text and illustrations are generally produced with software such as word processors and drawing and painting programs and with photograph-scanning equipment and digitizers. The finished product is then transferred to a page-makeup program, which is the software most people think of as the actual desktop publishing software. This type of program enables the user to lay out text and graphics on the screen and see what the results will be; for refining parts of the document, these programs often include word processing and graphics features in addition to layout capabilities. As a final step, the finished document is printed either on a laser printer or, for the best quality, by typesetting equipment.

desktop video *n.* The use of a personal computer to display video images. The video images may be recorded on video tape or on a laser disc or may be live footage from a video camera. Live video images can be transmitted in digital form over a network in video conferencing. *Acronym:* DTV.

destination *n.* The location (drive, folder, or directory) to which a file is copied or moved. *Compare* source.

destructive read *n.* An attribute of certain memory systems, notably core systems. In a destructive read of a memory location, the data is passed on to the processor, but the copy in memory is destroyed by the process of reading. Destructive memory systems require special logic to rewrite data back to a memory location after it is read. *Also called:* destructive readout. *See also* core. *Compare* nondestructive readout.

detail file *n. See* transaction file.

detection *n.* Discovery of a certain condition that affects a computer system or the data with which it works.

determinant *n.* In database design theory, any attribute or combination of attributes on which any other attribute or combination of attributes is functionally dependent.

determinism *n.* In computing, the ability to predict an outcome or to know in advance how data will be manipulated by a processing system. A deterministic simulation, for example, is one in which a certain input always produces the same output.

developer *n.* **1.** One who designs and develops software. **2.** *See* programmer.

developer's toolkit *n.* A set of routines (usually in one or more libraries) designed to allow developers to more easily write programs for a given computer, operating system, or user interface. *See also* library (definition 1), toolbox.

development cycle *n.* The process of application development from definition of requirements to finished product,

including the following stages: analysis, design and prototyping, software coding and testing, and implementation.

device *n.* A generic term for a computer subsystem. Printers, serial ports, and disk drives are often referred to as devices; such subsystems frequently require their own controlling software, called device drivers. *See also* device driver.

device address *n.* A location within the address space of a computer's random access memory (RAM) that can be altered either by the microprocessor or by an external device. Device addresses are different from other locations in RAM, which can be altered only by the microprocessor. *See also* device, input/output, RAM.

device control character *n. See* control character.

device controller *n. See* input/output controller.

device dependence *n.* The requirement that a particular device be present or available for the use of a program, interface, or protocol. Device dependence in a program is often considered unfortunate because the program either is limited to one system or requires adjustments for every other type of system on which it is to run. *Compare* device independence.

device driver *n.* A software component that permits a computer system to communicate with a device. In most cases, the driver also manipulates the hardware in order to transmit the data to the device. However, device drivers associated with application packages typically perform only the data translation; these higher-level drivers then rely on lower-level drivers to actually send the data to the device. Many devices, especially video adapters on PC-compatible computers, will not work properly—if at all—without the correct device drivers installed in the system.

Device Driver Developer Kit *n. See* DDK.

Device Driver Kit *n. See* DDK.

device independence *n.* A characteristic of a program, interface, or protocol that supports software operations that produce similar results on a wide variety of hardware. For example, the PostScript language is a device-independent page description language because programs issuing PostScript drawing and text commands need not be customized for each potential printer. *Compare* device dependence.

device-independent bitmap *n. See* DIB.

device manager *n.* A software utility that allows viewing and changing hardware configuration settings, such as interrupts, base addresses, and serial communication parameters.

Device Manager *n.* In Windows 95, a function within the System Properties utility that indicates device conflicts and other problems and allows a user to change the properties of the computer and each device attached to it. *See also* property, property sheet.

device name *n.* The label by which a computer system component is identified by the operating system. MS-DOS, for example, uses the device name COM1 to identify the first serial communications port.

device partnership *n.* A registry key, stored on the Windows CE device, that a desktop computer uses to identify that Windows CE device when it is connected to the desktop. The key defines values for synchronization, file conversions, and backup and restore information, which enable multiple Windows CE devices to connect to the same desktop computer. A device partnership is created the first time you connect a Windows CE device to a desktop computer.

device resolution *n. See* resolution (definition 1).

DFP *n. See* digital flat panel port.

DFS *n. See* distributed file system.

DGIS *n.* Acronym for **D**irect **G**raphics **I**nterface **S**pecification. An interface developed by Graphics Software Systems. DGIS is firmware (generally implemented in ROM on a video adapter) that allows a program to display graphics on a video display through an extension to the IBM BIOS Interrupt 10H interface.

DHCP *n.* Acronym for **D**ynamic **H**ost **C**onfiguration **P**rotocol. A TCP/IP protocol that enables a network connected to the Internet to assign a temporary IP address to a host automatically when the host connects to the network. *See also* IP address, TCP/IP. *Compare* dynamic SLIP.

Dhrystone *n.* A general-performance benchmarking test, originally developed by Rheinhold Weicker in 1984 to measure and compare computer performance. The test reports general system performance in dhrystones per second. It is intended to replace the older and less reliable Whetstone benchmark. The Dhrystone benchmark, like most benchmarks, consists of standard code revised periodically to minimize unfair advantages to certain combinations of hardware, compiler, and environment. Dhrystone concentrates on string handling and uses no floating-point operations. Like most benchmarking tests, it is heavily

influenced by hardware and software design, such as compiler and linker options, code optimizing, cache memory, wait states, and integer data types. *See also* benchmark[2]. *Compare* sieve of Eratosthenes, Whetstone.

DHTML *n. See* dynamic HTML.

DIA *n.* Acronym for **D**ocument **I**nterchange **A**rchitecture. A document exchange guideline used in IBM's Systems Network Architecture (SNA). DIA specifies methods of organizing and addressing documents for transmission between computers of different sizes and models. DIA is supported by IBM's Advanced Program-to-Program Communication (APPC) and by Logical Unit (LU) 6.2, which establish the capabilities and types of interactions possible in an SNA environment. *See also* DCA (definition 1), SNA.

diacritical mark *n.* An accent mark above, below, or through a written character—for example, the acute (´) and grave (`) accents.

dialect *n.* A variant of a language or protocol. For example, Transact-SQL is a dialect of structured query language (SQL).

dialog *n.* **1.** In computing, the exchange of human input and machine responses that forms a "conversation" between an interactive computer and the person using it. **2.** The exchange of signals by computers communicating on a network.

dialog box *n.* In a graphical user interface, a special window displayed by the system or application to solicit a response from the user. *See also* windowing environment. *Compare* integrator.

dial-up *adj.* Of, pertaining to, or being a connection that uses the public switched telephone network rather than a dedicated circuit or some other type of private network.

dial-up access *n.* Connection to a data communications network through a public switched telecommunication network.

dial-up boot loader *n.* A tool for upgrading a version of an operating system on a target device. *Acronym:* DUB.

dial-up networking *n.* Connection to a remote network through use of a modem. Dial-up networking is typically used in reference to telecommuting, although the term is equally applicable to connecting to the Internet.

dial-up service *n.* A telephone connection provider for a local or worldwide public switched telephone network that provides Internet or intranet access, advertisement via a Web page, access to news services, or access to the stock market and other resources.

DIB *n.* **1.** Acronym for **d**evice-**i**ndependent **b**itmap. A file format designed to ensure that bitmapped graphics created using one application can be loaded and displayed in another application exactly the way they appeared in the originating application. *See also* bitmapped graphics. **2.** Acronym for **D**irectory **I**nformation **B**ase. A directory of user and resource names in an X.500 system. The DIB is maintained by a Directory Server Agent (DSA). *Also called:* white pages.

DIBengine *n.* Software, or a combination of hardware and software, that produces DIB files. *See also* DIB (definition 1).

dibit *n.* A set of 2 bits representing one of four possible combinations: 00, 01, 10, and 11. In communications, a dibit is a kind of transmission unit made possible by the modulation technique known as differential phase-shift keying, which encodes data by using four different states (phase shifts) in the transmission line to represent each of the four dibit combinations. *See also* phase-shift keying.

dichotomizing search *n. See* binary search.

dictation software *n.* Computer programs that can recognize spoken words as input. Used as an alternative to keyboard input, dictation software cannot comprehend the spoken language; it can only convert and transmit the sounds to the computer. Speaker-dependent dictation software requires the user to "train" the computer to become familiar with his or her voice patterns and accent. First-generation discrete speech systems require the user to speak slowly and distinctly, with pauses between words. Next-generation continuous speech systems can interpret natural speech patterns and speeds. *See also* voice recognition.

dictionary attack *n.* Originally a method of guessing a user's password or PIN by trying every word in the dictionary until successful. Currently used to identify any attack that tries known words or alphanumeric character strings to break a simple password.

dielectric *n.* Insulating material, such as rubber or plastic, that does not conduct electricity.

DIF *n. See* data interchange format.

difference *n.* **1.** The amount by which two values differ. In electronics, differences in physical elements, such as waveforms or voltages, are used in the operation of circuits, amplifiers, multiplexers, communications equipment, and

so on. **2.** In database management, it is an operator in relational algebra that is used in sorting record sets (tuples). For example, given two relational tables, A and B, that are union-compatible (contain the same number of fields, with corresponding fields containing the same types of values), the statement *DIFFERENCE A, B* builds a third relation containing all those records that appear in A but not in B. *See also* relational algebra, tuple. *Compare* intersect, union.

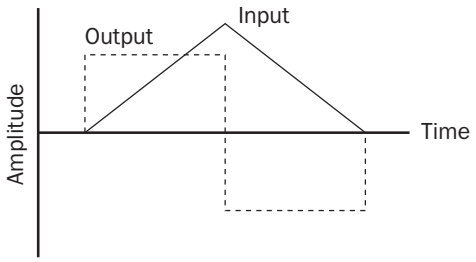
Difference Engine *n.* An early computerlike mechanical device designed by British mathematician and scientist Charles Babbage in the early 1820s. The Difference Engine was intended to be a machine with a 20-decimal capacity capable of solving mathematical problems. The concept of the Difference Engine was enhanced by Babbage in the 1830s in the design of his more famous Analytical Engine, a mechanical precursor of the electronic computer. *See also* Analytical Engine.

differential *adj.* In electronics, a reference to a type of circuit that makes use of the difference between two signals rather than the difference between one signal and some reference voltage.

differential backup *n.* A backup that copies files created or changed since the last normal or incremental backup. It does not mark files as having been backed up (in other words, the archive attribute is not cleared). If you are performing a combination of normal and differential backups, restoring files and folders requires that you have the last normal, as well as the last differential, backup.

differential phase-shift keying *n. See* phase-shift keying.

differentiator *n.* A circuit whose output is the differential (first derivative) of the input signal. The differential measures how fast a value is changing, so the output of a differentiator is proportional to the instantaneous rate of change of the input signal. See the illustration. *Compare* integrator.



Differentiator.

Diffie-Hellman *n.* Diffie-Hellman key agreement protocol. A public-key cryptography method that allows two hosts to create and share a secret key. Diffie-Hellman is used for key management by virtual private networks (VPNs) operating on the IPSec standard. *See also* IPSec.

digerati *n.* Cyberspace populace that can be roughly compared to *literati*. Digerati are people renowned as or claiming to be knowledgeable about topics and issues related to the digital revolution; more specifically, they are people "in the know" about the Internet and online activities. *See also* guru, techie, wizard (definition 1).

digest *n.* **1.** An article in a moderated newsgroup that summarizes multiple posts submitted to the moderator. *See also* moderator, newsgroup. **2.** A message in a mailing list that is sent to subscribers in place of the multiple individual posts that the digest contains. If the mailing list is moderated, the digest may be edited. *See also* moderated.

digicash *n. See* e-money.

digit *n.* One of the characters used to indicate a whole number (unit) in a numbering system. In any numbering system, the number of possible digits is equal to the base, or radix, used. For example, the decimal (base-10) system has 10 digits, 0 through 9; the binary (base-2) system has 2 digits, 0 and 1; and the hexadecimal (base-16) system has 16 digits, 0 through 9 and A through F.

digital *adj.* **1.** A reference to something based on digits (numbers) or their representation. **2.** In computing, analogous in use, though not in meaning, to *binary* because the computers familiar to most people process information coded as different combinations of the binary digits (bits) 0 and 1. *Compare* analog.

Digital Advanced Mobile Phone Service *n. See* D-AMPS.

digital audio disc *n.* An optical storage medium for recording digitally encoded audio information. *See also* compact disc (definition 1).

digital audio tape *n.* A magnetic tape storage medium for recording digitally encoded audio information. *Acronym:* DAT.

digital audio/video connector *n.* An interface on some high-end video cards or TV tuner cards that allows the simultaneous transmission of digital audio and video signals. *Also called:* DAV connector. *See also* interface (definition 3), video adapter.

digital broadcast satellite *n. See* direct broadcast satellite.

D

digital camera *n.* A type of camera that stores photographed images electronically instead of on traditional film. A digital camera uses a CCD (charge-coupled device) element to capture the image through the lens when the operator releases the shutter in the camera; circuitry within the camera then stores the image captured by the CCD in a storage medium such as solid-state memory or a hard disk. After the image has been captured, it is downloaded by cable to the computer using software supplied with the camera. Once stored in the computer, the image can be manipulated and processed much like the image from a scanner or related input device. *See also* charge-coupled device, digital photography.

digital cash *n. See* e-money.

digital certificate *n.* **1.** An assurance that software downloaded from the Internet comes from a reputable source. A digital certificate provides information about the software—such as the identity of the author and the date on which the software was registered with a certificate authority (CA), as well as a measure of tamper-resistance. **2.** A user identity card or "driver's license" for cyberspace. Issued by a certificate authority (CA), a digital certificate is an electronic credential that authenticates a user on the Internet and intranets. Digital certificates ensure the legitimate online transfer of confidential information, money, or other sensitive materials by means of public encryption technology. A digital certificate holder has two keys (strings of numbers): a private key held only by the user, for "signing" outgoing messages and decrypting incoming messages; and a public key, for use by anyone, for encrypting data to send to a specific user. *See also* certificate authority, encryption, private key, public key.

digital communications *n.* Exchange of communications in which all information is transmitted in binary-encoded (digital) form.

digital computer *n.* A computer in which operations are based on two or more discrete states. Binary digital computers are based on two states, logical "on" and "off," represented by two voltage levels, arrangements of which are used to represent all types of information—numbers, letters, graphics symbols, and program instructions. Within such a computer, the states of various circuit components change continuously to move, operate on, and save this information. *Compare* analog computer.

Digital Darkroom *n.* A Macintosh program developed by Silicon Beach Software for enhancement of black-and-white photographs or scanned images.

digital data service *n. See* DDS.

digital data transmission *n.* The transfer of information encoded as a series of bits rather than as a fluctuating (analog) signal in a communications channel.

digital display *n.* A video display capable of rendering only a fixed number of colors or gray shades. Examples of digital displays are IBM's Monochrome Display, Color/Graphics Display, and Enhanced Color Display. *See also* CGA, EGA, MDA. *Compare* analog display.

digital divide *n.* The gap between those who have the opportunity to take advantage of the Internet and related information resources, and those who do not. Differences in income, education, and comfort levels with technology are contributing factors to the separation between those with access to technological resources and those without.

digital DNA *n.* **1.** Broadly, a reference to the bits that comprise digital information. **2.** In the gaming world, a technology called "Cyberlife" that mimics biological DNA in the creation and development of trainable creatures known as Norns. Like real DNA, digital DNA is passed from parent to offspring and determines the artificial creature's characteristics and adaptability.

digital fingerprinting *n. See* digital watermark.

digital flat panel port *n.* An interface designed to allow direct connection between a flat panel monitor and a computer without requiring an analog-to-digital conversion. *Acronym:* DFP.

digital home *n. See* smart home.

digital light processing projector *n. See* DLP.

digital line *n.* A communications line that carries information only in binary-encoded (digital) form. To minimize distortion and noise interference, a digital line uses repeaters to regenerate the signal periodically during transmission. *See also* repeater. *Compare* analog line.

digital linear tape *n.* A magnetic storage medium used to back up data. Digital linear tape allows for faster transfer of data compared with other tape technologies. *Acronym:* DLT.

Digital Micromirror Device *n.* The circuit technology behind Texas Instruments' Digital Light Processing, used in image projectors. A Digital Micromirror Device, or DMD, consists of an array of individually addressable, hinged mirrors on a chip. Each chip, which is less than 0.002 mm wide, rotates in response to a digital signal to reflect light

into the lens of the projection system and thus create a bright, full-color display. Displays can be combined to create high-definition systems of 1920 × 1035 (1,987,200) pixels with 64 million colors. *Acronym:* DMD.

digital modem *n.* **1.** A communications device that acts as the intermediary between a digital device such as a computer or terminal and a digital communications channel, such as a high-speed network line, an ISDN circuit, or a cable TV system. Although a digital modem supports standard (analog) modem protocols, it is not a "typical" modem in the sense of being a device whose primary function is to modulate (convert digital to analog) before transmission and demodulate (convert analog to digital) after transmission. It uses advanced digital modulation techniques for changing data frames into a format suitable for transmission over a digital line. *See also* terminal adapter. *Compare* modem. **2.** A 56 Kbps modem. Such a modem is not purely digital but does eliminate the traditional digital-to-analog conversion for downstream transmissions—that is, transmissions moving from the Internet to the end user. A 56 Kbps modem is also digital in that it requires a digital connection, such as T1, between the telephone company and the user's Internet Service Provider (ISP) in order to achieve its highest speed. *See also* 56-Kbps modem. **3.** A term used to distinguish all-digital communications devices, such as ISDN and cable "modems" from the more traditional analog-to-digital, phone-based modems.

Digital Network Architecture *n.* A multilayered architecture and set of protocol specifications for networks. Designed by the Digital Equipment Corporation, Digital Network Architecture is implemented in the set of products known by the name *DECnet*. *Acronym:* DNA. *See also* DECnet.

digital photography *n.* Photography by means of a digital camera. Digital photography differs from conventional photography in that a digital camera does not use a silver halide–based film to capture an image. Instead, a digital camera captures and stores each image electronically. *See also* digital camera.

digital picture frame *n.* Electronic device used in displaying digital photos and graphics while giving the outward appearance of a traditional picture frame. Digital picture frames allow users to rotate photos within the frame at specified intervals, display a series of photos as a slide show, or use an Internet connection to download photos, order prints, or send customized photo sets to others.

Digital Print Order Format *n. See* DPOF.

digital proof *n. See* direct digital color proof.

digital recording *n.* The storage of information in binary-encoded (digital) format. Digital recording converts information—text, graphics, sound, or pictures—to strings of 1s and 0s that can be physically represented on a storage medium. Digital recording media include computer disks and tapes, optical (or compact) discs, and ROM cartridges of the type used for some software and many computer games.

Digital Rights Management *n. See* DRM.

digital satellite system *n.* A high-powered satellite system with the capability to deliver high-quality transmissions of hundreds of channels directly to television receivers. A DSS broadcast begins as a digital signal sent from a service provider's station to a satellite. From there, it is directed to a satellite dish (typically 18 inches) at the user's premises. The dish next transmits the signal to a converter box, which changes it to an analog signal before sending it to the television set. *Acronym:* DSS.

Digital Services *n. See* DS.

digital signal *n.* A signal, such as one transmitted within or between computers, in which information is represented by discrete states—for example, high and low voltages—rather than by fluctuating levels in a continuous stream, as in an analog signal.

Digital Signal *n. See* DS.

digital signal processor *n.* An integrated circuit designed for high-speed data manipulation and used in audio, communications, image manipulation, and other data acquisition and data control applications. *Acronym:* DSP.

digital signature *n.* A security mechanism used on the Internet that relies on two keys, one public and one private, that are used to encrypt messages before transmission and to decrypt them on receipt.

Digital Signature Algorithm *n.* The U.S. government standard for digital signatures, as specified by the National Institute of Standards and Technology, in FIPS 186, Digital Signature Standard. DSA is based on signature encryption based on a public and a private key. *Acronym:* DSA. *See also* digital signature.

Digital Signature Standard *n.* A public key cryptographic standard issued in 1994 by the United States National Institute of Standards and Technology (NIST) to authenticate electronic documents. The DSS uses a Digital Signature Algorithm (DSA) to generate and verify digital

D

signatures based on a public key, which is not secret, and a private key, which is known or held only by the person generating the signature. A digital signature serves to authenticate both the identity of the signer and the integrity of the transmitted information. *Acronym:* DSS. *See also* public key encryption.

Digital Simultaneous Voice and Data *n.* A modem technology by Multi-Tech Systems, Inc., that allows a single telephone line to be used for conversation together with data transfer. This is accomplished by switching to packet-mode communications when the need for voice transfer is detected; digitized voice packets are then transferred along with data and command packets. *Acronym:* DSVD.

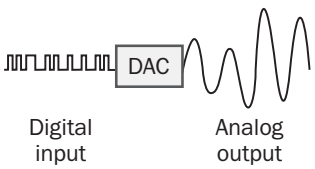
digital sort *n.* A type of ordering process in which record numbers or their key values are sorted digit by digit, beginning with the least significant (rightmost) digit. *Also called:* radix sort.

digital speech *n. See* speech synthesis.

digital subscriber line or **Digital Subscriber Line** *n. See* DSL.

Digital Subscriber Line Access Multiplexer or **Digital Subscriber Line Multiplexer** *n. See* DSLAM.

digital-to-analog converter *n.* A device that translates digital data to an analog signal. A digital-to-analog converter takes a succession of discrete digital values as input and creates an analog signal whose amplitude corresponds, moment by moment, to each digital value. See the illustration. *Acronym:* DAC. *Compare* analog-to-digital converter.



Digital-to-analog converter.

digital versatile disc *n. See* digital video disc.

digital video *n.* Video images and sound stored in a digital format. *Acronym:* DV.

digital TV or **digital television** *n.* The transmission of television signals using digital rather than the conventional analog signals. A digital TV standard for the United States was approved by the FCC in 1996. Digital TV provides a better television experience and new information services. Digital signals produce higher quality pictures and CD-quality sound, compared to the analog signals used with today's television. Digital TV can support interactive television, electronic program guides, and a variety of digital services, such as Internet channel broadcasting and data services. *Acronym:* DTV. *Compare* HDTV.

digital video disc *n.* The next generation of optical disc storage technology. With digital video disc technology, video, audio, and computer data can be encoded onto a compact disc (CD). A digital video disc can store greater amounts of data than a traditional CD. A standard single-layer, single-sided digital video disc can store 4.7 GB of data; a two-layer standard increases the single-sided disc capacity to 8.5 GB. Digital video discs can be double-sided with a maximum storage of 17 GB per disc. A digital video disc player is needed to read digital video discs; this player is equipped to read older optical storage technologies. Advocates of the digital video disc intend to replace current digital storage formats, such as laser disc, CD-ROM, and audio CD, with the single digital format of the digital video disc. *Acronym:* DVD**.** *Also called:* digital versatile disc**.** *See also* digital video disc–ROM.

digital video disc–erasable *n.* A proposed extension to the digital video disc recording format to allow multiple re-recording by a consumer. *Acronym:* DVD-E. *Also called:* digital video disc–ROM.

digital video disc–recordable *n.* A proposed extension to the digital video disc recording format to allow one-time recording by a consumer. *Acronym:* DVD-R.

digital video disc–ROM *n.* A computer-readable version of a digital video disc containing either 4.7 or 8.5 GB of storage per side, the larger if 3M's dual-layer "2P" technology is used. *Acronym:* DVD-ROM. *Also called:* digital video disc–erasable. *See also* digital video disc.

Digital Video–Interactive *n.* A hardware/software system developed by RCA, General Electric, and Intel that implements compression of digital video and audio for microcomputer applications. *Acronym:* DV-I.

Digital Video Interface *n. See* DVI.

digital video recording *n. See* DVR.

digital watermark *n.* A unique identifier embedded in a file to deter piracy and prove file ownership and quality. Digital watermarking is often used with graphics and audio files to identify the owner's rights to these works. *See also* fingerprint (definition 2).

digiterati *n. See* digerati.

digitize *vb.* To convert any continuously varying (analog) source of input, such as the lines in a drawing or a sound signal, to a series of discrete units represented in a computer by the binary digits 0 and 1. Analog-to-digital converters are commonly used to perform this translation. *See also* aliasing, analog-to-digital converter.

digitizing tablet *n. See* graphics tablet.

DikuMUD *n.* **1.** Multiuser dungeon (MUD) software developed by five individuals at the Computer Science Institute at Copenhagen University (whose acronym in Danish is DIKU). DikuMUD uses multimedia and is object-oriented, but the classes are hard-coded. The software is covered by a license agreement that forbids its distribution for money. *See also* MUD, multimedia, object-oriented. **2.** A game that uses the DikuMUD software.

dimensioning *n.* In CAD programs, a means of specifying and possibly controlling the measurements and spatial relationships of elements in a modeled object, such as using lines, arrows, and text (that is, measurements) to indicate the length, height, and thickness of each of the walls in a modeled room or house. *See also* CAD.

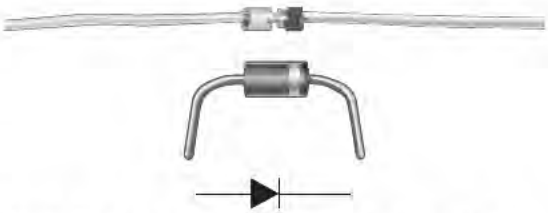
DIMM *n.* Acronym for **d**ual **i**nline **m**emory **m**odule. A type of memory board comprised of RAM chips mounted on a circuit board, similar to the more commonly used SIMM (Single Inline Memory Module). DIMMs are characterized by a 64-bit data path and pins (connectors) on each side that are on different circuits and that respond to different signals. SIMMs, in contrast, have a 32-bit data path, and their connectors are on the same circuit and respond to the same signal. While SIMMs must be added in pairs, DIMMs can be added to a computer one at a time. *See also* memory chip. *Compare* SIMM.

dimmed *adj.* Shown on the screen in gray characters instead of black characters on white or white characters on black. Menu options appear dimmed in a graphical user interface to indicate that under current circumstances they are not available—for example, "Cut" when no text has been highlighted or "Paste" when there is no text in the clipboard.

DIN connector *n.* A multipin connector conforming to the specification of the German national standards organization (Deutsch Industrie Norm). DIN connectors are used to link various components in personal computers.

dingbat *n.* A small graphical element used for decorative purposes in a document. Some fonts, such as Zapf Dingbats, are designed to present sets of dingbats. *See also* font. *Compare* bullet.

diode *n.* A device that passes current in only one direction. A diode is usually a semiconductor. See the illustration. *See also* semiconductor.



Diode. *The drawings (top) show two of the many types of diode packages. The band on the right end of each indicates polarity. At bottom is a schematic representation of a diode.*

diode-transistor logic *n.* A type of circuit design that employs diodes, transistors, and resistors to perform logic functions. *Acronym:* DTL.

DIP *n.* Acronym for **d**ual **i**nline **p**ackage. A standard for packaging integrated circuits in which the microminiature electronic circuits etched on a silicon wafer are enclosed in a rectangular housing of plastic or ceramic and connected to downward-pointing pins protruding from the longer sides of the chip. Designed to facilitate circuit board manufacturing, this design does not work well for modern chips requiring very large numbers of connections. *See also* document image processing. *Compare* leadless chip carrier, pin grid array, SIP, surface-mount technology.

dipole *n.* A pair of opposite electric charges or magnetic poles of opposite sign separated by a small distance.

DIP switch *n.* Short for **D**ual **I**nline **P**ackage **switch**. One or more small rocker- or sliding-type toggle switches contained in the plastic or ceramic housing of a dual inline package (DIP) connected to a circuit board. Each switch on a DIP switch can be set to one of two positions, closed or open, to control options on the circuit board. *See also* DIP.

dir *n.* An MS-DOS command that instructs a computer to display a list of files and subdirectories in the current directory or folder. If the command is followed by a path, the computer displays a list of files and subdirectories in the specified directory or folder. *See also* command, MS-DOS, path (definition 2).

Direct3D *n. See* DirectX.

direct access *n.* The ability of a computer to find and go straight to a particular storage location in memory or on disk to retrieve or store an item of information. Note that direct access is not the same as direct memory access (DMA), which is the ability to transfer information

directly between an input/output channel and memory rather than taking the longer and more circuitous route of I/O channel to microprocessor to memory. *See also* random access. *Compare* direct memory access.

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direct access storage device *n. See* DASD.

direct address *n. See* absolute address.

DirectAnimation *n. See* DirectX.

direct broadcast satellite *n.* A digital telecommunications service that delivers television programming via the Digital Satellite System (DSS). Direct broadcast satellite technology uses a geostationary orbit satellite (GEO) to receive digitized signals sent by ground-based uplink centers; the satellite then beams the signal across a wide swath on Earth. Subscribers within that swath use small (18-inch) satellite dishes to bring the signal into a set-top box decoder for playback. Although primarily used for television broadcasts, the technology is seen as having potential to also deliver high-quality, digital communications and multimedia content in the future. *Acronym:* DBS. *Also called:* digital broadcast satellite. *See also* digital satellite system, geostationary orbit satellite, webcasting.

direct cable connection *n.* A link between the I/O ports of two computers that uses a single cable rather than a modem or other active interface device. In most cases, a direct cable connection requires a null modem cable.

direct-connect modem *n.* A modem that uses standard telephone wire and connectors and that plugs directly into a telephone jack, eliminating the need for an intermediary telephone. *Compare* acoustic coupler.

direct-coupled transistor logic *n.* A circuit design that uses transistors and resistors only, with the transistors directly connected to each other. This design was used in the earliest commercial integrated circuits. The switching speed and power consumption of such circuits are about average. *Acronym:* DCTL.

direct current *n.* Electrical current whose direction of flow does not reverse. The current may stop or change amplitude, but it always flows in the same direction. *Acronym:* DC. *Compare* alternating current.

direct digital color proof *n.* A test sheet produced by a lower-cost output device, such as a color laser printer, to serve as an approximation of what the final image will look like when produced on professional-quality printing equipment. A direct digital color proof does not involve color separation, as in traditional proofs. Instead, a direct digital color proof is printed in all colors at one time on a single page, resulting in somewhat lower quality compared with traditional separation methods but having the advantages of increased speed and reduced cost. *Acronym:* DDCP. *Also called:* digital proof. *See also* color separation (definition 1).

DirectDraw *n. See* DirectX.

Direct Graphics Interface Specification *n. See* DGIS.

DirectInput *n.* An API (application programming interface) developed by Microsoft for joysticks and similar pointing devices in Windows 9x. *See also* DirectX.

direction key *n. See* arrow key.

direct memory access *n.* Memory access that does not involve the microprocessor and is frequently used for data transfer directly between memory and an "intelligent" peripheral device, such as a disk drive. *Acronym:* DMA. *Compare* PIO.

DirectMusic *n. See* DirectX.

directory *n.* **1.** A catalog for filenames and other directories stored on a disk. A directory is a way of organizing and grouping the files so that the user is not overwhelmed by a long list of them. The uppermost directory is called the *root directory*; the directories within a directory are called *subdirectories*. Depending on how an operating system supports directories, filenames in a directory can be viewed and ordered in various ways—for example, alphabetically, by date, by size, or as icons in a graphical user interface. What the user views as a directory is supported in the operating system by tables of data, stored on the disk, that indicate characteristics and the location of each file. In the Macintosh and Windows 9x operating systems, directories are called *folders*. **2.** On a network, an index of names and pertinent information related to authorized users and network resources.

Directory Access Protocol *n.* The protocol that governs communications between X.500 clients and servers. *See also* CCITT X series.

Directory Client Agent *n. See* DUA.

Directory Information Base *n. See* DIB (definition 2).

Directory Mozilla *n. See* Open Directory Project.

directory path *n. See* pathname.

directory replication *n.* The copying of a master set of directories from a server (called an *export server*) to specified servers or workstations (called *import computers*) in the same or other domains. Replication simplifies the task of maintaining identical sets of directories and files on

multiple computers because only a single master copy of the data must be maintained. *See also* directory, server.

Directory Server Agent *n. See* DSA.

directory service *n.* A service on a network that returns mail addresses of other users or enables a user to locate hosts and services.

Directory System Agent *n. See* DSA.

directory tree *n.* A graphic display listing the directories and subdirectories on a hard disk in tree form, with subdirectories shown as branches of the main directory. *See also* branch (definition 1), directory, tree structure.

Directory User Agent *n. See* DUA.

DirectPlay *n. See* DirectX.

direct processing *n.* Processing of data as it is received by the system, as opposed to deferred processing, in which data is stored in blocks before processing. *Compare* deferred processing.

direct read after write *n. See* DRAW.

direct read during write *n. See* DRDW.

direct sequence *n.* In spread spectrum communication, a form of modulation in which a carrier is modulated by a series of binary pulses. *See also* modulation (definition 1), spread spectrum.

DirectShow *n. See* DirectX.

DirectSound *n. See* DirectX.

direct view storage tube *n.* A type of cathode-ray tube (CRT) in which the screen can retain images for a long time and in which a beam of electrons from an electron gun can be moved arbitrarily across the screen surface (as opposed to a standard cathode-ray tube, in which the electron beam is moved in a specific pattern). This type of CRT is capable of displaying a precise, detailed image without requiring any screen refresh. However, once the image is drawn, it cannot be changed without a complete erasing of the screen. *Acronym:* DVST. *Also called:* storage tube. *Compare* CRT.

DirectX *n.* A set of Microsoft technologies that provide developers with the tools needed to create sophisticated multimedia applications on Windows-based computers. DirectX consists of components making up two integrated layers. The Foundation layer provides low-level functions, such as support for input devices, designed to ensure that applications can run on—and take full advantage of—Windows-based hardware. The Media layer, above the Foundation layer, provides high-level services, such as support for media streaming and animation, that are needed in creating applications incorporating such features as surround sound, video, and 3-D animation. DirectAnimation, DirectSound, and other similarly named application programming interfaces (APIs) are members of the DirectX family. See the table. *See also* application programming interface.

Table D.1 ATA Specifications.

DirectX Component	*Part Of*	*Supports*
Direct3D Immediate Mode	Foundation layer	Access to 3-D video hardware
Direct3D Retained Mode	Media layer	Creation and animation of onscreen 3-D worlds
DirectAnimation	Media layer	Interactive animation and integration of different multimedia types
DirectDraw	Foundation layer	Access to display memory and hardware capabilities
DirectInput	Foundation layer	Direct access to various input devices, including force-feedback joysticks
DirectMusic	Foundation layer	Real-time music composition
DirectPlay	Foundation layer	Multiplayer online gaming and other networked applications
DirectShow	Media layer	Capture and playback of streaming multimedia
DirectSound	Foundation layer	Direct access to sound cards; wave sound capture and playback
DirectSound3D	Foundation layer	3-D sound positioning
DirectX Transform	Media layer	Extensibility of the DirectX platform to include value-added products

DirectX Transform *n. See* DirectX.

dirty *adj.* Of, pertaining to, or characteristic of a communications line that is hampered by excessive noise, degrading the quality of the signal. *See also* noise (definition 2).

dirty bit *n.* A bit used to mark modified data in a cache so that the modifications may be carried over to primary memory. *See also* bit, cache.

dirty power *n.* A power source that can cause damage to electronic components, due to noise, voltage spikes, or incorrect voltage levels.

dirty ROM *n.* Short for **dirty r**ead-**o**nly **m**emory. In the earlier versions of the Macintosh (Mac II, IIx, SE/30, and IIcx), a memory system that simulates a 32-bit system but is not a true (clean) 32-bit system. Among other flaws, a dirty ROM machine can access only 8 megabytes of memory under Mac OS System 7. System extensions such as MODE32 and the 32-bit enabler are available to allow a dirty ROM machine to function like a true, 32-bit clean machine.

disable *vb.* To suppress something or to prevent it from happening. Disabling is a method of controlling system functions by disallowing certain activities. For example, a program might temporarily disable nonessential interrupts (requests for service from system devices) to prevent interruptions during a critical point in processing. *Compare* enable.

disabled folders *n.* In the Mac OS, several folders in the System folder that contain system extensions, control panels, and other items that have been removed from the system by the extension manager. Items currently in disabled folders will not be installed upon system startup; they may, however, later be moved back to their regular folders automatically by the extension manager. *See also* extension manager, System folder.

disassembler *n.* A program that converts machine code to assembly language source code. Most debuggers have some kind of built-in disassembler that allows the programmer to view an executable program in terms of human-readable assembly language. *See also* decompiler. *Compare* assembler.

disassociate *vb.* In Windows 95 and Windows NT, to remove an association between a file and some application. *Compare* associate.

disaster dump *n.* A dump (transfer of memory contents to a printer or other output device) made when a program fails without hope of recovery.

disc *n.* A round, flat piece of nonmagnetic, shiny metal encased in a plastic coating, designed to be read from and written to by optical (laser) technology. It is now standard practice to use the spelling *disc* for optical discs and *disk* in all other computer contexts, such as floppy disk, hard disk, and RAM disk. *See also* compact disc.

disconnect *vb.* To break a communications link.

discrete *adj.* Separate; individual; identifiable as a unit. For example, bits are discrete elements of data processed by a computer.

discrete multitone *n.* In telecommunications, a technology that uses digital signal processors to split available bandwidth into a number of subchannels, allowing over 6 Mbps of data to be carried over one copper twisted-pair wire. *Acronym:* DMT.

discrete speech recognition *n.* Computer speech recognition format in which each word is recognized as a distinct individual unit, requiring a pause between each word spoken.

discretionary access control list *n.* The part of an object's security descriptor that grants or denies specific users and groups permission to access the object. Only the owner of an object can change permissions granted or denied in a DACL; thus, access to the object is at the owner's discretion. *Acronym:* DACL. *See also* distribution group.

discretionary hyphen *n. See* hyphen.

discussion group *n.* Any of a variety of online forums in which people communicate about subjects of common interest. Forums for discussion groups include electronic mailing lists, Internet newsgroups, and IRC channels.

dish *n. See* satellite dish.

disk *n.* **1.** A round, flat piece of flexible plastic coated with a magnetic material that can be electrically influenced to hold information recorded in digital (binary) form and encased in a protective plastic jacket to protect the disk from damage and contamination. *Also called:* floppy, floppy disk, microfloppy disk. *Compare* compact disc, disc. **2.** *See* hard drive.

disk access time *n. See* access time (definition 2).

disk buffer *n.* A small amount of memory set aside for the purpose of storing data read from, or soon to be written

to, a disk. Because disk devices are slow compared with the CPU, it is not efficient to access the disk for only one or two bytes of data. Instead, during a read, a large chunk of data is read and stored in the disk buffer. When the program wants information, it is copied from the buffer. Many requests for data can be satisfied by a single disk access. The same technique can be applied to disk writes. When the program has information to store, it writes it into the disk buffer area in memory. When the buffer has been filled, the entire contents of the buffer are written to the disk in a single operation.

disk cache *n.* A portion of a computer's random access memory (RAM) set aside for temporarily holding information read from disk. A disk cache does not hold entire files, as does a RAM disk (a portion of memory that acts as if it were a disk drive). Instead, a disk cache is used to hold information that either has recently been requested from disk or has previously been written to disk. If the required information remains in a disk cache, access time is considerably faster than if the program must wait for the disk drive mechanism to fetch the information from disk. *See also* cache. *Compare* disk buffer.

disk cartridge *n.* A removable disk enclosed in a protective case. A disk cartridge can be used by certain types of hard disk drives and related devices, such as the external data storage units known as Bernoulli boxes.

disk controller *n.* A special-purpose chip and associated circuitry that directs and controls reading from and writing to a computer's disk drive. A disk controller handles such tasks as positioning the read/write head, mediating between the drive and the microprocessor, and controlling the transfer of information to and from memory. Disk controllers are used with floppy disk drives and hard disks and can either be built into the system or be part of a card that plugs into an expansion slot.

disk copy *n.* The process of duplicating a source disk's data and the data's organizational structure onto a target disk. *See also* backup.

disk crash *n.* The failure of a disk drive. *See also* crash[1].

disk directory *n.* An index of the files on a disk, analogous to a card catalog. A disk directory includes information about the files, such as their names, sizes, dates of creation, and physical locations on the disk. *See also* directory.

disk drive *n.* An electromechanical device that reads from and writes to disks. The main components of a disk drive include a spindle on which the disk is mounted, a drive motor that spins the disk when the drive is in operation, one or more read/write heads, a second motor that positions the read/write heads over the disk, and controller circuitry that synchronizes read/write activities and transfers information to and from the computer. Two types of disk drives are in common use: floppy disk drives and hard disk drives. Floppy disk drives are designed to accept removable disks in either 5.25-inch or 3.5-inch format; hard disk drives are faster, high-capacity storage units that are completely enclosed in a protective case.

disk driver *n.* A device driver that is added to a system to support a specific manufacturer's disk device. *See also* device driver.

disk duplexing *n. See* disk mirroring.

disk envelope *n.* The paper container that holds a 5.25-inch floppy disk and its attached jacket. The disk envelope protects exposed surfaces of the disk from dust and other foreign material that can scratch and otherwise damage the surface, resulting in the loss of recorded data. *See also* disk jacket.

diskette *n. See* floppy disk.

disk farm *n.* A number of disk drives in a single location used together to store or process vast quantities of information, such as scientific data, years' worth of corporate sales figures, large numbers of graphic images, or telephone company billing records. Current disk farms consist of magnetic or optical disks and can hold terabytes of information. In older usage, disk farms were sometimes known as "Laundromats" because they contained large drives referred to in jargon as "washing machines." *See also* server farm.

disk interface *n.* **1.** The circuitry that connects a disk drive to a computer system. **2.** A standard for connecting disk drives and computers. For example, the ST506 standard for connecting hard disks to computers is a disk interface standard.

disk jacket *n.* The protective plastic sheath that covers a floppy disk.

diskless workstation *n.* A station on a computer network that is not equipped with a disk drive and that uses files stored in a file server. *See also* file server.

disk memory *n. See* virtual memory.

disk mirroring *n.* A technique in which all or part of a hard disk is duplicated onto one or more other hard disks,

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each of which ideally is attached to its own controller. With disk mirroring, any change made to the original disk is simultaneously made to the other disks so that if the original disk becomes damaged or corrupted, the mirror disks will contain a current, undamaged collection of the data from the original disk. *Also called:* disk duplexing. *See also* fault tolerance.

disk operating system *n. See* DOS.

disk pack *n.* A collection of disks in a protective container. Used primarily with minicomputers and mainframe computers, a disk pack is a removable medium, generally a stack of 14-inch disks in a plastic housing.

disk partition *n.* A logical compartment on a physical disk drive. A single disk might have two or more logical disk partitions, each of which would be referenced with a different disk drive name. Multiple partitions are divided into a primary (boot) partition and one or more extended partitions.

disk server *n.* A node on a local area network that acts as a remote disk drive shared by network users. Unlike a file server, which performs the more sophisticated tasks of managing network requests for files, a disk server functions as a storage medium on which users can read and write files. A disk server can be divided into sections (volumes), each of which appears to be a separate disk. *Compare* file server.

disk striping *n.* The procedure of combining a set of same-size disk partitions that reside on separate disks (from 2 to 32 disks) into a single volume, forming a virtual stripe across the disks that the operating system recognizes as a single drive. Disk striping enables multiple I/O operations in the same volume to proceed concurrently, thus offering enhanced performance. *See also* disk striping with parity, input/output.

disk striping with parity *n.* The technique of maintaining parity information across a disk stripe so that if one disk partition fails, the data on that disk can be re-created using the information stored across the remaining partitions in the disk stripe. *See also* disk striping, fault tolerance, parity.

disk unit *n.* A disk drive or its housing.

dispatcher *n.* In some multitasking operating systems, the set of routines responsible for allocating CPU (central processing unit) time to various applications.

dispatch table *n.* A table of identifiers and addresses for a certain class of routines such as interrupt handlers (routines carried out in response to certain signals or conditions). *Also called:* interrupt vector table, jump table, vector table. *See also* interrupt handler.

disperse *vb.* To break up and place in more than one location—for example, to disperse results among several sets of data or to disperse items (such as fields in records) so that they appear in more than one place in the output. *Compare* distribute.

dispersion *n.* The degree to which, at any given time, data in a distributed (interconnected) system of computers is stored at different locations or on different devices.

display *n.* The visual output device of a computer, which is commonly a CRT-based video display. With portable and notebook computers, the display is usually an LCD-based or a gas plasma–based flat-panel display. *See also* flat-panel display, liquid crystal display, video adapter, video display.

display adapter *n. See* video adapter.

display attribute *n.* A quality assigned to a character or an image displayed on the screen. Display attributes include such features as color, intensity, and blinking. Users of applications can control display attributes when programs allow them to change color and other screen elements.

display background *n.* In computer graphics, the portion of an on-screen image that remains static while other elements change; for example, window borders on a screen, or a palette of shapes or patterns in a drawing program.

display board *n. See* video adapter.

display card *n. See* video adapter.

display cycle *n.* The complete set of events that must occur in order for a computer image to be displayed on the screen, including both the software creation of an image in a computer's video memory and the hardware operations required for accurate on-screen display. *See also* refresh cycle.

Display Data Channel *n. See* DDC.

display device *n. See* display.

display element *n. See* graphics primitive.

display entity *n. See* entity, graphics primitive.

display face *n.* A typeface suitable for headings and titles in documents, distinguished by its ability to stand out from

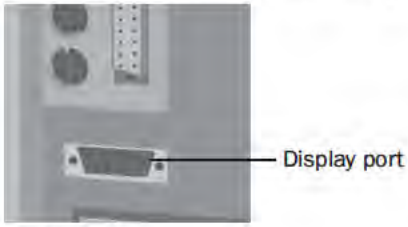
other text on the page. Sans serif faces such as Helvetica and Avant Garde often work well as display faces. *See also* sans serif. *Compare* body face.

display frame *n.* One image in an animation sequence. *See also* frame (definition 3).

display image *n.* The collection of elements displayed together at a single time on a computer screen.

display page *n.* One screenful of display information stored in a computer's video memory. Computers can have enough video memory to hold more than one display page at a time. In such instances, programmers, especially those concerned with creating animation sequences, can update the screen rapidly by creating or modifying one display page while another is being viewed by the user. *See also* animation.

display port *n.* An output port on a computer that provides a signal for a display device such as a video monitor. See the illustration. *Also called:* monitor port.



Display port.

Display PostScript *n.* An extended version of the PostScript language intended to provide a device-independent language for displaying images and text on bitmapped displays. *See also* PostScript.

Display Power Management Signaling *n. See* DPMS.

display screen *n.* The part of a video unit on which images are shown. *See also* CRT.

display terminal *n. See* terminal (definition 1).

distance learning *n.* Broadly, any educational or learning process or system in which the teacher/instructor is separated geographically or in time from his or her students, or in which students are separated from other students or educational resources. Contemporary distance learning is effected through the implementation of computer and electronics technology to connect teacher and student in either real or delayed time or on an as-needed basis. Content delivery may be achieved through a variety of technologies, including satellites, computers, cable television, interactive video, electronic transmissions via telephone lines, the World Wide Web and other Internet technology, and others. Distance learning does not preclude traditional learning processes; frequently it is used in conjunction with in-person classroom or professional training procedures and practices.

Distance Vector Multicast Routing Protocol *n.* An Internet routing protocol that provides an efficient mechanism for connectionless datagram delivery to a group of hosts across an Internet network. It is a distributed protocol that dynamically generates IP multicast delivery trees using a technique called Reverse Path Multicasting (RPM). *Acronym:* DVMRP.

distance-vector routing algorithm *n. See* Bellman-Ford distance-vector routing algorithm.

distortion *n.* An undesirable change in the waveform of a signal. Distortion can occur during signal transmission, as when a radio broadcast becomes garbled, or when a signal passes through a circuit, as when a stereo system is turned up too loud. Distortion often results in loss of information. It is mainly a problem in analog signals; digital signals are not affected by moderate distortion.

distribute *vb.* To allocate among locations or facilities, as in a data-processing function that is performed by a collection of computers and other devices linked together by a network.

distributed bulletin board *n.* A collection of newsgroups distributed to all computers in a wide area network. *See also* newsgroup, Usenet.

Distributed COM *n. See* DCOM.

Distributed Component Object Model *n. See* DCOM.

distributed computing *n. See* distributed processing.

Distributed Computing Environment *n.* A set of standards from the Open Group (formerly the Open Software Foundation) for development of distributed applications that can operate on more than one platform. *Acronym:* DCE. *See also* distributed processing.

distributed database *n.* A database implemented on a network. The component partitions are distributed over various nodes (stations) of the network. Depending on the specific update and retrieval traffic, distributing the database can significantly enhance overall performance. *See also* partition (definition 2).

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distributed database management system *n.* A database management system capable of managing a distributed database. *Acronym:* DDBMS. *See also* distributed database.

distributed denial of service attack *n. See* DDoS.

distributed file system *n.* A file management system in which files may be located on multiple computers connected over a local or wide area network. *Acronym:* DFS.

distributed intelligence *n.* A system in which processing ability (intelligence) is distributed among multiple computers and other devices, each of which can work independently to some degree but can also communicate with the other devices to function as part of the larger system. *See also* distributed processing.

distributed network *n.* A network in which processing, storage, and other functions are handled by separate units (nodes) rather than by a single main computer.

distributed processing *n.* A form of information processing in which work is performed by separate computers linked through a communications network. Distributed processing is usually categorized as either plain distributed processing or true distributed processing. Plain distributed processing shares the workload among computers that can communicate with one another. True distributed processing has separate computers perform different tasks in such a way that their combined work can contribute to a larger goal. The latter type of processing requires a highly structured environment that allows hardware and software to communicate, share resources, and exchange information freely.

distributed services *n. See* BISDN.

distributed system *n.* A noncentralized network consisting of numerous computers that can communicate with one another and that appear to users as parts of a single, large, accessible "storehouse" of shared hardware, software, and data.

Distributed System Object Model *n.* IBM's System Object Model (SOM) in a shared environment, where binary class libraries can be shared between applications on networked computers or between applications on a given system. The Distributed System Object Model complements existing object-oriented languages by allowing SOM class libraries to be shared among applications written in different languages. *Acronym:* DSOM. *See also* SOM (definition 1).

distributed transaction processing *n.* Transaction processing that is shared by one or more computers communicating over a network. *Acronym:* DTP. *See also* distributed processing, transaction processing.

distributed workplace *n.* An environment other than the traditional office or factory, in which work is carried out on a regular basis. The flexibility afforded by the combination of communications and computing technologies enables many workers to conduct business anywhere the appropriate computer and data communications infrastructure has been set up. *See also* SOHO, telecommute.

distribution group *n.* A group that is used solely for e-mail distribution and that is not security-enabled. Distribution groups cannot be listed in discretionary access control lists (DACLs) used to define permissions on resources and objects. Distribution groups can be used only with e-mail applications (such as Microsoft Exchange) to send e-mail messages to collections of users. If you do not need a group for security purposes, create a distribution group instead of a security group. *See also* discretionary access control list, security group.

distribution list *n.* A list of recipients on an e-mail mailing list. This can be in the form of either a mailing list program, such as LISTSERV, or an alias in an e-mail program for all recipients of an e-mail message. *See also* alias (definition 2), LISTSERV, mailing list.

distribution services *n. See* BISDN.

distributive sort *n.* An ordering process in which a list is separated into parts and then reassembled in a particular order. *See also* sort algorithm. *Compare* bubble sort, insertion sort, merge sort, quicksort.

distro[1] *n.* **1.** A distribution of software (usually a version of Linux), digital music, or an online magazine or e-zine. *See also* e-zine, Linux. **2.** A company or individual that sells items, typically software, music CDs, or books, via the Web.

distro[2] *vb.* To distribute or sell software releases, digital music, or text items via the Web.

dithering *n.* A technique used in computer graphics to create the illusion of varying shades of gray on a monochrome display or printer, or additional colors on a color display or printer. Dithering relies on treating areas of an

image as groups of dots that are colored in different patterns. Akin to the print images called *halftones*, dithering takes advantage of the eye's tendency to blur spots of different colors by averaging their effects and merging them into a single perceived shade or color. Depending on the ratio of black dots to white dots within a given area, the overall effect is of a particular shade of gray. Dithering is used to add realism to computer graphics and to soften jagged edges in curves and diagonal lines at low resolutions. See the illustration. *See also* aliasing, halftone.

Dithering. *A halftone image (left) and a dithered image (right) both at 72 cells per inch.*

divergence *n.* A moving apart or separation. On computer displays, divergence occurs when the red, green, and blue electron beams in a color monitor do not collectively light the same spot on the screen. Within a program, such as a spreadsheet, divergence can occur when a circular set of formulas is repeatedly recalculated (iterated), with the results of each iteration moving further from a stable solution. *Compare* convergence.

divide overflow *n. See* overflow error.

division by zero *n.* An error condition caused by an attempt to divide a number by zero, which is mathematically undefined, or by a number that is sufficiently near to zero that the result is too large to be expressed by the machine. Computers do not allow division by zero, and software must provide some means of protecting the user from program failure on such attempts.

DIX *n.* Acronym for **D**igital **I**ntel **X**erox, the companies that developed the AUI connector for thicknet Ethernet cable. *See also* AUI.

DJGPP *n.* A compiler and a set of tools used by some game programmers to produce 32-bit protected-mode programs that run on Windows operating systems. DJGPP is a complete 32-bit C/C++ development system for PCs running MS-DOS; it includes ports of many GNU development utilities. In most cases, programs produced using DJGPP can be sold commercially without license or royalties. *See also* 32-bit, Allegro, GNU.

djinn *n.* A group of devices, resources, and users joined by Sun Microsystem's JINI technology. The group, controlled by the JINI technology infrastructure, agrees on basic specifications for administration, trust, identification, and policy. *See also* JINI.

DLC *n.* Acronym for **D**ata **L**ink **C**ontrol. An error-correction protocol in the Systems Network Architecture (SNA) responsible for transmission of data between two nodes over a physical link. Supported by Microsoft Windows NT and Windows 2000, DLC is designed to provide access to IBM mainframe computers and to Hewlett-Packard printers connected to the network. *See also* HDLC, SNA.

DLCI *n. See* Data Link Connection Identifier.

.dll *n.* A file extension for a dynamic-link library. *See also* dynamic-link library.

DLL *n. See* dynamic-link library.

DLL hell *n.* A problem occurring in versions of Microsoft Windows prior to Windows Me and Windows 2000 in which a newly installed application overwrites shared dynamic-link library (DLL) files with the (older or newer) versions it needs in order to run. If the replaced files are incompatible with those needed by other applications, those applications may exhibit buggy behavior or crash when they access the incompatible DLL files. The latest versions of the Windows operating system, Windows 2000 and Windows XP, incorporate a feature called Windows File Protection that eliminates this situation by monitoring and correcting installation and replacement of DLL files. *See also* dynamic-link library.

DLP *n.* Short for **D**igital **L**ight **P**rocessing, a digital projection technology developed by Texas Instruments in which a signal sent from a computer to a DLP projector is projected onto a screen by means of light reflected from a Digital Micromirror Device, or DMD, that consists of thousands of tiny hinged mirrors, each representing one pixel, attached to a chip. The chip acts as a bank of switches, one switch per mirror. These switches, in turn, rotate the mirrors in response to the digital signal to reflect light through a projection lens to create the image. DLP projectors represent a newer technology than the LCD projectors also used to display images on screen. *See also* Digital Micromirror Device.

DLS *n. See* Downloadable Sounds.

DLT *n. See* digital linear tape.

DMA *n. See* direct memory access, document management system.

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DMD *n. See* Digital Micromirror Device.

DMI *n.* Acronym for **D**esktop **M**anagement **I**nterface. A system for managing the configurations and status of PCs on a network from a central computer. In DMI an agent program runs in the background on each machine and returns information or performs some action (as specified by a file on that machine) in response to a query received from the central computer. The actions to be performed by the agent might include watching for errors and reporting them to the central computer as they occur; for example, a printer might be set up to report to the central computer when paper runs out or jams. DMI was developed by the DMTF (Desktop Management Task Force), a consortium of computer equipment manufacturers, and competes with SNMP (although the two can coexist on the same system). *See also* agent (definition 1), DMTF. *Compare* SNMP.

DML *n. See* data manipulation language, declarative markup language.

DMOZ *n. See* Open Directory Project.

DMQL *n.* Acronym for **D**ata **M**ining **Q**uery **L**anguage. Any query language developed and used for data mining relational databases. DMQLs provide a syntax for specifying the kind of knowledge to be mined, pattern presentation and visualization, conceptual hierarchies, and task relevant data. *See also* data mining. *Compare* structured query language (SQL).

DMS *n. See* document management system.

DMT *n. See* discrete multitone.

DMTF *n.* Acronym for **D**esktop **M**anagement **T**ask **F**orce. A consortium formed in 1992 to develop standards for PC-based stand-alone and networked systems based on user and industry needs.

DNA *n. See* digital DNA, Digital Network Architecture, distributed network, Windows DNA.

DNS *n.* **1.** Acronym for **D**omain **N**ame **S**ystem. The hierarchical system by which hosts on the Internet have both domain name addresses (such as bluestem.prairienet.org) and IP addresses (such as 192.17.3.4). The domain name address is used by human users and is automatically translated into the numerical IP address, which is used by the packet-routing software. DNS names consist of a top-level domain (such as .com, .org, and .net), a second-level domain (the site name of a business, an organization, or an individual), and possibly one or more subdomains (servers within a second-level domain). *See also* domain name address, IP address. **2.** Acronym for **D**omain **N**ame **S**ervice. The Internet utility that implements the Domain Name System. DNS servers, also called name servers, maintain databases containing the addresses and are accessed transparently to the user. *See also* Domain Name System (definition 1), DNS server.

DNS name server *n. See* DNS server.

DNS server *n.* Short for **D**omain **N**ame **S**ystem **server**, a computer that can answer Domain Name System (DNS) queries. The DNS server keeps a database of host computers and their corresponding IP addresses. Presented with the name apex.com, for example, the DNS server would return the IP address of the hypothetical company Apex. *Also called:* name server. *See also* DNS (definition 2), IP address.

DNS zone transfer *n. See* zone transfer.

.doc *n.* A file extension that identifies document files formatted for a word processor. This is the default file extension for Microsoft Word document files.

dock *vb.* **1.** To connect a laptop or notebook computer to a docking station. *See also* docking station, laptop, portable computer. **2.** To move a toolbar to the edge of an application window so that it attaches to and becomes a feature of the application window.

Dock *n.* An organizational feature of Mac OS X that keeps track of frequently used applications, documents, and windows. Users can drag icons to the dock for easy access or can minimize an active window to the Dock and still see the application running while working with other windows. The Dock can run along the bottom or either side of the screen. *See also* Mac OS X.

docking mechanism *n.* The portion of a docking station that physically connects the portable computer with the station. *See also* docking station.

docking station *n.* A unit for housing a laptop or notebook computer that contains a power connection, expansion slots, and connections to peripherals, such as a monitor, printer, full-sized keyboard, and mouse. The purpose of a docking station is to turn the laptop or notebook computer into a desktop machine and allow users the convenience of using such peripherals as a monitor and a full-sized keyboard. See the illustration. *See also* expansion slot, laptop, peripheral, portable computer.

Docking station.

DOCSIS *n.* Acronym for **D**ata **O**ver **C**able **S**ervice **I**nterface **S**pecification. The International Telecommunications Union standard (ITU Recommendation J.112) that specifies functions and internal and external interfaces for high-speed, bidirectional transfer of digital data between cable television networks and subscribers. DOCSIS-compliant equipment ensures interoperability between cable modems and the cable television infrastructure, regardless of manufacturer or provider. Initially developed by a group of cable television providers, including Time Warner and TCI, DOCSIS was designed to support data, video, and rapid Internet access. Data rates are 27 Mbps to 36 Mbps downstream (from the cable network) and 320 Kbps to 10 Mbps upstream (to the cable network). *See also* cable modem. *Compare* IEEE 802.14.

doctype *n.* A declaration at the beginning of an SGML document that gives a public or system identifier for the document type definition (DTD) of the document. *See also* SGML.

document[1] *n.* Any self-contained piece of work created with an application program and, if saved on disk, given a unique filename by which it can be retrieved. Documents are generally thought of as word-processed materials only. To a computer, however, data is nothing more than a collection of characters, so a spreadsheet or a graphic is as much a document as is a letter or report. In the Macintosh environment in particular, a document is any user-created work named and saved as a separate file.

document[2] *vb.* To explain or annotate something, such as a program or a procedure.

documentation *n.* The set of instructions shipped with a program or a piece of hardware. Documentation usually includes necessary information about the type of computer system required, setup instructions, and instructions on the use and maintenance of the product.

document-centric *adj.* Of, pertaining to, or characteristic of an operating system in which the user opens document files and thus automatically invokes the applications (such as word processors or spreadsheet programs) that process them. Many graphical user interfaces, such as the Macintosh Finder, as well as the World Wide Web, are document-centric. *Compare* application-centric.

Document Content Architecture *n. See* DCA (definition 1).

Document Content Description *n. See* DCD (definition 2).

document file *n.* A user-created file that represents the output of a program. *Also called:* data file. *Compare* program file.

document image processing *n.* A system for storing and retrieving information for an enterprise in the form of bitmapped images of paper documents input with a scanner rather than in the form of text and numeric files. Document image processing takes more memory than purely electronic data processing, but it more readily incorporates signatures, drawings, and photographs and can be more familiar to users without computer training. *See also* paperless office.

Document Interchange Architecture *n. See* DIA.

document management *n.* The full spectrum of electronic document creation and distribution within an organization.

document management system *n.* A server-based network facility designed for the storage and handling of an organization's documents. A document management system, or DMS, is built around a central library known as a repository and typically supports controlled access, version tracking, cataloging, search capabilities, and the ability to check documents in and out electronically. The open interface specification known as ODMA (Open Document Management API) enables desktop applications that support ODMA to interface with a DMS so that users can access and manage documents from within their client applications. *Acronym:* DMS. *Also called:* EDMS, electronic document management system.

Document Object Model *n.* A World Wide Web Consortium specification that describes the structure of dynamic HTML and XML documents in a way that allows them to be manipulated through a Web browser. In the Document Object Model, or DOM, a document is presented as a logical structure rather than as a collection of

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tagged words. In essence, DOM is a means of defining a document as a treelike hierarchy of nodes in which the document is an object containing other objects, such as images and forms. Through DOM, programs and scripts can access these objects in order to change aspects such as their appearance or behavior. DOM is a vehicle for adding depth and interactivity to what would otherwise be a static Web page. *Acronym:* DOM.

document processing *n.* The act of retrieving and manipulating a document. In terms of the way a computer works, document processing involves three main steps: creating or retrieving a data file, using a program to manipulate the data in some way, and storing the modified file.

document reader *n.* A device that scans printed text and uses character recognition to convert it to computer text files. *See also* character recognition.

document retrieval *n.* A capability built into some application programs that enables the user to search for specific documents by specifying items of information, such as date, author, or previously assigned keywords. Document retrieval depends on an indexing scheme that the program maintains and uses. Depending on the program's capabilities, document retrieval might allow the user to specify more than one condition to refine a search.

document source *n.* The plain-text HTML form of a World Wide Web document, with all tags and other markup displayed as such rather than being formatted. *Also called:* source, source document. *See also* HTML.

Document Style Semantics and Specification Language *n.* An ISO standard derived from SGML that addresses the semantics of high-quality composition in a manner independent of particular formatting systems or processes. Like CSS and XSL, it can be used to format XML documents. *Acronym:* DSSSL. *See also* ISO, SGML.

document type definition *n. See* DTD.

document window *n.* In windowing environments, such as the Apple Macintosh and Microsoft Windows, an on-screen window (enclosed work area) in which the user can create, view, or work on a document.

DoD *n. See* U.S. Department of Defense.

do-gooder virus *n.* A virus or worm that has been released with the intention of correcting problems caused by other, more malicious viruses. The do-gooder virus typically looks for computers that have been compromised and then infects the system and fixes back doors and other vulnerabilities left behind by the malicious program. The do-gooder virus may then use the repaired computer as a platform to infect other computers. *See also* anti-worm, automatic patching.

DO loop *n.* A control statement used in programs that executes a section of code a number of times until a specified condition is met. DO loops are found in FORTRAN and Basic, among other languages. *See also* iterative statement. *Compare* FOR loop.

DOM *n. See* Document Object Model.

domain *n.* **1.** In database design and management, the set of valid values for a given attribute. For example, the domain for the attribute AREA-CODE might be the list of all valid three-digit numeric telephone area codes in the United States. *See also* attribute (definition 1). **2.** For Windows NT Advanced Server, a collection of computers that share a common domain database and security policy. Each domain has a unique name. **3.** In the Internet and other networks, the highest subdivision of a domain name in a network address, which identifies the type of entity owning the address (for example, .com for commercial users or .edu for educational institutions) or the geographical location of the address (for example, .fr for France or .sg for Singapore). The domain is the last part of the address (for example, www.acm.org). *See also* domain name.

domain controller *n.* In Windows NT, the master server that holds the directory services database that identifies all network users and resources.

domain name *n.* An address of a network connection that identifies the owner of that address in a hierarchical format: *server.organization.type.* For example, www.whitehouse.gov identifies the Web server at the White House, which is part of the U.S. government.

domain name address *n.* The address of a device connected to the Internet or any other TCP/IP network, in the hierarchical system that uses words to identify servers, organizations, and types, such as www.logos.net. *See also* TCP/IP.

Domain Name Server *n. See* DNS server.

Domain Name Service *n. See* DNS (definition 2).

Domain Name System *n. See* DNS (definition 1).

Domain Naming System *n. See* DNS (definition 1).

domain slamming *n.* The practice of transferring ownership of domain names from one customer to another without the permission of the first customer.

Domino *n. See* Lotus Domino.

dongle *n.* **1.** *See* hardware key. **2.** An adapter device or cable enabling a nonstandard interface between a computer and a peripheral device or between two disparate items of computer hardware.

do-nothing instruction *n. See* no-operation instruction.

doorway page *n.* A Web page that functions as a doorway into a Web site. Usually a doorway page contains keywords, which Internet search engines seek when they scan the Internet. Placing the correct keywords on a doorway page can increase the number of viewers visiting a site.

dopant *n.* An impurity that is added in small quantities to semiconductor material during the manufacture of diodes, transistors, and integrated circuits. The resistance of a semiconductor falls between the resistance of a conductor and the resistance of an insulator (hence its name); dopants are added to the semiconductor to increase its conductivity. The type and amount of dopant determine whether the semiconductor will be N-type (in which current is conducted by free electrons) or P-type (in which current is conducted by electron vacancies, called *holes*). Common dopants include arsenic, antimony, bismuth, and phosphorus. *See also* N-type semiconductor, P-type semiconductor.

DoS *n.* Acronym for **d**enial **o**f **s**ervice attack. A computerized assault, usually planned, that seeks to disrupt Web access. A denial of service attack can occur in a number of forms. The most common form of attack is to overwhelm an Internet server with connection requests that cannot be completed. This causes the server to become so busy attempting to respond to the attack that it ignores legitimate requests for connections. One example of this type of attack, known as a SYN flood, inundates the server's entry ports with false connection messages. Another, known as the Ping of Death, sends a ping command with an oversized IP packet that causes the server to freeze, crash, or restart. Other forms of denial of service attacks include the destruction or alteration of a server's configuration data, such as router information; unauthorized access to physical components of a system; and the sending of large or invalid data that causes a system to crash or freeze. *See also* packet, Ping of Death, SYN flood.

DOS *n.* **1.** Acronym for **d**isk **o**perating **s**ystem. A generic term describing any operating system that is loaded from disk devices when the system is started or rebooted. The term originally differentiated between disk-based systems and primitive microcomputer operating systems that were memory-based or that supported only magnetic or paper tape. **2.** *See* MS-DOS.

DOS box *n.* **1.** An OS/2 process that supports the execution of MS-DOS programs. *Also called:* compatibility box. **2.** A computer that uses the MS-DOS or PC-DOS operating system, as opposed to one that runs some other operating system, such as UNIX.

DOS extender *n.* A program designed to extend the 640 KB of conventional memory available for use by DOS and DOS-based applications. A DOS extender works by claiming a portion of reserved memory (memory used by other parts of the system, such as the video adapter, the ROM BIOS, and the I/O ports).

DOS prompt *n.* The visual indication from the MS-DOS command processor that the operating system is ready to accept a new command. The default DOS prompt is a path followed by a greater-than sign (for example, C:>); the user can also design a custom prompt with the PROMPT command.

DOS Protected Mode Interface *n.* A software interface, originally developed for Microsoft Windows version 3, that enables MS-DOS-based application programs to run in the protected mode built into 80286 and later microprocessors. In protected mode, the microprocessor can support multitasking and use of memory beyond 1 MB—capabilities otherwise unavailable to programs designed to run under MS-DOS. *See also* protected mode, real mode, Virtual Control Program Interface.

dot *n.* **1.** In the UNIX, MS-DOS, OS/2, and other operating systems, the character that separates a filename from an extension as in TEXT.DOC (pronounced "text-dot-doc"). **2.** In computer graphics and printing, a small spot combined with others in a matrix of rows and columns to form a character or a graphic element in a drawing or design. The dots forming an image on the screen are called pixels. The resolution of a display or printing device is often expressed in dots per inch (dpi). Dots are not the same as spots, which are groups of dots used in the halftoning process. *See also* pixel, resolution (definition 1). *Compare* spot. **3.** In an Internet address, the character that separates the different parts of the domain name, such as

the entity name from the domain. *See also* domain (definition 3), domain name.

dot address *n.* An IP address in dotted quad form. *See also* IP address.

D

dot-addressable mode *n.* A mode of operation in which a computer program can address ("point to") individual dots on the screen or in a printed character. *See also* all points addressable.

dot-bomb *n.* An Internet-based company or organization that has failed or downsized significantly. *See also* dot-commed.

dot-com *n.* A company doing business primarily or entirely on the Internet. The term is derived from the top-level domain, .com, at the end of the Web addresses of commercial Web sites.

dot command *n.* A formatting command typed into a document and preceded by a period (dot) to distinguish it from printable text. Text formatting programs such as the XENIX nroff editor and word processing programs such as WordStar use dot commands for formatting.

dot-commed *adj.* Losing a job because of the downsizing or failure of an Internet-based company or organization. *See also* dot-bomb.

dot file *n.* A file under UNIX whose name begins with a period. Dot files do not appear in ordinary listings of the files in a directory. Dot files are often used to store program setup information for the particular user; for example, .newsrc in a user's account indicates to a newsreader which newsgroups the user subscribes to.

dot-matrix[1] *adj.* Referring to video and print hardware that forms character and graphic images as patterns of dots.

dot matrix[2] *n.* The rectangular grid, or matrix, of tiny "cells" in which dots are displayed or printed in the patterns required to form text characters, circles, squares, and other graphical images. Depending on the frame of reference, the size of a dot matrix varies from a few rows and columns to an invisible grid covering an entire display screen or printed page. *See also* dot-matrix printer, raster.

dot-matrix printer *n.* Any printer that produces characters made up of dots using a wire-pin print head. The quality of output from a dot-matrix printer depends largely on the number of dots in the matrix, which might be low enough to show individual dots or might be high enough to approach the look of fully formed characters. Dot-matrix printers are often categorized by the number of pins in the print head—typically 9, 18, or 24. *Compare* daisy-wheel printer, laser printer.

dot pitch *n.* **1.** In printers, the distance between dots in a dot-matrix. *See also* dot matrix[2]. **2.** In video displays or CRTs, a measure of image clarity. A video display's dot pitch is the vertical distance, expressed in millimeters, between like-colored pixels. A smaller dot pitch generally means a crisper image, although the difference between two displays can vary because some manufacturers use different methods to determine the dot pitch of their products. A display's dot pitch is an integral part of the product and so cannot be altered. *See also* CRT, display.

dots per inch *n.* A measure of screen and printer resolution that is expressed as the number of dots that a device can print or display per linear inch. *Acronym:* dpi.

dotted decimal notation *n.* The process of formatting an IP address as a 32-bit identifier made up of four groups of numbers, with each group separated by a period. For example, 123.432.154.12.

double buffering *n.* The use of two temporary storage areas (buffers) rather than one to hold information coming from and going to a particular input/output device. Because one buffer can be filled while the other is being emptied, double buffering increases transfer speed. *Also called:* ping-pong buffer.

double-byte characters *n.* A set of characters in which each character is represented by two bytes. Some languages, such as Japanese, Chinese, and Korean, require double-byte character sets.

double-click *vb.* To press and release a mouse button twice without moving the mouse. Double-clicking is a means of rapidly selecting and activating a program or program feature. *Compare* click, drag.

double dabble *n.* A method of converting binary numbers to decimals by a process of doubling sums and adding successive bits: doubling the bit farthest to the left, adding the next bit and doubling the sum, adding the next bit and doubling the sum, and so on until the rightmost bit has been included in the total.

Double Data Rate SDRAM *n. See* DDR SDRAM.

Double Data Rate Synchronous Dynamic RAM *n. See* DDR SDRAM.

double-density disk *n.* A disk created to hold data at twice the density (bits per inch) of a previous generation of disks. Early IBM PC floppy disks held 180 KB of

data. Double-density disks increased that capacity to 360 KB. Double-density disks use modified frequency modulation encoding for storing data. *See also* floppy disk, microfloppy disk, modified frequency modulation encoding. *Compare* high-density disk.

double-dereference *vb.* To dereference a pointer that is pointed to by another pointer; in other words, to access the information pointed to by a handle. *See also* dereference, handle (definition 1), pointer (definition 1).

double leap year *n.* The mistaken idea that the year 2000 would have two leap days—February 29 and February 30—instead of one. In actuality, there was a potential leap year problem in 2000, but it was based on three rules for calculating leap years: (1) A year is a leap year if it is divisible by 4, *but* (2) not if it is divisible by 100, *unless* (3) it is also divisible by 400. Thus, 1900 was not a leap year, but 2000 is, although systems based on incorrect algorithms may not recognize it as a leap year and so may have difficulties functioning correctly after February 28, 2000.

double posting *n.* In newsgroup discussions, the practice of replying to one's own posts. Because it may be seen as the digital equivalent to talking to one's self, double posting is considered an undesirable practice.

double-precision *adj.* Of, pertaining to, or characteristic of a number stored in twice the amount (two words—typically 8 bytes) of computer memory that is required for storing a less precise (single-precision) number. Double-precision numbers are commonly handled by a computer in floating-point form. *See also* floating-point number. *Compare* single-precision.

double-sided disk *n.* A floppy disk that can hold data on both its top and bottom surfaces.

double slash *n. See* //.

double-strike *n.* On an impact printer, such as a daisy-wheel printer, the process of printing twice over a word, producing text that appears darker and heavier, or bolder, than it normally appears. On dot-matrix printers, double striking with a slight offset can be used to fill in the space between the dots, producing smoother and darker characters.

double supertwist nematic display *n. See* supertwist display.

double word *n.* A unit of data consisting of two contiguous words (connected bytes, not text) that are handled together by a computer's microprocessor.

doubly linked list *n.* A series of nodes (items representing discrete segments of information) in which each node refers to both the next node and the preceding node. Because of these two-way references, a doubly linked list can be traversed both forward and backward, rather than in a forward direction only, as with a singly linked list.

down *adj.* Not functioning, in reference to computers, printers, communications lines on networks, and other such hardware.

downflow *n.* One of the four stages of the data warehousing process, during which stored information is delivered and archived. *See also* data warehouse[2]. *Compare* inflow, metaflow, upflow.

downlink *n.* The transmission of data from a communications satellite to an earth station.

download *vb.* **1.** In communications, to transfer a copy of a file from a remote computer to the requesting computer by means of a modem or network. **2.** To send a block of data, such as a PostScript file, to a dependent device, such as a PostScript printer. *Compare* upload.

downloadable font *n.* A set of characters stored on disk and sent (downloaded) to a printer's memory when needed for printing a document. Downloadable fonts are most commonly used with laser printers and other page printers, although many dot-matrix printers can accept some of them. *Also called:* soft font.

Downloadable Sounds *n.* A standard for synthesizing wave sounds from digital samples stored in software. The DLS level 1 and level 2 standards are published by the MIDI Manufacturers Association. *Acronym:* DLS.

downsample *n.* To decrease the number of audio samples or pixels, by applying an operation such as averaging. Popular internet music formats, such as MP3, use downsampling to reduce file size.

downsizing *n.* In computing, the practice of moving from larger computer systems, such as mainframes and minicomputers, to smaller systems in an organization, generally to save costs and to update to newer software. The smaller systems are usually client/server systems composed of a combination of PCs, workstations, and some legacy system such as a mainframe, connected in one or more local area networks or wide area networks. *See also* client/server architecture, legacy system.

downstream[1] *n.* The direction in which information, such as a news feed for a newsgroup or data from an http

(Web) server, is passed from one server to the next. *See also* news feed, newsgroup, server.

downstream[2] *adv.* **1.** The location of a client computer in relation to a server. **2.** The direction in which data moves from the server to the client.

downstream[3] *adj.* Refers to data that moves *from* a remote network *to* an individual computer. In some Internet-related communications technologies, data flows more quickly downstream than upstream; cable modems, for example, can transfer data as fast as 30 Mbps downstream but support much slower rates, from 128 Kbps to around 2 Mbps, upstream. *Compare* upstream.

downtime *n.* The amount or percentage of time a computer system or associated hardware remains nonfunctional. Although downtime can occur because hardware fails unexpectedly, it can also be a scheduled event, as when a network is shut down to allow time for maintenance.

downward compatibility *n.* The capability of source code or programs developed on a more advanced system or compiler version to be executed or compiled by a less advanced (older) version. *Compare* upward-compatible.

DP *n. See* data processing.

dpi *n. See* dots per inch.

DPMA *n.* Acronym for **D**ata **P**rocessing **M**anagement **A**ssociation. A trade organization of information systems (IS) professionals. DPMA was founded in 1951 as the National Machine Accountants Association.

DPMI *n. See* DOS Protected Mode Interface.

DPMS *n.* Acronym for VESA **D**isplay **P**ower **M**anagement **S**ignaling. A VESA standard for signals that put a video monitor into "standby" or suspend mode to reduce power consumption. *See also* green PC, VESA[2].

DPOF *n.* Short for **D**igital **P**rint **O**rder **F**ormat. A printing specification developed by Canon Computer Systems, Inc., Eastman Kodak Company, Fuji Photo Film Co., Ltd., and Matsushita Electric Industrial Co., Ltd. DPOF is intended to ease the process of printing images stored on digital camera memory cards by enabling users to select the images to print, as well as specify the number of copies desired, on the card. The images ordered can then be printed by a professional photofinishing service or on a home printer.

DPSK *n.* Acronym for **d**ifferential **p**hase-**s**hift **k**eying. *See* phase-shift keying.

draft mode *n.* A high-speed, relatively low-quality print mode offered by most dot-matrix printers. *See also* dot-matrix printer, draft quality, print quality.

draft quality *n.* A low grade of printing generated by the draft mode on dot-matrix printers. Draft quality varies among printers, ranging from suitable for most purposes to nearly useless. *See also* draft mode, print quality.

drag *vb.* In graphical user interface environments, to move an image or a window from one place on the screen to another by "grabbing" it and pulling it to its new location using the mouse. The mouse pointer is positioned over the object, and the mouse button is pressed and held while the mouse is moved to the new location.

drag-and-drop *vb.* **1.** In general, to delve into something in increasing detail. **2.** More specifically, to perform operations in a graphical user interface by dragging objects on the screen with the mouse. For example, to delete a document, a user can drag the document icon across the screen and drop it on the trashcan icon (Macintosh OS) or in the Recycle Bin (Windows). *See also* drag, graphical user interface.

drain *n.* **1.** In an FET, the electrode toward which charge carriers (electrons or holes) move from the source under control of the gate. *See also* FET, gate (definition 2), MOSFET, source (definition 2). **2.** *See* current drain.

DRAM *n. See* dynamic RAM.

DRAW *n.* Acronym for **d**irect **r**ead **a**fter **w**rite. A technique used with optical discs to verify the accuracy of information immediately after it has been recorded (written) on the disc. *Compare* DRDW.

drawer *n.* In the Mac OS X Aqua interface, small child windows containing extra information that slide out of the side of main parent windows. Drawers are intended to reduce clutter on the computer desktop by enabling more information to be displayed without opening additional full-sized windows. *Also called:* Drop Drawer.

drawing interchange format *n. See* DXF.

drawing program *n.* A program for manipulating object-oriented graphics, as opposed to manipulating pixel images. In a drawing program, for example, the user can manipulate an element, such as a line, a circle, or a block of text, as an independent object simply by selecting the object and moving it. *See also* object-oriented graphics, pixel image, vector graphics.

DRDW *n.* Acronym for **d**irect **r**ead **d**uring **w**rite. A technique used with optical discs to verify the accuracy of information at the time it is being recorded on the disc. *Compare* DRAW.

Dreamcast *n.* A console game system designed by the Sega corporation. It features a Hitachi 128-bit graphics engine with an on-board SH-4 RISC processor (operating frequency of 200 MHz 360 MIPS/1.4 GFLOPS) and a customized OS using Windows CE as its base (supporting DirectX). Game developers for the Dreamcast platform use an environment supported by Microsoft Visual Studio and refined Visual C++. *See also* computer game, console game, DirectX, gigaflops, MIPS, OS, RISC, Visual C++. *Compare* GameCube, PlayStation, Xbox.

dribbleware *n.* Updates, patches, and new drivers for a software product that are released one at a time, as they become available, rather than being issued together in a new version of the product. A company using the dribbleware technique might distribute new and replacement files on diskette or CD-ROM, or make them available for download through the Internet or a private network. *See also* driver, patch[1].

drift *n.* The movement of charge carriers in a semiconductor caused by an applied voltage. The term is also used to refer to any slow, unwanted change in a parameter; for example, the value of a resistor might change, or drift, slightly as the resistor warms or cools.

drill down *vb.* To start at a top-level menu, directory, or Web page and pass through several intermediate menus, directories, or linked pages, until the file, page, menu command, or other item being sought is reached. Drilling down is common practice in searching for files or information on the Internet, where high-level Gopher menus and World Wide Web pages are frequently very general and become more specific at each lower level. *See also* Gopher, menu, Web page.

drive *n. See* disk drive.

drive bay *n.* A hollow, rectangular area in a computer chassis designed to hold a disk drive. A drive bay always has side walls, usually made of metal, that generally contain holes to facilitate installation of a disk drive. Some drive bays, such as those intended to hold hard disks, are not visible to the user. Most drives are located on the front of the chassis so that the user can interact with the drive.

drive letter *n.* The naming convention for disk drives on IBM and compatible computers. Drives are named by letter, beginning with A, followed by a colon.

drive mapping *n.* The assignment of a letter or name to a disk drive so that the operating system or network server can identify and locate it. For example, in PCs, the primary drive mappings are A: and B: for floppy disk drives and C: for the hard disk. *See also* A:, disk drive, hard disk.

drive number *n.* The naming convention for Macintosh disk drives. For example, a two-drive system calls its drives 0 and 1.

driver *n.* A hardware device or a program that controls or regulates another device. A line driver, for example, boosts signals transmitted over a communications line. A software driver is a device-specific control program that enables a computer to work with a particular device, such as a printer or a disk drive. Because the driver handles device-specific features, the operating system is freed from the burden of having to understand—and support—the needs of individual hardware devices. *See also* device driver.

Driver Development Kit *n. See* DDK.

DRM *n.* Acronym for **D**igital **R**ights **M**anagement. A group of technologies developed to protect intellectual property from online piracy by controlling who can view protected content and in what form. A DRM package may allow the purchaser to view protected content, but prevent printing or forwarding. Content may also be set to expire after a set amount of time or if distributed to multiple users. DRM technology is meant to protect multiple forms of digital and analog content, and includes encryption, digital watermarking, and content tracking software.

DRO *n.* Acronym for **d**estructive **r**ead **o**ut. *See* destructive read.

drop cable *n.* A cable, also known as a transceiver cable, that is used to connect a network interface card (NIC) to a Thick Ethernet network.

drop cap *n.* A large capital letter at the beginning of a text block that occupies the vertical depth of two or more lines of regular text. See the illustration.

Asectetuer adipsicing elite in sed utm diam nonummy nibh wisi tincidunt eusismond ut laoreet dolore

Drop cap.

drop-dead halt *n. See* dead halt.

drop-down menu *n.* A menu that drops from the menu bar when requested and remains open without further action until the user closes it or chooses a menu item. *Compare* pull-down menu.

D

drop in *vb.* To read a spurious signal during a data read/write operation, producing erroneous data.

droplet *n.* **1.** An extension for Quark XPress that allows files to be dragged onto a page from the finder. **2.** A feature from Frontier that allows scripts to be embedded within an application and run when the application is double-clicked. **3.** A general name for any AppleScript program that allows files to be dragged and dropped into it for processing. *See also* AppleScript.

drop out *vb.* To lose the signal momentarily during a data read/write operation, thus producing erroneous data.

drum *n.* A rotating cylinder used with some printers and plotters and (in the early days of mainframe computing) as a magnetic storage medium for data. In laser printers, a rotating drum is coated with a photoelectric material that retains a charge when struck by a laser beam. The electrically charged spots on the drum then attract toner particles that the drum transfers to the paper as the paper passes by.

drum plotter *n.* A plotter in which paper is wrapped around a large revolving drum, with a pen that moves back and forth at the uppermost point on the drum. The paper is rolled with the drum to align the correct point on the paper with the pen. Drums take up a fraction of the space required by flatbed plotters that can handle the same paper size. They also effectively have no limit on the length of the paper they can handle, which can be an advantage in some applications. *See also* plotter. *Compare* flatbed plotter, pinch-roller plotter.

drum scanner *n.* A type of scanner where the medium being scanned, such as a sheet of paper, is rotated around a stationary scan head. *See also* scanner. *Compare* feed scanner, flatbed scanner, handheld scanner.

.drv *n.* The file extension for a driver file. *See also* driver.

dry run *n.* Running a program intended to have a dramatic effect, such as formatting a disk or printing a book, with the effect disabled, thus avoiding formatting a disk with data on it or wasting paper.

DS *n.* Acronym for **D**igital **S**ervices or **D**igital **S**ignal, a category used in referencing the speed, number of channels, and transmission characteristics of T1, T2, T3, and T4 communications lines. The basic DS unit, or level, is known as DS-0, which corresponds to the 64 Kbps speed of a single T1 channel. Higher levels are made up of multiple DS-0 levels. DS-1 represents a single T1 line that transmits at 1.544 Mbps. For higher rates, T1 lines are multiplexed to create DS-2 (a T2 line consisting of four T1 channels that transmits at 6.312 Mbps), DS-3 (a T3 line consisting of 28 T1 channels that transmits at 44.736 Mbps), and DS-4 (a T4 line consisting of 168 T1 channels that transmits at 274.176 Mbps).

DSA *n.* **1.** Acronym for **D**irectory **S**ystem **A**gent or **D**irectory **S**erver **A**gent. An X.500 server program that looks up the address of a user on the network when requested by a DUA (Directory User Agent). *See also* agent (definition 3), CCITT X series, DUA. **2.** *See* Digital Signature Algorithm.

DSL *n.* Acronym for **D**igital **S**ubscriber **L**ine, a recently developed (late 1990s) digital communications technology that can provide high-speed transmissions over standard copper telephone wiring. DSL is often referred to as xDSL, where the *x* stands for one or two characters that define variations of the basic DSL technology. Currently, ADSL (Asymmetric DSL) is the form most likely to be provided, but even it is, as yet, available only to limited groups of subscribers. *See also* ADSL, DSL Lite, HDSL, RADSL, SDSL, VDSL.

DSLAM *n.* Acronym for **D**igital **S**ubscriber **L**ine **A**ccess **M**ultiplexer. A device in a telephone company central office that splits DSL subscriber lines and connects them to Internet network hosts and to the public telephone network. The use of a DSLAM makes it possible to provide both voice and data service through a single pair of copper wires.

DSL Lite *n.* Short for **D**igital **S**ubscriber **L**ine **Lite**. A variation of ADSL currently under development that simplifies installation but transmits more slowly, at 1.544 Mbps. *See also* ADSL, DSL.

DSO *n.* Acronym for **D**ynamic **S**hared **O**bject. An Apache HTTP server module that supports all UNIX-based platforms. DSO uses a dynamically linked shared library of resources that are loaded and executed only at run time when necessary. DSO is most commonly used with Linux and is included in most Linux distributions.

DSOM *n. See* Distributed System Object Model.

DSP *n. See* digital signal processor.

DSR *n.* Acronym for **D**ata **S**et **R**eady. A signal used in serial communications sent, for example, by a modem to the computer to which it is attached, to indicate that it is

ready to operate. DSR is a hardware signal sent over line 6 in RS-232-C connections. *See also* RS-232-C standard. *Compare* CTS.

DSS *n. See* decision support system, digital satellite system, Digital Signature Standard.

DSSSL *n. See* Document Style Semantics and Specification Language.

DSTN display *n.* Acronym for **d**ouble **s**upertwist **n**ematic **display**. *See* supertwist display.

DSU *n. See* DDS.

DSVD *n. See* Digital Simultaneous Voice and Data.

DTD *n.* Acronym for **d**ocument **t**ype **d**efinition. A separate document that contains formal definitions of all of the data elements in a particular type of HTML, SGML, or XML document, such as a report or a book. By consulting the DTD for a document, a program called a parser can work with the markup codes that the document contains. *See also* HTML, SGML.

DTE *n.* Acronym for **D**ata **T**erminal **E**quipment. In the RS-232-C and X.25 specifications, a device, such as a PC, that has the ability to transmit information in digital form over a cable or a communications line to a mediating device (known as the DCE). *See also* RS-232-C standard. *Compare* DCE (definition 1).

DTL *n. See* diode-transistor logic.

DTMF *n.* Acronym for **D**ual **T**one **M**ultiple **F**requency. *See* touch tone dialing.

DTP *n. See* desktop publishing, distributed transaction processing.

DTR *n.* Acronym for **D**ata **T**erminal **R**eady. A signal used in serial communications sent, for example, by a computer to its modem to indicate that the computer is ready to accept an incoming transmission. *See also* RS-232-C standard.

DTV *n.* Acronym for **d**esk **t**op **v**ideo. The use of digital cameras over a network for video conferencing. *See also* video conferencing.

DUA *n.* Acronym for **D**irectory **U**ser **A**gent. An X.500 client program that sends a request to a DSA for the address of a user on the network. *Also called:* DCA, Directory Client Agent. *See also* agent (definition 3), DSA.

dual attachment station *n.* An FDDI node with two connections to the network—either through a node and a concentrator or through two concentrators. *Compare* single attachment station.

dual-band phone *n.* Wireless phone that broadcasts and receives signals on both 800-MHz (digital cellular) and 1900-MHz (personal communications service, or PCS) networks.

dual boot *n.* A computer configuration in which two different operating systems are installed and either can be loaded at start-up. A user might set up a dual boot system to take advantage of specific applications and functions in each operating system. A dual boot system might also be set up with each operating system in a different language. A dual boot system is not limited to only two operating systems, and when more than two are installed, it may be called a multi-boot system. *See also* boot[1].

dual channel controller *n.* A circuit or device that governs signal access to two pathways.

dual density *adj.* Of, pertaining to, or characteristic of floppy disk drives that can read from and write to disks in more than one density format.

dual disk drive *n.* A computer that has two floppy disk drives.

dual homing *n.* A form of fault tolerance used with critical network devices on FDDI networks, in which such devices are attached to both the primary and secondary (backup) rings through two concentrators to provide the maximum possible security in case the primary ring fails.

dual inline memory module *n. See* DIMM.

dual inline package or **dual in-line package** *n. See* DIP.

dual-mode phone *n.* Wireless phone that broadcasts and receives signals on both analog and digital networks. Dual-mode phones allow wireless phone users with digital service to send and receive calls on analog networks in areas where wireless carriers do not provide digital service.

dual processors *n.* Two processors used in a computer to speed its operation—one processor to control memory and the bus, and another to manage input/output. Many personal computers use a second processor to perform floating-point mathematical operations. *See also* coprocessor, floating-point notation.

dual-ring topology *n.* A token-passing ring topology implemented in FDDI networks that consists of two rings in which information travels in opposite directions. One

ring, the primary ring, carries information; the second ring is used for backup. *See also* FDDI.

dual-scan display *n.* A passive matrix LCD-type display used in laptop computers. The screen refresh rate is twice as fast in dual-scan displays as in standard passive matrix displays. Compared with active matrix displays, dual-scan displays are more economical in terms of power consumption but have less clarity and a smaller viewing angle. *See also* passive matrix display.

dual-sided disk drive *n.* A disk drive that can read or write information to both the top and bottom sides of a double-sided disk. Dual-sided disk drives have two read/write heads, one for each disk surface.

Dual Tone Multiple Frequency *n. See* touch tone dialing.

DUB *n. See* dial-up boot loader.

dumb quotes *n.* Quotation marks that have the same appearance (usually upright like the apostrophe ' and quotation marks " on a typewriter) whether they stand before or after the material being quoted. *Compare* smart quotes.

dumb terminal *n.* A terminal that does not contain an internal microprocessor. Dumb terminals are typically capable of displaying only characters and numbers and responding to simple control codes. *Compare* smart terminal.

dummy *n.* A placeholder, usually a character, a record, or a variable, that is used to reserve space until the intended item is available. *See also* stub.

dummy argument *n.* In programming, an argument that does not convey any information into or out of the called routine and is usually used to hold a place for an argument that will be used in a future revision of the routine. *See also* argument.

dummy instruction *n. See* no-operation instruction.

dummy module *n.* A module, or group of routines, that performs no function but will do so in some future revision—essentially, a collection of dummy routines. *See also* dummy routine.

dummy routine *n.* A routine that performs no action but that can be rewritten to do so at some future time. Top-down program development usually involves the creation of dummy routines that are turned into functional routines as development proceeds. *Also called:* stub. *See also* dummy argument, dummy module, top-down programming.

DUN *n. See* dial-up networking.

duplex[1] *adj.* Capable of carrying information in both directions over a communications channel. A system is full-duplex if it can carry information in both directions at once; it is half-duplex if it can carry information in only one direction at a time.

duplex[2] *n.* **1.** Simultaneous communications, in both directions, between the sender and receiver. *Also called:* duplex transmission, full-duplex transmission. *See also* half-duplex transmission. **2.** Photographic paper on which an image can be printed on both sides.

duplex channel *n.* A communications link that allows for duplex (two-way) transmission.

duplex printer *n.* A printer capable of printing on both sides of the page.

duplex system *n.* A system of two computers, one of which is active while the other remains on standby, ready to take over processing if the active machine malfunctions.

duplex transmission *n. See* duplex[2] (definition 1).

duplicate key *n.* A value assigned to an indexed field in one record in a database that duplicates a value assigned to the same field in another record in the database. For example, a key (or index) composed of ZIP-CODE would necessarily contain duplicate values if the file contained a number of addresses from a single ZIP Code. A field in which duplicate values are permitted cannot serve as a primary key because the primary key must be unique, but it can serve as a component of a composite primary key. *See also* field (definition 1), key (definition 2), primary key.

duplication check *n.* **1.** A survey made to determine whether duplicate records or keys exist in a file. *See also* key. **2.** The use of separate independent calculations to establish the accuracy of a result.

DV *n. See* digital video.

DVD *n. See* digital video disc.

DVD decoder *n.* A hardware or software component that allows a digital video disc (DVD) drive to display movies on your computer screen. *See also* digital video disc.

DVD-E *n. See* digital video disc–erasable.

DVD-R *n. See* digital video disc–recordable.

DVD-ROM *n. See* digital video disc–ROM.

DVI *n.* Acronym for **D**igital **V**ideo **I**nterface. A hardware-based compression/decompression technique for storing

full-motion video, audio, graphics, and other data on a computer or on a CD-ROM. DVI technology was developed by RCA in 1987 and acquired by Intel in 1988. Intel has since developed a software version of DVI, called Indeo. *Also called:* digital video–interactive.

DV-I *n. See* digital video–interactive.

DVMRP *n. See* Distance Vector Multicast Routing Protocol.

Dvorak keyboard *n.* A keyboard layout developed by August Dvorak and William L. Dealey in 1936 as an alternative to the overwhelmingly popular QWERTY keyboard. The Dvorak keyboard was designed to speed typing by placing the characters on the keyboard for easiest access to the most frequently typed letters. In addition, pairs of letters that often occur sequentially were separated so that the hands could alternate typing them. See the illustration. *See also* ergonomic keyboard, keyboard. *Compare* QWERTY keyboard.

Dvorak keyboard.

DVR *n.* Acronym for **D**igital **V**ideo **R**ecording. Technology allowing broadcast television programming to be digitized and played back immediately. Television signals are routed through a hard drive, converted to a digital format and displayed in real-time or, at the viewer's option, on a delayed basis. DVR technology can be used like a VCR to record favorite programs in advance, with the user picking the programs to be recorded from an online programming guide. DVR capabilities can also be added to products that have related digital technologies and components, such as set-top boxes and digital TV converters.

DVST *n. See* direct view storage tube.

DWDM *n. See* dense wavelength division multiplexing.

DXF *n.* Short for **d**rawing interchange **f**ormat. A computer-aided design file format originally developed by Autodesk; for use with the AutoCAD program to facilitate transfer of graphics files between different applications

dyadic *adj.* Of, pertaining to, or characteristic of a pair—for example, a dyadic processor, which contains two processors controlled by the same operating system. The term is usually limited to describing a system with two microprocessors. Dyadic Boolean operations are those such as AND and OR in which the outcome depends on both values. *See also* Boolean algebra, operand. *Compare* unary.

dye-diffusion printer *n. See* continuous-tone printer.

dye-polymer recording *n.* A recording technology used with optical discs in which dye embedded in a plastic polymer coating on an optical disc is used to create minute bumps on the surface that can be read by a laser. Dye-polymer bumps can be flattened and re-created, thus making an optical disc rewritable.

dye-sublimation printer *n. See* continuous-tone printer.

Dylan *n.* Short for **Dy**namic **Lan**guage. An object-oriented programming language developed by Apple Computer in the mid-1990s for application and systems development. It includes garbage collection, type-safety, error recovery, a module system, and programmer control over runtime extensibility of programs.

dynalink *n.* Short for **dyn**amic **link.** *See* dynamic-link library.

Dynaload drivers *n.* Device drivers that are supported by Dynaload. Dynaload is a command that can be run from a DOS prompt under IBM's PC DOS 7 and will load compliant device drivers without modification of the CONFIG.SYS file. *See also* CONFIG.SYS.

dynamic *adj.* Occurring immediately and concurrently. The term is used in describing both hardware and software; in both cases it describes some action or event that occurs when and as needed. In dynamic memory management, a program is able to negotiate with the operating system when it needs more memory.

dynamic address translation *n.* On-the-fly conversion of memory-location references from relative addresses (such as "three units from the beginning of X") to absolute addresses (such as "location number 123") when a program is run. *Acronym:* DAT.

D

dynamic allocation *n.* The allocation of memory during program execution according to current needs. Dynamic allocation almost always implies that dynamic deallocation is possible too, so data structures can be created and destroyed as required. *See also* allocate, deallocate. *Compare* static allocation.

dynamic binding *n.* Binding (converting symbolic addresses in the program to storage-related addresses) that occurs during program execution. The term often refers to object-oriented applications that determine, during run time, which software routines to call for particular data objects. *Also called:* late binding. *Compare* static binding.

dynamic caching *n.* A technique for storing recently used data in memory where cache size is based on how much memory is available rather than how much memory is assigned to the application currently running.

Dynamic Data Exchange *n. See* DDE.

dynamic dump *n.* A listing, either stored on disk or sent to a printer, of memory contents generated at the time of a break in the execution of a program—a useful tool for programmers interested in knowing what is happening at a certain point in the execution of a program.

Dynamic Host Configuration Protocol *n. See* DHCP.

dynamic HTML *n.* A technology designed to add richness, interactivity, and graphical interest to Web pages by providing those pages with the ability to change and update themselves dynamically—that is, in response to user actions, without the need for repeated downloads from a server. This is done by enabling the interaction of HTML, cascading style sheets (CSS), and JavaScript. Examples of dynamic HTML actions include moving graphics on the page and displaying information, such as menus or tables, in response to mouse movements or clicks. Interoperability is governed by the World Wide Web Consortium (W3C) Document Object Model (DOM) specification, a platform- and language-neutral interface to ensure that programs and scripts can dynamically access and update the content, structure, and style of documents. *Acronym:* DHTML.

dynamic keys *n.* An encryption technique in which messages are encrypted differently for each transmission based on different keys so that if a key is captured and decrypted, it would never be useful again. *See also* encryption, key (definition 3).

dynamic-link library *n.* A feature of the Microsoft Windows family of operating systems and OS/2 that allows executable routines to be stored separately as files with DLL extensions and to be loaded only when needed by a program. A dynamic-link library has several advantages. First, it does not consume any memory until it is used. Second, because a dynamic-link library is a separate file, a programmer can make corrections or improvements to only that module without affecting the operation of the calling program or any other dynamic-link library. Finally, a programmer can use the same dynamic-link library with other programs. *Acronym:* DLL.

dynamic memory allocation *n.* The allocation of memory to a process or program at run time. Dynamic memory is allocated from the system heap by the operating system upon request from the program.

dynamic page *n.* An HTML document that contains animated GIFs, Java applets, or ActiveX controls. *See also* ActiveX control, GIF, HTML, Java applet.

dynamic RAM *n.* A form of semiconductor random access memory (RAM). Dynamic RAM stores information in integrated circuits containing capacitors. Because capacitors lose their charge over time, dynamic RAM boards must include logic to refresh (recharge) the RAM chips continuously. While a dynamic RAM is being refreshed, it cannot be read by the processor; if the processor must read the RAM while it is being refreshed, one or more wait states occur. Despite being slower, dynamic RAM is more commonly used than RAM because its circuitry is simpler and because it can hold up to four times as much data. *Acronym:* DRAM. *See also* RAM. *Compare* static RAM.

dynamic random access memory *n. See* dynamic RAM.

dynamic relocation *n.* The relocation in memory of data or of the code of a currently running program by an internal system routine. Dynamic relocation helps a computer use memory efficiently.

dynamic routing *n.* Routing that adjusts automatically to the current conditions of a network. Dynamic routing typically uses one of several dynamic-routing protocols such as Routing Information Protocol (RIP) and Border Gateway Protocol (BGP). *Compare* static routing.

dynamic scheduling *n.* The management of concurrently running processes (programs), usually by the operating system.

Dynamic Shared Object *n. See* DSO.

dynamic SLIP *n.* Short for **dynamic S**erial **L**ine **I**nternet **P**rotocol. Internet access under SLIP in which the user's IP address is not permanent but is reassigned from a pool each time the user connects. The number of IP addresses an Internet service provider needs to offer is reduced to the number of connections that can be in use at once, rather than the total number of subscribers. *See also* IP address, ISP, SLIP. *Compare* DHCP.

dynamic storage *n.* **1.** Information storage systems whose contents will be lost if power is removed from the system. RAM (random access memory) systems are the most common form of dynamic storage, and both dynamic RAM (DRAM) and static RAM (SRAM) are considered forms of dynamic storage. *See also* dynamic RAM, static RAM. *Compare* permanent storage. **2.** In programming, blocks of memory that can be allocated, deallocated, or freely changed in size.

dynamic Web page *n.* A Web page that has fixed form but variable content, allowing it to be tailored to a customer's search criteria.

E

E

e *n.* The symbol for the base of the natural logarithm 2.71828. Introduced by Leonhard Euler in the mid-eighteenth century, *e* is a fundamental mathematical constant used in calculus, science, engineering, and programming languages, as in logarithmic and exponential functions in C and Basic.

e- *prefix* Short for **e**lectronic. A prefix indicating that a word refers to the computer-based version of some traditionally nonelectronic term, as e-mail, e-commerce, and e-money.

E- *prefix* *See* exa-.

E3 *n.* Acronym for **E**lectronic **E**ntertainment **E**xpo. A major convention where game industry developers, manufacturers, and publishers demonstrate their latest wares.

EAI *n.* Acronym for **E**nterprise **A**pplication **I**ntegration. The process of coordinating the operation of the various programs, databases, and existing technologies of a business or enterprise so that they function as an efficient, business-wide system.

early binding *n.* *See* static binding.

EAROM *n.* Acronym for **e**lectrically **a**lterable **r**ead-**o**nly **m**emory. *See* EEPROM.

Easter egg *n.* A hidden feature of a computer program. It may be a hidden command, an animation, a humorous message, or a list of credits for the people who developed the program. In order to display an Easter egg, a user often must enter an obscure series of keystrokes.

eavesdropper *n.* *See* lurker.

EBCDIC *n.* Acronym for **E**xtended **B**inary **C**oded **D**ecimal **I**nterchange **C**ode. An IBM code that uses 8 bits to represent 256 possible characters, including text, numbers, punctuation marks, and transmission control characters. It is used primarily in IBM mainframes and minicomputers. *Compare* ASCII.

e-bomb *n.* Short for **e**-mail **bomb**. A technique used by some hackers in which a target is put on a large number of mailing lists so that network traffic and storage are tied up by e-mail sent by other mailing list subscribers to the lists' recipients.

e-book *n.* Format allowing books and other large texts to be downloaded from a Web site and viewed digitally. Typically, reading an e-book requires using a small computer appliance that is about the size of a paperback book and consists of a display screen and basic controls. Users can bookmark, highlight, or annotate text, but rights management features may prevent users from e-mailing, printing, or otherwise sharing e-book contents. *Also called:* electronic book.

e-cash *n.* *See* e-money.

ECC *n.* *See* error-correction coding.

echo[1] *n.* In communications, a signal transmitted back to the sender that is distinct from the original signal. Network connections can be tested by sending an echo back to the main computer.

echo[2] *vb.* To transmit a received signal back to the sender. Computer programs, such as MS-DOS and OS/2, can be commanded to echo input by displaying data on the screen as it is received from the keyboard. Data communications circuits may echo text back to the originating terminal to confirm that it has been received.

echo cancellation *n.* A technique for eliminating unwanted incoming transmissions in a modem that are echoes of the modem's own transmission. The modem sends a modified, reversed version of its transmission on its receiving path, thus erasing echoes while leaving incoming data intact. Echo cancellation is standard in V.32 modems.

echo check *n.* In communications, a method for verifying the accuracy of transmitted data by retransmitting it to the sender, which compares the echoed signal with the original.

echo loop attack *n.* A form of denial of service (DoS) attack in which a connection is established between User Datagram Protocol (UDP) services on two or more host machines that bounce an increasing volume of packets back and forth. The echo loop attack ties up the host machines and causes network congestion.

echoplex *n.* In communications, a technique for error detection. The receiving station retransmits data back to the sender's screen, where it can be displayed visually to check for accuracy.

echo suppressor *n.* In communications, a method for preventing echoes in telephone lines. Echo suppressors inhibit signals from the listener to the speaker, creating a one-way channel. For modems that send and receive on the same frequency, the echo suppressor must be disabled to allow two-way transmission. This disabling produces the high-pitched tone heard in modem-to-modem connections.

ECL *n. See* emitter-coupled logic.

ECMA *n.* Acronym for **E**uropean **C**omputer **M**anufacturers **A**ssociation. An organization based in Geneva, Switzerland, whose American counterpart is CBEMA (Computer and Business Equipment Manufacturers Association). Its standard, ECMA-101, is used for transmitting formatted text and graphical images while retaining their original formatting.

ECMAScript *n.* A standardized, object-oriented scripting language specification defined by the European Computer Manufacturers Association (ECMA) 262 specification. This language was originally designed to perform computations and manipulate objects within a Web environment. Microsoft implements ECMAScript as JScript, and Netscape implements ECMAScript as JavaScript.

ECML *n. See* Electronic Commerce Modeling Language.

e-commerce *n.* Short for **e**lectronic **commerce**. Commercial activity that takes place by means of computers connected through a network. Electronic commerce can occur between a user and a vendor through the Internet, an online information service, or a bulletin board system (BBS), or between vendor and customer computers through electronic data interchange (EDI). *Also called:* e-tail. *See also* EDI.

ECP *n.* Acronym for **E**nhanced **C**apabilities **P**ort. A protocol, developed by Microsoft and Hewlett Packard, for bidirectional, high-speed communication between a computer and a printer or scanner. ECP is part of the IEEE 1284 standard, which specifies enhanced parallel ports that are compatible with the older, de facto standard Centronics parallel ports. *See also* EPP, IEEE 1284.

e-credit *n. See* electronic credit.

e-currency *n. See* e-money.

edge *n.* **1.** In graphics, a border joining two polygons. **2.** In data structures, a link between two nodes on a tree or graph. *See also* graph, node (definition 3), tree.

EDGE *n.* Acronym for **E**nhanced **D**ata Rates for **G**lobal **E**volution or **E**nhanced **D**ata Rates for **G**SM and TDMA **E**volution. A third-generation enhancement to the Global System for Mobile Communications (GSM) wireless service, which allows data, multimedia services, and applications to be delivered on broadband at rates up to 384 Kbps.

edge connector *n.* The set of wide, flat, metallic contacts on an expansion board that is inserted into a personal computer's expansion slot or a ribbon cable's connector. It connects the board with the system's shared data pathway, or bus, by means of a series of printed lines that connect to the circuits on the board. The number and pattern of lines differ with the various types of connectors. *See also* expansion board, ribbon cable.

EDI *n.* Acronym for **E**lectronic **D**ata **I**nterchange. A standard for exchanging bundles of data between two companies via telephone lines or the Internet. EDI transmits much larger bundles of data than can be transmitted via e-mail. For EDI to be effective, users must agree on certain standards for formatting and exchanging information, such as the X.400 protocol. *See also* CCITT X series, standard (definition 1).

edit[1] *n.* A change made to a file or a document.

edit[2] *vb.* **1.** To make a change to an existing file or document. Changes to the existing document are saved in memory or in a temporary file but are not added to the document until the program is instructed to save them. Editing programs typically provide safeguards against inadvertent changes, such as by requesting confirmation before saving under an existing filename, by allowing the user to assign a password to a file, or by giving the option of setting the file to read-only status. **2.** To run software that makes extensive, predictable changes to a file automatically, such as a linker or a filter for graphics.

editing keys *n.* A set of keys on some keyboards that assists in editing. Located between the main keyboard and the numeric keypad, editing keys consist of three pairs: Insert and Delete, Home and End, and Page Up and Page Down.

edit key *n.* In a software application, a predefined key or combination of keys that, when pressed, causes the application to enter edit mode.

edit mode *n.* The mode of a program in which a user can make changes to a document, as by inserting or deleting data or text. *Compare* command mode.

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editor *n.* A program that creates files or makes changes to existing files. An editor is usually less powerful than a word processor, lacking the latter's capability for text formatting, such as use of italics. Text or full-screen editors allow the user to move through the document using direction arrows. In contrast, line editors require the user to indicate the line number on which text is to be edited. *See also* Edlin.

Edlin *n.* An outdated line-by-line text editor used in MS-DOS through version 5. Its OS/2 counterpart is SSE. *See also* editor.

EDMS *n.* Acronym for **e**lectronic **d**ocument **m**anagement **s**ystem. *See* document management system.

EDO DRAM *n.* Acronym for **e**xtended **d**ata **o**ut **d**ynamic **r**andom **a**ccess **m**emory. A type of memory that allows for faster read times than DRAM of comparable speed by allowing a new read cycle to begin while data is being read from a previous cycle. This allows for faster overall system performance. *Compare* dynamic RAM, EDO RAM.

EDO RAM *n.* Acronym for **e**xtended **d**ata **o**ut **r**andom **a**ccess **m**emory. A type of dynamic RAM that keeps data available for the CPU while the next memory access is being initialized, resulting in increased speed. Pentium-class computers using Intel's Triton chip set are designed to take advantage of EDO RAM. *See also* central processing unit, dynamic RAM. *Compare* EDO DRAM.

EDP *n.* **1.** Acronym for **e**lectronic **d**ata **p**rocessing. *See* data processing. **2.** Acronym for **E**nhanced **C**apabilities **P**ort. A protocol, developed by Microsoft and Hewlett Packard, for bidirectional, high-speed communication between a computer and a printer or scanner. ECP is part of the IEEE 1284 standard, which specifies enhanced parallel ports that are compatible with the older, de facto standard Centronics parallel ports. *See also* EPP, IEEE 1284.

.edu *n.* In the Internet's Domain Name System, the top-level domain that identifies addresses operated by four-year, degreed educational institutions. The domain name .edu appears as a suffix at the end of the address. In the United States, schools that offer kindergarten through high school classes use the top-level domain of .k12.us or just .us. *See also* DNS (definition 1), domain (definition 3), .k12.us, .us. *Compare* .com, .gov, .mil, .net, .org.

edutainment *n.* Multimedia content in software, on CD-ROM, or on a Web site that purports to educate the user as well as entertain. *See also* multimedia.

EEMS *n.* Acronym for **E**nhanced **E**xpanded **M**emory **S**pecification. A superset of the original Expanded Memory Specification (EMS). Version 3.0 of EMS allowed only storage of data and supported 4-page frames. EEMS allowed up to 64 pages along with executable code to be stored in expanded memory. The features of EEMS were included in EMS version 4.0. *See also* EMS, page frame.

EEPROM *n.* Acronym for **e**lectrically **e**rasable **p**rogrammable **r**ead-**o**nly **m**emory. A type of EPROM that can be erased with an electrical signal. It is useful for stable storage for long periods without electricity while still allowing reprogramming. EEPROMs contain less memory than RAM, take longer to reprogram, and can be reprogrammed only a limited number of times before wearing out. *See also* EPROM, ROM.

EFF *n. See* Electronic Frontier Foundation.

e-form *n.* Short for **e**lectronic **form**. An online document that contains blank spaces for a user to fill in with requested information and that can be submitted through a network to the organization requesting the information. On the Web, e-forms are often coded in CGI script and secured via encryption. *See also* CGI (definition 1).

EGA *n.* Acronym for **E**nhanced **G**raphics **A**dapter. An IBM video display standard introduced in 1984. It emulates the Color/Graphics Adapter (CGA) and the Monochrome Display Adapter (MDA) and provides medium-resolution text and graphics. It was superseded by Video Graphics Display (VGA).

ego-surfing *n.* The practice of using a Web search engine to search for one's own name on the Internet.

EGP *n. See* exterior gateway protocol.

e-home *n. See* smart home.

EIA *n.* Acronym for **E**lectronic **I**ndustries **A**ssociation. An association based in Washington, D.C., with members from various electronics manufacturers. It sets standards for electronic components. RS-232-C, for example, is the EIA standard for connecting serial components. *See also* RS-232-C standard.

EIDE or **E-IDE** *n.* Acronym for **E**nhanced **I**ntegrated **D**rive **E**lectronics. An extension of the IDE standard, EIDE is a hardware interface standard for disk drive designs that house control circuits in the drives themselves. It allows for standardized interfaces to the system bus while providing for advanced features, such as burst data transfer and direct data access. EIDE accommodates drives as large as 8.4 gigabytes (IDE supports up to 528 megabytes). It supports the ATA-2 interface, which permits transfer rates up to 13.3 megabytes per second (IDE permits up to 3.3 megabytes per second), and the ATAPI interface, which connects drives for CD-ROMs, optical discs and tapes, and multiple channels. Most PCs have EIDE drives, which are cheaper than SCSI drives and provide much of the same functionality. *See also* IDE, SCSI.

Eiffel *n.* An advanced object-oriented programming language with a syntax similar to C, developed by Bertrand Meyer in 1988. Eiffel runs on MS-DOS, OS/2, and UNIX. Its major design features are the ability to use modules in multiple programs and software extensibility.

Eiffel# *n.* Pronounced "Eiffel Sharp." A subset language of Eiffel specifically designed to target the .NET Framework and embody the full extent of Design by Contract. *See also* Design by Contract.

eight dot three *n. See* 8.3.

EIP *n. See* enterprise information portal.

EIS *n. See* executive information system.

EISA *n.* Acronym for **E**xtended **I**ndustry **S**tandard **A**rchitecture. A bus standard for the connection of add-on cards to a PC motherboard, such as video cards, internal modems, sound cards, drive controllers, and cards that support other peripherals. EISA was introduced in 1988 by a consortium of nine computer industry companies. The companies—AST Research, Compaq, Epson, Hewlett-Packard, NEC, Olivetti, Tandy, Wyse, and Zenith—were referred to collectively as "the Gang of Nine." EISA maintains compatibility with the earlier Industry Standard Architecture (ISA) but provides for additional features introduced by IBM in its Micro Channel Architecture bus standard. EISA has a 32-bit data path, and it uses connectors that can accept ISA cards. However, EISA cards are compatible only with EISA systems. EISA can operate at much higher frequencies than the ISA bus and provides much faster data throughput than ISA. *See also* ISA, Micro Channel Architecture.

EJB *n. See* Enterprise JavaBeans.

electroluminescent *adj.* Giving off light when electric current is applied. Electroluminescent panels are used in portable computers to backlight the liquid crystal displays. A thin phosphor layer is sandwiched between two thin electrode panels, one of which is nearly transparent. *See also* liquid crystal display.

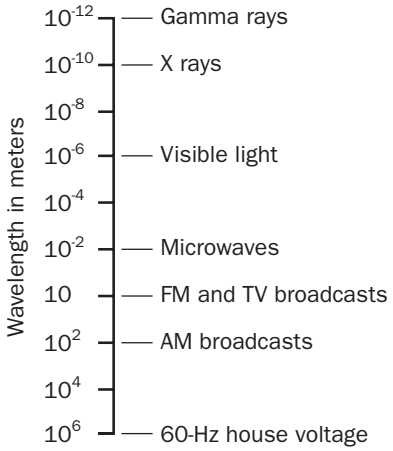
electroluminescent display *n.* A type of flat-panel display used in laptops in which a thin phosphor layer is set between vertical and horizontal electrodes. These electrodes form *xy*-coordinates; when a vertical and a horizontal electrode are charged, the phosphor at their intersection emits light. Electroluminescent displays provide a sharp, clear image and a wide viewing angle. They were replaced by active matrix LCD screens. *See also* flat-panel display, liquid crystal display, passive-matrix display. *Compare* active-matrix display.

electrolysis *n.* A process in which a chemical compound is broken down into its constituent parts by passing an electric current through it.

electromagnet *n.* A device that creates a magnetic field when electric current passes through it. An electromagnet typically contains an iron or steel core with wire wrapped around it. Current is passed through the wire, producing a magnetic field. Electromagnets are used in disk drives to record data onto the disk surface.

electromagnetic radiation *n.* The propagation of a magnetic field through space. Radio waves, light, and X rays are examples of electromagnetic radiation, all traveling at the speed of light.

electromagnetic spectrum *n.* The range of frequencies of electromagnetic radiation. In theory, the spectrum's range is infinite. See the illustration.



Electromagnetic spectrum.

electromotive force *n.* The force that causes movement in charge carriers (the electrons) in a conductor. *Acronym:* EMF. *Also called:* potential, voltage. *See also* ampere, coulomb.

electron beam *n.* A stream of electrons moving in one direction. An electron beam is used in a cathode-ray tube (CRT) to produce an image as it is passed across the phosphor coating inside the tube. *See also* CRT.

electron gun *n.* A device that produces an electron beam, typically found in television or computer monitors. *See also* CRT.

electronic bulletin board *n. See* BBS (definition 1).

electronic cash *n. See* e-money.

electronic circuit *n. See* circuit.

electronic commerce *n. See* e-commerce.

Electronic Commerce Modeling Language *n.* A computer language developed by leading e-commerce companies as a standard for inputting e-wallet information into the payment fields of Web sites. This allows for one-click transfer of e-wallet information at compatible Web sites. *Acronym:* ECML.

electronic credit *n.* A form of electronic commerce involving credit card transactions carried out over the Internet. *Also called:* e-credit. *See also* e-commerce.

electronic data interchange *n. See* EDI.

electronic data processing *n. See* data processing.

electronic form *n. See* e-form.

Electronic Frontier Foundation *n.* A public advocacy organization dedicated to the defense of civil liberties for computer users. The organization was founded in 1990 by Mitchell Kapor and John Perry Barlow as a response to U.S. Secret Service raids on hackers. *Acronym:* EFF.

electronic funds transfer *n.* The transfer of money via automated teller machine, telephone lines, or Internet connection. Examples of electronic fund transfers include using a credit card to make purchases from an e-commerce site, or using an automated teller machine or automated telephone banking system to move funds between bank accounts. *Acronym:* EFT.

Electronic Industries Association *n. See* EIA.

electronic journal *n. See* journal.

electronic mail *n. See* e-mail[1].

electronic mail services *n.* Services that allow users, administrators, or daemons to send, receive, and process e-mail. *See also* daemon.

electronic mall *n.* A virtual collection of online businesses that affiliate with the intention of increasing the exposure of each business through the fellow businesses.

electronic money *n. See* e-money.

electronic music *n.* Music created with computers and electronic devices. *See also* MIDI, synthesizer.

electronic office *n.* A term used especially in the late 1970s to mid-1980s to refer to a hypothetical paperless work environment to be brought about by the use of computers and communications devices.

electronic paper *n.* Technology allowing a computer display to imitate the look and feel of traditional paper media. Electronic paper consists of thin, flexible sheets of plastic containing millions of small beads called microcapsules. Each microcapsule contains both a black and a white pigment and displays the proper color in response to an electrical charge. It retains this pattern until a new screen of text or images is requested.

electronic photography *n. See* digital photography.

Electronic Privacy Information Center *n. See* EPIC.

electronic publishing *n.* A general term for distributing information via electronic media, such as communications networks or CD-ROM.

electronics *n.* The branch of physics dealing with electrons, electronic devices, and electrical circuits.

Electronics Industries Association *n. See* EIA.

electronic software distribution *n.* A means of directly distributing software to users on line over the Internet. Electronic software distribution is analogous to direct-mail ordering. *Acronym:* ESD.

electronic spreadsheet *n. See* spreadsheet program.

electronic storefront *n.* A business that displays its merchandise on the Internet and has provisions for contact or online sales.

electronic text *n. See* e-text.

electron tube *n.* A device for switching and amplifying electronic signals. It consists of a sealed glass container with electronic elements, such as metallic plates and grids, inside. In most applications, tubes have been replaced by transistors, although they are still used in cathode-ray tubes and in some radio frequency circuits and audio amplifiers. *Also called:* vacuum tube, valve. *See also* CRT.

electrophotographic printers *n.* Printers in a category including laser, LED, LCD, and ion-deposition printers. In such a printer, a negative image is applied to an electrically charged, photosensitive drum. A photosensitive drum develops a pattern of electrostatic charge on its surface representing the photo negative of the image the drum will print. Powdered ink (toner) adheres to the charged areas of the drum, the drum presses the ink onto the paper, and then heat binds the toner to the paper. The printer types vary mainly in how they charge the drum. *See also* ion-deposition printer, laser printer, LCD printer, LED printer.

electrophotography *n.* The production of photographic images using electrostatic charges. This method is used in photocopiers and laser printers. *Also called:* xerography. *See also* electrophotographic printers.

electroplating *n.* The use of electrolysis for depositing a thin layer of one material onto another material. *See also* electrolysis.

electrostatic *adj.* Of or relating to electric charges that are not flowing along a conducting path. Electrostatic charges are used in copiers and laser printers to hold toner particles on a photoconducting drum and in flatbed plotters to hold the plot medium in place.

electrostatic discharge *n.* The discharge of static electricity from an outside source, such as human hands, into an integrated circuit, often resulting in damage to the circuit. *Acronym:* ESD.

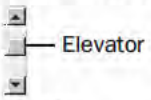
electrostatic plotter *n.* A plotter that creates an image from a dot pattern on specially coated paper. The paper is electrostatically charged and exposed to toner, which adheres to the dots. Electrostatic plotters can be up to 50 times faster than pen plotters but are more costly. Color models produce images through multiple passes with cyan, magenta, yellow, and black. *See also* plotter. *Compare* electrophotographic printers, pen plotter.

electrostatic printer *n. See* electrostatic plotter.

elegant *adj.* Combining simplicity, terseness, efficiency, and subtlety. On the academic side of computer science, elegant design (say, of programs, algorithms, or hardware) is a priority, but in the frenetic pace of the computer industry, elegant design may be sacrificed for the sake of speeding a product's development, sometimes resulting in bugs that are difficult to correct.

element *n.* **1.** Any stand-alone item within a broader context. For example, a data element is an item of data with the characteristics or properties of a larger set; a picture element (pixel) is one single dot on a computer screen or in a computer graphic; a print element is the part of a daisy-wheel printer that contains the embossed characters. *See also* daisy-wheel printer, data element, graphics primitive, pixel, thimble. **2.** In markup languages such as HTML and SGML, the combination of a set of tags, any content contained between the tags, and any attributes the tags may have. Elements can be nested, one within the other. *See also* attribute (definition 3), HTML, markup language, SGML.

elevator *n.* The square box within a scroll bar that can be moved up and down to change the position of text or an image on the screen. See the illustration. *Also called:* scroll box, thumb. *See also* scroll bar.



Elevator.

elevator seeking *n.* A method of limiting hard disk access time in which multiple requests for data are prioritized based on the location of the data relative to the read/write head. This serves to minimize head movement. *See also* access time (definition 2), hard disk, read/write head.

E

elite *n.* **1.** A size of fixed-width type that prints 12 characters to the inch. **2.** A fixed-width font that may be available in various type sizes. *See also* monospace font.

ELIZA *n.* A program, modeled on Rogerian psychotherapy, that conducts simulated conversations with humans by echoing responses and posing questions based on key words in earlier comments. It was created by Dr. Joseph Weizenbaum, who considered it a bit of a joke and was alarmed that people took it seriously. *See also* artificial intelligence, Turing test.

ellipsis *n.* A set of three dots (...) used to convey incompleteness. In many windowing applications, selection of a command that is followed by an ellipsis will produce a submenu or a dialog box. In programming and software manuals, an ellipsis in a syntax line indicates the repetition of certain elements. *See also* dialog box, syntax.

elm *n.* Short for **el**ectronic **m**ail. A program for reading and composing e-mail on UNIX systems. The elm program has a full-screen editor, making it easier to use than the original mail program, but elm has largely been superseded by pine. *See also* e-mail[1]. *Compare* Eudora, pine.

e-mail[1] or **email** or **E-mail** *n.* **1.** Short for **e**lectronic **m**ail. The exchange of text messages and computer files over a communications network, such as a local area network or the Internet, usually between computers or terminals. **2.** An electronic text message.

e-mail[2] or **email** or **E-mail** *vb.* To send an e-mail message.

e-mail address *n.* A string that identifies a user so that the user can receive Internet e-mail. An e-mail address typically consists of a name that identifies the user to the mail server, followed by an at sign (@) and the host name and domain name of the mail server. For example, if Anne E. Oldhacker has an account on the machine called baz at Foo Enterprises, she might have an e-mail address aeo@baz.foo.com, which would be pronounced "A E O at baz dot foo dot com."

e-mail filter *n.* A feature in e-mail-reading software that automatically sorts incoming mail into different folders or mailboxes based on information contained in the message. For example, all incoming mail from a user's Uncle Joe might be placed in a folder labeled "Uncle Joe." Filters may also be used either to block or accept e-mail from designated sources.

e-mail management system *n.* An automated e-mail response system used by an Internet-based business to sort incoming e-mail messages into predetermined categories and either reply to the sender with an appropriate response or direct the e-mail to a customer service representative. *Acronym:* EMS.

embed *vb.* To insert information created in one program, such as a chart or an equation, into another program. After the object is embedded, the information becomes part of the document. Any changes made to the object are reflected in the document.

embedded *adj.* In software, pertaining to code or a command that is built into its carrier. For example, application programs insert embedded printing commands into a document to control printing and formatting. Low-level assembly language is embedded in higher-level languages, such as C, to provide more capabilities or better efficiency.

embedded chip *n. See* embedded system.

embedded command *n.* A command placed in a text, graphics, or other document file, often used for printing or page-layout instructions. Such commands often do not appear on screen but can be displayed if needed. In transferring documents from one program to another, embedded commands can cause problems if the programs are incompatible.

embedded controller *n.* A processor-based controller circuit board that is built into the computer machinery. *See also* controller.

embedded hyperlink *n.* A link to a resource that is embedded within text or is associated with an image or an image map. *See also* hyperlink, image map.

embedded interface *n.* An interface built into a hardware device's drive and controller board so that the device can be directly connected to the computer's system bus. *See also* controller, interface (definition 3). *Compare* ESDI, SCSI, ST506 interface.

embedded system *n.* Microprocessors used to control devices such as appliances, automobiles, and machines used in business and manufacturing. An embedded system is created to manage a limited number of specific tasks

within a larger device or system. An embedded system is often built onto a single chip or board and is used to control or monitor the host device—usually with little or no human intervention and often in real time. *See also* microprocessor.

em dash *n.* A punctuation mark (—) used to indicate a break or interruption in a sentence. It is named for the em, a typographical unit of measure that in some fonts equals the width of a capital M. *Compare* en dash, hyphen.

EMF *n. See* electromotive force.

emitter *n.* In transistors, the region that serves as a source of charge carriers. *Compare* base (definition 3), collector.

emitter-coupled logic *n.* A circuit design in which the emitters of two transistors are connected to a resistor so that only one of the transistors switches at a time. The advantage of this design is very high switching speed. Its drawbacks are the high number of components required and susceptibility to noise. *Acronym:* ECL.

EMM *n. See* Expanded Memory Manager.

e-money or **emoney** *n.* Short for **e**lectronic **money**. A generic name for the exchange of money through the Internet. *Also called:* cybercash, digicash, digital cash, e-cash, e-currency.

emotag *n.* In an e-mail message or newsgroup article, a letter, word, or phrase that is encased in angle brackets and that, like an emoticon, indicates the attitude the writer takes toward what he or she has written. Often emotags have opening and closing tags, similar to HTML tags, that enclose a phrase or one or more sentences. For example: <joke>You didn't think there would really be a joke here, did you?</joke>. Some emotags consist of a single tag, such as <grin>. *See also* emoticon, HTML.

emoticon *n.* A string of text characters that, when viewed sideways, form a face expressing a particular emotion. An emoticon is often used in an e-mail message or newsgroup post as a comment on the text that precedes it. Common emoticons include :-) or :) (meaning "I'm smiling at the joke here"), ;-) ("I'm winking and grinning at the joke here"), :-(("I'm sad about this"), :-7 ("I'm speaking with tongue in cheek"), :D or :-D (big smile; "I'm overjoyed"), and :-O (either a yawn of boredom or a mouth open in amazement). *Compare* emotag.

EMS *n.* Acronym for **E**xpanded **M**emory **S**pecification. A technique for adding memory to PCs that allows for increasing memory beyond the Intel 80x86 microprocessor real-mode limit of 1 megabyte (MB). In earlier versions of microprocessors, EMS bypassed this memory board limit with a number of 16-kilobyte banks of RAM that could be accessed by software. In later versions of Intel microprocessors, including the 80386 and 80486 models, EMS is converted from extended memory by software memory managers, such as EMM386 in MS-DOS 5. Now EMS is used mainly for older MS-DOS applications because Windows and other applications running in protected mode on 80386 and higher microprocessors are free of the 1-MB limit. *Also called:* LIM EMS. *See also* expanded memory, protected mode. *Compare* conventional memory, extended memory.

em space *n.* A typographical unit of measure that is equal in width to the point size of a particular font. For many fonts, this is equal to the width of a capital M, from which the em space takes its name. *Compare* en space, fixed space, thin space.

emulate *vb.* For a hardware or software system to behave in the same manner as another hardware or software system. In a network, for example, microcomputers might emulate terminals in order to communicate with mainframes.

emulation *n.* The process of a computer, device, or program imitating the function of another computer, device, or program.

emulator *n.* Hardware or software designed to make one type of computer or component act as if it were another. By means of an emulator, a computer can run software written for another machine. In a network, microcomputers might emulate terminals in order to communicate with mainframes.

emulsion laser storage *n.* A method for recording data in film by selective heating with a laser beam.

enable *vb.* To activate or turn on. *Compare* disable.

encapsulate *vb.* **1.** To treat a collection of structured information as a whole without affecting or taking notice of its internal structure. In communications, a message or packet constructed according to one protocol, such as a TCP/IP packet, may be taken with its formatting data as an undifferentiated stream of bits that is then broken up and packaged according to a lower-level protocol (for example, as ATM packets) to be sent over a particular network; at the destination, the lower-level packets are assembled, re-creating the message as formatted for the encapsulated protocol. *See also* ATM (definition 1). **2.** In object-oriented

programming, to keep the implementation details of a class a separate file whose contents do not need to be known by a programmer using that class. *See also* object-oriented programming, TCP/IP.

Encapsulated PostScript *n. See* EPS.

E

encapsulated type *n. See* abstract data type.

encapsulation *n.* **1.** In object-oriented programming, the packaging of attributes (properties) and functionality (methods or behaviors) to create an object that is essentially a "black box"—one whose internal structure remains private and whose services can be accessed by other objects only through messages passed via a clearly defined interface (the programming equivalent of a mailbox or telephone line). Encapsulation ensures that the object providing service can prevent other objects from manipulating its data or procedures directly, and it enables the object requesting service to ignore the details of how that service is provided. *See also* information hiding. **2.** In terms of the Year 2000 problem, a method of dealing with dates that entails shifting either program logic (data encapsulation) or input (program encapsulation) backward into the past, to a parallel year that allows the system to avoid Year 2000 complications. Encapsulation thus allows processing to take place in a "time warp" created by shifting to an earlier time before processing and—for accuracy—shifting output forward by the same number of years to reflect the actual date. *See* data encapsulation, program encapsulation.

encipher *vb. See* encrypt.

encode *vb.* **1.** *See* encrypt. **2.** In programming, to put something into code, which frequently involves changing the form—for example, changing a decimal number to binary-coded form. *See also* binary-coded decimal, EBCDIC.

encoder *n.* **1.** In general, any hardware or software that encodes information—that is, converts the information to a particular form or format. For example, the Windows Media Encoder converts audio and video to a form that can be streamed to clients over a network. **2.** In reference to MP3 digital audio in particular, technology that converts a WAV audio file into an MP3 file. An MP3 encoder compresses a sound file to a much smaller size, about one-twelfth as large as the original, without a perceptible drop in quality. *Also called:* MP3 encoder. *See also* MP3, WAV. *Compare* rip, ripper.

encoding *n.* **1.** *See* Huffman coding. **2.** A method of dealing with computers with Year 2000 problems that entails storing a four-digit year in date fields designed to hold only two digits in a program or system. This can be accomplished by using the bits associated with the date field more efficiently—for example, by converting the date field from ASCII to binary or from decimal to hexadecimal, both of which allow storage of larger values.

encrypt *vb.* To encode (scramble) information in such a way that it is unreadable to all but those individuals possessing the key to the code. Encrypted information is known as cipher text. Also called: encipher, encode.

encryption *n.* The process of encoding data to prevent unauthorized access, especially during transmission. Encryption is usually based on one or more keys, or codes, that are essential for decoding, or returning the data to readable form. The U.S. National Bureau of Standards created a complex encryption standard, Data Encryption Standard (DES), which is based on a 56-bit variable that provides for more than 70 quadrillion unique keys to encrypt documents. *See also* DES.

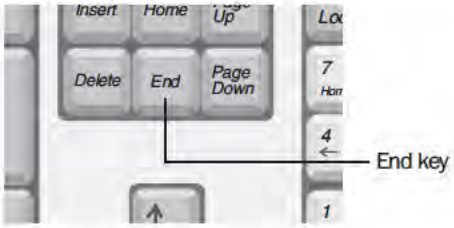
encryption key *n.* A sequence of data that is used to encrypt other data and that, consequently, must be used for the data's decryption. *See also* decryption, encryption.

end-around carry *n.* A special type of end-around shift operation on a binary value that treats the carry bit as an extra bit; that is, the carry bit is moved from one end of the value to the other. *See also* carry, end-around shift, shift.

end-around shift *n.* An operation performed on a binary value in which a bit is shifted out of one end and into the other end. For example, a right-end shift on the value 00101001 yields 10010100. *See also* shift.

en dash *n.* A punctuation mark (–) used to show ranges of dates and numbers, as in 1990–92, and in compound adjectives where one part is hyphenated or consists of two words, as in pre–Civil War. The en dash is named after a typographical unit of measure, the en space, which is half the width of an em space. *See also* em space. *Compare* em dash, hyphen.

End key *n.* A cursor-control key that moves the cursor to a certain position, usually to the end of a line, the end of a screen, or the end of a file, depending on the program. See the illustration.



End key.

endless loop *n. See* infinite loop.

end mark *n.* A symbol that designates the end of some entity, such as a file or word processing document.

end-of-file *n.* **1.** A code placed by a program after the last byte of a file to tell the computer's operating system that no additional data follows. In ASCII, end-of-file is represented by the decimal value 26 (hexadecimal 1A) or the Ctrl+Z control character. *Acronym:* EOF. **2.** An indicator of some sort in a computer program or database that indicates that the end of a file has been reached. If older systems that have the capacity to store only two-digit years in the date field also use end-of-file markers such as 99, they can be susceptible to date-related problems. *See also* 99 or 9999.

end-of-text *n.* In data transmission, a character used to mark the end of a text file. End-of-text does not necessarily signify the end of transmission; other information, such as error-checking or transmission control characters, can be included at the end of the file. In ASCII, end-of-text is represented by the decimal value 3 (hexadecimal 03). *Acronym:* ETX.

end-of-transmission *n.* A character representing the end of a transmission. In ASCII, the end-of-transmission character has the decimal value 4 (hexadecimal 04). *Acronym:* EOT.

endpoint *n.* The beginning or end of a line segment.

end-to-end delivery *n.* A communications process in networks in which packets are delivered and then acknowledged by the receiving system.

end-to-end examination *n.* An inspection of all of the processes and systems in place at an organization that affect the computer systems. The examination begins with the data or information that flows into the system, continues with how the data is manipulated and stored, and ends with how the data is output. For example, end-to-end examination is one technique that was employed to ferret out Year 2000 problems in computer systems of an organization.

end user *n.* The ultimate user of a computer or computer application in its finished, marketable form.

End-User License Agreement *n.* A legal agreement between a software manufacturer and the software's purchaser with regard to terms of distribution, resale, and restricted use. *Acronym:* EULA.

Energy Star *n.* A symbol affixed to systems and components that denotes lower power-consumption design. Energy Star is the name of an Environmental Protection Agency program that encourages PC manufacturers to build systems that are energy efficient. Requirements dictate that systems or monitors be capable of automatically entering a "sleep state" or lower power-consumption state while the unit is inactive, where the low-power state is defined as 30 watts or less. Systems and monitors that comply with these guidelines are marked with an Energy Star sticker.

engine *n.* A processor or portion of a program that determines how the program manages and manipulates data. The term *engine* is most often used in relation to a specific use; for example, a database engine contains the tools for manipulating a database, and a Web search engine has the ability to search World Wide Web indexes for matches to one or more key words entered by the user. *Compare* back-end processor, front-end processor.

Enhanced Capabilities Port *n. See* ECP.

enhanced Category 5 cable *n. See* Cat 5e cable.

Enhanced Data Rates for Global Evolution *n. See* EDGE.

Enhanced Data Rates for GSM and TDMA Evolution *n. See* EDGE.

Enhanced Expanded Memory Specification *n. See* EEMS.

Enhanced Graphics Adapter *n. See* EGA.

Enhanced Graphics Display *n.* A PC video display capable of producing graphic images with resolutions ranging from 320 x 200 through 640 x 400 pixels, in color or in black and white. Resolution and color depth depend on the vertical and horizontal scanning frequencies of the display, the capabilities of the video display controller card, and available video RAM.

Enhanced IDE *n. See* EIDE.

Enhanced Integrated Device Electronics *n. See* EIDE.

enhanced keyboard *n.* An IBM 101/102-key keyboard that replaced the PC and AT keyboards. It features 12 function keys across the top (rather than 10 on the left side), extra Control and Alt keys, and a bank of cursor and editing keys between the main keyboard and number pad. It is similar to the Apple Extended Keyboard.

Enhanced Parallel Port *n. See* EPP.

enhanced serial port *n.* A connection port for peripheral devices, commonly used for mice and external modems. Enhanced serial ports utilize 16550-type or newer high-speed UART circuits for faster data throughput. Enhanced serial ports are capable of transferring data at speeds as high as 921.6 Kbps. *Acronym:* ESP. *See also* input/output port, UART.

Enhanced Small Device Interface *n. See* ESDI.

ENIAC *n.* An 1800-square-foot, 30-ton computer containing about 18,000 vacuum tubes and 6000 manual switches. Developed between 1942 and 1946 for the U.S. Army by J. Presper Eckert and John Mauchly at the University of Pennsylvania, ENIAC is considered to have been the first truly electronic computer. It remained in operation until 1955.

enlarge *vb.* In Windows and other graphical user interfaces, to increase the size of a window. *See also* maximize. *Compare* minimize, reduce.

E notation *n. See* floating-point notation.

ENQ *n. See* enquiry character.

enquiry character *n.* Abbreviated ENQ. In communications, a control code transmitted from one station to request a response from the receiving station. In ASCII, the enquiry character is designated by decimal value 5 (hexadecimal 05).

en space *n.* A typographical unit of measure that is equal in width to half the point size of a particular font. *Compare* em space, fixed space, thin space.

Enter key *n.* The key that is used at the end of a line or command to instruct the computer to process the command or text. In word processing programs, the Enter key is used at the end of a paragraph. *Also called:* Return key.

Enterprise Application Integration *n. See* EAI.

enterprise computing *n.* In a large enterprise such as a corporation, the use of computers in a network or series of interconnected networks that generally encompass a variety of different platforms, operating systems, protocols, and network architectures. *Also called:* enterprise networking.

enterprise information portal *n.* A portal or gateway that allows internal and external users in a business or enterprise to access information from intranets, extranets, and the Internet for business needs. An enterprise information portal provides a simple Web interface that is designed to help users sift through large amounts of data quickly to find the information they need. By organizing all internal information from company servers, databases, e-mail, and legacy systems, the enterprise information portal exercises control over the company's information availability and presentation. *Acronym:* EIP. *See also* portal.

Enterprise JavaBeans *n.* An application programming interface (API) designed to extend the JavaBean component model to cross-platform, server-side applications that can run on the various systems usually present in an enterprise environment. Enterprise JavaBeans are defined in the Enterprise JavaBean specification released by Sun Microsystems, Inc. The goal of the API is to provide developers with a means of applying Java technology to the creation of reusable server components for business applications, such as transaction processing. *Acronym:* EJB. *See also* Java, JavaBean.

enterprise network *n.* In a large enterprise such as a corporation, the network (or interconnected networks) of computer systems owned by the enterprise, which fills the enterprise's various computing needs. This network can span diverse geographical locations and usually encompasses a range of platforms, operating systems, protocols, and network architectures.

enterprise networking *n. See* enterprise computing.

Enterprise Resource Planning *n.* An approach to business information management that relies on integrated application software to provide data on all aspects of the enterprise, such as manufacturing, finance, inventory, human resources, sales, and so on. The objective of Enterprise Resource Planning software is to provide data, when and as needed, to enable a business to monitor and control its overall operation. *Acronym:* ERP. *Compare* Material Requirements Planning.

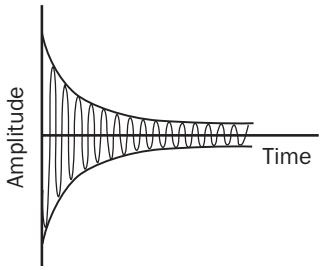
entity *n.* In computer-aided design and object-oriented design, an item that can be treated as a unit and, often, as a member of a particular category or type. *See also* CAD, object-oriented design.

entry *n.* **1.** A unit of information treated as a whole by a computer program. **2.** The process of inputting information.

entry point *n.* A place in a program where execution can begin.

enumerated data type *n.* A data type consisting of a sequence of named values given in a particular order.

envelope *n.* **1.** In communications, a single unit of information that is grouped with other items, such as error-checking bits. **2.** The shape of a sound wave, caused by changes in amplitude. See the illustration.



Envelope.

envelope delay *n.* In communications, the difference in travel times of different frequencies in a signal. If the frequencies reach their destination at different times, signal distortion and errors can result. *Also called:* delay distortion.

environment *n.* **1.** The configuration of resources available to the user. *Environment* refers to the hardware and the operating system running on it. For example, Windows and Macintosh are called windowing environments because they are based on screen regions called windows. **2.** In microcomputing, *environment* refers to a definition of the specifications, such as command path, that a program operates in.

EOF *n. See* end-of-file (definition 1).

EOL *n.* Acronym for **e**nd **o**f **l**ine. A control (nonprinting) character that signals the end of a data line in a data file.

EOT *n. See* end-of-transmission.

EPIC *n.* **1.** Short for **E**xplicitly **P**arallel **I**nstruction **C**omputing. A technology developed jointly by Intel and Hewlett-Packard as the foundation of the 64-bit instruction set architecture incorporated in IA-64, the basis of the Merced chip. EPIC technology is designed to enable IA-64 processors to execute instructions efficiently and extremely quickly. Core elements include explicit parallelism based on software identification of instructions that the processor can execute concurrently; improved execution of branch paths; and earlier loads from memory. *See also* IA-64, Merced. **2.** Short for **E**lectronic **P**rivacy **I**nformation **C**enter. A public-interest research center based in Washington, D.C., dedicated to directing public attention toward civil liberties and online privacy related to electronic communication, cryptography, and related technologies.

epitaxial layer *n.* In semiconductors, a layer that has the same crystal orientation as the underlying layer.

EPP *n.* Acronym for **E**nhanced **P**arallel **P**ort, a high-speed port for peripheral devices other than printers and scanners—that is, for devices such as external drives. Specified in the IEEE 1284 standard, EPP describes bidirectional parallel ports that provide data throughput of 1 Mbps or more, as opposed to the 100 Kbps to 300 Kbps typical of the older, de facto standard Centronics ports. *See also* IEEE 1284, input/output port. *Compare* ECP.

EPP IEEE standard *n.* An IEEE standard relating to the Enhanced Parallel Port (EPP) protocol. This protocol was originally developed by Intel, Xircom, and Zenith Data Systems as a means to provide a high-performance parallel port link that would still be compatible with the standard parallel port. This protocol capability was implemented by Intel in the 386SL chip set (82360 I/O chip), prior to the establishment of the IEEE 1284 committee and the associated standards work. The EPP protocol offered many advantages to parallel port peripheral manufacturers and was quickly adopted by many as an optional data transfer method. A loose association of about 80 interested manufacturers was formed to develop and promote the EPP protocol. This association became the EPP Committee and was instrumental in helping to get this protocol adopted as one of the IEEE 1284 advanced modes. *See also* communications protocol, IEEE 1284, parallel port.

EPROM *n.* Acronym for **e**rasable **p**rogrammable **r**ead-**o**nly **m**emory. A nonvolatile memory chip that is programmed after it is manufactured. EPROMs can be reprogrammed by removing the protective cover from the top of the chip and exposing the chip to ultraviolet light. Though EPROMs are more expensive than PROM chips, they can be more cost-effective if many changes are required. *Also called:* reprogrammable read-only memory (RPROM). *See also* EEPROM, PROM, ROM.

.eps *n.* The file extension that identifies Encapsulated PostScript files. *See also* EPS.

EPS *n.* Acronym for **E**ncapsulated **P**ost**S**cript. A PostScript file format that can be used as an independent entity. The EPS image must be incorporated into the PostScript output of an application such as a desktop publisher. Many high-quality clip-art packages consist of such images. *See also* PostScript.

EPSF *n.* Acronym for **E**ncapsulated **P**ost**S**cript **f**ile. *See* EPS.

equality *n.* The property of being identical, used most often in reference to values and data structures.

equalization *n.* A form of conditioning used to compensate for signal distortion and delay on a communication channel. Equalization attempts to maintain the amplitude and phase characteristics of a signal so that it remains true to the original when it reaches the receiving device.

equation *n.* A mathematical statement that indicates equality with the use of an equal sign (=) between two expressions. In programming languages, assignment statements are written in equation form. *See also* assignment statement.

erasable programmable read-only memory *n. See* EPROM.

erasable storage *n.* Storage media that can be used repeatedly because the user has the ability to erase whatever data was previously there. Most forms of magnetic storage, such as tape and disk, are erasable.

erase *vb.* To remove data permanently from a storage medium. This is usually done by replacing existing data with zeros or meaningless text or, in magnetic media, by disturbing the magnetic particles' physical arrangement, either with the erase head or with a large magnet. *Erase* differs from *delete* in that *delete* merely tells the computer that data or a file is no longer needed; the data remains stored and is recoverable until the operating system reuses the space containing the deleted file. *Erase*, on the other hand, removes data permanently. *See also* erase head. *Compare* delete.

erase head *n.* The device in a magnetic tape machine that erases previously recorded information.

Eratosthenes' sieve *n. See* sieve of Eratosthenes.

ergonomic keyboard *n.* A keyboard designed to reduce the risk of wrist and hand injuries that result from prolonged use or repetitive movement. An ergonomic keyboard can include such features as alternative key layouts, palm rests, and shaping designed to minimize strain. *See also* Dvorak keyboard, keyboard, Kinesis ergonomic keyboard.

ergonomics *n.* The study of people (their physical characteristics and the ways they function) in relation to their working environment (the furnishings and machines they use). The goal of ergonomics is to incorporate comfort, efficiency, and safety into the design of keyboards, computer desks, chairs, and other items in the workplace.

Erlang *n.* A concurrent functional programming language. Originally developed for controlling telephone exchanges, Erlang is a general-purpose language best suited for applications where rapid development of complex systems and robustness are essential. Erlang has built-in support for concurrency, distribution, and fault tolerance. The most widely implemented version of Erlang is the open source version.

ERP *n. See* Enterprise Resource Planning.

error *n.* A value or condition that is not consistent with the true, specified, or expected value or condition. In computers, an error results when an event does not occur as expected or when impossible or illegal maneuvers are attempted. In data communications, an error occurs when there is a discrepancy between the transmitted and received data. *See also* critical error, error message, error rate, error ratio, fatal error, hard error, inherent error, intermittent error, logic error, machine error, overflow error, parity error. *Compare* fault.

error analysis *n.* The art and science of detecting errors in numeric calculations, especially in long and involved computations, where the possibility of errors increases.

error checking *n.* A method for detecting discrepancies between transmitted and received data during file transfer.

error control *n.* **1.** The section of a program, procedure, or function that checks for errors such as type mismatches, overflows and underflows, dangling or illegal pointer references, and memory-use inconsistencies. **2.** The process of anticipating program errors during software development.

error-correcting code *n. See* error-correction coding.

error-correction coding *n.* A method for encoding that allows for detection and correction of errors that occur during transmission. Data is encoded in such a way that transmission errors may be detected and corrected by examination of the encoded data on the receiving end. Most error-correction codes are characterized by the maximum number of errors they can detect and by the maximum number of errors they can correct. Error-correction coding is

used by most modems. *Also called:* error-correcting code. *See also* error detection and correction. *Compare* error-detection coding.

error detection and correction *n.* A method for discovering and resolving errors during file transfer. Some programs only detect errors; others detect and attempt to fix them.

error-detection coding *n.* A method of encoding data so that errors that occur during storage or transmission can be detected. Most error-detection codes are characterized by the maximum number of errors they can detect. *See also* checksum. *Compare* error-correction coding.

error file *n.* A file that records the time and type of data processing and transmission errors.

error handling *n.* The process of dealing with errors (or exceptions) as they arise during the running of a program. Some programming languages, such as C++, Ada, and Eiffel, have features that aid in error handling. *See also* bug (definition 1).

error message *n.* A message from the system or program indicating that an error requiring resolution has occurred.

error rate *n.* In communications, the ratio of the number of bits or other elements that arrive incorrectly during transmission. For a 1200-bps modem, a typical error rate would be 1 in every 200,000 bits. *See also* parity, parity bit, Xmodem, Ymodem.

error ratio *n.* The ratio of errors to the number of units of data processed. *See also* error rate.

error trapping *n.* **1.** The process by which a program checks for errors during execution. **2.** The process of writing a function, program, or procedure such that it is capable of continuing execution despite an error condition.

escape character *n. See* ESC character.

escape code *n.* A character or sequence of characters that indicates that a following character in a data stream is not to be processed in the ordinary way. In the C programming language, the escape code is the backslash \.

Escape key *n.* A key on a computer keyboard that sends the escape (ESC) character to the computer. In many applications, the Escape key moves the user back one level in the menu structure or exits the program. See the illustration. *See also* Clear key.

Escape key.

escape sequence *n.* A sequence of characters that usually begins with the ESC character (ASCII 27, hexadecimal 1B), which is followed by one or more additional characters. An escape sequence escapes from the normal sequence of characters (such as text) and issues an instruction or command to a device or program.

ESC character *n.* One of the 32 control codes defined in the ASCII character set. It usually indicates the beginning of an escape sequence (a string of characters that give instructions to a device such as a printer). It is represented internally as character code 27 (hexadecimal 1B). *Also called:* escape character.

Esc key *n. See* Escape key.

ESD *n. See* electronic software distribution, electrostatic discharge.

ESDI *n.* Acronym for Enhanced Small Device Interface. A device that allows disks to communicate with computers at high speeds. ESDI drives typically transfer data at about 10 megabits per second, but they are capable of doubling that speed. Although fast, ESDI has been superseded by interfaces such as SCSI and EIDE. *See also* EIDE, SCSI.

ESP *n. See* enhanced serial port.

ESP IEEE standard *n.* Short for Encapsulating Security Payload IEEE standard. A standard for providing integrity and confidentiality to IP (Internet Protocol) datagrams. In some circumstances, it can also provide authentication to IP datagrams. *See also* authentication, datagram, IEEE, IP.

ESRB *n.* Acronym for Entertainment Software Rating Board. An independent, self-regulatory body providing ratings to the public and support to companies in the interactive software entertainment industry. The ESRB provides

ratings for computer games and other interactive products such as Web sites, online games, and interactive chat.

e-tail *n. See* e-commerce.

e-text *n.* Short for **e**lectronic **text**. A book or other text-based work that is available on line in an electronic media format. An e-text can be read online or downloaded to a user's computer for offline reading. *See also* e-zine.

Ethernet *n.* **1.** The IEEE 802.3 standard for contention networks. Ethernet uses a bus or star topology and relies on the form of access known as Carrier Sense Multiple Access with Collision Detection (CSMA/CD) to regulate communication line traffic. Network nodes are linked by coaxial cable, by fiberoptic cable, or by twisted-pair wiring. Data is transmitted in variable-length frames containing delivery and control information and up to 1500 bytes of data. The Ethernet standard provides for baseband transmission at 10 megabits (10 million bits) per second and is available in various forms, including those known as Thin Ethernet, Thick Ethernet, 10Base2, 10Base5, 10Base-F, and 10Base-T. The IEEE standard dubbed 802.3z, or Gigabit Ethernet, operates at 10 times 100 Mbps speed. *See also* ALOHAnet, baseband, bus network, coaxial cable, contention, CSMA/CD, Gigabit Ethernet, IEEE 802 standards, twisted-pair cable. **2.** A widely used local area network system developed by Xerox in 1976, from which the IEEE 802.3 standard was developed.

Ethernet/802.3 *n.* The IEEE standard for 10- or 100-Mbps transmissions over an Ethernet network. Ethernet/802.3 defines both hardware and data packet construction specifications. *See also* Ethernet.

E-time *n. See* execution time.

etiquette *n. See* netiquette.

ETX *n. See* end-of-text.

Eudora *n.* An e-mail client program originally developed as freeware for Macintosh computers by Steve Dorner at the University of Illinois, now maintained in both freeware and commercial versions for both Macintosh and Windows by Qualcomm, Inc.

EULA *n. See* End-User License Agreement.

Euphoria *n.* Acronym for **E**nd **U**ser **P**rogramming with **H**ierarchical **O**bjects for **R**obust **I**nterpreted **A**pplications. An interpreted programming language intended for general application development and game programming on MS-DOS, Windows, and Linux platforms.

European Computer Manufacturers Association *n. See* ECMA.

European Laboratory for Particle Physics *n. See* CERN.

EUV lithography *n.* Acronym for **E**xtreme **U**ltra**V**iolet **lithography**. Manufacturing process allowing smaller circuits to be etched onto chips than is possible with traditional lithographic techniques. With this process, it is possible to economically produce chips that are much faster than those that are created using traditional processes. In EUV lithography, the image of a map of circuits to appear on a chip is bounced off a series of mirrors that condense the image. The condensed image is projected onto wafers containing layers of metal, silicon, and photosensitive material. Because EUV light has a short wavelength, extremely intricate circuit patterns can be created on the wafers.

evaluation *n.* The determination, by a program, of the value of an expression or the action that a program statement specifies. Evaluation can take place at compile time or at run time.

even parity *n. See* parity.

event *n.* An action or occurrence, often generated by the user, to which a program might respond—for example, key presses, button clicks, or mouse movements. *See also* event-driven programming.

event-driven *adj.* Of, pertaining to, or being software that accomplishes its purpose by responding to externally caused events, such as the user pressing a key or clicking a button on a mouse. For example, an event-driven data entry form will allow the user to click on and edit any field at any time rather than forcing the user to step through a fixed sequence of prompts.

event-driven processing *n.* A program feature belonging to more advanced operating-system architectures such as the Apple Macintosh operating system, Windows, and UNIX. In times past, programs were required to interrogate, and effectively anticipate, every device that was expected to interact with the program, such as the keyboard, mouse, printer, disk drive, and serial port. Often, unless sophisticated programming techniques were used, one of two events happening at the same instant would be lost. Event processing solves this problem through the creation and maintenance of an event queue. Most common events that occur are appended to the event queue for the program to process in turn; however, certain types of events can preempt others if they have a higher priority.

An event can be of several types, depending on the specific operating system considered: pressing a mouse button or keyboard key, inserting a disk, clicking on a window, or receiving information from a device driver (as for managing the transfer of data from the serial port or from a network connection). *See also* autopolling, event, interrupt.

event-driven programming *n.* A type of programming in which the program constantly evaluates and responds to sets of events, such as key presses or mouse movements. Event-driven programs are typical of Apple Macintosh computers, although most graphical interfaces, such as Windows or the X Window System, also use such an approach. *See also* event.

event handler *n.* 1. A method within a program that is called automatically whenever a particular event occurs. 2. A core function in JavaScript that handles client-side events. It is the mechanism that causes a script to react to an event. For example, common JavaScript event handlers coded in Web pages include onClick, onMouseOver, and onLoad. When the user initiates the action, such as a mouse over, the event handler executes, or carries out, the desired outcome. 3. In Java applets, rather than having a specific starting point, the applet has a main loop where it waits for an event or series of events (keystroke, mouse click, and so on). Upon occurrence of the event, the event handler carries out the instructions specified. *See also* applet, client, JavaScript.

event horizon *n.* The time at which hardware or software began to have the potential to encounter a Year 2000 problem. For instance, the event horizon in an accounting system in a company whose fiscal year ended on June 30, 1999, would be six months dating from January 1, 1999. *Also called:* time horizon to failure.

event log *n.* A file that contains information and error messages for all activities on the computer.

event logging *n.* The process of recording an audit entry in the audit trail whenever certain events occur, such as starting and stopping, or users logging on and off and accessing resources. *See also* event, service.

event procedure *n.* A procedure automatically executed in response to an event initiated by the user or program code, or triggered by the system.

event property *n.* A characteristic or parameter of an object that you can use to respond to an associated event. You can run a procedure or macro when an event occurs by setting the related event property.

e-wallet *n.* A program used in e-commerce that stores a customer's shipping and billing information to facilitate Web-based financial transactions. An e-wallet allows customers to instantly enter encrypted shipping and billing information when placing an order, rather than manually typing the information into a form on a Web page.

exa- *prefix* A prefix meaning 1 quintillion (10^{18}). In computing, which is based on the binary (base-2) numbering system, exa- has a literal value of 1,152,921,504,606,846,976, which is the power of 2 (2^{60}) closest to one quintillion. *Abbreviation:* E.

exabyte *n.* Roughly one quintillion bytes, or a billion billion bytes, or 1,152,921,504,606,846,976 bytes. *Abbreviation:* EB.

Excel *n.* Microsoft's spreadsheet software for Windows PCs and Macintosh computers. Excel is part of the family of Office products. The most recent version, part of Office XP, includes the ability to access and analyze live data from the Web by simply copying and pasting Web pages into Excel. The first version of Excel was introduced for the Macintosh in 1985. Excel for Windows was released in 1987.

exception *n.* In programming, a problem or change in conditions that causes the microprocessor to stop what it is doing and handle the situation in a separate routine. An exception is similar to an interrupt; both refer the microprocessor to a separate set of instructions. *See also* interrupt.

exception handling *n. See* error handling.

exchangeable disk *n. See* removable disk.

exchange sort *n. See* bubble sort.

Excite *n.* A World Wide Web search engine developed by Excite, Inc. After conducting a search, Excite provides both a summary of each matching Web site it has located and a link to more information of the same type.

exclusive NOR *n.* A two-state digital electronic circuit in which the output is driven high only if the inputs are all high or all low.

exclusive OR *n.* A Boolean operation that yields "true" if and only if one of its operands is true and the other is false. See the table. *Acronym:* EOR. *Also called:* XOR. *See also* Boolean operator, truth table. *Compare* AND, OR.

Table E.1 Exclusive OR.

a	*b*	*a XOR b*
0	0	0
0	1	1
1	0	1
1	1	0

.exe *n.* In MS-DOS, a filename extension that indicates that a file is an executable program. To run an executable program, the user types the filename without the .exe extension at the prompt and presses Enter. *See also* executable program.

executable[1] *adj.* Of, pertaining to, or being a program file that can be run. Executable files have extensions such as .bat, .com, and .exe.

executable[2] *n.* A program file that can be run, such as file0.bat, file1.exe, or file2.com.

executable program *n.* A program that can be run. The term usually applies to a compiled program translated into machine code in a format that can be loaded into memory and run by a computer's processor. In interpreter languages, an executable program can be source code in the proper format. *See also* code (definition 1), compiler (definition 2), computer program, interpreter, source code.

execute *vb.* To perform an instruction. In programming, execution implies loading the machine code of the program into memory and then performing the instructions.

execute in place *n.* The process of executing code directly from ROM, rather than loading it from RAM first. Executing the code in place, instead of copying the code into RAM for execution, saves system resources. Applications in other file systems, such as on a PC Card storage device, cannot be executed in this way. *Acronym:* XIP.

execution time *n.* The time, measured in clock ticks (pulses of a computer's internal timer), required by a microprocessor to decode and carry out an instruction after it is fetched from memory. *Also called:* E-time. *See also* instruction time.

executive *n.* The set of kernel-mode components that form the base operating system for Microsoft Windows NT or later. *See also* operating system.

executive information system *n.* A set of tools designed to organize information into categories and reports. Because it emphasizes information, an executive information system differs from a decision support system (DSS), which is designed for analysis and decision making. *Acronym:* EIS. *Compare* decision support system.

exerciser *n.* A program that exercises a piece of hardware or software by running it through a large set of operations.

exit *vb.* In a program, to move from the called routine back to the calling routine. A routine can have more than one exit point, thus allowing termination based on various conditions.

expanded *adj.* A font style that sets characters farther apart than the normal spacing. *Compare* condensed.

expanded memory *n.* A type of memory, up to 8 MB, that can be added to IBM PCs. Its use is defined by the Expanded Memory Specification (EMS). Expanded memory is not accessible to programs in MS-DOS, so the Expanded Memory Manager (EMM) maps pages (blocks) of bytes from expanded memory into page frames in accessible memory areas. Expanded memory is not needed in Windows 9x, all versions of Windows NT, and Windows 2000. *See also* EEMS, EMS, Expanded Memory Manager, page frame.

Expanded Memory Manager *n.* A driver that implements the software portion of the Expanded Memory Specification (EMS) to make expanded memory in IBM and compatible PCs accessible. *Acronym:* EMM. *See also* EMS, expanded memory, extended memory.

Expanded Memory Specification *n. See* EMS.

expansion *n.* A way of increasing a computer's capabilities by adding hardware that performs tasks that are not part of the basic system. Expansion is usually achieved by plugging printed circuit boards (expansion boards) into openings (expansion slots) inside the computer. *See also* expansion board, expansion slot, open architecture (definition 2), PC Card, PCMCIA slot.

expansion board *n.* A circuit board that is plugged into a computer's bus (main data transfer path) to add extra functions or resources to the computer. Typical expansion boards add memory, disk drive controllers, video support, parallel and serial ports, and internal modems. For laptops and other portable computers, expansion boards come in credit card-sized devices called PC Cards that plug into a slot in the side or back of the computer. *Also called:* expansion board, extender board. *See also* expansion slot, PC Card, PCMCIA slot.

expansion bus *n.* A group of control lines that provide a buffered interface to devices. These devices can be located

either on the system board or on cards that are plugged into expansion connectors. Common expansion buses included on the system board are USB, PC Card, and PCI. *See also* AT bus.

expansion card *n.* *See* card (definition 1), expansion board.

expansion slot *n.* A socket in a computer, designed to hold expansion boards and connect them to the system bus (data pathway). Expansion slots are a means of adding or enhancing the computer's features and capabilities. In laptop and other portable computers, expansion slots come in the form of PCMCIA slots designed to accept PC Cards. *See also* expansion board, PC Card, PCMCIA slot.

experience points *n.* Often used in role-playing games (RPGs), experience points are a way of measuring how much a player has experienced or learned. As a player moves through a game, additional benefits, often in the form of increased statistics or skills, are earned. These points are frequently spent or used by the player to increase his or her score. *See also* computer game, role-playing game.

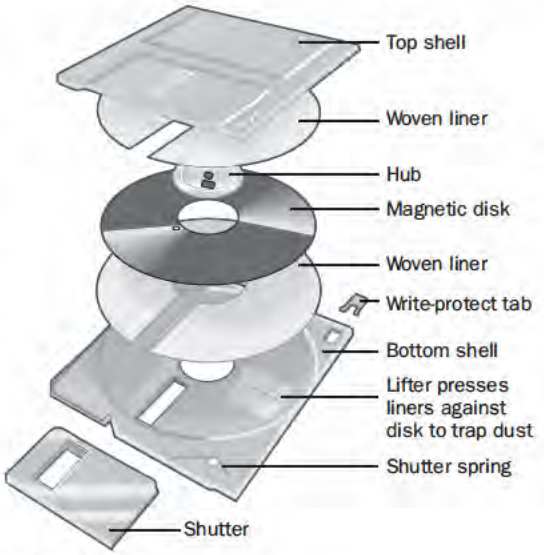
expert system *n.* An application program that makes decisions or solves problems in a particular field, such as finance or medicine, by using knowledge and analytical rules defined by experts in the field. It uses two components, a knowledge base and an inference engine, to form conclusions. Additional tools include user interfaces and explanation facilities, which enable the system to justify or explain its conclusions as well as allowing developers to run checks on the operating system. *See also* artificial intelligence, inference engine, intelligent database, knowledge base.

expiration date *n.* The date on which a shareware, beta, or trial version of a program stops functioning, pending purchase of the full version or the entry of an access code.

expire *vb.* To stop functioning in whole or in part. Beta versions of software are often programmed to expire when a new version is released. *See also* beta[2].

Explicitly Parallel Instruction Computing *n.* *See* EPIC.

exploded view *n.* A form of display that shows a structure with its parts separated but depicted in relation to each other. See the illustration.



Exploded view.

Explorer *n.* *See* Internet Explorer, Windows Explorer.

ExploreZip *n.* A destructive virus that attacks computers running Windows, where it first appears as an e-mail attachment named zipped_files.exe. ExploreZip affects local drives, mapped drives, and accessible network machines and destroys both document and source-code files by opening and immediately closing them, leaving a zero-byte file. Described as both a Trojan horse (because it requires the victim to open the attachment) and a worm (because it can propagate itself in certain instances), ExploreZip spreads by mailing itself to the return address of every unread e-mail in the inbox of the computer's e-mail program, as well as by searching for—and copying itself to—the Windows directory on mapped drives and networked machines. *See also* Trojan horse, virus, worm.

exponent *n.* In mathematics, a number that shows how many times a number is used as a factor in a calculation; in other words, an exponent shows that number's power. Positive exponents, as in 2^3, indicate multiplication (2 times 2 times 2). Negative exponents, as in 2^{-3}, indicate division (1 divided by 2^3). Fractional exponents, as in $8^{1/3}$, indicate the root of a number (the cube root of 8).

exponential notation *n. See* floating-point notation.

exponentiation *n.* The operation in which a number is raised to a given power, as in 2^3. In computer programs and programming languages, exponentiation is often shown by a caret (^), as in 2^3.

E

export *vb.* To move information from one system or program to another. Files that consist only of text can be exported in ASCII (plain text format). For files with graphics, however, the receiving system or program must offer some support for the exported file's format. *See also* EPS, PICT, TIFF. *Compare* import.

export *n.* In NFS, a file or folder made available to other network computers using the NFS mount protocol. *See also* NFS.

expression *n.* A combination of symbols—identifiers, values, and operators—that yields a result upon evaluation. The resulting value can then be assigned to a variable, passed as an argument, tested in a control statement, or used in another expression.

extended ASCII *n.* Any set of characters assigned to ASCII values between decimal 128 and 255 (hexadecimal 80 through FF). The specific characters assigned to the extended ASCII codes vary between computers and between programs, fonts, or graphics characters. Extended ASCII adds capability by allowing for 128 additional characters, such as accented letters, graphics characters, and special symbols. *See also* ASCII.

Extended Binary Coded Decimal Interchange Code *n. See* EBCDIC.

extended characters *n.* Any of the 128 additional characters in the extended ASCII (8-bit) character set. These characters include those used in several foreign languages, such as accent marks, and special symbols used for creating pictures. *See also* extended ASCII.

extended data out random access memory *n. See* EDO RAM.

Extended Edition *n.* A version of OS/2 with built-in database and communications facilities, developed by IBM. *See also* OS/2.

eXtended Graphics Array *n.* An advanced standard for graphics controller and display mode design, introduced by IBM in 1990. This standard supports 640 x 480 resolution with 65,536 colors, or 1024 x 768 resolution with 256 colors, and is used mainly on workstation-level systems. *Acronym:* XGA.

Extended Industry Standard Architecture *n. See* EISA.

extended memory *n.* System memory beyond 1 megabyte in computers based on the Intel 80x86 processors. This memory is accessible only when an 80386 or higher-level processor is operating in protected mode or in emulation on the 80286. To use extended memory, MS-DOS programs need the aid of software that temporarily places the processor into protected mode or by the use of features in the 80386 or higher-level processors to remap portions of extended memory into conventional memory. Extended memory is not an issue in Windows 9x, all versions of Windows NT, Windows 2000, and Windows XP. *See also* EMS, extended memory specification, protected mode.

extended memory specification *n.* A specification developed by Lotus, Intel, Microsoft, and AST Research that defines a software interface allowing real-mode applications to use extended memory and areas of memory not managed by MS-DOS. Memory is managed by an installable device driver, the Expanded Memory Manager (EMM). The application must use the driver to access the additional memory. *Acronym:* XMS. *See also* Expanded Memory Manager, extended memory.

extended VGA *n.* An enhanced set of Video Graphics Array (VGA) standards that is capable of displaying an image of from 800 x 600 pixels to 1600 x 1200 pixels and that can support a palette of up to 16.7 million (2^{24}) colors. This palette approaches the 19 million colors that a normal person can distinguish, so it is considered a digital standard for color realism that parallels analog television. *Also called:* Super VGA, SVGA. *See also* analog-to-digital converter, CRT, VGA.

extender board *n. See* expansion board.

eXtensible Firmware Interface *n.* In computers with the Intel Itanium processor, the interface between the operating system and the computer's low-level booting and initialization firmware. The interface is made up of data tables that contain platform-related information, plus boot and run-time service calls that are available to the operating system and its loader to provide a standard environment for booting an operating system and running preboot applications. *Acronym:* EFI.

Extensible Forms Description Language or **eXtensible Forms Description Language** *n. See* XFDL.

Extensible Hypertext Markup Language *n. See* XHTML.

extensible language *n.* A computer language that allows the user to extend or modify the syntax and semantics of the language. In the strict sense, the term relates to only a few of the languages actually used that allow the programmer to change the language itself, such as Forth. *See also* computer language, semantics (definition 1), syntax.

Extensible Markup Language or **eXtensible Markup Language** *n. See* XML.

extensible style language *n. See* XSL.

eXtensible Stylesheet Language *n. See* XSL.

eXtensible Stylesheet Language Formatting Objects *n. See* XSL-FO.

Extensible Stylesheets Language-Transformations *n. See* XSLT.

extension *n.* **1.** A set of characters added to a filename that serves to extend or clarify its meaning or to identify a file as a member of a category. An extension may be assigned by the user or by a program, as, for example, .com or .exe for executable programs that MS-DOS can load and run. **2.** A supplemental set of codes used to include additional characters in a particular character set. **3.** A program or program module that adds functionality to or extends the effectiveness of a program. **4.** On the Macintosh, a program that alters or augments the functionality of the operating system. There are two types: system extensions, such as QuickTime, and Chooser extensions, such as printer drivers. When a Macintosh is turned on, the extensions in the Extensions folder within the System folder are loaded into memory. *See also* Chooser extension, QuickTime, System folder.

Extension Manager *n.* A Macintosh utility developed by Apple that allows the user to determine which extensions are loaded when the computer is turned on. *See also* extension (definition 4).

extent *n.* On a disk or other direct-access storage device, a continuous block of storage space reserved by the operating system for a particular file or program.

exterior gateway protocol *n.* A protocol used by routers (gateways) on separate, independent networks for distributing routing information between and among themselves—for example, between hosts on the Internet. *Acronym:* EGP. *Also called:* external gateway protocol. *Compare* interior gateway protocol.

external command *n.* A program included in an operating system such as MS-DOS that is loaded into memory and executed only when its name is entered at the system prompt. Although an external command is a program in its own right, it is called a command because it is included with the operating system. *See also* XCMD. *Compare* internal command.

external function *n. See* XFCN.

External Gateway Protocol *n.* A protocol for distributing information regarding availability to the routers and gateways that interconnect networks. *Acronym:* EGP. *See also* gateway, router.

external gateway protocol *n. See* exterior gateway protocol.

external hard disk *n.* A free-standing hard disk with its own case and power supply, connected to the computer with a data cable and used mainly as a portable unit. *See also* hard disk.

external interrupt *n.* A hardware interrupt generated by hardware elements external to the microprocessor. *See also* hardware interrupt, internal interrupt, interrupt.

external modem *n.* A stand-alone modem that is connected via cable to a computer's serial port. *See also* internal modem.

external reference *n.* A reference in a program or routine to some identifier, such as code or data, that is not declared within that program or routine. The term usually refers to an identifier declared in code that is separately compiled. *See also* compile.

external storage *n.* A storage medium for data, such as a disk or tape unit, that is external to a computer's memory.

external viewer *n.* A separate application used to view documents that are of a type that cannot be handled by the current application. *See also* helper program.

extract *vb.* **1.** To remove or duplicate items from a larger group in a systematic manner. **2.** In programming, to derive one set of characters from another by using a mask (pattern) that determines which characters to remove.

extra-high-density floppy disk *n.* A 3.5-inch floppy disk capable of holding 4 MB of data and requiring a special disk drive that has two heads rather than one. *See also* floppy disk.

extranet *n.* An extension of a corporate intranet using World Wide Web technology to facilitate communication with the corporation's suppliers and customers. An extranet allows customers and suppliers to gain limited access

to a company's intranet in order to enhance the speed and efficiency of their business relationship. *See also* intranet.

extrinsic semiconductor *n.* A semiconductor that conducts electricity due to a P-type or N-type impurity that allows electrons to flow under certain conditions, such as heat application, by forcing them to move out of their standard state to create a new band of electrons or electron gaps. *See also* N-type semiconductor, P-type semiconductor, semiconductor.

eyeballs *n.* The individuals or the number of individuals who view a Web site or its advertising.

e-zine or **ezine** *n.* Short for **e**lectronic maga**zine**. A digital publication available on the Internet, a bulletin board system (BBS), or other online service, often free of charge.

F

F *n. See* farad.

F2F *adv.* Short for **f**ace-**to**-**f**ace. In person, rather than over the Internet. The term is used in e-mail.

face *n.* **1.** In geometry and computer graphics, one side of a solid object, such as a cube. **2.** In printing and typography, short for *typeface.*

face time *n.* Time spent dealing face-to-face with another person, rather than communicating electronically.

facsimile *n. See* fax.

factor *n.* In mathematics, an item that is multiplied in a multiplication problem; for example, 2 and 3 are factors in the problem 2 x 3. The prime factors of a number are a set of prime numbers that, when multiplied together, produce the number.

factorial *n.* Expressed as *n*! (*n* factorial), the result of multiplying the successive integers from 1 through *n*; *n*! equals *n* x (*n* – 1) x (*n* – 2) x ... x 1.

failback *n.* In a cluster network system (one with two or more interconnected servers), the process of restoring resources and services to their primary server after they have been temporarily relocated to a backup system while repairs were implemented on the original host. *See also* cluster, failover.

failover *vb.* In a cluster network system (one with two or more interconnected servers), to relocate an overloaded or failed resource, such as a server, a disk drive, or a network, to its redundant, or backup, component. For example, when one server in a two-server system stops processing because of a power outage or other malfunction, the system automatically fails over to the second server, with little or no disruption to the users. *See also* cluster, failback.

fail-safe system *n.* A computer system designed to continue operating without loss of or damage to programs and data when part of the system breaks down or seriously malfunctions. *Compare* fail-soft system.

fail-soft system *n.* A computer system designed to fail gracefully over a period of time when an element of hardware or software malfunctions. A fail-soft system terminates nonessential functions and remains operating at a diminished capacity until the problem has been corrected. *Compare* fail-safe system.

failure *n.* The inability of a computer system or related device to operate reliably or to operate at all. A common cause of system failure is loss of power, which can be minimized with a battery-powered backup source until all devices can be shut down. Within a system, electronic failures generally occur early in the life of a system or component and can often be produced by burning in the equipment (leaving it turned on constantly) for a few hours or days. Mechanical failures are difficult to predict but are most likely to affect devices, such as disk drives, that have moving parts.

failure rate *n.* The number of failures in a specified time period. Failure rate is a means of measuring the reliability of a device, such as a hard disk. *See also* MTBF.

fair queuing *n.* A technique used to improve quality of service that gives each session flow passing through a network device a fair share of network resources. With fair queuing, no prioritization occurs. *Acronym:* FQ. *See also* quality of service, queuing. *Compare* weighted fair queuing.

fair use *n.* A legal doctrine describing the boundaries of legitimate use of copyrighted software or other published material.

fallout *n.* Any failure of components that occurs while equipment is being burned in, especially when the test is done at the factory. *See also* burn in (definition 1).

family *n.* A series of hardware or software products that have some properties in common, such as a series of personal computers from the same company, a series of CPU chips from the same manufacturer that all use the same instruction set, a set of 32-bit operating systems based on the same API (for example, Windows 95 and Windows 98), or a set of fonts that are intended to be used together, such as Times New Roman. *See also* central processing unit, font, instruction set, operating system.

fan[1] *n.* The cooling mechanism built into computer cabinets, laser printers, and other such devices to prevent malfunction due to heat buildup. Fans are the main source of the continuous humming associated with computers and other hardware.

fan[2] *vb.* To flip through a stack of printer paper to ensure that the pages are loose and will not stick together or jam the printer.

F

fanfold paper *n.* Paper with pin-feed holes on both margins designed to be fed into the tractor-feed mechanism of a printer, page by page, in a continuous, unbroken stream. *Also called:* z-fold paper.

fan-in *n.* The maximum number of signals that can be fed to a given electronic device, such as a logic gate, at one time without risking signal corruption. The fan-in rating of a device depends on its type and method of construction. *Compare* fan-out.

fan-out *n.* The maximum number of electronic devices that can be fed by a given electronic device, such as a logic gate, at one time without the signal becoming too weak. The fan-out rating of a device depends on its type and method of construction. *Compare* fan-in.

fanzine *n.* A magazine, distributed on line or by mail, that is produced by and devoted to fans of a particular group, person, or activity. *See also* ezine.

FAQ *n.* Acronym for frequently asked questions. A document listing common questions and answers on a particular subject. FAQs are often posted on Internet newsgroups where new participants tend to ask the same questions that regular readers have answered many times.

farad *n.* The unit of capacitance (the ability to hold a charge). A 1-farad capacitor holds a charge of 1 coulomb with a potential difference of 1 volt between its plates. In practical use, a farad is an extremely large amount of capacitance; capacitance is usually expressed in terms of microfarads (10^{-6}) or picofarads (10^{-12}). *Abbreviation:* F.

FARNET *n. See* Federation of American Research Networks.

Fast Ethernet *n. See* 100BaseX.

fast Fourier transform *n.* A set of algorithms used to compute the discrete Fourier transform of a function, which in turn is used for solving series of equations, performing spectral analysis, and carrying out other signal-processing and signal-generation tasks. *Acronym:* FFT. *See also* Fourier transform.

fast infrared port *n. See* FIR port.

fast packet *n.* A standard for high-speed network technology that utilizes fast switching of fixed-length cells or packets for real-time transmission of data. *Also called:* Asynchronous Transfer Mode, ATM. *See also* packet (definition 2), packet switching.

fast packet switching *adj.* Of, describing, or pertaining to high-speed packet-switching networks that perform little or no error checking. The term is often, however, restricted to high-speed networking technologies, such as ATM, that transmit fixed-length cells rather than including those, such as frame relay, that transmit variable-length packets.

fast page-mode RAM *n. See* page mode RAM.

Fast SCSI *n.* A form of the SCSI-2 interface that can transfer data 8 bits at a time at up to 10 megabytes per second. The Fast SCSI connector has 50 pins. *Also called:* Fast SCSI-2. *See also* SCSI, SCSI-2. Compare Fast/Wide SCSI, Wide SCSI.

Fast/Wide SCSI *n.* A form of the SCSI-2 interface that can transfer data 16 bits at a time at up to 20 megabytes per second. The Fast/Wide SCSI connector has 68 pins. *Also called:* Fast/Wide SCSI-2. *See also* SCSI, SCSI-2. Compare Fast SCSI, Wide SCSI.

FAT *n. See* file allocation table.

fatal error *n.* An error that causes the system or application program to crash—that is, to fail abruptly with no hope of recovery.

fatal exception error *n.* A Windows message signaling that an unrecoverable error, one that causes the system to halt, has occurred. Data being processed when the error occurs is usually lost, and the computer must be rebooted. *See also* error handling.

fat application *n.* An application that can be used on both PowerPC processor–based Macintosh computers and 68K-based Macintosh computers.

fat binary *n.* An application format that supports both PowerPC processor–based Macintosh computers and 68K-based Macintosh computers.

fatbits *n.* **1.** Originally (as FatBits), a feature of the Apple MacPaint program in which a small portion of a drawing can be enlarged and modified one pixel (FatBit) at a time. **2.** A similar feature in any program that allows pixel-by-pixel modification through a zoom feature.

fat client *n.* In a client/server architecture, a client machine that performs most or all of the processing, with little or none performed by the server. The client handles presentation and functions, and the server manages data and access to it. *See also* client (definition 3), client/server architecture, server (definition 2), thin server. *Compare* fat server, thin client.

FAT file system *n.* The system used by MS-DOS to organize and manage files. The FAT (file allocation table) is a data structure that MS-DOS creates on the disk when the disk is formatted. When MS-DOS stores a file on a formatted disk, the operating system places information about the stored file in the FAT so that MS-DOS can retrieve the file later when requested. The FAT is the only file system MS-DOS can use; OS/2, Windows NT, and Windows 9x operating systems can use the FAT file system in addition to their own file systems (HPFS, NTFS, and VFAT, respectively). *See also* file allocation table, HPFS, NTFS, OS/2, VFAT, Windows.

father *n. See* generation (definition 1).

father file *n.* A file that is the last previously valid set of a changing set of data. The father file is immediately preceded by a grandfather file and immediately succeeded by its son. The pairs *father* and *son*, *parent* and *child* (or *descendant*), and *independent* and *dependent* are synonymous. *See also* generation (definition 1).

fat server *n.* In a client/server architecture, a server machine that performs most of the processing, with little or none performed by the client. Applications logic and data reside on the server, and presentation services are handled by the client. *See also* client (definition 3), client/server architecture, server (definition 2), thin client. *Compare* fat client, thin server.

fatware *n.* Software that monopolizes hard disk space and power due to an overabundance of features or inefficient design. *Also called:* bloatware.

fault *n.* **1.** A physical defect, such as a loose connection, that prevents a system or device from operating as it should. **2.** A programming error that can cause the software to fail. **3.** As page fault, an attempt to access a page of virtual memory that is not mapped to a physical address. *See also* page fault.

fault resilience *n. See* high availability.

fault tolerance *n.* The ability of a computer or an operating system to respond to a catastrophic event or fault, such as a power outage or a hardware failure, in a way that ensures that no data is lost and any work in progress is not corrupted. This can be accomplished with a battery-backed power supply, backup hardware, provisions in the operating system, or any combination of these. In a fault-tolerant network, the system has the ability either to continue the system's operation without loss of data or to shut the system down and restart it, recovering all processing that was in progress when the fault occurred.

favorite *n.* In Microsoft Internet Explorer, a user-defined shortcut to a page on the World Wide Web, analogous to a bookmark in Netscape Navigator. *See also* Favorites folder, hotlist. *Compare* bookmark (definition 2).

Favorites folder *n.* In Microsoft Internet Explorer, a collection of shortcuts to Web sites that a user has selected for future reference. Other Web browsers refer to this collection by other names, such as bookmarks or hotlists. *See also* bookmark file (definition 1), Internet Explorer, URL. *Compare* bookmark (definition 2), hotlist.

fax *n.* Short for **facs**imile. The transmission of text or graphics over telephone lines in digitized form. Conventional fax machines scan an original document, transmit an image of the document as a bit map, and reproduce the received image on a printer. Resolution and encoding are standardized in the CCITT Groups 1–4 recommendations. Fax images can also be sent and received by microcomputers equipped with fax hardware and software. *See also* CCITT Groups 1–4.

fax machine *n.* Short for **facs**imile **machine**. A device that scans pages, converts the images of those pages to a digital format consistent with the international facsimile standard, and transmits the image through a telephone line. A fax machine also receives such images and prints them on paper. *See also* scan (definition 2).

fax modem *n.* A modem that sends (and possibly receives) data encoded in a fax format (typically CCITT fax format), which a fax machine or another modem decodes and converts to an image. The image must already have been encoded on the host computer. Text and graphic documents can be converted into fax format by special software usually provided with the modem; paper documents must first be scanned in. Fax modems may be internal or external and may combine fax and conventional modem capabilities. *See also* fax, modem.

fax on demand *n.* An automated system that makes information available for request by telephone. When a request is made, the system faxes the information to the telephone number given in the request. *Acronym:* FOD.

fax program *n.* A computer application that allows the user to send, receive, and print fax transmissions. *See also* fax.

fax server *n.* A computer on a network capable of sending and receiving fax transmissions to and from other computers on the network. *See also* fax, server (definition 1).

FCB *n. See* file control block.

FCC *n.* Acronym for Federal Communications Commission. The U.S. agency created by the Communications Act of 1934, which regulates interstate and international wire, radio, and other broadcast transmissions, including telephone, telegraph, and telecommunications.

F connector *n.* A coaxial connector, used primarily in video applications, that requires a screw-on attachment. See the illustration.

F connector.

FDDI *n.* Acronym for Fiber Distributed Data Interface. A standard developed by the American National Standards Institute (ANSI) for high-speed fiber-optic LANs (local area networks). FDDI provides specifications for transmission rates of 100 megabits (100 million bits) per second on networks based on the token ring standard. *See also* token ring network.

FDDI II *n.* Acronym for Fiber Distributed Data Interface. An extension of the FDDI standard, FDDI II contains additional specifications for the real-time transmission of analog data in digitized form for high-speed fiber-optic LANs (local area networks). *See also* FDDI.

FDHP *n.* Acronym for Full Duplex Handshaking Protocol. A protocol used by duplex modems to determine the source type of the transmission and match it. *See also* duplex[1], handshake.

FDM *n.* Acronym for Frequency Division Multiplexing. A means of loading multiple transmission signals onto separate bands of a single communications channel so that all signals can be carried simultaneously. FDM is used in analog transmissions, as on a baseband network or in communications over a telephone line. In FDM the frequency range of the channel is divided into narrower bands, each of which can carry a different transmission signal. For example, FDM might divide a voice channel with a frequency range of 1400 hertz (Hz) into four subchannels—820–990 Hz, 1230–1400 Hz, 1640–1810 Hz, and 2050–2220 Hz—with adjacent subchannels separated by a 240-Hz guard band to minimize interference.

FDMA *n.* Acronym for Frequency Division Multiple Access. A method of multiplexing in which the set of frequencies assigned to cellular phone service is divided into 30 separate channels, each of which can be used by a different caller. FDMA is the technology used in the AMPS phone service, which is widespread in North America and in other countries around the world. *See also* AMPS. *Compare* TDMA.

fear, uncertainty, and doubt *n. See* FUD.

feasibility study *n.* An evaluation of a prospective project for the purpose of determining whether or not the project should be undertaken. Feasibility studies normally consider the time, budget, and technology required for completion and are generally used in computing departments in large organizations.

feature *n.* A unique, attractive, or desirable property of a program or of a computer or other hardware.

feature extraction *n.* The selection of significant aspects of a computer image for use as guidelines in computerized pattern matching and image recognition. *See also* image processing.

featuritis *n.* Jargon for a tendency to add new features to a program at the expense of its original compact size or elegance. Creeping featuritis describes the accretion of feature upon feature over time, eventually resulting in a large, unwieldy, generally inelegant program that is, or appears to be, a collection of ad-hoc additions. The result of featuritis is a program condition known as software bloat. *Also called:* creeping featuritis, creeping featurism, feeping creaturism. *See also* bloatware.

February 30 *n. See* double leap year.

Federal Communications Commission *n. See* FCC.

Federal Information Processing Standards *n.* A system of standards, guidelines, and technical methods for information processing within the U.S. federal government. *Acronym:* FIPS.

Federal Internet Exchange *n. See* FIX.

federated database *n.* A database to which scientists contribute their findings and knowledge regarding a particular field or problem. A federated database is designed for scientific collaboration on problems of such scope that they are difficult or impossible for an individual to solve. *See also* database.

Federation of American Research Networks *n.* A nonprofit association of internetworking technology companies in the United States that serves as a national advocate for internetworking, with a primary focus on the education, research, and related communities. *Acronym:* FARNET. *See also* internetwork.

Federation on Computing in the United States *n.* The U.S. representative of the International Federation of Information Processing (IFIP). *Acronym:* FOCUS. *See also* IFIP.

feed[1] *n. See* news feed.

feed[2] *vb.* **1.** To advance paper through a printer. **2.** To supply media to a recording device, as by inserting disks into a disk drive.

feedback *n.* The return of a portion of system output as input to the same system. Often feedback is deliberately designed into a system, but sometimes it is unwanted. In electronics, feedback is used in monitoring, controlling, and amplifying circuitry.

feedback circuit *n.* Any circuit or system that returns (feeds back) a portion of its output to its input. A common example of a feedback system, although it is not completely electronic, is a thermostatically controlled household heating system. This self-limiting or self-correcting process is an example of negative feedback, in which changes in output are fed back to the source so that the change in the output is reversed. In positive feedback, an increase in output is fed back to the source, increasing the output further, which creates a snowballing effect. An example of unwanted positive feedback is the "screech" that occurs when the microphone of a public address system is brought too close to its loudspeaker.

feed scanner *n. See* sheet-fed scanner.

feeping creaturism *n. See* featuritis.

female connector *n.* A connector that has one or more receptacles for the insertion of pins. Female connector part numbers often include an *F* (female), an *S* (socket), a *J* (jack), or an *R* (receptacle). For example, a female DB-25 connector might be labeled DB-25S or DB-25F. (Note that although the letter *F* can denote a female connector, it does not have that meaning in *F connector*, which is a type of coaxial cable connector.) See the illustration. *Compare* male connector.

Female connector.

femto- *prefix* Metric prefix meaning 10^{-15} (one quadrillionth).

femtosecond *n.* One quadrillionth (10^{-15}) of a second. *Abbreviation:* fs.

FEP *n. See* front-end processor.

ferric oxide *n.* The chemical substance Fe2O3, an oxide of iron used with a binding agent in the magnetic coating applied to disks and tapes for data storage.

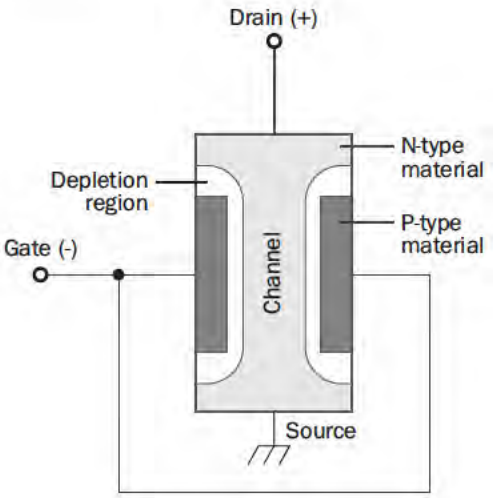
ferric RAM *n. See* FRAM.

ferromagnetic domain *n. See* magnetic domain.

ferromagnetic material *n.* A substance that can become highly magnetized. Ferrite and powdered iron are ferromagnetic materials commonly used in electronics, for example, as cores for inductors to increase their inductance, and as part of the coating on floppy and hard disks and magnetic tape.

FET *n.* Acronym for field-effect transistor. A type of transistor in which the flow of current between the source and the drain is modulated by the electric field around the gate electrode. FETs are used as amplifiers, oscillators, and switches and are characterized by an extremely high input impedance (resistance) that makes them particularly suitable for amplification of very small signals. Types of FETs include the junction FET and the metal-oxide semiconductor FET (MOSFET). See the illustration. *See also* MOSFET.

F



FET. *An N-channel junction field-effect transistor.*

fetch *vb.* To retrieve an instruction or an item of data from memory and store it in a register. Fetching is part of the execution cycle of a microprocessor; first an instruction or item of data must be fetched from memory and loaded into a register, after which it can be executed (if it is an instruction) or acted upon (if it is data).

fetch time *n. See* instruction time.

FF *n. See* form feed.

FFT *n. See* fast Fourier transform.

FFTDCA *n. See* Final-Form-Text DCA.

Fiber Distributed Data Interface *n. See* FDDI.

fiberoptic cable or **fiber-optic cable** *n.* A form of cable used in networks that transmits signals optically, rather than electrically as do coaxial and twisted-pair cable. The light-conducting heart of a fiberoptic cable is a fine glass or plastic fiber called the core. This core is surrounded by a refractive layer called the cladding that effectively traps the light and keeps it bouncing along the central fiber. Outside both the core and the cladding is a final layer of plastic or plastic-like material called the coat, or jacket. Fiberoptic cable can transmit clean signals at speeds as high as 2 Gbps. Because it transmits light, not electricity, it is also immune to eavesdropping.

fiber optics *n.* A technology for the transmission of light beams along optical fibers. A light beam, such as that produced in a laser, can be modulated to carry information. Because light has a higher frequency on the electromagnetic spectrum than other types of radiation, such as radio waves, a single fiber-optic channel can carry significantly more information than most other means of information transmission. Optical fibers are thin strands of glass or other transparent material, with dozens or hundreds of strands housed in a single cable. Optical fibers are essentially immune to electromagnetic interference. *See also* optical fiber.

fiber to the curb *n. See* FTTC.

fiber to the home *n. See* FTTH.

Fibonacci numbers *n.* In mathematics, an infinite series in which each successive integer is the sum of the two integers that precede it—for example, 1, 1, 2, 3, 5, 8, 13, 21, 34, ... Fibonacci numbers are named for the thirteenth-century mathematician Leonardo Fibonacci of Pisa. In computing, Fibonacci numbers are used to speed binary searches by repeatedly dividing a set of data into groups in accordance with successively smaller pairs of numbers in the Fibonacci sequence. For example, a data set of 34 items would be divided into one group of 21 and another of 13. If the item being sought is in the group of 13, the group of 21 is discarded, and the group of 13 is divided into groups of 5 and 8; the search would continue until the item was located. The ratio of two successive terms in the Fibonacci sequence converges on the Golden Ratio, a "magic number" that seems to represent the proportions of an ideal rectangle. The number describes many things, from the curve of a nautilus shell to the proportions of playing cards or, intentionally, the Parthenon, in Athens, Greece. *See also* binary search.

fiche *n. See* microfiche.

Fidonet *n.* **1.** A protocol for sending e-mail, newsgroup postings, and files over telephone lines. The protocol originated on the Fido BBS, initiated in 1984 by Tom Jennings, and maintaining low costs has been a factor in its subsequent development. Fidonet can exchange e-mail with the Internet. **2.** The network of BBSs, private companies, NGOs (nongovernment organizations), and individuals that use the Fidonet protocol.

field *n.* **1.** A location in a record in which a particular type of data is stored. For example, EMPLOYEE-RECORD might contain fields to store Last-Name, First-Name, Address, City, State, Zip-Code, Hire-Date, Current-Salary, Title, Department, and so on. Individual fields are characterized by their maximum length and the type of data (for

example, alphabetic, numeric, or financial) that can be placed in them. The facility for creating these specifications usually is contained in the data definition language (DDL). In relational database management systems, fields are called *columns*. **2.** A space in an on-screen form where the user can enter a specific item of information.

field-effect transistor *n. See* FET.

field expansion *n. See* date expansion.

Field Programmable Gate Array *n. See* FPGA.

field-programmable logic array *n.* An integrated circuit containing an array of logic circuits in which the connections between the individual circuits, and thus the logic functions of the array, can be programmed after manufacture, typically at the time of installation in the field. Programming can be performed only once, typically by passing high current through fusible links on the chip. *Acronym:* FPLA. *Also called:* PLA, programmable logic array.

field separator *n.* Any character that separates one field of data from another. *See also* delimiter, field (definition 1).

FIFO *n. See* first in, first out.

fifth-generation computer *n. See* computer.

fifth normal form *n. See* normal form (definition 1).

file *n.* A complete, named collection of information, such as a program, a set of data used by a program, or a user-created document. A file is the basic unit of storage that enables a computer to distinguish one set of information from another. A file is the "glue" that binds a conglomeration of instructions, numbers, words, or images into a coherent unit that a user can retrieve, change, delete, save, or send to an output device.

file allocation table *n.* A table or list maintained by some operating systems to manage disk space used for file storage. Files on a disk are stored, as space allows, in fixed-size groups of bytes (characters) rather than from beginning to end as contiguous strings of text or numbers. A single file can thus be scattered in pieces over many separate storage areas. A file allocation table maps available disk storage space so that it can mark flawed segments that should not be used and can find and link the pieces of a file. In MS-DOS, the file allocation table is commonly known as the FAT. *See also* FAT file system.

file attribute *n.* A restrictive label attached to a file that describes and regulates its use—for example, hidden, system, read-only, archive, and so forth. In MS-DOS, this information is stored as part of the file's directory entry.

file backup *n. See* backup.

file compression *n.* The process of reducing the size of a file for transmission or storage. *See also* data compression.

file control block *n.* A small block of memory temporarily assigned by a computer's operating system to hold information about an opened file. A file control block typically contains such information as the file's identification, its location on a disk, and a pointer that marks the user's current (or last) position in the file. *Acronym:* FCB.

file conversion *n.* The process of transforming the data in a file from one format to another without altering the data—for example, converting a file from a word processor's format to its ASCII equivalent. In some cases, information about the data, such as formatting, may be lost. Another, more detailed, type of file conversion involves changing character coding from one standard to another, as in converting EBCDIC characters (which are used primarily with mainframe computers) to ASCII characters. *See also* ASCII, EBCDIC.

file extension *n. See* extension (definition 1).

file extent *n. See* extent.

file format *n.* The structure of a file that defines the way it is stored and laid out on the screen or in print. The format can be fairly simple and common, as are files stored as "plain" ASCII text, or it can be quite complex and include various types of control instructions and codes used by programs, printers, and other devices. Examples include RTF (Rich Text Format), DCA (Document Content Architecture), PICT, DIF (Data Interchange Format), DXF (Data Exchange File), TIFF (Tagged Image File Format), and EPSF (Encapsulated PostScript Format).

file fragmentation *n.* **1.** The breaking apart of files as they are stored by the operating system into small, separate segments on disk. The condition is a natural consequence of enlarging files and saving them on a crowded disk that no longer contains contiguous blocks of free space large enough to hold them. File fragmentation is not an integrity problem, although it can eventually slow read and write access times if the disk is very full and storage is badly fragmented. Software products are available for redistributing (optimizing) file storage to reduce fragmentation. **2.** In a database, a situation in which records are not stored in their optimal access sequence because of accumulated additions and deletions of records. Most database

systems offer or contain utility programs that resequence records to improve efficiency of access and to aggregate free space occupied by deleted records.

file gap *n. See* block gap.

file handle *n.* In MS-DOS, OS/2, and Windows, a token (number) that the system uses to identify or refer to an open file or, sometimes, to a device.

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file-handling routine *n.* Any routine designed to assist in creating, opening, accessing, and closing files. Most high-level languages have built-in file-handling routines, although more sophisticated or complex file-handling routines in an application are often created by the programmer.

file header *n. See* header (definition 2).

file layout *n.* In data storage, the organization of records within a file. Frequently, descriptions of the record structure are also included within the file layout.

file librarian *n.* A person or process responsible for maintaining, archiving, copying, and providing access to a collection of data.

file maintenance *n.* Broadly, the process of changing information in a file, altering a file's control information or structure, or copying and archiving files. A person using a terminal to enter data, the program accepting the data from the terminal and writing it to a data file, and a database administrator using a utility to alter the format of a database file are all forms of file maintenance.

file management system *n.* The organizational structure that an operating system or program uses to order and track files. For example, a hierarchical file system uses directories in a so-called tree structure. All operating systems have built-in file management systems. Commercially available products implement additional features that provide more sophisticated means of navigating, finding, and organizing files. *See also* file system, hierarchical file system.

file manager *n.* A module of an operating system or environment that controls the physical placement of and access to a group of program files.

file name *n.* The set of letters, numbers, and allowable symbols assigned to a file to distinguish it from all other files in a particular directory on a disk. A file name is the label under which a computer user saves and requests a block of information. Both programs and data have file names and often extensions that further identify the type or purpose of the file. Naming conventions, such as maximum length and allowable characters of a file name, vary from one operating system to another. *See also* directory, path (definition 5).

file name extension *n. See* extension (definition 1).

filename globbing *n.* A Linux command-line feature, available on most FTP servers, which allows a user to refer to sets of files without individually listing each file name. Filename globbing can be used to select or delete all files in a working directory with a single command. At the discretion of the user, globbing can match all files, or only those with filenames containing a specific character or range of characters. *See also* wildcard character.

file property *n.* A detail about a file that helps identify it, such as a descriptive title, the author name, the subject, or a keyword that identifies topics or other important information in the file.

file protection *n.* A process or device by which the existence and integrity of a file are maintained. Methods of file protection range from allowing read-only access and assigning passwords to covering the write-protect notch on a disk and locking away floppy disks holding sensitive files.

file recovery *n.* The process of reconstructing lost or unreadable files on disk. Files are lost when they are inadvertently deleted, when on-disk information about their storage is damaged, or when the disk is damaged. File recovery involves the use of utility programs that attempt to rebuild on-disk information about the storage locations of deleted files. Because deletion makes the file's disk space available but does not remove the data, data that has not yet been overwritten can be recovered. In the case of damaged files or disks, recovery programs read whatever raw data they can find, and save the data to a new disk or file in ASCII or numeric (binary or hexadecimal) form. In some instances, however, such reconstructed files contain so much extraneous or mixed information that they are unreadable. The best way to recover a file is to restore it from a backup copy.

file retrieval *n.* The act of accessing a data file and transferring it from a storage location to the machine where it is to be used.

file server *n.* A file-storage device on a local area network that is accessible to all users on the network. Unlike a disk server, which appears to the user as a remote disk drive, a file server is a sophisticated device that not only stores files but manages them and maintains order as net-

work users request files and make changes to them. To deal with the tasks of handling multiple—sometimes simultaneous—requests for files, a file server contains a processor and controlling software as well as a disk drive for storage. On local area networks, a file server is often a computer with a large hard disk that is dedicated only to the task of managing shared files. *Compare* disk server.

File Server for Macintosh *n.* An AppleTalk network integration service that allows Macintosh clients and personal computers clients to share files. *Also called:* MacFile. *See also* Print Server for Macintosh, Services for Macintosh.

file sharing *n.* The use of computer files on networks, wherein files are stored on a central computer or a server and are requested, reviewed, and modified by more than one individual. When a file is used with different programs or different computers, file sharing can require conversion to a mutually acceptable format. When a single file is shared by many people, access can be regulated through such means as password protection, security clearances, or file locking to prohibit changes to a file by more than one person at a time.

file size *n.* The length of a file, typically given in bytes. A computer file stored on disk actually has two file sizes, logical size and physical size. The logical file size corresponds to the file's actual size—the number of bytes it contains. The physical size refers to the amount of storage space allotted to the file on disk. Because space is set aside for a file in blocks of bytes, the last characters in the file might not completely fill the block (allocation unit) reserved for them. When this happens, the physical size is larger than the logical size of the file.

filespec *n. See* file specification (definition 1).

file specification *n.* **1.** The path to a file, from a disk drive through a chain of directory files to the file name that serves to locate a particular file. Abbreviated filespec. **2.** A file name containing wildcard characters that indicate which files among a group of similarly named files are requested. **3.** A document that describes the organization of data within a file.

file structure *n.* A description of a file or group of files that are to be treated together for some purpose. Such a description includes file layout and location for each file under consideration.

file system *n.* In an operating system, the overall structure in which files are named, stored, and organized. A file system consists of files, directories, or folders, and the information needed to locate and access these items. The term can also refer to the portion of an operating system that translates requests for file operations from an application program into low-level, sector-oriented tasks that can be understood by the drivers controlling the disk drives. *See also* driver.

file transfer *n.* The process of moving or transmitting a file from one location to another, as between two programs or over a network.

File Transfer Protocol *n. See* FTP[1] (definition 1).

file type *n.* A designation of the operational or structural characteristics of a file. A file's type is often identified in the file name, usually in the file name extension. *See also* file format.

fill[1] *n.* In computer graphics, the colored or patterned "paint" inside an enclosed figure, such as a circle. The portion of the shape that can be colored or patterned is the fill area. Drawing programs commonly offer tools for creating filled or nonfilled shapes; the user can specify color or pattern.

fill[2] *vb.* To add color or a pattern to the enclosed portion of a circle or other shape.

fill handle *n.* The small black square in the lower-right corner of a cell selection. When you point to the fill handle, the pointer changes to a black cross.

film at 11 *n.* A phrase sometimes seen in newsgroups. An allusion to a brief newsbreak on TV that refers to a top news story that will be covered in full on the 11 o'clock news, it is used sarcastically to ridicule a previous article's lack of timeliness or newsworthiness. *See also* newsgroup.

film recorder *n.* A device for capturing on 35-mm film the images displayed on a computer screen.

film ribbon *n. See* carbon ribbon.

filter *n.* **1.** A program or set of features within a program that reads its standard or designated input, transforms the input in some desired way, and then writes the output to its standard or designated output destination. A database filter, for example, might flag information of a certain age. **2.** In communications and electronics, hardware or software that selectively passes certain elements of a signal and eliminates or minimizes others. A filter on a communications network, for example, must be designed to transmit a certain frequency but attenuate (dampen) frequencies above it (a lowpass filter), those below it (a highpass filter), or those above and below it (a bandpass filter). **3.** A pattern or mask through which data is passed to weed out specified items. For instance, a filter used in e-mail or in retrieving newsgroup messages can allow users to filter

out messages from other users. *See also* e-mail filter, mask. **4.** In computer graphics, a special effect or production effect that is applied to bitmapped images; for example, shifting pixels within an image, making elements of the image transparent, or distorting the image. Some filters are built into a graphics program, such as a paint program or an image editor. Others are separate software packages that plug into the graphics program. *See also* bitmapped graphics, image editor, paint program.

F

filtering program *n.* A program that filters information and presents only results that match the qualifications defined in the program.

FilterKeys *n.* A Windows 9x accessibility control panel feature that enables users with physical disabilities to use the keyboard. With FilterKeys, the system ignores brief and repeated keystrokes that result from slow or inaccurate finger movements. *See also* accessibility. *Compare* MouseKeys, ShowSounds, SoundSentry, StickyKeys, ToggleKeys.

Final-Form-Text DCA *n.* A standard in Document Content Architecture (DCA) for storing documents in ready-to-print form for interchange between dissimilar programs. A related standard is Revisable-Form-Text DCA (RFTDCA). *Acronym:* FFTDCA. *See also* DCA (definition 1). *Compare* Revisable-Form-Text DCA.

finally *n.* A keyword used in the Java programming language that executes a block of statements regardless of whether a Java exception, or run-time error, occurred in a previous block defined by the "try" keyword. *See also* block, exception, keyword, try.

find *vb. See* search[2].

Finder *n.* The standard interface to the Macintosh operating system. The Finder allows the user to view the contents of directories (folders); to move, copy, and delete files; and to launch applications. Items in the system are often represented as icons, and a mouse or similar pointing device is used to manipulate these items. The Finder was the first commercially successful graphical user interface, and it helped launch a wave of interest in icon-based systems. *See also* MultiFinder.

finger[1] *n.* An Internet utility, originally limited to UNIX but now available on many other platforms, that enables a user to obtain information on other users who may be at other sites (if those sites permit access by finger). Given an e-mail address, finger returns the user's full name, an indication of whether or not the user is currently logged on, and any other information the user has chosen to supply as a profile. Given a first or last name, finger returns the logon names of users whose first or last names match.

finger[2] *vb.* To obtain information on a user by means of the finger program.

fingerprint[1] *vb.* To scan a computer system to discover what operating system (OS) the computer is running. By detecting a computer's OS through fingerprinting, a hacker is better able to specify attacks on system vulnerabilities and therefore better able to plan an attack on that system. A hacker may use several different fingerprinting schemes separately and in tandem to pinpoint the OS of a target computer.

fingerprint[2] *n.* Information embedded or attached to a file or image to uniquely identify it. *Compare* digital watermark.

fingerprint reader *n.* A scanner that reads human fingerprints for comparison to a database of stored fingerprint images.

fingerprint recognition *n.* A technology used to control access to a computer, network, or other device or to a secure area through a user's fingerprints. The patterns of an individual's fingers are scanned by a fingerprint reader or similar device and matched with stored images of fingerprints before access is granted. *See also* biometric.

FIPS *n. See* Federal Information Processing Standards.

FIPS 140-1 *n.* Acronym for **F**ederal **I**nformation **P**rocessing **S**tandard 140-1. A U.S. Government standard, issued by the National Institute of Standards and Technology (NIST), entitled Security Requirements for Cryptographic Modules. FIPS 140-1 defines four levels of security requirements related to cryptographic hardware and software modules within computer and telecommunications systems used for sensitive but unclassified data. The four security levels range from basic module design through increasingly stringent levels of physical security. The standard covers such security-related features as hardware and software security, cryptographic algorithms, and management of encryption keys. FIPS 140-1products can be validated for federal use in both the United States and Canada after independent testing under the Cryptographic Module Validation (CMV) Program, developed and jointly adopted by NIST and the Canadian Communication Security Establishment. *See also* cryptography.

firewall *n.* A security system intended to protect an organization's network against external threats, such as hackers, coming from another network, such as the Internet.

Usually a combination of hardware and software, a firewall prevents computers in the organization's network from communicating directly with computers external to the network and vice versa. Instead, all communication is routed through a proxy server outside of the organization's network, and the proxy server decides whether it is safe to let a particular message or file pass through to the organization's network. *See also* proxy server.

firewall sandwich *n.* The use of load-balancing appliances on both sides of Internetworked firewalls to distribute both inbound and outbound traffic among the firewalls. The firewall sandwich architecture helps to prevent firewalls from degrading network performance and creating a single point of network failure. *See also* firewall, load balancing.

FireWire *n.* A high-speed serial bus from Apple that implements the IEEE 1394 standard. *See also* IEEE 1394.

firmware *n.* Software routines stored in read-only memory (ROM). Unlike random access memory (RAM), read-only memory stays intact even in the absence of electrical power. Startup routines and low-level input/output instructions are stored in firmware. It falls between software and hardware in terms of ease of modification. *See also* RAM, ROM.

FIR port *n.* Short for **f**ast **i**nfra**r**ed **port**. A wireless I/O port, most common on a portable computer, that exchanges data with an external device using infrared light. *See also* infrared, input/output port.

FIRST *n.* Acronym for **F**orum of **I**ncident **R**esponse and **S**ecurity **T**eams. An organization within the Internet Society (ISOC) that coordinates with CERT in order to encourage information sharing and a unified response to security threats. *See also* CERT, Internet Society.

first-generation computer *n. See* computer.

first in, first out *n.* A method of processing a queue, in which items are removed in the same order in which they were added—the first in is the first out. Such an order is typical of a list of documents waiting to be printed. *Acronym:* FIFO. *See also* queue. *Compare* last in, first out.

first normal *n. See* normal form (definition 1).

fishbowl *n.* A secure area within a computer system in which intruders can be contained and monitored. A fishbowl is typically set up by a security administrator to impersonate important applications or information so that the system administrator can learn more about hackers who have broken into the network without the hacker learning more about or damaging the system. *See also* honeypot.

fitting *n.* The calculation of a curve or other line that most closely approximates a set of data points or measurements. *See also* regression analysis.

five-nines availability *n.* The availability of a system 99.999 percent of the time. *See* also high availability.

FIX *n.* Acronym for **F**ederal **I**nternet E**x**change. A connection point between the U.S. government's various internets and the Internet. There are two Federal Internet Exchanges: FIX West, in Mountain View, California; and FIX East, in College Park, Maryland. Together, they link the backbones of MILNET, ESnet (the TCP/IP network of the Department of Energy), and NSInet (NASA Sciences Internet) with NSFnet. *See also* backbone (definition 1), MILNET, NSFnet, TCP/IP.

fixed disk *n. See* hard disk.

fixed-length field *n.* In a record or in data storage, a field whose size in bytes is predetermined and constant. A fixed-length field always takes up the same amount of space on a disk, even when the amount of data stored in the field is small. *Compare* variable-length field.

fixed-pitch spacing *n. See* monospacing.

fixed-point arithmetic *n.* Arithmetic performed on fixed-point numbers. *See also* fixed-point notation.

fixed-point notation *n.* A numeric format in which the decimal point has a specified position. Fixed-point numbers are a compromise between integral formats, which are compact and efficient, and floating-point numeric formats, which have a great range of values. Like floating-point numbers, fixed-point numbers can have a fractional part, but operations on fixed-point numbers usually take less time than floating-point operations. *See also* floating-point notation, integer.

fixed space *n.* A set amount of horizontal space used to separate characters in text—often, the width of a numeral in a given font. *See also* em space, en space, thin space.

fixed spacing *n. See* monospacing.

fixed storage *n.* Any nonremovable storage, such as a large disk that is sealed permanently in its drive.

fixed-width font *n. See* monospace font.

fixed-width spacing *n. See* monospacing.

fixed-word-length computer *n.* A description that applies to almost all computers and refers to the uniform size of the data units, or words, that are processed by the microprocessor and shuttled through the system over the hardware lines composing the main data bus. Fixed-word-length computers, including IBM and Macintosh personal computers, commonly work with 2 or 4 bytes at a time.

F

F keys *n. See* function key.

flag *n.* **1.** Broadly, a marker of some type used by a computer in processing or interpreting information; a signal indicating the existence or status of a particular condition. Flags are used in such areas as communications, programming, and information processing. Depending on its use, a flag can be a code, embedded in data, that identifies some condition, or it can be one or more bits set internally by hardware or software to indicate an event of some type, such as an error or the result of comparing two values. **2.** In the HDLC communications protocol, a flag is the unique series of bits 01111110, used to start and end a transmission frame (message unit). *See also* HDLC.

flame[1] *n.* An abusive or personally insulting e-mail message or newsgroup posting.

flame[2] *vb.* **1.** To send an abusive or personally insulting e-mail message or newsgroup posting. **2.** To criticize personally by means of e-mail messages or newsgroup postings.

flame bait *n.* A posting to a mailing list, newsgroup, or other online conference that is likely to provoke flames, often because it expresses a controversial opinion on a highly emotional topic. *See also* flame[1], flame war. *Compare* troll.

flamefest *n.* A series of inflammatory messages or articles in a newsgroup or other online conference.

flamer *n.* A person who sends or posts abusive messages via e-mail, in newsgroups and other online forums, and in online chats. *See also* chat[1] (definition 1), newsgroup.

flame war *n.* A discussion in a mailing list, newsgroup, or other online conference that has turned into a protracted exchange of flames. *See also* flame[1].

Flash *n.* A vector graphics file format (extension .swf) developed by Macromedia to enable designers to add animation and interactivity to multimedia Web pages. Flash files can be played back with a downloadable Shockwave plug-in or a Java program. The file format has been released by Macromedia as an open standard for the Internet.

flash *vb. See* burn.

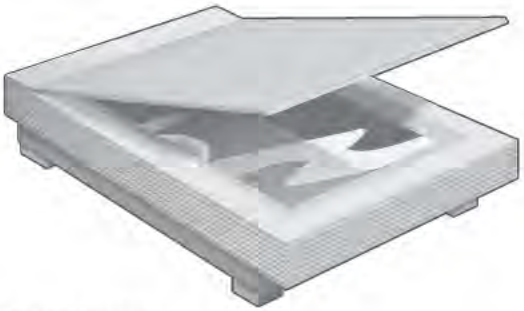
flash memory *n.* A type of nonvolatile memory. Flash memory is similar to EEPROM memory in function but it must be erased in blocks, whereas EEPROM can be erased one byte at a time. Because of its block-oriented nature, flash memory is commonly used as a supplement to or replacement for hard disks in portable computers. In this context, flash memory either is built into the unit or, more commonly, is available as a PC Card that can be plugged into a PCMCIA slot. A disadvantage of the block-oriented nature of flash memory is that it cannot be practically used as main memory (RAM) because a computer needs to be able to write to memory in single-byte increments. *See also* EEPROM, nonvolatile memory, PC Card, PCMCIA slot.

flash ROM *n. See* flash memory.

flat address space *n.* An address space in which each location in memory is specified by a unique number. (Memory addresses start at 0 and increase sequentially by 1.) The Macintosh operating system, OS/2, and Windows NT use a flat address space. MS-DOS uses a segmented address space, in which a location must be accessed with a segment number and an offset number. *See also* segmentation. *Compare* segmented address space.

flatbed plotter *n.* A plotter in which paper is held on a flat platform and a pen moves along both axes, traveling across the paper to draw an image. This method is slightly more accurate than that used by drum plotters, which move the paper under the pen, but requires more space. Flatbed plotters can also accept a wider variety of media, such as vellum and acetate, because the material does not need to be flexible. *See also* plotter. *Compare* drum plotter, pinch-roller plotter.

flatbed scanner *n.* A scanner with a flat, transparent surface that holds the image to be scanned, generally a book or other paper document. A scan head below the surface moves across the image. Some flatbed scanners can also reproduce transparent media, such as slides. See the illustration. *Compare* drum scanner, handheld scanner, sheet-fed scanner.



Flatbed scanner.

flat file *n.* A file consisting of records of a single record type in which there is no embedded structure information that governs relationships between records.

flat-file database *n.* A database that takes the form of a table, where only one table can be used for each database. A flat-file database can only work with one file at a time. *Compare* relational database.

flat file directory *n.* A directory that cannot contain subdirectories but simply contains a list of file names. *Compare* hierarchical file system.

flat file format *n.* An image file format in which individual objects cannot be edited. Files stored in JPEG, GIF, and BMP formats, for example, are all flat files.

flat file system *n.* A filing system with no hierarchical order in which no two files on a disk may have the same name, even if they exist in different directories. *Compare* hierarchical file system.

flat memory *n.* Memory that appears to a program as one large addressable space, whether consisting of RAM or virtual memory. The 68000 and VAX processors have flat memory; by contrast, 80x86 processors operating in real mode have segmented memory, although when these processors operate in protected mode, OS/2 and 32-bit versions of Windows access memory using a flat memory model. *Also called:* linear memory.

flat pack *n.* An integrated circuit housed in a flat rectangular package with connecting leads along the edges of the package. The flat pack was a precursor of surface-mounted chip packaging. *See also* surface-mount technology. *Compare* DIP (definition 1).

flat-panel display *n.* A video display with a shallow physical depth, based on technology other than the CRT (cathode-ray tube). Such displays are typically used in laptop computers. Common types of flat-panel displays are the electroluminescent display, the gas discharge display, and the LCD display.

flat panel monitor *n.* A desktop computer monitor that uses a liquid crystal display (LCD) rather than a cathode ray tube (CRT) to display data. Flat panel monitors are not as deep as CRT monitors and so occupy much less physical space.

flat screen *n. See* flat-panel display.

flatten *vb.* In digital graphic creation and manipulation programs, to combine all layers of text, images, and other graphic elements into a single layer. Elements cannot be edited after the graphic is flattened, so a graphic is not usually flattened until the final step when all adjustments have been made to the individual layers. Flattening an image significantly reduces its file size and allows it to be saved in a wider range of formats. Flattening is similar to grouping in that both actions combine a set of objects. However, flattening is a permanent action, whereas a group of objects can be ungrouped. *See also* layering.

flavor *n.* One of several varieties of a system, having its own details of operation. UNIX in particular is found in distinct flavors, such as BSD UNIX or AT&T UNIX System V.

flex circuit *n.* A circuit printed on a thin sheet of flexible polymer film that can be used in applications requiring circuits to curve and bend. Flex circuits offer space and weight savings over traditional circuits, and are used extensively for medical, industrial, and telecommunications applications.

flexible disk *n. See* floppy disk.

flexible transistor *n. See* plastic transistor.

flicker *n.* Rapid, visible fluctuation in a screen image, as on a television or computer monitor. Flicker occurs when the image is refreshed (updated) too infrequently or too slowly for the eye to perceive a steady level of brightness. In television and raster-scan displays, flicker is not noticeable when the refresh rate is 50 to 60 times per second. Interlaced displays, in which the odd-numbered scan lines are refreshed on one sweep and even-numbered lines on the other, achieve a flicker-free effective refresh rate of 50 to 60 times per second because the lines appear to merge, even though each line is actually updated only 25 to 30 times per second.

flies *n.* In Web development and marketing, individuals who spend significant time on the Web and who are the targets of specific Web content or advertising.

flight simulator *n.* A computer-generated recreation of the experience of flying. Sophisticated flight simulators costing hundreds of thousands of dollars can provide pilot training, simulating emergency situations without putting human crews and planes at risk. Flight simulator software running on personal computers simulates flight in a less realistic fashion; it provides entertainment and practice in navigation and instrument reading.

F

flip-flop *n.* A circuit that alternates between two possible states when a pulse is received at the input. For example, if the output of a flip-flop is high and a pulse is received at the input, the output "flips" to low; a second input pulse "flops" the output back to high, and so on. *Also called:* bistable multivibrator.

flippy-floppy *n.* An outmoded 5.25-inch floppy disk that uses both sides for storage but is used in an older drive that can read only one side at a time. Thus, to access the opposite side, the disk must be physically removed from the drive and flipped over. *See also* double-sided disk.

float *n.* The data type name used in some programming languages, notably C, to declare variables that can store floating-point numbers. *See also* data type, floating-point number, variable.

floating-point arithmetic *n.* Arithmetic performed on floating-point numbers. *See also* floating-point notation, floating-point number.

floating-point constant *n.* A constant representing a real, or floating-point, value. *See also* constant, floating-point notation.

floating-point notation *n.* A numeric format that can be used to represent very large real numbers and very small real numbers. Floating-point numbers are stored in two parts, a mantissa and an exponent. The mantissa specifies the digits in the number, and the exponent specifies the magnitude of the number (the position of the decimal point). For example, the numbers 314,600,000 and 0.0000451 are expressed respectively as 3146E5 and 451E-7 in floating-point notation. Most microprocessors do not directly support floating-point arithmetic; consequently, floating-point calculations are performed either by using software or with a special floating-point processor. *Also called:* exponential notation. *See also* fixed-point notation, floating-point processor, integer.

floating-point number *n.* A number represented by a mantissa and an exponent according to a given base. The mantissa is usually a value between 0 and 1. To find the value of a floating-point number, the base is raised to the power of the exponent, and the mantissa is multiplied by the result. Ordinary scientific notation uses floating-point numbers with 10 as the base. In a computer, the base for floating-point numbers is usually 2.

floating-point operation *n.* An arithmetic operation performed on data stored in floating-point notation. Floating-point operations are used wherever numbers may have either fractional or irrational parts, as in spreadsheets and computer-aided design (CAD). Therefore, one measure of a computer's power is how many millions of floating-point operations per second (MFLOPS or megaflops) it can perform. *Acronym:* FLOP. *Also called:* floating-point operation. *See also* floating-point notation, MFLOPS.

floating-point processor *n.* A coprocessor for performing arithmetic on floating-point numbers. Adding a floating-point processor to a system can speed up the processing of math and graphics dramatically if the software is designed to recognize and use it. The i486DX and 68040 and higher microprocessors have built-in floating-point processors. *Also called:* math coprocessor, numeric coprocessor. *See also* floating-point notation, floating-point number.

floating-point register *n.* A register designed to store floating-point values. *See also* floating-point number, register.

flooding *n.* The networking technique of forwarding a frame onto all ports of a switch except the port on which it arrived. Flooding can be used for robust data distribution and route establishment. *Also called:* flood routing.

FLOP *n. See* floating-point operation.

floppy disk *n.* A round piece of flexible plastic film coated with ferric oxide particles that can hold a magnetic field. When placed inside a disk drive, the floppy disk rotates to bring different areas, or sectors, of the disk surface under the drive's read/write head, which can detect and alter the orientation of the particles' magnetic fields to represent binary 1s and 0s. A floppy disk 5.25 inches in diameter is encased in a flexible plastic jacket and has a large hole in the center, which fits around a spindle in the disk drive; such a disk can hold from a few hundred thousand to over one million bytes of data. A 3.5-inch disk encased in rigid plastic is also called a floppy disk or a

microfloppy disk. In addition, 8-inch floppy disks were common in DEC and other minicomputer systems. *See also* microfloppy disk.

floppy disk controller *n. See* disk controller.

floppy disk drive *n.* An electromechanical device that reads data from and writes data to floppy or microfloppy disks. See the illustration. *See also* floppy disk.

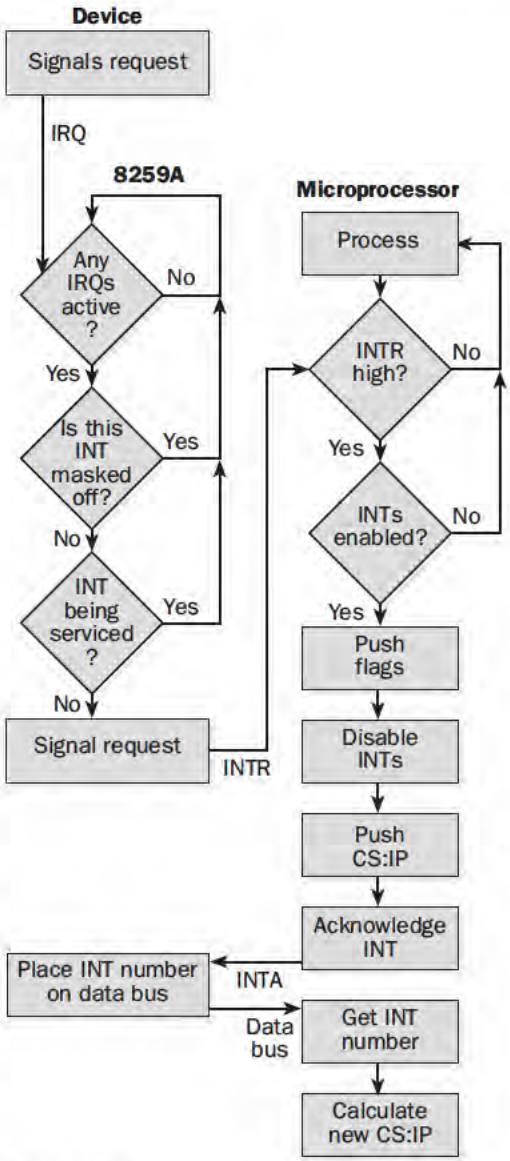
Floppy disk drive.

FLOPS *n.* Acronym for floating-point operations per second. A measure of the speed at which a computer can perform floating-point operations. *See also* floating-point operation, MFLOPS. *Compare* MIPS.

floptical *adj.* Using a combination of magnetic and optical technology to achieve a very high data density on special 3.5-inch disks. Data is written to and read from the disk magnetically, but the read/write head is positioned optically by means of a laser and grooves on the disk.

flow analysis *n.* A method of tracing the movement of different types of information through a computer system, especially with regard to security and the controls applied to ensure the integrity of the information. *See also* flowchart.

flowchart *n.* A graphic map of the path of control or data through the operations in a program or an information-handling system. Symbols such as squares, diamonds, and ovals represent various operations. These symbols are connected by lines and arrows to indicate the flow of data or control from one point to another. Flowcharts are used both as aids in showing the way a proposed program will work and as a means of understanding the operations of an existing program. See the illustration.



Flowchart.

flow control *n.* The management of data flow in a network to ensure that the receiver can handle all the incoming data. Flow-control mechanisms, implemented in both hardware and software, prevent a sender of traffic from sending it faster than the receiver can receive it.

flush[1] *adj.* Aligned in a certain way on the screen or on paper. Flush left, for example, means aligned on the left side; flush right means aligned on the right side. *See also* align (definition 1).

flush[2] *vb.* To clear a portion of memory. For example, to flush a disk file buffer is to save its contents on disk and then clear the buffer for filling again.

F

flux *n.* **1.** The total strength of a magnetic, electric, or radiation field over a given area. **2.** A chemical used to aid the binding of solder to electrical conductors.

flux reversal *n.* The change in orientation of the minute magnetic particles on the surface of a disk or tape toward one of two magnetic poles. The two different alignments are used to represent binary 1 and binary 0 for data storage: a flux reversal typically represents a binary 1, and no reversal represents a binary 0.

fly swapping *n. See* swap-on-the-fly.

FM *n. See* frequency modulation.

FM encoding *n. See* frequency modulation encoding.

focus *vb.* In television and raster-scan displays, to make an electron beam converge at a single point on the inner surface of the screen.

FOCUS *n. See* Federation on Computing in the United States.

FOD *n. See* fax on demand.

folder *n.* In the Mac OS, 32-bit versions of Windows, and other operating systems, a container for programs and files in graphical user interfaces, symbolized on the screen by a graphical image (icon) of a file folder. This container is called a directory in other systems, such as MS-DOS and UNIX. A folder is a means of organizing programs and documents on a disk and can hold both files and additional folders. It first appeared commercially in Apple Computer's Lisa in 1983 and in the Apple Macintosh in 1984. *See also* directory.

folio *n.* A printed page number.

follow-up *n.* A post to a newsgroup that replies to an article. The follow-up has the same subject line as the original article, with the prefix "Re:" attached. An article and all of its follow-ups, in the order they were received, constitute a thread, which a user can read together using a newsreader.

font *n.* A set of characters of the same typeface (such as Garamond), style (such as italic), and weight (such as bold). A font consists of all the characters available in a particular style and weight for a particular design; a typeface consists of the design itself. Fonts are used by computers for on-screen displays and by printers for hard-copy output. In both cases, the fonts are stored either as bit maps (patterns of dots) or as outlines (defined by a set of mathematical formulas). Even if the system cannot simulate different typefaces on the screen, application programs may be able to send information about typeface and style to a printer, which can then reproduce the font if a font description is available. *See also* bit map, font generator.

font card *n. See* font cartridge, ROM card.

font cartridge *n.* A plug-in unit available for some printers that contains fonts in several different styles and sizes. Font cartridges, like downloadable fonts, enable a printer to produce characters in sizes and styles other than those created by the fonts built into it. *Also called:* font card. *See also* ROM cartridge.

Font/DA Mover *n.* An application for older Apple Macintosh systems that allows the user to install screen fonts and desk accessories.

font editor *n.* A utility program that enables the user to modify existing fonts or to create and save new ones. Such an application commonly works with a screen representation of the font, with a representation that can be downloaded to a PostScript or other printer, or with both. *See also* PostScript font, screen font.

font family *n.* The set of available fonts representing variations of a single typeface. For example, Times Roman and Times Roman Italic are members of the same font family. When the user indicates italic, the system selects the correct italic font for the font family, with its characteristic appearance. If there is no italic font in the family, the system simply slants, or "obliques," the corresponding roman character. *See also* italic, roman.

font generator *n.* A program that transforms built-in character outlines into bit maps (patterns of dots) of the style and size required for a printed document. Font generators work by scaling a character outline to size; often they can also expand or compress the characters they generate. Some font generators store the resultant characters on disk; others send them directly to the printer.

font number *n.* The number by which an application or operating system internally identifies a given font. On the Apple Macintosh, for example, fonts can be identified by their exact names as well as their font numbers, and a font

number can be changed if the font is installed in a system already having a font with that number. *See also* font.

font page *n.* A portion of video memory reserved for holding programmer-specified character definition tables (sets of character patterns) used for displaying text on the screen on IBM Multi-Color Graphics Array video systems.

font size *n.* The point size of a set of characters in a particular typeface. *See also* point[1] (definition 1).

font suitcase *n.* A file on Macintosh computers that contains one or more fonts or desk accessories. Such files are indicated in early versions of the operating system with the icon of a suitcase marked with a capital A. From System 7.0 onward, this icon is used to denote individual fonts.

foo *n.* A string used by programmers in place of more specific information. Variables or functions in code examples intended to demonstrate syntax, as well as temporary scratch files, may all appear with the name *foo*. Likewise, a programmer may type *foo* to test a string input handler. If a second placeholder string is needed, it will often be *bar*, suggesting that the origin of both is the U.S. Army phrase FUBAR (an acronym which, in discreet language, represents Fouled Up Beyond All Recognition/Repair). However, other origins have been claimed. *Compare* fred (definition 2).

footer *n.* One or more identifying lines printed at the bottom of a page. A footer may contain a folio (page number), a date, the author's name, and the document title. *Also called:* running foot. *Compare* header (definition 1).

footprint *n.* The surface area occupied by a personal computer or other device.

force *vb.* In programming, to perform a particular action that would normally not occur. The term is most often used in the context of forcing data to be within a particular range of values—for example, forcing a divisor to be nonzero. *See also* cast.

force feedback *n.* A technology that generates push or resistance in an input/output device. Force feedback enables an input/output device, such as a joystick or a steering wheel, to react to the user's action in appropriate response to events displayed on the screen. For example, force feedback can be used with a computer game to react to a plane rising in a steep ascent or a race car turning a tight corner. *See also* input/output device.

foreground[1] *adj.* Currently having control of the system and responding to commands issued by the user. *See also* multitasking. *Compare* background[1].

foreground[2] *n.* **1.** The color of displayed characters and graphics. *Compare* background[2] (definition 1). **2.** The condition of the program or document currently in control and affected by commands and data entry in a windowing environment. *Compare* background[2] (definition 4).

forest *n.* A collection of one or more domains in Microsoft Windows that share a common schema, configuration, and global catalog and are linked with two-way transitive trusts. *See also* domain, global catalog, schema, transitive trust, two-way trust.

fork[1] *n.* One of the two parts of a file recognized by the Mac OS. A Macintosh file has a data fork and a resource fork. Most or all of a typical user-produced document is in the data fork; the resource fork usually contains application-oriented information, such as fonts, dialog boxes, and menus. *See also* data fork, resource fork.

fork[2] *vb.* To initiate a child process in a multitasking system after a parent process has been started. *See also* multitasking.

fork bomb *n.* In UNIX-based systems, a program or shell script that locks up the system by recursively spawning copies of itself using the Unix system call "fork(2)" until they occupy all the process table entries. *Also called:* logic bomb.

FOR loop *n.* A control statement that executes a section of code a specified number of times. Actual syntax and usage vary from language to language. In most cases, the value of an index variable moves through a range of values, being assigned a different (and usually consecutive) value each time the program moves through the section of code. *See also* iterative statement, loop[1] (definition 1). *Compare* DO loop.

form *n.* **1.** A structured document with spaces reserved for entering information and often containing special coding as well. **2.** In some applications (especially databases), a structured window, box, or other self-contained presentation element with predefined areas for entering or changing information. A form is a visual filter for the underlying data it is presenting, generally offering the advantages of better data organization and greater ease of viewing. **3.** In optical media, a data storage format used in compact disc technology. **4.** In programming, a metalanguage (such as Backus-Naur form) used to describe the syntax of a language. *See also* Backus-Naur form.

formal language *n.* A combination of syntax and semantics that completely defines a computer language. *See also* Backus-Naur form, semantics (definition 1), syntax.

formal logic *n.* A study of the logical expressions, sequences, and overall construction of a valid argument, without regard to the truth of the argument. Formal logic is used in proving program correctness.

format[1] *n.* **1.** In general, the structure or appearance of a unit of data. **2.** The arrangement of data within a document file that typically permits the document to be read or written by a certain application. Many applications can store a file in a more generic format, such as plain ASCII text. **3.** The layout of data storage areas (tracks and sectors) on a disk. **4.** The order and types of fields in a database. **5.** The attributes of a cell in a spreadsheet, such as its being alphabetic or numeric, the number of digits, the use of commas, and the use of currency signs. **6.** The specifications for the placement of text on a page or in a paragraph.

format[2] *vb.* **1.** To change the appearance of selected text or the contents of a selected cell in a spreadsheet. **2.** To prepare a disk for use by organizing its storage space into a collection of data "compartments," each of which can be located by the operating system so that data can be sorted and retrieved. When a previously used disk is formatted, any preexisting information on it is lost.

format bar *n.* A toolbar within an application used for modifying the format of the document being displayed, such as changing font size or type.

formatting *n.* **1.** The elements of style and presentation that are added to documents through the use of margins, indents, and different sizes, weights, and styles of type. **2.** The process of initializing a disk so that it can be used to store information. *See also* initialize.

form control *n.* On a Web site, an individual box or button with which you enter information on an electronic form.

form factor *n.* **1.** The size, shape, and configuration of a piece of computer hardware. The term is often applied to subcomponents such as disk drives, circuit boards, and small devices, such as handheld PCs. It can also be used more broadly to include the arrangement and positioning of external switches, plugs, and other components of the device, or it can refer to the footprint of an entire computer. **2.** A term used in computer graphics, specifically with reference to a method of rendering known as radiosity, which divides an image into small patches for calculating illumination. The form factor is a calculated value that represents the amount of energy radiated by one surface and received by another, taking into account such conditions as the distance between the surfaces, their orientation with respect to one another, and the presence of obstructions between them. **3.** When used to describe software, refers to the amount of memory required, the size of the program, and so on.

form feed *n.* A printer command that tells a printer to move to the top of the next page. In the ASCII character set, the form-feed character has the decimal value 12 (hexadecimal 0C). Because its purpose is to begin printing on a new page, form feed is also known as the page-eject character. *Acronym:* FF.

form letter *n.* A letter created for printing and distribution to a group of people whose names and addresses are taken from a database and inserted by a mail-merge program into a single basic document. *See also* mail merge.

formula *n.* A mathematical statement that describes the actions to be performed on numeric values. A formula sets up a calculation without regard to the actual values it is to act upon, such as *A* + *B*, with *A* and *B* representing whatever values the user designates. Thus, a formula is unlike an arithmetic problem, such as 1 + 2, which includes values and must be restated if any value is changed. Through formulas, users of applications such as spreadsheets gain the power to perform "what-if" calculations simply by changing selected values and having the program recalculate the results. Sophisticated programs include many built-in formulas for performing standard business and mathematical calculations.

Forte *n.* Sun Microsystems integrated development environment (IDE) for Java developers. *See also* integrated development environment.

Fortezza *n.* A cryptographic technology developed by the United States National Security Agency (NSA) for enabling secure communication of sensitive information. Fortezza is based on encryption, authentication, and other technologies built into a personalized card known as the Fortezza Crypto Card that can be inserted into a PCMCIA slot on a computer. This card works with Fortezza-enabled hardware and software to secure applications such as e-mail, Web browsing, e-commerce, and file encryption. An RS-232 token can also be used with legacy systems that do not have card-reading capability. The technology is supported by a number of commercial vendors.

Forth *n.* A programming language originated by Charles Moore in the late 1960s. Moore chose the language's name, a shortened version of the word *fourth*, because he believed it was a fourth-generation language and his operating system would allow him to use only five letters for a program name. Forth is an interpreted, structured language that uses threading, which lets programmers easily extend the language and enables Forth to fit a great deal of

functionality into limited space. Unlike most other programming languages, Forth uses postfix notation for its mathematical expressions and requires the programmer to work with the program stack directly. *See also* 4GL, interpreted language, postfix notation, stack, threading.

FORTRAN or **Fortran** *n.* Short for **for**mula **tran**slation. The first high-level computer language (developed over the period 1954–58 by John Backus) and the progenitor of many key high-level concepts, such as variables, expressions, statements, iterative and conditional statements, separately compiled subroutines, and formatted input/output. FORTRAN is a compiled, structured language. The name indicates its roots in science and engineering, where it is still used heavily, although the language itself has been expanded and improved vastly over the last 35 years to become a language that is useful in any field. *See also* compiled language, structured programming.

fortune cookie *n.* A proverb, prediction, joke, or other phrase chosen at random from a collection of such items and output to the screen by a program. Fortune cookies are sometimes displayed at logon and logoff times by UNIX systems.

forum *n.* A medium provided by an online service or BBS for users to carry on written discussions of a particular topic by posting messages and replying to them. On the Internet, the most widespread forums are the newsgroups in Usenet.

Forum of Incident Response and Security Teams *n. See* FIRST.

forward *vb.* In e-mail, to send a received message, either modified or in its entirety, to a new recipient.

forward chaining *n.* In expert systems, a form of problem solving that starts with a set of rules and a database of facts and works to a conclusion based on facts that match all the premises set forth in the rules. *See also* expert system. *Compare* backward chaining.

forward error correction *n.* In communications, a means of controlling errors by inserting extra (redundant) bits into a stream of data transmitted to another device. The redundant bits are used by the receiving device in detecting and, where possible, correcting errors in the data. *See also* error-correction coding.

forward pointer *n.* A pointer in a linked list that contains the address (location) of the next element in the list.

FOSDIC *n.* Acronym for **f**ilm **o**ptical **s**ensing **d**evice for **i**nput to **c**omputers. A device used by the U.S. government to read documents on microfilm and store them digitally on magnetic tape or on a disk that can be accessed by a computer.

Fourier transform *n.* A mathematical method, developed by the French mathematician Jean-Baptiste-Joseph Fourier (1768–1830), for signal processing and signal generation tasks such as spectral analysis and image processing. The Fourier transform converts a signal value that is a function of time, space, or both into a function of frequency. The inverse Fourier transform converts a function of frequencies into a function of time, space, or both. *See also* fast Fourier transform.

four-nines availability *n.* The availability of a system 99.99 percent of the time. *See* high availability.

fourth-generation computer *n. See* computer.

fourth-generation language *n. See* 4GL.

fourth normal form *n. See* normal form (definition 1).

FPD *n. See* full-page display.

FPGA *n.* Acronym for **F**ield **P**rogrammable **G**ate **A**rray. A type of programmable logic chip that can be configured for a wide range of specialized applications after manufacture and delivery. FPGAs can be reprogrammed to incorporate innovations and upgrades. Because of their flexibility and adaptability, FPGAs are used in devices from microwave ovens to supercomputers.

FPLA *n. See* field-programmable logic array.

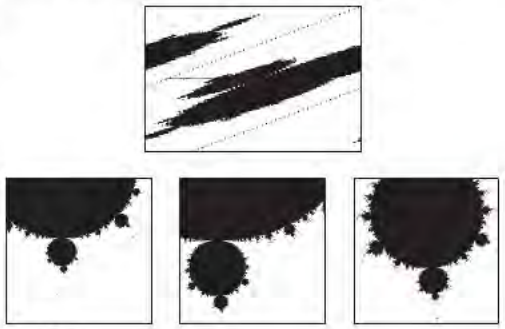
FPM RAM *n. See* page mode RAM.

FPU *n.* Acronym for **f**loating-**p**oint **u**nit. A circuit that performs floating-point calculations. *See also* circuit, floating-point operation.

FQ *n. See* fair queuing.

fractal *n.* A word coined by mathematician Benoit Mandelbrot in 1975 to describe a class of shapes characterized by irregularity, but in a way that evokes a pattern. Computer graphics technicians often use fractals to generate naturelike images such as landscapes, clouds, and forests. The distinguishing characteristic of fractals is that they are "self-similar"; any piece of a fractal, when magnified, has the same character as the whole. The standard analogy is that of a coastline, which has a similar structure whether viewed on a local or continental scale. Interestingly, it is often difficult to measure the length of the perimeter of such a shape exactly because the total distance measured depends on the size of the smallest element measured. For example, one could measure on a given coastline the

perimeter of every peninsula and inlet, or at a higher magnification the perimeter of every small promontory and jetty, and so on. In fact, a given fractal may have a finite area but an infinite perimeter; such shapes are considered to have a fractional dimension—for example, between 1 (a line) and 2 (a plane)—hence the name fractal. See the illustration. *See also* cellular automata, graftal.



Fractal.

fractional T1 *n.* A shared connection to a T1 line, in which only a fraction of the 24 T1 voice or data channels are used. *Acronym:* FT1. *See also* T1.

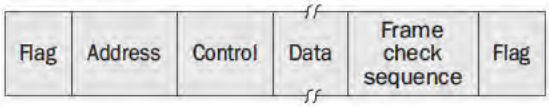
FRAD *n. See* frame relay assembler/disassembler.

fraggle attack *n. See* smurf attack.

fragmentation *n.* The scattering of parts of the same disk file over different areas of the disk. Fragmentation occurs as files on a disk are deleted and new files are added. Such fragmentation slows disk access and degrades the overall performance of disk operations, although usually not severely. Utility programs are available for rearranging file storage on fragmented disks.

FRAM *n.* Acronym for ferromagnetic random access memory. A form of data storage technology in which data is recorded semipermanently on small cards or strips of material coated with a ferric oxide (iron-based) magnetic film. As with tape or disk, the data persists without power; as with semiconductor RAM, a computer can access the data in any order.

frame *n.* **1.** In asynchronous serial communications, a unit of transmission that is sometimes measured in elapsed time and begins with the start bit that precedes a character and ends with the last stop bit that follows the character. **2.** In synchronous communications, a package of information transmitted as a single unit. Every frame follows the same basic organization and contains control information, such as synchronizing characters, station address, and an error-checking value, as well as a variable amount of data. For example, a frame used in the widely accepted HDLC and related SDLC protocols begins and ends with a unique flag (01111110). See the illustration. *See also* HDLC, SDLC. **3.** A single screen-sized image that can be displayed in sequence with other, slightly different, images to create animated drawings. **4.** The storage required to hold one screen-sized image of text, graphics, or both. **5.** A rectangular space containing, and defining the proportions of, a graphic. **6.** The part of an on-screen window (title bar and other elements) that is controlled by the operating system rather than by the application running in the window. **7.** A rectangular section of the page displayed by a Web browser that is a separate HTML document from the rest of the page. Web pages can have multiple frames, each of which is a separate document. Associated with each frame are the same capabilities as for an unframed Web page, including scrolling and linking to another frame or Web site; these capabilities can be used independently of other frames on the page. Frames, which were introduced in Netscape Navigator 2.0, are often used as a table of contents for one or more HTML documents on a Web site. Most current Web browsers support frames, although older ones do not. *See also* HTML document, Web browser.



Frame. *The fields in an HDLC-SDLC frame.*

frame buffer *n.* A portion of a computer's display memory that holds the contents of a single screen image. *See also* video buffer.

frame grabber *n. See* video digitizer.

frame rate *n.* **1.** The speed at which full, single-screen images are transmitted to and displayed by a raster-scan monitor. Frame rate is calculated as the number of times per second (hertz) the electron beam sweeps the screen. **2.** In animation, the number of times per second an image is updated. When the frame rate exceeds about 14 frames per second, animation seems to blend into smooth motion. *See also* animation.

frame relay *n.* A packet-switching protocol for use on WANs (wide area networks). Frame relay transmits variable-length packets at up to 2 Mbps over predetermined, set paths known as PVCs (permanent virtual circuits). It is a variant of X.25 but dispenses with some of

X.25's error detection for the sake of speed. *See also* ATM (definition 1), X.25.

frame relay access device *n. See* frame relay assembler/disassembler.

frame relay assembler/disassembler *n.* A combination channel service unit/digital service unit (CSU/DSU) and router that connects an internal network to a frame relay connection. The device converts data (which may be in the form of IP packets or conform to some other network protocol) into packets for transmission over the frame relay network and converts such packets back to the original data. Since this type of connection is direct—without a firewall—other network protection is necessary. *Acronym:* FRAD. *See also* firewall, frame relay, IP.

frame source *n.* In the HTML frames environment, a contents document that will look for the source document to display within a frame drawn by the local browser. *See also* HTML.

frames page *n.* A Web page that divides a Web browser window into different scrollable areas that can independently display several Web pages. One window can remain unchanged, while the other windows change based on hyperlinks that the user selects.

frames per second *n. See* frame rate.

framework *n.* In object-oriented programming, a reusable basic design structure, consisting of abstract and concrete classes, that assists in building applications. *See also* abstract class, object-oriented programming.

FRC *n. See* functional redundancy checking.

fred *n.* **1.** An interface utility for X.500. *See also* CCITT X series. **2.** A placeholder string used by programmers in syntax examples to stand for a variable name. If a programmer has used *fred*, the next placeholder needed is likely to be *barney*. *Compare* foo.

free block *n.* A region (block) of memory that is not currently being used.

FreeBSD *n.* A freely distributed version of BSD UNIX (Berkeley Software Distribution UNIX) for IBM and IBM-compatible PCs. *See also* BSD UNIX.

free-form language *n.* A language whose syntax is not constrained by the position of characters on a line. C and Pascal are free-form languages; FORTRAN is not.

freenet or **free-net** *n.* A community-based computer BBS and Internet service provider, usually operated by volunteers and providing free access to subscribers in the community or access for a very small fee. Many freenets are operated by public libraries or universities. *See also* ISP.

free software *n.* Software, complete with source code, that is distributed freely to users who are in turn free to use, modify, and distribute it, provided that all alterations are clearly marked and that the name and copyright notice of the original author are not deleted or modified in any way. Unlike freeware, which a user might or might not have permission to modify, free software is protected by a license agreement. Free software is a concept pioneered by the Free Software Foundation in Cambridge, Massachusetts. *Compare* freeware, open source, public-domain software, shareware.

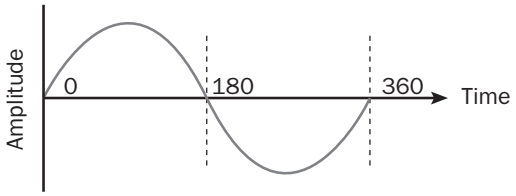
Free Software Foundation *n.* An advocacy organization founded by Richard Stallman, dedicated to eliminating restrictions on people's right to use, copy, modify, and redistribute computer programs for noncommercial purposes. The Free Software Foundation is the maintainer of GNU software, which is UNIX-like software that can be freely distributed. *See also* GNU.

free space *n.* Space on a floppy disk or a hard drive not currently occupied by data. *See also* floppy disk, hard disk.

freeware *n.* A computer program given away free of charge and often made available on the Internet or through user groups. An independent program developer might offer a product as freeware either for personal satisfaction or to assess its reception among interested users. Freeware developers often retain all rights to their software, and users are not necessarily free to copy or distribute it further. *Compare* free software, public-domain software, shareware.

freeze-frame video *n.* Video in which the image changes only once every few seconds. *Compare* full-motion video.

frequency *n.* The measure of how often a periodic event occurs, such as a signal going through a complete cycle. Frequency is usually measured in hertz (Hz), with 1 Hz equaling 1 occurrence (cycle) per second. In the United States, household electricity is alternating current with a frequency of 60 Hz. Frequency is also measured in kilohertz (kHz, or 1000 Hz), megahertz (MHz, or 1000 kHz), gigahertz (GHz, or 1000 MHz), or terahertz (THz, or 1000 GHz). See the illustration. *Compare* wavelength.



Frequency.

F

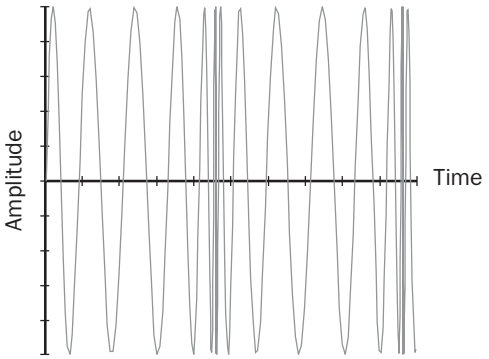
frequency counter *n.* **1.** An item of engineering test equipment that measures and displays the frequencies of electronic signals. **2.** An electronic circuit, often found embedded in process-control computers, that counts the frequency of occurrence of an activity.

Frequency Division Multiple Access *n. See* FDMA.

frequency-division multiplexing *n. See* FDM.

frequency hopping *n.* The switching of frequencies within a given bandwidth during a point-to-point transmission. Frequency hopping reduces the chance of unauthorized signal interception or the effects of single-frequency jamming.

frequency modulation *n.* A way of encoding information in an electrical signal by varying its frequency. The FM radio band uses frequency modulation, as does the audio portion of broadcast television. See the illustration. *Acronym:* FM. *Compare* amplitude modulation.



Frequency modulation.

frequency modulation encoding *n.* A method of storing information on a disk in which both data and additional synchronizing information, called clock pulses, are recorded on the surface. FM encoding is relatively inefficient because of the extra disk space required by the clock pulses. It has been generally superseded by a more efficient method called *modified* frequency modulation (MFM) encoding and by the complex but extremely efficient technique called run-length limited (RLL) encoding. *Abbreviation:* FM encoding. *Compare* modified frequency modulation encoding, run-length limited encoding.

frequency response *n.* The range of frequencies an audio device can reproduce from its input signals. *See also* frequency.

frequency-shift keying *n. See* FSK.

frequently asked questions *n. See* FAQ.

friction feed *n.* A means of moving paper through a printer in which the paper is pinched either between the printer's platen and pressure rollers or (in printers that do not have a platen) between two sets of rollers. Friction feed is available on most printers, for use with paper that does not have pin-feed holes. In printers that have tractor feed as well as friction feed, the friction-feed mechanism should be left disengaged when the tractor is being used, to avoid unnecessary stress on the tractor gears. *See also* platen. *Compare* pin feed, tractor feed.

friendly *adj.* Referring to features built into hardware or software that make a computer or computer program easy to learn and easy to use. Friendliness is emphasized by most developers and sought after by most users. *See also* user-friendly.

fringeware *n.* Freeware whose reliability and value are questionable. *See also* freeware.

front end *n.* **1.** In a client/server application, the part of the program that runs on the client. *See also* client/server architecture. *Compare* back end (definition 1). **2.** In applications, software or a feature of software that provides an interface to another application or tool. Front ends are often used to supply a common interface for a range of tools produced by a software manufacturer. A front end generally offers a more user-friendly interface than that of the application running "behind" it. **3.** In networking, a client computer or the processing that takes place on it. *Compare* back end (definition 2).

front-end processor *n.* **1.** Generally, a computer or processing unit that produces and manipulates data before another processor receives it. *Compare* back-end processor (definition 2). **2.** In communications, a computer that is located between communications lines and a main (host) computer and is used to relieve the host of housekeeping chores related to communications; sometimes considered synonymous with communications controller.

A front-end processor is dedicated entirely to handling transmitted information, including error detection and control; receipt, transmission, and possibly encoding of messages; and management of the lines running to and from other devices. *See also* communications controller.

front panel *n.* The faceplate of a computer cabinet through which the control knobs, switches, and lights are available to an operator. *See also* console.

fry *vb.* To destroy a circuit board or another component of a computer by applying excessive voltage. Even when applied voltage is not excessive, an electronic component can become fried when it breaks down, conducting more current than its design permits.

fs *n. See* femtosecond.

FSK *n.* Acronym for **f**requency-**s**hift **k**eying. A simple form of modulation in which the digital values 0 and 1 are represented by two different frequencies. FSK was used by early modems running at 300 bits per second.

FT1 *n. See* fractional T1.

FTAM *n.* Acronym for **F**ile-**T**ransfer **A**ccess and **M**anagement. A communications standard for transferring files between different makes and models of computer.

FTP[1] *n.* **1.** Acronym for **F**ile **T**ransfer **P**rotocol, a fast, application-level protocol widely used for copying files to and from remote computer systems on a network using TCP/IP, such as the Internet. This protocol also allows users to use FTP commands to work with files, such as listing files and directories on the remote system. *See also* TCP/IP. **2.** A common logon ID for anonymous FTP.

FTP[2] *vb.* To download files from or upload files to remote computer systems, via the Internet's File Transfer Protocol. The user needs an FTP client to transfer files to and from the remote system, which must have an FTP server. Generally, the user also needs to establish an account on the remote system to FTP files, although many FTP sites permit the use of anonymous FTP. *See also* FTP client, FTP server.

FTP client or **ftp client** *n.* A program that enables the user to upload and download files to and from an FTP site over a network, such as the Internet, using the File Transfer Protocol. *See also* FTP[1] (definition 1). *Compare* FTP server.

FTP commands *n.* Commands that are part of the File Transfer Protocol. *See also* FTP[1] (definition 1).

FTP program or **ftp program** *n. See* FTP client.

FTP server *n.* A file server that uses the File Transfer Protocol to permit users to upload or download files through the Internet or any other TCP/IP network. *See also* file server, FTP[1] (definition 1), TCP/IP. *Compare* FTP client.

FTP site *n.* The collection of files and programs residing on an FTP server. *See also* FTP[1] (definition 1), FTP server.

FTTC *n.* Acronym for **f**iber **t**o **t**he **c**urb. The installation and use of fiber-optic cable from the central office (CO) to within a thousand feet of a user's home or office. With FTTC, coaxial cable or another medium carries the signals from the curb into the home or office. FTTC is a replacement for Plain Old Telephone Service (POTS) that enables the distribution of telephony, cable TV, Internet access, multimedia, and other communications over one line. *Compare* FTTH, POTS.

FTTH *n.* Acronym for **f**iber **t**o **t**he **h**ome. The installation and use of fiber-optic cable from the central office (CO) directly into a user's home or office. FTTH is a replacement for Plain Old Telephone Service (POTS) that enables the distribution of telephony, cable TV, Internet access, multimedia, and other communications over one line. *Compare* FTTC, POTS.

FUD *n.* Acronym for **f**ear, **u**ncertainty, and **d**oubt. Derogatory slang used to express disagreement or displeasure with a vendor's public statements, particularly when the vendor is speaking of a competitor's products. If a vendor is perceived as implying that buying from a competitor is obviously the wrong choice, that vendor is said to be using FUD as a marketing technique.

fuel cell *n.* An electrochemical device, similar to a battery in function, in which the chemical energy of a fuel, such as hydrogen, and an oxidant, usually oxygen, are converted directly into electrical energy. Unlike batteries, however, fuel cells do not store energy, and they never run down or need recharging as long as the fuel and oxidant are supplied continuously. The principle of fuel cell technology was discovered more than 100 years ago, but until recently it had found use only in laboratories and in space travel (the Apollo missions and the space shuttle). Today, large and small fuel cells are being developed that will power portable devices such as laptop computers and cellular phones, generate electricity and heat, and replace automotive combustion engines.

fulfillment *n.* The process of delivering goods and services ordered by a consumer. Fulfillment involves establishing a reliable procedure for tracking orders and delivering products.

fulfillment service provider *n.* A company that provides fulfillment services for an e-commerce Web site by tracking, packing, and shipping goods ordered via the e-commerce site. A fulfillment service provider allows an e-business to save time, costs, and labor by outsourcing order processing.

F

full adder *n.* A logic circuit used in a computer to add binary digits. A full adder accepts three digital inputs (bits): 2 bits to be added and a carry bit from another digit position. It produces two outputs: a sum and a carry bit. Full adders are combined with two-input circuits called *half adders* to enable computers to add 4 or more bits at a time. *See also* carry bit, half adder.

full-duplex *adj. See* duplex[1].

full-duplex transmission *n. See* duplex[2] (definition 1).

full justification *n.* In typesetting, word processing, and desktop publishing, the process of aligning text evenly along both the left and right margins of a column or page. *See also* justify (definition 2).

full mode *n.* The default operational state of Windows Media Player in which all of its features are displayed. The Player can also appear in skin mode. *See also* skin mode.

full-motion video *n.* Video reproduction at 30 frames per second (fps) for NTSC signals or 25 fps for PAL signals. *Also called:* continuous motion video. *See also* frame (definition 1). *Compare* freeze-frame video.

full-motion video adapter *n.* An expansion card for a computer that can convert motion video from devices such as a video cassette recorder to a digital format that a computer can use, such as AVI, MPEG, or Motion JPEG. *See also* AVI, Motion JPEG, MPEG.

full name *n.* A user's complete name, usually consisting of last name, first name, and middle initial. The full name is often maintained by the operating system as part of the information that identifies and defines a user account. *See also* user account.

full-page display *n.* A video display with sufficient size and resolution to show at least one $8^1/2$-by-11-inch image. Such displays are useful for desktop publishing applications. *Acronym:* FPD. *See also* portrait monitor.

full path *n.* In a hierarchical filing system, a pathname containing all the possible components of a pathname, including the network share or drive and root directory, as well as any subdirectories and the file or object name. For example, the MS-DOS full path c:\book\chapter \myfile.doc indicates that myfile.doc is located in a directory called *chapter*, which in turn is located in a directory called *book* in the root directory of the C: drive. *Also called:* full pathname. *See also* path (definition 2), root directory, subdirectory. *Compare* relative path.

full pathname *n. See* full path.

full-screen *adj.* Capable of using or being displayed on the full area of a display screen. Applications running in windowing environments, although they might use the entire area of the screen, commonly allocate different areas to different windows, any of which can be enlarged to fill the entire screen.

full-text search *n.* A search for one or more documents, records, or strings based on all of the actual text data rather than on an index containing a limited set of keywords. For example, a full-text search can locate a document containing the words "albatrosses are clumsy on land" by searching files for just those words without the need of an index containing the keyword "albatross." *See also* index.

fully formed character *n.* A character formed by striking an inked ribbon with a molded or cast piece of type in the manner of a typewriter. Impact printers that produce fully formed characters use letters attached to wheels (daisy wheels), balls, thimbles, bands, or chains, rather than dot-matrix wires. *See also* daisy wheel, near-letter-quality, thimble.

fully populated board *n.* A printed circuit board whose integrated circuit (IC) sockets are all occupied. Memory boards in particular may have fewer than the maximum possible number of memory chips, leaving some IC sockets empty. Such a board is said to be *partially populated.*

function *n.* **1.** The purpose of, or the action carried out by, a program or routine. **2.** A general term for a subroutine. **3.** In some languages, such as Pascal, a subroutine that returns a value. *See also* function call, procedure, routine, subroutine.

functional design *n.* The specification of the relationships between working parts of a computer system, including details of logical components and the way they work together. Functional design is shown graphically in a

functional diagram, which uses special symbols to represent the elements of the system.

functional programming *n.* A style of programming in which all facilities are provided as functions (subroutines), usually without side effects. Pure functional programming languages lack a traditional assignment statement; assignment is usually implemented by copy and modify operations. Functional programming is thought to offer advantages for parallel-processing computers. *See also* side effect.

functional redundancy checking *n.* A method of preventing errors by having two processors execute the same instructions on the same data at the same time. If the results produced by the two processors do not agree, an error has occurred. The Intel Pentium and higher processors have built-in support for functional redundancy checking. *Acronym:* FRC.

functional specification *n.* A description of the scope, objectives, and types of operations that are to be considered in the development of an information-handling system.

function call *n.* A program's request for the services of a particular function. A function call is coded as the name of the function along with any parameters needed for the function to perform its task. The function itself can be a part of the program, be stored in another file and brought into the program when the program is compiled, or be a part of the operating system. *See also* function (definition 2).

function key *n.* Any of the 10 or more keys labeled F1, F2, F3, and so on, that are placed along the left side or across the top of a keyboard (or both) and are used for special tasks by different programs. The meaning of a function key is defined by a program or, in some instances, by the user. Function keys are used in application programs or the operating system to provide either a shortcut for a series of common instructions (such as calling up a program's on-screen help facility) or a feature that is not otherwise available. *See also* key (definition 1). *Compare* Command key, Control key, Escape key.

function library *n.* A collection of routines compiled together. *See also* function (definition 2), library (definition 1), toolbox.

function overloading *n.* The capability of having several routines in a program with the same name. The different functions are distinguished by their parameter types, return value types, or both; the compiler automatically selects the correct version, based on parameter types and return types. For example, a program might have one trigonometric sine function that uses a floating-point parameter to represent an angle in radians, and another that uses an integer parameter to represent an angle in degrees. In such a program, sin(3.14159/2.0) would return the value 1.0 (because the sine of p/2 radians is 1), but sin(30) would return the value 0.5 (because the sine of 30 degrees is 0.5). *See also* operator overloading.

Function procedure *n.* A procedure that returns a value and that can be used in an expression. You declare a function with the Function statement and end it with the End Function statement.

fuse *n.* A circuit element that burns out or breaks when the current passing through it exceeds a certain level. A fuse protects a circuit from damage caused by excess current. It performs the same function as a circuit breaker, but it cannot be reset, so it must be replaced if it breaks. A fuse consists of a short length of wire of a specific composition and thickness; the thicker the wire, the more current it can pass before the wire melts and breaks the circuit.

fusible link *n.* A circuit component, often part of an integrated circuit, that is designed to break, or burn like a fuse, when a relatively high current is applied. Rather than protecting against excessive current flow, fusible links allow intentional circuit modification in the field. Fusible links were used in PROM chips, and they form the foundation of a kind of integrated circuit known as a field-programmable logic array. One can customize such a circuit "in the field," after it has been made in the factory, by selectively programming high current through certain fusible links and breaking them. *See also* field-programmable logic array, PROM.

fuzzy computing *n.* **1.** A computing technique that deals with vague, incomplete, or ambiguous data in a precise mathematical way while providing solutions based on the human way of thinking. The term fuzzy relates to the type of data it processes, not to the technique itself, which is very exact. Fuzzy computing is also known as fuzzy set theory or fuzzy logic, and covers fuzzy control and fuzzy expert systems, for example. **2.** A computing technology in which the computer interprets data by looking for patterns in problems while completing tasks. Using fuzzy computing, the computer is able to examine patterns in the data it receives and to make inferences based on that data, and act accordingly.

fuzzy logic *n.* A form of logic used in some expert systems and other artificial-intelligence applications in which variables can have degrees of truthfulness or falsehood represented by a range of values between 1 (true) and 0 (false). With fuzzy logic, the outcome of an operation can be expressed as a probability rather than as a certainty. For example, an outcome might be probably true, possibly true, possibly false, or probably false. *See also* expert system.

F

fuzzy set *n.* A set constructed using the principles of fuzzy logic. It is used in artificial intelligence to deal with vague or continuous data that cannot be expressed by conventional set theory. In a fuzzy set, the membership function for the set of objects is not binary but continuous, such that an object may be a member of the set to a specific degree or arbitrary value. In computer programming, a fuzzy set is usually effectively represented by an array. *See also* array, artificial intelligence, fuzzy logic.

FWIW *adv.* Acronym for **f**or **w**hat **i**t's **w**orth. An expression used in e-mail and newsgroups.

FYI *n.* **1.** Acronym for **f**or **y**our **i**nformation. An expression used in e-mail and newsgroups to introduce information that is thought to be useful to the reader. **2.** An electronic document distributed through InterNIC like a request for comments (RFC), but intended to explain an Internet standard or feature for users rather than to define it for developers, as the RFC does. *See also* InterNIC. *Compare* RFC.

G

G *prefix* *See* giga-.

G3 *n.* *See* PowerPC 750.

G4 *n.* *See* Power Macintosh.

GaAs *n.* *See* gallium arsenide.

gain *n.* The increase in the amplitude of a signal, as of voltage, current, or power, that is produced by a circuit. Gain can be expressed as a factor or in decibels. *See also* decibel.

gallium arsenide *n.* A semiconductor compound used in place of silicon to make devices that perform faster, require less power, and are more tolerant of temperature changes and radiation than those made with silicon. *Also called:* GaAs.

game *n.* *See* computer game.

Game Boy *n.* Nintendo Corporation's popular battery-powered, portable handheld gaming system first introduced in 1990 and updated frequently. Games are supplied on cartridges. The latest Game Boy, Game Boy Advance, features a 32-bit ARM CPU with embedded memory and a 2.9-inch TFT reflective screen with 240x160 resolution. *See also* computer game, TFT.

game card *n.* *See* ROM card.

game cartridge *n.* *See* ROM cartridge.

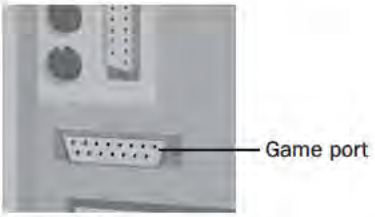
game console *n.* *See* console game.

Game Control Adapter *n.* In IBM personal computers and compatibles, a circuit that processes input signals at a game port. Devices such as joysticks and game paddles use potentiometers to represent their positions as varying voltage levels; the Game Control Adapter converts these levels to numbers using an analog-to-digital converter (ADC). *See also* analog-to-digital converter, game port, potentiometer.

GameCube *n.* Nintendo Corporation's console gaming system. It features a developer-friendly format and introduces 1T-RAM technology, which reduces delays to the main memory and the graphics LSI mixed memory. The microprocessor is a custom IBM Power PC "Gekko" featuring a secondary cache (Level One: Instruction 32 KB, Data 32 KB (8-way); Level Two: 256 KB (2-way)). Games are supplied on a GameCube game disc. *See also* computer game, console game. *Compare* Dreamcast, PlayStation, Xbox.

game pad *n.* An action-control input device used with arcade-type games played on PCs and game consoles such as Microsoft's Xbox, Nintendo's GameCube, Sega's Dreamcast, and Sony's PlayStation. A game pad, unlike a joystick, is meant to be held in a player's hands. Buttons on the game pad allow a player to control direction, speed, and other screen actions. *Also called:* joypad. *Compare* joystick.

game port *n.* In IBM personal computers and compatibles, an I/O port for devices such as joysticks and game paddles. The game port is often included with other I/O ports on a single expansion card. See the illustration. *See also* Game Control Adapter.



Game port.

gamer *n.* Refers to a person who plays games, sometimes role-playing games or trading card games; often a person who plays computer, console, arcade, or online games as a primary hobby or avocation.

game theory *n.* A mathematical theory, ascribed to John von Neumann, that considers strategy and probability in terms of competitive games in which all players have partial control and each seeks the most advantageous moves in relation to the others.

game tree *n.* A tree structure representing contingencies in a game and used by game developers for design purposes. Each node in a game tree represents a possible position (for example, the configuration of pieces on a chessboard) in the game, and each branching represents a possible move. *See also* computer game.

gamut *n.* The complete range of colors a display or printer is capable of producing. If a color falls outside the gamut of a device, it cannot be accurately displayed or printed from that device.

G

gamut alarm *n.* A feature in graphics programs that alerts the user if a chosen color will fall outside the currently selected gamut. *See also* gamut.

Gantt chart *n.* A bar chart that shows individual parts of a project as bars against a horizontal time scale. Gantt charts are used as a project-planning tool for developing schedules. Most project-planning software can produce Gantt charts.

gap *n. See* inter-record gap.

garbage *n.* **1.** Incorrect or corrupted data. **2.** Gibberish displayed on screen, either due to faulty hardware or software or because a program is unable to display a file's content. For example, an executable file is not meant to be displayed by a text editor and so is indecipherable on screen.

garbage collection *n.* A process for automatic recovery of heap memory. Blocks of memory that had been allocated but are no longer in use are freed, and blocks of memory still in use may be moved to consolidate the free memory into larger blocks. Some programming languages require the programmer to handle garbage collection. Others, such as Java, perform this task for the programmer. *See also* heap (definition 1).

garbage in, garbage out *n.* A computing axiom meaning that if the data put into a process is incorrect, the data output by the process will also be incorrect. *Acronym:* GIGO.

gas-discharge display *n.* A type of flat-panel display, used on some portable computers, containing neon between a horizontal and a vertical set of electrodes. When one electrode in each set is charged, the neon glows (as in a neon lamp) where the two electrodes intersect, representing a pixel. *Also called:* gas-plasma display. *See also* flat-panel display, pixel.

gas-plasma display *n. See* gas-discharge display.

gate *n.* **1.** An electronic switch that is the elementary component of a digital circuit. It produces an electrical output signal that represents a binary 1 or 0 and is related to the states of one or more input signals by an operation of Boolean logic, such as AND, OR, or NOT. *Also called:* logic gate. *See also* gate array. **2.** The input terminal of a field-effect transistor (FET). *Also called:* gate electrode. *See also* drain (definition 1), FET, MOSFET, source (definition 2). **3.** A data structure used by 80386 and higher microprocessors to control access to privileged functions, to change data segments, or to switch tasks.

gate array *n.* A special type of chip that starts out as a nonspecific collection of logic gates. Late in the manufacturing process, a layer is added to connect the gates for a specific function. By changing the pattern of connections, the manufacturer can make the chip suitable for many needs. This process is very popular because it saves both design and manufacturing time. The drawback is that much of the chip goes unused. *Also called:* application-specific integrated circuit, logic array.

gated *adj.* **1.** Transmitted through a gate to a subsequent electronic logic element. **2.** Transmitted through a gateway to a subsequent network or service. For example, a mailing list on BITNET may be gated to a newsgroup on the Internet.

gate electrode *n. See* gate (definition 2).

gateway *n.* A device that connects networks using different communications protocols so that information can be passed from one to the other. A gateway both transfers information and converts it to a form compatible with the protocols used by the receiving network. *Compare* bridge.

gateway page *n. See* doorway page.

gating circuit *n.* An electronic switch whose output is either on or off, depending on the state of two or more inputs. For example, a gating circuit may be used to pass or not pass an input signal, depending on the states of one or more control signals. A gating circuit can be constructed from one or more logic gates. *See also* gate (definition 1).

gatored *vb.* To have been the victim of a hijackware program that seized control of an Internet shopping or surfing experience and caused the victim's browser to display ads and Web sites chosen by the program. Users may be

gatored when they have unknowingly installed a program or plug-in with a hidden marketing agenda, which intrudes on the user's Web shopping to display ads or Web sites promoting competing products. The term gatored comes from the name of a plug-in that was one of the first hijackware products to be used by Web marketers. *See also* hijackware.

GB *n. See* gigabyte.

Gbps *n. See* gigabits per second.

GDI *n.* Acronym for Graphical Device Interface. In Windows, a graphics display system used by applications to display or print bitmapped text (TrueType fonts), images, and other graphical elements. The GDI is responsible for drawing dialog boxes, buttons, and other elements in a consistent style on screen by calling the appropriate screen drivers and passing them the information on the item to be drawn. The GDI also works with GDI printers, which have limited ability to prepare a page for printing. Instead, the GDI handles that task by calling the appropriate printer drivers and moving the image or document directly to the printer, rather than reformatting the image or document in PostScript or another printer language. *See also* bitmapped font, dialog box, driver, PostScript.

Gecko *n.* A cross-platform Web browsing engine introduced by Netscape in 1998, distributed and developed as open-source software through Mozilla.org. Designed to be small, fast, and modular, the Gecko engine supports Internet standards including HTML, cascading style sheets (CSS), XML, and the Document Object Model (DOM). Gecko is the layout engine in Netscape's Communicator software.

geek *n.* **1.** Generally, a person who enjoys cerebral activities (such as wordplay or computer programming) more than the mainstream population does. Geeks in this sense increasingly claim the word with pride, but it may give offense when used by others, suggesting inadequacy in normal social relationships. **2.** A computer expert or specialist. For issues of etiquette, see definition 1. *Compare* guru, techie, wizard.

GENA *n.* Acronym for General Event Notification Architecture. An extension to HTTP defined by an Internet Engineering Task Force (IETF) Internet-Draft and used to communicate events over the Internet between HTTP resources. Universal Plug and Play (UPnP) services use GENA to send XML event messages to control points.

gender bender *n. See* gender changer.

gender changer *n.* A device for joining two connectors that are either both male (having pins) or both female (having sockets). See the illustration. *Also called:* gender bender.

Gender changer.

General Event Notification Architecture *n. See* GENA.

General Inter-ORB Protocol *n. See* IIOP.

General Packet Radio Service *n. See* GPRS.

General Protection Fault *n.* The error condition that occurs in an 80386 or higher processor running in protected mode (such as Windows 3.1) when an application attempts to access memory outside of its authorized memory space or when an invalid instruction is issued. *Acronym:* GPF. *See also* protected mode.

General Public License *n.* The agreement under which software, such as the GNU (GNU's Not UNIX) utilities, is distributed by the Free Software Foundation. Anyone who has a copy of such a program may redistribute it to another party and may charge for distribution and support services, but may not restrict the other party from doing the same. A user may modify the program, but if the modified version is distributed, it must be clearly identified as such and is also covered under the General Public License. A distributor must also either provide source code or indicate where source code can be obtained. *Acronym:* GPL. *Also called:* copyleft. *See also* free software, Free Software Foundation, GNU.

general-purpose computer *n.* A computer that can perform any computational task for which software is available. A PC is a general-purpose computer.

general-purpose controller *n.* A controller that is designed for multiple uses. *See also* controller.

General-Purpose Interface Bus *n.* A bus developed for the exchange of information between computers and industrial automation equipment. The electrical definition

of this bus has been incorporated into an IEEE standard. *Acronym:* GPIB. *See also* IEEE 488.

general-purpose language *n.* A programming language, such as Ada, Basic, C, or Pascal, designed for a variety of applications and uses. By contrast, SQL is a language designed to be used only with databases.

general-purpose register *n.* **1.** A register within a microprocessor that is available for any use rather than being reserved, like a segment selector or stack pointer, for a specific use by the processor design or operating system. **2.** Any digital circuit capable of storing binary data.

generation *n.* **1.** A concept used to distinguish stored versions of a set of files. The oldest is called the grandfather, the next oldest is the father, and the newest is the son. **2.** A concept used to distinguish among a process, another process that it initiates (its child), and the process that initiated it (its parent or the child's grandparent). *See also* process[1]. **3.** A category that distinguishes products, such as computers or programming languages, according to the technological advances they represent. *See also* computer.

generic icon *n.* An icon on a Macintosh screen that identifies a file only as a document or an application. Ordinarily the icon for an application will be specific to that application, and the icon for a document will be specific to the application that opens it. If a generic icon appears instead, the information that the Macintosh Finder uses to identify the application has been damaged. *See also* Finder, icon, Macintosh.

genetic algorithm *n.* A computational method for adapting problem solutions based on genetic aspects of evolution. Implementations typically use fixed-length text strings to represent information, together with a population of individuals that undergo crossover and mutation in order to find promising results. Genetic algorithms typically have three distinct stages: 1) Encoding of the potential solutions into bit strings that support the necessary variation, 2) mating and mutation algorithms that produce a new generation of individuals that recombine features of the parents, and 3) a fitness function that judges the results based on what is most appropriate for a potential solution to the problem. *See also* algorithm, genetic programming.

genetic programming *n.* A paradigm in which the principle of natural selection (whereby a biological entity whose structure is more fit for its environment than its peers produces descendants better able to survive) is applied to the creation of computer programs. Thus, genetic programming seeks to find and develop, from the set of all possible programs, code that is highly fit to solve problems, but not necessarily explicitly designed for a specific task. This inductive discovery method aims to mimic the natural selection process by developing computer code based on its adaptability and suitability. *See also* artificial intelligence.

Genie *n.* An online information service originally developed by General Electric (GE) Information Services as GEnie (**G**eneral **E**lectric **n**etwork for **i**nformation **e**xchange); currently owned and provided by IDT Corporation as Genie (lowercase *e*). Genie provides business information, forums, home shopping, and news and can exchange e-mail with the Internet.

GEO *n. See* geostationary orbit satellite.

geographic information system *n.* An application or suite of applications for viewing and creating maps. Generally, geographic information systems contain a viewing system (sometimes allowing users to view maps with a Web browser), an environment for creating maps, and a server for managing maps and data for real-time online viewing. *Acronym:* GIS.

geometry *n.* The branch of mathematics that deals with the construction, properties, and relationships of points, lines, angles, curves, and shapes. Geometry is an essential part of computer-aided design and graphics programs.

GeoPort *n.* A fast serial input/output port on a range of Macintosh computers, including Macintosh Centris 660AV, Quadra 660AV, Quadra 840AV, or PowerMac. Any Macintosh-compatible serial device can be connected to a GeoPort, but with GeoPort-specific hardware and software the GeoPort can transmit data at up to 2 Mbps (megabits per second) and can handle voice, fax, data, and video transmission.

GEOS *n.* An operating system developed by Geoworks Corporation, used in some handheld devices. GEOS is designed to provide broad functionality in resource-constrained environments that have limited storage or memory capability, such as enhanced phones, some Internet access devices, and PDAs and other handheld computers.

geostationary *adj. See* geosynchronous.

geostationary orbit satellite *n.* A communications satellite that rotates with the earth and thus appears to remain fixed, or stationary, over a particular location. This travels in orbit 22,282 miles above the equator, where its period

of rotation matches the earth's rotation. The service area, or *footprint*, of the satellite is approximately one-third of the earth's surface, so global satellite coverage can be achieved with three satellites in orbit. In a voice communication system, a round-trip to and from this satellite takes approximately 250 milliseconds. Satellite-based data communications are necessary for delivering high bandwidth options to rural areas. *Acronym:* GEO.

geosynchronous *adj.* Completing one revolution in the same time that the earth completes one rotation, as a communications satellite. *Also called:* geostationary.

germanium *n.* A semiconductor element (atomic number 32) that is used in some transistors, diodes, and solar cells but has been replaced by silicon in most applications. Germanium has a lower bias voltage than silicon but is more sensitive to heat (as in soldering).

get *n.* An FTP command that instructs the server to transfer a specified file to the client. *See also* FTP client, FTP commands, FTP server.

GFLOP *n. See* gigaflops.

GGA *n.* Acronym for **G**ood **G**ame **A**ll. GGA is often used in online and chat games at the conclusion of play. *See also* role-playing game.

ghost[1] *n.* **1.** A dim, secondary image that is displaced slightly from the primary image on a video display (due to signal reflection in transmission) or on a printout (due to unstable printing elements). **2.** An abandoned or no-longer-maintained Web site that remains accessible to visitors.

ghost[2] *vb.* **1.** To produce a duplicate, such as duplicating an application in memory. *See also* screen saver. **2.** To display an option on a menu or on a submenu in faint type to show that it cannot be selected at the present time.

ghosting *n. See* burn in (definition 2).

giant magnetoresistive head *n.* A type of hard-disk head developed by IBM and based on a physical property known as the giant magnetoresistive effect. Discovered by European scientists in the late 1980s, the giant magnetoresistive effect, or GMR, produces large resistance changes in magnetic fields when various metallic materials are "sandwiched" together in thin, alternating layers. When incorporated into disk heads, GMR technology allows for very dense data storage—currently, as much as 11.6 billion bits per square inch, or the equivalent of more than 700,000 typewritten pages. *Acronym:* GMR. *See also* head.

.gif *n.* The file extension that identifies GIF bit map images. *See also* GIF.

GIF *n.* **1.** Acronym for **G**raphics **I**nterchange **F**ormat. A graphics file format developed by CompuServe and used for transmitting raster images on the Internet. An image may contain up to 256 colors, including a transparent color. The size of the file depends on the number of colors actually used. The LZW compression method is used to reduce the file size still further. *See also* LZW compression, raster graphics. **2.** A graphic stored as a file in the GIF format.

GIF animation *n.* A file containing a series of graphics that are displayed in rapid sequence in a Web browser to appear as though they are a moving picture.

giga- *prefix* **1.** One billion (1000 million, 10^9). **2.** In data storage, $1024 \times 1{,}048{,}576$ (2^{30}) or $1000 \times 1{,}048{,}576$. *See also* gigabyte, gigaflops, gigahertz, kilo-, mega-.

Gigabit Ethernet *n.* The IEEE standard dubbed 802.3z, which includes support for transmission rates of 1 Gbps (gigabit per second)—1000 Mbps (megabits per second)—over an Ethernet network. The usual Ethernet standard (802.3) supports only up to 100 Mbps. *Compare* Ethernet/802.3.

gigabit over copper *n. See* Cat 5 cable.

gigabits per second *n.* A measurement of data transfer speed, as on a network, in multiples of 1,073,741,824 (2^{30}) bits. *Acronym:* Gbps.

gigabyte *n.* **1.** 1024 megabytes (1024 x 1,048,576 [2^{30}] bytes). **2.** One thousand megabytes (1000 x 1,048,576 bytes). *Acronym:* GB.

gigaflops *n.* A measure of computing performance: one billion (1000 million) floating-point operations per second. *Acronym:* GFLOP. *See also* floating-point operation.

gigahertz *n.* A measure of frequency: one billion (1000 million) cycles per second. *Abbreviation:* GHz.

gigaPoP *n.* Short for **giga**bit **P**oint **o**f **P**resence. A point of access for Internet2 (and possibly other high-speed networks) that supports data transfer speeds of at least 1 Gbps. Approximately 30 gigaPoPs are located at various points across the United States.

GIGO *n. See* garbage in, garbage out.

GIMP *n.* Acronym for **G**NU **I**mage **M**anipulation **P**rogram. A free and expandable graphics program for image creation and photo manipulation. GIMP is available for various UNIX-related platforms, including Linux and Mac OS X.

GIOP *n.* Short for **G**eneral **I**nter-**O**RB **P**rotocol. *See* IIOP.

GIS *n. See* geographic information system.

GKS *n. See* Graphical Kernel System.

glare filter *n.* A transparent mask placed over the screen of a video monitor to reduce or eliminate light reflected from its glass surface.

glitch *n.* **1.** A problem, usually minor. **2.** A brief surge in electrical power.

global *adj.* Pertaining to an entire document, file, or program rather than to a restricted segment of it. *Compare* local, local variable.

global assembly cache *n.* A machine-wide code cache, introduced with Microsoft's .NET systems, that stores assemblies specifically installed to be shared by many applications on the computer. Applications deployed in the global assembly cache must have a strong name. *Acronym:* GAC. *See also* assembly cache, strong name.

global catalog *n.* A directory Windows database that applications and clients can query to locate any object in a forest. The global catalog is hosted on one or more domain controllers in the forest. It contains a partial replica of every domain directory partition in the forest. These partial replicas include replicas of every object in the forest, as follows: the attributes most frequently used in search operations and the attributes required to locate a full replica of the object. *See also* Active Directory, attribute, domain controller, forest, replication.

globally unique identifier *n.* In the Component Object Model (COM), a 16-byte code that identifies an interface to an object across all computers and networks. Such an identifier is unique because it contains a time stamp and a code based on the network address hardwired on the host computer's LAN interface card. These identifiers are generated by a utility program. *Acronym:* GUID.

global operation *n.* An operation, such as a search and replace, that affects an entire document, program, or other object such as a disk.

Global Positioning System *n. See* GPS.

global search and replace *n.* A search-and-replace operation that finds and changes all instances of the selected string throughout a document. *See also* search and replace.

Global System for Mobile Communications *n. See* GSM.

global universal identification *n.* An identification scheme in which only one name is associated with a particular object; this name is accepted across platforms and applications. *Acronym:* GUID. *See also* globally unique identifier.

global variable *n.* A variable whose value can be accessed and modified by any statement in a program, not merely within a single routine in which it is defined. *See also* global. *Compare* local variable.

GMR *n. See* giant magnetoresistive head.

GNOME *n.* Acronym for **G**NU **N**etwork **O**bject **M**odel **E**nvironment. A popular open-source desktop environment for UNIX and UNIX-based operating systems such as Linux. GNOME provides a GUI desktop interface and basic applications that correspond to those found with Microsoft Windows or the Macintosh operating system. By providing a mainstream environment and familiar desktop appearance GNOME is intended to make UNIX easier for users. Development of GNOME is overseen by the GNOME Foundation, an association of computer industry companies and organizations with interests in the UNIX operating system. GNOME and KDE are leading contenders for consideration as a Linux desktop standard. *See also* KDE.

gnomon *n.* In computer graphics, a representation of the three-dimensional (*x*-*y*-*z*) axis system.

GNU *n.* Acronym for **G**NU's **N**ot **U**NIX. A collection of software based on the UNIX operating system maintained by the Free Software Foundation. GNU is distributed under the GNU General Public License, which requires that anyone who distributes GNU or a program based on GNU may charge only for distribution and support and must allow the user to modify and redistribute the code on the same terms. *See also* Free Software Foundation, General Public License. *Compare* Linux.

GNU Image Manipulation Program *n. See* GIMP.

Gnutella *n.* A file-sharing protocol that forms the basis of a number of peer-to-peer networking products. Gnutella forms a loose decentralized network with each user able to

see and access all shared files of other Gnutella users. Unlike Napster, Gnutella does not require a central server, and any file type can be exchanged. Gnutella was originally developed by researchers at America Online's Nullsoft group but the original implementation of the protocol was never publicly released. An open-source Gnutella preview appeared that resulted in a number of variations becoming available. *See also* Napster.

Godwin's Law *n.* As originally proposed by Internet activist Michael Godwin, the theory that as an online discussion grows longer, a comparison involving Nazis or Hitler will inevitably be made. When a participant in an online discussion resorts to invoking such a comparison, other participants might cite Godwin's Law to indicate both that the person has lost the argument and that the discussion has continued too long.

Good Times virus *n.* A purported e-mail virus alluded to in a warning that has been propagated widely across the Internet, as well as by fax and standard mail. The letter claims that reading an e-mail message with the subject "Good Times" will cause damage to the user's system. In fact, it is currently impossible to harm a system by reading an e-mail message, although it is possible to include a virus in a file that is attached to an e-mail message. Some consider the chain letter itself to be the "virus" that wastes Internet bandwidth and the reader's time. Information on such hoaxes and on real viruses can be obtained from CERT (http://www.cert.org/). *See also* urban legend, virus.

Gopher or **gopher** *n.* An Internet utility for finding textual information and presenting it to the user in the form of hierarchical menus, from which the user selects submenus or files that can be downloaded and displayed. One Gopher client may access all available Gopher servers, so the user accesses a common "Gopherspace." The name of the program is a three-way pun: it is designed to go for desired information; it tunnels through the Internet and digs the information up; and it was developed at the University of Minnesota, whose athletic teams are named the Golden Gophers. Gopher is being subsumed by the World Wide Web.

Gopher server *n.* The software that provides menus and files to a Gopher user. *See also* Gopher.

Gopher site *n.* A computer on the Internet on which a Gopher server runs. *See also* Gopher, Gopher server.

Gopherspace *n.* The total set of information on the Internet that is accessible as menus and documents through Gopher. *See also* Gopher.

GOSIP *n.* Acronym for **G**overnment **O**pen **S**ystems **I**nterconnection **P**rofile. A U.S. government requirement that all of its new network purchases comply with the ISO/OSI standards. GOSIP went into effect on August 15, 1990, but was never fully implemented and was replaced by POSIT.

GOTO statement *n.* A control statement used in programs to transfer execution to some other statement; the high-level equivalent of a branch or jump instruction. Use of GOTO statements is generally discouraged because they make it difficult not only for a programmer to trace the logic of a program but also for a compiler to generate optimized code. *See also* branch instruction, jump instruction, spaghetti code.

.gov *n.* In the Internet's Domain Name System, the top-level domain that identifies addresses operated by government agencies. The domain name .gov appears as a suffix at the end of the address. In the United States, only nonmilitary federal government agencies may use the .gov domain. State governments in the United States use the top-level domain of .state.us, with .us preceded by the two-letter abbreviation for the state, or just .us; other regional governments in the United States are registered under the .us domain. *See also* DNS (definition 1), domain (definition 3), .state.us, .us. *Compare* .com, .edu, .mil, .net, .org.

Government Open Systems Interconnection Profile *n. See* GOSIP.

GPF *n. See* General Protection Fault.

GPIB *n. See* General-Purpose Interface Bus.

GPL *n. See* General Public License.

GPRS *n.* Acronym for **G**eneral **P**acket **R**adio **S**ervice. A third-generation enhancement to the Global System for Mobile Communications (GSM), which supports nonvoice applications such as Web browsing and other servicing requiring transfer of data packets without limits in message size. Systems using the service can be immediately connected when needed and therefore seem to the users to be always on. *See also* GSM, TDMA.

GPS *n.* Acronym for **G**lobal **P**ositioning **S**ystem. A radio navigation system developed by the U.S. Department of

Defense that uses a constellation of 24 earth satellites, which are monitored by ground-based control stations, to provide precise, continuous worldwide positioning and timing information. GPS offers two services: a public Standard Positioning Service that provides positioning data accurate to within 100 meters horizontally and 156 meters vertically and time accurate to within 340 nanoseconds; and a Precise Positioning Service, principally for government and military use, with positioning data accurate to within 22 meters horizontally and 27.7 meters vertically and time accurate to within 100 nanoseconds. *See also* GPS receiver.

GPS receiver *n.* A device that includes an antenna, a radio receiver, and a processor for use with the worldwide GPS (Global Positioning System). A GPS receiver uses position and time information from four GPS satellites to calculate precise information about its current location, its speed of travel, and the current time. A portable GPS receiver may be a stand-alone device or a plug-in unit for use with a portable computer. GPS receivers are used for scientific work, such as surveying, mapping, and studies of volcanoes, as well as for land, sea, and air navigation. On the consumer front, they are used in outdoor activities such as hiking and sailing and in cars to provide location, destination, and traffic information. *See also* GPS.

grabber *n.* **1.** A device for capturing graphical image data from a video camera or another full-motion video source and putting it into memory. *Also called:* frame grabber, video digitizer. **2.** Any device for capturing data. **3.** Software that takes a snapshot of the currently displayed screen image by transferring a portion of video memory to a file on disk. **4.** In some graphics-based applications, a special type of mouse pointer.

graceful exit *n.* The methodical termination of a process, even under error conditions, that allows the operating system or parent process to regain normal control, leaving the system in a state of equilibrium. This is expected behavior. *See also* fail-soft system.

grade *n.* In communications, the range of frequencies available for transmission on a single channel. For example, voice-grade telephone frequencies range from about 300 hertz (Hz) through 3400 Hz.

grade of service *n.* The probability that a user of a shared communications network, such as a public telephone system, will receive an "all channels busy" signal. The grade of service is used as a measure of the traffic-handling ability of the network and is usually applied to a specific period, such as the peak traffic hour. A grade of service of 0.002, for example, assumes that a user has a 99.8 percent chance that a call made during the specified period will reach its intended destination.

gradient *n.* A smooth progression of colors and shades, usually from one color to another color, or from one shade to another shade of the same color.

Graffiti *n.* A software application developed by Palm to allow handwriting recognition on personal digital assistants (PDAs). Graffiti contains preprogrammed shapes for each letter, which users of the application must match as closely as possible when writing. Text is written directly onto the PDA's display screen using a stylus. The Graffiti application then passes the translated letter to the PDA's application.

grafPort *n.* A structure used on the Apple Macintosh to define a graphics environment with its own pen size, font, fill patterns, and so on. Each window has a grafPort, and grafPorts can be used to send graphics to off-screen windows or files.

graftal *n.* One of a family of geometric forms, similar to fractals but easier to compute. Graftals are often used in the special-effects industry to create synthetic images of structures such as trees and plants. *See also* fractal.

grammar checker *n.* A software accessory that checks text for errors in grammatical construction.

Grammar Specification Language *n. See* GSL.

grandfather *n. See* generation (definition 1).

grandfather/father/son *adj. See* generation (definition 1).

grandparent *n. See* generation (definition 2).

granularity *n.* A description, from "coarse" to "fine," of a computer activity or feature (such as screen resolution, searching and sorting, or time slice allocation) in terms of the size of the units it handles (pixels, sets of data, or time slices). The larger the pieces, the coarser the granularity.

graph *n.* **1.** In programming, a data structure consisting of zero or more nodes and zero or more edges, which connect pairs of nodes. If any two nodes in a graph can be connected by a path along edges, the graph is said to be connected. A subgraph is a subset of the nodes and edges within a graph. A graph is directed (a digraph) if each edge links two nodes together only in one direction. A

graph is weighted if each edge has some value associated with it. *See also* node (definition 3), tree. **2.** *See* chart.

Graphical Device Interface *n. See* GDI.

graphical interface *n. See* graphical user interface.

Graphical Kernel System *n.* A computer graphics standard, recognized by ANSI and ISO, that specifies methods of describing, manipulating, storing, and transferring graphical images. It functions at the application level rather than the hardware level and deals with logical workstations (combinations of input and output devices such as keyboard, mouse, and monitor) rather than with individual devices. Graphical Kernel System was developed in 1978 to handle two-dimensional graphics; the later modification, GKS-3D, extended the standard to three-dimensional graphics. *Acronym:* GKS. *See also* ANSI, ISO.

graphical user interface *n.* A visual computer environment that represents programs, files, and options with graphical images, such as icons, menus, and dialog boxes, on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, with the keyboard. A particular item (such as a scroll bar) works the same way for the user in all applications, because the graphical user interface provides standard software routines to handle these elements and report the user's actions (such as a mouse click on a particular icon or at a particular location in text, or a key press); applications call these routines with specific parameters rather than attempting to reproduce them from scratch. *Acronym:* GUI.

graphic character *n.* Any character that is represented by a visible symbol, such as an ASCII character. A graphic character is not the same as a graphics character. *Compare* graphics character.

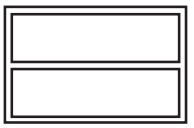
graphic limits *n.* On a computer screen, the boundary of a graphical image in a graphics software program, including all the area enclosed within the graphic. In some graphics environments the limits of a graphic consist of the smallest rectangle that can completely enclose it, called its *bounding rectangle* or *bounding box*.

graphics accelerator *n.* A video adapter that contains a graphics coprocessor. A graphics accelerator can update the video display much more quickly than the CPU can, and it frees the CPU for other tasks. A graphics accelerator is a necessity for modern software such as graphical user interfaces and multimedia applications. *See also* graphics coprocessor, video adapter.

graphics adapter *n.* A video adapter capable of displaying graphics as well as alphanumeric characters. Almost all video adapters in common use today are graphics adapters.

graphics card *n. See* video adapter.

graphics character *n.* A character that can be combined with others to create simple graphics, such as lines, boxes, and shaded or solid blocks. See the illustration. *Compare* graphic character.



Graphics character. *Box built up from line graphics characters.*

graphics controller *n.* The part of the EGA and VGA video adapters that allows the computer to access the video buffer. *See also* EGA, VGA.

graphics coprocessor *n.* A specialized microprocessor, included in some video adapters, that can generate graphical images such as lines and filled areas in response to instructions from the CPU, freeing the CPU for other work.

graphics data structure *n.* A data structure that is designed specifically for representing one or more elements of a graphical image.

graphics engine *n.* **1.** A display adapter that handles high-speed graphics-related processing, freeing the CPU for other tasks. *Also called:* graphics accelerator, video accelerator. **2.** Software that, based on commands from an application, sends instructions for creating graphic images to the hardware that actually creates the images. Examples are Macintosh QuickDraw and Windows Graphics Device Interface (GDI).

graphics export component *n.* A technology developed by Apple for creating, editing, publishing, and viewing multimedia content. The graphics export component provides an application programming interface that enables a QuickTime player to export still images into a variety of file formats.

graphics import component *n.* A technology developed by Apple for creating, editing, publishing, and viewing multimedia content. The graphics import component provides an application programming interface that enables a QuickTime player to import still images from a variety of file formats.

Graphics Interchange Format *n. See* GIF.

graphics interface *n. See* graphical user interface.

graphics mode *n.* **1.** On computers such as the IBM PC, the display mode in which lines and characters on the screen are drawn pixel by pixel. Because graphics mode creates images from individual dots on the screen, programs have more flexibility in creating images than they do in text (or character) mode. Thus, the computer is able to display a mouse pointer as an arrowhead or other shape rather than as a blinking square or rectangle, and it can display character attributes, such as boldface and italics, as they will appear in print rather than using conventions such as highlighting, underlining, or alternate colors. *Compare* text mode. **2.** A particular set of color and resolution values, often related to a particular video adapter, such as VGA color with 16 colors and 640 x 480 pixels on the screen. *See also* high resolution, low resolution, resolution (definition 1).

graphics port *n. See* grafPort.

graphics primitive *n.* A drawing element, such as a text character, an arc, or a polygon, that is drawn and manipulated as a single unit and is combined with other primitives to create an image. *Compare* entity.

graphics printer *n.* A printer, such as a laser, ink-jet, or dot-matrix impact printer, that can produce graphics formed pixel by pixel and not merely text characters. Nearly all printers presently used with personal computers are graphics printers; daisy-wheel printers are the exception. *Compare* character printer.

graphics processor *n. See* graphics coprocessor.

graphics tablet *n.* A device used to input graphics position information in engineering, design, and illustration applications. A flat rectangular plastic board is equipped with a puck or a pen (also called a stylus) and sensing electronics that report the position of the puck or stylus to the computer, which translates that data into a cursor position on the screen. *Also called:* digitizing tablet. *See also* puck, stylus.

graphics terminal *n.* A terminal capable of displaying graphics as well as text. Such terminals usually interpret graphics control commands rather than receiving streams of already-processed pixels.

Graphite *n.* An alternate appearance option in Mac OS X that features a gray interface with more subtle highlights than the colorful standard Aqua appearance. *See also* Aqua.

Gray code *n. See* cyclic binary code.

gray market *n.* Resellers and other sources for hardware and software that obtain their inventory from distributors other than those authorized by the manufacturer. Gray market transactions may involve items that wholesalers purchase at discount and resell at higher prices, or they may refer to purchases made when sudden spikes in demand cannot be satisfied through normal distribution channels. On a more unsavory front, gray market transactions can also *illegally* involve stolen or counterfeit hardware, such as CPU chips and software packages.

gray scale *n.* A sequence of shades ranging from black through white, used in computer graphics to add detail to images or to represent a color image on a monochrome output device. Like the number of colors in a color image, the number of shades of gray depends on the number of bits stored per pixel. Grays may be represented by actual gray shades, by halftone dots, or by dithering. *See also* dithering, halftone.

greater than *adj. See* relational operator.

greater than or equal to *adj. See* relational operator.

Great Plains *n.* Microsoft Corporation's suite of business solution applications for finance, accounting, and management. Microsoft acquired the Great Plains applications in December 2000, when it purchased Great Plains Software, which had originally developed the suite of business accounting and management solutions. Great Plains Business Solutions include applications for accounting and finance, customer relations management, e-commerce, human resources, manufacturing, project accounting, and supply-chain management.

Great Renaming *n.* The changeover to the current system of Usenet hierarchies throughout the Internet. Before the Great Renaming, which took place in 1985, nonlocal newsgroup names had the form net.*; for example, a group that carried source code, formerly named net.sources, was renamed comp.sources.misc. *See also* local newsgroups, newsgroup, traditional newsgroup hierarchy, Usenet.

greeking *n.* **1.** The use of gray bars or other graphics to represent lines of characters too small to be drawn legibly on a screen at the chosen resolution, such as when viewing the layout of a whole page or pair of facing pages. **2.** The use of nonsense words to represent the text of a document in design samples. A garbled Latin text beginning "Lorem ipsum dolor sit amet" is traditionally used for this purpose.

Greeking does not involve substituting the Greek alphabet for the Roman one.

greek text *n. See* greeking.

Green Book *n.* A specifications book written by the Sony and Philips Corporations, covering the CD-I (compact disc-interactive) technology. *See also* CD-I. *Compare* Orange Book (definition 2), Red Book (definition 2).

green PC *n.* A computer system designed to conserve energy. For example, some computers shut off power to nonessential systems when no input has been detected for a certain amount of time, a condition known as *sleep mode*. Green PCs may also be distinguished by the use of minimal packaging materials and replaceable components, such as toner cartridges, that are recyclable.

Gregorian calendar *n.* The calendar used today in the Western world, introduced by Pope Gregory XIII in 1582 to replace the Julian calendar. To approximate better the length of the astronomical year (365.2422 days), years divisible by 100 are leap years only if they are also divisible by 400 (thus, 2000 was a leap year, but 1900 was not). To correct the error accumulated since A.D. 1, 10 days were dropped from October 1582; however, Britain and the American colonies did not adopt the Gregorian calendar until 1752 and had to remove 11 days then. Because the Gregorian calendar uses several rules for calculating leap years, systems based on algorithms that did not correctly determine that the year 2000 was a leap year might have encountered difficulties after February 28, 2000. *Compare* Julian calendar.

grep[1] *n.* Acronym for **g**lobal **r**egular **e**xpression **p**rint. A UNIX command used to search a file or files by keyword.

grep[2] *vb.* To search text, especially with the UNIX grep utility.

grid *n.* **1.** Two sets of lines or linear elements at right angles to each other. **2.** A spreadsheet is a grid of rows and columns; a graphics screen is a grid of horizontal and vertical lines of pixels. **3.** In optical character recognition, a grid is used for measuring or specifying characters. *See also* Cartesian coordinates.

gridlines *n.* **1.** Lines across a page in a graphics program that correspond to intervals on a ruler. **2.** In many word-processing and spreadsheet programs, thin lines that indicate the cell boundaries in a table. **3.** Lines you can add to a chart that make it easier to view and evaluate data. Gridlines extend from the tick marks on an axis across the plot area. Gridlines do not print when you print a document.

grok *vb.* To understand deeply and appreciatively. The term comes from Robert A. Heinlein's novel *Stranger in a Strange Land*, where it is also a Martian word for "to drink" and implies the kind of devoted interest that a Martian—native of a dry planet—would have in water. Hackers often use it (for example, in Internet discussions) in reference to computer expertise. *See also* cyberpunk.

ground *n.* A conducting path from an electric circuit to earth or to a conducting body serving in place of earth, usually used as a safety device. *See also* grounding.

grounding *n.* The connection of sections of an electrical circuit to a common conductor, called the *ground*, which serves as the reference for the other voltages in the circuit. The ground conductor on installed circuit boards is usually connected to the chassis, or metal frame, holding the electronic parts; the chassis is in turn usually connected to the third (round) prong on the power plug, which connects to a ground circuit that is, in fact, connected to the earth. This is important to avoid creating a shock hazard.

group[1] *n.* A collection of elements that can be treated as a whole, such as a collection of records in a database report, or a collection of objects that can be moved and transformed as a single object in a drawing program. In various multiuser operating systems, a group is a set of user accounts, sometimes called *members*; privileges can be specified for the group, and each member will then have those privileges. *See also* built-in groups, local group, user account.

group[2] *vb.* In a drawing program, to transform a number of objects into a group. *See also* drawing program.

Group Policy Object *n.* A collection of Group Policy settings that are essentially the documents created by the Group Policy snap-in, a utility in Microsoft Windows 2000. These settings are stored at the domain level and affect users and computers contained in sites, domains, and organizational units. *Acronym:* GPO.

groupware *n.* Software intended to enable a group of users on a network to collaborate on a particular project. Groupware may provide services for communication (such as e-mail), collaborative document development, scheduling, and tracking. Documents may include text, images, or other forms of information.

grovel *vb.* **1.** To search or do other work at great length without apparent progress. Some programs grovel over a whole input file before they begin to produce output. A programmer may have to grovel through manuals in search of documentation on a particular command, or through code in search of a bug. **2.** To post a plea for some favor to a newsgroup.

grunge *n. See* dead code.

GSL *n.* Acronym for **G**rammar **S**pecification **L**anguage. A grammar description format used by VoiceXML applications and other speech recognition systems. GSL was developed by Nuance and supports a number of XML-based speech editing and voice-browsing applications.

GSM *n.* Acronym for **G**lobal **S**ystem for **M**obile Communications. A digital cellular phone technology first deployed in 1992. In 2000, GSM was the predominant phone technology in Europe, and was used by 250 million subscribers worldwide. GSM phones offer a removable smart card containing subscriber account information. This card can be transferred from phone to phone quickly and easily, allowing the user to access his account from any phone in the system. Various enhancements to the GSM system allow increased Web browsing and data transfer options. *See also* GPRS, TDMA.

guest *n.* A common name for a login account that can be accessed without a password. BBSs and service providers often maintain such an account so that prospective subscribers can sample the services offered.

guest account *n.* An account used to log onto a system or domain where the user does not have access. Generally, resources and access are severely limited. On Windows NT technology, this account is built in to all domains. *See also* domain.

GUI *n. See* graphical user interface.

GUID *n. See* globally unique identifier, global universal identification.

GUID partition table *n.* A disk-partitioning scheme that is used by the eXtensible Firmware Interface (EFI) in Itanium-based computers. A GUID partition table offers more advantages than master boot record (MBR) partitioning because it allows up to 128 partitions per disk, provides support for volumes up to 18 exabytes in size, allows primary and backup partition tables for redundancy, and supports unique disk and partition IDs (GUIDs). *Acronym:* GPT. *See also* eXtensible Firmware Interface, Itanium, master boot record.

gunzip *n.* A GNU utility for decompressing files compressed with gzip. *See also* GNU, uncompress. *Compare* gzip.

guru *n.* A technical expert who is available to help solve problems and to answer questions in an intelligible way. *See also* techie, wizard (definition 1).

gutter *n.* The blank area between two or more columns of text or between two facing pages in a publication.

gzip *n.* A GNU utility for compressing files. *See also* compress[2], GNU. *Compare* gunzip.

H

H *n. See* henry.

H.320 *n.* An International Telecommunications Union (ITU) standard that enables interoperability among videoconferencing equipment from different manufacturers over circuit-switched services such as ISDN, thus making desktop video conferencing viable. H.320 establishes the common formats necessary to make audio and video inputs and outputs compatible and defines a protocol that makes it possible for a multimedia terminal to use audio/visual communications links and synchronization. *See also* International Telecommunications Union, ISDN, video conferencing.

H.323 *n.* An International Telecommunications Union (ITU) interoperability protocol enabling cross-communication of multimedia products and applications over packet-based networks. Under H.323, multimedia products offered by one vendor can work with those of another, regardless of hardware compatibility. For example, a PC can share audio and video streams over either an intranet or the Internet. Applications are thus network-, platform-, and application-independent. *See also* International Telecommunications Union, packet switching.

H.324 *n.* An International Telecommunications Union (ITU) standard for simultaneously transmitting video, data, and voice over POTS (Plain Old Telephone Service) modem connections. *See also* POTS.

hack[1] *n.* **1.** A modification to the code in a program, often made without taking the time to find an elegant solution. **2.** A sloppy job. *See also* kludge (definition 2), patch[2].

hack[2] *vb.* **1.** To apply creative ingenuity to a programming problem or project. **2.** To alter the behavior of an application or an operating system by modifying its code rather than by running the program and selecting options.

hacker *n.* **1.** A computerphile; a person who is totally engrossed in computer technology and computer programming or who likes to examine the code of operating systems and other programs to see how they work. **2.** A person, more commonly considered a cracker, who uses computer expertise for illicit ends, such as by gaining access to computer systems without permission and tampering with programs and data. *Also called:* cracker. *See also* hacktivist.

hacktivist *n.* An individual who furthers political or social agendas through hacking activity. Hacktivists may break into computer systems to disrupt traffic or cause confusion, and may alter Web pages or e-mail to display content sympathetic to a specific cause. *See also* hacker.

HAGO *n.* Acronym for **h**ave **a g**ood **o**ne. An expression used to conclude e-mail messages or in signing off from IRC.

HailStorm *n. See* .NET My Services.

hairline *n.* The smallest amount of visible space or the narrowest line that is displayable on a printed page. The size of a hairline depends on the materials, hardware, and software used or on the organizations involved. The United States Postal Service defines a hairline as 1/2 point (roughly 0.007 inch), whereas the Graphic Arts Technical Foundation (GATF) defines a hairline as 0.003 inch. *See also* point[1] (definition 1), rule (definition 1).

HAL *n.* **1.** *See* hardware abstraction layer. **2.** In the 1968 book and movie "2001: A Space Odyssey" by novelist Arthur C. Clarke, the intelligent but eventually psychotic computer, HAL 9000, that takes over a spaceship bound for Jupiter. The name HAL is an acronym for **H**euristic/**AL**gorithmic computer, but the letters H-A-L are also one letter removed from I-B-M in the alphabet.

half adder *n.* A logic circuit that can add two input data bits and produce a sum bit and a carry bit as output. A half adder cannot accept a carry bit from a previous addition; to add two input bits and a carry bit, a full adder is required. To add two multibit binary numbers, a computer uses a half adder and one or more full adders. *See also* carry bit, full adder.

half-card *n. See* short card.

half-duplex[1] *adj.* Of or pertaining to two-way communication that takes place in only one direction at a time. For example, transmission between half-duplex modems occurs when one modem waits to transmit until the other has finished sending. *Compare* duplex[1].

half-duplex[2] *n.* Two-way electronic communication that takes place in only one direction at a time. *Also called:* half-duplex transmission. *Compare* duplex[2] (definition 1), simplex transmission.

half-duplex transmission *n. See* half-duplex[2].

half-height drive *n.* Any of a generation of disk drives that are roughly one-half the height of the previous generation of drives.

half router *n.* A device that connects a local area network (LAN) to a communications line (such as one to the Internet) using a modem and that controls the routing of data to individual stations on the LAN.

H

halftone *n.* A printed reproduction of a photograph or other illustration, using evenly spaced spots of varying diameter to produce apparent shades of gray. The darker the shade at a particular point in the image, the larger the corresponding spot in the halftone. In traditional publishing, halftones are created by photographing an image through a screen. In desktop publishing, each halftone spot is represented by an area containing a number of dots printed by a laser printer or digital imagesetter. In both cases, the frequency of the halftone dots is measured in lines per inch. Higher printer resolution enables effective use of higher frequencies of halftone dots, enhancing image quality. *See also* dithering, gray scale, imagesetter, spot function.

half-word *n.* Half the number of bits considered to be a word in a particular computer; if a word is 32 bits, a half-word will be 16 bits or 2 bytes. *See also* word.

hammer *n.* The part of an impact printer that strikes or causes another component to strike the ribbon to print a character on the paper. In a dot-matrix printer, the pins or wires are the hammers; in a daisy-wheel printer, the hammer strikes the daisy wheel.

Hamming code *n.* A family of error-correction codes named for R. W. Hamming of Bell Labs. In one of the simplest Hamming codes, every 4 data bits are followed by 3 check bits, each computed from the 4 data bits. If any one of the 7 bits becomes altered, a simple computation can detect the error and determine which bit is altered. *See also* error-correction coding, forward error correction.

handheld computer *n.* A computer small enough to be held in one hand while being operated with the other hand. Handheld computers are commonly used in transportation and other field service industries. They are usually built to perform specific tasks. They often have restricted specialized keyboards rather than the standard QWERTY layout, smaller displays, input devices such as bar code readers, and communications devices for sending their data to a central computer; they rarely have disk drives. Their software is usually proprietary and stored in ROM. *See also* QWERTY keyboard, ROM. Compare handheld PC, PDA.

Handheld Device Markup Language *n. See* HDML.

Handheld Device Transport Protocol *n. See* HDTP.

handheld PC *n.* A computer that is small enough to fit in a jacket pocket and can run, for example, Windows CE (an operating system for handheld PCs and embedded systems) and applications made for that operating system. See the illustration. *Acronym:* HPC. *Compare* handheld computer, PDA.

Handheld PC.

handheld scanner *n.* A type of scanner used as follows: the user passes the scan head, contained within a handheld unit, over the medium being scanned, such as a piece of paper. *See also* scan head, scanner. *Compare* drum scanner, feed scanner, flatbed scanner.

handle *n.* **1.** A pointer to a pointer; that is, a variable that contains the address of another variable, which in turn contains the address of the desired object. In certain operating systems, the handle points to a pointer stored in a fixed location in memory, whereas that pointer points to a movable block. If programs start from the handle whenever they access the block, the operating system can perform memory-management tasks such as garbage collection

without affecting the programs. *See also* pointer. **2.** Any token that a program can use to identify and access an object such as a device, a file, a window, or a dialog box. **3.** One of several small squares displayed around a graphical object in a drawing program. The user can move or reshape the object by clicking on a handle and dragging. See the illustration. **4.** In online communication, such as chats and bulletin boards, the name a person uses to identify himself or herself. A handle is comparable to an alias or a nickname and is like those used with CB radio. **5.** A unique alphanumeric identifier of up to 10 characters assigned by InterNIC to the domain names, contacts, and network records in its domain name database. The NIC handle is used as a shorthand means of finding records and ensuring accuracy in the database. *Also called:* NIC handle.

Handle. *A computer graphic's handle.*

handler *n.* **1.** A routine that manages a common and relatively simple condition or operation, such as error recovery or data movement. **2.** In some object-oriented programming languages that support messages, a subroutine that processes a particular message for a particular class of objects. *See also* message, object-oriented programming.

handoff *n.* The process of transferring a wireless telephone signal between cell towers as a caller travels from one cell to another. A caller will not notice a smooth handoff, but an abrupt handoff can interfere with reception, with results ranging from momentary static to a disconnected call. *Also called:* handover. *See also* cell.

hands-free kit *n.* Wireless phone accessory that allows users to make calls without holding the phone. A basic kit includes a headset or an earpiece with a microphone. More elaborate sets for use in automobiles may include a power amplifier, dashboard microphone, phone cradle, and speakers.

handshake *n.* A series of signals acknowledging that communication or the transfer of information can take place between computers or other devices. A hardware handshake is an exchange of signals over specific wires (other than the data wires) in which each device indicates its readiness to send or receive data. A software handshake consists of signals transmitted over the same wires used to transfer data, as in modem-to-modem communications over telephone lines.

hands-on *adj.* Involving interactive work with a computer or a computer program. A hands-on tutorial, for example, would teach a skill (such as the use of a program) by means of practice sessions and question-and-answer dialogues.

handwriting input device *n.* A tool, such as a digital pen and tablet, used to enter text by writing instead of typing. Along with writing tablets, additional devices include 3-D drawing or computer-aided design (CAD) tablets, a tablet PC, or moving a mouse on the mouse pad.

handwriting recognition *n.* **1.** The ability of a computer to identify a user by recognizing features of handwriting, especially a signature. **2.** The ability of a computer to translate handwritten text into character data for input. This technology is still under considerable development, and most handwriting recognition programs require users to form letters and words in a very consistent and clear manner to work adequately. The development of handwriting recognition programs has been spurred by PDAs, which frequently have keyboards that are too small for data entry, and software designed for Asian markets that have languages with numerous characters, which makes keyboards a cumbersome method for entering text. *See also* PDA. *Compare* optical character recognition.

hang *vb.* To stop responding. A hung program or computer system does not respond to user input, but the screen looks as if everything is running normally. The program or system might be waiting for something—for example, information from a network—or it might have terminated abnormally. It might resume running normally on its own, or the user might need to terminate and restart the program or reboot the computer. A hung computer system is said to be locked up. *See also* crash[2] (definition 1).

hanging indent *n.* Placement of the beginning of the first line of a paragraph farther to the left than the subsequent lines. *Also called:* outdent. *Compare* indent.

haptics *n.* The study of the sense of touch. This study has extended to the study of human interaction with computer technology through tactile means. Haptics technology is central to virtual reality gaming settings, in which computers could sense and respond to finger, hand, body, or head movements. The computer could also re-create the sense of touch by altering texture, increasing resistance, or other simulations appropriate to the user's virtual reality experience. *See also* force feedback.

hard *adj.* **1.** Permanent, fixed, or physically defined; unchangeable by the ordinary operation of a computer system. *See also* hard copy, hard error, hard return,

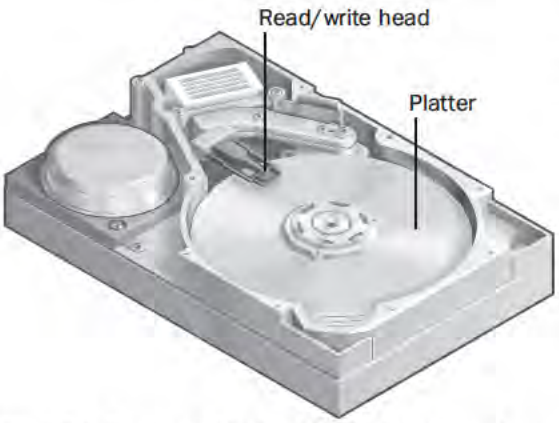
hard-sectored disk. *Compare* soft (definition 1). **2.** Retaining magnetization even in the absence of an external magnetic field. *Compare* soft (definition 2).

hard card *n.* A circuit board, carrying a hard disk and containing its controller, that plugs into an expansion slot and uses the expansion bus for power as well as for data and control signals. By contrast, a hard disk in a drive bay communicates with a separate controller card by a ribbon cable and has a direct cable to the computer's main power supply. *See also* controller, drive bay, expansion slot, ribbon cable.

hard-coded *adj.* **1.** Designed to handle a specific situation only. **2.** Depending on values embedded in the program code rather than on values that can be input and changed by the user.

hard copy *n.* Printed output on paper, film, or other permanent medium. *Compare* soft copy.

hard disk *n.* A device containing one or more inflexible platters coated with material in which data can be recorded magnetically, together with their read/write heads, the head-positioning mechanism, and the spindle motor in a sealed case that protects against outside contaminants. The protected environment allows the head to fly 10 to 25 millionths of an inch above the surface of a platter rotating typically at 3600 to 7200 rpm; therefore, much more data can be stored and accessed much more quickly than on a floppy disk. Most hard disks contain from two to eight platters. See the illustration. *Also called:* hard disk drive. *Compare* floppy disk.



Hard disk. *The cover of this hard disk has been removed to reveal the components within.*

hard disk drive *n. See* hard disk.

hard disk type *n.* One or more numbers that inform a computer about the characteristics of a hard disk, such as the number of read/write heads and the number of cylinders the hard disk contains. The hard disk type numbers are usually marked on a label attached to the disk and must be input to the computer when the hard disk is installed, often by means of the computer's CMOS setup program. *See also* CMOS setup.

hard error *n.* **1.** An error caused by a hardware failure or by accessing incompatible hardware. *See also* hard failure. *Compare* soft error. **2.** An error that prevents a program from returning to normal operation. *See also* fatal error.

hard failure *n.* A cessation of function from which no recovery is possible, usually requiring a call to a repair service to correct. *Also called:* hardware failure.

hard hyphen *n. See* hyphen.

hard return *n.* A character input by the user to indicate that the current line of text is to end and a new line is to begin. In word-processing programs that automatically break lines within the margins of a page, a hard return indicates the end of a paragraph. In text-entry programs that lack wordwrap, on the other hand, a hard return is required to end each line, and often two or more hard returns are needed to end a paragraph. *See also* wordwrap. *Compare* soft return.

hard-sectored disk *n.* A floppy disk whose data sectors have been physically marked with punched holes that are detected by sensors in the drive to locate the beginning of each sector. *Compare* soft-sectored disk.

hard space *n. See* nonbreaking space.

hardware *n.* The physical components of a computer system, including any peripheral equipment such as printers, modems, and mouse devices. *Compare* firmware, software.

hardware abstraction layer *n.* In advanced operating systems such as Windows NT, Windows 2000, and Windows XP a layer in which assembly language code is isolated. A hardware abstraction layer functions similarly to an application programming interface (API) and is used by programmers to write device-independent applications. *Acronym:* HAL. *See also* application programming interface, device independence.

hardware address *n. See* physical address.

hardware check *n.* **1.** An automatic check performed by hardware to detect internal errors or problems. **2.** On a PC, a check of system hardware performed by a PC's BIOS

(Basic Input/Output System) during the POST (Power On Self Test) portion of the startup process.

hardware conversion *n.* Changing all or part of a computer system to work with new or different devices.

hardware cryptographic module *n.* Hardware designed to handle the cryptographic functions necessary for data security. For example, a hardware cryptographic module, or HCM, can be used in an SSL-enabled Web server to reduce CPU processing time and improve overall performance by working to secure data during online transactions. Using an HCM allows the Web server to continue processing customer requests. *Acronym:* HCM. *See also* SSL.

hardware-dependent *adj.* Of or pertaining to programs, languages, or computer components and devices that are tied to a particular computer system or configuration. Assembly language, for example, is hardware-dependent because it is created for and works only with a particular make or model of microprocessor.

hardware emulation layer *n.* In advanced operating systems such as Windows NT, Windows 2000, and Windows XP a layer in which software drivers duplicate hardware functionality. This allows software programs to use hardware features even if the hardware is not present. *Acronym:* HEL. *Compare* hardware abstraction layer.

hardware failure *n.* A malfunction of a physical component in a computer system, such as a disk head crash or memory error. *See also* hard failure.

hardware handshake *n. See* handshake.

hardware interrupt *n.* A request for service from the central processing unit, generated either externally by a hardware device such as a disk drive or an input/output port, or internally by the CPU itself. External hardware interrupts are used for such situations as a character received from a port and needing to be processed, a disk drive ready to transfer a block of data, or a tick of the system timer. Internal hardware interrupts occur when a program attempts an impossible action such as accessing an unavailable address or dividing by zero. Hardware interrupts are assigned levels of importance or priority. The highest priority is given to a type of interrupt called a nonmaskable interrupt—one that indicates a serious error, such as a memory failure, that must be serviced immediately. *See also* external interrupt, interrupt.

hardware key *n.* **1.** A security device connected to an input/output port to permit the use of a particular software package on that computer. The use of the hardware key permits backup copying of software but prevents its unlicensed use on additional computers. *Also called:* dongle. **2.** Any physical device used to secure a computer system from unauthorized access, such as the lock on the front of the cabinet of some personal computers.

hardware monitor *n.* A separate board-level circuit used to oversee the performance of a hardware/software system. A hardware monitor can detect the cause of a fatal error such as a system crash, whereas a software monitor or debugger cannot. *Compare* debugger.

hardware profile *n.* A set of data that describes the configuration and characteristics of a given piece of computer equipment. Such data is typically used to configure computers for use with peripheral devices.

hardware tree *n.* In Windows 9x, a data structure containing information about the configuration and requirements of a system's hardware devices. Consisting of nodes that point to active devices, the hardware tree is dynamic and is reconstructed every time the operating system is started or refreshed. The hardware tree facilitates the Plug and Play capability of Windows 9x.

hardwired *adj.* **1.** Built into a system using hardware such as logic circuits, rather than accomplished through programming. **2.** Physically connected to a system or a network, as by means of a network connector board and cable.

Harvard architecture *n.* A processor architecture that uses separate address buses for code and for data. This increases throughput by allowing the system to fetch instructions at the same time that it reads and writes data. This architecture also allows optimization of memory system design because instructions tend to be fetched sequentially, whereas data reads and writes are more random.

Harvard Mark I *n. See* Mark I.

Harvest research project *n. See* ICP.

hash[1] *n.* In many FTP client programs, a command that instructs the FTP client to display a pound sign (#) each time it sends or receives a block of data. *See also* FTP client.

hash[2] *vb.* To be mapped to a numerical value by a transformation known as a hashing function. Hashing is used to convert an identifier or key, meaningful to a user, into a value for the location of the corresponding data in a structure, such as a table. For example, given the key MOUSE and a hashing function that added up the ASCII values of the characters, divided the total by 127, and took the remainder, MOUSE would hash to 12 and the data identified by

MOUSE would be found among the items in entry 12 in the table.

hash coding *n. See* hash[2].

hashing algorithm *n.* A formula used to generate hash values and digital signatures. *Also called:* hash function.

hash search *n.* A search algorithm that uses hashing to find an element of a list. Hash searches are highly efficient because the hashing enables direct or almost direct access to the target element. *See also* binary search, hash[2], linear search, search algorithm.

hash total *n.* An error-checking value derived from the addition of a set of numbers taken from data (not necessarily numeric data) that is to be processed or manipulated in some way. After processing, the hash total is recalculated and compared with the original total. If the two do not match, the original data has been changed in some way.

hash value *n.* A value used in creating digital signatures. This value is generated by imposing a hashing algorithm onto a message. This value is then transformed, or signed, by a private key to produce a digital signature. *Also called:* message digest.

Haskell *n.* A functional programming language based on lambda calculus and suitable for the creation of applications that need to be highly modifiable.

Hayes-compatible *adj.* Responding to the same set of commands as the modems manufactured by Hayes Microcomputer Products. This command set has become the de facto standard for microcomputer modems.

HCM *n. See* hardware cryptographic module.

HDBMS *n. See* hierarchical database management system.

HDCP *n.* Acronym for **H**igh-bandwidth **D**igital **C**ontent **P**rotection. An encryption and authentication specification created by Intel for Digital Video Interface (DVI) devices such as digital cameras, high-definition televisions, and video disk players. HDCP is designed to protect transmissions between DVI devices from being copied.

HDF *n. See* Hierarchical Data Format.

HDLC *n.* Acronym for **H**igh-level **D**ata **L**ink **C**ontrol. A protocol for information transfer adopted by the ISO. HDLC is a bit-oriented, synchronous protocol that applies to the data-link (message-packaging) layer (layer 2 of the ISO/OSI reference model) for computer-to-microcomputer communications. Messages are transmitted in units called frames, which can contain differing amounts of data but which must be organized in a particular way. *See also* frame (definition 1), ISO/OSI reference model.

HDML *n.* Acronym for **H**andheld **D**evice **M**arkup **L**anguage. A simple, first-generation markup language used to define hypertext-like content and applications for wireless and other handheld devices with small displays. This language is used primarily to create Web sites viewed via wireless phones and personal digital assistants (PDAs). HDML provides content consisting mainly of text with limited graphics. *See also* WML.

HDSL *n.* Acronym for **H**igh-bit-rate **D**igital **S**ubscriber **L**ine. A form of DSL, HDSL is a protocol for digital transmission of data over standard copper telecommunications lines (as opposed to fiber-optic lines) at rates of 1.544 Mbps in both directions. *Also called:* High-data-rate Digital Subscriber Line. *See also* DSL.

HDTP *n.* Acronym for **H**andheld **D**evice **T**ransport **P**rotocol. Protocol that enables a handheld device, such as a wireless phone or personal digital assistant (PDA), to access the Internet. HDTP regulates the input and output of data interpreted by the device's microbrowser. *See also* WAP.

HDTV *n.* Acronym for **H**igh-**D**efinition **T**ele**V**ision. A new television display standard that doubles the existing screen resolution and increases the screen aspect ratio from 4:3 to 16:9. This aspect ratio creates a television screen that is shaped like a movie screen.

HDTV-over-IP *n.* An Internet-based delivery option for High Definition Television (HDTV). HDTV-over-IP provides options for new and expanded services to ISPs, cable companies, telecommunications carriers, and business intranets, with its most extensive use in education. Universities use high-speed networks such as Internet2 to provide the intensive bandwidth demanded by HDTV-over-IP. Because HDTV-over-IP offers extreme image fidelity and sharpness, it is seen as ideal for delivery of distance education courses requiring precise visuals for which conventional video cannot provide sufficient resolution. *Also called:* iHDTV.

head *n.* **1.** The read/write mechanism in a disk or tape drive. It converts changes in the magnetic field of the material on the disk or tape surface to changing electrical signals and vice versa. Disk drives usually contain one head for each surface that can be read from and written to. **2.** In relation to software or documents, the top or beginning of something. **3.** In HTML, a section of coding that precedes the body of a document and is used to describe

the document itself (title, author, and so on) rather than the elements within the document.

head arm *n. See* access arm.

head-cleaning device *n.* An apparatus for applying a small amount of cleaning fluid to a magnetic head to remove accumulated debris.

head crash *n.* A hard disk failure in which a read/write head, normally supported on a cushion of air only millionths of an inch thick, comes into contact with the platter, damaging the magnetic coating in which data is recorded. Still more damage occurs when the head picks up material gouged out of the surface and pushes it. A head crash can be caused by mechanical failure or by heavy shaking of the disk drive. If the crash occurs on a directory track, the whole disk may become instantly unreadable.

header *n.* **1.** In word processing or printing, text that is to appear at the top of pages. A header might be specified for the first page, all pages after the first, even pages, or odd pages. It usually includes the page number and may also show the date, the title, or other information about a document. *Also called:* heading, running head. *Compare* footer. **2.** An information structure that precedes and identifies the information that follows, such as a block of bytes in communications, a file on a disk, a set of records in a database, or an executable program. **3.** One or more lines in a program that identify and describe for human readers the program, function, or procedure that follows.

header file *n.* A file that is identified to be included at the beginning of a program in a language such as C and that contains the definitions of data types and declarations of variables used by the functions in the program.

header label *n.* An initial structure, such as an opening record, in the linear organization of a file or communication that describes the length, type, and structure of the data that follows. *Compare* trailer label (definition 1).

header record *n.* The first record in a sequence of records.

heading *n. See* header (definition 1).

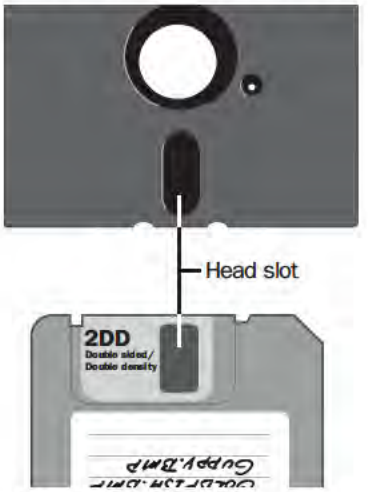
headless computer *n.* A computer system that does not have a keyboard, mouse, or video monitor during normal operation.

head-mounted device *n.* A headset or helmet used with virtual reality systems ranging from gaming to military, medical, educational, and industrial applications. A head-mounted device contains small screens that display images in such a way that the headset allows the wearer to view and move about in a three-dimensional, virtual world. The simulated environment is generated by a controlling computer, which adjusts the images in accordance with the wearer's head and body movements. A head-mounted device can include audio capability and is often used with an interactive input device, such as a joystick or glove. *Acronym:* HMD. *See also* virtual reality, wearable computer.

head-per-track disk drive *n.* A disk drive that has one read/write head for every data track. Such a disk drive has a very low seek time because the heads do not have to move across the disk surface to the required track for reading and writing. Because read/write heads are expensive, this type of drive is uncommon.

head positioning *n.* The process of moving the read/write head of a disk drive to the proper track for reading and writing.

head slot *n.* The oblong opening in the jacket of a floppy disk that provides access to the magnetic surface of the disk for the read/write head. See the illustration.



Head slot.

head switching *n.* The process of electrically switching among multiple read/write heads in a disk drive.

heap *n.* **1.** A portion of memory reserved for a program to use for the temporary storage of data structures whose existence or size cannot be determined until the program is running. To build and use such elements, programming languages such as C and Pascal include functions and procedures for requesting free memory from the heap,

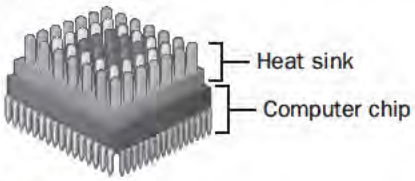
accessing it, and freeing it when it is no longer needed. In contrast to stack memory, heap memory blocks are not freed in reverse of the order in which they were allocated, so free blocks may be interspersed with blocks that are in use. As the program continues running, the blocks may have to be moved around so that small free blocks can be merged together into larger ones to meet the program's needs. *See also* garbage collection. *Compare* stack. **2.** A complete binary tree in which the value of any node is not exceeded by the value of either of its children. *See also* binary tree.

H

heap sort or **heapsort** *n.* A space-efficient sorting method that first arranges the key fields into a heap structure; then repeatedly removes the root of the heap, which must, by definition, have the largest key; and re-forms the heap. *See also* heap (definition 1).

heat pipe *n.* A cooling device consisting of a sealed metal tube containing a liquid and a wick. The liquid evaporates at the hot end; the vapor spreads along the tube to the cold end, where it condenses onto the wick; the liquid flows back along the wick to the hot end by capillary action. Heat pipes have been used in Pentium-based laptop computers, which have high cooling requirements and little room for conventional heat sinks. *Compare* heat sink.

heat sink *n.* A device that absorbs and dissipates heat produced by an electrical component, such as an integrated circuit, to prevent overheating. Heat sinks are usually made of metal and often have fins that assist in transferring heat to the atmosphere. See the illustration. *Compare* heat pipe.



Heat sink.

hecto- *prefix* Metric prefix meaning 10^2 (one hundred).

HEL *n. See* hardware emulation layer.

hello, world *n.* The output of the first program in Brian Kernighan and Dennis Ritchie's *The C Programming Language*. The program is traditionally the first test a C programmer makes in a new environment.

help *n.* **1.** The capability of many programs and operating systems to display advice or instructions for using their features when so requested by the user, as by a screen button or a menu item or a function key. The user can access help without interrupting work in progress or leafing through a manual. Some help facilities are context-sensitive, meaning that the user receives information specific to the task or command being attempted. *Also called:* online help. **2.** In many applications, a command that displays an explanation of another command that follows it. For instance, in many FTP programs, the command *help* can be followed by other commands, such as *cd* (change directory) or *ls* (list files and directories), to discover the purpose of these other commands. **3.** In versions 5 and 6 of MS-DOS, the command used to request information about MS-DOS commands, command parameters, and switches.

Help *n.* An item on a menu bar in a graphical user interface that enables the user to access the help feature of the present application. *See also* graphical user interface, help (definition 1), menu bar.

help desk *n.* **1.** Technical support staff who help solve users' problems with hardware or software systems or refer such problems to those who can solve them. Help desks are typically run by larger organizations, such as corporations, universities, or vendors to corporations, to assist users in the organization. **2.** A software application for tracking problems with hardware and software and their solutions.

helper *n. See* helper application.

helper application *n.* An application intended to be launched by a Web browser when the browser downloads a file that it is not able to process itself. Examples of helper applications are sound and movie players. Helper applications generally must be obtained and installed by users; they usually are not included in the browser itself. Many current Web browsers no longer require helper applications for common multimedia file formats. *Also called:* helper program. *Compare* ActiveX controls, plug-in (definition 2).

helper program *n. See* helper application.

Help key *n.* A key on the keyboard that the user can press to request help. *See also* function key, help (definition 1).

help screen *n.* A screen of information that is displayed when the user requests help. *See also* help (definition 1).

henry *n.* The unit of inductance. A current changing at a rate of one ampere per second will generate one volt across an inductance of one henry. In practice, a henry is a

very large unit; inductances measured in millihenries (mH = 10^{-3} H), microhenries (<MU>H = 10^{-6} H), or nanohenries (nH = 10^{-9} H) are more commonly encountered. Abbreviated H. *See also* inductance.

Hercules Graphics Card *n. See* HGC.

hertz *n.* The unit of frequency measurement; one cycle (of a periodic event such as a waveform) per second. Frequencies of interest in computers and electronic devices are often measured in kilohertz (kHz = 1000 Hz = 10^3 Hz), megahertz (MHz = 1000 kHz = 10^6 Hz), gigahertz (GHz = 1000 MHz = 10^9 Hz), or terahertz (THz = 1000 GHz = 10^{12} Hz). Abbreviated Hz.

hertz time *n. See* clock rate.

heterogeneous environment *n.* A computing milieu, usually within an organization, in which hardware and software from two or more manufacturers are used. *Compare* homogeneous environment.

heuristic *n.* An approach or algorithm that leads to a correct solution of a programming task by nonrigorous or self-learning means. One approach to programming is first to develop a heuristic and then to improve on it. The term comes from Greek *heuriskein* ("to discover, find out") and is related to "eureka" ("I have found it").

Hewlett-Packard Graphics Language *n. See* HPGL.

Hewlett-Packard Printer Control Language *n. See* Printer Control Language.

hex *n. See* hexadecimal.

hexadecimal *adj.* Using 16 rather than 10 as the base for representing numbers. The hexadecimal system uses the digits 0 through 9 and the letters A through F (uppercase or lowercase) to represent the decimal numbers 0 through 15. One hexadecimal digit is equivalent to 4 bits, and 1 byte can be expressed by two hexadecimal digits. For example, binary 0101 0011 corresponds to hexadecimal 53. To prevent confusion with decimal numbers, hexadecimal numbers in programs or documentation are usually followed by *H* or preceded by *&*, *$*, or *0x*. Thus, 10H = decimal 16; 100H = decimal 16^2 = decimal 256. Equivalents and conversion tables for binary, decimal, hexadecimal, and octal numbers are given in Appendix E. *Also called:* hex.

hexadecimal conversion *n.* Conversion of a number to or from the hexadecimal system. See Appendix E.

HFS *n. See* Hierarchical File System.

HFS+ *n.* Acronym for **H**ierarchal **F**ile **S**ystem Plus. The primary file system format available on the Macintosh operating system. With Mac OS 8.1, HFS+ replaced the earlier HFS format, adding support for names longer than 31 characters and Unicode representation of file and directory names. *Also called:* Mac OS Extended format.

HGA *n.* Acronym for **H**ercules **G**raphics **A**dapter. *See* HGC.

HGC *n.* Acronym for **H**ercules **G**raphics **C**ard. A video adapter introduced in 1982 by Hercules Computer Technology for IBM personal computers and compatibles and now superseded by VGA and its successors. It offered a monochrome graphics mode with 720 x 348 pixels. *See also* VGA.

HGC Plus *n.* A video adapter, introduced in 1986 by Hercules Computer Technology, that offered additional video buffer space to store 12 fonts of 256 characters each, which could be used for graphics characters.

HHOK *n.* Acronym for **h**a, **h**a, **o**nly **k**idding. An indication of humor or facetiousness often used in e-mail and online communications.

hibernation *n.* A state in which a computer shuts down after saving everything in memory to the hard disk. When the computer is powered on, programs and documents that were open are restored to the desktop. *See also* standby.

hidden file *n.* A file that, in order to protect it from deletion or modification, is not shown in the normal listing of the files contained in a directory. Such a file is often used to store code or data critical to the operating system.

hidden line *n.* In any application, such as a CAD program, that represents solid three-dimensional objects, a line in a drawing that would (or should) be hidden if the object were perceived as a solid construction. The process of removing such lines in an application is called hidden-line removal. *See also* CAD, hidden surface.

hidden surface *n.* A surface of a solid three-dimensional object, such as one represented in a CAD program, that would not be visible when the object is viewed from a particular angle—for example, the underside of the wing of an airplane when viewed from above. *See also* CAD, hidden line.

hide *vb.* To temporarily remove the onscreen display of an application's active window while leaving the application running. Windows that have been hidden are returned to active display by issuing the appropriate command to the operating system.

hierarchical *adj.* Of, relating to, or organized as a hierarchy. *See also* hierarchy.

hierarchical computer network *n.* **1.** A network in which one host computer controls a number of smaller computers, which may in turn act as hosts to a group of PC workstations. **2.** A network in which control functions are organized according to a hierarchy and in which data processing tasks may be distributed.

hierarchical database *n.* A database in which records are grouped in such a way that their relationships form a branching, treelike structure. This type of database structure, most commonly used with databases for large computers, is well suited for organizing information that breaks down logically into successively greater levels of detail. The organization of records in a hierarchical database should reflect the most common or the most time-critical types of access expected.

hierarchical database management system *n.* A database management system that supports a hierarchical model. *Acronym:* HDBMS. *See also* hierarchical model.

Hierarchical Data Format *n.* A file format for storing multiple types of graphical and numerical data and transferring them between different types of machines, together with a library of functions for handling such files in a uniform way. NCSA developed and supports the file function and library and has placed them in the public domain. Hierarchical Data Format files are supported on most common types of computers. The format can easily be extended to accommodate additional data models. The library functions have both FORTRAN and C interfaces. *Acronym:* HDF. *See also* NCSA (definition 1).

hierarchical file system *n.* A system for organizing files on a disk in which files are contained in directories or folders, each of which can contain other directories as well as files. The main directory for the disk is called the root; the chain of directories from the root to a particular file is called the path. *See also* hierarchy, path (definition 2), root. *Compare* flat file system.

Hierarchical File System *n.* A tree-structured file system used on the Apple Macintosh in which folders can be nested within other folders. *Acronym:* HFS. *See also* hierarchy, path (definition 2), root. *Compare* flat file system.

hierarchical menu *n.* A menu that has one or more submenus. Such a menu/submenu arrangement is hierarchical because each level subsumes the next.

hierarchical model *n.* A model used in database management in which each record may be the "parent" of one or more child records, which may or may not have the same structure as the parent; a record can have no more than one parent. Conceptually, therefore, a hierarchical model can be, and usually is, regarded as a tree. The individual records are not necessarily contained in the same file. *See also* tree.

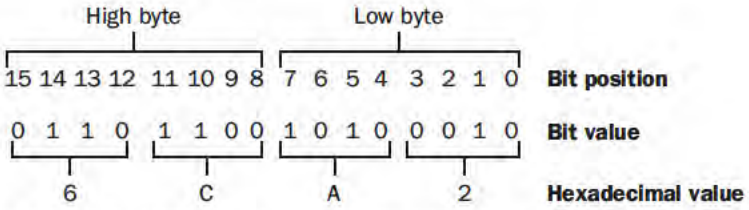
Hierarchical Storage Management *n. See* HSM.

hierarchy *n.* A type of organization that, like a tree, branches into more specific units, each of which is "owned" by the higher-level unit immediately above. Hierarchies are characteristic of several aspects of computing because they provide organizational frameworks that can reflect logical links, or relationships, between separate records, files, or pieces of equipment. For example, hierarchies are used in organizing related files on a disk, related records in a database, and related (interconnected) devices on a network. In applications such as spreadsheets, hierarchies of a sort are used to establish the order of precedence in which arithmetic operations are to be performed by the computer. *See also* hierarchical file system.

high availability *n.* The ability of a system or device to be usable when it is needed. When expressed as a percentage, high availability is the actual service time divided by the required service time. Although high availability does not guarantee that a system will have no downtime, a network often is considered highly available if it achieves 99.999 percent network uptime. *Also called:* RAS (reliability/availability/serviceability), fault resilience. *See also* five-nines availability, four-nines availability, three-nines availability, two-nines availability. *Compare* fault tolerance.

High-bit-rate Digital Subscriber Line *n. See* HDSL.

high byte *n.* The byte containing the most significant bits (bits 8 through 15) in a 2-byte grouping representing a 16-bit (bits 0 through 15) value. See the illustration. *See also* hexadecimal.



High byte. *The high byte is binary 01101100 or hexadecimal 6C or decimal 108.*

high-capacity CD-ROM *n. See* digital video disc.

High Contrast *n.* An accessibility display feature in Microsoft Windows that instructs programs to use the color scheme specified in the Settings dialog box and to increase legibility whenever possible.

High-data-rate Digital Subscriber Line *n. See* HDSL.

High-Definition Television *n. See* HDTV.

high-density disk *n.* **1.** A 3.5-inch floppy disk that can hold 1.44 MB. *Compare* double-density disk. **2.** A 5.25-inch floppy disk that can hold 1.2 MB. *Compare* double-density disk.

high DOS memory *n. See* high memory.

high-end *adj.* A descriptive term for something that uses the latest technology to maximize performance. There is usually a direct correlation between high-end technology and higher prices.

High-level Data Link Control *n. See* HDLC.

high-level language *n.* A computer language that provides a level of abstraction from the underlying machine language. Statements in a high-level language generally use keywords similar to English and translate into more than one machine-language instruction. In practice, every computer language above assembly language is a high-level language. *Acronym:* HLL. *Also called:* high-order language. *Compare* assembly language.

highlight *vb.* To alter the appearance of displayed characters as a means of calling attention to them, as by displaying them in reverse video (light on dark rather than dark on light, and vice versa) or with greater intensity. Highlighting is used to indicate an item, such as an option on a menu or text in a word processor, that is to be acted on in some way.

high memory *n.* **1.** Memory locations addressed by the largest numbers. **2.** In IBM PCs and compatibles, the range of addresses between 640 kilobytes and 1 megabyte, used primarily for the ROM BIOS and control hardware such as the video adapter and input/output ports. *Compare* low memory.

high memory area *n.* In IBM PCs and compatibles, the 64-kilobyte range of addresses immediately above 1 megabyte. By means of the file HIMEM.SYS, MS-DOS (versions 5 and later) can move portions of itself into the high memory area, thereby increasing the amount of conventional memory available for applications. *Acronym:* HMA. *See also* conventional memory, expanded memory.

high-order *adj.* Having the most weight or significance. The high-order term usually appears first or leftmost in writing systems based on the Roman alphabet or Arabic numerals. For example, in the 2-byte hex value 6CA2, the high-order byte 6C has a value by itself of decimal 108 but counts for 108 x 256 = 27,648 in the group, whereas the low-order byte A2 counts only for decimal 162. *Compare* low-order.

high-order language *n. See* high-level language.

highpass filter *n.* An electronic circuit that passes all frequencies in a signal that are above a specified frequency. *Compare* bandpass filter, lowpass filter.

High-Performance File System *n. See* HPFS.

High-Performance Parallel Interface *n. See* HIPPI.

High-Performance Serial Bus *n. See* IEEE 1394.

high-persistence phosphor *n.* A phosphor that glows for a relatively long time after being struck by electrons. High-persistence phosphors are used in direct view storage tubes, but most CRTs (cathode-ray tubes) use phosphors of relatively low persistence so that their images can be changed quickly without "ghosts" of earlier images remaining on the screen. *See also* CRT, direct view storage tube.

high resolution *n.* The capability for reproducing text and graphics with relative clarity and fineness of detail.

High resolution is achieved by using a large number of pixels (dots) to create an image in a given area. For screen displays, the resolution is stated in terms of the total number of pixels in the horizontal and vertical dimensions. For example, the VGA video adapter has a resolution of 640 by 480 pixels. In printing, resolution refers to the number of dots per inch (dpi) produced by the printer, such as 300 to 600 dpi for a desktop laser or ink-jet printer or 1000 to 2000 dpi for a production-quality imagesetter. *Also called:* hi-res.

High Sierra specification *n.* An industry-wide format specification for the logical structure, file structure, and record structures on a CD-ROM. The specification is named after a meeting on CD-ROM held near Lake Tahoe in November 1985. It served as the basis for the international standard, ISO 9660.

high tech *n.* **1.** Cutting-edge applied science and engineering, usually involving computers and electronics. **2.** Sophisticated, often complex, specialized technical innovation.

hijackware *n.* Software that appears to be a useful plug-in or utility, but which will take over a user's Internet surfing or shopping activity by creating pop-up advertisements for competing products or redirecting the user to competitor's Web sites. Typically users will download and install a hijackware product believing it to be free browser enhancement software. Businesses pay the makers of hijackware products to push their shopping sites and product advertising onto Internet users, sometimes to the point of denying the user access to competing Web sites. *See also* gatored.

Hijiri calendar *n.* The lunar calendar used in Islamic countries. *Compare* Gregorian calendar, Julian calendar.

HIPPI *n.* Acronym for **Hi**gh-**P**erformance **P**arallel **I**nterface. An ANSI communications standard used with supercomputers.

hi-res *n. See* high resolution.

histogram *n.* A chart consisting of horizontal or vertical bars, the widths or heights of which represent the values of certain data.

history *n.* A list of the user's actions within a program, such as commands entered in an operating system shell, menus passed through using Gopher, or links followed using a Web browser.

hit *n.* **1.** A successful retrieval of data from a cache rather than from the slower hard disk or RAM. *See also* cache, hard disk, RAM. **2.** A successful retrieval of a record matching a query in a database. *See also* query (definition 1), record[1]. **3.** Retrieval of a file from a Web site. Each separate file accessed on a Web page, including HTML documents and graphics, counts as a hit. **4.** In computer war and other games, when a character is successfully fired on, attacked, or otherwise taken out.

hit points *n.* Used in most computer and console war games to refer to the amount of times a player can be damaged before his or her character passes out or dies.

hive *n.* One of the top-level sets of keys, subkeys, and values in Windows 9x, Windows NT, Windows 2000, and Windows CE Registries. The term was created by a Microsoft programmer who thought the structure of the Registry resembled a beehive. Each hive is a permanent part of the Registry and is associated with a set of files containing information related to the configuration (applications, user preferences, devices, and so on) of the computer on which the operating system is installed. Registry hives include HKEY_LOCAL_MACHINE, HKEY_CURRENT_USER, and HKEY_CURRENT_CONFIG. *See also* Registry.

HKEY *n.* Short for **hkey** handle. In Windows 9x, Windows NT, and Windows 2000, a handle to a Registry key in which configuration information is stored. Each key leads to subkeys containing configuration information that, in earlier versions of Windows, was stored in .ini files. For example, the handle key HKEY_CURRENT_USERControl Panel leads to the subkey for the Windows Desktop. *See also* handle (definition 1).

HLL *n. See* high-level language.

HLS *n.* Acronym for **h**ue-**l**ightness-**s**aturation. *See* HSB.

HMA *n. See* high memory area.

HMD *n. See* head-mounted device.

Hollerith tabulating/recording machine *n.* An electromechanical machine invented by Herman Hollerith in the late 1800s for processing data supplied in the form of holes punched at predetermined locations in cards. Contacts made through the holes completed electrical circuits, allowing signals to be passed to counting and tabulating devices. This machine is considered to have reduced the time required to finish the 1890 U.S. census by two-thirds. Such machines were manufactured in the early 1900s by Hollerith's Tabulating Machine Company, which eventually became the International Business Machines Corporation (IBM).

hologram *n.* A three-dimensional image record created by holography. The hologram consists of a light interference pattern preserved in a medium such as photographic film. When suitably illuminated, it produces an image that changes its appearance as the viewer changes viewing angle. *See also* holography.

holography *n.* A method of reproducing three-dimensional visual images by recording light interference patterns on a medium such as photographic film, creating a hologram. *See also* hologram.

holy war *n.* **1.** A widespread and acrimonious debate among computer professionals over some aspect of the computer field, such as the debate over use of the GOTO statement in programming or that over big-endian versus little-endian data storage. **2.** An argument in a mailing list, newsgroup, or other forum over some emotional and controversial topic, such as abortion or Northern Ireland. Introducing a holy war that is off the purported topic of the forum is considered a violation of netiquette.

home *n.* A beginning position, such as the upper left corner of a character-based display, the left end of a line of text, cell A1 of a spreadsheet, or the top of a document.

home automation *n.* The process of programmatically controlling appliances, lighting, heating and cooling systems, and other devices in a home network. *See also* home network (definition 1).

homebrew *n.* Hardware or software developed by an individual at home or by a company for its own use rather than as a commercial product, such as hardware developed by electronics hobbyists when microcomputers first appeared in the 1970s.

home computer *n.* A personal computer designed and priced for use in the home.

home controller *n.* A software or hardware interface used to control the systems in a home network for home automation.

home directory *n.* A directory associated with a user account under UNIX. The home directory is the current directory when the user first logs in, and the user can return to it by entering the command *cd* (change directory) without a pathname. The user's files will ordinarily be stored in the home directory and its descendants.

homegrown software *n.* Software developed by an individual at home rather than in a professional environment. Most public-domain and shareware programs are created this way.

Home key *n.* A key, found on most keyboards, whose function usually involves sending the cursor to some type of home position in an application. *See also* home.

home network *n.* **1.** A communications network in a home or building used for home automation. Home networks can use wiring (existing or new) or wireless connections. *See also* home automation, home controller. **2.** Two or more computers in a home that are interconnected to form a local area network (LAN).

home office *n.* **1.** An office set up within a residence. **2.** The main headquarters of a company.

home page *n.* **1.** A document intended to serve as a starting point in a hypertext system, especially the World Wide Web. A home page is called a *start page* in Microsoft Internet Explorer. **2.** An entry page for a set of Web pages and other files in a Web site. **3.** A personal Web page, usually for an individual.

Home Phoneline Networking Alliance *n. See* HomePNA.

HomePNA *n.* Short for **H**ome **P**honeline **N**etworking **A**lliance. An association of more than 100 companies working toward the adoption of a unified technology for setting up home networks over existing telephone wiring. Phoneline networking allows multiple PCs, printers, and peripheral devices to be connected for such purposes as multiplayer gaming, sharing printers and other peripherals, and rapid downloads over the Internet. The alliance was founded by a number of companies including IBM, Intel, AT&T, and Lucent Technologies.

Home Radio Frequency *n. See* HomeRF.

home record *n. See* header record.

HomeRF *n.* Acronym for **Home R**adio **F**requency. A wireless home-networking specification that uses the 2.4-GHz frequency band to communicate between computers, peripherals, cordless phones, and other devices. HomeRF is supported by Siemens, Compaq, Motorola, National Semiconductor, Proxim, and other companies.

homogeneous environment *n.* A computing milieu, usually within an organization, in which only one manufacturer's hardware and one manufacturer's software are used. *Compare* heterogeneous environment.

homogeneous network *n.* A network on which all the hosts are similar and only one protocol is used.

Honeynet Project *n.* A nonprofit security research group created to collect and analyze data on hacking tools and methods by maintaining a decoy network of computers that is potentially attractive to hackers. The Honeynet Project sets up entire networks of computers in different combinations of operating systems and security to realistically simulate those used in businesses and organizations. Hackers are lured to the network where all inbound and outbound data is captured and contained to help researchers learn about hacker tactics and motives.

H

honeypot *n.* A security program designed to lure and distract a network attacker with decoy data. The honeypot appears to be a system that the intruder would like to crack but which, in reality, is safely separated from the actual network. This allows network administrators to observe attackers and study their activities without the intruders knowing they are being monitored. Honeypot programs get their name from the "like a bear to honey" metaphor.

honker *n.* A slang term for a hacker, the term originated in China. The Honker Union of China is an active group of Chinese hackers with nationalistic or hacktivist aims. The Honker Union of China has claimed patriotic motivation for defacing Japanese and U.S. Web sites, hacking U.S. networks, and releasing the Lion worm and other malicious programs. *See also* hacktivist, Lion worm.

hook *n.* A location in a routine or program in which the programmer can connect or insert other routines for the purpose of debugging or enhancing functionality.

hop *n.* In data communications, one segment of the path between routers on a geographically dispersed network. A hop is comparable to one "leg" of a journey that includes intervening stops between the starting point and the destination. The distance between each of those stops (routers) would be a communications hop.

horizontal blanking interval *n. See* blanking, horizontal retrace.

horizontal flyback *n. See* horizontal retrace.

horizontal market *n.* A broad category of business activity, such as accounting or inventory control, that carries across many types of business. *Compare* vertical market.

horizontal market software *n.* Application programs, such as word processors, that can be used in all types of business, as opposed to those geared for a certain industry.

horizontal retrace *n.* The movement of the electron beam in a raster-scan video display from the right end of one scan line to the left end (the beginning) of the next. During horizontal retrace, the electron beam is turned off, so the time required for the beam to move is called the horizontal blanking interval. *See also* blanking. *Compare* vertical retrace.

horizontal scrolling *n.* A feature of programs such as word processors and spreadsheets that enables the user to scroll left and right to display information beyond the horizontal limits of the screen (or window, in a graphical user interface).

horizontal synchronization *n.* On raster displays, the timing produced by a signal that controls the sweep of the display's electron beam as it moves from left to right and back again to form an image line by line. The horizontal synchronization signal is usually controlled by a circuit known as a phase-locked loop, which maintains a constant precise frequency so that a clear image is formed.

host[1] *n.* **1.** The main computer in a mainframe or minicomputer environment—that is, the computer to which terminals are connected. **2.** In PC-based networks, a computer that provides access to other computers. **3.** On the Internet or other large networks, a server computer that has access to other computers on the network. A host computer provides services, such as news, mail, or data, to computers that connect to it.

host[2] *vb.* To provide services to client computers that connect from remote locations—for example, to offer Internet access or to be the source for a news or mail service.

host adapter *n.* A device for connecting a peripheral to the main computer, typically in the form of an expansion card. *Also called:* controller, host bus adapter.

hosting *n.* The practice of providing computer and communication facilities to businesses or individuals, especially for use in creating Web and electronic commerce sites. A hosting service can provide high-speed access to the Internet, redundant power and data storage, and 24-hour maintenance at lower cost than implementing the same services independently. *See also* host[2], virtual hosting.

Host Integration Server *n.* A software application from Microsoft Corporation to allow businesses to integrate existing application, data, and network assets with new business applications and technologies. Host Integration Server preserves a company's existing legacy infrastructure and investments, while providing out-of-the-box

development tools that enable integration with client/server and Web networks.

host language *n.* **1.** The machine language of a CPU. **2.** A high-level language that is specifically supported by an operating system with its toolbox routines and native development systems.

host name *n.* The name of a specific server on a specific network within the Internet, leftmost in the complete host specification. For example, www.microsoft.com indicates the server called "www" within the network at Microsoft Corporation.

host not responding *n.* An error message issued by an Internet client indicating that the computer to which a request has been sent is refusing the connection or is otherwise unavailable to respond to the request.

host replacement *n. See* rehosting.

host timed out *n.* An error condition that occurs when a remote system fails to respond within a reasonable amount of time (a few minutes) during an exchange of data over a TCP connection. This condition may mean that the remote system has crashed or been disconnected from the network. The error message the user sees may or may not be phrased in this manner. *See also* TCP. *Compare* host not responding.

host unreachable *n.* An error condition that occurs when the particular computer to which the user wishes to connect over a TCP/IP network cannot be accessed on its LAN because it is either down or disconnected from the network. The error message the user sees may or may not be phrased in this manner. *See also* TCP/IP.

hot *adj.* Of special or urgent interest, or deemed popular.

HotBot *n.* An Internet search engine developed by Inktomi Corporation and HotWired, Inc. Using Slurp, a Web robot, this tool maintains a database of documents that can be matched to key words entered by the user, in a fashion similar to other search engines. HotBot incorporates many workstations in parallel to search and index Web pages. *See also* spider.

hot carrier diode *n. See* Schottky diode.

hot docking *n.* The process of attaching a laptop computer to a docking station while the computer is running, and automatically activating the docking station's video display and other functions. *See also* docking station, laptop.

hot insertion *n.* The insertion of a device or card while there is power to the system. Many newer laptops allow for hot insertion of PCMCIA cards. High-end servers may also allow hot insertion to reduce downtimes.

HotJava *n.* A Web browser developed by Sun Microsystems, Inc., that is optimized to run Java applications and applets embedded in Web pages. *See also* applet, Java, Java applet.

hot key[1] *n.* A keystroke or combination of keystrokes that switches the user to a different program, often a terminate-and-stay-resident (TSR) program or the operating system user interface. *See also* TSR.

hot key[2] *vb.* To transfer to a different program by pressing a hot key.

hot link *n.* A connection between two programs that instructs the second program to make changes to data when changes occur in the first program. For example, a word processor or desktop publishing program could update a document based on information obtained from a database through a hot link. *See* hyperlink.

hotlist *n.* A list of frequently accessed items, such as Web pages in a Web browser, from which the user can select one. The hotlist of Web pages is called the bookmark list in Netscape Navigator and Lynx and is called the Favorites folder in Microsoft Internet Explorer.

Hotmail *n.* A Web-based e-mail service launched in 1996 and owned and operated by Microsoft since December 1997. Hotmail provides free e-mail accounts and can be used by anyone with Internet access and Web browsing software.

hot plugging *n.* A feature that allows equipment to be connected to an active device, such as a computer, while the device is powered on.

hot-potato routing *n.* A packet routing scheme that relies on keeping data moving, even if it may temporarily move away from its final destination. *Also called:* deflection routing.

hot spare *n.* In RAID (redundant array of independent disks) systems, a spare drive in the array that is configured as a backup on which data can be rebuilt in the event that another drive fails. Hot spares are kept on line and do not require operator intervention to be activated. *See also* RAID.

hot spot *n.* The position in a mouse pointer, such as the position at the tip of an arrow or the intersection of the lines in a cross, that marks the exact location that will be affected by a mouse action, such as a button press.

hot swapping *n. See* hot plugging.

HotSync *n.* Software application from Palm that permits data synchronization between a Palm handheld computing device and another computing device, such as a laptop or personal computer. The synchronization occurs via a cable connection or wirelessly (for example, via infrared signals).

HotWired *n.* A Web site affiliated with *Wired* magazine that contains news, gossip, and other information about the culture of the Internet.

housekeeping *n.* Any of various routines, such as updating the clock or performing garbage collection, designed to keep the system, the environment within which a program runs, or the data structures within a program in good working order.

H

hover button *n.* Text or an image on a Web page, usually in the form of a button, that changes appearance when a cursor passes over it. The hover button may change color, blink, display a pop-up with additional information, or produce other similar effects. Hover buttons are usually implemented through ActiveX objects and scripting, although hover behavior can also be set through HTML attributes.

HPC *n. See* handheld PC.

HPFS *n.* Acronym for **H**igh **P**erformance **F**ile **S**ystem. A file system available with OS/2 versions 1.2 and later. *See also* FAT file system, NTFS.

HPGL *n.* Acronym for **H**ewlett-**P**ackard **G**raphics **L**anguage. A language originally developed for images destined for plotters. An HPGL file consists of instructions that a program can use to reconstruct a graphical image.

HPIB *n.* Acronym for **H**ewlett-**P**ackard **I**nterface **B**us. *See* general-purpose interface bus.

HPPCL *n.* Acronym for **H**ewlett-**P**ackard **P**rinter **C**ontrol **L**anguage. *See* Printer Control Language.

HP/UX or **HP-UX** *n.* Acronym for **H**ewlett-**P**ackard **UNIX**. A version of the UNIX operating system specifically designed to be run on Hewlett-Packard's workstations. *See also* UNIX.

.hqx *n.* A file extension for a file encoded with BinHex. *See also* BinHex.

HREF *n.* Short for **h**ypertext **ref**erence. An attribute in an HTML document that defines a link to another document on the Web. *See also* HTML.

HSB *n.* Acronym for **h**ue-**s**aturation-**b**rightness. A color model in which hue is the color itself as placed on a color wheel, where 0° is red, 60° is yellow, 120° is green, 180° is cyan, 240° is blue, and 300° is magenta; saturation is the percentage of the specified hue in the color; and brightness is the percentage of white in the color. *Also called:* HLS, HSV, hue. *See also* color model. *Compare* CMY, RGB.

HSM *n.* Short for **H**ierarchical **S**torage **M**anagement. A technology for managing online data and data storage in which the medium on which the information resides is linked to the frequency with which the information is accessed. By migrating data to and from primary (rapidly accessed but expensive) and secondary (slower but less expensive) storage, HSM maintains often-used information on primary storage media and less frequently used data on secondary storage such as tape or an optical jukebox. Although information resides on different storage media, all of it appears to be on line and remains accessible to the user. When users request data residing on secondary storage, HSM moves the information back to the primary storage medium.

HSV *n.* Acronym for **h**ue-**s**aturation-**v**alue. *See* HSB.

H-sync *n. See* horizontal synchronization.

HTCPCP *n.* Acronym for **H**yper **T**ext **C**offee **P**ot **C**ontrol **P**rotocol. A protocol defined in jest as an April Fools' Day spoof of open Internet standards. HTCPCP/1.0 was proposed in RFC 2324 on April 1, 1998 by Larry Masinter of Xerox PARC. In this RFC, Masinter described a protocol for controlling, monitoring, and diagnosing coffee pots.

.htm *n.* The MS-DOS/Windows 3.*x* file extension that identifies Hypertext Markup Language (HTML) files, most commonly used as Web pages. Because MS-DOS and Windows 3.*x* cannot recognize file extensions longer than three letters, the .html extension is truncated to three letters in those environments. *See also* HTML.

.html *n.* The file extension that identifies Hypertext Markup Language (HTML) files, most commonly used as Web pages. *See also* HTML.

HTML *n.* Acronym for **H**yper**t**ext **M**arkup **L**anguage. The markup language used for documents on the World Wide Web. A tag-based notation language used to format documents that can then be interpreted and rendered by an Internet browser. HTML is an application of SGML (Standard Generalized Markup Language) that uses tags to mark elements, such as text and graphics, in a document to

indicate how Web browsers should display these elements to the user and should respond to user actions such as activation of a link by means of a key press or mouse click. HTML 2, defined by the Internet Engineering Task Force (IETF), included features of HTML common to all Web browsers as of 1994 and was the first version of HTML widely used on the World Wide Web. HTML+ was proposed for extending HTML 2 in 1994, but it was never implemented. HTML 3, which also was never standardized or fully implemented by a major browser developer, introduced tables. HTML 3.2 incorporated features widely implemented as of early 1996, including tables, applets, and the ability to flow text around images. HTML 4, the latest specification, supports style sheets and scripting languages and includes internationalization and accessibility features. Future HTML development will be carried out by the World Wide Web Consortium (W3C). Most Web browsers, notably Netscape Navigator and Internet Explorer, recognize HTML tags beyond those included in the present standard. *See also* .htm, .html, SGML, tag (definition 3), Web browser.

HTML attribute *n.* A value within an HTML tag that assigns additional properties to the object being defined. Some HTML editing software assigns some attributes automatically when you create an object such as a paragraph or table.

HTML code fragment *n.* HTML code that you add to a Web page to create features such as a script, a counter, or a scrolling marquee. Often used in the context of webrings to add a link and standard graphics or automation to an individual page to indicate membership.

HTML document *n.* A hypertext document that has been coded with HTML. *See* Web page.

HTML editor *n.* A software program used to create and modify HTML documents (Web pages). Most HTML editors include a method for inserting HTML tags without actually having to type out each tag. A number of HTML editors will also automatically reformat a document with HTML tags, based on formatting codes used by the word processing program in which the document was created. *See also* tag (definition 3), Web page.

HTML extensions *n.* A feature or setting that is an extension to the formal HTML specification. Extensions may not be supported by all Web browsers, but they may be used widely by Web authors. An example of an extension is marquee scrolling text.

HTML page *n. See* Web page.

HTML server control *n.* An ASP.NET server control that belongs to the System.Web.UI.HtmlControls namespace. An HTML server control maps directly to an HTML element and is declared on an ASP.NET page as an HTML element marked by a runat=server attribute. In contrast to Web server controls, HTML server controls do not have an <asp:ControlName> tag prefix. *See also* Web server control.

HTML source *n. See* source (definition 2).

HTML source file *n. See* source (definition 2).

HTML tag *n. See* tag (definition 3).

HTML validation service *n.* A service used to confirm that a Web page uses valid HTML according to the latest standard and/or that its hyperlinks are valid. An HTML validation service can catch small syntactical errors in HTML coding as well as deviations from the HTML standards. *See also* HTML.

HTTP *n.* Acronym for **H**yper**t**ext **T**ransfer **P**rotocol. The protocol used to carry requests from a browser to a Web server and to transport pages from Web servers back to the requesting browser. Although HTTP is almost universally used on the Web, it is not an especially secure protocol.

HTTPd *n.* Acronym for **H**yper**t**ext **T**ransfer **P**rotocol **D**aemon. A small, fast HTTP server that was available free from NCSA. HTTPd was the predecessor for Apache. *Also called:* HTTP Daemon. *See also* Apache, HTTP server, NCSA (definition 1).

HTTP Daemon *n. See* HTTPd.

HTTP Next Generation *n. See* HTTP-NG.

HTTP-NG *n.* Acronym for **H**yper**t**ext **T**ransfer **P**rotocol **N**ext **G**eneration. A standard under development by the World Wide Web Consortium (W3C) for improving performance and enabling the addition of features such as security. Whereas the current version of HTTP establishes a connection each time a request is made, HTTP-NG will set up one connection (which consists of separate channels for control information and data) for an entire session between a particular client and a particular server.

HTTPS *n.* **1.** Acronym for **H**yper**t**ext **T**ransfer **P**rotocol **S**ecure. A variation of HTTP that provides for encryption and transmission through a secure port. HTTPS was devised by Netscape and allows HTTP to run over a security mechanism known as SSL (Secure Sockets Layer). *See also* HTTP, SSL. **2.** Web server software for Windows NT. Developed by the European Microsoft Windows NT Academic Centre (EMWAC) at the University of Edinburgh,

Scotland, it offers such features as WAIS search capability. *See also* HTTP server, WAIS.

HTTP server *n.* **1.** Server software that uses HTTP to serve up HTML documents and any associated files and scripts when requested by a client, such as a Web browser. The connection between client and server is usually broken after the requested document or file has been served. HTTP servers are used on Web and Intranet sites. *Also called:* Web server. *See also* HTML, HTTP, server (definition 2). *Compare* application server. **2.** Any machine on which an HTTP server program is running.

HTTP status codes *n.* Three-digit codes sent by an HTTP server that indicate the results of a request for data. Codes beginning with 1 respond to requests that the client may not have finished sending; with 2, successful requests; with 3, further action that the client must take; with 4, requests that failed because of client error; and with 5, requests that failed because of server error. *See also* 400, 401, 402, 403, 404, HTTP.

HTTP streaming *n.* The process of downloading streaming digital media using an HTTP server (a standard Internet server) rather than a server designed specifically to transmit streaming media. HTTP streaming downloads the media file onto a computer, which plays the downloaded file as it becomes available. *See also* real-time streaming.

hub *n.* In a network, a device joining communication lines at a central location, providing a common connection to all devices on the network. The term is an analogy to the hub of a wheel. *See also* active hub, switching hub.

hue *n.* In the HSB color model, one of the three characteristics used to describe a color. Hue is the attribute that most readily distinguishes one color from other colors. It depends on the frequency of a light wave in the visible spectrum. *See also* color model, HSB. *Compare* brightness, saturation (definition 2).

Huffman coding *n.* A method of compressing a given set of data based on the relative frequency of the individual elements. The more often a given element, such as a letter, occurs, the shorter, in bits, is its corresponding code. It was one of the earliest data compression codes and, with modifications, remains one of the most widely used codes for a large variety of message types.

human engineering *n.* The designing of machines and associated products to suit the needs of humans. *See also* ergonomics.

human-machine interface *n.* The boundary at which people make contact with and use machines; when applied to programs and operating systems, it is more widely known as the user interface.

hung *adj. See* hang.

hybrid circuit *n.* A circuit in which fundamentally different types of components are used to perform similar functions, such as a stereo amplifier that uses both tubes and transistors.

hybrid computer *n.* A computer that contains both digital and analog circuits.

hybrid microcircuit *n.* A microelectronic circuit that combines individual microminiaturized components and integrated components.

hybrid network *n.* A network constructed of different topologies, such as ring and star. *See also* bus network, ring network, star network, Token-Ring network, topology.

Hybris virus *n.* A slow-spreading but persistent self-updating Internet worm first detected in late 2000. The Hybris virus is activated whenever an infected computer is connected to the Internet. It attaches itself to all outgoing e-mail messages, maintains a list of all e-mail addresses in the headers of incoming e-mail messages, and sends copies of itself to all e-mail addresses on the list. Hybris is difficult to eradicate because it updates itself regularly, accessing and downloading updates and plug-ins from anonymous postings to the alt.comp.virus newsgroup. Hybris incorporates downloaded extensions into its code, and it e-mails its modified form to additional potential victims. Hybris often includes a spiral plug-in which produces a spinning disk on top of any active windows on a user's screen.

HyperCard *n.* An information-management software tool, designed for the Apple Macintosh, that implements many hypertext concepts. A HyperCard document consists of a series of cards, collected into a stack. Each card can contain text, graphical images, sound, buttons that enable travel from card to card, and other controls. Programs and routines can be coded as scripts in an object-oriented language called HyperTalk or developed as external code resources (XCMDs and XFCNs). *See also* hypertext, object-oriented programming, XCMD, XFCN.

hyperlink *n.* A connection between an element in a hypertext document, such as a word, a phrase, a symbol, or an image, and a different element in the document, another

document, a file, or a script. The user activates the link by clicking on the linked element, which is usually underlined or in a color different from the rest of the document to indicate that the element is linked. Hyperlinks are indicated in a hypertext document through tags in markup languages such as SGML and HTML. These tags are generally not visible to the user. *Also called:* hot link, hypertext link, link. *See also* anchor (definition 2), HTML, hypermedia, hypertext, URL.

hypermedia *n.* The combination of text, video, graphic images, sound, hyperlinks, and other elements in the form typical of Web documents. Essentially, hypermedia is the modern extension of hypertext, the hyperlinked, text-based documents of the original Internet. Hypermedia attempts to offer a working and learning environment that parallels human thinking—that is, one in which the user can make associations between topics, rather than move sequentially from one to the next, as in an alphabetic list. For example, a hypermedia presentation on navigation might include links to astronomy, bird migration, geography, satellites, and radar. *See also* hypertext.

hyperspace *n.* The set of all documents that can be accessed by following hyperlinks in the World Wide Web. *Compare* cyberspace (definition 2), Gopherspace.

HyperTalk *n.* A programming language used to manipulate HyperCard stacks developed by Apple Computer, Inc. *See also* HyperCard.

hypertext *n.* Text linked together in a complex, nonsequential web of associations in which the user can browse through related topics. For example, in an article with the word *iron*, traveling among the links to *iron* might lead the user to the periodic table of the elements or a map of the migration of metallurgy in Iron Age Europe. The term *hypertext* was coined in 1965 to describe documents presented by a computer that express the nonlinear structure of ideas as opposed to the linear format of books, film, and speech. The term *hypermedia*, more recently introduced, is nearly synonymous but emphasizes the nontextual element, such as animation, recorded sound, and video. *See also* HyperCard, hypermedia.

Hyper Text Coffee Pot Control Protocol *n. See* HTCPCP.

hypertext link *n. See* hyperlink.

Hypertext Markup Language *n. See* HTML.

Hypertext Transfer Protocol *n. See* HTTP.

Hypertext Transfer Protocol Daemon *n. See* HTTPd.

Hypertext Transfer Protocol Next Generation *n. See* HTTP-NG.

HyperWave *n.* A World Wide Web server that specializes in database manipulation and multimedia.

hyphen *n.* A punctuation mark (-) used to break a word between syllables at the end of a line or to separate the parts of a compound word. Word processing programs with sophisticated hyphenation capabilities recognize three types of hyphens: normal, optional, and nonbreaking. Normal hyphens, also called *required* or *hard hyphens*, are part of a word's spelling and are always visible, as in *long-term*. Optional hyphens, also called *discretionary* or *soft hyphens*, appear only when a word is broken between syllables at the end of a line; they are usually supplied by the word processing program itself. Nonbreaking hyphens are always visible, like normal hyphens, but they do not allow a line break. *See also* hyphenation program.

hyphenation program *n.* A program (often included as part of a word processing application) that introduces optional hyphens at line breaks. A good hyphenation program will avoid ending more than three lines in a row with hyphens and will prompt the user for confirmation or tag ambiguous breaks, as in the word *desert* (did the army de-sert in the des-ert?). *See also* hyphen.

hysteresis *n.* The tendency of a system, a device, or a circuit to behave differently depending on the direction of change of an input parameter. For example, a household thermostat might turn on at 68 degrees when the house is cooling down, but turn off at 72 degrees when the house is warming up. Hysteresis is important in many devices, especially those employing magnetic fields, such as transformers and read/write heads.

HYTELNET *n.* A menu-driven index of Internet resources that are accessible via telnet, including library catalogs, databases and bibliographies, bulletin boards, and network information services. HYTELNET can operate through a client program on a computer connected to the Internet, or through the World Wide Web.

HyTime *n.* Acronym for **Hy**permedia/**Time**-based Structuring Language. A markup language standard that describes links within and between documents and hypermedia objects. The standard defines structures and some semantic features, enabling description of traversal and presentation information of objects.

Hz *n. See* hertz.

I

I²L *n. See* integrated injection logic.

I2O *n.* Short for **I**ntelligent **I**nput/**O**utput. A specification for I/O device driver architecture that is independent of both the device being controlled and the host operating system. *See also* driver, input/output device.

i386 *n.* A family of 32-bit microprocessors developed by Intel. The i386 was introduced in 1985. *See also* 80386DX.

i486 *n.* A family of 32-bit microprocessors developed by Intel that extended and built upon the capabilities of the i386. The i486 was introduced in 1989. *See also* i486DX.

i486DX *n.* An Intel microprocessor introduced in 1989. In addition to the features of the 80386 (32-bit registers, 32-bit data bus, and 32-bit addressing), the i486DX has a built-in cache controller, a built-in floating-point coprocessor, provisions for multiprocessing, and a pipelined execution scheme. *Also called:* 486, 80486. *See also* pipelining (definition 1).

i486DX2 *n.* An Intel microprocessor introduced in 1992 as an upgrade to certain i486DX processors. The i486DX2 processes data and instructions at twice the system clock frequency. The increased operating speed leads to the generation of much more heat than in an i486DX, so a heat sink is often installed on the chip. *Also called:* 486DX, 80486. *See also* heat sink, i486DX, microprocessor. *Compare* OverDrive.

i486SL *n.* A low-power-consumption version of Intel's i486DX microprocessor designed primarily for laptop computers. The i486SL operates at a voltage of 3.3 volts rather than 5 volts, can shadow memory, and has a System Management Mode (SMM) in which the microprocessor can slow or halt some system components when the system is not performing CPU-intensive tasks, thus prolonging battery life. *See also* i486DX, shadow memory.

i486SX *n.* An Intel microprocessor introduced in 1991 as a lower-cost alternative to the i486DX. It runs at slower clock speeds and has no floating-point processor. *Also called:* 486, 80486. *See also* 80386DX, 80386SX. *Compare* i486DX.

IA-64 *n.* Short for **I**ntel **A**rchitecture **64**. Intel's 64-bit microprocessor architecture based on EPIC (Explicitly Parallel Instruction Computing) technology. IA-64 is the foundation for the 64-bit Merced chip, as well as future chips to be based on the same architecture. Unlike architectures based on the sequential execution of instructions, IA-64 is designed to implement the parallel execution defined by EPIC technology. It also provides for numerous registers (128 general registers for integer and multimedia operations and 128 floating-point registers) and for grouping instructions in threes as 128-bit bundles. IA-64 architecture also features inherent scalability and compatibility with 32-bit software. *See also* EPIC, Merced.

IAB *n. See* Internet Architecture Board.

IAC *n.* Acronym for **I**nformation **A**nalysis **C**enter. One of several organizations chartered by the U.S. Department of Defense to facilitate the use of existing scientific and technical information. IACs establish and maintain comprehensive knowledge bases, including historical, technical, and scientific data, and also develop and maintain analytical tools and techniques for their use.

IANA *n.* Acronym for **I**nternet **A**ssigned **N**umbers **A**uthority. The organization historically responsible for assigning IP (Internet Protocol) addresses and overseeing technical parameters, such as protocol numbers and port numbers, related to the Internet protocol suite. Under the direction of the late Dr. Jon Postel, IANA operated as an arm of the Internet Architecture Board (IAB) of the Internet Society (ISOC) under contract with the U.S. government. However, given the international nature of the Internet, IANA's functions, along with the domain name administration handled by U.S.-based Network Solutions, Inc. (NSI), were privatized in 1998 and turned over to a new, nonprofit organization known as ICANN (Internet Corporation for Assigned Names and Numbers). *See also* ICANN, NSI.

I-beam *n.* A mouse cursor used by many applications, such as word processors, when in text-editing mode. The I-beam cursor indicates sections of the document where text can be inserted, deleted, changed, or moved. The cursor is named for its I shape. *Also called:* I-beam pointer. *See also* cursor (definition 3), mouse.

I-beam pointer *n. See* I-beam.

IBG *n.* Acronym for **i**nter **b**lock **g**ap. *See* inter-record gap.

IBM AT *n.* A class of personal computers introduced in 1984 and conforming to IBM's PC/AT (Advanced Technology) specification. The first AT was based on the Intel 80286 processor and dramatically outperformed its predecessor, the XT, in speed. *See also* 80286.

IBM PC *n.* Short for **IBM P**ersonal **C**omputer. A class of personal computers introduced in 1981 and conforming to IBM's PC specification. The first PC was based on the Intel 8088 processor. For a number of years, the IBM PC was the de facto standard in the computing industry for PCs, and clones, or PCs that conformed to the IBM specification, have been called *PC-compatible*. *See also* PC-compatible, Wintel.

IBM PC/XT *n.* A class of personal computers released by IBM in 1983. XT, short for e**X**tended **T**echnology, enabled users to add a wider range of peripherals to their machines than was possible with the original IBM PC. Equipped with a 10-megabyte hard disk drive and one or two $5^1/_4$-inch floppy drives, the PC/XT was expandable to 256K of RAM on the motherboard and was loaded with MS-DOS v2.1, which supported directories and subdirectories. The popularity of this machine contributed to the production of what came to be known in the industry as "clones," copies of its design by many manufacturers. *See also* IBM AT, IBM PC, XT.

IBM PC-compatible *adj. See* PC-compatible.

iBook *n.* A notebook computer introduced by Apple in July 1999. The iBook was intended as a portable version of the iMac and is easily distinguished by its rounded shape and the bright colors of its case. Initial iBook models were powered by a 300-MHz G3 (PowerPC 750) processor and had the capability for wireless networking. *See also* iMac, PowerPC 750.

IC^1 *adj.* Acronym for **I**n **C**haracter. Used to refer to events going on within a role-playing game, such as MUD, as opposed to events in real life. It is also used in the context of online chat, e-mail, and newsgroup postings. *See also* MUD, role-playing game.

IC^2 *n. See* integrated circuit.

ICANN *n.* Acronym for **I**nternet **C**orporation for **A**ssigned **N**ames and **N**umbers. The private, nonprofit corporation to which the U.S. government in 1998 delegated authority for administering IP (Internet Protocol) addresses, domain names, root servers, and Internet-related technical matters, such as management of protocol parameters (port numbers, protocol numbers, and so on). The successor to IANA (IP address administration) and NSI (domain name registration), ICANN was created to internationalize and privatize Internet management and administration. *See also* IANA, NSI.

I-CASE *n.* Acronym for **I**ntegrated **C**omputer-**A**ided **S**oftware **E**ngineering. Software that performs a wide variety of software engineering functions, such as program design, coding, and testing parts or all of the completed program.

ICE *n.* **1.** Acronym for **I**nformation and **C**ontent **E**xchange. A protocol based on XML (Extensible Markup Language) designed to automate the distribution of syndicated content over the World Wide Web. Based on the concept of content syndicators (distributors) and subscribers (receivers), ICE defines the responsibilities of the parties involved, as well as the format and means of exchanging content so that data can easily be transferred and reused. The protocol has been submitted to the World Wide Web Consortium by Adobe Systems, Inc., CNET, Microsoft, Sun Microsystems, and Vignette Corporation. It is intended to help in both publishing and inter-business exchanges of content. **2.** Acronym for **i**n **c**ircuit **e**mulator. A chip used as a stand-in for a microprocessor or a microcontroller. An in-circuit emulator is used to test and debug logic circuits. **3.** Acronym for **I**ntrusion **C**ountermeasure **E**lectronics. A fictional type of security software, popularized by science fiction novelist William Gibson, that responds to intruders by attempting to kill them. The origin of the term is attributed to a USENET subscriber, Tom Maddox. **4.** *See* Intelligent Concept Extraction.

ICM *n. See* image color matching.

ICMP *n.* Acronym for **I**nternet **C**ontrol **M**essage **P**rotocol. A network-layer (ISO/OSI level 3) Internet protocol that provides error correction and other information relevant to IP packet processing. For example, it can let the IP software on one machine inform another machine about an unreachable destination. *See also* communications protocol, IP, ISO/OSI reference model, packet (definition 1).

icon *n.* **1.** A small image displayed on the screen to represent an object that can be manipulated by the user. By serving as visual mnemonics and allowing the user to control certain computer actions without having to remember commands or type them at the keyboard, icons contribute

significantly to the user-friendliness of graphical user interfaces and to PCs in general. *See also* graphical user interface. **2.** A high-level programming language designed to process non-numerical data structures and character strings using a Pascal-like syntax.

iconic interface *n.* A user interface that is based on icons rather than on typed commands. *See also* graphical user interface, icon.

icon parade *n.* The sequence of icons that appears during the boot-up of a Macintosh computer.

ICP *n.* Acronym for **I**nternet **C**ache **P**rotocol. A networking protocol used by cache servers to locate specific Web objects in neighboring caches. Typically implemented over UDP, ICP also can be used for cache selection. ICP was developed for the Harvest research project at the University of Southern California. It has been implemented in SQUID and other Web proxy caches.

ICQ *n.* A downloadable software program developed by Mirabilis, and now owned by AOL Time-Warner Inc., that notifies Internet users when friends, family, or other selected users are also on line and allows them to communicate with one another in real time. Through ICQ, users can chat, send e-mail, exchange messages on message boards, and transfer URLs and files, as well as launch third-party programs, such as games, in which multiple people can participate. Users compile a list of other users with whom they want to communicate. All users must register with the ICQ server and have ICQ software on their computer. The name is a reference to the phrase "I seek you." *See also* instant messaging.

ICSA *n.* Acronym for **I**nternational **C**omputer **S**ecurity **A**ssociation. An education and information organization concerned with Internet security issues. Known as the NCSA (National Computer Security Association) until 1997, the ICSA provides security assurance systems and product certification; disseminates computer security information in white papers, books, pamphlets, videos, and other publications; organizes consortiums devoted to various security issues; and maintains a Web site that provides updated information on viruses and other computer security topics. Founded in 1987, the ICSA is currently located in Reston, VA.

ID *n.* Acronym for **i**ntrusion **d**etection. *See* IDS.

IDE *n.* **1.** Acronym for **I**ntegrated **D**evice **E**lectronics. A type of disk-drive interface in which the controller electronics reside on the drive itself, eliminating the need for a separate adapter card. The IDE interface is compatible with the controller used by IBM in the PC/AT computer but offers advantages such as look-ahead caching. **2.** *See* integrated development environment.

identifier *n.* Any text string used as a label, such as the name of a procedure or a variable in a program or the name attached to a hard disk or floppy disk. *Compare* descriptor.

IDL *n.* Acronym for **I**nterface **D**efinition **L**anguage. In object-oriented programming, a language that lets a program or object written in one language communicate with another program written in an unknown language. An IDL is used to define interfaces between client and server programs. For example, an IDL can provide interfaces to remote CORBA objects. *See also* CORBA, MIDL, object-oriented programming.

idle *adj.* **1.** Operational but not in use. **2.** Waiting for a command.

idle character *n.* In communications, a control character transmitted when no other information is available or ready to be sent. *See also* SYN.

idle interrupt *n.* An interrupt that occurs when a device or process becomes idle.

idle state *n.* The condition in which a device is operating but is not being used.

IDS *n.* Acronym for **i**ntrusion-**d**etection **s**ystem. A type of security management system for computers and networks that gathers and analyzes information from various areas within a computer or a network to identify possible security breaches, both inside and outside the organization. An IDS can detect a wide range of hostile attack signatures, generate alarms, and, in some cases, cause routers to terminate communications from hostile sources. *Also called:* intrusion detection. *Compare* firewall.

IDSL *n.* Acronym for **I**nternet **d**igital **s**ubscriber **l**ine. A high-speed digital communications service that provides Internet access as fast as 1.1 Mbps (megabits per second) over standard telephone lines. IDSL uses a hybrid of ISDN and digital subscriber line technology. *See also* digital subscriber line, ISDN.

IE *n.* Acronym for **i**nformation **e**ngineering. A methodology for developing and maintaining information-processing systems, including computer systems and networks, within an organization.

IEEE *n.* Acronym for **I**nstitute of **E**lectrical and **E**lectronics **E**ngineers. A society of engineering and electronics professionals based in the United States but boasting membership from numerous other countries. The IEEE (pronounced "eye triple ee") focuses on electrical, electronics, computer engineering, and science-related matters.

IEEE 1284 *n.* The IEEE standard for high-speed signaling through a bidirectional parallel computer interface. A computer that is compliant with the IEEE 1284 standard can communicate through its parallel port in five modes: outbound data transfer to a printer or similar device ("Centronics" mode), inbound transfer 4 (nibble mode) or 8 (byte mode) bits at a time, bidirectional Enhanced Parallel Ports (EPP) used by storage devices and other nonprinter peripherals, and Enhanced Capabilities Ports (ECP) used for bidirectional communication with a printer. *See also* Centronics parallel interface, ECP, enhanced parallel port.

IEEE 1394 *n.* A nonproprietary, high-speed, serial bus input/output standard. IEEE 1394 provides a means of connecting digital devices, including personal computers and consumer electronics hardware. It is platform-independent, scalable (expandable), and flexible in supporting peer-to-peer (roughly, device-to-device) connections. IEEE 1394 preserves data integrity by eliminating the need to convert digital signals into analog signals. Created for desktop networks by Apple Computer and later developed by the IEEE 1394 working group, it is considered a low-cost interface for devices such as digital cameras, camcorders, and multimedia devices and is seen as a means of integrating personal computers and home electronics equipment. FireWire is the proprietary implementation of the standard by Apple Computer. *See also* analog data, IEEE.

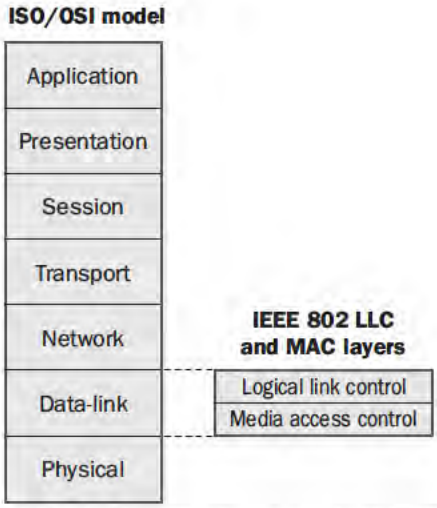
IEEE 1394 connector *n.* A type of connector that enables you to connect and disconnect high-speed serial devices. An IEEE 1394 connector is usually on the back of your computer near the serial port or the parallel port. The IEEE 1394 bus is used primarily to connect high-end digital video and audio devices to your computer; however, some hard disks, printers, scanners, and DVD drives can also be connected to your computer using the IEEE 1394 connector.

IEEE 1394 port *n.* A 4- or 6-pin port that supports the IEEE 1394 standard and can provide direct connections between digital consumer electronics and computers. *See also* IEEE 1394.

IEEE 488 *n.* The electrical definition of the General-Purpose Interface Bus (GPIB), specifying the data and control lines and the voltage and current levels for the bus. *See also* General-Purpose Interface Bus.

IEEE 696/S-100 *n.* The electrical definition of the S-100 bus, used in early personal computer systems that used microprocessors such as the 8080, Z-80, and 6800. The S-100 bus, based on the architecture of the Altair 8800, was extremely popular with early computer enthusiasts because it permitted installation of a wide range of expansion boards. *See also* Altair 8800, S-100 bus.

IEEE 802.x *n.* A series of networking specifications developed by the IEEE. The x following 802 is a placeholder for individual specifications. The IEEE 802.x specifications correspond to the physical and data-link layers of the ISO/OSI reference model, but they divide the data-link layer into two sublayers. The logical link control (LLC) sublayer applies to all IEEE 802.x specifications and covers station-to-station connections, generation of message frames, and error control. The media access control (MAC) sublayer, dealing with network access and collision detection, differs from one IEEE 802 standard to another. IEEE 802.3 is used for bus networks that use CSMA/CD, both broadband and baseband, and the baseband version is based on the Ethernet standard. IEEE 802.4 is used for bus networks that use token passing, and IEEE 802.5 is used for ring networks that use token passing (token ring networks). IEEE 802.6 is an emerging standard for metropolitan area networks, which transmit data, voice, and video over distances of more than 5 kilometers. IEEE 802.14 is designed for bidirectional transmission to and from cable television networks over optical fiber and coaxial cable through transmission of fixed-length ATM cells to support television, data, voice, and Internet access. See the illustration. *See also* bus network, ISO/OSI reference model, ring network, token passing, token ring network.



IEEE 802.x. *ISO/OSI reference model with IEEE 802 LLC and MAC layers shown.*

IEEE 802.11 *n.* The Institute of Electrical and Electronics Engineers' (IEEE) specifications for wireless networking. These specifications, which include 802.11, 802.11a, 802.11b, and 802.11g, allow computers, printers, and other devices to communicate over a wireless local area network (LAN).

IEEE printer cable *n.* A cable used to connect a printer to a PC's parallel port that adheres to the IEEE 1284. *See also* IEEE 1284.

IEPG *n.* Acronym for Internet Engineering and Planning Group. A collaborative group of Internet service providers whose goal is to promote the Internet and coordinate technical efforts on it.

IESG *n. See* Internet Engineering Steering Group.

IETF *n.* Acronym for Internet Engineering Task Force. A worldwide organization of individuals interested in networking and the Internet. Managed by the IESG (Internet Engineering Steering Group), the IETF is charged with studying technical problems facing the Internet and proposing solutions to the Internet Architecture Board (IAB). The work of the IETF is carried out by various Working Groups that concentrate on specific topics, such as routing and security. The IETF is the publisher of the specifications that led to the TCP/IP protocol standard. *See also* Internet Engineering Steering Group.

IFC *n. See* Internet Foundation Classes.

.iff *n.* The file extension that identifies files in the IFF (Interchange File Format) format. IFF was most commonly used on the Amiga platform, where it constituted almost any kind of data. On other platforms, IFF is mostly used to store image and sound files.

IFF *n.* Acronym for Interchange File Format. *See* .iff.

IFIP *n.* Acronym for International Federation of Information Processing. An organization of societies, representing over 40 member nations, that serves information-processing professionals. The United States is represented by the Federation on Computing in the United States (FOCUS). *See also* AFIPS, FOCUS.

IFS *n. See* Installable File System Manager.

IF statement *n.* A control statement that executes a block of code if a Boolean expression evaluates to true. Most programming languages also support an ELSE clause, which specifies code that is to be executed only if the Boolean expression evaluates to false. *See also* conditional.

IGES *n. See* Initial Graphics Exchange Specification.

IGMP *n. See* Internet Group Membership Protocol.

IGP *n. See* Interior Gateway Protocol.

IGRP *n.* Acronym for Interior Gateway Routing Protocol. A protocol developed by Cisco Systems that allows coordination between the routing of a number of gateways. Goals of IGRP include stable routing in large networks, fast response to changes in network topology, and low overhead. *See also* communications protocol, gateway, topology.

IIA *n. See* SIIA.

IIL *n. See* integrated injection logic.

IIOP *n.* Acronym for Internet Inter-ORB Protocol. A networking protocol that enables distributed programs written in different programming languages to communicate over the Internet. IIOP, a specialized mapping in the General Inter-ORB Protocol (GIOP) based on a client/server model, is a critical part of CORBA. *See also* CORBA. *Compare* DCOM.

IIS *n. See* Internet Information Services.

ILEC *n.* Acronym for Incumbent Local Exchange Carrier. A telephone company that provides local service to its customers. *Compare* CLEC.

illegal *adj.* Not allowed, or leading to invalid results. For example, an illegal character in a word processing program would be one that the program cannot recognize; an

illegal operation might be impossible for a program or system because of built-in constraints. *Compare* invalid.

illuminance *n.* **1.** The amount of light falling on, or illuminating, a surface area. **2.** A measure of illumination (such as watts per square meter) used in reference to devices such as televisions and computer displays. *Compare* luminance.

IM *n. See* instant messaging.

iMac *n.* A family of Apple Macintosh computers introduced in 1998. Designed for nontechnical users, the iMac has a case that contains both the CPU and the monitor and is available in several bright colors. The "i" in iMac stands for Internet; the iMac was designed to make setting up an Internet connection extremely simple. The first version of the iMac included a 266-MHz PowerPC processor, a 66-MHz system bus, a hard drive, a CD-ROM drive, and a 15-inch monitor, with a translucent blue case. Later iMacs came with faster processors and a choice of case colors. See the illustration. *See also* Macintosh.

iMac.

.image *n.* A file extension for a Macintosh Disk Image, a storage type often used on Apple's FTP software download sites.

image *n.* **1.** A stored description of a graphic picture, either as a set of brightness and color values of pixels or as a set of instructions for reproducing the picture. *See also* bit map, pixel map. **2.** A duplicate, copy, or representation of all or part of a hard or floppy disk, a section of memory or hard drive, a file, a program, or data. For example, a RAM disk can hold an image of all or part of a disk in main memory; a virtual RAM program can create an image of some portion of the computer's main memory on disk. *See also* RAM disk.

image-based rendering *n. See* immersive imaging.

image color matching *n.* The process of image output correction to match the same colors that were scanned or input.

image compression *n.* The use of a data compression technique on a graphical image. Uncompressed graphics files tend to use up large amounts of storage, so image compression is useful to conserve space. *See also* compressed file, data compression, video compression.

image compression dialog component *n.* An application programming interface that sets parameters for compressing images and image sequences in QuickTime, a technology from Apple for creating, editing, publishing, and viewing multimedia content. The component displays a dialog box as a user interface, validates and stores the settings selected in the dialog box, and oversees the compression of the image or images based on the selected criteria.

Image Compression Manager *n.* A major software component used in QuickTime, a technology from Apple for creating, editing, publishing, and viewing multimedia content. The Image Compression Manager is an interface that provides image-compression and image-decompression services to applications and other managers. Because the Image Compression Manager is independent of specific compression algorithms and drivers, it can present a common application interface for software-based compressors and hardware-based compressors and offer compression options so that it or its application can use the appropriate tool for a particular situation. *See also* QuickTime.

image compressor component *n.* A software component used by the Image Compression Manager to compress image data in QuickTime, a technology from Apple for creating, editing, publishing, and viewing multimedia content. *See also* Image Compression Manager, QuickTime.

image decompressor component *n.* A software component used by the Image Compression Manager to decompress image data in QuickTime, a technology from Apple for creating, editing, publishing, and viewing multimedia content. *See also* Image Compression Manager, QuickTime.

image editing *n.* The process of changing or modifying a bitmapped image, usually with an image editor.

image editor *n.* An application program that allows users to modify the appearance of a bitmapped image, such as a scanned photo, by using filters and other functions. Creation of new images is generally accomplished in a paint or drawing program. *See also* bitmapped graphics, filter (definition 4), paint program.

image enhancement *n.* The process of improving the quality of a graphic image, either automatically by software or manually by a user through a paint or drawing program. *See also* anti-aliasing, image processing.

image map *n.* An image that contains more than one hyperlink on a Web page. Clicking different parts of the image links the user to other resources on another part of the Web page or a different Web page or in a file. Often an image map, which can be a photograph, drawing, or a composite of several different drawings or photographs, is used as a map to the resources found on a particular Web site. Older Web browsers support only server-side image maps, which are executed on a Web server through CGI script. However, most newer Web browsers (Netscape Navigator 2.0 and higher and Internet Explorer 3.0 and higher) support client-side image maps, which are executed in a user's Web browser. *Also called:* clickable maps. *See also* CGI script, hyperlink, Web page.

image processing *n.* The analysis, manipulation, storage, and display of graphical images from sources such as photographs, drawings, and video. Image processing spans a sequence of three steps. The input step (image capture and digitizing) converts the differences in coloring and shading in the picture into binary values that a computer can process. The processing step can include image enhancement and data compression. The output step consists of the display or printing of the processed image. Image processing is used in such applications as television and film, medicine, satellite weather mapping, machine vision, and computer-based pattern recognition. *See also* image enhancement, video digitizer.

image sensor *n.* A light-sensitive integrated circuit or group of integrated circuits used in scanners, digital cameras, and video cameras.

imagesetter *n.* A typesetting device that can transfer camera-ready text and artwork from computer files directly onto paper or film. Imagesetters print at high resolution (commonly above 1000 dpi) and are usually PostScript-compatible.

image transcoder component *n.* A component that transfers compressed images from one file format to another in QuickTime, a technology developed by Apple for creating, editing, publishing, and viewing multimedia content.

imaginary number *n.* A number that must be expressed as the product of a real number and *i*, where $i^2 = -1$. The sum of an imaginary number and a real number is a complex number. Although imaginary numbers are not directly encountered in the universe (as in "1.544 *i* megabits per second"), some pairs of quantities, especially in electrical engineering, behave mathematically like the real and imaginary parts of complex numbers. *Compare* complex number, real number.

imaging *n.* The processes involved in the capture, storage, display, and printing of graphical images.

IMAP4 *n.* Acronym for **I**nternet **M**essage **A**ccess **P**rotocol **4**. The latest version of IMAP, a method for an e-mail program to gain access to e-mail and bulletin board messages stored on a mail server. Unlike POP3, a similar protocol, IMAP allows a user to retrieve messages efficiently from more than one computer. *Compare* POP3.

IMC *n. See* Internet Mail Consortium.

IMHO *n.* Acronym for **i**n **m**y **h**umble **o**pinion. IMHO, used in e-mail and in online forums, flags a statement that the writer wants to present as a personal opinion rather than as a statement of fact. *See also* IMO.

Imitation Game *n. See* Turing test.

immediate access *n. See* direct access, random access.

immediate operand *n.* A data value, used in the execution of an assembly language instruction, that is contained in the instruction itself rather than pointed to by an address in the instruction.

immediate printing *n.* A process in which text and printing commands are sent directly to the printer without being stored as a printing file and without the use of an intermediate page-composition procedure or a file containing printer setup commands.

immersive imaging *n.* A method of presenting photographic images on a computer by using virtual reality techniques. A common immersive image technique puts the user in the center of the view. The user can pan 360 degrees within the image and can zoom in and out. Another technique puts an object in the center of the view and allows the user to rotate around the object to examine it from any perspective. Immersive imaging techniques can be used to provide virtual reality experiences without equip-

ment such as a headpiece and goggles. *Also called:* image-based rendering. *See also* imaging, virtual reality.

IMO *n.* Acronym for **i**n **m**y opinion. A shorthand phrase used often in e-mail and Internet news and discussion groups to indicate an author's admission that a statement he or she has just made is a matter of judgment rather than fact. *See also* IMHO.

impact printer *n.* A printer, such as a wire-pin dot-matrix printer or a daisy-wheel printer, that drives an inked ribbon mechanically against the paper to form marks. *See also* daisy-wheel printer, dot-matrix printer. *Compare* nonimpact printer.

impedance *n.* Opposition to the flow of alternating current. Impedance has two aspects: resistance, which impedes both direct and alternating current and is always greater than zero; and reactance, which impedes alternating current only, varies with frequency, and can be positive or negative. *See also* resistance.

implementor *n.* In role-playing games, the administrator, coder, or developer of the game. *Also called:* Imp. *See also* role-playing game.

import *vb.* To bring information from one system or program into another. The system or program receiving the data must somehow support the internal format or structure of the data. Conventions such as the TIFF (Tagged Image File Format) and PICT formats (for graphics files) make importing easier. *See also* PICT, TIFF. *Compare* export.

IMT-2000 *n. See* International Mobile Telecommunications for the Year 2000.

inactive window *n.* In an environment capable of displaying multiple on-screen windows, any window other than the one currently being used for work. An inactive window can be partially or entirely hidden behind another window, and it remains inactive until the user selects it. *Compare* active window.

in-band signaling *n.* Transmission within the voice or data-handling frequencies of a communication channel.

in-betweening *n. See* tween.

Inbox *n.* In many e-mail applications, the default mailbox where the program stores incoming messages. *See also* e-mail, mailbox. *Compare* Outbox.

incident light *n.* The light that strikes a surface in computer graphics. *See also* illuminance.

in-circuit emulator *n. See* ICE (definition 2).

INCLUDE directive *n.* A statement within a source-code file that causes another source-code file to be read in at that spot, either during compilation or during execution. It enables a programmer to break up a program into smaller files and enables multiple programs to use the same files.

inclusive OR *n. See* OR.

increment[1] *n.* A scalar or unit amount by which the value of an object such as a number, a pointer within an array, or a screen position designation is increased. *Compare* decrement[1].

increment[2] *vb.* To increase a number by a given amount. For example, if a variable has the value 10 and is incremented successively by 2, it takes the values 12, 14, 16, 18, and so on. *Compare* decrement[2].

incumbent local exchange carrier *n. See* ILEC.

indent[1] *n.* **1.** Displacement of the left or right edge of a block of text in relation to the margin or to other blocks of text. **2.** Displacement of the beginning of the first line of a paragraph relative to the other lines in the paragraph. *Compare* hanging indent.

indent[2] *vb.* To displace the left or right edge of a text item, such as a block or a line, relative to the margin or to another text item.

Indeo *n.* A codec technology developed by Intel for compressing digital video files. *See also* codec. *Compare* MPEG.

independent content provider *n.* A business or organization that supplies information to an online information service, such as America Online, for resale to the information service's customers. *See also* online information service.

independent software vendor *n.* A third-party software developer; an individual or an organization that independently creates computer software. *Acronym:* ISV.

index[1] *n.* **1.** A listing of keywords and associated data that point to the location of more comprehensive information, such as files and records on a disk or record keys in a database. **2.** In programming, a scalar value that allows direct access into a multi-element data structure such as an array without the need for a sequential search through the collection of elements. *See also* array, element (definition 1), hash, list.

index[2] *vb.* **1.** In data storage and retrieval, to create and use a list or table that contains reference information

pointing to stored data. **2.** In a database, to find data by using keys such as words or field names to locate records. **3.** In indexed file storage, to find files stored on disk by using an index of file locations (addresses). **4.** In programming and information processing, to locate information stored in a table by adding an offset amount, called the index, to the base address of the table.

indexed address *n.* The location in memory of a particular item of data within a collection of items, such as an entry in a table. An indexed address is calculated by starting with a base address and adding to it a value stored in a register called an index register.

indexed search *n.* A search for an item of data that uses an index to reduce the amount of time required.

indexed sequential access method *n.* A scheme for decreasing the time necessary to locate a data record within a large database, given a key value that identifies the record. A smaller index file is used to store the keys along with pointers that locate the corresponding records in the large main database file. Given a key, first the index file is searched for the key and then the associated pointer is used to access the remaining data of the record in the main file. *Acronym:* ISAM.

index hole *n.* The small, round hole near the large, round spindle opening at the center of a 5.25-inch floppy disk. The index hole marks the location of the first data sector, enabling a computer to synchronize its read/write operations with the disk's rotation.

Indexing Service Query Language *n.* A query language available in addition to SQL for the Indexing Service in Windows 2000. Formerly known as Index Server, its original function was to index the content of Internet Information Services (IIS) Web servers. Indexing Service now creates indexed catalogs for the contents and properties of both file systems and virtual Webs.

index mark *n.* **1.** A magnetic indicator signal placed on a soft-sectored disk during formatting to mark the logical start of each track. **2.** A visual information locator, such as a line, on a microfiche.

indicator *n.* A dial or light that displays information about the status of a device, such as a light connected to a disk drive that glows when the disk is being accessed.

indirect address *n. See* relative address.

inductance *n.* The ability to store energy in the form of a magnetic field. Any length of wire has some inductance, and coiling the wire, especially around a ferromagnetic core, increases the inductance. The unit of inductance is the henry. *Compare* capacitance, induction.

induction *n.* The creation of a voltage or current in a material by means of electric or magnetic fields, as in the secondary winding of a transformer when exposed to the changing magnetic field caused by an alternating current in the primary winding. *See also* impedance. *Compare* inductance.

inductor *n.* A component designed to have a specific amount of inductance. An inductor passes direct current but impedes alternating current to a degree dependent on its frequency. An inductor usually consists of a length of wire coiled in a cylindrical or toroidal (doughnut-shaped) form, sometimes with a ferromagnetic core. See the illustration. *Also called:* choke.

Inductor. *One of several kinds of inductors.*

Industry Standard Architecture *n. See* ISA.

INET *n.* **1.** Short for **Internet**. **2.** An annual conference held by the Internet Society.

.inf *n.* The file extension for device information files, those files containing scripts used to control hardware operations.

infection *n.* The presence of a virus or Trojan horse in a computer system. *See also* Trojan horse, virus, worm.

infer *vb.* To formulate a conclusion based on specific information, either by applying the rules of formal logic or by generalizing from a set of observations. For example, from the facts that canaries are birds and birds have feathers, one can infer (draw the inference) that canaries have feathers.

inference engine *n.* The processing portion of an expert system. It matches input propositions with facts and rules contained in a knowledge base and then derives a conclusion, on which the expert system then acts.

inference programming *n.* A method of programming (as in Prolog) in which programs yield results based on

logical inference from a set of facts and rules. *See also* Prolog.

infinite loop *n.* **1.** A loop that, because of semantic or logic errors, can never terminate through normal means. **2.** A loop that is intentionally written with no explicit termination condition but will terminate as a result of side effects or direct intervention. *See also* loop[1] (definition 1), side effect.

infix notation *n.* A notation, used for writing expressions, in which binary operators appear between their arguments, as in 2 + 4. Unary operators usually appear before their arguments, as in –1. *See also* operator precedence, postfix notation, prefix notation, unary operator.

.info *n.* One of seven new top-level domain names approved in 2001 by the Internet Corporation for Assigned Names and Numbers (ICANN). Unlike the other new domain names, which focus on specific types of Web sites, .info is meant for unrestricted use.

infobahn *n.* The Internet. *Infobahn* is a mixture of the terms *information* and *Autobahn*, a German highway known for the high speeds at which drivers can legally travel. *Also called:* Information Highway, Information Superhighway, the Net.

infomediary *n.* A term created from the phrase *information intermediary*. A service provider that positions itself between buyers and sellers, collecting, organizing, and distributing focused information that improves the interaction of consumer and online business.

information *n.* The meaning of data as it is intended to be interpreted by people. Data consists of facts, which become information when they are seen in context and convey meaning to people. Computers process data without any understanding of what the data represents.

Information Analysis Center *n. See* IAC.

Information and Content Exchange *n. See* ICE (definition 1).

information appliance *n.* A specialized computer designed to perform a limited number of functions and, especially, to provide access to the Internet. Although devices such as electronic address books or appointment calendars might be considered information appliances, the term is more typically used for devices that are less expensive and less capable than a fully functional personal computer. Set-top boxes are a current example; other devices, envisioned for the future, would include network-aware microwaves, refrigerators, watches, and the like. *Also called:* appliance.

information center *n.* **1.** A large computer center and its associated offices; the hub of an information management and dispersal facility in an organization. **2.** A specialized type of computer system dedicated to information retrieval and decision-support functions. The information in such a system is usually read-only and consists of data extracted or downloaded from other production systems.

information engineering *n. See* IE (definition 1).

information explosion *n.* **1.** The current period in human history, in which the possession and dissemination of information has supplanted mechanization or industrialization as a driving force in society. **2.** The rapid growth in the amount of information available today. *Also called:* information revolution.

information hiding *n.* A design practice in which implementation details for both data structures and algorithms within a module or subroutine are hidden from routines using that module or subroutine, so as to ensure that those routines do not depend on some particular detail of the implementation. In theory, information hiding allows the module or subroutine to be changed without breaking the routines that use it. *See also* break, module, routine, subroutine.

Information Highway or **information highway** *n. See* Information Superhighway.

Information Industry Association *n. See* SIIA.

information kiosk *n. See* kiosk.

information management *n.* The process of defining, evaluating, safeguarding, and distributing data within an organization or a system.

information packet *n. See* packet (definition 1).

information processing *n.* The acquisition, storage, manipulation, and presentation of data, particularly by electronic means.

information resource management *n.* The process of managing the resources for the collection, storage, and manipulation of data within an organization or system.

information retrieval *n.* The process of finding, organizing, and displaying information, particularly by electronic means.

information revolution *n. See* information explosion.

information science *n.* The study of how information is collected, organized, handled, and communicated. *See also* information theory.

Information Services *n.* The formal name for a company's data processing department. *Acronym:* IS.*Also called:* Data Processing, Information Processing, Information Systems, Information Technology, Management Information Services, Management Information Systems.

Information Superhighway *n.* The existing Internet and its general infrastructure, including private networks, online services, and so on. *See also* National Information Infrastructure.

Information Systems *n. See* Information Services.

Information Technology *n. See* Information Services.

Information Technology Industry Council *n.* Trade organization of the information technology industry. The council promotes the interests of the information technology industry and compiles information on computers, software, telecommunications, business equipment, and other topics related to information technology. *Acronym:* ITIC.

information theory *n.* A mathematical discipline founded in 1948 that deals with the characteristics and the transmission of information. Information theory was originally applied to communications engineering but has proved relevant to other fields, including computing. It focuses on such aspects of communication as amount of data, transmission rate, channel capacity, and accuracy of transmission, whether over cables or within society.

information warehouse *n.* The total of an organization's data resources on all computers.

information warfare *n.* Attacks on the computer operations on which an enemy country's economic life or safety depends. Possible examples of information warfare include crashing air traffic control systems or massively corrupting stock exchange records.

Infoseek *n.* A Web search site that provides full-text results for user searches plus categorized lists of related sites. InfoSeek is powered by the Ultraseek search engine and searches Web pages, Usenet newsgroups, and FTP and Gopher sites.

infrared *adj.* Having a frequency in the electromagnetic spectrum in the range just below that of red light. Objects radiate infrared in proportion to their temperature. Infrared radiation is traditionally divided into four somewhat arbitrary categories based on its wavelength. See the table. *Acronym:* IR.

Table I.1 Infrared Radiation Categories.

near infrared	750–1500 nanometers (nm)
middle infrared	1500–6000 nm
far infrared	6000–40,000 nm
far-far infrared	40,000 nm–1 millimeter (mm)

Infrared Data Association *n. See* IrDA.

infrared device *n.* A computer, or a computer peripheral such as a printer, that can communicate by using infrared light. *See also* infrared.

infrared file transfer *n.* Wireless file transfer between a computer and another computer or device using infrared light. *See also* infrared.

infrared network connection *n.* A direct or incoming network connection to a remote access server using an infrared port. *See also* infrared port.

infrared port *n.* An optical port on a computer for interfacing with an infrared-capable device. Communication is achieved without physical connection through cables. Infrared ports can be found on some laptops, notebooks, and printers. *See also* cable, infrared, port.

inherent error *n.* An error in assumptions, design, logic, algorithms, or any combination thereof that causes a program to work improperly, regardless of how well written it is. For example, a serial communications program that is written to use a parallel port contains an inherent error. *See also* logic, semantics (definition 1), syntax.

inherit *vb.* To acquire the characteristics of another class, in object-oriented programming. The inherited characteristics may be enhanced, restricted, or modified. *See also* class.

inheritance *n.* **1.** The transfer of the characteristics of a class in object-oriented programming to other classes derived from it. For example, if "vegetable" is a class, the classes "legume" and "root" can be derived from it, and each will inherit the properties of the "vegetable" class: name, growing season, and so on. *See also* class, object-oriented programming. **2.** The transfer of certain properties, such as open files, from a parent program or process to another program or process that the parent causes to run. *See also* child (definition 1).

inheritance code *n.* A set of structural and procedural attributes belonging to an object that has been passed on to

it by the class or object from which it was derived. *See also* object-oriented programming.

inhibit *vb.* To prevent an occurrence. For example, to inhibit interrupts from an external device means to prevent the external device from sending any interrupts.

.ini *n.* In MS-DOS and Windows 3.x, the file extension that identifies an initialization file, which contains user preferences and startup information about an application program.

ini file *n.* Short for **ini**tialization **file**, a text file containing information about the initial configuration of Windows and Windows-based applications, such as default settings for fonts, margins, and line spacing. Two ini files, win.ini and system.ini, are required to run the Windows operating system through version 3.1. In later versions of Windows, ini files are replaced by a database known as the registry. In addition to Windows itself, many older applications create their own ini files. Because they are composed only of text, ini files can be edited in any text editor or word processor to change information about the application or user preferences. All initialization files bear the extension .ini. *See also* configuration, configuration file, registry, system.ini, win.ini.

INIT *n.* On older Macintosh computers, a system extension that is loaded into memory at startup time. *See also* extension (definition 4). *Compare* cdev.

Initial Graphics Exchange Specification *n.* A standard file format for computer graphics, supported by the American National Standards Institute (ANSI), that is particularly suitable for describing models created with computer-aided design (CAD) programs. It includes a wide variety of basic geometric forms (primitives) and, in keeping with CAD objectives, offers methods for describing and annotating drawings and engineering diagrams. *Acronym:* IGES *See also* ANSI.

initialization *n.* The process of assigning initial values to variables and data structures in a program.

initialization file *n. See* ini file.

initialization string *n.* A sequence of commands sent to a device, especially a modem, to configure it and prepare it for use. In the case of a modem, the initialization string consists of a string of characters.

initialize *vb.* **1.** To prepare a storage medium, such as a disk or a tape, for use. This may involve testing the medium's surface, writing startup information, and setting up the file system's index to storage locations. **2.** To assign a beginning value to a variable. **3.** To start up a computer. *See also* cold boot, startup.

initializer *n.* An expression whose value is the first (initial) value of a variable. *See also* expression.

initial program load *n.* The process of copying an operating system into memory when a system is booted. *Acronym:* IPL. *See also* boot, startup.

initiator *n.* The device in a SCSI connection that issues commands. The device that receives the commands is the target. *See also* SCSI, target.

ink cartridge *n.* A disposable module that contains ink and is typically used in an ink-jet printer. *See also* ink-jet printer.

ink-jet printer or **inkjet printer** *n.* A nonimpact printer in which liquid ink is vibrated or heated into a mist and sprayed through tiny holes in the print head to form characters or graphics on the paper. Ink-jet printers are competitive with some laser printers in price and print quality if not in speed. However, the ink, which must be highly soluble to avoid clogging the nozzles in the print head, produces fuzzy-looking output on some papers and smears if touched or dampened shortly after printing. *See also* nonimpact printer, print head.

inline *adj.* **1.** In programming, referring to a function call replaced with an instance of the function's body. Actual arguments are substituted for formal parameters. An inline function is usually done as a compile-time transformation to increase the efficiency of the program. *Also called:* unfold, unroll. **2.** In HTML code, referring to graphics displayed along with HTML-formatted text. Inline images placed in the line of HTML text use the tag <IMG>. Text within an inline image can be aligned to the top, bottom, or middle of a specific image.

inline code *n.* Assembly language or machine language instructions embedded within high-level source code. The form it takes varies considerably from compiler to compiler, if it is supported at all.

inline discussion *n.* Discussion comments that are associated with a document as a whole or with a particular paragraph, image, or table of a document. In Web browsers, inline discussions are displayed in the body of the document; in word-processing programs, they are usually displayed in a separate discussion or comments pane.

inline graphics *n.* Graphics files that are embedded in an HTML document or Web page and viewable by a Web browser or other program that recognizes HTML. By avoiding the need for separate file opening operations, inline graphics can speed the access and loading of an HTML document. *Also called:* inline image.

inline image *n.* An image that is embedded within the text of a document. Inline images are common on Web pages. *See also* inline graphics.

inline processing *n.* Operation on a segment of low-level program code, called inline code, to optimize execution speed or storage requirements. *See also* inline code.

inline stylesheet *n.* A stylesheet included within an HTML document. Because an inline stylesheet is directly associated with an individual document, any changes made to that document's appearance will not affect the appearance of other Web site documents. *Compare* linked stylesheet.

inline subroutine *n.* A subroutine whose code is copied at each place in a program at which it is called, rather than kept in one place to which execution is transferred. Inline subroutines improve execution speed, but they also increase code size. Inline subroutines obey the same syntactical and semantic rules as ordinary subroutines.

Inmarsat *n.* Acronym for **In**ternational **Mar**itime **Sat**ellite. Organization based in London, England, that operates satellites for international mobile telecommunications services in more than 80 nations. Inmarsat provides services for maritime, aviation, and land use.

inner join *n.* An operator in relational algebra, often implemented in database management. The inner join produces a relation (table) that contains all possible ordered concatenations (joinings) of records from two existing tables that meet certain specified criteria on the data values. It is thus equivalent to a product followed by a select applied to the resulting table. *Compare* outer join.

inoculate *vb.* To protect a program against virus infection by recording characteristic information about it. For example, checksums on the code can be recomputed and compared with the stored original checksums each time the program is run; if any have changed, the program file is corrupt and may be infected. *See also* checksum, virus.

input[1] *n.* Information entered into a computer or program for processing, as from a keyboard or from a file stored on a disk drive.

input[2] *vb.* To enter information into a computer for processing.

input area *n. See* input buffer.

input-bound *adj. See* input/output-bound.

input buffer *n.* A portion of computer memory set aside for temporary storage of information arriving for processing. *See also* buffer[1].

input channel *n. See* input/output channel.

input device *n.* A peripheral device whose purpose is to allow the user to provide input to a computer system. Examples of input devices are keyboards, mice, joysticks, and styluses. *See also* peripheral.

input driver *n. See* device driver.

input language *n.* 1. A language to be inputted into the system through the keyboard, a speech-to-text converter, or an Input Method Editor (IME). 2. In Microsoft Windows XP, a Regional and Language Options setting that specifies the combination of the language being entered and the keyboard layout, IME, speech-to-text converter, or other device being used to enter it. This setting was formerly known as input locale.

Input Method Editor *n.* Programs used to enter the thousands of different characters in written Asian languages with a standard 101-key keyboard. An IME consists of both an engine that converts keystrokes into phonetic and ideograph characters and a dictionary of commonly used ideographic words. As the user enters keystrokes, the IME engine attempts to identify which character or characters the keystrokes should be converted into. *Acronym:* IME.

input/output *n.* The complementary tasks of gathering data for a computer or a program to work with, and of making the results of the computer's activities available to the user or to other computer processes. Gathering data is usually done with input devices such as the keyboard and the mouse, while the output is usually made available to the user via the display and the printer. Other data resources, such as disk files and communications ports for the computer, can serve as either input or output devices. *Acronym:* I/O.

input/output area *n. See* input/output buffer.

input/output-bound *adj.* Characterized by the need to spend lengthy amounts of time waiting for input and output of data that is processed much more rapidly. For example, if the processor is capable of making rapid changes to a large database stored on a disk faster than the drive

mechanism can perform the read and write operations, the computer is input/output-bound. A computer may be just input-bound or just output-bound if only input or only output limits the speed at which the processor accepts and processes data. *Also called:* I/O-bound.

input/output buffer *n.* A portion of computer memory reserved for temporary storage of incoming and outgoing data. Because input/output devices can often write to a buffer without intervention from the CPU, a program can continue execution while the buffer fills, thus speeding program execution. *See also* buffer[1].

input/output bus *n.* A hardware path used inside a computer for transferring information to and from the processor and various input and output devices. *See also* bus.

input/output channel *n.* A hardware path from the CPU to the input/output bus. *See also* bus.

input/output controller *n.* Circuitry that monitors operations and performs tasks related to receiving input and transferring output at an input or output device or port, thus providing the processor with a consistent means of communication (input/output interface) with the device and also freeing the processor's time for other work. For example, when a read or write operation is performed on a disk, the drive's controller carries out the high-speed, electronically sophisticated tasks involved in positioning the read-write heads, locating specific storage areas on the spinning disk, reading from and writing to the disk surface, and even checking for errors. Most controllers require software that enables the computer to receive and process the data the controller makes available. *Also called:* device controller, I/O controller.

input/output device *n.* A piece of hardware that can be used both for providing data to a computer and for receiving data from it, depending on the current situation. A disk drive is an example of an input/output device. Some devices, such as a keyboard or a mouse, can be used only for input and are thus called input (input-only) devices. Other devices, such as printers, can be used only for output and are thus called output (output-only) devices. Most devices require installation of software routines called device drivers to enable the computer to transmit and receive data to and from them.

input/output interface *n. See* input/output controller.

input/output port *n. See* port.

input/output processor *n.* Hardware designed to handle input and output operations to relieve the burden on the main processing unit. For example, a digital signal processor can perform time-intensive, complicated analysis and synthesis of sound patterns without CPU overhead. *See also* digital signal processor, front-end processor (definition 1).

input/output statement *n.* A program instruction that causes data to be transferred between memory and an input or output device.

input port *n. See* port.

input stream *n.* A flow of information used in a program as a sequence of bytes that are associated with a particular task or destination. Input streams include series of characters read from the keyboard to memory and blocks of data read from disk files. *Compare* output stream.

inquiry *n.* A request for information. *See also* query.

INS *n. See* WINS.

insertion point *n.* A blinking vertical bar on the screen, such as in graphical user interfaces, that marks the location at which inserted text will appear. *See also* cursor (definition 1).

insertion sort *n.* A list-sorting algorithm that starts with a list that contains one item and builds an ever-larger sorted list by inserting the items to be sorted one at a time into their correct positions on that list. Insertion sorts are inefficient when used with arrays, because of constant shuffling of items, but are ideally suited for sorting linked lists. *See also* linked list, sort algorithm. *Compare* bubble sort, quicksort.

Insert key *n.* A key on the keyboard, labeled "Insert" or "Ins," whose usual function is to toggle a program's editing setting between an insert mode and an overwrite mode, although it may perform different functions in different applications. *Also called:* Ins key.

insert mode *n.* A mode of operation in which a character typed into a document or at a command line pushes subsequent existing characters farther to the right on the screen rather than overwriting them. Insert mode is the opposite of overwrite mode, in which new characters replace subsequent existing characters. The key or key combination used to change from one mode to the other varies among programs, but the Insert key is most often used. *Compare* overwrite mode.

insider attack *n.* An attack on a network or system carried out by an individual associated with the hacked system. Insider attacks are typically the work of current or former employees of a company or organization who have knowledge of passwords and network vulnerabilities. *Compare* intruder attack.

Ins key *n. See* Insert key.

install *vb.* To set in place and prepare for operation. Operating systems and application programs commonly include a disk-based installation, or setup, program that does most of the work of preparing the program to work with the computer, printer, and other devices. Often such a program can check for devices attached to the system, request the user to choose from sets of options, create a place for the program on the hard disk, and modify system startup files as necessary.

installable device driver *n.* A device driver that can be embedded within an operating system, usually in order to override an existing, less-functional service.

Installable File System Manager *n.* In Windows 9x and Windows 2000, the part of the file system architecture responsible for arbitrating access to the different file system components. *Acronym:* IFS.

installation program *n.* A program whose function is to install another program, either on a storage medium or in memory. An installation program, also called a setup program, might be used to guide a user through the often complex process of setting up an application for a particular combination of machine, printer, and monitor.

Installer *n.* A program, provided with the Apple Macintosh operating system, that allows the user to install system upgrades and make bootable (system) disks.

instance *n.* An object, in object-oriented programming, in relation to the class to which it belongs. For example, an object *myList* that belongs to a class *List* is an instance of the class *List*. *See also* class, instance variable, instantiate, object (definition 2).

instance variable *n.* A variable associated with an instance of a class (an object). If a class defines a certain variable, each instance of the class has its own copy of that variable. *See also* class, instance, object (definition 2), object-oriented programming.

instantiate *vb.* To create an instance of a class. *See also* class, instance, object (definition 2).

instant messaging *n.* A service that alerts users when friends or colleagues are on line and allows them to communicate with each other in real time through private online chat areas. With instant messaging, a user creates a list of other users with whom he or she wishes to communicate; when a user from his or her list is on line, the service alerts the user and enables immediate contact with the other user. While instant messaging has primarily been a proprietary service offered by Internet service providers such as AOL and MSN, businesses are starting to employ instant messaging to increase employee efficiency and make expertise more readily available to employees.

Institute of Electrical and Electronics Engineers *n. See* IEEE.

instruction *n.* An action statement in any computer language, most often in machine or assembly language. Most programs consist of two types of statements: declarations and instructions. *See also* declaration, statement.

instruction code *n. See* operation code.

instruction counter *n. See* instruction register.

instruction cycle *n.* The cycle in which a processor retrieves an instruction from memory, decodes it, and carries it out. The time required for an instruction cycle is the sum of the instruction (fetch) time and the execution (translate and execute) time and is measured by the number of clock ticks (pulses of a processor's internal timer) consumed.

instruction mix *n.* The assortment of types of instructions contained in a program, such as assignment instructions, mathematical instructions (floating-point or integer), control instructions, and indexing instructions. Knowledge of instruction mixes is important to designers of CPUs because it tells them which instructions should be shortened to yield the greatest speed, and to designers of benchmarks because it enables them to make the benchmarks relevant to real tasks.

instruction pointer *n. See* program counter.

instruction register *n.* A register in a central processing unit that holds the address of the next instruction to be executed.

instruction set *n.* The set of machine instructions that a processor recognizes and can execute. *See also* assembler, microcode.

instruction time *n.* The number of clock ticks (pulses of a computer's internal timer) required to retrieve an instruction from memory. Instruction time is the first part of an instruction cycle; the second part is the execution (translate and execute) time. *Also called:* I-time.

instruction word *n.* **1.** The length of a machine language instruction. **2.** A machine language instruction containing an operation code identifying the type of instruction, possibly one or more operands specifying data to be affected or its address, and possibly bits used for indexing or other purposes. *See also* assembler, machine code.

insulator *n.* **1.** Any material that is a very poor conductor of electricity, such as rubber, glass, or ceramic. *Also called:* nonconductor. *Compare* conductor, semiconductor. **2.** A device used to separate elements of electrical circuits and prevent current from taking unwanted paths, such as the stacks of ceramic disks that suspend high-voltage power lines from transmission towers.

integer *n.* **1.** A positive or negative "whole" number, such as 37, –50, or 764. **2.** A data type representing whole numbers. Calculations involving only integers are much faster than calculations involving floating-point numbers, so integers are widely used in programming for counting and numbering purposes. Integers can be signed (positive or negative) or unsigned (positive). They can also be described as long or short, depending on the number of bytes needed to store them. Short integers, stored in 2 bytes, cover a smaller range of numbers (for example, –32,768 through 32,767) than do long integers (for example, –2,147,483,648 through 2,147,483,647), which are stored in 4 bytes. *Also called:* integral number. *See also* floating-point notation.

integral modem *n.* A modem that is built into a computer, as opposed to an internal modem, which is a modem on an expansion card that can be removed. *See also* external modem, internal modem, modem.

integral number *n. See* integer (definition 2).

integrated circuit *n.* A device consisting of a number of connected circuit elements, such as transistors and resistors, fabricated on a single chip of silicon crystal or other semiconductor material. Integrated circuits are categorized by the number of elements they contain. See the table. *Acronym:* IC. *Also called:* chip. *See also* central processing unit.

Table I.2 Types of Integrated Circuits.

Category	*Elements*
small-scale integration (SSI)	in the 10s
medium-scale integration (MSI)	in the 100s
large-scale integration (LSI)	in the 1000s
very-large-scale integration (VLSI)	in the 100,000s
ultra-large-scale integration (ULSI)	1,000,000 or more

integrated development environment *n.* A set of integrated tools for developing software. The tools are generally run from one user interface and consist of a compiler, an editor, and a debugger, among others. *Acronym:* IDE.

Integrated Device Electronics *n. See* IDE (definition 1).

integrated injection logic *n.* A type of circuit design that uses both NPN and PNP transistors and does not require other components, such as resistors. Such circuits are moderately fast, consume little power, and can be manufactured in very small sizes. *Acronym:* I2L, IIL. *Also called:* merged transistor logic. *See also* NPN transistor, PNP transistor.

Integrated Services Digital Network *n. See* ISDN.

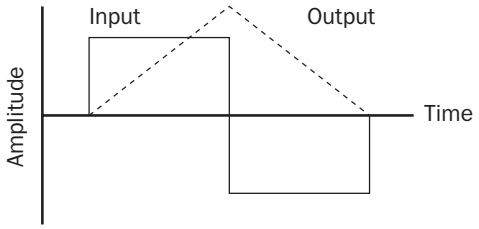
Integrated Services LAN *n. See* isochronous network.

integrated software *n.* A program that combines several applications, such as word processing, database management, and spreadsheets, in a single package. Such software is "integrated" in two ways: it can transfer data from one of its applications to another, helping users coordinate tasks and merge information created with the different software tools; and it provides the user with a consistent interface for choosing commands, managing files, and otherwise interacting with the programs so that the user will not have to master several, often very different, programs. The applications in an integrated software package are often not, however, designed to offer as much capability as single applications, nor does integrated software necessarily include all the applications needed in a particular environment.

integration *n.* **1.** In computing, the combining of different activities, programs, or hardware components into a functional unit. *See also* integral modem, integrated software, ISDN. **2.** In electronics, the process of packing multiple electronic circuit elements on a single chip. *See also* integrated circuit. **3.** In mathematics, specifically calculus, a procedure performed on an equation and related to finding

the area under a given curve or the volume within a given shape.

integrator *n.* A circuit whose output represents the integral, with respect to time, of the input signal—that is, its total accumulated value over time. See the illustration. *Compare* differentiator.



Integrator. *An example of the action of an integrator circuit.*

integrity *n.* The completeness and accuracy of data stored in a computer, especially after it has been manipulated in some way. *See also* data integrity.

Intel Architecture 64 *n. See* IA-64.

intellectual property *n.* Content of the human intellect deemed to be unique and original and to have marketplace value—and thus to warrant protection under the law. Intellectual property includes but is not limited to ideas; inventions; literary works; chemical, business, or computer processes; and company or product names and logos. Intellectual property protections fall into four categories: copyright (for literary works, art, and music), trademarks (for company and product names and logos), patents (for inventions and processes), and trade secrets (for recipes, code, and processes). Concern over defining and protecting intellectual property in cyberspace has brought this area of the law under intense scrutiny.

intelligence *n.* **1.** The ability of hardware to process information. A device without intelligence is said to be dumb; for example, a dumb terminal connected to a computer can receive input and display output but cannot process information independently. **2.** The ability of a program to monitor its environment and initiate appropriate actions to achieve a desired state. For example, a program waiting for data to be read from disk might switch to another task in the meantime. **3.** The ability of a program to simulate human thought. *See also* artificial intelligence. **4.** The ability of a machine such as a robot to respond appropriately to changing stimuli (input).

intelligent *adj.* Of, pertaining to, or characteristic of a device partially or totally controlled by one or more processors integral to the device.

intelligent agent *n. See* agent (definition 2).

intelligent cable *n.* A cable that incorporates circuitry to do more than simply pass signals from one end of the cable to the other, such as to determine the characteristics of the connector into which it is plugged. *Also called:* smart cable.

Intelligent Concept Extraction *n.* A technology owned by Excite, Inc., for searching indexed databases to retrieve documents from the World Wide Web. Intelligent Concept Extraction is like other search technologies in being able to locate indexed Web documents related to one or more key words entered by the user. Based on proprietary search technology, however, it also matches documents conceptually by finding relevant information even if the document found does not contain the key word or words specified by the user. Thus, the list of documents found by Intelligent Concept Extraction can include both documents containing the specified search term and those containing alternative words related to the search term. *Acronym:* ICE.

intelligent database *n.* A database that manipulates stored information in a way that people find logical, natural, and easy to use. An intelligent database conducts searches relying not only on traditional data-finding routines but also on predetermined rules governing associations, relationships, and even inferences regarding the data. *See also* database.

Intelligent hub *n.* A type of hub that, in addition to transmitting signals, has built-in capability for other network chores, such as monitoring or reporting on network status. Intelligent hubs are used in different types of networks, including ARCnet and 10Base-T Ethernet. *See also* hub.

Intelligent Input/Output *n. See* I2O.

intelligent terminal *n.* A terminal with its own memory, processor, and firmware that can perform certain functions independently of its host computer, most often the rerouting of incoming data to a printer or video screen.

Intelligent Transportation Infrastructure *n.* A system of automated urban and suburban highway and mass transit control and management services proposed in 1996 by U.S. Secretary of Transportation Federico Peña. *Acronym:* ITI.

IntelliSense *n.* A Microsoft technology used in various Microsoft products, including Internet Explorer, Visual Basic, Visual Basic C++, and Office that is designed to help users perform routine tasks. In Visual Basic, for example, information such as the properties and methods of an object is displayed as the developer types the name of the object in the Visual Basic code window.

Intensity Red Green Blue *n. See* IRGB.

interactive *adj.* Characterized by conversational exchange of input and output, as when a user enters a question or command and the system immediately responds. The interactivity of microcomputers is one of the features that makes them approachable and easy to use.

interactive fiction *n.* A type of computer game in which the user participates in a story by giving commands to the system. The commands given by the user determine, to some extent, the events that occur during the story. Typically the story involves a goal that must be achieved, and the puzzle is to determine the correct sequence of actions that will lead to the accomplishment of that goal. *See also* adventure game.

interactive graphics *n.* A form of user interface in which the user can change and control graphic displays, often with the help of a pointing device such as a mouse or a joystick. Interactive graphics interfaces occur in a range of computer products, from games to computer-aided design (CAD) systems.

interactive processing *n.* Processing that involves the more or less continuous participation of the user. Such a command/response mode is characteristic of microcomputers. *Compare* batch processing (definition 2).

interactive program *n.* A program that exchanges output and input with the user, who typically views a display of some sort and uses an input device, such as a keyboard, mouse, or joystick, to provide responses to the program. A computer game is an interactive program. *Compare* batch program.

interactive services *n. See* BISDN.

interactive session *n.* A processing session in which the user can more or less continuously intervene and control the activities of the computer. *Compare* batch processing (definition 2).

interactive television *n.* A video technology in which a viewer interacts with the television programming. Typical uses of interactive television include Internet access, video on demand, and video conferencing. *See also* video conferencing.

interactive TV *n. See* iTV.

interactive video *n.* The use of computer-controlled video, in the form of a CD-ROM or videodisc, for interactive education or entertainment. *See also* CD-ROM, interactive, interactive television, videodisc.

interactive voice response *n.* A computer that operates through the telephone system, in which input commands and data are transmitted to the computer as spoken words and numbers or tones and dial pulses generated by a telephone instrument; and output instructions and data are received from the computer as prerecorded or synthesized speech. For example, a dial-in service that provides airline flight schedules when you press certain key codes on your telephone is an interactive voice response system. *Also called:* IVR.

Interactive voice system *n. See* interactive voice response.

interapplication communication *n.* The process of one program sending messages to another program. For example, some e-mail programs allow users to click on a URL within the message. After the user clicks on the URL, browser software will automatically launch and access the URL.

interblock gap *n. See* inter-record gap.

Interchange File Format *n. See* .iff.

Interchange Format *n. See* Rich Text Format.

interconnect *n.* **1.** *See* System Area Network. **2.** An electrical or mechanical connection. Interconnect is the physical connection and communication between two components in a computer system.

interface *n.* **1.** The point at which a connection is made between two elements so that they can work with each other or exchange information. **2.** Software that enables a program to work with the user (the user interface, which can be a command-line interface, menu-driven interface, or a graphical user interface), with another program such as the operating system, or with the computer's hardware. *See also* application programming interface, graphical user interface. **3.** A card, plug, or other device that connects pieces of hardware with the computer so that information can be moved from place to place. For example, standardized interfaces such as RS-232-C standard and

SCSI enable communications between computers and printers or disks. *See also* RS-232-C standard, SCSI.

interface adapter *n. See* network adapter.

interface card *n. See* adapter.

Interface Definition Language *n. See* IDL.

interference *n.* **1.** Noise or other external signals that affect the performance of a communications channel. **2.** Electromagnetic signals that can disturb radio or television reception. The signals can be generated naturally, as in lightning, or by electronic devices, such as computers.

Interior Gateway Protocol *n.* A protocol used for distributing routing information among routers (gateways) in an autonomous network—that is, a network under the control of one administrative body. The two most often used interior gateway protocols are RIP (Routing Information Protocol) and OSPF (Open Shortest Path First). *Acronym:* IGP. *See also* autonomous system, OSPF, RIP. *Compare* exterior gateway protocol.

Interior Gateway Routing Protocol *n. See* IGRP.

Interix *n.* A software application from Microsoft that allows businesses to run existing UNIX-based legacy applications while adding applications based on the Microsoft Windows operating system. Interix serves as a single enterprise platform from which to run UNIX-based, Internet-based, and Windows-based applications.

interlaced *adj.* Pertaining to a display method on raster-scan monitors in which the electron beam refreshes or updates all odd-numbered scan lines in one vertical sweep of the screen and all even-numbered scan lines in the next sweep. *Compare* noninterlaced.

interlaced GIF *n.* A picture in GIF format that is gradually displayed in a Web browser, showing increasingly detailed versions of the picture until the entire file has finished downloading. Users of slower modems have a perceived shorter wait time for the image to appear, and they can sometimes get enough information about the image to decide whether to proceed with the download or move on. Users with faster connections will notice little difference in effect between an interlaced GIF and a noninterlaced GIF.

interlace scanning *n.* A display technique designed to reduce flicker and distortions in television transmissions; also used with some raster-scan monitors. In interlace scanning the electron beam in the television or monitor refreshes alternate sets of scan lines in successive top-to-bottom sweeps, refreshing all even lines on one pass, and all odd lines on the other. Because of the screen phosphor's ability to maintain an image for a short time before fading and the tendency of the human eye to average or blend subtle differences in light intensity, the human viewer sees a complete display, but the amount of information carried by the display signal and the number of lines that must be displayed per sweep are halved. Interlaced images are not as clear as those produced by the progressive scanning typical of newer computer monitors. Interlace scanning is, however, the standard method of displaying analog broadcast television images. *Also called:* interlacing. *Compare* progressive scanning.

interlacing *n. See* interlace scanning.

interleave *vb.* To arrange the sectors on a hard disk in such a way that after one sector is read, the next sector in numeric sequence will arrive at the head when the computer is ready to accept it rather than before, which would make the computer wait a whole revolution of the platter for the sector to come back. Interleaving is set by the format utility that initializes a disk for use with a given computer.

interleaved memory *n.* A method of organizing the addresses in RAM memory in order to reduce wait states. In interleaved memory, adjacent locations are stored in different rows of chips so that after accessing a byte, the processor does not have to wait an entire memory cycle before accessing the next byte. *See also* access time (definition 1), wait state.

interlock *vb.* To prevent a device from acting while the current operation is in progress.

intermediate language *n.* **1.** A computer language used as an intermediate step between the original source language, usually a high-level language, and the target language, usually machine code. Some high-level compilers use assembly language as an intermediate language. *See also* compiler (definition 2), object code. **2.** *See* Microsoft intermediate language.

intermittent *adj.* Pertaining to something, such as a signal or connection, that is not unbroken but occurs at periodic or occasional intervals.

intermittent error *n.* An error that recurs at unpredictable times.

internal clock *n. See* clock/calendar.

internal command *n.* A routine that is loaded into memory along with the operating system and resides there for as long as the computer is on. *Compare* external command.

internal font *n.* A font that is already loaded in a printer's memory (ROM) when the printer is shipped. *Compare* downloadable font, font cartridge.

internal interrupt *n.* An interrupt generated by the processor itself in response to certain predefined situations, such as an attempt to divide by zero or an arithmetic value exceeding the number of bits allowed for it. *See also* interrupt. *Compare* external interrupt.

internal memory *n. See* primary storage.

internal modem *n.* A modem constructed on an expansion card to be installed in one of the expansion slots inside a computer. *Compare* external modem, integral modem.

internal schema *n.* A view of information about the physical files composing a database, including file names, file locations, accessing methodology, and actual or potential data derivations, in a database model such as that described by ANSI/X3/SPARC, that supports a three-schema architecture. The internal schema corresponds to the schema in systems based on CODASYL/DBTG. In a distributed database, there may be a different internal schema at each location. *See also* conceptual schema, schema.

internal sort *n.* **1.** A sorting operation that takes place on files completely or largely held in memory rather than on disk during the process. **2.** A sorting procedure that produces sorted subgroups of records that will be subsequently merged into one list.

International Computer Security Association *n. See* ICSA.

International Federation of Information Processing *n. See* IFIP.

International Maritime Satellite *n. See* Inmarsat.

International Mobile Telecommunications for the Year 2000 *n.* Specifications set forth by the International Telecommunications Union (ITU) to establish third-generation wireless telecommunication network architecture. The specifications include faster data transmission speeds and improved voice quality. *Acronym:* IMT-2000.

International Organization for Standardization *n. See* ISO.

International Telecommunication Union *n. See* ITU.

International Telecommunication Union-Telecommunication Standardization Sector *n. See* ITU-T.

International Telegraph and Telephone Consultative Committee *n.* English-language form of the name for the Comité Consultatif International Télégraphique et Téléphonique, a standards organization that became part of the International Telecommunication Union in 1992. *See also* CCITT, ITU-T.

Internaut *n. See* cybernaut.

internet *n.* Short for **internet**work. A set of computer networks that may be dissimilar and are joined together by means of gateways that handle data transfer and conversion of messages from the sending networks' protocols to those of the receiving network.

Internet *n.* The worldwide collection of networks and gateways that use the TCP/IP suite of protocols to communicate with one another. At the heart of the Internet is a backbone of high-speed data communication lines between major nodes or host computers, consisting of thousands of commercial, government, educational, and other computer systems, that route data and messages. One or more Internet nodes can go off line without endangering the Internet as a whole or causing communications on the Internet to stop, because no single computer or network controls it. The genesis of the Internet was a decentralized network called ARPANET created by the U.S. Department of Defense in 1969 to facilitate communications in the event of a nuclear attack. Eventually other networks, including BITNET, Usenet, UUCP, and NSFnet, were connected to ARPANET. Currently the Internet offers a range of services to users, such as FTP, e-mail, the World Wide Web, Usenet news, Gopher, IRC, telnet, and others. *Also called:* the Net. *See also* BITNET, FTP[1] (definition 1), Gopher, IRC, NSFnet, telnet[1], Usenet, UUCP, World Wide Web.

Internet2 *n.* A computer-network development project launched in 1996 by a collaborative group of 120 universities under the auspices of the University Corporation for Advanced Internet Development (UCAID). The consortium is now being led by over 190 universities working with industry and government. The goal of Internet2, whose high-speed, fiberoptic backbone was brought on line in early 1999, is the development of advanced Internet technologies and applications for use in research and education at the university level. Though not open for public use, Internet2 and the technologies and applications developed by its members are intended to eventually benefit users of the commercial Internet as well. Some of the new technologies Internet2 and its members are developing and testing include IPv6, multicasting, and quality of service (QoS). Internet2 and the Next Generation Internet

(NGI) are complementary initiatives. *Compare* Internet, Next Generation Internet.

Internet access *n.* **1.** The capability of a user to connect to the Internet. This is generally accomplished through one of two ways. The first is through a dialing up of an Internet service provider or an online information services provider via a modem connected to the user's computer. This method is the one used by the majority of home computer users. The second way is through a dedicated line, such as a T1 carrier, that is connected to a local area network, to which, in turn, the user's computer is connected. The dedicated line solution is used by larger organizations, such as corporations, which either have their own node on the Internet or connect to an Internet service provider that is a node. A third way that is emerging is for users to use set-top boxes with their TVs. Generally, however, this will give a user access only to documents on the World Wide Web. *See also* dedicated line (definition 1), ISP, LAN, modem, node (definition 2), set-top box. **2.** The capability of an online information service to exchange data with the Internet, such as e-mail, or to offer Internet services to users, such as newsgroups, FTP, and the World Wide Web. Most online information services offer Internet access to their users. *See also* FTP[1] (definition 1), online information service.

Internet access device *n.* A communications and signal-routing mechanism, possibly incorporating usage tracking and billing features, for use in connecting multiple remote users to the Internet.

Internet access provider *n. See* ISP.

Internet account *n.* A generic term for a registered username at an Internet Service Provider (ISP). An Internet account is accessed via username and password. Services such as dial-in PPP Internet access and e-mail are provided by ISPs to Internet account owners.

Internet address *n. See* domain name address, e-mail address, IP address.

Internet appliance *n.* **1.** *See* set-top box. **2.** *See* server appliance.

Internet Architecture Board *n.* The body of the Internet Society (ISOC) responsible for overall architectural considerations regarding the Internet. The IAB also serves to adjudicate disputes in the standards process. *Acronym:* IAB *See also* Internet Society.

Internet Assigned Numbers Authority *n. See* IANA, ICANN.

Internet backbone *n.* One of several high-speed networks connecting many local and regional networks, with at least one connection point where it exchanges packets with other Internet backbones. Historically, the NSFnet (predecessor to the modern Internet) was the backbone to the entire Internet in the United States. This backbone linked the supercomputing centers that the National Science Foundation (NSF) runs. Today, different providers have their own backbones so that the backbone for the supercomputing centers is independent of backbones for commercial Internet providers such as MCI and Sprint. *See also* backbone.

Internet broadcasting *n.* Broadcasting of audio, or audio plus video, signals across the Internet. Internet broadcasting includes conventional over-the-air broadcast stations that transmit their signals into the Internet as well as Internet-only stations. Listeners use audio Internet software, such as RealAudio. One method of Internet broadcasting is MBONE. *See also* MBONE, RealAudio.

Internet Cache Protocol *n. See* ICP.

Internet Control Message Protocol *n. See* ICMP.

Internet Corporation for Assigned Names and Numbers *n. See* ICANN.

Internet cramming *n. See* Web cramming.

Internet Directory *n.* **1.** Online database of sites organized by category where you can search for files and information by subject, keyword, or other criteria. **2.** Storage place for information such as names, Web addresses, organizations, departments, countries, and locations. Typically, Internet Directories are used to look up e-mail addresses that are not in a local address book or a corporate-wide directory.

Internet Draft *n.* A document produced by the Internet Engineering Task Force (IETF) for purposes of discussing a possible change in standards that govern the Internet. An Internet Draft is subject to revision or replacement at any time; if not replaced or revised, the Internet Draft is valid for no more than six months. An Internet Draft, if accepted, may be developed into an RFC. *See also* IETF, RFC.

Internet Engineering and Planning Group *n. See* IEPG.

Internet Engineering Steering Group *n.* The group within the Internet Society (ISOC) that, along with the Internet Architecture Board (IAB), reviews the standards

proposed by the Internet Engineering Task Force (IETF). *Acronym:* IESG.

Internet Engineering Task Force *n. See* IETF.

Internet Explorer *n.* Microsoft's Web browsing software. Introduced in October 1995, the latest versions of Internet Explorer include many features that allow you to customize your experience on the Web. Internet Explorer is also available for the Macintosh and UNIX platforms. *See also* ActiveX control, Java applet, Web browser.

Internet Foundation Classes *n.* A Java class library developed by Netscape to facilitate the creation of full-feature, mission-critical Java applications. Internet Foundation Classes (IFC) comprises user-interface objects and frameworks intended to extend Java's Abstract Window Toolkit (AWT) and includes a multifont text editor; essential application controls; and drag-and-drop, drawing/event, windowing, animation, object persistence, single-thread, and localization frameworks. *See also* Abstract Window Toolkit, Application Foundation Classes, Java Foundation Classes, Microsoft Foundation Classes.

Internet gateway *n.* A device that provides the connection between the Internet backbone and another network, such as a LAN (local area network). Usually the device is a computer dedicated to the task or a router. The gateway generally performs protocol conversion between the Internet backbone and the network, data translation or conversion, and message handling. A gateway is considered a node on the Internet. *See also* gateway, Internet backbone, node (definition 2), router.

Internet Group Membership Protocol *n.* A protocol used by IP hosts to report their host group memberships to any immediately neighboring multicast routers. *Acronym:* IGMP.

Internet home *n. See* smart home.

Internet Information Services *n.* Software services that support Web site creation, configuration, and management, along with other Internet functions. Internet Information Services include Network News Transfer Protocol (NNTP), File Transfer Protocol (FTP), and Simple Mail Transfer Protocol (SMTP).

Internet Inter-ORB Protocol *n. See* IIOP.

Internet Mail Consortium *n.* An international membership organization of businesses and vendors involved in activities related to e-mail transmission over the Internet. The goals of the Internet Mail Consortium are related to the promotion and expansion of Internet mail. The group's interests range from making Internet mail easier for new users to advancing new mail technologies and expanding the role played by Internet mail into areas such as electronic commerce and entertainment. For example, the Internet Mail Consortium supports two companion specifications, vCalendar and vCard, designed to facilitate electronic exchange of scheduling and personal information. *Acronym:* IMC.

Internet Naming Service *n. See* WINS.

Internet Printing Protocol *n.* A specification for transmission of documents to printers through the Internet. Development of the Internet Printing Protocol (IPP) was proposed in 1997 by members of the Internet Engineering Task Force (IETF). Intended to provide a standard protocol for Internet-based printing, IPP covers both printing and printer management (printer status, job cancellation, and so on). It is applicable to print servers and to network-capable printers.

Internet Protocol *n. See* IP.

Internet Protocol address *n. See* IP address.

Internet Protocol next generation *n. See* IPng.

Internet Protocol number *n. See* IP address.

Internet Protocol Security *n. See* IPSec.

Internet Protocol version 4 *n. See* IPv4.

Internet Protocol version 6 *n. See* IPv6.

Internet reference model *n. See* TCP/IP reference model.

Internet Relay Chat *n. See* IRC.

Internet Research Steering Group *n.* The governing body of the Internet Research Task Force (IRTF). *Acronym:* IRSG.

Internet Research Task Force *n.* A volunteer organization that is an arm of the Internet Society (ISOC) focused on making long-term recommendations concerning the Internet to the Internet Architecture Board (IAB). *Acronym:* IRTF. *See also* Internet Society.

Internet robot *n. See* spider.

Internet security *n.* A broad topic dealing with all aspects of data authentication, privacy, integrity, and verification for transactions over the Internet. For example, credit card purchases made via a World Wide Web browser require attention to Internet security issues to ensure that the credit card number is not intercepted by an intruder or copied from the server where the number is stored, and to verify that the credit card number is actually sent by the person who claims to be sending it.

Internet Security and Acceleration Server *n.* A software application from Microsoft Corporation to increase the security and performance of Internet access for businesses. Internet Security and Acceleration Server provides an enterprise firewall and high-performance Web cache server to securely manage the flow of information from the Internet through the enterprise's internal network. *Acronym:* ISA Server.

Internet Server Application Programming Interface *n. See* ISAPI.

Internet service provider *n. See* ISP.

Internet Society *n.* An international, nonprofit organization based in Reston, Virginia, comprising individuals, companies, foundations, and government agencies, that promotes the use, maintenance, and development of the Internet. The Internet Architecture Board (IAB) is a body within the Internet Society. In addition, the Internet Society publishes the *Internet Society News* and produces the annual INET conference. *Acronym:* ISOC *See also* INET, Internet Architecture Board.

Internet Software Consortium *n.* A nonprofit organization that develops software that is available for free, via the World Wide Web or FTP, and engages in development of Internet standards such as the Dynamic Host Configuration Protocol (DHCP). *Acronym:* ISC. *See also* DHCP.

Internet SSE *n. See* SSE.

Internet Streaming Media Alliance *n. See* ISMA.

Internet synchronization *n.* **1.** The process of synchronizing data between computing and communication devices that are connected to the Internet. **2.** A feature in Microsoft Jet and Microsoft Access that allows replicated information to be synchronized in an environment in which an Internet server is configured with Microsoft Replication Manager, a tool included with Microsoft Office 2000 Developer.

Internet Talk Radio *n.* Audio programs similar to radio broadcasts but distributed over the Internet in the form of files that can be downloaded via FTP. Internet Talk Radio programs, prepared at the National Press Building in Washington, D.C., are 30 minutes to 1 hour in length; a 30-minute program requires about 15 MB of disk space. *Acronym:* ITR.

Internet telephone *n.* Point-to-point voice communication that uses the Internet instead of the public-switched telecommunications network to connect the calling and called parties. Both the sending and the receiving party need a computer, a modem, an Internet connection, and an Internet telephone software package to make and receive calls.

Internet Telephony Service Provider *n. See* ITSP.

Internet telephony *n. See* VoIP.

Internet television *n.* The transmission of television audio and video signals over the Internet.

Internet traffic distribution *n. See* ITM.

Internet traffic management *n. See* ITM.

internetwork[1] *adj.* Of or pertaining to communications between connected networks. It is often used to refer to communication between one LAN (local area network) and another over the Internet or another WAN (wide-area network). *See also* LAN, WAN.

internetwork[2] *n.* A network made up of smaller, interconnected networks.

Internetwork Packet Exchange *n. See* IPX.

Internetwork Packet Exchange/Sequenced Packet Exchange *n. See* IPX/SPX.

Internet World *n.* Series of international conferences and exhibitions on e-commerce and Internet technology sponsored by *Internet World* magazine. Major conferences include the world's largest Internet conferences, Internet World Spring and Internet World Fall.

Internet Worm *n.* A string of self-replicating computer code that was distributed through the Internet in November 1988. In a single night, it overloaded and shut down a large portion of the computers connected to the Internet at that time by replicating itself over and over on each computer it accessed, exploiting a bug in UNIX systems. Intended as a prank, the Internet Worm was written by a student at Cornell University. *See also* back door, worm.

InterNIC *n.* Short for NSFnet (**Inter**net) **N**etwork **I**nformation **C**enter. The organization that has traditionally registered domain names and IP addresses as well as distributed information about the Internet. InterNIC was formed in 1993 as a consortium involving the U.S. National Science Foundation, AT&T, General Atomics, and Network Solutions, Inc. (Herndon, Va.). The latter partner administers InterNIC Registration Services, which assigns Internet names and addresses.

interoperability *n.* Referring to components of computer systems that are able to function in different environments. For example, Microsoft's NT operating system is interoperable on Intel, DEC Alpha, and other CPUs. Another example is the SCSI standard for disk drives and other peripheral devices that allows them to interoperate with different operating systems. With software, interoperability occurs when programs are able to share data and resources. Microsoft Word, for example, is able to read files created by Microsoft Excel.

interpolate *vb.* To estimate intermediate values between two known values in a sequence.

interpret *vb.* **1.** To translate a statement or instruction into executable form and then execute it. **2.** To execute a program by translating one statement at a time into executable form and executing it before translating the next statement, rather than by translating the program completely into executable code (compiling it) before executing it separately. *See also* interpreter. *Compare* compile.

interpreted language *n.* A language in which programs are translated into executable form and executed one statement at a time rather than being translated completely (compiled) before execution. Basic, LISP, and APL are generally interpreted languages, although Basic can also be compiled. *See also* compiler. *Compare* compiled language.

interpreter *n.* A program that translates and then executes each statement in a program written in an interpreted language. *See also* compiler, interpreted language, language processor.

interprocess communication *n.* The ability of one task or process to communicate with another in a multitasking operating system. Common methods include pipes, semaphores, shared memory, queues, signals, and mailboxes. *Acronym:* IPC.

inter-record gap *n.* An unused space between data blocks stored on a disk or tape. Because the speed of disks and tapes fluctuates slightly during operation of the drives, a new data block may not occupy the exact space occupied by the old block it overwrites. The inter-record gap prevents the new block from overwriting part of adjacent blocks in such a case. *Acronym:* IRG.*Also called:* gap, interblock gap.

interrogate *vb.* To query with the expectation of an immediate response. For example, a computer may interrogate an attached terminal to determine the terminal's status (readiness to transmit or receive).

interrupt *n.* A signal from a device to a computer's processor requesting attention from the processor. When the processor receives an interrupt, it suspends its current operations, saves the status of its work, and transfers control to a special routine known as an interrupt handler, which contains the instructions for dealing with the particular situation that caused the interrupt. Interrupts can be generated by various hardware devices to request service or report problems, or by the processor itself in response to program errors or requests for operating-system services. Interrupts are the processor's way of communicating with the other elements that make up a computer system. A hierarchy of interrupt priorities determines which interrupt request will be handled first if more than one request is made. A program can temporarily disable some interrupts if it needs the full attention of the processor to complete a particular task. *See also* exception, external interrupt, hardware interrupt, internal interrupt, software interrupt.

interrupt-driven processing *n.* Processing that takes place only when requested by means of an interrupt. After the required task has been completed, the CPU is free to perform other tasks until the next interrupt occurs. Interrupt-driven processing is usually employed for responding to events such as a key pressed by the user or a floppy disk drive that has become ready to transfer data. *See also* interrupt. *Compare* autopolling.

interrupt handler *n.* A special routine that is executed when a specific interrupt occurs. Interrupts from different causes have different handlers to carry out the corresponding tasks, such as updating the system clock or reading the keyboard. A table stored in low memory contains pointers, sometimes called vectors, that direct the processor to the various interrupt handlers. Programmers can create interrupt handlers to replace or supplement existing handlers,

such as by making a clicking sound each time the keyboard is pressed.

interrupt priority *n. See* interrupt.

interrupt request line *n.* A hardware line over which a device such as an input/output port, the keyboard, or a disk drive can send interrupts (requests for service) to the CPU. Interrupt request lines are built into the computer's internal hardware and are assigned different levels of priority so that the CPU can determine the sources and relative importance of incoming service requests. They are of concern mainly to programmers dealing with low-level operations close to the hardware. *Acronym:* IRQ.

interrupt vector *n.* A memory location that contains the address of the interrupt handler routine that is to be called when a specific interrupt occurs. *See also* interrupt.

interrupt vector table *n. See* dispatch table.

intersect *n.* An operator in relational algebra, used in database management. Given two relations (tables), A and B, that have corresponding fields (columns) containing the same types of values (that is, they are union-compatible), then INTERSECT A, B builds a third relation containing only those tuples (rows) that appear in both A and B. *See also* tuple.

interstitial *n.* An Internet ad format that appears in a pop-up window between Web pages. Interstitial ads download completely before appearing, usually while a Web page the user has chosen is loading. Because interstitial pop-up windows don't appear until the entire ad has downloaded, they often use animated graphics, audio, and other attention-getting multimedia technology that require longer download time.

in the wild *adj.* Currently affecting the computing public, particularly in regard to computer viruses. A virus that is not yet contained or controlled by antivirus software or that keeps reappearing despite virus detection measures is considered to be in the wild. *See also* virus.

intranet *n.* A private network based on Internet protocols such as TCP/IP but designed for information management within a company or organization. Its uses include such services as document distribution, software distribution, access to databases, and training. An intranet is so called because it looks like a World Wide Web site and is based on the same technologies, yet is strictly internal to the organization and is not connected to the Internet proper. Some intranets also offer access to the Internet, but such connections are directed through a firewall that protects the internal network from the external Web. *Compare* extranet.

intrinsic font *n.* A font (type size and design) for which a bit image (an exact pattern) exists that can be used as is, without such modification as scaling. *Compare* derived font.

intruder *n.* An unauthorized user or unauthorized program, generally considered to have malicious intent, on a computer or computer network. *See also* bacterium, cracker, Trojan horse, virus.

intruder attack *n.* A form of hacker attack in which the hacker enters the system without prior knowledge or access to the system. The intruder will typically use a combination of probing tools and techniques to learn about the network to be hacked. *Compare* insider attack.

Intrusion Countermeasure Electronics *n. See* ICE (definition 3).

intrusion detection *n. See* IDS.

intrusion-detection system *n. See* IDS.

invalid *adj.* Erroneous or unrecognizable because of a flaw in reasoning or an error in input. Invalid results, for example, might occur if the logic in a program is faulty. *Compare* illegal.

inverse video *n. See* reverse video.

invert *vb.* **1.** To reverse something or change it to its opposite. For example, to invert the colors on a monochrome display means to change light to dark and dark to light. See the illustration. **2.** In a digital electrical signal, to replace a high level by a low level and vice versa. This type of operation is the electronic equivalent of a Boolean NOT operation.

Invert. *An example showing the effects of inverting the colors on a monochrome display.*

inverted file *n. See* inverted list.

inverted list *n.* A method for creating alternative locators for sets of information. For example, in a file containing data about cars, records 3, 7, 19, 24, and 32 might contain the value "Red" in the field COLOR. An inverted list (or index) on the field COLOR would contain a record for "Red" followed by the locator numbers 3, 7, 19, 24, and 32. *See also* field, record. *Compare* linked list.

inverted-list database *n.* A database similar to a relational database but with several differences that make it much more difficult for the database management system to ensure data consistency, integrity, and security than with a relational system. The rows (records or tuples) of an inverted-list table are ordered in a specific physical sequence, independent of any orderings that may be imposed by means of indexes. The total database can also be ordered, with specified logical merge criteria being imposed between tables. Any number of search keys, either simple or composite, can be defined. Unlike the keys of a relational system, these search keys are arbitrary fields or combinations of fields. No integrity or uniqueness constraints are enforced; neither the indexes nor the tables are transparent to the user. *Compare* relational database.

inverted structure *n.* A file structure in which record keys are stored and manipulated separately from the records themselves.

inverter *n.* **1.** A logic circuit that inverts (reverses) the signal input to it—for example, inverting a high input to a low output. **2.** A device that converts direct current (DC) to alternating current (AC).

invoke *vb.* To call or activate; used in reference to commands and subroutines.

I/O *n. See* input/output.

I/O-bound *adj. See* input/output-bound.

I/O controller *n. See* input/output controller.

I/O device *n. See* input/output device.

ion-deposition printer *n.* A page printer in which the image is formed in electrostatic charges on a drum that picks up toner and transfers it to the paper, as in a laser, LED, or LCD printer, but the drum is charged using a beam of ions rather than light. These printers, used mainly in high-volume data-processing environments, typically operate at speeds from 30 to 90 pages per minute. In ion-deposition printers, toner is typically fused to paper by a method that is fast and does not require heat but leaves the paper a little glossy, making it unsuitable for business correspondence. In addition, ion-deposition printers tend to produce thick, slightly fuzzy characters; the technology is also more expensive than that of a laser printer. *See also* electrophotographic printers, nonimpact printer, page printer. *Compare* laser printer, LCD printer, LED printer.

I/O port *n. See* port[1] (definition 1).

I/O processor *n. See* input/output processor.

IO.SYS *n.* One of two hidden system files installed on an MS-DOS startup disk. IO.SYS in IBM releases of MS-DOS (called IBMBIO.COM) contains device drivers for peripherals such as the display, keyboard, floppy disk drive, hard disk drive, serial port, and real-time clock. *See also* MSDOS.SYS.

IP *n.* Acronym for **I**nternet **P**rotocol. The protocol within TCP/IP that governs the breakup of data messages into packets, the routing of the packets from sender to destination network and station, and the reassembly of the packets into the original data messages at the destination. IP runs at the internetwork layer in the TCP/IP model—equivalent to the network layer in the ISO/OSI reference model. *See also* ISO/OSI reference model, TCP/IP. *Compare* TCP.

IP address *n.* Short for **I**nternet **P**rotocol **address**. A 32-bit (4-byte) binary number that uniquely identifies a host (computer) connected to the Internet to other Internet hosts, for the purposes of communication through the transfer of packets. An IP address is expressed in "dotted quad" format, consisting of the decimal values of its 4 bytes, separated with periods; for example, 127.0.0.1. The first 1, 2, or 3 bytes of the IP address identify the network the host is connected to; the remaining bits identify the host itself. The 32 bits of all 4 bytes together can signify almost 2^{32}, or roughly 4 billion, hosts. (A few small ranges within that set of numbers are not used.) *Also called:* Internet Protocol number, IP number. *See also* host, IANA, ICANN, InterNIC, IP, IP address classes, packet (definition 2). *Compare* domain name.

IP address classes *n.* Short for **I**nternet **P**rotocol **address classes**. The classes into which IP addresses were divided to accommodate different network sizes. Each class is associated with a range of possible IP addresses and is limited to a specific number of networks per class and hosts per network. See the table. *See also* Class A IP address, Class B IP address, Class C IP address, IP address.

Address Class	*Range of IP Addresses*	*Networks per Class*	*Hosts per Network (maximum number)*
Class A (/8)	1.x.x.x to 126.x.x.x	126	16,777,214
Class B (/16)	128.0.x.x to 191.255.x.x	16,384	65,534
Class C (/24)	192.0.0.x to 223.255.255.x	2,097,152	254

IP address classes. *Each x represents the host-number field assigned by the network administrator.*

IP aliasing *n. See* NAT.

IPC *n. See* interprocess communication.

ipchains *n. See* iptables.

IP Filter *n.* Short for **I**nternet **P**rotocol **Filter**. A TCP/IP packet filter for UNIX, particularly BSD. Similar in functionality to netfilter and iptables in Linux, IP Filter can be used to provide network address translation (NAT) or firewall services. *See also* firewall. *Compare* netfilter, iptables.

IPL *n. See* initial program load.

IP masquerading *n. See* NAT.

IP multicasting *n.* Short for **I**nternet **P**rotocol **multicasting**. The extension of local area network multicasting technology to a TCP/IP network. Hosts send and receive multicast datagrams, the destination fields of which specify IP host group addresses rather than individual IP addresses. A host indicates that it is a member of a group by means of the Internet Group Management Protocol. *See also* datagram, Internet Group Membership Protocol, IP, MBONE, multicasting.

IPng *n.* Acronym for **I**nternet **P**rotocol **n**ext **g**eneration. A revised version of the Internet Protocol (IP) designed primarily to address growth on the Internet. IPng is compatible with, but an evolutionary successor to, the current version of IP, IPv4 (IP version 4), and was approved as a draft standard in 1998 by the IETF (Internet Engineering Task Force). It offers several improvements over IPv4 including a quadrupled IP address size (from 32 bits to 128 bits), expanded routing capabilities, simplified header formats, improved support for options, and support for quality of service, authentication, and privacy. *Also called:* IPv6. *See also* IETF, IP, IP address.

IP number *n. See* IP address.

IPP *n. See* Internet Printing Protocol.

IPSec *n.* Short for **I**nternet **P**rotocol **Sec**urity. A security mechanism under development by the IETF (Internet Engineering Task Force) designed to ensure secure packet exchanges at the IP (Internet Protocol) layer. IPSec is based on two levels of security: AH (Authentication Header), which authenticates the sender and assures the recipient that the information has not been altered during transmission, and ESP (Encapsulating Security Protocol), which provides data encryption in addition to authentication and integrity assurance. IPSec protects all protocols in the TCP/IP protocol suite and Internet communications by using Layer Two Tunneling Protocol (L2TP) and is expected to ensure secure transmissions over virtual private networks (VPNs). *See also* anti-replay, communications protocol, Diffie-Hellman, ESP, IETF, IP, IPv6, Layer L2TP, TCP/IP, packet, virtual private network.

IP Security *n. See* IPSec.

IP/SoC Conference and Exhibition *n.* Acronym for **I**ntellectual **P**roperty/**S**ystem **o**n a **C**hip **Conference and Exhibition**. Leading conference and exhibition for executives, architects, and engineers using intellectual property in the design and production of system-on-a-chip semiconductors. The event features product exhibits and forums for the exchange of information.

IP splicing *n. See* IP spoofing.

IP spoofing *n.* The act of inserting a false sender IP address into an Internet transmission in order to gain unauthorized access to a computer system. *Also called:* IP splicing. *See also* IP address, spoofing.

IP switching *n.* A technology developed by Ipsilon Networks (Sunnyvale, Calif.) that enables a sequence of IP packets with a common destination to be transmitted over a high-speed, high-bandwidth Asynchronous Transfer Mode (ATM) connection.

iptables *n.* A utility used to configure firewall settings and rules in Linux. Part of the netfilter framework in the Linux kernel, iptables replaces ipchains, a previous implementation. *See also* netfilter. *Compare* IP Filter.

IP telephony *n.* Telephone service including voice and fax, provided through an Internet or network connection. IP telephony requires two steps: conversion of analog voice to digital format by a coding/uncoding device

(codec) and conversion of the digitized information to packets for IP transmission. *Also called:* Internet telephony, Voice over IP (VoIP). *See also* H.323, VoIP.

IP tunneling *n.* A technique used to encapsulate data inside a TCP/IP packet for transmission between IP addresses. IP tunneling provides a secure means for data from different networks to be shared over the Internet.

IPv4 *n.* Short for **I**nternet **P**rotocol **v**ersion **4**. The current version of the Internet Protocol (IP), as compared with the next-generation IP, which is known familiarly as IPng and more formally as IPv6 (IP version 6). *See also* IP. *Compare* IPng.

IPv6 *n.* Short for **I**nternet **P**rotocol **v**ersion **6**. The next-generation Internet Protocol from the Internet Engineering Task Force (IETF), IPv6 is now included as part of IP support in many products and in the major operating systems. IPv6 offers several improvements from IPv4, most significantly an increase of available address space from 32 to 128 bits, which makes the number of available addresses effectively unlimited. Usually called IPng (next generation), IPv6 also includes support for multicast and anycast addressing. *See also* anycasting, IP, IPng.

ipvs *n.* Acronym for **IP V**irtual **S**erver. *See* LVS.

IPX *n.* Acronym for **I**nternetwork **P**acket E**x**change. The protocol in Novell NetWare that governs addressing and routing of packets within and between LANs. IPX packets can be encapsulated in Ethernet packets or Token Ring frames. IPX operates at ISO/OSI levels 3 and 4 but does not perform all the functions at those levels. In particular, IPX does not guarantee that a message will be complete (no lost packets); SPX has that job. *See also* Ethernet (definition 1), packet, Token Ring network. *Compare* SPX (definition 1).

IPX/SPX *n.* Acronym for **I**nternetwork **P**acket E**x**change/**S**equenced **P**acket E**x**change. The network and transport level protocols used by Novell NetWare, which together correspond to the combination of TCP and IP in the TCP/IP protocol suite. IPX is a connectionless protocol that handles addressing and routing of packets. SPX, which runs above IPX, ensures correct delivery. *See also* IPX, SPX (definition 1).

IR *n. See* infrared.

IRC *n.* Acronym for **I**nternet **R**elay **C**hat. A service that enables an Internet user to participate in a conversation on line in real time with other users. An IRC channel, maintained by an IRC server, transmits the text typed by each user who has joined the channel to all other users who have joined the channel. Generally, a channel is dedicated to a particular topic, which may be reflected in the channel's name. An IRC client shows the names of currently active channels, enables the user to join a channel, and then displays the other participants' words on individual lines so that the user can respond. IRC was invented in 1988 by Jarkko Oikarinen of Finland. *See also* channel (definition 2), server (definition 2).

IrDA *n.* Acronym for **I**nfra**r**ed **D**ata **A**ssociation. The industry organization of computer, component, and telecommunications vendors who have established the standards for infrared communication between computers and peripheral devices such as printers.

IRE scale *n.* Short for **I**nstitute of **R**adio **E**ngineers **scale**. Scale to determine video signal amplitudes as devised by the Institute of Radio Engineers, which is now part of the Institute of Electrical and Electronic Engineers (IEEE). The IRE scale includes a total of 140 units, with 100 up and 40 down from zero.

IRG *n. See* inter-record gap.

IRGB *n.* Acronym for **I**ntensity **R**ed **G**reen **B**lue. A type of color encoding originally used in IBM's Color/Graphics Adapter (CGA) and continued in the EGA (Enhanced Graphics Adapter) and VGA (Video Graphics Array). The standard 3-bit RGB color encoding (specifying eight colors) is supplemented by a fourth bit (called Intensity) that uniformly increases the intensity of the red, green, and blue signals, resulting in a total of 16 colors. *See also* RGB.

IRL *n.* Acronym for **i**n **r**eal **l**ife. An expression used by many online users to denote life outside the computer realm, especially in conjunction with virtual worlds such as online talkers, IRC, MUDs, and virtual reality. *See also* IRC, MUD, talker, virtual reality.

IRQ *n.* Acronym for **i**nterrupt **r**e**q**uest. One of a set of possible hardware interrupts, identified by a number, on a Wintel computer. The number of the IRQ determines which interrupt handler will be used. In the AT bus, ISA, and EISA, 15 IRQs are available; in Micro Channel Architecture, 255 IRQs are available. Each device's IRQ is hardwired or set by a jumper or DIP switch. The VL bus and the PCI local bus have their own interrupt systems, which they translate to IRQ numbers. *See also* AT bus, DIP switch, EISA, interrupt, IRQ conflict, ISA, jumper, Micro Channel Architecture, PCI local bus, VL bus.

IRQ conflict *n.* The condition on a Wintel computer in which two different peripheral devices use the same IRQ to request service from the central processing unit (CPU). An IRQ conflict will prevent the system from working correctly; for example, the CPU may respond to an interrupt from a serial mouse by executing an interrupt handler for interrupts generated by a modem. IRQ conflicts can be prevented by the use of Plug and Play hardware and software. *See also* interrupt handler, IRQ, Plug and Play.

irrational number *n.* A real number that cannot be expressed as the ratio of two integers. Examples of irrational numbers are the square root of 3, pi, and *e*. *See also* integer, real number.

IRSG *n. See* Internet Research Steering Group.

IRTF *n. See* Internet Research Task Force.

IS *n. See* Information Services.

ISA *n.* Acronym for **I**ndustry **S**tandard **A**rchitecture. A bus design specification that allows components to be added as cards plugged into standard expansion slots in IBM Personal Computers and compatibles. Originally introduced in the IBM PC/XT with an 8-bit data path, ISA was expanded in 1984, when IBM introduced the PC/AT, to permit a 16-bit data path. A 16-bit ISA slot actually consists of two separate 8-bit slots mounted end-to-end so that a single 16-bit card plugs into both slots. An 8-bit expansion card can be inserted and used in a 16-bit slot (it occupies only one of the two slots), but a 16-bit expansion card cannot be used in an 8-bit slot. *See also* EISA, Micro Channel Architecture.

ISAM *n. See* indexed sequential access method.

ISAPI *n.* Acronym for **I**nternet **S**erver **A**pplication **P**rogramming **I**nterface. An easy-to-use, high-performance interface for back-end applications for Microsoft's Internet Information Server (IIS). ISAPI has its own dynamic-link library, which offers significant performance advantages over the CGI (Common Gateway Interface) specification. *See also* API, dynamic-link library, Internet Information Server. *Compare* CGI.

ISAPI filter *n.* A DLL file used by Microsoft Internet Information Server (IIS) to verify and authenticate ISAPI requests received by the IIS.

ISA Server *n. See* Internet Security and Acceleration Server.

ISA slot *n.* A connection socket for a peripheral designed according to the ISA (Industry Standard Architecture) standard, which applies to the bus developed for use in the 80286 (IBM PC/AT) motherboard. *See also* ISA.

ISC *n. See* Internet Software Consortium.

ISDN *n.* Acronym for **I**ntegrated **S**ervices **D**igital **N**etwork. A high-speed digital communications network evolving from existing telephone services. The goal in developing ISDN was to replace the current telephone network, which requires digital-to-analog conversions, with facilities totally devoted to digital switching and transmission, yet advanced enough to replace traditionally analog forms of data, ranging from voice to computer transmissions, music, and video. ISDN is available in two forms, known as BRI (Basic Rate Interface) and PRI (Primary Rate Interface). BRI consists of two B (bearer) channels that carry data at 64 Kbps and one D (data) channel that carries control and signal information at 16 Kbps. In North America and Japan, PRI consists of 23 B channels and 1 D channel, all operating at 64 Kbps; elsewhere in the world, PRI consists of 30 B channels and 1 D channel. Computers and other devices connect to ISDN lines through simple, standardized interfaces. *See also* BRI, channel (definition 2), PRI.

ISDN terminal adapter *n.* The hardware interface between a computer and an ISDN line. *See also* ISDN.

I seek you *n. See* ICQ.

ISIS or **IS-IS** *n.* Acronym for **I**ntelligent **S**cheduling and **I**nformation **S**ystem. A toolkit designed to help prevent and eliminate faults in manufacturing systems. Developed in 1980 at Cornell University, ISIS is now available commercially.

ISLAN *n. See* isochronous network.

ISMA *n.* Acronym for **I**nternet **S**treaming **M**edia **A**lliance. A nonprofit organization promoting the adoption of open standards for the streaming of rich media over Internet Protocol (IP) networks. ISMA membership consists of a number of technology companies and groups including Apple Computer, Cisco Systems, IBM, Kasenna, Philips, and Sun Microsystems. *See also* Windows Metafile Format.

ISO *n.* Short for **I**nternational **O**rganization for **S**tandardization (often incorrectly identified as an acronym for International Standards Organization), an international association of 130 countries, each of which is represented