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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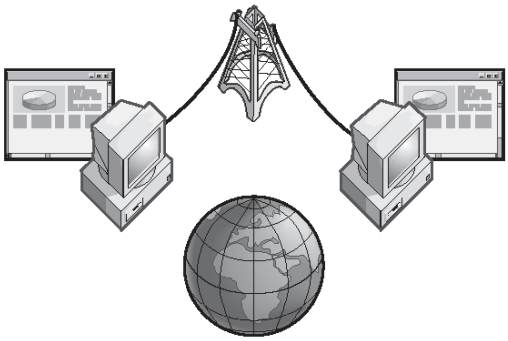
data compression *n.* A means of reducing the amount of space or bandwidth needed to store or transmit a block of data, used in data communications, facsimile transmission, file storage and transfer, and CD-ROM publishing. *Also called:* data compaction.

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**atabase **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 Equipment. 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 Exchange. 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.

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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.

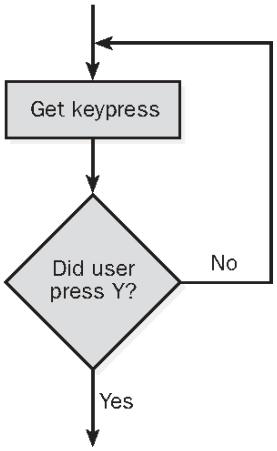
decI- *prefix* Metric prefix meaning 10^{-1} (one-tenth).

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.

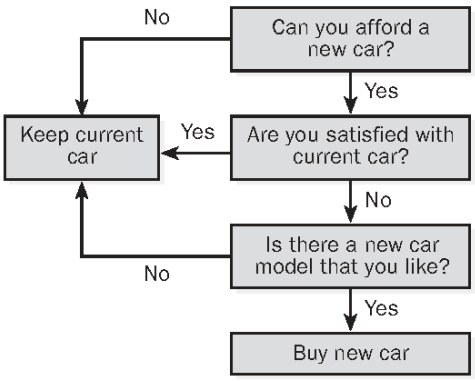


Decision box.

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.

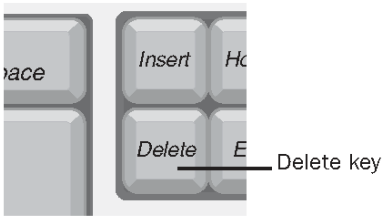
DEK *n. See* data encryption key.

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.

D

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.

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-ended **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.

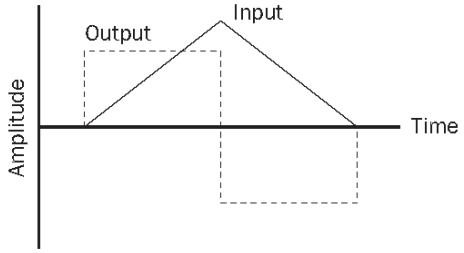
Difference Engine *n.* An early computerlike mechanical device designed by British mathematician and scientist Charles Babbage in the early 1820s. The Difference Engine was intended to be a machine with a 20-decimal capacity capable of solving mathematical problems. The concept of the Difference Engine 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

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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.

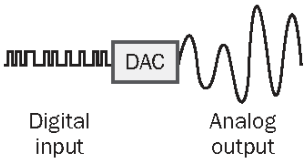
digital sort *n.* A type of ordering process in which record numbers or their key values are sorted digit by digit, beginning with the least significant (rightmost) digit. *Also called:* radix sort.

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.

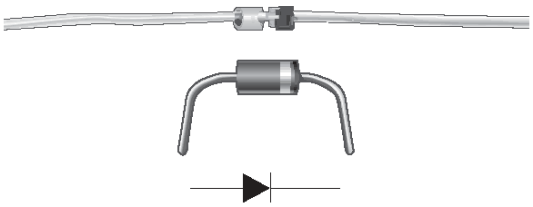
DIMM *n.* Acronym for **d**ual **i**nline **m**emory **m**odule. A type of memory board comprised of RAM chips mounted on a circuit board, similar to the more commonly used SIMM (Single Inline Memory Module). DIMMs are characterized by a 64-bit data path and pins (connectors) on each side that are on 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** read-only **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

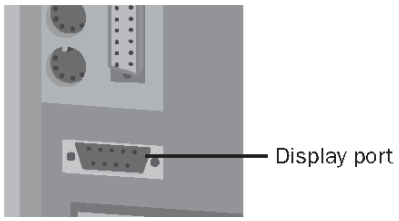
other text on the page. Sans serif faces such as Helvetica and Avant Garde often work well as display faces. *See also* sans serif. *Compare* body face.

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.

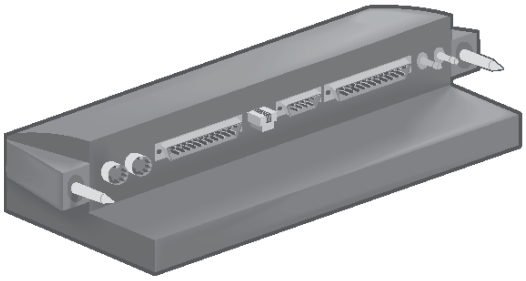
.doc *n.* A file extension that identifies document files formatted for a word processor. This is the default file extension for Microsoft Word document files.

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 denial of service 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 disk operating system. 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.

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.

D

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.

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.

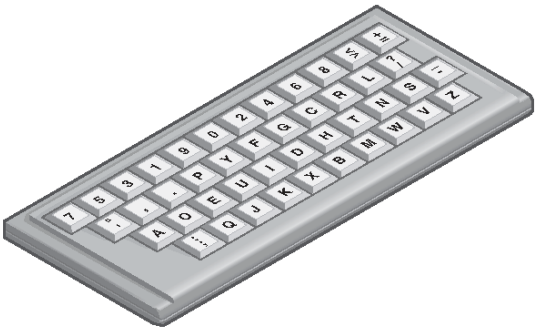
DVI *n.* Acronym for Digital Video Interface. A hardware-based compression/decompression technique for storing

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 **dyna**mic **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 electronic. 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 Electronic Entertainment Expo. A major convention where game industry developers, manufacturers, and publishers demonstrate their latest wares.

EAI *n.* Acronym for Enterprise Application Integration. 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 electrically alterable read-only memory. *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 Extended Binary Coded Decimal Interchange Code. 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.

E

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.

EdIin *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 electronic document management system. *See* document management system.

EDO DRAM *n.* Acronym for extended data out dynamic random access memory. 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 extended data out random access memory. 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 electronic data processing. *See* data processing. **2.** Acronym for Enhanced Capabilities Port. 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 Enhanced Expanded Memory Specification. 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 electrically erasable programmable read-only memory. 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 electronic 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 Enhanced Graphics Adapter. 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 Electronic Industries Association. 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 Enhanced Integrated Drive Electronics. 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 Extended Industry Standard Architecture. 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.

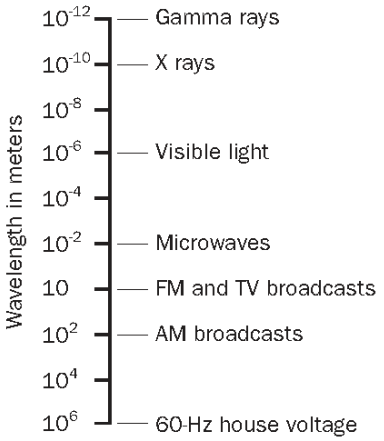
electroluminescent display *n.* A type of flat-panel display used in laptops in which a thin phosphor layer is set between vertical and horizontal electrodes. These electrodes form *xy*-coordinates; when a vertical and a horizontal electrode are charged, the phosphor at their intersection emits light. 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.

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 **e**lectronic **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 electronic 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 Expanded Memory Specification. 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.

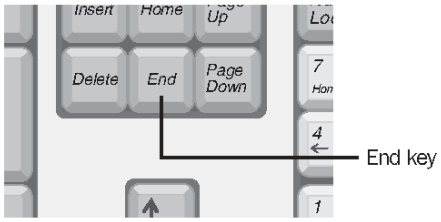
encryption key *n.* A sequence of data that is used to encrypt other data and that, consequently, must be used for the data's decryption. *See also* decryption, encryption.

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.

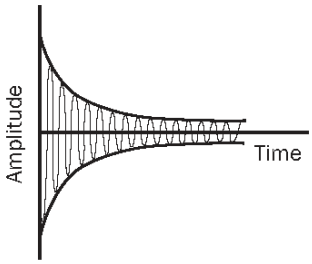
entity *n.* In computer-aided design and object-oriented design, an item that can be treated as a unit and, often, as a member of a particular category or type. *See also* CAD, object-oriented design.

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 end of line. 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 Explicitly Parallel Instruction Computing. 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 Electronic Privacy Information Center. 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 Enhanced Parallel Port, 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 erasable programmable read-only memory. 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 Encapsulated PostScript. 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.

E

EPSF *n.* Acronym for Encapsulated PostScript file. *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.

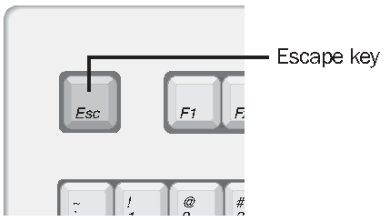
error ratio *n.* The ratio of errors to the number of units of data processed. *See also* error rate.

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 electronic **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 End User Programming with Hierarchical Objects for Robust Interpreted Applications. 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 Extreme UltraViolet **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

E

.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.

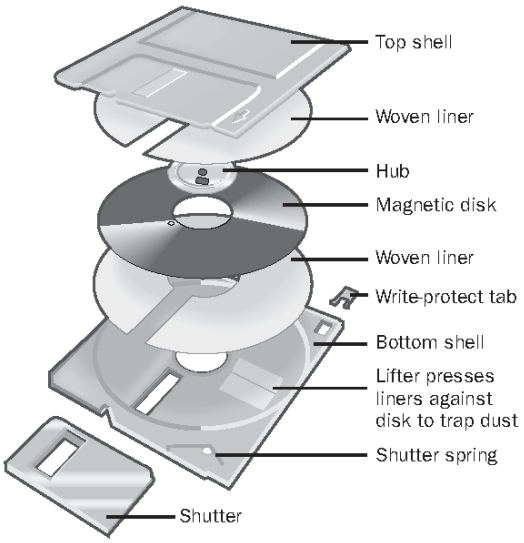
expert system *n.* An application program that makes decisions or solves problems in a particular field, such as finance or medicine, by using knowledge and analytical rules defined by experts in the field. It uses two components, a knowledge base and an inference engine, to form conclusions. Additional 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 electronic 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 face-to-face. 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 $n \times (n-1) \times (n-2) \times \ldots \times 1$.

fallback *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.

fallover *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.

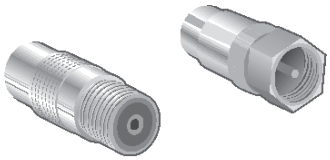
fax program *n.* A computer application that allows the user to send, receive, and print fax transmissions. *See also* fax.

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.

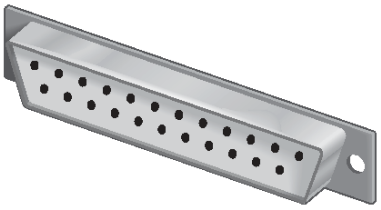
feedback *n.* The return of a portion of system output as input to the same system. Often feedback is deliberately designed into a system, but sometimes it is unwanted. In electronics, feedback is used in monitoring, controlling, and amplifying circuitry.

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.

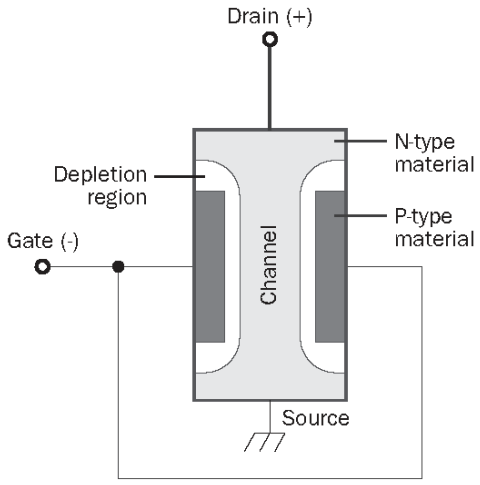
ferric oxide *n.* The chemical substance Fe2O3, an oxide of iron used with a binding agent in the magnetic coating applied to disks and tapes for data storage.

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.



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.

F

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 Federal Information Processing Standard 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 fast infrared 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 Forum of Incident Response and Security Teams. 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 Federal Internet Exchange. 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.

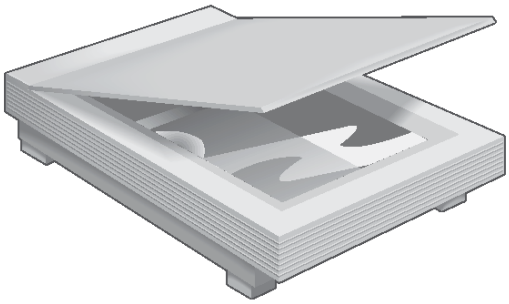
flash memory *n.* A type of nonvolatile memory. Flash memory is similar to EEPROM memory in function but it must be erased in blocks, whereas EEPROM can be erased one byte at a time. Because of its block-oriented nature, flash memory is commonly used as a supplement to or replacement for hard disks in 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.

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.

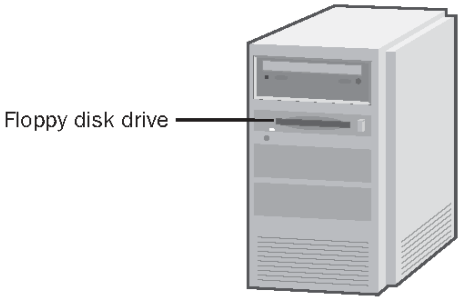
FLOP *n. See* floating-point operation.

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.



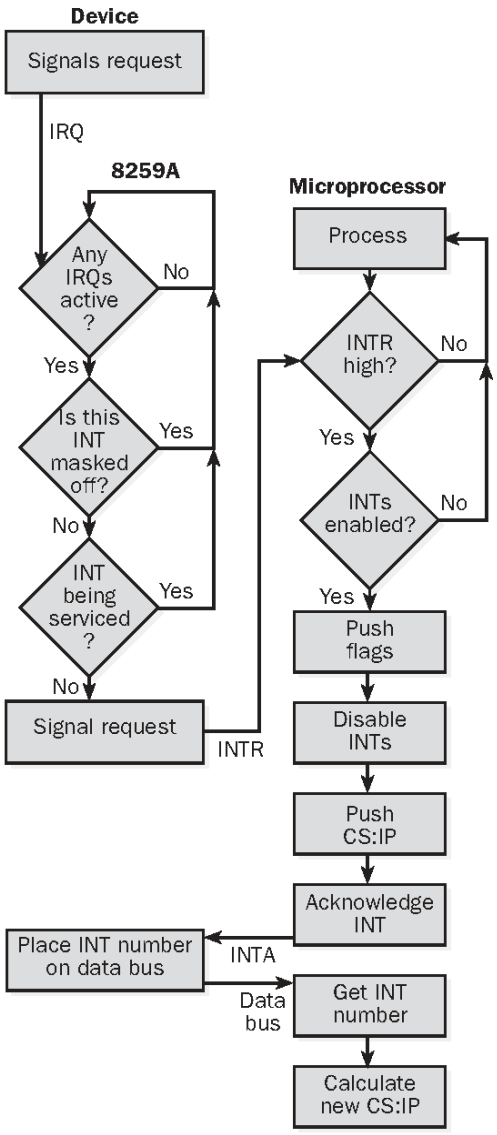
Floppy disk drive.

FLOPS *n.* Acronym for **f**loating-point **o**perations **p**er **s**econd. 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.

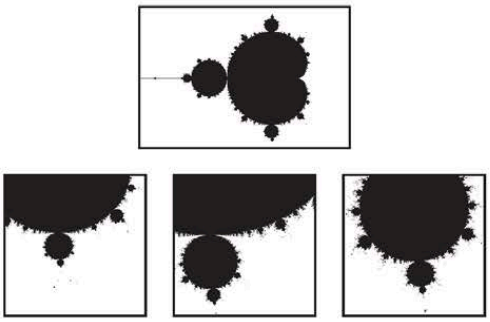
FPM RAM *n. See* page mode RAM.

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.

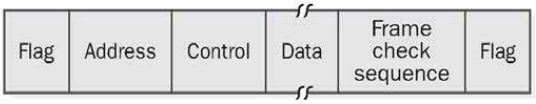
FRAD *n. See* frame relay assembler/disassembler.

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 **f**erromagnetic **r**andom **a**ccess **m**emory. 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.

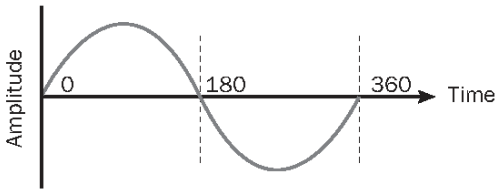
Free Software Foundation *n.* An advocacy organization founded by Richard Stallman, dedicated to eliminating restrictions on people's right to use, copy, modify, and redistribute computer programs for noncommercial purposes. The Free Software Foundation is the maintainer of GNU software, which is UNIX-like 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

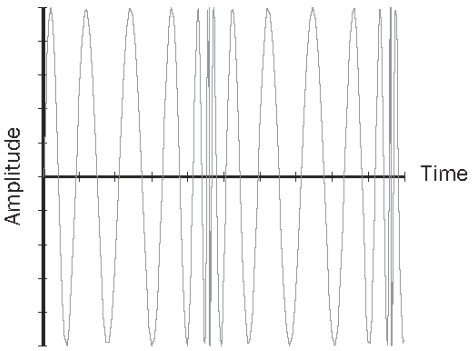
frequency counter *n.* **1.** An item of engineering test equipment that measures and displays the frequencies of electronic signals. **2.** An electronic circuit, often found embedded in process-control computers, that counts the frequency of occurrence of an activity.

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 the **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 the **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.

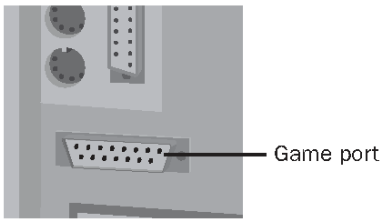
game console *n. See* console game.

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 of **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 GNU Image Manipulation Program. 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 General Inter-ORB Protocol. *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 GNU Network Object Model Environment. 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 GNU's Not UNIX. 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.

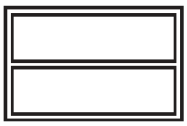
graphic limits *n.* On a computer screen, the boundary of a graphical image in a graphics software program, including all the area enclosed within the graphic. In some graphics environments the limits of a graphic consist of the smallest rectangle that can completely enclose it, called its *bounding 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,

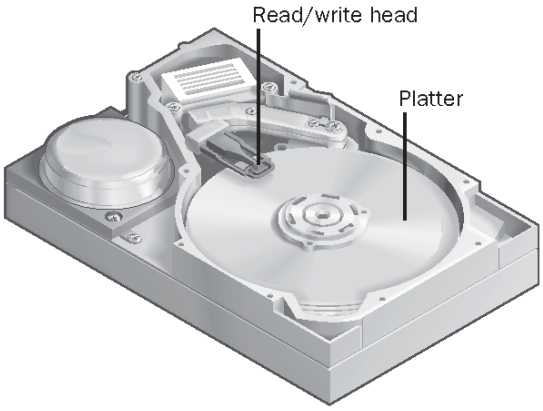
hard-sectored disk. *Compare* soft (definition 1). **2.** Retaining magnetization even in the absence of an external magnetic field. *Compare* soft (definition 2).

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 High-bandwidth Digital Content Protection. 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 High-level Data Link Control. 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 Handheld Device Markup Language. 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 High-bit-rate Digital Subscriber Line. 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 Handheld Device Transport Protocol. 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 High-Definition TeleVision. 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).

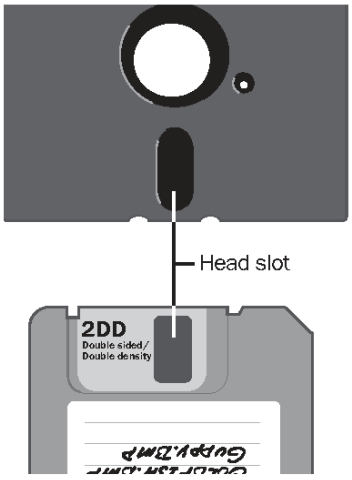
headless computer *n.* A computer system that does not have a keyboard, mouse, or video monitor during normal operation.

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.

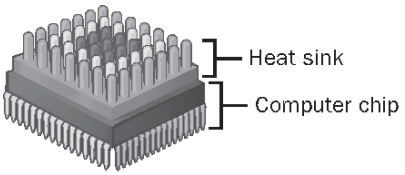
heap *n.* **1.** A portion of memory reserved for a program to use for the temporary storage of data structures whose existence or size cannot be determined until the program is running. To build and use such elements, programming languages such as C and Pascal include functions and procedures for requesting 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.

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.

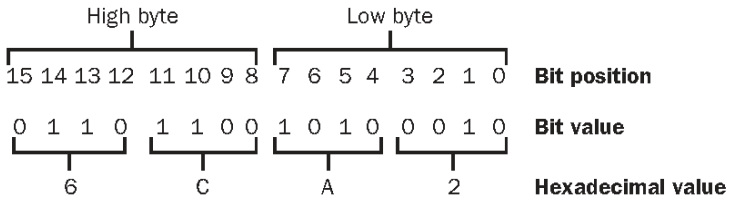
Hierarchical Storage Management *n. See* HSM.

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.

Hijri calendar *n.* The lunar calendar used in Islamic countries. *Compare* Gregorian calendar, Julian calendar.

HIPPI *n.* Acronym for High-Performance Parallel Interface. 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 Home Phoneline Networking Alliance. 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 Radio Frequency. 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 High Performance File System. A file system available with OS/2 versions 1.2 and later. *See also* FAT file system, NTFS.

HPGL *n.* Acronym for Hewlett-Packard Graphics Language. 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 Hewlett-Packard Interface Bus. *See* general-purpose interface bus.

HPPCL *n.* Acronym for Hewlett-Packard Printer Control Language. *See* Printer Control Language.

HP/UX or **HP-UX** *n.* Acronym for Hewlett-Packard 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 hypertext reference. An attribute in an HTML document that defines a link to another document on the Web. *See also* HTML.

HSB *n.* Acronym for hue-saturation-brightness. 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 Hierarchical Storage Management. 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 hue-saturation-value. *See* HSB.

H-sync *n. See* horizontal synchronization.

HTCPCP *n.* Acronym for Hyper Text Coffee Pot Control Protocol. 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 Hypertext Markup Language. 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 Hypertext Transfer Protocol. 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 Hypertext Transfer Protocol Daemon. 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 Hypertext Transfer Protocol Next Generation. 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 Hypertext Transfer Protocol Secure. 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.

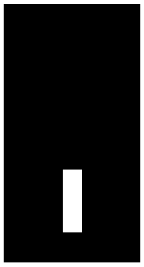
hyphenation program *n.* A program (often included as part of a word processing application) that introduces optional hyphens at line breaks. A good hyphenation program will avoid ending more than three lines in a row with hyphens and will prompt the user for confirmation or tag ambiguous breaks, as 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 **H**ypermedia/**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.



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 Intel **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 inter block gap. *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 Personal Computer. 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 eXtended Technology, 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 In Character. 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 Internet Corporation for Assigned Names and Numbers. 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 Integrated Computer-Aided Software Engineering. 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 Information and Content Exchange. 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 in circuit emulator. 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 Intrusion Countermeasure Electronics. 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 Internet Control Message Protocol. 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 Internet Cache Protocol. 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 International Computer Security Association. 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 intrusion detection. *See* IDS.

IDE *n.* **1.** Acronym for Integrated Device Electronics. 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 Interface Definition Language. 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 intrusion-detection system. 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 Internet digital subscriber line. 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 information engineering. A methodology for developing and maintaining information-processing systems, including computer systems and networks, within an organization.

IEEE *n.* Acronym for Institute of Electrical and Electronics Engineers. 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.

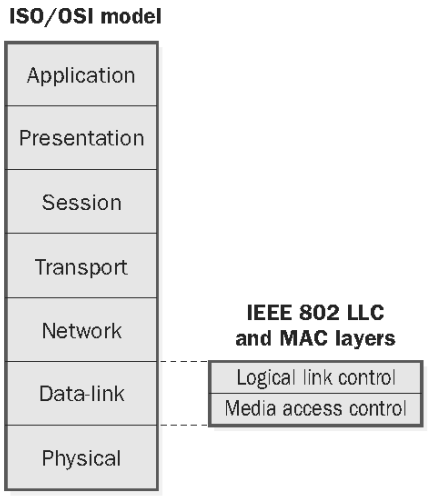
IEEE 1394 connector *n.* A type of connector that enables you to connect and disconnect high-speed serial devices. An IEEE 1394 connector is usually on the back of your computer near the serial port or the parallel port. The IEEE 1394 bus is used primarily to connect high-end digital video and audio 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 Internet Message Access Protocol 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 in my humble opinion. 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.

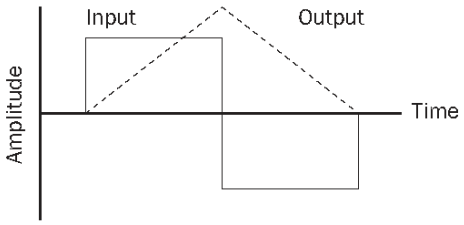
Integrated Services LAN *n. See* isochronous network.

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 Internet Protocol. 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 Internet Protocol **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 Internet Protocol **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 Internet Protocol **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 Internet Protocol **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 Internet Protocol **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 Internet Protocol **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 Intellectual Property/System on a Chip **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 tunnelling *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**nfrared **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**equest. 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