

# OPERATING SYSTEM CONCEPTS



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Realtime 2013  
Page 1 of 4



COVER ILLUSTRATIONS

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Realtime 2013  
Page 2 of 4



the effectiveness of any given algorithm depends on the situation. In selecting a memory-management scheme for a specific system, we must take into account many factors—especially the *hardware* design of the system. Each algorithm requires its own hardware support.

The operating system is responsible for the following activities in connection with memory management:

- Keeping track of which parts of memory are currently being used and by whom
- Deciding which processes (or parts thereof) and data to move into and out of memory
- Allocating and deallocating memory space as needed

Memory-management techniques are discussed in Chapters 8 and 9.

## 1.8 Storage Management

To make the computer system convenient for users, the operating system provides a uniform, logical view of information storage. The operating system abstracts from the physical properties of its storage devices to define a logical storage unit, the file. The operating system maps files onto physical media and accesses these files via the storage devices.

### 1.8.1 File-System Management

File management is one of the most visible components of an operating system. Computers can store information on several different types of physical media. Magnetic disk, optical disk, and magnetic tape are the most common. Each of these media has its own characteristics and physical organization. Each medium is controlled by a device, such as a disk drive or tape drive, that also has its own unique characteristics. These properties include access speed, capacity, data-transfer rate, and access method (sequential or random).



be numeric, alphabetic, alphanumeric, or binary. Files may be free-form (for example, text files), or they may be formatted rigidly (for example, fixed fields). Clearly, the concept of a file is an extremely general one.

The operating system implements the abstract concept of a file by managing mass-storage media, such as tapes and disks, and the devices that control them. Also, files are normally organized into directories to make them easier to find. Finally, when multiple users have access to files, it may be desirable to control by whom and in what ways (for example, read, write, append) files may be accessed.

The operating system is responsible for the following activities in connection with file management:

- Creating and deleting files
- Creating and deleting directories to organize files
- Supporting primitives for manipulating files and directories
- Mapping files onto secondary storage
- Backing up files on stable (nonvolatile) storage media

File-management techniques are discussed in Chapters 10 and 11.

### 1.8.2 Mass-Storage Management

As we have already seen, because main memory is too small to accommodate all data and programs, and because the data that it holds are lost when power is lost, the computer system must provide secondary storage to back up main memory. Most modern computer systems use disks as the principal on-line storage medium for both programs and data. Most programs—including compilers, assemblers, word processors, editors, and so on—are stored on a disk until loaded into memory and then use that memory as the primary and destination of their processing. Hence, the primary storage is of central importance to a computer system. The operating system is responsible for the following activities in connection with mass-storage management: