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IBM v. Security First Innovations, LLC

IBM's Exhibit 1016

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automatically identifying and configuring it for optimum performance. Peripherals can be connected while the computer is running (*hot plugging*) and are automatically assigned a unique address (auto-addressing). Developed from the I2 architecture designed jointly by Philips and Digital Equipment Corporation, the ACCESS.bus specification is controlled by the ACCESS.bus Industry Group and competes with Intel's USB. *See also* bidirectional, bus, daisy chain¹, hot plugging, input/output port, peripheral. *Compare* USB.

access code *n.* *See* password.

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

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

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

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

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

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

access method *n.* *See* access mechanism.

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

accessory *n.* *See* peripheral.

access path *n.* *See* search path.

access permission *n.* *See* permission.

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

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

access provider *n.* *See* ISP.

access rights *n.* *See* access privileges.

access speed *n.* *See* access time.

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

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

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

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

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

auxiliary device *n.* *See* peripheral.

auxiliary equipment *n.* *See* peripheral.

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

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

available time *n.* *See* uptime.

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

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

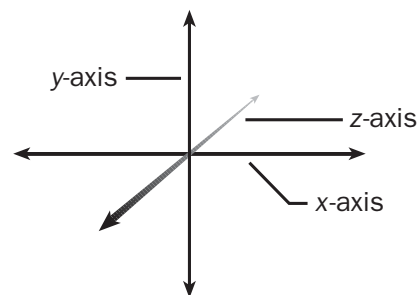
.avi *n.* The file extension that identifies an audiovisual interleaved data file in the Microsoft RIFF format.

AVI *n.* Acronym for **A**udio **V**ideo **I**nterleaved. A Windows multimedia file format for sound and moving pictures that uses the Microsoft RIFF (Resource Interchange File Format) specification.

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

AWT *n.* *See* Abstract Window Toolkit.

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



Axis.

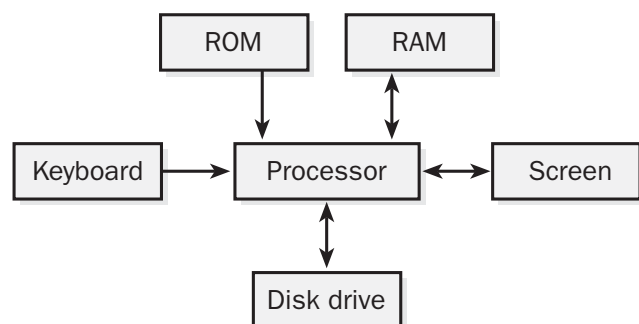
3. To select a segment of text, by using a mouse, menu selection, or cursor key, to be acted upon in some way, such as to format or to delete the segment.

block cipher *n.* A private key encryption method that encrypts data in blocks of a fixed size (usually 64 bits). The encrypted data block contains the same number of bits as the original. *See also* encryption, private key.

block cursor *n.* An on-screen cursor that has the same width and height in pixels as a text-mode character cell. A block cursor is used in text-based applications, especially as the mouse pointer when a mouse is installed in the system. *See also* character cell, cursor (definition 1), mouse pointer.

block device *n.* A device, such as a disk drive, that moves information in blocks—groups of bytes—rather than one character (byte) at a time. *Compare* character device.

block diagram *n.* A chart of a computer or other system in which labeled blocks represent principal components and lines and arrows between the blocks show the pathways and relationships among the components. A block diagram is an overall view of what a system consists of and how it works. To show the various components of such a system in more detail, different types of diagrams, such as flowcharts or schematics, are used. *See the illustration.* *Compare* bubble chart, flowchart.



Block diagram.

block gap *n.* The unused physical space that separates blocks of data or physical records on a tape or formatted sectors on a disk. *Also called:* IBG, interblock gap.

block header *n.* Information that appears at the beginning of a block of data and serves such purposes as signaling the beginning of the block, identifying the block, providing error-checking information, and describing such characteristics as the block length and the type of data contained in the block. *See also* header (definition 2).

blocking factor *n.* **1.** The size of the chunks in which data is transferred to or from a block device such as a disk. If fewer bytes are requested, the disk drive will still read the whole block. Common blocking factors on personal computers are 128, 256, and 512 bytes. **2.** The number of file records in one disk block. If the record length for a file is 170 bytes, a block on the disk contains 512 bytes, and records do not span blocks, then the blocking factor is 3, and each block contains 510 (170 x 3) bytes of data and 2 unused bytes.

block length *n.* The length, usually in bytes, of a block of data. Block length typically ranges from 512 bytes through 4096 kilobytes (KB), depending on the purpose for which the block is used.

block move *n.* Movement of a number of items of data together to a different location, as in reorganizing documents with a word processor or moving the contents of cell ranges in a spreadsheet. Most CPUs have instructions that easily support block moves.

block size *n.* The declared size of a block of data transferred internally within a computer, via FTP, or by modem. The size is usually chosen to make the most efficient use of all the hardware devices involved. *See also* FTP¹ (definition 1).

block structure *n.* The organization of a program into groups of statements called *blocks*, which are treated as units. Programming languages such as Ada, C, and Pascal were designed around block structure. A block is a section of code surrounded by certain delimiters (such as BEGIN and END or { and }), which signify that the intervening code can be treated as a related group of statements. For example, in C, each function is a separate block. Block structure also limits the scope of constants, data types, and variables declared in a block to that block. *See also* function (definition 2), procedure, scope (definition 1).

block transfer *n.* The movement of data in discrete blocks (groups of bytes).

blog¹ *n.* *See* weblog.

blog² *vb.* To create or maintain a weblog.

blogger *n.* One who creates or maintains a weblog.

blow *vb.* *See* burn (definition 1).

blow up *vb.* To terminate abnormally, as when a program crosses some computational or storage boundary and cannot handle the situation on the other side, as in, “I tried to

Cascading Style Sheet mechanism *n.* See cascading style sheets.

cascading style sheets *n.* A Hypertext Markup Language (HTML) specification developed by The World Wide Web Consortium (W3C) that allows authors of HTML documents and users to attach style sheets to HTML documents. The style sheets include typographical information on how the page should appear, such as the font of the text in the page. This specification also directs the way in which the style sheets of the HTML document and the user's style will blend. Cascading style sheets have been proposed for the HTML 3.2 standard. *Acronym:* CSS. *Also called:* Cascading Style Sheet mechanism, CSS1. *See also* HTML, style sheet (definition 2).

cascading windows *n.* A sequence of successive, overlapping windows in a graphical user interface, displayed so that the title bar of each is visible. *Also called:* overlaid windows.

case *n.* In text processing, an indication of whether one or more alphabetic characters are capitalized (uppercase) or not (lowercase). A case-sensitive program or routine distinguishes between uppercase and lowercase letters and treats the word *cat* as totally distinct from either *Cat* or *CAT*. A case-sensitive program that also separates capitalized and lowercased words would list *Arkansas* before *aardvark* or *antimony*, even though its alphabetic position follows both lowercased words.

CASE *n.* Acronym for **computer-aided software engineering**. A comprehensive label for software designed to use computers in all phases of computer program development, from planning and modeling through coding and documentation. CASE represents a working environment consisting of programs and other development tools that help managers, systems analysts, programmers, and others to automate the design and implementation of programs and procedures for business, engineering, and scientific computer systems.

case-sensitive search *n.* A search in a database in which capitalization of key words must exactly match the capitalization of words in the database. A case-sensitive search for "north and south" would fail to find a database entry for "North and South."

case sensitivity *n.* Discrimination between lowercase and uppercase characters in a program or a programming language. *See also* case.

case statement *n.* In programming languages such as Ada, Pascal, and C, a type of control statement that executes one of several sets of instructions based on some key value. Case statements are used in evaluating situations that can have a number of different results. "Case" in this sense refers to a refinement of a basic IF-THEN type of conditional statement (if A is true, then do B), but a case statement functions more like a series of nested IFs (if A, then do this; else if B, then do that; else . . .). In a case evaluation, a variable (such as a number or a string of characters) is compared against one after another of a series of constants assigned by the programmer. Each constant represents a different case and defines an action to be carried out. When the program finds a constant that matches the variable, it carries out whatever action is dictated by the case in which the match occurs. *See also* constant, control statement, variable.

cassette *n.* The unit consisting of both the plastic case and the magnetic tape it contains. Cassette tapes are used for backing up large amounts of computer data.

cassette tape *n.* **1.** The tape within a cassette. **2.** The unit consisting of both the plastic cassette case and the tape it contains.

cast *n.* A programmer-specified data conversion from one type to another, such as a conversion from integer to floating point. *Also called:* coercion. *See also* data type.

CAT *n.* **1.** Acronym for **computer-aided testing**. A procedure used by engineers for checking or analyzing designs, especially those created with CAD programs. Computer-aided testing is also used by software developers for automated regression testing. **2.** Acronym for **computer-assisted teaching** or **computer-aided teaching**. *See* CAI. **3.** Acronym for **computerized axial tomography**. A medical procedure in which a computer is used to generate a three-dimensional image of a body part from a series of X-rays taken as cross sections along a single axis. *See* CAI.

catalog *n.* **1.** In a computer, a list containing specific information, such as name, length, type, and location of files or of storage space. **2.** In a database, the data dictionary. *See also* data dictionary.

catch *n.* A keyword in the Java programming language used to declare a block of statements to be executed in the event that a Java exception or runtime error occurs in a preceding "try" block. *See also* block, exception, keyword, runtime, try.

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click *vb.* To press and release a mouse button once without moving the mouse. Clicking is usually performed to select or deselect an item or to activate a program or program feature. *See also* right click. *Compare* double-click, drag.

clickable maps *n.* *See* image map.

click rate *n.* *See* clickthrough rate.

clicks and mortar *n.* A business that combines an online presence with traditional “bricks and mortar” outlets.

click speed *n.* The maximum interval between the first and second time a user presses a button on a mouse or other pointing device that will still identify these actions as a double-click to the computer as opposed to two single-clicks. *See also* double-click, mouse, pointing device.

clickstream *n.* The path a user takes while browsing a Web site. Each distinct selection made on a Web page adds one click to the stream. The further down the clickstream the user goes without finding the sought item, the more likely he or she is to depart to another Web site. Analysis of usage patterns helps Web site designers create user-friendly site structures, links, and search facilities. *See also* Web site.

clickthrough *n.* The number of times that visitors to a Web site click on an advertising banner within a specified period of time. Clickthrough is one of the elements that Web site producers use to decide how much to charge advertisers. *See also* clickthrough rate.

clickthrough rate *n.* The proportion of visitors to a Web site who click on a banner advertisement there, expressed as a percentage of total visitors to the Web site. *Also called:* click rate. *See also* clickthrough.

clickwrap agreement *n.* A contract or license in software or on a Web site that sets forth conditions for use of the software or for goods and services distributed through the Web site. Users must agree to the terms in a clickwrap agreement—typically by clicking on a button that states “I Agree” or “Agree”—before they can install the software or utilize goods or services. A clickwrap agreement is an electronic version of an End-User License Agreement. *Also called:* clickwrap license. *See also* End-User License Agreement. *Compare* shrinkwrap agreement.

clickwrap license *n.* *See* clickwrap agreement.

client *n.* **1.** In object-oriented programming, a member of a class (group) that uses the services of another class to which it is not related. *See also* inheritance (definition 1). **2.** A process, such as a program or task, that requests a

service provided by another program—for example, a word processor that calls on a sort routine built into another program. The client process uses the requested service without having to “know” any working details about the other program or the service itself. *Compare* child (definition 1), descendant (definition 2). **3.** On a local area network or the Internet, a computer that accesses shared network resources provided by another computer (called a *server*). *See also* client/server architecture, server.

client error *n.* A problem reported by the Hypertext Transfer Protocol (HTTP) client module as the result of difficulty in interpreting a command or the inability to connect properly to a remote host.

client/server architecture *n.* An arrangement used on LANs (local area networks) that makes use of distributed intelligence to treat both the server and the individual workstations as intelligent, programmable devices, thus exploiting the full computing power of each. This is done by splitting the processing of an application between two distinct components: a “front-end” client and a “back-end” server. The client component is a complete, stand-alone personal computer (not a “dumb” terminal), and it offers the user its full range of power and features for running applications. The server component can be a personal computer, a minicomputer, or a mainframe that provides the traditional strengths offered by minicomputers and mainframes in a time-sharing environment: data management, information sharing between clients, and sophisticated network administration and security features. The client and server machines work together to accomplish the processing of the application being used. Not only does this increase the processing power available over older architectures but it also uses that power more efficiently. The client portion of the application is typically optimized for user interaction, whereas the server portion provides the centralized, multiuser functionality. *See also* distributed intelligence. *Compare* peer-to-peer network.

client/server network *n.* *See* client/server architecture.

client-side image maps *n.* An image map that performs the processing completely within the client program (i.e., Web browser) itself. Early Web implementations of image maps (circa 1993) transmitted user mouse click coordinates to the Web server for processing. Generally client-side image maps improve the speed of response to the user. *See also* image map.

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resources available to users. Content providers include online services such as America Online and CompuServe, Internet service providers (ISPs), and an increasing number of media companies representing television, long-distance telephone, and publishing industries. *See also* ISP, online information service. *Compare* content aggregator.

Content Scrambling System *n.* *See* CSS.

contents directory *n.* A series of queues that contain the descriptors and addresses of routines located within a region of memory.

context-dependent *adj.* Of, pertaining to, or characteristic of a process or a set of data characters whose meaning depends on the surrounding environment.

context-sensitive help *n.* A form of assistance in which a program that provides on-screen help shows information to the user concerning the current command or operation being attempted.

context-sensitive menu *n.* A menu that highlights options as available or unavailable depending on the context in which the option is called. The menus on Windows' menu bar, for example, are context sensitive; options such as copy are grayed out if nothing is selected.

context switching *n.* A type of multitasking; the act of turning the central processor's "attention" from one task to another, rather than allocating increments of time to each task in turn. *See also* multitasking, time slice.

contextual search *n.* A search operation in which the user can direct a program to search specified files for a particular set of text characters.

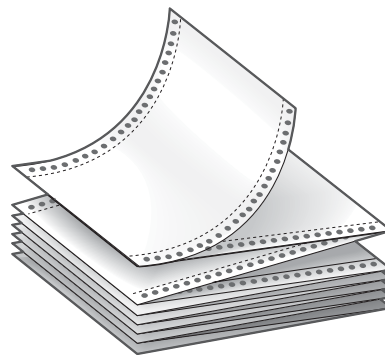
contiguous *adj.* Having a shared boundary; being immediately adjacent. For example, contiguous sectors on a disk are data-storage segments physically located next to one another.

contiguous data structure *n.* A data structure, such as an array, that is stored in a consecutive set of memory locations. *See also* data structure. *Compare* noncontiguous data structure.

continuous carrier *n.* In communications, a carrier signal that remains on throughout the transmission, whether or not it is carrying information.

continuous-form paper *n.* Paper in which each sheet is connected to the sheets before and after it, for use with most impact and ink-jet printers and some other printing devices designed with an appropriate paper-feed mechanism. The paper usually has holes punched along each side

so that it can be pulled by a tractor-feed device. *See the illustration. See also* pin feed, sprocket feed, tractor feed.



Continuous-form paper.

continuous processing *n.* The processing of transactions as they are input to the system. *Compare* batch processing (definition 3).

continuous speech recognition *n.* A type of automatic speech recognition (ASR) technology that responds to strings of words. Continuous speech recognition allows a user to speak in a natural voice without the need to slow down and enunciate each word separately. Continuous speech recognition software takes advantage of context in recognizing words, and thus will not operate at full efficiency if each word is spoken with distinct separation. *See also* ASR (definition 2).

continuous-tone image *n.* An image, such as a photograph, in which color or varying shades of gray are reproduced as gradients rather than as clustered or variably sized dots, as in traditional book or newspaper printing. Continuous-tone images can be viewed on an analog monitor (such as a television monitor), which accepts input as a continuously variable signal. They cannot be viewed on a digital monitor, which requires input broken into discrete units, nor can they be printed in books or newspapers, which represent illustrations as groups of dots. *See also* scan (definition 2), video digitizer. *Compare* halftone.

continuous-tone printer *n.* A printer that produces an image using smoothly blended levels of continuous ink for gradations of gray or color. *Compare* dithering.

contouring *n.* **1.** In computer graphics, such as CAD models, the representation of the surface of an object—its bumps and crannies. *See the illustration. 2. In image processing, the loss of detail that occurs in a shaded image when too few gradations of gray are used to reproduce a graphic, such as a photograph. In photography and graphic arts, this phenomenon is sometimes called *posterization*.*

gally from a computer system or use computer resources. However, the goal of the majority is only to break into the system. *See also* hacker (definition 2).

cradle *n.* A receptacle used to recharge the batteries in some handheld or palm-size PCs or PDAs (personal digital assistants). Some cradles also serve as a means to connect these smaller devices with a desktop PC. Not all of these devices require a cradle to recharge or connect to a desktop system. *Also called:* dock, docking station.

cramfs *n.* Short for **C**ompressed **R**ead-**O**nly **F**ile **S**ystem and **cr**am a filesystem onto a small ROM. A filesystem feature available with Linux version 2.4 systems. Cramfs are used in handheld Linux devices to compress and write applications to ROM or Flash memory.

crash¹ *n.* The failure of either a program or a disk drive. A program crash results in the loss of all unsaved data and can leave the operating system unstable enough to require restarting the computer. A disk drive crash, sometimes called a disk crash, leaves the drive inoperable and can cause loss of data. *See also* abend, head crash.

crash² *vb.* **1.** For a system or program, to fail to function correctly, resulting in the suspension of operation. *See also* abend. **2.** For a magnetic head, to hit a recording medium, with possible damage to one or both.

crash recovery *n.* The ability of a computer to resume operation after a disastrous failure, such as the failure of a hard drive. Ideally, recovery can occur without any loss of data, although usually some, if not all, data is lost. *See also* crash¹.

crawl *vb.* To compile and organize entries for a search engine by reading Web pages and related information. Crawling is typically performed by programs called “spiders.”

crawler *n.* *See* spider, Web browser.

Cray-1 *n.* An early supercomputer developed in 1976 by Seymour Cray. Extremely powerful in its day, the 64-bit Cray-1 ran at 75 MHz and was capable of executing 160 million floating-point operations per second. *See also* supercomputer.

CRC *n.* Acronym for **c**yclical (or **c**yclic) **r**edundancy **c**heck. A procedure used in checking for errors in data transmission. CRC error checking uses a complex calculation to generate a number based on the data transmitted. The sending device performs the calculation before transmission and includes it in the packet that it sends to the

receiving device. The receiving device repeats the same calculation after transmission. If both devices obtain the same result, it is assumed that the transmission was error free. The procedure is known as a redundancy check because each transmission includes not only data but extra (redundant) error-checking values. Communications protocols such as XMODEM and Kermit use cyclical redundancy checking.

create method *n.* In Java programming, a method defined in the home interface and invoked by a client to create an enterprise java bean. *See also* enterprise java bean, method.

creator *n.* On the Apple Macintosh, the program that creates a file. Files are linked to their creators by creator codes; this link enables the operating system to open the creator application when a document file is opened.

credentials *n.* A set of information that includes identification and proof of identification that is used to gain access to local and network resources. Examples of credentials are user names and passwords, smart cards, and certificates.

creeping featurism *n.* The process by which features are added to a new version of a program by software developers until the program becomes unduly cumbersome and difficult to use. Generally, creeping featurism occurs as developers attempt to enhance the competitiveness of the program with each new release by adding new features.

crippled version *n.* A scaled-down or functionally reduced version of hardware or software, distributed for demonstration purposes. *See also* demo.

critical error *n.* An error that suspends processing until the condition can be corrected either by software or by user intervention (for example, an attempt to read to a nonexistent disk, an out-of-paper condition on the printer, or a checksum fault in a data message).

critical-error handler *n.* A software routine that attempts to correct or achieve a graceful exit from a critical or threatening error. *See also* critical error, graceful exit.

critical path method *n.* A means of evaluating and managing a large project by isolating tasks, milestone events, and schedules and by showing interrelationships among them. The critical path for which this method is named is a line connecting crucial events, any of which, if delayed, affects subsequent events and, ultimately, completion of the project. *Acronym:* CPM.

C

opportunity to transmit, both nodes stop transmitting. To avoid another collision, both then wait for differing random amounts of time before attempting to transmit again. *Compare* token passing.

CSO *n.* Acronym for **Computing Services Office**. An Internet directory service that matches users' own names with e-mail addresses, generally at colleges and universities. The CSO service, which can be reached through Gopher, was originally developed at the Computing Services Office at the University of Illinois.

CSO name server *n.* A facility that provides e-mail directory information through the CSO system. *See also* CSO.

CSR *n.* *See* continuous speech recognition.

CSS *n.* **1.** *See* cascading style sheets. **2.** Acronym for **Content Scrambling System**. An encryption feature added to DVDs distributed with approval of the MPAA. CSS looks for a matching region code on the DVD and the playback device. If the codes do not match (such as for a DVD purchased in Japan and a DVD player purchased in the United States), CSS will not allow the DVD to play. CSS also will not allow a DVD to be played on playback equipment not approved by the MPAA. *See also* deCSS, region code.

CSS1 *n.* *See* cascading style sheets.

CSTN display *n.* *See* supertwist display.

CSU *n.* *See* DDS.

.csv *n.* The file extension for a comma-delimited text file.

CSV *n.* **1.** *See* circuit-switched voice. **2.** *See* alternate circuit-switched voice/circuit-switched data. **3.** Acronym for **comma separated values**. Filename extension assigned to text files containing tabular data of the sort stored in database fields. As the name indicates, individual data entries are separated by commas. *Compare* TSV.

CTERM *n.* *See* Communications Terminal Protocol.

CT Expo *n.* Acronym for **Computer Telephony Expo**. Annual exposition on data and communications issues involving the computer, telecommunications, and Internet industries. Held in Los Angeles, California, CT Expo features exhibits by hundreds of companies displaying their latest products and services, as well as conferences on a range of subjects affecting computer telephony.

CTI *n.* Acronym for **computer-telephony integration**. The practice of using a computer to control one or more telephone and communications functions.

CTIA *n.* *See* Cellular Telecommunications and Internet Association.

CTIA Wireless *n.* Annual conference of the wireless data, mobile Internet, and handheld computing industries. Sponsored by the Cellular Telecommunications and Internet Association, CTIA Wireless showcases products and technical developments in the field of wireless communications and data.

CTL *n.* Short for **control**. *See* control character (definition 2), Control key.

CTO *n.* Acronym for **Chief Technology Officer**. A corporate executive in charge of managing a company's information technology (IT) architecture and other technological assets. The CTO's responsibilities may include oversight of IT centers, networks and intranet, applications, databases, Web presence, and other technological resources.

CTRL or **Ctrl** *n.* Short for **control**. A designation used to label the Control key on computer keyboards. *See also* control character (definition 2), Control key.

Ctrl+Alt+Delete *n.* A three-key combination used with IBM and compatible computers to restart (reboot) the machine. Pressing Ctrl+Alt+Delete (Control+Alternate+Delete) causes a warm boot in MS-DOS—the computer restarts but does not go through all of the internal checks involved when power to the system is switched on (cold boot). In Windows 9x and Windows NT, Ctrl+Alt+Delete provides a dialog box from which the user may choose to shut down the computer or end any current tasks.

Ctrl+C *n.* **1.** In UNIX, the key combination used to break out of a running process. **2.** The keyboard shortcut recognized by many programs (as in Windows) as an instruction to copy the currently selected item.

Ctrl+S *n.* **1.** On systems in which a software handshake is used between terminals and a central computer, the key combination used to suspend output. Ctrl+Q will resume output after a Ctrl-S suspension. *See also* software handshake, XON/XOFF. **2.** A keyboard shortcut recognized by many programs as an instruction to save the current document or file.

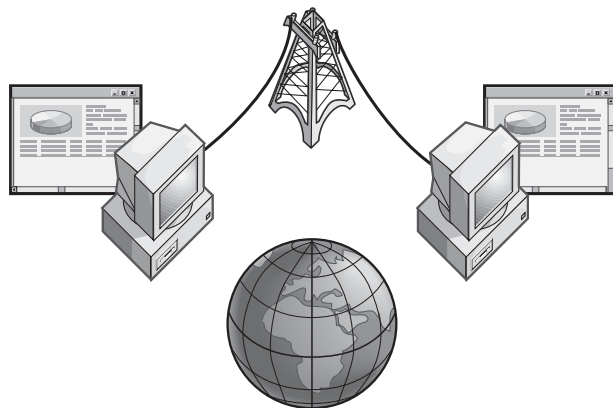
CTS *n.* Acronym for **Clear To Send**. In serial communications, a signal sent, as from a modem to its computer, to indicate that transmission can proceed. CTS is a hardware signal sent over line 5 in RS-232-C connections. *Compare* RTS.

CUA *n.* *See* Common User Access.

D

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, record¹, 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

D

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-overflow 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* record¹.

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.

line removal. **2.** Drawing objects from background to foreground to ease in the task of hidden-line removal.

deque *n.* Short for **double-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, view¹ (definition 2).

DES *n.* Acronym for **Data Encryption Standard**. 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,

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.

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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.

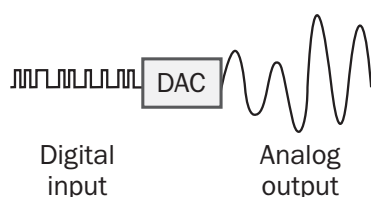
digital sort *n.* A type of ordering process in which record numbers or their key values are sorted digit by digit, beginning with the least significant (rightmost) digit. *Also called:* radix sort.

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.

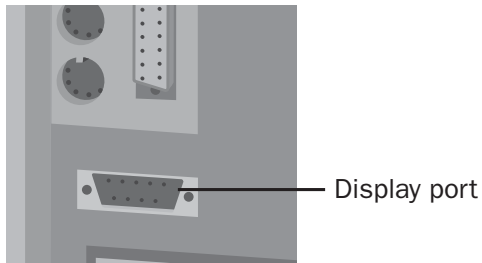
other text on the page. Sans serif faces such as Helvetica and Avant Garde often work well as display faces. *See also* sans serif. *Compare* body face.

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).

D

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 writ-

ten 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 (DACs) 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.

distro¹ *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.

distro² *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

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.

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.

E

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.

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

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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

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.

<i>a</i>	<i>b</i>	<i>a XOR b</i>
0	0	0
0	1	1
1	0	1
1	1	0

.exe *n.* In MS-DOS, a filename extension that indicates that a file is an executable program. To run an executable program, the user types the filename without the .exe extension at the prompt and presses Enter. *See also* executable program.

executable¹ *adj.* Of, pertaining to, or being a program file that can be run. Executable files have extensions such as .bat, .com, and .exe.

executable² *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

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 **facsimile**. 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 **facsimile 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.

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.

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 maxi-

mum 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-

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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* FTP¹ (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.

fill¹ *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.

fill² *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.

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* search².

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.

finger¹ *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.

finger² *vb.* To obtain information on a user by means of the finger program.

fingerprint¹ *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.

fingerprint² *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 140-1 products 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.

(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 non-maskable 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 unauthorized 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.

hash¹ *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.

hash² *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 hash².

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, hash², linear search, search algorithm.

hash total *n.* An error-checking value derived from the addition of a set of numbers taken from data (not necessarily numeric data) that is to be processed or manipulated in some way. After processing, the hash total is recalculated and compared with the original total. If the two do not match, the original data has been changed in some way.

hash value *n.* A value used in creating digital signatures. This value is generated by imposing a hashing algorithm onto a message. This value is then transformed, or signed, by a private key to produce a digital signature. *Also called:* message digest.

Haskell *n.* A functional programming language based on lambda calculus and suitable for the creation of applications that need to be highly modifiable.

Hayes-compatible *adj.* Responding to the same set of commands as the modems manufactured by Hayes Microcomputer Products. This command set has become the de facto standard for microcomputer modems.

HCM *n.* See hardware cryptographic module.

HDBMS *n.* See hierarchical database management system.

HDCP *n.* Acronym for **H**igh-**b**andwidth **D**igital **C**ontent **P**rotection. An encryption and authentication specification created by Intel for Digital Video Interface (DVI) devices such as digital cameras, high-definition televisions, and video disk players. HDCP is designed to protect transmissions between DVI devices from being copied.

HDF *n.* See Hierarchical Data Format.

HDLC *n.* Acronym for **H**igh-level **D**ata **L**ink **C**ontrol. A protocol for information transfer adopted by the ISO. HDLC is a bit-oriented, synchronous protocol that applies to the data-link (message-packaging) layer (layer 2 of the ISO/OSI reference model) for computer-to-microcomputer communications. Messages are transmitted in units called frames, which can contain differing amounts of data but

which must be organized in a particular way. *See also* frame (definition 1), ISO/OSI reference model.

HDML *n.* Acronym for **H**andheld **D**evice **M**arkup **L**anguage. A simple, first-generation markup language used to define hypertext-like content and applications for wireless and other handheld devices with small displays. This language is used primarily to create Web sites viewed via wireless phones and personal digital assistants (PDAs). HDML provides content consisting mainly of text with limited graphics. *See also* WML.

HDSL *n.* Acronym for **H**igh-bit-rate **D**igital **S**ubscriber **L**ine. A form of DSL, HDSL is a protocol for digital transmission of data over standard copper telecommunications lines (as opposed to fiber-optic lines) at rates of 1.544 Mbps in both directions. *Also called:* High-data-rate Digital Subscriber Line. *See also* DSL.

HDTP *n.* Acronym for **H**andheld **D**evice **T**ransport **P**rotocol. Protocol that enables a handheld device, such as a wireless phone or personal digital assistant (PDA), to access the Internet. HDTP regulates the input and output of data interpreted by the device's microbrowser. *See also* WAP.

HDTV *n.* Acronym for **H**igh-**D**efinition **T**ele**V**ision. A new television display standard that doubles the existing screen resolution and increases the screen aspect ratio from 4:3 to 16:9. This aspect ratio creates a television screen that is shaped like a movie screen.

HDTV-over-IP *n.* An Internet-based delivery option for High Definition Television (HDTV). HDTV-over-IP provides options for new and expanded services to ISPs, cable companies, telecommunications carriers, and business intranets, with its most extensive use in education. Universities use high-speed networks such as Internet2 to provide the intensive bandwidth demanded by HDTV-over-IP. Because HDTV-over-IP offers extreme image fidelity and sharpness, it is seen as ideal for delivery of distance education courses requiring precise visuals for which conventional video cannot provide sufficient resolution. *Also called:* iHDTV.

head *n.* **1.** The read/write mechanism in a disk or tape drive. It converts changes in the magnetic field of the material on the disk or tape surface to changing electrical signals and vice versa. Disk drives usually contain one head for each surface that can be read from and written to. **2.** In relation to software or documents, the top or beginning of something. **3.** In HTML, a section of coding that precedes the body of a document and is used to describe

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 **internetwork**. 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, FTP¹ (definition 1), Gopher, IRC, NSFnet, telnet¹, 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

L1 cache *n.* A memory cache built into i486 and higher-level processors to help improve processing speed. The L1 cache, typically containing 8 KB, can be read in a single clock cycle, so it is tried first. The i486 contains one L1 cache; the Pentium contains two, one for code and one for data. *Also called:* level 1 cache, on-chip cache. *See also* cache, i486DX, Pentium. *Compare* L2 cache.

L2 cache *n.* A memory cache consisting of static RAM on a motherboard that uses an i486 or higher-level processor. The L2 cache, which typically contains 128 KB to 1 MB, is faster than the system DRAM but slower than the L1 cache built into the CPU chip. *Also called:* level 2 cache. *See also* cache, dynamic RAM, i486DX, static RAM. *Compare* L1 cache.

L2TP *n.* *See* Layer Two Tunneling Protocol.

L8R *adv.* Abbreviation for later, as in “See you later,” an expression often used in e-mail or Usenet groups as a closing remark.

label *n.* An identifier. A label can be a physical item, such as a stick-on tag used to identify disks and other computer equipment, or an electronic label added to floppy disks or hard disks. It can also be a word, symbol, or other group of characters used to identify a file, a storage medium, an element defined in a computer program, or a specific item in a document such as a spreadsheet or a chart. *See also* identifier.

label edge router *n.* *See* MPLS.

label prefix *n.* In a spreadsheet, a character at the beginning of a cell entry that identifies the entry to the program as a label.

label switching *n.* *See* MPLS.

label switch path *n.* *See* MPLS.

label switch router *n.* *See* MPLS.

LACP *n.* Acronym for **Link Aggregation Control Protocol**. *See* link aggregation.

lag *n.* The time difference between two events. In electronics, a lag is a delay between a change in input and a change in output. On computer displays, a lag is a fading

brightness left on the phosphor coating of the screen after an image changes. *See also* persistence.

LAN *n.* Acronym for **local area network**. A group of computers and other devices dispersed over a relatively limited area and connected by a communications link that enables any device to interact with any other on the network. LANs commonly include PCs and shared resources such as laser printers and large hard disks. The devices on a LAN are known as nodes, and the nodes are connected by cables through which messages are transmitted. *See also* baseband network, broadband network, bus network, client/server architecture, collision detection, communications protocol, contention, CSMA/CD, network, peer-to-peer architecture, ring network, star network. *Compare* WAN.

landscape mode *n.* A horizontal print orientation in which text or images are printed “sideways”—that is, the width of the image on the page is greater than the height. *Compare* portrait mode.

landscape monitor *n.* A monitor that is wider than it is high. Landscape monitors are usually about 33 percent wider than they are high—roughly the same proportion as a television screen. *Compare* full-page display, portrait monitor.

LANE *n.* Acronym for **LAN Emulation**. *See* ATM (definition 1), communications protocol, LAN.

LANGID *n.* *See* language identifier.

language *n.* *See* programming language.

language-description language *n.* *See* metalanguage.

language identifier *n.* A standard international numeric abbreviation for a country or geographical region. A language identifier is a 16-bit value that consists of a primary language identifier and a secondary language identifier. *Acronym:* LANGID. *See also* locale identifier.

language processor *n.* A hardware device or a software program designed to accept instructions written in a particular language and translate them into machine code. *See also* compiler (definition 2), interpreter.

LLC *n.* Acronym for **Logical Link Control**. In the IEEE 802.x specifications, the higher of two sublayers that make up the ISO/OSI data link layer. The LLC is responsible for managing communications links and handling frame traffic. *See also* IEEE 802.x, MAC.

Lmhosts file *n.* A local text file that lists the names of network hosts (sometimes called NetBIOS names) to IP addresses for hosts that are not located on the local subnet. *See also* IP address, systemroot.

load¹ *n.* **1.** The total computing burden a system carries at one time. **2.** In electronics, the amount of current drawn by a device. **3.** In communications, the amount of traffic on a line.

load² *vb.* To place information from storage into memory for processing, if it is data, or for execution, if it is program code.

load-and-go *adj.* In reference to a routine, able to begin execution immediately, once loaded. The term is commonly used in reference to compilers and the machine code they generate.

load balancing *n.* **1.** In distributed processing, the distribution of activity across two or more servers in order to avoid overloading any one with too many requests from users. Load balancing can be either static or dynamic. In the former, the load is balanced ahead of time by assigning different groups of users to different servers. In the latter, software refers incoming requests at runtime to whichever server is most capable of handling them. **2.** In client/server network administration, the process of reducing heavy traffic flows either by dividing a busy network segment into multiple smaller segments or by using software to distribute traffic among multiple network interface cards working simultaneously to transfer information to a server. **3.** In communications, the process of routing traffic over two or more routes rather than one. Such load balancing results in faster, more reliable transmissions.

loaded line *n.* A transmission cable fitted with loading coils, usually spaced about a mile apart, that reduce amplitude distortion in a signal by adding inductance (resistance to changes in current flow) to the line. Loaded lines minimize distortion within the range of frequencies affected by the loading coils, but the coils also reduce the bandwidth available for transmission.

loader *n.* A utility that loads the executable code of a program into memory for execution. On most microcomputers, the loader is an invisible part of the operating system

and is automatically invoked when a program is run. *See also* loader routine, load module.

loader routine *n.* A routine that loads executable code into memory and executes it. A loader routine can be part of an operating system or it can be part of the program itself. *See also* loader, overlay¹ (definition 1).

load module *n.* An executable unit of code loaded into memory by the loader. A program consists of one or more load modules, each of which can be loaded and executed independently. *See also* loader.

load point *n.* The beginning of the valid data area on a magnetic tape.

load sharing *n.* A method of managing one or more tasks, jobs, or processes by scheduling and simultaneously executing portions of them on two or more microprocessors.

load shedding *n.* In electrical systems, the process of turning off power to some electronic equipment in order to maintain the integrity of the power supply to other connected devices. *See also* UPS.

lobby page *n.* A page of information about the broadcast that is displayed in the viewer's browser before the broadcast begins. It can contain a title, subject, host's name, information about the broadcast, and a countdown to the time of the broadcast.

local *adj.* **1.** In general, close at hand or restricted to a particular area. **2.** In communications, a device that can be accessed directly rather than by means of a communications line. **3.** In information processing, an operation performed by the computer at hand rather than by a remote computer. **4.** In programming, a variable that is restricted in scope, that is, used in only one part (subprogram, procedure, or function) of a program. *Compare* remote.

local area network *n.* *See* LAN.

local bus *n.* A PC architecture designed to speed up system performance by allowing some expansion boards to communicate directly with the microprocessor, bypassing the normal system bus entirely. *See also* PCI local bus, VL bus.

local bypass *n.* A telephone connection used by some businesses that links separate buildings but bypasses the telephone company.

locale identifier *n.* A 32-bit value that consists of a language identifier and a sort identifier. In code, a locale

L

identifier (LCID) identifies the primary language and any secondary language of a specific locale. *Acronym:* LCID. *See also* language identifier.

localhost *n.* The name that is used to represent the same computer on which a TCP/IP message originates. An IP packet sent to localhost has the IP address 127.0.0.1 and does not actually go out to the Internet. *See also* IP address, packet (definition 1), TCP/IP.

localization *n.* The process of altering a program so that it is appropriate for the geographic area in which it is to be used. Localization involves the customization or translation of the separated data and resources required for a specific region or language. For example, the developers of a word processing program must localize the sorting tables in the program for different countries or languages because the correct order of characters in one language might be incorrect in another. L10N is a common abbreviation for Localization, where the “L” in Localization is followed by 10 letters and ends with the letter “N.”

localized version *n.* A version of a program that has been translated into another language. *Also called:* international version.

local loop *n.* The (end) portion of a telephone connection that runs from the subscriber to the local telephone exchange. *See also* last mile.

local memory *n.* In multiprocessor systems, the memory on the same card or high-speed bus as a particular processor. Typically, memory that is local to one processor cannot be accessed by another without some form of permission.

local newsgroups *n.* Newsgroups that are targeted toward a geographically limited area such as a city or educational institution. Posts to these newsgroups contain information that is specific to the area, concerning such topics as events, meetings, and sales. *See also* newsgroup.

local reboot *n.* A reboot of the machine that one is directly working on, rather than of a remote host. *See also* reboot.

LocalTalk *n.* An inexpensive cabling scheme used by AppleTalk networks to connect Apple Macintosh computers, printers, and other peripheral devices. *See also* AppleTalk.

local user profile *n.* A user profile that is created automatically on the computer the first time a user logs on to a

computer. *See also* mandatory user profile, roaming user profile, user profile.

local variable *n.* A program variable whose scope is limited to a given block of code, usually a subroutine. *See also* scope (definition 1). *Compare* global variable.

location *n.* *See* address¹ (definition 1).

location-based service *n.* A service provided to a wireless mobile device based on the device’s location. Location-based services can range from simple services, such as listing nearby restaurants, to more complex features, such as connecting to the Internet to monitor traffic conditions and find the least congested route to a destination.

lock *n.* **1.** A software security feature that requires a key or dongle in order for the application to run correctly. *See also* dongle. **2.** A mechanical device on some removable storage medium (for example, the write-protect notch on a floppy disk) that prevents the contents from being overwritten. *See also* write-protect notch.

locked file *n.* **1.** A file on which one or more of the usual types of manipulative operation cannot be performed—typically, one that cannot be altered by additions or deletions. **2.** A file that cannot be deleted or moved or whose name cannot be changed.

locked volume *n.* On the Apple Macintosh, a volume (storage device, such as a disk) that cannot be written to. The volume can be locked either physically or through software.

lockout *n.* The act of denying access to a given resource (file, memory location, I/O port), usually to ensure that only one program at a time uses that resource.

lock up *n.* A condition in which processing appears to be completely suspended and in which the program in control of the system will accept no input. *See also* crash¹.

log *n.* A record of transactions or activities that take place on a computer system. *See* logarithm.

logarithm *n.* Abbreviated log. In mathematics, the power to which a base must be raised to equal a given number. For example, for the base 10, the logarithm of 16 is (approximately) 1.2041 because $10^{1.2041}$ equals (approximately) 16. Both natural logarithms (to the base *e*, which is approximately 2.71828) and common logarithms (to the base 10) are used in programming. Languages such as C and Basic include functions for calculating natural logarithms.

MPC *n.* See Multimedia PC.

.mpeg *n.* The file extension that identifies video and sound files compressed in the MPEG format specified by the Moving Pictures Experts Group. *See also* MPEG.

MPEG *n.* **1.** Acronym for **M**oving **P**icture **E**xperts **G**roup. A set of standards for audio and video compression established by the Joint ISO/IEC Technical Committee on Information Technology. The MPEG standard has different types that have been designed to work in different situations. *Compare* Motion JPEG. **2.** A video/audio file in the MPEG format. Such files generally have the extension .mpg. *See also* JPEG. *Compare* Motion JPEG.

MPEG-1 *n.* The original MPEG standard for storing and retrieving video and audio information, designed for CD-ROM technology. MPEG-1 defines a medium bandwidth of up to 1.5 Mbps, two audio channels, and noninterlaced video. *See also* MPEG (definition 1). *Compare* MPEG-2, MPEG-3, MPEG-4.

MPEG-2 *n.* An extension of the MPEG-1 standard designed for broadcast television, including HDTV. MPEG-2 defines a higher bandwidth of up to 40 Mbps, five audio channels, a wider range of frame sizes, and interlaced video. *See also* HDTV, MPEG (definition 1). *Compare* MPEG-1, MPEG-3, MPEG-4.

MPEG-3 *n.* Initially an MPEG standard designed for HDTV (high-definition television), but it was found that MPEG-2 could be used instead. Therefore, this standard no longer exists. *See also* HDTV, MPEG (definition 1). *Compare* MP3, MPEG-1, MPEG-2, MPEG-4.

MPEG-4 *n.* A standard currently under development designed for videophones and multimedia applications. MPEG-4 provides a lower bandwidth of up to 64 Kbps. *See also* MPEG (definition 1). *Compare* MPEG-1, MPEG-2, MPEG-3.

.mpg *n.* *See* .mpeg.

MPI *n.* Acronym for **M**essage **P**assing **I**nterface. A specification for message passing on workstation clusters and massively parallel processing (MPP) architectures. MPI was designed as a proposed standard by the MPI Forum, a committee of vendors and users.

MPLS *n.* Acronym for **M**ultiprotocol **L**abel **S**witching. A standards-based technique used to manage and optimize traffic flow for large-scale networks. In an MPLS network, incoming packets are assigned a label by a label edge router (LER). Label switch routers (LSRs) use these labels

to forward the packets through the network along a label switch path (LSP). Each LSR removes the existing label and assigns a new one. MPLS combines the advantages of bridges (Layer 2 switching, which is used in ATM and frame relay) and routers (Layer 3 switching, which is used in IP). MPLS serves to create faster and more scalable networks to facilitate quality of service, class of service, and the use of VPNs.

MP/M *n.* Acronym for **M**ultitasking **P**rogram for **M**icrocomputers. A multitasking, multiuser version of the CP/M operating system. *See also* CP/M.

MPOA *n.* Acronym for **M**ulti-**P**rotocol **O**ver **A**TM. A specification established by the ATM Forum (an industry group of Asynchronous Transfer Mode users and vendors) to integrate ATM into existing Ethernet, token ring, and TCP/IP networks. *See also* ATM (definition 1).

MPP *n.* *See* massively parallel processing, massively parallel processor.

MPPP *n.* *See* Multilink Point-to-Point Protocol.

MPR II *n.* A standard for limiting magnetic and electric field emissions from video monitors, including VLF radiation. MPR II is a voluntary standard developed by the Swedish Board for Measurement and Testing in 1987 and updated in 1990. *See also* VLF radiation.

mput *n.* In many FTP clients, the command that instructs the local client to transmit multiple files to the remote server.

MR *n.* Acronym for **m**odem **r**eady. A light on the front panel of a modem indicating that the modem is ready.

MRP *n.* *See* Material Requirements Planning.

ms *n.* *See* millisecond.

MSAA *n.* Short for **M**icrosoft **A**ctive **A**ccessibility. *See* Active Accessibility.

MSAU *n.* *See* MAU.

MS Audion. *n.* The code name, or working name, of Windows Media Audio, before the technology was released by Microsoft. *See also* Windows Media Audio.

MSB *n.* *See* most significant bit.

MSC *n.* *See* most significant character.

MSD *n.* *See* most significant digit.

MSDN *n.* Acronym for the **M**icrosoft **D**eveloper **N**etwork. An online, print, and CD-DVD resource for developers

through the server to a CGI script for processing. *See also* CGI, CGI script, HTML.

naming container *n.* Any ASP.NET control that implements the INamingContainer interface. This is a marker interface that enables a control to create a new naming scope under itself so that ID attributes assigned to its child controls are unique within the entire ASP.NET page that contains the control.

NAMPS *n.* Acronym for **N**arrow-band **A**nalog **M**obile **P**hone **S**ervice. A standard proposed by Motorola Corporation that combines the current AMPS cellular telephone standard with digital signaling information, resulting in higher performance and increased capabilities. *See also* AMPS.

NAND *n.* Short for **NOT AND**. A logical operation that combines the values of two bits (0,1) or two Boolean values (false, true) that returns a value of 1 (or true) if one input value is 0 (or false), and returns a 0 (false) only if both inputs are true.

NAND gate *n.* Short for **NOT AND gate**. A digital circuit whose output is true (1) if any input is false (0). A NAND gate is an AND circuit (output with the value of 1 when all input values are 1) followed by a NOT circuit (output that is the logical complement of the input). Thus, NAND gate output is high if any of its inputs are low. *See also* AND gate, gate (definition 1), NOT gate.

nano- *prefix* Abbreviated *n.* Metric prefix meaning 10^{-9} (one billionth).

nanosecond *n.* One billionth of a second. A nanosecond is a time measure used to represent computing speed, particularly the speed at which electrical signals travel through circuits within the computer. *Acronym:* ns.

NAP *n.* *See* Network Access Point.

Napster *n.* An Internet music search application that allows users to search for and swap MP3 files over the Web. In response to a user request for a song or an artist, Napster searches the hard drives of all other Napster users on line. When the requested item is found, the file is downloaded to the computer making the request. Napster also includes a chat room and a library of most popular items. The introduction of Napster in 1999 sparked heated debate over copyright and digital distribution issues. *See also* MP3.

narrowband *n.* A bandwidth set aside by the FCC for mobile or portable radio services, such as advanced two-way paging systems, including transmission rates between 50 bps and 64 Kbps. Narrowband formerly referred to the bandwidth from 50 to 150 bps. *See also* bandwidth, FCC. *Compare* broadband.

narrowband ISDN *n.* Name used to distinguish current ISDN lines from the developing broadband ISDN technology. *See also* broadband ISDN, ISDN.

arrowcast *vb.* To transmit data or programming to a defined or limited area or audience. A cable television company narrowcasts its programs only to subscribers, whereas network television stations *broadcast* to everyone with reception equipment in their transmission range. On the Web, content delivered to users via push technology represents a form of narrowcasting. *See also* unicast. *Compare* broadcast (definition 2), multicasting.

Narrow SCSI *n.* A SCSI or SCSI-2 interface that can transfer data only 8 bits at a time. *See also* SCSI, SCSI-2. *Compare* Fast/Wide SCSI, Wide SCSI.

NAS *n.* Acronym for **N**etwork-**A**ttached **S**torage. A platform-independent storage appliance connected to a network. NAS uses a storage unit with a built-in server that can communicate with clients over a network. NAS devices are popular for ease of maintenance, manageability, and scalability. *Compare* SAN.

NAT *n.* Acronym for **N**etwork **A**ddress **T**ranslation. The process of converting between IP addresses used within an intranet or other private network and Internet IP addresses. This approach makes it possible to use a large number of addresses within the private network without depleting the limited number of available numeric Internet IP addresses. Variations of NAT displaying similar functions include IP aliasing, IP masquerading, and Port Address Translation.

national attachment point *n.* *See* Network Access Point.

National Center for Supercomputing Applications *n.* *See* NCSA (definition 1).

National Committee for Information Technology Standards *n.* A committee formed by the Information Technology Industry Council to develop national standards for use in the information technology industry and to promote those standards for international use. *Acronym:* NCITS.

National Computer Security Association *n.* *See* ICSCA.

Net surfing *n.* The practice of exploring the Internet without a specific goal in mind. The concept of Net surfing is similar to (and probably derived from) “channel surfing” in reference to watching television.

Net TV *n.* *See* Internet television.

NetWare *n.* A family of LAN (local area network) operating system products developed by Novell, Inc. Designed to run on PCs and Macintoshes, Novell NetWare allows users to share files and system resources such as hard disks and printers. *See also* network operating system.

network *n.* A group of computers and associated devices that are connected by communications facilities. A network can involve permanent connections, such as cables, or temporary connections made through telephone or other communication links. A network can be as small as a LAN (local area network) consisting of a few computers, printers, and other devices, or it can consist of many small and large computers distributed over a vast geographic area (WAN, or wide area network). *See also* ALOHAnet, Ethernet (definition 1), LAN, WAN.

Network Access Point *n.* One of the interchange points for Internet traffic, where various Internet network carriers and major ISPs exchange data. When Internet traffic originates on one network and goes to another network, it almost always passes through at least one Network Access Point, or NAP. In the United States, major NAPs include MAE East, in Vienna, Virginia, and MAE West, in San Jose, California (both operated by MCI WorldCom); the Chicago NAP (operated by Ameritech); the Pacific Bell NAP (with multiple locations in California); the Digital Internet Exchange in Palo Alto, California (operated by Digital/Compaq); and the Sprint NAP in Pennsauken, New Jersey. Additional local and regional exchange points are located in many other locations around the world. *Acronym:* NAP. *Also called:* National Attachment Point.

network adapter *n.* *See* network interface card.

Network Address Translation *n.* *See* NAT.

network administrator *n.* The person in charge of operations on a computer network. The duties of a network administrator can be broad and might include such tasks as installing new workstations and other devices, adding and removing individuals from the list of authorized users, archiving files, overseeing password protection and other security measures, monitoring usage of shared resources, and handling malfunctioning equipment. *See also* system administrator.

network architecture *n.* The underlying structure of a computer network, including hardware, functional layers, interfaces, and protocols, used to establish communication and ensure the reliable transfer of information. Network architectures are designed to provide both philosophical and physical standards for the complexities of establishing communications links and transferring information without conflict. Various network architectures exist, including the internationally accepted seven-layer ISO Open Systems Interconnection (OSI) model and IBM’s Systems Network Architecture (SNA). *See also* ISO/OSI reference model, SNA.

Network-Attached Storage *n.* *See* NAS.

network boot *n.* *See* PXE boot.

network card *n.* *See* network interface card.

network-centric computing *n.* A computing environment in which a network server or servers represent the hub of activity. Considered the “third wave” in large-system computing after mainframe and desktop developments, network-centric computing establishes servers as the main source of computing power, to give users direct access to network-based applications and information. In network-centric computing systems, applications are not preinstalled or uninstalled locally, that is, on the desktop; they are accessed on an as-needed, “on-the-fly” basis. Thus, individual desktop computers do not have to maintain large amounts of disk storage or load and manage application programs. *See also* server.

network computer *n.* A computer designed for use on a network in which programs and storage are provided by servers. Network computers, unlike dumb terminals, have their own processing power, but their design does not include local storage and they depend on network servers for applications. *Acronym:* NC.

network congestion *n.* *See* congestion.

network connection *n.* *See* Ethernet.

network control program *n.* In a communications network that includes a mainframe computer, a program that usually resides in a communications controller and takes over communications tasks such as routing, error control, line control, and polling (checking terminals for transmissions), leaving the main computer free for other functions. *See also* communications controller.

Network Control Protocol *n.* *See* Point-to-Point Protocol.

network database *n.* **1.** A database that runs in a network. **2.** A database containing the address of other users in the network. **3.** In information management, a type of database in which data records can be related to one another in more than one way. A network database is similar to a hierarchical database in the sense that it contains a progression from one record to another. It differs in being less rigidly structured: any single record can point to more than one other record and, conversely, can be pointed to by one or more records. In effect, a network database allows more than one path between any two records, whereas a hierarchical database allows only one, from parent (higher-level record) to child (lower-level record). *Compare* hierarchical database, relational database.

Network Data Management Protocol *n.* *See* NDMP.

network device driver *n.* Software that coordinates communication between the network adapter card and the computer's hardware and other software, controlling the physical function of the network adapter card.

network directory *n.* On a local area network, a directory on a disk that is located on a computer other than the one the user is operating. A network directory differs from a network drive in that the user has access to only that directory. Whether the rest of the disk is accessible to the user depends on whether he or she has been granted access rights by the network administrator. On the Macintosh, a network directory is referred to as a shared folder. *Also called:* networked directory, shared directory. *See also* network drive, shared folder.

network drive *n.* On a local area network, a disk drive whose disk is available to other computers on the network. Access to a network drive might not be allowed to all users of the network; many operating systems contain security provisions that enable a network administrator to grant or deny access to part or all of a network drive. *Also called:* networked drive. *See also* network directory.

Network Driver Interface Specification *n.* *See* NDIS.

networked directory *n.* *See* network directory.

networked drive *n.* *See* network drive.

networked home *n.* *See* smart home.

Network File System *n.* *See* NFS.

network information center *n.* *See* NIC (definition 2).

network interface card *n.* An expansion card or other device used to provide network access to a computer or other device, such as a printer. Network interface cards

mediate between the computer and the physical media, such as cabling, over which transmissions travel. *Acronym:* NIC. *Also called:* network adapter, network card.

Network Kernel Extension *n.* *See* NKE.

network latency *n.* The time it takes for information to be transferred between computers in a network.

network layer *n.* The third of the seven layers in the ISO/OSI reference model for standardizing computer-to-computer communications. The network layer is one level above the data-link layer and ensures that information arrives at its intended destination. It is the middle of the three layers (data-link, network, and transport) concerned with the actual movement of information from one device to another. *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

Network layer.

network meltdown *n.* *See* broadcast storm, meltdown.

network model *n.* A database structure, or layout, similar to a hierarchical model, except that records can have multiple parent records as well as multiple child records. A database management system that supports a network model can be used to simulate a hierarchical model. *See also* CODASYL, network database (definition 3). *Compare* hierarchical model.

network modem *n.* A modem that is shared by users of a network for calling an online service provider, an ISP, a service bureau, or other online source. *See also* ISP, modem online information service, service bureau (definition 2).

news.announce.newusers *n.* A newsgroup that contains general information for new users about using Internet newsgroups.

newsfeed or **news feed** *n.* Deliveries, exchanges, or distributions of newsgroup articles to and from news servers. Newsfeeds are accomplished through cooperating news servers, which communicate via NNTP through network connections. *Also called:* feed. *See also* newsgroup, news server, NNTP.

newsgroup *n.* A forum on the Internet for threaded discussions on a specified range of subjects. A newsgroup consists of articles and follow-up posts. An article with all of its follow-up posts—which are (supposed to be) related to the specific subject named in the original article’s subject line—constitutes a thread. Each newsgroup has a name that consists of a series of words, separated by periods, indicating the newsgroup’s subject in terms of increasingly narrow categories, such as rec.crafts.textiles.needlework. Some newsgroups can be read and posted to only on one site; others, such as those in the seven Usenet hierarchies or those in ClariNet, circulate throughout the Internet. *See also* article, bit, newsgroups, ClariNet, follow-up, Great Renaming, local newsgroups, mail reflector, threaded discussion, traditional newsgroup hierarchy, Usenet. *Compare* mailing list.

newsmaster *n.* The person in charge of maintaining the Internet news server at a particular host. Sending e-mail to “newsmaster@domain.name” is the standard way to reach a given newsmaster.

news. newsgroups *n.* Usenet newsgroups that are part of the news. hierarchy and begin with “news.” These newsgroups cover topics that deal with Usenet itself, such as Usenet policy and the creation of new Usenet newsgroups. *See also* newsgroup, traditional newsgroup hierarchy, Usenet. *Compare* comp. newsgroups, misc. newsgroups, rec. newsgroups, sci. newsgroups, soc. newsgroups, talk. newsgroups.

.newsrsc *n.* The file extension that identifies a setup file for UNIX-based newsreaders. The setup file typically contains a current list of newsgroups that the user subscribes to and the articles in each newsgroup that the user has already read. *See also* newsreader, setup (definition 2).

newsreader *n.* A Usenet client program that enables a user to subscribe to Usenet newsgroups, read articles, post follow-ups, reply by e-mail, and post articles. Many Web browsers also provide these functions. *See also* article,

e-mail (definition 1), follow-up, newsgroup, Usenet, Web browser.

news server *n.* A computer or program that exchanges Internet newsgroups with newsreader clients and other servers. *See also* newsgroup, newsreader.

Newton *n.* A personal digital assistant (PDA) developed by Apple Computer, Inc. *See also* PDA.

Newton OS *n.* The operating system that controls the Newton MessagePad personal digital assistant (PDA). *See also* PDA.

NeXT *n.* A computer designed and produced by NeXT Computer, Inc. (later NeXT Software, Inc.), a computer manufacturer and software developer founded in 1985 by Steven Jobs. NeXT was purchased by Apple Computer in 1997.

Next Generation Internet *n.* An initiative funded by the U.S. federal government designed to develop faster, more powerful networking technologies than are available on the current global Internet. The Next Generation Internet, or NGI, was begun in 1997 under the auspices of a number of government agencies, including DARPA (Defense Advanced Research Projects Agency), NASA (National Aeronautics & Space Administration), and the NSF (National Science Foundation). Its objective is to develop advanced networking technologies and to demonstrate them on university and government test networks running 100 to 1000 times faster than the current Internet. The technologies developed are intended for eventual use by schools, businesses, and the general public. *Acronym:* NGI. *Compare* Internet, Internet2.

NFS *n.* Acronym for Network File System. A distributed file system that allows users to access remote files and directories on a network as if they were local. NFS is compatible with Microsoft Windows and UNIX-based systems, including Linux and Mac OS X.

NGI *n.* *See* Next Generation Internet.

nibble or **nybble** *n.* Half a byte (4 bits). *Compare* quadbit.

NIC *n.* **1.** *See* network interface card. **2.** Acronym for network information center. An organization that provides information about a network and other support to users of the network. The principal NIC for the Internet is InterNIC. Intranets and other private networks may have their own NICs. *See also* InterNIC.

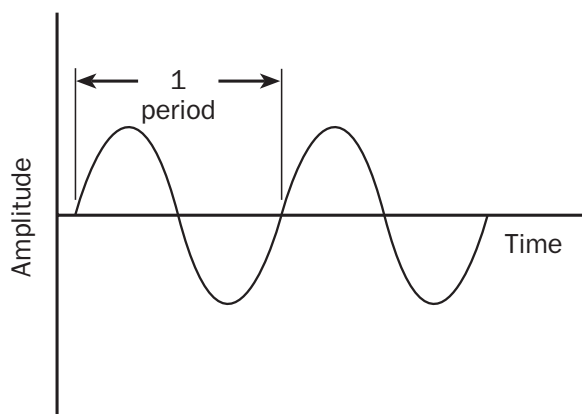
NiCad battery *n.* *See* nickel cadmium battery.

2. A 486 PC that can be upgraded to Pentium class by adding a Pentium processor. *See also* i486DX.

perfboard *n.* Short for **perforated fiber board**. *See* breadboard.

performance monitor *n.* A process or program that appraises and records status information about various system devices and other processes.

period *n.* The length of time required for an oscillation to complete one full cycle. For an oscillating electrical signal, the period is the time between waveform repetitions. If f is the frequency of oscillation in hertz, and t is the period in seconds, then $t = 1/f$. *See* the illustration.



Period. *The period of an oscillating signal.*

peripheral *n.* In computing, a device, such as a disk drive, printer, modem, or joystick, that is connected to a computer and is controlled by the computer's microprocessor. *Also called:* peripheral device. *See also* console.

Peripheral Component Interconnect *n.* *See* PCI local bus.

peripheral device *n.* *See* peripheral.

peripheral power supply *n.* An auxiliary source of electricity used by a computer or a device as a backup in case of a power failure. *Acronym:* PPS.

Perl *n.* Acronym for **P**ractical **E**xtraction and **R**eport **L**anguage. An interpreted language, based on C and several UNIX utilities. Perl has powerful string-handling features for extracting information from text files. Perl can assemble a string and send it to the shell as a command; hence, it

is often used for system administration tasks. A program in Perl is known as a script. Perl was devised by Larry Wall at NASA's Jet Propulsion Laboratory.

permanent storage *n.* A recording medium that retains the data recorded on it for long periods of time without power. Ink on paper is by far the most widely used permanent storage, but data can be transferred from paper to a computer only with difficulty. Typically, some form of magnetic medium, such as floppy disk or tape, is preferable. Magnetic media are generally accepted as permanent, even though the magnetic fields that encode data in the media tend to fade eventually (in five years or more). *See also* nonvolatile memory.

permanent swap file *n.* In Windows, a file composed of contiguous disk sectors used for virtual memory operations. *See also* swap file, virtual memory.

permanent virtual circuit *n.* *See* PVC.

permission *n.* In a networked or multiuser computer environment, the ability of a particular user to access a particular resource by means of his or her user account. Permissions are granted by the system administrator or other authorized person. Several levels of access can be given: read only, read and write (view and change), or read, write, and delete. *Also called:* Access permission.

permission class *n.* A class that defines access to a resource or defines an identity by supporting authorization checks.

permission object *n.* An instance of a permission class that represents access rights to resources or identity. A permission object can be used to specify a request, a demand, or a grant of permission.

permissions log *n.* A file on a network or multiuser computer environment where permissions for users are stored. When a user attempts to access a resource on the system, the permissions log is checked to see whether the user has permission to use it.

perpendicular recording *n.* A method of increasing storage capacity on magnetic media by aligning the magnetic dipoles, whose orientation determines bit values, in a direction that is perpendicular to the recording surface. *Also called:* vertical recording.

when it starts; data for that session goes to that port number, and the port number goes out of use when the session ends. A total of 65,535 port numbers are available for use with TCP, and the same number are available for UDP. *See also* IP, Simple Mail Transfer Protocol, socket (definition 1), TCP, UDP. *Compare* IP address.

portrait mode *n.* A vertical print orientation in which a document is printed across the narrower dimension of a rectangular sheet of paper. This is the print mode typical of most letters, reports, and other such documents. *Compare* landscape mode.

portrait monitor *n.* A monitor with a screen shape higher than it is wide. The proportions (but not necessarily the size) of the screen are usually the same as for a sheet of 8½-by-11-inch paper. *Compare* landscape monitor.

port replicator *n.* A device that enables easy connection of portable computers to less portable devices, such as printers, monitors, and full-sized keyboards. Instead of having to connect each such device individually to a portable computer, a user can plug it permanently into a port replicator and use it simply by plugging the computer into a single socket, also on the port replicator. Port replicators are comparable to docking stations, but without the same capability for expansion and storage. *Also called:* convenience adapter. *See also* docking station, port.

POS *n.* Acronym for **point of sale**. The place in a store at which goods are paid for. Computerized transaction systems, such as those in use at automated supermarkets, use scanners for reading tags and bar codes, electronic cash registers, and other special devices to record purchases at this point.

POSIT *n.* Acronym for **Profiles for Open Systems Inter-networking Technology**. A set of nonmandatory standards for U.S. government network equipment. POSIT, which recognizes the prevalence of TCP/IP, is the successor to GOSIP. *See also* GOSIP, TCP/IP.

positional notation *n.* In mathematics, a form of notation whose meaning relies in part on the relative location of the elements involved. For example, common numeric notation is positional notation. In the decimal number 34, the position of the numeral 3 signifies three 10s and the position of the numeral 4 signifies four 1s.

POSIX *n.* Acronym for **Portable Operating System Interface for UNIX**. An Institute of Electrical and Electronics Engineers (IEEE) standard that defines a set of operating-system services. Programs that adhere to the POSIX standard can be easily ported from one system to another. POSIX was based on UNIX system services, but it was created in a way that allows it to be implemented by other operating systems. *See also* service (definition 2).

post¹ *n.* *See* article.

post² *vb.* **1.** To submit an article in a newsgroup or other online conference or forum. The term is derived from the “posting” of a notice on a physical bulletin board. *See also* newsgroup. **2.** To place a file on a server on a network or on a Web site.

POST *n.* *See* power-on self test.

posterization *n.* *See* contouring.

postfix notation *n.* A form of algebraic notation in which the operators appear after the operands. *Also called:* reverse Polish notation. *Compare* infix notation, prefix notation.

postmaster *n.* The logon name (and therefore the e-mail address) of an account that is responsible for maintaining e-mail services on a mail server. When an account holder is having trouble with e-mail, a message to postmaster or “postmaster@machine.org.domain.name” will usually reach a human who can solve the problem.

post office *n.* The server and associated storage and mail handling services that provide the centralized location for collection and distribution of e-mail over a network.

Post Office Protocol *n.* A protocol for servers on the Internet that receive, store, and transmit e-mail and for clients on computers that connect to the servers to download and upload e-mail. *Acronym:* POP.

postprocessor *n.* A device or a software routine, such as a linker, that operates on data manipulated first by another processor. *See also* back-end processor (definition 2). *Compare* preprocessor.

PostScript *n.* A page-description language from Adobe Systems that offers flexible font capability and high-quality graphics. The most well-known page-description lan-

preventive maintenance *n.* Routine servicing of hardware intended to keep equipment in good operating condition and to find and correct problems before they develop into severe malfunctions.

preview *n.* In word processors and other applications, the feature that formats a document for printing but displays it on the video monitor rather than sending it directly to the printer.

PRI *n.* Acronym for **Primary Rate Interface**. One of two ISDN transmission rate services (the other is the basic rate interface, BRI). PRI has two variations. The first, which operates at 1.536 Mbps, transmits data over 23 B channels and sends signaling information at 64 Kbps over one D channel in the United States, Canada, and Japan. The second, which operates at 1.984 Mbps, transmits data over 30 B channels and sends signaling information at 64 Kbps over one D channel in Europe and Australia. *See also* BRI, ISDN.

primary channel *n.* The data-transmission channel in a communications device, such as a modem. *Compare* secondary channel.

Primary Domain Controller *n.* **1.** In Windows NT, a database providing a centralized administration site for resources and user accounts. The database allows users to log onto the domain, rather than onto a specific host machine. A separate account database keeps track of the machines in the domain and allocates the domain's resources to users. **2.** In any local area network, the server that maintains the master copy of the domain's user accounts database and that validates logon requests. *Acronym:* PDC.

primary key *n.* In databases, the key field that serves as the unique identifier of a specific tuple (row) in a relation (database table). *Also called:* major key. *See also* alternate key (definition 1), candidate key. *Compare* secondary key.

Primary Rate Interface *n.* *See* PRI.

primary storage *n.* Random access memory (RAM); the main general-purpose storage region to which the microprocessor has direct access. A computer's other storage options, such as disks and tape, are called *secondary storage* or (sometimes) *backing storage*.

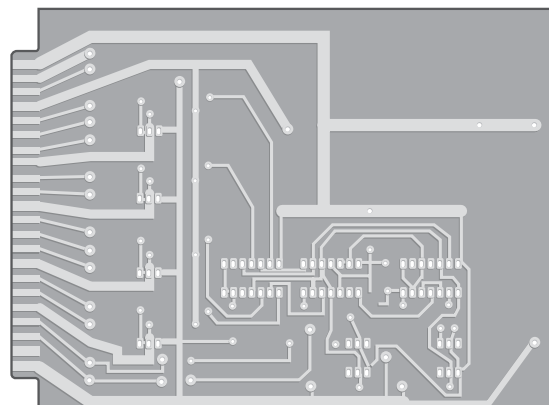
primitive *n.* **1.** In computer graphics, a shape, such as a line, circle, curve, or polygon, that can be drawn, stored, and manipulated as a discrete entity by a graphics program. A primitive is one of the elements from which a large graphic design is created. **2.** In programming, a fundamen-

tal element in a language that can be used to create larger procedures that do the work a programmer wants to do.

print *vb.* In computing, to send information to a printer. The word is also sometimes used in the sense of "show me" or "copy this." For example, the PRINT statement in Basic causes output to be displayed (printed) on the screen. Similarly, an application program that can be told to print a file to disk interprets the command as an instruction to route output to a disk file instead of to a printer.

print buffer *n.* A section of memory to which print output can be sent for temporary storage until the printer is ready to handle it. A print buffer can exist in a computer's random access memory (RAM), in the printer, in a separate unit between the computer and the printer, or on disk. Regardless of its location, the function of a print buffer is to free the computer for other tasks by taking print output at high speed from the computer and passing it along at the much slower rate required by the printer. Print buffers vary in sophistication: some simply hold the next few characters to be printed, and others can queue, reprint, or delete documents sent for printing.

printed circuit board *n.* A flat board made of nonconducting material, such as plastic or fiberglass, on which chips and other electronic components are mounted, usually in predrilled holes designed to hold them. The component holes are connected electrically by predefined conductive metal pathways that are printed on the surface of the board. The metal leads protruding from the electronic components are soldered to the conductive metal pathways to form a connection. A printed circuit board should be held by the edges and protected from dirt and static electricity to avoid damage. *See the illustration.* *Acronym:* PCB.



Printed circuit board.

ready for it. The term *spooler* is an acronym created from “simultaneous peripheral operations on line.”

print to file *n.* A command in many applications that instructs the program to format a document for printing and store the formatted document as a file rather than sending it to a printer.

print wheel *n.* See daisy wheel.

priority *n.* Precedence in receiving the attention of the microprocessor and the use of system resources. Within a computer, unseen and unnoticed levels of priority are the means by which many different types of potential clashes and disruptions are avoided. Similarly, tasks running on a computer can be assigned priorities that determine when and for how long they receive time from the microprocessor. On networks, stations can be assigned priorities that determine when and how often they can control the communications line, and messages can be assigned priorities that indicate how soon they must be transmitted. See also interrupt.

Priority Frame *n.* A telecommunications protocol developed by Infonet and Northern Telecom, Inc., designed to carry data, facsimile, and voice information.

privacy *n.* The concept that a user’s data, such as stored files and e-mail, is not to be examined by anyone else without that user’s permission. A right to privacy is not generally recognized on the Internet. Federal law protects only e-mail in transit or in temporary storage, and only against access by Federal agencies. Employers often claim a right to inspect any data on their systems. To obtain privacy, the user must take active measures such as encryption. See also encryption, PGP, Privacy Enhanced Mail. Compare security.

Privacy Enhanced Mail *n.* An Internet standard for e-mail systems that use encryption techniques to ensure the privacy and security of messages. Acronym: PEM. See also encryption, standard. Compare PGP.

privacy policy *n.* Public statement delineating how a Web site uses the information it gathers from visitors to the site. Some Web sites sell this information to third parties or use the information for marketing purposes. Other sites have strict policies limiting how that information may be used.

private *adj.* A keyword used in some programming languages to signify that methods or variables can be

accessed only by elements residing in the same class or module. See also class, keyword (definition 2), local variable, reserved word, scope. Compare public.

private assembly *n.* An assembly that is used by only one application. A private assembly is deployed into the directory structure of the application that uses it. Also called: private side-by-side assembly. See also shared assembly.

Private Branch Exchange *n.* See PBX.

private channel *n.* In Internet relay chat (IRC), a channel reserved for the use of a certain group of people. Private channel names are hidden from view by the public at large. Also called: secret channel. See also IRC.

Private Communications Technology *n.* See PCT (definition 2).

private folders *n.* In a shared network environment, those folders on a user’s computer that are not accessible by other users on the network. Compare public folders.

private key *n.* One of two keys in public key encryption. The user keeps the private key secret and uses it to encrypt digital signatures and to decrypt received messages. See also public key encryption. Compare public key.

private line *n.* See dedicated line (definition 1).

Private Network-to-Network Interface *n.* See PNNI.

privatization *n.* Generally, the process of turning something over from government to commercial industry control. In the context of computer science and the Internet, the term refers to the government’s turning over of various Internet backbones to private industry—for example, control of NSFnet was passed from the government to private business in 1992—and to the government’s more recent (1998) privatization of responsibility for domain names and addresses, which was shifted from IANA and NSI/InterNIC to a new organization known as ICANN. See also IANA, ICANN, InterNIC.

privileged instruction *n.* An instruction (usually a machine instruction) that can be executed only by the operating system. Privileged instructions exist because the operating system needs to perform certain operations that applications should not be allowed to perform; therefore, only the operating-system routines have the necessary privilege to execute these particular instructions.

from the beginning of the file, rather than from any point, as can be the case with true streaming. *See also* stream.

PSK *n.* *See* phase-shift keying.

PSN *n.* Acronym for **packet-switching network**. *See* packet switching.

PSTN *n.* *See* Public Switched Telephone Network.

p-system *n.* An operating system based on a pseudomachine implemented in software. A program written for the p-system is more portable than one written for a machine-dependent operating system. *See also* UCSD p-System.

P-type semiconductor *n.* Semiconductor material in which electrical conduction is carried by holes (“vacancies” left by electrons). Whether a semiconductor is N-type or P-type depends on the kind of dopant added during manufacture. A dopant with a shortage of electrons results in a P-type semiconductor. *Compare* N-type semiconductor.

pub *n.* *See* /pub.

/pub *n.* Short for **public**. A directory in an anonymous FTP archive that is accessible by the public and that generally contains files available for free download. *See also* anonymous FTP.

public *adj.* A keyword in some programming languages to signify that methods or variables can be accessed by elements residing in other classes or modules. *See also* class., keyword (definition 2), global variable, reserved word, scope. *Compare* private.

public directory *n.* A directory on an FTP server that is accessible by anonymous users for the purpose of retrieving or storing files. Often the directory is called /pub. *See also* anonymous FTP, FTP (definition 1), FTP server /pub.

public domain *n.* The set of all creative works, such as books, music, or software, that are not covered by copyright or other property protection. Works in the public domain can be freely copied, modified, and otherwise used in any manner for any purpose. Much of the information, texts, and software on the Internet is in the public domain, but putting a copyrighted work on the Internet does not put it in the public domain. *Compare* proprietary.

public-domain software *n.* A program donated for public use by its owner or developer and freely available for copying and distribution. *Compare* free software, freeware, proprietary software, shareware.

public files *n.* Files with no access restrictions.

public folders *n.* The folders that are made accessible on a particular machine or by a particular user in a shared networking environment. *Compare* private folders.

public key *n.* One of two keys in public key encryption. The user releases this key to the public, who can use it for encrypting messages to be sent to the user and for decrypting the user’s digital signature. *See also* public key encryption. *Compare* private key.

public key cryptography *n.* *See* public key encryption.

public key encryption *n.* An asymmetric scheme that uses a pair of keys for encryption: the public key encrypts data, and a corresponding secret key decrypts it. For digital signatures, the process is reversed: the sender uses the secret key to create a unique electronic number that can be read by anyone possessing the corresponding public key, which verifies that the message is truly from the sender. *See also* private key, public key.

public rights *n.* In the context of the Internet, the extent to which members of the public are permitted to use (and to place) information on the Internet under intellectual property law. *See also* fair use, public domain, public-domain software.

Public Switched Telephone Network *n.* The public telephone system.

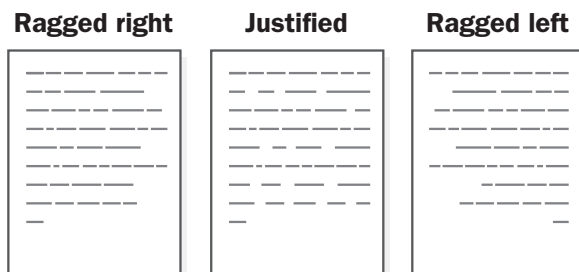
Publisher *n.* A software application developed by Microsoft Corporation to help businesses create high-quality marketing and business material. A part of the Office product family, Publisher provides business users with design options for a variety of publications, such as newsletters, flyers, brochures, and Web pages.

publishing point *n.* A publishing point is a virtual directory used for storing content or delivering a live stream. End users reach a publishing point through its URL. There are two types of unicast publishing points: on-demand for stored content and broadcast for live streams. *See also* on-demand publishing point, broadcast publishing point. *Compare* unicast.

puck *n.* A pointing device used with a graphics tablet. A puck, which is often used in engineering applications, is a mouselike device with buttons for selecting items or choosing commands and a clear plastic section extending from one end with cross hairs printed on it. The intersection of the cross hairs on the puck points to a location on the graphics tablet, which in turn is mapped to a specific

(asymmetric digital subscriber line) that is capable of adjusting transmission speed (bandwidth) based on signal quality and length of the transmission line. As the signal quality improves or deteriorates while a transmission line is being used, the transmission speed is adjusted accordingly. *See also* ADSL, xDSL.

rag *n.* Irregularity along the left or right edge of a set of lines of text on a printed page. Rag complements justification, in which one or both edges of the text form a straight vertical line. *See the illustration. See also* justify, ragged left, ragged right.



Rag.

ragged left *adj.* Of, relating to, or being lines of text whose left ends are not vertically aligned but form an irregular edge. Text may be right-justified and have a ragged left margin. Ragged-left text is used infrequently—typically, for visual effect in advertisements. *See also* rag, right-justify.

ragged right *adj.* Of, relating to, or being lines of text whose right ends are not vertically aligned but form an irregular edge. Letters and other word-processed documents are commonly left-justified, with ragged-right margins. *See also* left-justify, rag.

RAID *n.* Acronym for **redundant array of independent** (or **inexpensive**) **disks**. A data storage method in which data is distributed across a group of computer disk drives that function as a single storage unit. All the information stored on each of the disks is duplicated on other disks in the array. This redundancy ensures that no information will be lost if one of the disks fails. RAID is generally used on network servers where data accessibility is critical and fault tolerance is required. There are various defined levels of RAID, each offering differing trade-offs among access speed, reliability, and cost. *See also* disk controller, error-correction coding, Hamming code, hard disk, parity bit, server (definition 1).

RAID array *n.* *See* RAID.

RAM *n.* Acronym for **random access memory**. Semiconductor-based memory that can be read and written by the central processing unit (CPU) or other hardware devices. The storage locations can be accessed in any order. Note that the various types of ROM memory are capable of random access but cannot be written to. The term *RAM*, however, is generally understood to refer to volatile memory that can be written to as well as read. *Compare* core, EPROM, flash memory, PROM, ROM (definition 2).

RAMAC *n.* **1.** Acronym for **Random Access Method of Accounting Control**. Developed by an IBM team led by Reynold B. Johnson, RAMAC was the first computer disk drive. It was introduced in 1956. The original RAMAC consisted of a stack of 50 24-inch platters, with a storage capacity of 5 megabytes and an average access time of 1 second. **2.** A high-speed, high-capacity disk storage system introduced by IBM in 1994. Based on the original RAMAC storage device, it was designed to fulfill enterprise requirements for efficient and fault-tolerant storage.

Rambus DRAM *n.* *See* RDRAM.

Rambus dynamic random access memory *n.* *See* RDRAM.

RAM cache *n.* Short for **random access memory cache**. Cache memory that is used by the system to store and retrieve data from the RAM. Frequently accessed segments of data may be stored in the cache for quicker access compared with secondary storage devices such as disks. *See also* cache, RAM.

RAM card *n.* Short for **random access memory card**. An add-in circuit board containing RAM memory and the interface logic necessary to decode memory addresses.

RAM cartridge *n.* *See* memory cartridge.

RAM chip *n.* Short for **random access memory chip**. A semiconductor storage device. RAM chips can be either dynamic or static memory. *See also* dynamic RAM, RAM, static RAM.

RAM compression *n.* Short for **random access memory compression**. This technology was an attempt by a number of software vendors to solve the problem of running out of global memory under Windows 3.x. Compression of the usual contents of RAM may lessen the system's need to read or write to virtual (hard disk-based) memory and thus speed up the system, as virtual memory is much slower than physical RAM. Because of the falling prices of RAM and the introduction of operating systems that handle RAM

continuing through referrals to name servers at lower levels of the hierarchy, the DNS is able to match a “friendly” Internet address, such as microsoft.com, with its numerical counterpart, the IP address. Root servers thus contain the data needed for referrals to name servers at the highest level of the hierarchy. There are 13 root servers in the world, located in the United States, the United Kingdom, Sweden, and Japan. *Also called:* root name server. *See also* DNS (definition 1), DNS server, top-level domain.

root web *n.* The default, top-level web provided by a Web server. To access the root web, you supply the URL of the server without specifying a page name or subweb.

ROT13 encryption *n.* A simple encryption method in which each letter is replaced with the letter of the alphabet 13 letters after the original letter, so that A is replaced by N, and so forth; N, in turn, is replaced by A, and Z is replaced by M. ROT13 encryption is not used to protect messages against unauthorized readers; rather, it is used in newsgroups to encode messages that a user may not want to read, such as sexual jokes or spoilers. Some newsreaders can automatically perform ROT13 encryption and decryption at the touch of a key.

rotary dialing *n.* The signaling system used in telephones with rotary dials, in which each digit is associated with a set number of pulses. During dialing, these pulses, which are audible as series of clicks, momentarily turn the current in the telephone wires on and off. *Also called:* pulse dialing. *Compare* touch tone dialing.

rotate *vb.* **1.** To turn a model or other graphical image so that it is viewed at a different angle. **2.** To move bits in a register to the left or to the right. The bit that moves out of the end position rotates to the newly vacated position at the opposite end of the register. *Compare* shift.

rotational delay *n.* The time required for a desired disk sector to rotate to the read/write head. *Also called:* rotational latency.

rotational latency *n.* *See* rotational delay.

RO terminal *n.* Short for **read-only terminal**. A terminal that can receive data but cannot send data. Nearly all printers can be classified as RO terminals.

ROTFL *n.* *See* ROFL.

round *vb.* To shorten the fractional part of a number, increasing the last remaining (rightmost) digit or not, according to whether the deleted portion was over or

under five. For example, 0.3333 rounded to two decimal places is 0.33, and 0.6666 is 0.67. Computer programs often round numbers, sometimes causing confusion when the resulting values do not add up “correctly.” Percentages in a spreadsheet can thus total 99 percent or 101 percent because of rounding.

round robin *n.* A sequential, cyclical allocation of resources to more than one process or device.

roundtripping *n.* The process of converting files from one format to another for viewing or editing and then converting the files back to the original format again. In some cases, roundtripping can involve repeated conversions of the file from one format to another and back. Frequent roundtripping may be a concern because each conversion has the potential to introduce unwanted changes to the file.

routable protocol *n.* A communications protocol that is used to route data from one network to another by means of a network address and a device address. TCP/IP is an example of a routable protocol.

router *n.* An intermediary device on a communications network that expedites message delivery. On a single network linking many computers through a mesh of possible connections, a router receives transmitted messages and forwards them to their correct destinations over the most efficient available route. On an interconnected set of LANs (local area networks)—including those based on differing architectures and protocols—using the same communications protocols, a router serves the somewhat different function of acting as a link between LANs, enabling messages to be sent from one to another. *See also* bridge, gateway.

routine *n.* Any section of code that can be invoked (executed) within a program. A routine usually has a name (identifier) associated with it and is executed by referencing that name. Related terms (which may or may not be exact synonyms, depending on the context) are *function*, *procedure*, and *subroutine*. *See also* function (definition 3), procedure, subroutine.

routing *n.* The process of forwarding packets between networks from source to destination. *See also* dynamic routing, static routing.

Routing Information Protocol *n.* *See* RIP (definition 1).

routing table *n.* In data communications, a table of information that provides network hardware (bridges and routers) with the directions needed to forward packets of data to locations on other networks. The information contained

recorded piano note, digitized and stored in memory, is used by the synthesizer to create other piano-like notes.

samurai *n.* A hacker employed by a company or organization to manage network security or conduct legal cracking operations. A samurai uses the skills of a hacker to meet the legitimate needs of an employer.

SAN *n.* See storage area network.

sandbox *n.* **1.** Java Virtual Machine security area for downloaded (remote or untrusted) applets, an area in which such applets are confined and prevented from accessing system resources. Confinement to the sandbox prevents downloaded applets from carrying out potentially dangerous operations, maliciously or otherwise. They have to “play” inside the sandbox, and any attempt to “escape” is thwarted by the Java Security Manager.

2. Slang for the research and development department at many software and computer companies. See also applet, Java Virtual Machine.

sans serif *adj.* Literally, “without stroke”; describes any typeface in which the characters have no serifs (the short lines or ornaments at the upper and lower ends of the strokes). A sans serif typeface usually possesses a more straightforward, geometric appearance than a typeface with serifs and typically lacks the contrast between thick and thin strokes found in serif faces. Sans serif typefaces are used more frequently in display type, such as headlines, than in blocks of text. Compare serif¹.

SAOL *n.* Acronym for **Structured Audio Orchestra Language**. Part of the MPEG-4 standard, SAOL describes a set of tools for producing computer music, audio for computer games, streaming Internet sound or music, and other multimedia applications. SAOL is a flexible computer language for describing music synthesis and integrating synthetic sound with recorded sound in an MPEG-4 bit stream. See also bit stream, MPEG-4, streaming (definition 1).

SAP *n.* See Service Advertising Protocol.

SAPI *n.* Acronym for **Speech Application Programming Interface**. A feature in Windows 9x and Windows NT that allows applications to include speech recognition or convert text to speech. Also called: Speech API. See also voice recognition.

SAS *n.* See single attachment station.

SASL *n.* Acronym for **Simple Authentication and Security Layer**. An authentication support mechanism for use with connection-based protocols. SASL allows a client to request identification from a server and negotiate use of an added security layer for authentication during subsequent client/server interaction.

satellite *n.* See communications satellite.

satellite computer *n.* A computer that is connected to another computer, with which it interacts over a communications link. As its name indicates, a satellite computer is of lesser “stature” than the main, or host, computer; the host controls either the satellite itself or the tasks the satellite performs. See also remote communications.

satellite dish *n.* A parabolic (dish-shaped) reflector and antenna that is used for transmitting and receiving signals between the ground and earth satellites. Satellite dishes are commonly used for receiving television transmissions.

saturated mode *n.* The state in which a switching device or amplifier is passing the maximum possible current. A device is in saturated mode when increasing the control signal does not result in output of additional current.

saturation *n.* **1.** In a switching device or amplifier, the fully conducting state. At saturation, the device is passing the maximum possible current. The term is most commonly used with reference to circuits containing bipolar or field-effect transistors. **2.** In color graphics and printing, the amount of color in a specified hue, often specified as a percentage. See also HSB.

save *vb.* To write data (typically a file) to a storage medium, such as a disk or tape.

SAX *n.* Acronym for **Simple API for XML**. An event-driven application program interface (API) used to interpret an XML file. SAX works with an XML parser, providing an interface between the parser and an XML application. SAX is used as an alternative to the more complex object-based Document Object Model (DOM) interface. See also DOM.

scalability *n.* A measure of how well a computer, service, or application can grow to meet increasing performance demands. For server clusters, it is the ability to incrementally add one or more systems to an existing cluster when the overall load of the cluster exceeds its capabilities. See also server cluster.

SDMI *n.* See Secure Digital Music Initiative.

SDRAM *n.* Acronym for synchronous **DRAM**. A form of dynamic random access memory (DRAM) that can run at higher clock speeds than conventional DRAM by employing a bursting technique in which the DRAM predicts the address of the next memory location to be accessed. *See also* dynamic RAM.

SDSL *n.* Acronym for symmetric (or single-line) **digital subscriber line**, a digital telecommunications technology that is a variation of HDSL. SDSL uses one pair of copper wires rather than two pairs of wires and transmits at 1.544 Mbps. *Compare* ADSL.

.sea *n.* A file extension for a self-extracting Macintosh archive compressed with StuffIt. *See also* self-extracting file.

seamless integration *n.* The favorable result that occurs when a new hardware component or program blends smoothly into the overall operation of the system. It is usually the result of thoughtful design and programming.

search¹ *n.* The process of seeking a particular file or specific data. A search is carried out by a program through comparison or calculation to determine whether a match to some pattern exists or whether some other criteria have been met. *See also* binary search, hash search, linear search, search and replace, wildcard character.

search² *vb.* **1.** To look for the location of a file. **2.** To seek specific data within a file or data structure. *See also* replace.

search algorithm *n.* An algorithm designed to locate a certain element, called the target, in a data structure. *See also* algorithm, binary search, hash search, linear search.

search and replace *n.* A common process in applications such as word processors in which the user specifies two strings of characters. The process finds instances of the first string and replaces them with the second string.

search criteria *n.* The terms or conditions that a search engine uses to find items in a database. *See also* search engine.

search engine *n.* **1.** A program that searches for keywords in documents or in a database. **2.** On the Internet, a program that searches for keywords in files and documents found on the World Wide Web, newsgroups, Gopher menus, and FTP archives. Some search engines are used for a single Internet site, such as a dedicated search engine for a Web site. Others search across many sites, using such agents as spiders to gather lists of avail-

able files and documents and store these lists in databases that users can search by keyword. Examples of the latter type of search engine are Lycos and Excite. Most search engines reside on a server. *See also* agent (definition 2), FTP, Gopher or gopher, newsgroup, spider, World Wide Web.

search key *n.* **1.** The particular field (or column) of the records to be searched in a database. *See also* primary key, secondary key. **2.** The value that is to be searched for in a document or any collection of data.

search path *n.* The route followed by an operating system to find the location of a stored file. The search path begins with a drive or volume (disk) designator or a network share, continues through a chain of directories and subdirectories, if any, and ends with the file name. C:\books\diction\start.exe is an example of a search path. *Also called:* access path.

search string *n.* The string of characters to be matched in a search—typically (but not necessarily) a text string.

seat¹ *n.* One workstation or computer, in the context of software licensing on a per-seat basis. *See also* license agreement, workstation (definition 1).

seat² *vb.* To insert a piece of hardware fully and position it correctly in a computer or affiliated equipment, as in seating a single inline memory module (SIMM) in its socket.

secondary channel *n.* A transmission channel in a communications system that carries testing and diagnostic information rather than actual data. *Compare* primary channel.

secondary key *n.* A field that is to be sorted or searched within a subset of the records having identical primary key values. *See also* alternate key (definition 1), candidate key. *Compare* primary key.

secondary service provider *n.* An Internet service provider that provides a Web presence but not direct connectivity. *See also* ISP.

secondary storage *n.* Any data storage medium other than a computer's random access memory (RAM)—typically tape or disk. *Compare* primary storage.

Second Generation *n.* See 2G.

second-level domain *n.* The level immediately beneath the top-level domain in the Internet's DNS hierarchy. *See also* domain (definition 3).

second normal form *n.* *See* normal form (definition 1).

serial port adapter *n.* An interface card or device that either provides a serial port or converts a serial port to another use. *See also* adapter, serial port.

serial printer *n.* A printer connected to the computer via a serial interface (commonly RS-232-C or compatible). Connectors for this type of printer vary widely, which is one reason they are less popular than parallel printers among those who use IBM and IBM-compatible PCs. Serial printers are standard for Apple computers. *See also* DB connector, serial, serial transmission. *Compare* parallel printer.

serial processing *n.* *See* sequential processing (definition 2).

Serial Storage Architecture *n.* *See* SSA.

serial transmission *n.* The transfer of discrete signals one after another. In communications and data transfer, serial transmission involves sending information over a single line one bit at a time, as in modem-to-modem connections. *Compare* parallel transmission.

series circuit *n.* A circuit in which two or more components are linked in series. All the current passes through each component in a series circuit, but the voltage is divided among the components. *See* the illustration. *Compare* parallel circuit.



Series circuit.

serif¹ *adj.* Marked by the use of serifs. For example, Goudy is a serif typeface, whereas Helvetica is a sans serif typeface. *See* the illustration. *See also* serif². *Compare* sans serif.

ABC

↓
Serifs

ABC

Serif. A serif typeface (top) and a sans serif typeface (bottom).

serif² *n.* Any of the short lines or ornaments at the ends of the strokes that form a typeface character.

server *n.* **1.** On a local area network (LAN), a computer running administrative software that controls access to the network and its resources, such as printers and disk drives, and provides resources to computers functioning as workstations on the network. **2.** On the Internet or other network, a computer or program that responds to commands from a client. For example, a file server may contain an archive of data or program files; when a client submits a request for a file, the server transfers a copy of the file to the client. *See also* application server (definitions 1 and 2), client/server architecture. *Compare* client (definition 3).

server appliance *n.* A device designed to deliver one or more specific network services in a single turnkey package that includes both hardware and software. All necessary programs are preinstalled on a server appliance, which has minimal, simplified options and controls. Server appliances can be used to complement or replace traditional servers on a network and can provide such services as file and printer sharing and Internet connectivity. *Also called:* appliance. *See also* information appliance.

server-based application *n.* A program that is shared over a network. The program is stored on the network server and can be used at more than one client machine at a time.

server cluster *n.* A group of independent computer systems, known as nodes, working together as a single system to ensure that mission-critical applications and resources remain available to clients. A server cluster is the type of cluster that Cluster service implements. *See also* cluster.

server control *n.* *See* ASP.NET server control.

server error *n.* A failure to complete a request for information through HTTP that results from an error at the server rather than an error by the client or the user. Server errors are indicated by HTTP status codes beginning with 5. *See also* HTTP, HTTP status codes.

server farm *n.* A centralized grouping of network servers maintained by an enterprise or, often, an Internet service provider (ISP). A server farm provides a network with load balancing, scalability, and fault tolerance. Individual servers may be connected in such a way that they appear to represent a single resource.

serverlet *n.* *See* servlet.

Server Message Block *n.* *See* SMB.

their documents and the tags they will use to denote the structure in individual documents. *See also* ISO.

SGRAM *n.* *See* synchronous graphics RAM.

sh *n.* *See* Bourne shell.

SHA *n.* Acronym for **Secure Hash Algorithm**. A technique that computes a 160-bit condensed representation of a message or data file, called a *message digest*. The SHA is used by the sender and the receiver of a message in computing and verifying a digital signature, for security purposes. *See also* algorithm, digital signature.

shade¹ *n.* A particular color variation produced by mixing black with a pure color. *See also* brightness, IRGB.

shade² *vb.* To give added dimension to an image by including changes in appearance caused by light and shadow. *See also* color model.

shadow mask *n.* A type of mask used in cathode ray tube (CRT) monitors in which an opaque sheet perforated by tiny pinholes ensures that the electron beam for a particular color strikes only the phosphor it is supposed to illuminate. Like the aperture grill, which relies on vertical stripes, and the slot mask, which is based on elliptical openings, a shadow mask helps create a clear, sharp image by narrowly focusing the electron beam. *See also* CRT, mask (definition 2). *Compare* aperture grill, slot mask.

shadow memory *n.* A technique employed by the BIOS in some 80x86-based computers to copy the system's ROM BIOS routines into an unused section of RAM during the computer's startup process. This helps boost system performance by diverting system requests for the BIOS routines to their "shadow" copies. *Also called:* shadow RAM, shadow ROM.

shadow print *n.* A style applied to text in which a duplicate of each character is shifted, typically down and to the right, to create a shadow effect. *See* the illustration.

Shadows



Shadow print.

shadow RAM *n.* *See* shadow memory.

shadow ROM *n.* *See* shadow memory.

share *vb.* To make files, directories, or folders accessible to other users over a network.

shared assembly *n.* An assembly that can be referenced by more than one application. An assembly must be explicitly built to be shared by giving it a cryptographically strong name. *See also* private assembly, strong name.

shared directory *n.* *See* network directory.

shared folder *n.* On a Macintosh computer connected to a network and running System 6.0 or higher, a folder that a user has made available to others on the network. A shared folder is analogous to a network directory on a PC. *See also* network directory.

shared logic *n.* The use, by multiple circuits or software routines, of common circuits or routines to implement an operation.

shared medium *n.* The communications medium shared by network nodes; essentially, the network bandwidth.

shared memory *n.* **1.** Memory accessed by more than one program in a multitasking environment. **2.** A portion of memory used by parallel-processor computer systems to exchange information. *See also* parallel processing.

shared name *n.* *See* strong name.

shared network directory *n.* *See* network directory.

shared printer *n.* A printer that receives input from more than one computer.

shared resource *n.* **1.** Any device, data, or program used by more than one device or program. **2.** On a network, any resource made available to network users, such as directories, files, and printers.

SharePoint team Web site *n.* A customizable Web site with features that help a team work together. The default site has pages for document libraries, announcements, and team events. Only members, specified by the site creator, can use the site.

shareware *n.* Copyrighted software that is distributed on a try-before-you-buy basis. Users who want to continue using the program after the trial period are encouraged to send a payment to the program's author. *Compare* free software, freeware, public-domain software.

sharpness *n.* *See* resolution (definition 1).

sheet *n.* A feature for handling dialog boxes included in the Mac OS X Aqua interface. When the user chooses to

soft patch *n.* A fix or modification performed only while the code being patched is loaded into memory, so that the executable or object file is not modified in any way. *See also* patch¹.

soft return *n.* A line break inserted in a document by a word processor when the next word in the current line of text would cause the line to overflow into the margin—a movable line break. *See also* wordwrap. *Compare* hard return.

soft-sectored disk *n.* A disk, especially a floppy disk, whose sectors have been marked with recorded data marks rather than punched holes. *See also* index hole. *Compare* hard-sectored disk.

software *n.* Computer programs; instructions that make hardware work. Two main types of software are system software (operating systems), which controls the workings of the computer, and applications, such as word processing programs, spreadsheets, and databases, which perform the tasks for which people use computers. Two additional categories, which are neither system nor application software but contain elements of both, are network software, which enables groups of computers to communicate, and language software, which provides programmers with the tools they need to write programs. In addition to these task-based categories, several types of software are described based on their method of distribution. These include packaged software (canned programs), sold primarily through retail outlets; freeware and public domain software, which are distributed free of charge; shareware, which is also distributed free of charge, although users are requested to pay a small registration fee for continued use of the program; and vaporware, software that is announced by a company or individuals but either never makes it to market or is very late. *See also* application, canned software, freeware, network software, operating system, shareware, system software, vaporware. *Compare* firmware, hardware, liveware.

Software & Information Industry Association *n.* *See* SIIA.

software-based modem *n.* A modem that uses a general-purpose, reprogrammable digital signal processor chip and RAM-based program memory rather than a dedicated chip with the modem functions burned into the silicon. A software-based modem can be reconfigured to update and change the modem's features and functions.

software bloat *n.* A software condition caused by the addition of excessive number of possibly unnecessary features and functions as new versions of the software are released. Software bloat is generally assumed to result in long loading times and inordinate resource (memory and storage) requirements. *See also* bloatware, creeping featurism.

software conversion *n.* Changing or moving a program designed to run on one computer to run on another. Usually this involves detailed (professional) work on the program itself.

software-dependent *adj.* Of, pertaining to, or being a computer or device that is tied to a particular program or set of programs developed for it.

software development kit *n.* *See* developer's kit.

software engineer *n.* **1.** In general, one who works at the code level with software. Although such engineering can be considered to encompass everything from software design to management and testing, the term is generally considered more or less synonymous with *programmer*—one who actually writes the code. **2.** *See* developer.

software engineering *n.* The design and development of software. *See also* programming.

software handshake *n.* A handshake that consists of signals transmitted over the same wires used to transfer the data, as in modem-to-modem communications over telephone lines, rather than signals transmitted over special wires. *See also* handshake.

software house *n.* An organization that develops and supports software for its customers.

software IC *n.* *See* software integrated circuit.

software integrated circuit *n.* An existing software module that can be designed into a program, much as an integrated circuit can be designed into a logic board. *Abbreviation:* software IC. *See also* abstract data type, module (definition 1), object-oriented programming.

software interrupt *n.* A program-generated interrupt that stops current processing in order to request a service provided by an interrupt handler (a separate set of instructions designed to perform the task required). *Also called:* trap.

software package *n.* A program sold to the public, ready to run and containing all necessary components and documentation.

software piracy *n.* *See* piracy.

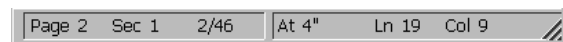
statistical multiplexer *n.* A multiplexing device that adds intelligence to time-division multiplexing by using buffering (temporary storage) and a microprocessor to combine transmission streams into a single signal and to allocate available bandwidth dynamically. *Also called:* stat mux. *See also* dynamic allocation, multiplexing, time-division multiplexing.

statistics *n.* The branch of mathematics that deals with the relationships among groups of measurements and with the relevance of similarities and differences in those relationships. *See also* binomial distribution, Monte Carlo method, probability, regression analysis, standard deviation, stochastic.

stat mux *n.* *See* statistical multiplexer.

status *n.* The condition at a particular time of any of numerous elements of computing—a device, a communications channel, a network station, a program, a bit, or other element—used to report on or to control computer operations.

status bar *n.* In Windows 9x and Windows NT 4 and later, a space at the bottom of many program windows that contains a short text message about the current condition of the program. Some programs also display an explanation of the currently selected menu command in the status bar. *See the illustration.*



Status bar.

status codes *n.* Strings of digits or other characters that indicate the success or failure of some attempted action. Status codes were commonly used to report the results of early computer programs, but most software today uses words or graphics. Internet users, especially those with UNIX shell accounts, are likely to encounter status codes while using the Web or FTP. *See also* HTTP status codes.

steganography *n.* A “hide-in-plain-sight” technique for concealing information by embedding a message within an innocuous cover message. In steganography, bits of unnecessary data within an image, sound, text, or even a blank file are replaced with bits of invisible information. The term steganography comes from the Greek for “covered writing” and has traditionally included any method of secret communication that conceals the existence of the message. Because steganography cannot be detected by decryption software, it is often used to replace or supplement encryption.

step-frame *n.* The process of capturing video images one frame at a time. This process is used by computers that are too slow to capture analog video images in real time.

stepper motor *n.* A mechanical device that rotates only a fixed distance each time it receives an electrical pulse. A stepper motor is part of a disk drive.

step-rate time *n.* The time required to move a disk actuator arm from one track to the next. *See also* actuator, stepper motor.

stereogram *n.* *See* autostereogram.

sticky *adj.* In reference to a Web site, properties such as targeted content or services that increase the amount of time users choose to spend at the site and increase user’s desire to return to the site repeatedly.

StickyKeys *n.* An accessibility feature built into Macintosh and Windows computers that causes modifier keys such as Shift, Control, or Alt to “stay on” after they are pressed, eliminating the need to press multiple keys simultaneously. This feature facilitates the use of modifier keys by users who are unable to hold down one key while pressing another.

stochastic *adj.* Based on random occurrences. For example, a stochastic model describes a system by taking into account chance events as well as planned events.

stop bit *n.* In asynchronous transmission, a bit that signals the end of a character. In early electromechanical teleprinters, the stop bit provided time for the receiving mechanism to coast back to the idle position and, depending on the mechanism, had a duration of 1, 1.5, or 2 data bits. *See also* asynchronous transmission. *Compare* parity bit, start bit.

Stop error *n.* A serious error that affects the operating system and that could place data at risk. The operating system generates an obvious message, a screen with the Stop error, rather than continuing on and possibly corrupting data. *Also called:* blue screen error, fatal system error. *See also* Blue Screen of Death.

storage *n.* In computing, any device in or on which information can be kept. Microcomputers have two main types of storage: random access memory (RAM) and disk drives and other external storage media. Other types of storage include read-only memory (ROM) and buffers.

storage area network *n.* A high-speed network that provides a direct connection between servers and storage, including shared storage, clusters, and disaster-recovery

devices. A storage area network, or SAN, includes components such as hubs and routers that are also used in local area networks (LANs), but it differs in being something of a “subnetwork” dedicated to providing a high-speed connection between storage elements and servers. Most SANs rely on fiber-channel connections that deliver speeds up to 1000 Mbps and can support up to 128 devices. SANs are implemented to provide the scalability, speed, and manageability required in environments that demand high data availability. *Acronym:* SAN. *Also called:* system area network.

storage device *n.* An apparatus for recording computer data in permanent or semipermanent form. When a distinction is made between primary (main) storage devices and secondary (auxiliary) storage devices, the former refers to random access memory (RAM) and the latter refers to disk drives and other external devices.

storage location *n.* The position at which a particular item can be found—either an addressed location or a uniquely identified location on a disk, tape, or similar medium.

storage media *n.* The various types of physical material on which data bits are written and stored, such as floppy disks, hard disks, tape, and optical discs.

storage tube *n.* *See* direct view storage tube.

store-and-forward *n.* A method of delivering transmissions in which messages are held temporarily by an intermediary before being sent on to their destination. Store and forward is used by some switches in delivering packets to their destinations. *Compare* cut-through switch.

stored procedure *n.* A precompiled collection of SQL statements and optional control-of-flow statements stored under a name and processed as a unit. They are stored in an SQL database and can be run with one call from an application.

stored program concept *n.* A system architecture scheme, credited largely to the mathematician John von Neumann, in which both programs and data are in direct-access storage (random access memory, or RAM), thereby allowing code and data to be treated interchangeably. *See also* von Neumann architecture.

storefront *n.* *See* virtual storefront.

storm *n.* On a network, a sudden, excessive burst of traffic. Storms are often responsible for network outages.

STP *n.* Acronym for shielded twisted pair. A cable consisting of one or more twisted pairs of wires and a sheath

of foil and copper braid. The twists protect the pairs from interference by each other, and the shielding protects the pairs from interference from outside. Therefore, STP cable can be used for high-speed transmission over long distances. *See also* twisted-pair cable. *Compare* UTP.

straight-line code *n.* Program code that follows a direct sequence of statements rather than skipping ahead or jumping back via transfer statements such as GOTO and JUMP. *See also* GOTO statement, jump instruction. *Compare* spaghetti code.

stream¹ *n.* Any data transmission, such as the movement of a file between disk and memory, that occurs in a continuous flow. Manipulating a data stream is a programming task. Consumers, however, are likely to encounter references to streams and streaming in connection to the Internet, which has increased reliance on stream techniques to enable users (even those with slower equipment) to access large multimedia files—especially those containing audio and video components—and to display or play them before all the data has been transferred.

stream² *vb.* To transfer data continuously, beginning to end, in a steady flow. Many aspects of computing rely on the ability to stream data: file input and output, for example, and communications. If necessary, an application receiving a stream must be able to save the information to a buffer in order to prevent loss of data. On the Internet, streaming enables users to begin accessing and using a file before it has been transmitted in its entirety.

stream cipher *n.* A method for encrypting a data sequence of unlimited length using a key of fixed length. *See also* key (definition 3). *Compare* block cipher.

streaming *n.* **1.** On the Internet, the process of delivering information, especially multimedia sound or video, in a steady flow that the recipient can access as the file is being transmitted. **2.** In magnetic tape storage devices, a low-cost technique to control the motion of the tape by removing tape buffers. Although streaming tape compromises start/stop performance, it achieves highly reliable storage and retrieval of data, and is useful when a steady supply of data is required by a particular application or computer.

streaming buffer *n.* A small sound buffer that can play lengthy sounds because the application dynamically loads audio data into the buffer as it plays. For example, an application could use a buffer that can hold 3 seconds of audio data to play a 2-minute sound. A streaming buffer requires much less memory than a static buffer. *See also* static buffer.

video display tube *n.* See CRT.

video display unit *n.* See monitor.

video DRAM *n.* See video RAM.

video driver *n.* Software that provides the interface between the video adapter hardware and other programs, including the operating system. The user can access the video driver to specify the resolution and color-bit depth of images on the monitor during the setup process. *See also* driver, monitor, video adapter.

video editor *n.* A device or program used to modify the contents of a video file.

Video Electronics Standards Association *n.* See VESA².

video game *n.* See computer game.

Video Graphics Adapter or **Video Graphics Array** *n.* See VGA.

video graphics board *n.* A video adapter that generates video signals for displaying graphical images on a video screen.

video look-up table *n.* See color look-up table.

video memory *n.* Memory from which a display image is created, located in the video adapter or video subsystem. If both the video processor and the central processing unit (CPU) have access to video memory, images are produced by the CPU's modification of video memory. Video circuitry normally has priority over the processor when both attempt to read or write to a video memory location, so updating video memory is often slower than accessing main memory. *See also* video RAM.

video mode *n.* The manner in which a computer's video adapter and monitor display on-screen images. The most common modes are text (character) mode and graphics mode. In text mode, characters include letters, numbers, and some symbols, none of which are "drawn" on screen dot by dot. In contrast, graphics mode produces all screen images, whether text or art, as patterns of pixels (dots) that are drawn one pixel at a time.

videophone *n.* A device equipped with camera and screen, as well as a microphone and speaker, capable of transmitting and receiving video signals as well as voice over a telephone line. Using conventional telephone lines, a videophone can transmit only freeze-frame video. *See also* freeze-frame video.

video port *n.* A cable connector or port on a computer that outputs video signals to a monitor.

video RAM *n.* A special type of dynamic RAM (DRAM) used in high-speed video applications. Video RAM uses separate pins for the processor and the video circuitry, providing the video circuitry with a back door to the video RAM. The video circuitry can access the video RAM serially (bit by bit), which is more appropriate for transferring pixels to the screen than is the parallel access provided by conventional DRAM. *Acronym:* VRAM. *See also* dynamic RAM.

video server *n.* A server designed to deliver digital video-on-demand and other broadband interactive services to the public over a wide area network.

video signal *n.* The signal sent from a video adapter or other video source to a raster display. The signal can include horizontal and vertical synchronization signals, as well as image information. *See also* composite video display, RGB monitor.

video terminal *n.* See terminal (definition 1).

videotex *n.* An interactive information retrieval service designed to be accessed by subscribers over telephone lines. Information can be displayed on a home television screen or a videotex terminal. Subscribers use keypads to choose from menus and to request specific screens, or pages. *Also called:* videotext.

videotext *n.* See videotex.

Vienna Definition Language *n.* See VDL.

view¹ *n.* **1.** The display of data or an image from a given perspective or location. **2.** In relational database management systems, a logical table created through the specification of one or more relational operations on one or more tables. A view is equivalent to a divided relation in the relational model. *See also* relational database, relational model.

view² *vb.* To cause an application to display information on a computer screen.

viewer *n.* An application that displays or otherwise outputs a file in the same way as the application that created the file. An example of a viewer is a program to display the images stored in GIF or JPEG files. *See also* GIF, JPEG.

viewport *n.* In computer graphics, a view of a document or an image. A viewport is similar to the view in a window, but usually only part of the document or graphical image is visible. *Compare* window.

vine *n.* A means of distributing audiotape copies that is similar to a tape tree. Because vine tapes are digital in for-

the merchant's server and allows the user to authorize the appropriate debit to a credit card.

wallpaper *n.* In a graphical user interface such as Windows, a pattern or picture in the screen background that can be chosen by the user. *See also* graphical user interface.

WAN *n.* Acronym for **wide area network**. A geographically widespread network, one that relies on communications capabilities to link the various network segments. A WAN can be one large network, or it can consist of a number of linked LANs (local area networks).

wand *n.* Any pen-shaped device used for data entry, such as a graphics tablet's stylus or, most commonly, the scanning instrument used with many bar code readers. *See also* optical scanner, scan head. *Compare* stylus.

wanderer *n.* A person who frequently uses the World Wide Web. Many of these people make indexes of what they find.

WAP *n.* *See* Wireless Application Protocol.

war dialer *n.* A computer program that calls a range of phone numbers to identify those numbers that make a connection to a computer modem. War dialers are typically used by hackers to search for vulnerable computers and, once a connection is made, the war dialers may automatically probe the computer for potential weaknesses. Early war dialer programs called demon dialers were used to crack telephone systems in the 1970s and 1980s.

warez *n.* Illegal copies of computer software distributed through the Internet and other online channels, such as bulletin boards and FTP servers. The spelling is part of the tendency among some online groups to use odd symbols and intentional misspellings. *Compare* freeware, shareware.

warm boot *n.* The restarting of a running computer without first turning off the power. *Also called:* soft boot, three-finger salute, vulcan death grip, warm start.

warm start *n.* *See* warm boot.

warp *vb.* Sometimes used by computer game developers to describe the need to completely redraw a screen within a game. For example, moving through a door or advancing to a higher level would require a complete screen overhaul. *See also* computer game.

watchdog *n.* A hardware device (usually a timer or driver) used to monitor continuing system health and functionality through communications with the system software using a dedicated device driver.

watermark *n.* A semitransparent image often used for letters and business cards. In currency, a watermark is visible when you hold a bill up to the light.

watt *n.* The unit of power equal to the expenditure of 1 joule of energy in 1 second. The power of an electrical circuit is a function of the potential across the circuit and the current flowing through the circuit. If E = potential, I = current, and R = resistance, power in watts can be calculated as $I \times E$, $I^2 \times R$, or E^2/R .

.wav *n.* The file extension that identifies sound files stored in waveform (WAV) audio format. *See also* WAV.

WAV *n.* A file format in which Windows stores sounds as waveforms. Such files have the extension .wav. Depending on the sampling frequency, on whether the sound is monaural or stereo, and on whether 8 or 16 bits are used for each sample, one minute of sound can occupy as little as 644 kilobytes or as much as 27 megabytes of storage. *See also* sampling, waveform.

wave *n.* **1.** Any disturbance or change that has an oscillatory, periodic nature, for example, a light or sound wave. *See also* waveform. **2.** In electronics, the time-amplitude profile of an electrical signal.

wave division multiplexing *n.* *See* dense wavelength division multiplexing.

waveform *n.* The manner in which a wave's amplitude changes over time. *See also* period, phase, wavelength.

wavelength *n.* The distance between successive peaks or troughs in a periodic signal that is propagated through space. Wavelength is symbolized by the Greek letter lambda and can be calculated as speed divided by frequency.

wavelet *n.* A mathematical function that varies over a limited extent of time. Wavelets are coming into increasing use for analyzing signals (such as sound). They have limited duration and sudden changes in frequency and amplitude rather than the infinite duration and constant amplitude and frequency of the sine and cosine functions. *Compare* Fourier transform.

wave table synthesis or **wavetable synthesis** *n.* A method of producing sound, especially music, through a PC. Wave table synthesis is based on use of a wave table, which is a collection of digitized sound samples taken from recordings of actual instruments. These samples are typically stored on a sound card and are edited and mixed together to produce music. Wave table synthesis produces

whiteboard *n.* Software that allows multiple users across a network to work together on a document that is simultaneously displayed on all the users' screens, as though they are all gathered around a physical whiteboard.

Whiteboard *n.* Microsoft NetMeeting feature that opens a separate window in which multiple users can simultaneously review, create, and update graphic information. The Whiteboard is object-oriented, not pixel-oriented, allowing participants to manipulate the contents by clicking and dragging with the mouse. In addition, they can use a remote pointer or highlighting tool to point out specific contents or sections of shared pages. The NetMeeting Whiteboard is T.126 compliant and is interoperable with other T.126-compatible whiteboards.

white box *n.* A nonbranded PC assembled by a reseller, potentially including components from a number of manufacturers. The name refers to the typical color of the shipping carton, a box unadorned by brand name or logo.

white box testing *n.* A method of testing software that is based on knowledge of how the software is intended to function. Unlike black box testing, which focuses on how the software functions without reference to how it is designed, white box testing relies on detailed knowledge of the program code itself and is intended to find flaws and/or errors in its design and specification. *Also called:* glass box testing. *Compare* black box testing.

white hat *n.* A hacker who operates without malicious intent. A white hat will not break into a system with the intention of doing damage. White hats may be employed to provide security against other hackers. *See also* hacker. *Compare* black hat.

white noise *n.* Noise that contains components at all frequencies, at least within the frequency band of interest. It is called "white" by analogy to white light, which contains light at all the visible frequencies. In the audible spectrum, white noise is a hiss or a roar, such as that produced when a television set is tuned to a channel over which no station is broadcasting.

white pages *n.* *See* DIB (definition 2).

white space *n.* The areas of blank space on a page that can be used in a design for balance, contrast, and visual appeal.

whois *n.* **1.** An Internet service, provided by some domains, that enables a user to find e-mail addresses and other information for users listed in a database at that domain. **2.** A UNIX command to access the whois service. **3.** A command that displays a list of all users logged onto a Novell network.

whois client *n.* A program (such as the UNIX whois command) that enables a user to access databases of usernames, e-mail addresses, and other information. *See also* whois (definition 1).

whois server *n.* Software that provides the usernames and e-mail addresses from a database (often listing people who have accounts at an Internet domain) to users who request the information using whois clients. *See also* whois (definition 1).

Whole Earth 'Lectronic Link *n.* *See* WELL.

whole number *n.* A number without a fractional component—for example, 1 or 173; an integer.

WID *n.* Acronym for **Wireless Information Device**. Smart phone or other handheld wireless device capable of multiple communications functions, including e-mail and Internet access.

Wide Area Information Server *n.* *See* WAIS.

wide area network *n.* *See* WAN.

wideband transmission *n.* *See* broadband network.

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 Wide SCSI connector has 68 pins. *Also called:* Wide SCSI-2. *See also* SCSI, SCSI-2. *Compare* Fast SCSI, Fast/Wide SCSI.

Wide SCSI-2 *n.* *See* Wide SCSI.

widow *n.* A last line of a paragraph, shorter than a full line, appearing at the top of a page. A widow is considered visually undesirable on the printed page. *Compare* orphan.

wildcard character *n.* A keyboard character that can be used to represent one or many characters. The asterisk (*), for example, typically represents one or more characters, and the question mark (?) typically represents a single character. Wildcard characters are often used in operating systems as a means of specifying more than one file by name.

permits complex data structures to be transmitted, processed, and returned between different operating systems running in different environments.

XML Schema *n.* A specification providing a common base for data description and validation in XML environments. XML schema replaces Document Type Definition (DTD) by defining a greater set of data types with more explicit data descriptions. XML schema has been developed as an open, vendor-neutral format to enhance information exchange and e-commerce over the Internet. It is also a standard for the description and encoding of data.

XML Schema Description Language *n.* See XSDL.

XML stylesheet *n.* Contains formatting rules that are applied to an XML file referencing the stylesheet. The standard set of rules for XML stylesheets is the Extensible Stylesheet Language (XSL). *See also* XSL.

XML Web services *n.* Units of application logic providing data and services to other applications. Applications access XML Web services via standard Web protocols and data formats such as HTTP, XML, and SOAP, independent of how each XML Web service is implemented. XML Web services combine the best aspects of component-based development and the Web and are a cornerstone of the Microsoft .NET programming model.

Xmodem *n.* A file transfer protocol used in asynchronous communications that transfers information in blocks of 128 bytes.

Xmodem 1K *n.* A version of the Xmodem file transfer protocol designed for larger, longer-distance file transfers. Xmodem 1K transmits information in 1-kilobyte (1024-byte) blocks and uses a more reliable form of error checking. *See also* Xmodem.

Xmodem-CRC *n.* An enhanced version of the Xmodem file transfer protocol that incorporates a 2-byte cyclical redundancy check (CRC) to detect transmission errors. *See also* CRC.

XMS *n.* *See* extended memory specification.

XMT *n.* Short for **transmit**. A signal used in serial communications.

XNS *n.* Acronym for **Xerox Network System**. A set of protocols assigned to five numbered layers (0 through 4) that form a suite designed to handle packaging and delivery of network transmissions.

XON/XOFF *n.* An asynchronous communications protocol in which the receiving device or computer uses special characters to control the flow of data from the transmitting device or computer. When the receiving computer cannot continue to receive data, it transmits an XOFF control character that tells the sender to stop transmitting; when transmission can resume, the computer signals the sender with an XON character. *Also called:* software handshake. *See also* handshake.

XOR *n.* *See* exclusive OR.

XOR encryption *n.* Short for **Exclusive-OR encryption**. A simple encryption scheme using the “exclusive-or” concept, in which a decision is based on only one of two conditions being met. Using a provided key, XOR encryption performs an exclusive-or process on each byte of data to be encrypted. Because XOR encryption is not a strong security tool used alone, it is typically used as an additional level of security for Internet transmission of sensitive information.

XPath *n.* An XML language for addressing items in an XML document by specifying a path through the document structure. XPath is used by XPointer and XSLT to locate and identify XML document data. XPath is also considered a query language complement to XQuery. XPath is more supported than XQuery even though there is no approved standard yet for either. *See also* XPointer.

XPointer *n.* An XML language used to locate data within an XML document based on data property descriptions, such as attributes, location, and content. XPointer references the internal structure of a document, allowing links to be made to occurrences of a word, character set, content attribute, or other element, rather than to a specific point within the document. *See also* XPath.

XQuery *n.* Short for **eXtensible Query Language**. Designed to be a functional query language that is broadly applicable to a variety of XML data types derived from Quilt, XPath, and XQL. Both Ipedo and Software AG implement their own versions of the W3C’s proposed specification for the XQuery language. *Also called:* XML Query, XQL.

XSD *n.* Acronym for **eXtensible Schema Definition**. A prefix used by convention to indicate a W3C schema namespace.