GLOSSARY

A

Access time. The amount of time it takes for information to be read from or written to a disk. The sum of search time plus seek time.

Accumulator. A register used to temporarily store data being manipulated by the CPU.

Acoustic modem. A modem using a coupler into which the telephone handset is plugged. Also called an acoustic coupler.

Acronym. A word formed by taking the first letters or sounds of each word in a phrase and capitalizing them. For example, RAM (pro-nounced as a word) is an acronym for random-access memory.

Ada. A U.S. Defense Department-sponsored high-level programming language named after Augusta Ada (Countess of Lovelace), the world's first programmer and Charles Babbage's associate.

Adder. The circuitry that performs addition on data received by the CPU.

Address. **(1)** A location in memory where data are stored and can be retrieved. (2) The part of an instruction that identifies the specific location of the data

to be operated on by that instruction.

Address bus. An electrical pathway that carries the addresses of data from memory to the processor.

Address register. A register containing the storage location'of the next data item to be retrieved from memory.

Aliasing. The jagged or stairstep appearance of the edges of diagonal lines or curves on a display screen. It occurs because pixels on the screen are arranged in rows and columns, and is clearly visible on low-resolution screens.

Algorithm. A predetermined set of instructions for solving a problem in a finite number of steps. (See also Heuristic).

Alphanumeric. Data represented in both alphabetic (the letters A -Z) and numeric (the numbers 0-9) form.

ALU. An acronym for arithmetic/ logic unit. The component of the CPU that is responsible for performing arithmetic and logic operations.

Analog. **(1)** Pertaining to the representation of numerical quantities, such as the measurement

of speed by an analog speed-ometer. (2) A type of signal used in some telephone and television networks, as well as some VCRs, cassette tapes, and plastic records.

Analog computer. A type of computer that is designed to process data obtained directly from measurable quantities, such as voltages, resistances, or rotations.

Analog-to-digital converter. A device that converts analog quantities, such as voltages, resistances, rotations, light, pressure, or temperature, into digital numbers for processing by a computer.

Analytical graphics. Graphics that are intended to help the user of a computer analyze data from spreadsheets and databases. Usually includes simple bar, line, and pie charts.

Antenna. A device for sending and receiving electromagnetic waves.

APL. An acronym for a programming language. An interactive scientific programming language designed for on-line use.

Application. What is done with a computer system.

Application generator. A program that writes other programs based on the user's input combined into a single module of software.

Application programmer. A person who writes computer pro-

grams, such as spreadsheets, word processors, database programs, and specific application programs (e.g., accounting or inventory programs). There are two categories: business-application programmers and scientific- or engineering-application programmers.

Application software, A computer program or set of programs intended to perform a specific function, such as accounting, payroll, word processing, spreadsheet calculating, or database management.

Application-specific integrated circuit (AS1C). An integrated circuit designed to fill the specific requirements of an application.

Architecture. A term used by computer designers to designate the structure of complex information-processing systems. It includes the kinds of instructions and data used, the memory organization and addressing, and the methods by which the system is implemented.

Arithmetic/logic unit. See ALU.

Arithmetic operator. A symbol that tells the computer to perform an arithmetic operation. The operators are (+) for addition, (-) for subtraction, (*) for multiplication, (/) for division, and (**) for exponentiation.

Arithmetic unit. The functional unit of a central processing unit that performs adding, subtracting, multiplying, dividing, and shifting of numbers.

Array. A type of data structure that consists of two or more related data elements identified by a single name.

Artificial intelligence (AI). The branch of computerscience that attempts to understand the nature of intelligence and produces new classes of intelligent machines. Areas of study include robotics, speech recognition, image recognition, natural-language processing, and expert systems.

Artificial language. A language whose syntax, grammar, and rules were developed prior to its use. Programming languages are examples of artificial languages.

Artificial life. A lifelike process in an artificial medium such as a computer model, simulation, or robot. Artificial life simulations have been developed that synthesize some of the processes (e.g., reproduction, growth, learning, and evolution) exhibited by biological systems of life.

Ascending order. Sequential arrangement from lowest to highest. A telephone book, for example, lists names in ascending order.

ASCII. An acronym for American Standard Code for Information Inter-change. A seven- or eight-bit code that specifies a unique set of binary digits that represent a character set.

Assembler. A program that translates an assembly-level language into machine language.

Assembly-level language. A low-level computer language consisting of symbolic instructions and addresses that translate into machine codes on a one-to-one basis.

Asynchronous transmission. A mode of communication in which individual data packages are sent at random time intervals. (See also Synchronous transmission).

Attribute. A column in a two-dimensional database.

Audio digitizer board. A board that plugs into a computer's expansion slot and turns analog sound waves into digital files for playback.

Authoring system. A specialized application generator that combines hardware and software tools for designing interactive programs.

Automatic teller machine (ATM). A special-purpose computer that allows bank customers to perform routine bank-ing transactions themselves, rather than having to wait for a bank employee.

Automation. Short for automatic operation. The process of mechanizing or computerizing functions so they perform without human intervention.

B

B-tree. A file in which the records are structured into an inverted tree based on a series of midpoints. For example, the root of the tree is the midpoint of a file, at the second level are more midpoints, and so on.

Background study. The analysis of an existing system for the purpose of performing a requirements analysis.

Backingup. Copying program or data files in case the original is lost or destroyed.

Backup file. A copy of a file made for safekeeping in case the original is lost or damaged.

Band/belt/train printer. An impact printer that uses one striking mechanism for each character position across a line; sometimes called a line printer.

Bandwidth. The term used as a measure of the capacity of a communication channel, expressed in bits per second.

Bank switching. A software technique used to increase a computer's memory by allowing different pieces of memory to occupy the same addresses.

Bar code. A series of thick and thin stripes used to represent numbers and characters.

BASIC. An acronym for Beginner's All-purpose Symbolic Instruction Code. Ahigh-level programming language originally intended for time-sharing systems but now used primarily in conjunction with microcomputers.

Batch processing. A method by which a computer performs one job at a time, with no human interaction occurring during the job.

Baud. A unit of information transfer that is synonymous with one bit per second.

Bidirectional printing. Printing lines of output in alternate directions. For example, if the first line is printed left to right, the next line will be printed right to left.

Binary digit. The smallest unit of information capable of being represented in a computer or communication system.

Binary number. A number system that uses only the symbols 0 and 1 to represent digits (from the Latin binarius, meaning "two at a time").

Binary search. A search method in which a list of items is successively halved until the sought item is located.

Binary signal. A computer circuit that is represented by two different levels (high and low) of voltage.

Biometric device. An instrument that performs mathematical analysis of biological characteristics. Examples include analyzing speech, handwriting, fingerprints, or eye retina features.

BIOS. An acronym for basic input/ output system. The part of an operating system that links the specific hardware devices to the software.

Bistable. A hardware device, such as a switch, that can only assume two stable states, such as on or off.

Bit. Short for binary digit. (See also Binary digit).

Bit map. A technique for dividing a display screen into a very fine grid of pixels that uses a video memory, in which bits represent pixels on a display screen. With bit mapping, a grid of pixels on a display screen is represented by a light or dark point on the surface of the display screen. (See also Pixel).

Bits per second. The number of bits of information that pass a given point in one second. A measure of the carrying capacity of a channel; sometimes called baud rate.

Boolean algebra. An algebra that is used to manipulate symbols according to the operators and, or, and not. It allows logic to be handled as simply as mathematical formulas. Developed by George Boole in 1847.

Bootstrap loader. An initialisation program that sets up and readies the computer when it is turned on.

Bottom-up design. In software development, a technique that starts with the parts or most basic functional components and proceeds to build a whole or completed program.

Branch. A type of program instruction that performs a test on a register or flag and, depending on the results, continues on with the next instruction in sequence, or branches (or jumps) to another instruction in the program.

Buffer. A device (usually a memory) that temporarily stores data while it is being routed to a destination, such as a printer, mass storage, or a communication channel.

Bug. A computer term for an error. A software bug is a programming error, a hardware bug is a malfunction or design error in the computer or one of its components.

Bundled. A computer system sold as a complete system. A typical bundled system would include all the necessary hardware components along with a vari-ety of software programs

for various applications; often called a turnkey system.

Bus. The electrical pathway used to transfer information from one point in a computer to another.

Bus network. A system in which all computers or terminals communicate via a common distribution channel or bus.

Business systems analyst. A systems analyst who is in an organizational department other than the data-process-ing department.

Byte. A sequence of eight consecu-tive bits used in coding systems to repre-sent one character of data or information.

C

C. A high-level programming language that is very popular with system programmers because of its transportability between computer systems.

Cache. A high-speed buffer memory filled from lower-speed mass storage. Frequently used instructions and data can be fed to and from the CPU much faster when located in a cache. Pronounced "cash".

Cathode ray tube. See CRT.

CCITT. Short for Consultative Committee for International Telephone and Telegraphy, A United Nations standards organization responsible for setting international telecommunications standards.

CD ROM. An acronym for compact disk read-only memory. An optical disk on which data are encoded for retrieval by a laser. (See also Optical disk).

Cell. In a spreadsheet, the space representing the intersection of a row and column.

Cellular mobile radio. A technique for dividing a geographi-cal area into hexagonal-shaped cells, A local antenna within each cell is used to transmit via noninterfering frequencies. As mobile radio users move from cell to cell, telephone calls continue uninterrupted while a central computer adjusts transmit and receive frequencies. Cellular mobileradio service is an alternative to the more limited single-antenna mobile-telephone services.

Central electronic complex. The processor and memory of a computer system along with some pathways for information to travel between the two.

Central processing unit. See CPU.

CGA. Short for color graphics adapter, an IBM video card that plugs into an expansion slot and provides 320- by 200-pixel resolution and a 16-color palette on the display screen. (See also EGA; VGA; XGA).

Channel. A pathway for the transmission of data or information

to and from a computer or communication system.

Character map. A technique for dividing the display screen into a grid that is 25 rows high by 80 columns wide. Each location on the grid can correspond to a character, such as a letter, number, or punctuation mark. A ROM (read-only memory) stores each character as a pattern of dots.

Chart. Graphics or diagrams that display data or the relationships among data in pictorial form.

Charting program. A built-in component of spreadsheet programs. These programs are capable of transforming data that are contained in their spread-sheet into charts – graphics or diagrams that display data or the relationships among data in pictorial form. Common chart types include bar, line, and pie charts.

Chip. A small piece of silicon or other semiconducting material containing an integrated circuit.

Circuit. (1) In a computer, an interconnected set of components that per-forms an electronic function. (2) In communications, an electrical connection between two nodes.

Circuit switching. A physical (electrical) connection between two nodes in a communication network that dedicates the entire bandwidth of that circuit until the connection is dropped. (See also Packet switching).

Class. In object-oriented programming, a generalized category that describes a group of objects that can exist within it. The class serves as the template from which specific objects are created.

Client. An end user or computer program that requests resources across a network.

Client/server computing. A combi-nation of clients and servers that provides the framework for distributing files and databases across a network.

Clock. A computer circuit that uses regular electrical pulses to trigger, time, and synchronize various events within a computer.

Coaxial cable. A channel medium consisting of wire surrounded by a flexible metallic shielding.

COBOL. An acronym for COmmon Business Oriented Language. A high-level programming language that is used primarily for business-oriented applications.

Code. (1) A set of symbols, such as the dots and dashes of the Morse code, that represents another set of symbols, such as the letters of the alphabet. (2) The set of rules that defines the way in which bits can be ar-

ranged to represent numbers and letters. Example: ASCII. (3) To write a computer program in a specific programming language.

Collision. In a communications network, when two messages are transmitted at the same time, they will collide, resulting in a garbled transmission with neither message arriving at its destination intact.

Collision detection. A task performed in a network system to prevent two computers from transmitting at the same time and having the messages collide.

Command. An instruction that tells a computer to perform an operation.

Command-driven interface. Software that takes action as a result of the user typing single-letter, word, or line commands.

Command processor. A program that examines what you type when interacting with an operating system.

Communication. (1) A process by which information is exchanged between individuals through the use of a commonly agreed-onset of symbols. (2) From an engineering standpoint, the movement of electronic traffic from one point to another.

Communication channel. A transmission path for electrical or optical signals. All commu-

nication channels use the medium of electromagnetic waves, such as radio waves, light waves, and microwaves.

Communication processor. A device that interfaces a central computer to a number of terminals.

Communication server. A device that connects local-area networks (LANs) to wide-area (WANs) or telecommunication networks.

Communications software. Programs that enable a computer to connect to other computers and exchange information.

Communication system. A system that consists of senders (transmitters), physical channels, and receivers.

Compatibility. (l) The ability to connect different computer systems, devices, or software so they can work together. (2) The capability of different computer systems to process the same applications.

Compiler. A computer program (software) that reads a high-level program to (1) check it for spelling and grammar errors and (2) translate it into lower-level language instructions.

Component. In the computer industry, an elementary part, such as an integrated circuit, memory chip, or microprocessor, that can be connected to

other parts to form larger systems.

Compression. Techniques for compacting information so that it requires less storage space.

Computer. An electronic device that can accept input, process it according to a set of instructions, store the instructions and the results of processing, and produce results as its output.

Computer-aided design (CAD). The use of a computer system to aid the process of design.

Computer-aided engineering (CAE). The use of a computer system to produce, analyze, test, and design systems and components.

Computer-aided manufacturing (CAM). The use of a computer system to assist in a manufacturing process.

Computer-aided software engineering (CASE). A set of tools to automate the tasks involved in designing and developing large-scale or complex software projects. Included are data dictionaries, diagram generators, prototyping tools, and consistency-checking tools.

Computer-assisted instruction (CAI). The use of a computer system to provide instruction and drill and practice in basic computation and language skills.

Computer graphics. A broad term that refers to the methods and techniques used to draw pictures or images on display screens or on special graphic printers and plotters.

Computer-integrated manufacturing (CIM). Computer-based systems in different company departments that integrate independent design, manufacturing, and administrative functions. For example, drafting accomplished on a CAD system might be directly linked to a numerically controlled CAM factory machine tool.

Computer literacy. The knowledge and skills required to use a computer as a problem-solving tool.

Computer science. The science of problem-solving techniques using computers.

Computer systems analyst. A systems analyst who is in the data-processing department and is concerned with the technical aspects of system design.

Computerization. The reshaping of society by the widespread adoption and use of computers.

Computerized information services. On-line databases to which subscribers can gain access via telephone lines.

Computerphobia. The fear of computers.

Concentrator. A device that combines data from several sources into a smaller number of channels for retransmission.

Concurrent program execution. The execution of two or more programs at the same time. They actually take turns using the computer so rapidly that they give the illusion of operating concurrently.

Configuration. A set of computer equipment programmed and/or physically linked together to operate as a system.

Container object. An object that holds other objects so they can be easily stored, filed, or sent through electronic mail.

Control bus. An electrical pathway used to signal various parts of a computer when to transfer information and when the transfer is complete.

Control key. Akey that when pressed in combination with other keys generates control characters for use by a program. For example, pressing a control key in conjunction with the D key might mean delete a character in a word processing program.

Control structures. Statements in the program that control the order in which the instructions are executed. Examples include sequence, selection, looping, and case.

Control unit. The functional unit of the CPU that is responsible for retrieving instructions from memory, determining their type, and breaking each instruction into a series of simple, small steps or actions.

Coprocessor. A processor that adds additional functions to the central processor. Examples include math and graphics coprocessors.

Copy protection. A technique used by software developers to make a disk difficult, if not impossible, to copy.

CPU. An acronym for central processing unit. The part of the computer system that interprets and executes instructions, performs arithmetic and logic operations, and directs the input, storage, and output operations. Also called a processor.

CRT. An acronym for cathode ray tube. A type of screen found in television sets and computer displays in which an electron beam scans a phosphor-coated surface, leaving light or dark points of light (pixels) on the inside face of the screen. (See also Pixel).

Cursor. A visual aid on a display screen that indicates where the next symbol will appear, usually in the form of an arrow, blinking block, or blinking underline.

Cursor movement keys. Keys that move the cursor in a particular direction when pressed.

Cybernetics. The science of communication and control in living organisms and machines. It in-

cludes the study of messages as a means of controlling machinery and society, the development of automation, and the study of psychology and the nervous system.

Cycle. A set of operations that is repeated regularly in the same sequence.

Cylinder. The imaginary surface composed of all the tracks that lie directly above and below one another on a multiple-platter disk pack.

D

Data. A general term meaning the facts, numbers, letters, and symbols processed by a computer or communication system to produce information. (See also Information).

Data bus. An electrical pathway over which data and instructions travel to and from the processor.

Data communications. The transfer of data or information between computer-related devices.

Data dictionary. (1) In system design, a listing of all the data elements and data structures within a system. (2) In a database system, a file that contains descriptions of and relationships among a collection of data.

Data-flow diagram. In systems analysis, a series of blocks that represents processes or procedures that are connected by flow lines.

Data independence. The ability of a database to exist independently of specific applications.

Data integrity. Techniques for protecting a database against invalid alteration or destruction.

Data model. A description of the way to structure and manipulate the data in a database. The structural part of the model specifies how data should be represented (e.g., tree, tables, and so on).

Data processing. A general term that stands for all the logical, arithmetic, and input/output operations that can be performed on data by a computer.

Data-processing analyst. A systems analyst who is in the data processing department of an organization and is concerned with the technical aspects of system design. Also called computer systems analyst.

Data-processing (DP) department. The combination of the information system and the people who support it. The DP department combines computer

and communication hardware and software with manual procedures and models for analysis, planning, control, and decision making.

Data security. Techniques for protecting a database against access or modification without authorization.

Data structure. An organizational scheme used to structure or organize data so that they can be stored, retrieved, and manipulated by a program. Examples include records, lists, and arrays.

Database. (1) A collection of different types of data organized according to a structure that minimizes redundancies and facilitates the manipulation of the data. (2) A collection of one or more files treated as a whole unit.

Database management system (DBMS). Software that organizes, manipulates, and retrieves data stored in a database.

Database manager. Multiple files, their indexes, the relationships among data in the files, and a program to link the files and handle basic tasks, such as entering, modifying, retrieving, and printing data from the files. (See also File manager).

Database server. Software that services requests to a database across a network.

Database system. An information system that integrates a collection of data and makes it available to a wide variety of people in an organization.

Database transaction. A group of database modifications treated as a single unit.

Debug. The process of going through a program (software) or component (hardware) to remove errors.

Decimal number. Referring to the base 10 number system we normally use for arithmetic. Some early computers used decimal numbers instead of binary numbers.

Decision support software. Knowledge-based software that builds decision-making models.

Decision support system. Applications within MIS that directly support specific decision making.

Decode. To modify information from a computer-readable form into a form that people can read or use. (See also Encode).

Decryption. The decoding of a cryptic electronic transmission. (See also Encryption).

Dedicated. Something designed for a specific use, such as a leased line for data transmission or a computer intended only for word processing.

Default. An action or value that a computer automatically as-

sumes unless a different action or value is specified.

Descending order. Arrangement of information in sequence from highest to lowest. (See also Ascending order).

Design review. The process of reexamining the proposed design with the intended users and other systems analysts and programming professionals.

Desktop publishing. The use of personal computers to prepare and print a wide variety of typeset- or near-typeset-quality documents. The process involves composing the text, manipulating graphics, making up or composing the document, and publishing the finished product on a laser printer or typesetter.

Detail documentation. Documentation that provides a programmer with sufficient information to write the program.

Device driver. Programs that interface with the operating system to control the operation of the hardware components of a personal computer system. The device driver is responsible for translating instructions from the application into commands the hardware understands.

Dialog box. A temporary window that contains choices when the program needs additional information from the user.

Dial-up line. The normal switched telephone line that is used as a transmission medium for communications.

Double in-line memory module (DIMM). A mini circuit board designed to accomodate surface-mounted memory chips. DIMMs plug into small sockets on the system.

Digital. Relating to the technology of communications and computers by which information is stored and transmitted in binary ones and zeros. (See also Analog).

Digital camera. A camera coupled with a processor used for encoding highly detailed images, such as pictures or three-dimensional objects, into digital data.

Digital computer. A type of computer capable of representing binary digits by producing and sensing discrete on or off states represented by binary ones and zeros.

Digitizing. The process of translating analog data into digital data.

Direct conversion method. When changing from one computer system or method of operation to another, the old system or method is stopped and the new system or method is started immediately.

Direct-access file. A type of file organization scheme designed for processing records in an order other than sequential.

Also called a random-access file.

Direct source input. Data that are captured directly from their source without the requirement of a separate transcribing step. (See also Transcribed in-put).

Disk. A circular platter on which a magnetic or reflective coating is applied. Used for long-term storage of data.

Disk array. The combination and synchronization of multiple disk drives into one self-contained unit. A disk array features faster data access and higher data throughput than an equivalent-sized single disk drive.

Disk cartridge. Removable disks that are sealed in a container similar to a videotape cartridge.

Disk drive. A device that houses the motor to spin the disk and the read/write head for accessing and storing information on the disk.

Disk pack. A removable stack of hard disks joined together by a common spindle.

Display. A method or device for representing information that is output from a computer system. Usually found in the form of a cathode ray tube (CRT) or flat-panel display. (See also CRT; Flat-panel display).

Distributed computing. A type of processing that utilizes a number of small computers distrib-uted throughout an organization.

Distributed database. A capability in which different pans of a database reside on physically separate computers. The goal is to access information without regard to where the data might be stored.

DMA. An acronym for direct-memory access. A technique by which the CPU is placed in a wait state while another device transfers data to or from memory at a high rate.

Document. Any text or collection of characters (letters, numbers, spaces, punctuation marks, and other symbols); usually associated with word processing and desktop-publishing applications.

Documentation. (1) The books, manuals, or tutorials that accompany a computer-related product. (2) Written specifications that are a part of the process of developing software.

DOS. An acronym for disk operating system. (See also Operating system).

Dot-matrix printer. A printer that uses a selected pattern of dots transferred by impact to produce images on paper.

Download. A method of sending a copy of data, such as a file, from a central location to a remote location and storing it there for future use.

DRAM. An acronym for dynamic random-access memory, a

memory that is constantly re-freshed with electrical pulses. Pronounced "dee-ram".

Draw program. A graphics pro-gram that provides commands to create lines, circles, rectangles, and other shapes, as well as do freehand sketching, while al-lowing the objects created to be resized or moved around without affecting other objects. Exam-ples include MacDraw for the Macintosh and Windows Draw for MS-DOS computers.

Duplex. A data communications term that indicates how many directions data can flow at one time. In half-duplex, data move in one direction at a time; in full-duplex, data move in two directions at a time.

E

EBCDIC. An acronym for Ex-tended Binary-Coded Decimal Interchange Code. An eight-bit code designed by IBM that assigns binary digits to specific symbols. Used primarily by IBM computers.

Edit. To make changes in data, a program, or a document.

EGA. Short for enhanced graphics adapter, an IBM video board that plugs into an expansion slot and provides 640-by 350-pixel resolution and a 16-color palette on the display screen. (See also CG4, VGA).

Electroluminescent display (ELD). A display device that produces light through the application of electric current on a sensitive surface.

Electronic conference. A meeting that is conducted over an elec-tronic network using terminals or personal computers.

Electronic data interchange (EDI). The computer-to-computer electronic transmission of stan-dard documents such as in-voices and purchase orders. EDI makes the translation of paper-based documents into and out of a generic form pos-sible so that they can be trans-ferred electronically among different computers.

Electronic mail. An electronic technology that handles the sending and receiving of mes-sages.

Electronic mailbox. A file stored on disk in which each record represents a message and serves as an interface for elec-tronic mail.

Electronic marketplace. The buying and selling of informa-tion through information ser-vices and videotex services. Examples of services that can be subscribed to include Prod-igy, The Source, CompuServe, Dialog, and Nexis.

Electronic pen. A pen that utilizes radio waves to communicate with a grid of wires underneath a liquid-crystal display screen. Radio waves are sent to the tip of the pen and returned for position analysis. Also called a stylus.

Electronic transaction. The electronic transfer of funds in lieu of conventional paper transactions, such as checks.

Electrostatic printer. A printer that uses electricity to transfer images onto specially coated paper.

Emulation. The imitation of one computer system or part of a computer system by another.

Encode. To modify information into a desired pattern for transmission or processing. (See also Decode).

Encryption. The coding of an electronic transmission for purposes of security or privacy. (See also Decryption).

End user. A person who uses a product, as opposed to a person who develops or markets the product.

End-user development. The use of tools, such as macros, program generators, or interface builders, by noncomputer specialists to develop applications that the end users will use.

Enterprise computing. Computer and communication technology that combines geographically dispersed office workers, computing resources, and information into a single integrated environment.

Erasable optical disk. An optical disk that uses lasers to read and write information to and from the disk, but also uses a magnetic material on the surface of the disk and a magnetic write head to achieve erasability.

Ergonomics. The science of the study of how people use tools to perform work and how they physically relate to their environment.

Error checking. In communications, software routines that identify and often correct erroneous data.

Execute. To run a computer program or part of a program.

Expanded memory. Bank-switched memory that expands the memory of a microprocessor beyond its one-megabyte limitation, (See also Bank switching; Extended memory).

Expansion slot. A series of sockets into which additional circuit boards can be plugged. Many personal computers and minicomputers use an "open architecture" by which additional hardware devices can easily be added to the system via expansion slots. (See also Architecture).

Expert system. A computer program that solves specialized

problems at the level of a human expert.

Expert-system shell. A development environment that uses rules or examples as its input but eliminates the need for programming.

Extended memory. Real memory that extends beyond the one-megabyte addressing limitation of a microprocessor. (See also Expanded memory).

F

Facsimile. A method for electronically copying and transmitting an image.

Fault. A condition that causes a functional component to fail to operate in the required manner.

Fault-tolerant computer. A computer that uses redundant hardware or software components to prevent failure from disrupting the operation of the system. The system can continue processing while the faulty component is replaced or repaired.

Fiber-Distributed Data Interchange (FDDI). A token-based local-area network technology that operates at 100 million bits per second.

Fiber optics. Transmitting information by using infrared or visible light frequencies through glass fibers.

Field. The smallest unit of named data that has meaning in a record. A field usually describes an attribute of the record, such as a name or address.

File. A collection of organized data stored as one complete unit for processing.

File manager. A single file, its indexes, and a program to handle basic tasks, such as entering, modifying, retrieving, and printing data from the file.

File server. A device that interfaces files or databases to a local-area network.

Firmware. Software that has been copied on integrated circuits, usually ROM (read-only memory).

First generation. Referring to computers of the period 1951-1958, which used vacuum tubes.

Fixed-length operations. The type of operations performed by a word-addressable computer.

Flat file. A single file consisting of rows (records) and columns (fields) of data that resemble a two-dimensional spreadsheet.

Flat-panel display. A display characterized by a thin panel consisting of rows and columns of pixels. Digital circuits feed signals to each row and column. For

example, sending a low voltage down a row while sending higher voltages across selected columns causes the pixels at the intersections to light up.

Floppy disk. A flexible plastic disk coated with a magnetic recording material.

Flowchart. A graphic representation used in the design phase of programming to represent the logic of a program or module. (See also System flowchart).

Form. (1) In database management systems, a display that identifies the names and characteristics of the fields within a record. (2) In printed materials, a structured document with spaces reserved for entering information.

Format. (1) The process of preparing a magnetic storage medium, such as a floppy disk, to store data in specified places (i.e., tracks and sectors). (2) The way information is physically organized on a display screen, printed page, or disk.

FORTRAN. Short for formula translator. A high-level computer programming language used primarily for scientific and engineering applications.

Fourth generation. Referring to computers of the period 1975 to the present, which use various forms of microproces-sor and other VLSI chips. (See also Microprocessor; VLSI).

Fourth-generation language. A term that encompasses (1) presentation languages, such as query languages and report generators; (2) specialty languages, such as spreadsheets and database languages; (3) application generators that define, input, modify or update, and report data to build applications; and (4) very-high-level languages that are used to generate application code. Often abbreviated as 4 GL.

Frame. (1) A basic unit of information (equivalent to one full screen) in a video-tex system. (2) The vertical section of magnetic tape that corresponds to one byte of data.

Frame buffer. In graphics, a special area of random-access memory that holds the contents of a screen display. The processor can perform manipulations on information in a frame buffer before it is displayed. Sometimes used interchangeably with the term bit map.

Freeware. Software that is given away free of charge. Freeware is often made available on electronic bulletin boards and through user groups.

Frequency. The rate at which a signal pattern is repeated.

Frequency-division multiplexing. The communication process of assigning a channel to several users on the basis of

dividing the channel into different frequencies.

Front-end processor. A computer that handles communications between terminals and a central computer.

Full-duplex. A mode that allows two computers to send and receive data at the same time.

Full-text retrieval software. Software that allows text to be indexed, edited, annotated, linked, and searched for in an electronic document.

Function key. A key that tells a program to perform a specific action, usually labeled [Fl] through [F10] or [F12]. Pressing the [Fl] key, for example, might invoke a help system.

Functional specification. A precise description of the functional requirements of a computer system.

G

Garbage in-garbage out. A term referring to information processing that has been distorted by invalid input.

Gas plasma display. A display device in which a gas, usually a mixture of neon and argon, is trapped between flat glass plates. A grid of electrodes permits the turning on and off of pixels.

Gate array. A standardized design for an integrated circuit consisting of a fixed number of logic gates that can be interconnected according to customer specifications.

Gateway. A device used to connect dissimilar networks.

General-purpose computer. A type of computer that can be programmed for a wide variety of tasks or applications.

General-purpose programs. Programs that are adaptable to a wide variety of tasks, such as word processing, spreadsheet, database management, graphics, and communications. Also called general-purpose application software.

Geographical information system (GIS). A system that digitizes maps and images of distributions of statistical data and displays them as graphics.

Gigabyte (GB). A unit of measure that is the equivalent of 2^{30}, or 1,073,741,824 bytes.

Graphical user interface. An interface that uses pictures and graphic symbols to represent commands, choices, or actions.

Graphics. The term encompassing several elements, including color, motion, and resolution, that together result in the ability of a computer to show line drawings, pictures, or animation on a display screen or printer.

Grayscale scanner. A scanner that is able to distinguish among levels of gray as well as

black-and-white. By measuring the relative amount of reflected light, a grayscale scanner can translate points in the image into a code that represents the levels of gray at each point.

Groupware. Application software that supports collaborative work and integrates electronic mail, conferencing, calendar and scheduling software; workflow software, which auto-mates the routing of business processes and forms over a network; and document management software to handle the creating and revision of shared documents on a network.

Guided-vehicle system. Robots that can find their way around a factory either by sensing guide wires embedded in the floor or through a vision system.

H

Hacker. A term for a person who gains access to computer systems without authorization.

Half-duplex. A mode that allows two computers to send and receive data, but only in one direction at a time. For example, if one computer is receiving data, it must wait until transmission is complete before sending data.

Handshaking. A procedure or protocol used to establish if two computers or a computer and a peripheral are ready to exchange information.

Handwriting recognition. The process of recognizing characters (e.g., letters, numbers, and punctuation) handwritten or printed on a display screen and translating them into digital codes that are redisplayed as text on the screen.

Hard automation. Dedicated equipment that can only per-form a single operation under carefully controlled circumstances, for example, a factory assembly line that can automatically weld certain types of car parts.

Hard copy. Output from a computer system that is in the form of images recorded on paper or film.

Hard disk. A disk made of a rigid base, such as aluminum, and coated with a magnetic-oxide layer.

Hardware. The physical components associated with a computer or other system. (See also Software).

Hashing. A mathematical technique for assigning a unique number to each record in a file.

Heuristic methods. Exploratory methods for problem solving in which an evaluation is made of the progress toward the goal using a series of approximate

results. Sometimes associated with trial-and-error methods or rules of thumb. (See also Algorithm).

Hexadecimal number. A number system that uses a base of 16. Its symbols consist of 0,1,2,3,4, 5,6,7,8,9, A, B, C, D, E, and F. It is often used as a shorthand method for writing binary numbers. (See also Binary number; Decimal number).

Hierarchical model. A method for storing data in a database that structures data into an inverted tree in which records contain (1) a single root or master key field that identifies the type, location, or ordering of the records, and (2) a variable number of subordinate fields that define the rest of the data within a record.

Hierarchical network. A central controller coupled to a series of nodes (or subcontrollers), that are connected to several terminals or personal computers.

Hierarchy chart. A diagram that shows the interrelationships among program modules. Also called a structure chart.

High-level documentation. Documentation used by systems analysts to provide a picture of the overall structure of the system, including input, processing, storage, and output.

High-level language. A programming language that allows a programmer to specify instructions in English-like statements that are closer to the problem being solved than to the computer language in which they are written.

Human factors. Those elements that pertain to the design of the software interface between people and computers. For example, the design of icons and windows is a human-factors concern.

Hybrid approach. An approach that enables the assembly of systems from two or more existing tools.

Hybrid computer. A type of computer designed for highly specialized tasks, which combines the features of both digital and analog computers.

Hypermedia. An extension of hypertext that includes graphics, video, sound, and music.

Hypertext. Electronic books in which an author can link information and create nonlinear paths through related material.

I

Icon. A picture on a display screen that represents a physical object, such as a file folder, memo, letter, in-basket, or wastebasket.

Image scanner. A device that converts optically focused images, such as photographs or drawings, into digital images that can then be processed like any other digital data. A photoreceptor device is required to convert reflected light into digital images.

Immediate addressing. An addressing technique in which the contents of an address portion of an instruction contain an operand instead of an address. (See also Operand).

Impact printer. A printer that operates on the principle of a striking mechanism transferring an image through a ribbon onto paper.

Index. A list containing an entry for each record in a file organized in a certain way.

Index file. In a database, a file that keeps track of the addresses where records can be found.

Index sequential. A file organization method that provides both sequential and direct-access capability.

Industrial work. Work involving the production of goods and services; it is often associated with blue-collar factory workers. Inference engine. The part of an expert system that performs the reasoning. (See also Expert system).

Information. (1) Data that have a context. (2) Data used in decision making.

Information explosion. Refers to the growing volume of information created by the increasingly complex society in which we live.

Information processing. The work that information systems perform, consisting of responding to input, processing that input according to instructions, and providing output.

Information revolution. (1) A term used to indicate the point at which modern society shifted from being an industrial society to being an information society. No agreed-on date. (2) The reshaping of economic, social, political, and technical structures resulting from the teaming of people and computers.

Information society. A society structured around the principles of information as a commodity and as a strategic resource.

Information system. A system that takes input, processes it, and produces information as output.

Information technology. A collective term for computer-and-communication hardware and system-and application-software.

Information theory. The branch of computer science that studies the properties of information and how it is measured.

Information work. Work involving professionals, managers, clerks, and administrators who produce information. Inheritance. In object-oriented programming, the passing along of certain behavior and structure from a class to its descendants. Inheritance allows new objects to be created from old ones.

Inkjet printer. A printer that uses a selected pattern of dots to form images that are transferred by spraying droplets of ink.

Input. (1) The use of a device to encode data. (2) The process of transferring data into a computer system.

Instruction. A basic unit of a program that specifies what action is to be performed on what data.

Instruction counter. A register used to store the address (location) of the next instruction to be executed by the CPU.

Instruction set. The unique set of software operations that comes with every processor and helps to define the architecture of the processor. (See also Architecture).

Integrated application software. Software that combines several applications under one consistent user interface.

Integrated circuit. A system of interrelated circuits packaged together on a single silicon chip.

Interactive. A computer system that provides response to all inquiries by the user.

Interface. The hardware and/or software necessary to interconnect components of a computer system or to connect one computer system to another.

Interface builder. A program that allows you to assemble a user interface, also called a front end, from a library of predefined graphic objects such as windows, buttons, and scroll bars. Interpreter. A computer program that translates an instruction into machine language, executes it, and then repeats the process for each instruction in a program until the program is finished.

Interrupt. A signal that causes a processor to suspend the instruction that it is currently executing and to transfer control to a special interrupt-handler program. Interrupts may occur because of an exception, such as an arithmetic overflow or data transfer error.

I/O port. An abbreviation for input/ output port. A device connected to a computer that allows the input or output of data and instructions. (See also Port).

Iterative prototyping. The process of building working models of the application, testing them, and modifying them in

response to new ideas. (See also Prototyping).

Jargon. The vocabulary peculiar to a profession or group.

Joystick. A lever, pivoted to move in any direction, that controls the movement of a cursor on a display screen. Similar to a mouse but used mostly in game programs. (See also Cursor).

K

K. An abbreviation for 1024 bytes.

Key. A field in a file used to identify records for purposes of retrieval or sorting.

Key-to-disk or key-to-tape device. A device in which data are entered on a keyboard and directly recorded on a disk or tape.

Keyboard. Keyswitch technology coupled with electronic circuitry that is used to encode input data.

Key field. A field in a file used to identify records for purposes of retrieval or sorting.

Keypunch machine. An early type of input device in which data are entered on a keyboard

and transcribed by punching combinations of holes into specially designed cards.

Kilobyte (KB). A unit of measure equal to 2^{lo} or 1024 bytes. (See also TC).

Knowledge base. The collection of facts, data, beliefs, assumptions, and heuristic methods about a problem area.

Knowledge engineer. A systems designer who designs expert systems.

Knowledge representation. The formal method for representing facts and rules about the area under consideration in an expert system.

L

Laptop computer. A term used to indicate a portable computer that can be operated while on a person's lap. Laptop computers are battery powered in their normal operation.

Laser disk. See Optical disk.

Laser printer. A printer that uses a laser to record an impression on a drum or belt, which is then transferred to paper.

LCD. An acronym for liquid-crystal display. A liquid-filled display surface that, when electrically charged, creates images using ambient light. Typically used in watches, calculators, and portable computers.

LED. An acronym for light-emitting diode. A semiconductor device used as a display in watches, calculators, and instruments.

Life-cycle approach. An approach used in system design and software development that proceeds from definition to design and development to implementation.

Light-emitting diode. See LED.

Light pen. A handheld light-sensitive device that allows a user to point to or write information on a display screen.

Line printer. A printer that prints character by character or dot by dot, but the process happens so fast that it seems to be printing one line at a time.

Linear density. The number of bits per inch on a disk track.

Linker. A program that combines separate modules into one executable program.

Liquid crystal display. See LCD.

LISP. Short for list processor. A language used primarily by artificial intelligence programmers for general symbol manipulation and list processing.

Loader. A program that brings programs stored in a program library into memory for execution.

Local-area network (LAN). A communication channel along with interface circuitry that connects devices, such as computers or peripherals, within a limited geographical distance.

Logical record. A record that is defined according to its content or function. (See also Physical record).

Loop. A series of program instructions that are performed repeatedly until a specified condition is satisfied.

Low-level language. A programming language that uses symbolic codes that closely resemble the machine language into which they are translated, such as an assembler language. (See also High-level language).

LSI. An acronym for large-scale integration, a process that packs thousands of transistors on a single chip.

M

Machine cycle. The length of time required to perform one specific machine (computer) operation.

Machine language. A computer-specific set of primitive or elementary instructions that al-

lows people to communicate with a particular computer.

Macro. (1) A single command that executes a sequence of other commands. For example, displaying your name, address, and phone number by typing [Ctrl] A. (2) When used as a shortened version of macroinstruction, a single instruction that represents a given sequence of instructions in a program.

Macro language. A special-purpose programming language embedded inside an application; usually found in word processor, spreadsheet, and database programs.

Magnetic-ink character recognition. See MICK.

Magnetic printer. A printer that projects a selected pattern of charged particles onto a drum that is then transferred onto paper. Also called an ion printer.

Magnetic tape. A tape, similar to audiotape, that is coated with a film on which data can be magnetically recorded.

Mainframe. A class of computer providing large storage capacity, high-speed processing, and complex data-handling capabilities.

Management information system (MIS). A system that gathers, condenses, and filters data until they become information, then makes it available on time, and in a useful form, for use in decision making at various levels of management within an organization.

Mapping. A term that programmers use to describe the correspondence between the logical and the physical structure of a file. For example, if a physical record and a logical record happen to be equal in size, there is said to be one-to-one mapping.

Mask. In integrated-circuit design, a glass photographic plate that contains the circuit patterns used in fabricating a chip.

Mass storage. The storage of mass data. Commonly used to replace the term auxiliary storage; includes storing data on disks, tapes, and drums.

Master file. A type of file that can be thought of as a relatively permanent collection of records.

Megabyte (MB). A unit of measure that is the equivalent of $2^{-\circ}$, or 1,048,576, bytes.

Megahertz (MHz). A term used in computers and communication as a unit of frequency. It means million cycles per second. One megahertz = (MHz) 1,000,000 hertz.

Memory. The component of a computer system that stores programs and data while waiting to be processed by the CPU. Also called primary storage.

Memory card. A credit-card-sized removable card based on a chip technology called flash EEPROM (electrically erasable programmable read-only memory). This type of chip is useful in applications that need a rewriteable medium that does not require power to store the data. Like floppy disks, memory cards can store data and programs, are erasable, and can be exchanged among computers that have memory card slots.

Menu. A list of options from which a user must make a choice so that processing can continue.

Menu-driven interface. A technique for getting the user to make choices between several different options.

Metaphor. In software development, the use of words or pictures to suggest a resemblance. For example, the Apple Macintosh uses a desktop metaphor with its icons for paper, folders, files, waste-baskets, and so on.

Metropolitan-area network (MAN). A network that provide communications across and among major metropolitan areas, Public-safety agencies, such as police and fire departments, and dispatch-oriented companies, like Federal Express, operate and maintain their own private networks.

MICR. An acronym for magnetic-ink character recognition. Devices that are capable of recognizing patterns written or printed in magnetic ink. Used primarily by the banking industry on checks.

Micro. (1) In precise measurement, a prefix meaning one millionth. (2) In inexact measurement, a prefix meaning small. (3) Short for microcomputer.

Micro Channel. A hardware bus with a 32-bit data path used in some IBM PS/x computers. It is a trademark of IBM.

Microcomputer. A computer system based on a single-chip microprocessor as the central processing unit.

Microelectronics. The electronic logic represented as microscopic circuits on a chip.

Microfiche. A 4- by 6-inch sheet of photo film used to store images of documents in miniature.

Microfilm. A roll of photo film used to store images of documents in miniature.

Micron. A unit of measure equivalent to one-millionth (1/1,000,000) of a meter.

Microprocessor. The central processing unit (CPU) implemented on an integrated-circuit chip or set of chips.

Microprogram. The lowest level of software instructions that

operates directly on the hardware circuitry of a computer.

Microsecond. A measure of time equivalent to one-millionth (1/1,000,000) of a second.

Millisecond. A measure of time equivalent to one-thousandth (1/1000) of a second.

Minicomputer. A type of medi-umsized computer introduced in the 1960s that provides lower-cost processing and storage capacities than the larger main-frame computers.

MIPS. An acronym for million instructions per second. Most often used as a unit of measure for comparing the processing speed of different computers.

Modeling. A partial simulation of real or possible situations or conditions.

Modem Short for modulator de-modulator. A device that changes digital computer signals into analog computer signals for transmission over telephone lines and, in reverse, transforms analog signals into digital signals.

Modulation. Controlling a communication signal so that it contains information in the necessary format for transmission.

Modular conversion method. When changing from one computer system or method of operation to another, the system or method is divided into modules.

Once a module is converted and running smoot-hly, the next module is converted, and so on.

Module. A set of programming instructions that can be tested and verified independently of its use in a larger program.

Monitor. A television receiver or CRT used for computer output display.

Mother board. A fiberglass circuit board that contains sockets into which chips can be plugged and a set of tracks (printed on the circuit board) that connects the various chips.

Mouse. A device used to position the cursor on a display screen in lieu of cursor control keys. A mouse also has buttons for selecting options.

Multimedia. The combination of text with dynamic data types such as sound, animation, and video.

Multimedia extensions. Time-based synchronizing software in an operating system for managing the coordination of video, sound, and animation.

Multiplexer. A device that allows several communication signals to share the same channel concurrently.

Multiprocessing. A computer system that uses two or more processors that share memory and input and output devices.

Multiprogramming. A computer system in which two or more

programs are executed concurrently by one computer. In effect, the programs take turns running, usually giving the user the illusion that he or she is the only user of the system.

Multitasking. A technique for concurrently executing tasks, or basic units of work performed by a program, on the same computer system. It is similar to multiprogramming, except the processor may be working on several portions of a program instead of several programs.

Multiuser. Systems that allow several users to share a computer's processor, memory, and mass storage simultaneously. Often characterized by systems with several terminals connected to a single central processor.

Musical instrument digital interface (MIDI). A technology that interconnects electronic music instruments and computers. The information passed between MIDI devices is not sound, but a condensed description of the composition (e.g., what notes were played, when, and with what nuance). On playback, MIDI controls the creation of sound on a synthesizer.

N

Nanosecond. A measure of time equivalent to one-billionth (I/1,000,000,000) of a second.

Natural-language. Languages, such as English, used by humans that develop over time through usage. (See an Artificial language).

Natural-language interface. An interface that allows the user to input simple English or other natural-language phrases in lieu of complex computer commands.

Natural-language processing. Processing that translates and responds to commands that are given to a program in a natural language such as English. (See also Artificial language).

Network. Two or more communicating devices that are connected to form a system.

Network model. A technique used in database systems to store data by combining records with a linked list of pointers.

Network services. Communication functions provided by an operating system. Examples include file-sharing, print-sharing, and electronic mail.

Neural network. A computer that has a memory that is modeled on the human brain. The memory consists of thousands of interconnected "neurons" that receive input from their neighboring neurons. They can

perform very simple processing based on patterns of input and then produce results by sending their output back to neighboring neurons.

Node. The term for a device, such as a terminal, computer, or disk drive, connected to a communication network. (See also Topology).

Noise. In communications, an unwanted signal that was not part of the original transmission.

Nonimpact printer. A printer that prints without a striking mechanism impacting a ribbon. Examples include thermal, thermal transfer, electrostatic, inkjet, and laser printers.

Nonprocedural language. A programming language in which a problem is defined in terms of the results desired instead of the steps necessary to solve a problem. (See also Procedure-oriented language).

Nonvolatile storage. Memory devices, such as ROMs, magnetic tape, and magnetic disk, that can retain data when electric power is shut off. (See also Volatile storage).

Notepad. A grid of wires behind a liquid-crystal display screen combined with an electronic pen (often called a stylus), As the tip of the pen nears the screen, the location of the pen is determined by which wires in the grid detect the pen. Software can then interpret the movement and meaning of the pen strokes.

O

Object. A module that contains both data and instructions and can perform specific tasks. In software engineering, an object is an instance of a class or a logical grouping of objects.

Object code. Output from a compiler or an assembler that is linked with another code to produce executable machine-language code.

Object environment. A development environment that exploits the availability of prefabricated software components called objects. In these environ-ments, predesigned objects can be easily combined and modified, in many different ways, to produce a new application.

Object model. In database systems, data and instructions are combined into objects – modules that perform specific tasks when they are sent an appropriate message.

Object-oriented programming. A technique in which the programmer breaks the problem into modules called objects, which contain both data and instructions and can perform

specific tasks. The programmer then organizes the program around the collection of objects.

Object program. See Object code.

OCR. An acronym for optical character recognition. A process that scans a printed image, reads the symbols, and translates them into computer-readable codes.

Office. A place where information is acquired and processed and more information is produced as output.

Office automation. Technology that reduces the amount of human effort necessary to perform tasks in the office.

On-line processing. Processing where data enter the system directly from the point of origin and the input and output devices are under direct control of the CPU. (See also Batch processing).

Operand. Something that is to be operated on or manipulated, such as the part of an instruction that contains the addresses of data to be manipulated by the instruction. (See also Operation).

Operating environment. Programs that combine independent programs into a single environment and allow them to be integrated and their user interfaces simplified.

Operating system. A set of programs that manages the overall operation of the computer system. Software that manages routine procedures within a com-puter system, such as input, output, scheduling, job management, file management, and task management.

Operation. The part of an instruction that specifies the function that is to be performed. (See also Operand).

Optical character recognition. See OCR.

Optical disk. Disks that record and retrieve data using laser beams of light instead of magnetic methods. There are three types of optical disks: read only, also called CD ROM; write once, which can be recorded on once by the end user; and erasable, which combines optical and magnetic techniques to record on the surface of the disk.

OS/2. An acronym for Operating Sys-tem/2, a personal-computer operating system developed jointly by Microsoft and IBM.

Output. (1) The use of a device to decode symbols into a form people can use. (2) The results of computer processing.

Output device. A device to decode symbols into a form of information that is easy for people to use or understand,

such as text, pictures, graphics, or sound.

Overlay. To divide a program into sections that are stored on a mass-storage device and then are brought into main memory as needed. Used when a program is too large to fit into main memory.

P

Packet switching. A method for breaking messages into smaller units that can be transmitted separately over communication networks and reassembled into the original message at the destination.

Page-description language. A language that is used to describe output to a printer or display device. The language contains commands for describing individual character shapes, drawing lines and polygons, and scaling images.

Paging. A memory-management technique for mapping virtual addresses on disk to real addresses in memory. (See also Segmentation).

Paint program. A graphics program that provides commands to create lines, circles, rectangles, and other shapes, as well as do freehand sketching.

Parallel. The transmission, processing, or storage of data such that all parts of a byte are handled simultaneously. (See also Serial)

Parallel computer. A computer in which multiple computing nodes that are self-contained microcomputers join together to speed the execution of a single program. A parallel computer may combine from tens to thousands of microcomputers to increase the speed and improve the performance of a complex program.

Parallel conversion method. When changing from one computer system or method of operation to another, the old system (or method) and the new system (or method) are operated in parallel until it becomes clear that there are no problems with the new system (or method).

Parity. A bit that is part of a binary code that indicates the number of Is in the code, which is used for error checking.

Parsing. Taking a sentence or command and breaking it down into its components to determine what action to take.

Pascal. A high-level programming language developed to teach the concepts of structured programming. It is used as both a teaching tool and for general-purpose software development; named after the seventeenth-century French mathematician Blaise Pascal.

Password. A unique, usually secret code used to identify users, which allows them to access a system. The system can be accessed by multiple users.

Password protection. The use of passwords as a security measure to allow only authorized users access to a computer system or its files.

Peripheral. A device that operates in conjunction with, but is not a part of, a computer, such as a printer, disk drive, or graphics tablet.

Personal computer. A microcomputer usually targeted to the information processing needs of an individual, often called a microcomputer.

Physical file. The way in which the actual data in adatabasesystem are stored and accessed on a medium such as a disk.

Physical record. A record that is composed of one or more logical records. (See also Logical record).

Picosecond. A measure of time equivalent to one-trillionth (1/1,000,000,000,000) of a second.

Pilot-test conversion method. When changing from one computer system or method of operation to another, one or two key units are converted first. After a shakedown period, the rest of the systems or methods are converted.

Pipelining. The overlapping of fetch and execute cycles within a processor. For example, while one instruction is being executed, the processor will begin fetching the next instruction to be executed.

Pixel. Short for picture element, which is a light or dark point on the surface of a display screen.

Plotter. A device that produces an image by controlling the motion of a pen carriage.

Pointer. An address that specifies a storage location where data can be found.

Pointing device. A device for moving the cursor and interacting with a display screen.

Point-of-sale system. A computer input device located at the point at which goods and services are paid for.

Polling. A communications control method in which a master computer "asks" remote terminals whether or not they have any information to transmit.

Port. The location through which the computer exchanges information with an external device. A port has a physical connector and an address so that programs know where to send information.

Power supply. A device consisting of a transformer and related components that transforms household current into the di-

rect voltages used by a computer.

Presentation graphics. Graphics that are intended to communicate information to other people. Example: graphics used at a sales presentation.

Print buffer. A hardware device that attaches to a printer, stores characters, and controls printing.

Print server. A device that connects printers to a local-area network.

Printer. A device that produces hard-copy output from a computer system by transferring an image onto paper.

Procedure. A detailed set of instructions that identifies what is to be done, who will do it, when it will be done, how it will be done, and why it will be done.

Procedure-oriented language. A programming language that describes the steps necessary to solve a problem. Most high-level languages, such as CO-BOL, BASIC, or FORTRAN, are procedure oriented.

Process. (1) A systematic series of actions directed toward a goal. (2) In programming, a sequence of steps undertaken by a program.

Processor. A functional unit that interprets and carries out instructions. (See also CPU).

Productivity crisis. A term used to describe a lack of productivity increase in proportion to the amount of technology applied to office work.

Program. (1) A set of instructions that tells a computer what to do. (2) The activity involved in creating a program.

Program design language. See Pseudocode.

Program documentation. Written or printed information necessary to support the ongoing existence of the software.

Program generator. Automatic generation of a program as a result of writing specifications about the problem to be solved.

Program testing. The process of verifying a program for its ability to perform its intended function and not to perform anything unexpected.

Programmable industrial automation. Flexible, easy-to-learn-and-use, intelligent automation applied to factory systems. It includes robotics, vision systems, and information systems.

Programmer. A person who creates computer programs.

Programmer analyst. A job classification that combines the functions of a programmer and a systems analyst.

Programming language. A formally constructed artificial language in which (the syntax

and grammar are stated so pre-cisely that a computer can ana-lyze, interpret, and understand the meaning) of that language. Examples are Ada, Assembly language, C, COBOL, FOR-TRAN, and Pascal.

Protocol. A formal set of rules for specifying the format and rela-tionships when exchanging information between commu-nicating devices.

Protocol converter. Hardware or software that translates the codes of one computer or ter-minal into the code of another computer or terminal. It en-ables incompatible computers or terminals to communicate with one another.

Prototyping. The process of build-ing working models of a sys-tem's inputs, outputs, and files.

Pseudocode. A method for writing English-language statements that are equivalent to progra mming-language statements in their sequence. Often used in alternative to flowcharting. Sometimes called program design language.

Pull-down menu. A menu that is hidden from view until needed.

Q

Query. A question or request for information.

Query by example (QBE). A fill-in-the-blanks approach to ques-tioning a database. The user searches for information by filling out a query form on the display screen.

Query language. The capability to question a database or file of information without any knowledge of how or where the information is stored.

QWERTY. An abbreviation used to designate a standard type-writer keyboard layout, indi-cated by the first six letters in the first row of alphabetic char-acters.

R

RAM. An acronym for random-access memory. A temporary memory that is empty until the microprocessor needs to use it, that is, load programs and data into it. RAM is often called read/write memory, meaning that the microprocessor can read its contents and write pro-grams or data into it. Its name comes from the method used to access information from the memory: random access. This means that it takes the same

amount of time to access any one piece of information as it does another.

RAM disk. A section of random-access memory (RAM) that is treated as if it were a disk.

Random access. (1) A technique for organizing the cells in RAM so that the access time for any one cell is the same as that for any other cell. (2) A technique for organizing information on a disk so that records can be processed in an order other than sequential.

Random-access device. A device that can read and write information at any location on the device in the same amount of time, regardless of its physical location.

Random-access memory. See RAM.

Random-access method. A method of accessing a file that allows a program to read or write any record in the file in the same amount of time without regard to its physical location.

Read. A program instruction that acquires a copy of a block of data from a storage medium, such as disk or tape.

Read-only memory. See ROM.

Read-only optical disks. Optical disks that cannot be written on and so have the functional equivalency of read-only memory (ROM).

Real-time processing. A processing method in which the immediate response requirements limit the running time of the program. For example, a program monitoring a critically ill patient needs to give immediate responses and cannot spend an excessive amount of time processing the input data.

Record. A collection of related data treated as a unit. For example, the payroll information about one person.

Reduced instruction set computer. See RISC.

Reentrant routine. A module of programming code that is executed simultaneously by more than one software module.

Refresh. The reactivation of electronic components, such as dynamic random-access memory (DRAM) and phosphor-coated display screens, to maintain information that would otherwise leak or fade away.

Register. A small amount of memory, usually one or two bytes, reserved to function as a temporary storage area during program execution.

Relation. A two-dimensional table in the formal terminology of relational databases.

Relational model. A technique used in database systems in which one or more flat files or tables create relationships

among the tables on the basis of a common field in each of the tables.

Report. The presentation of information about a given topic, typically in printed form.

Report generator. A special type of program generator that can generate only one type of program – a report from a database. (See also Program generator).

Requirements list. Formally written statements that specify what the software must do or how it must be structured.

Requirements planning. A broad term that includes planning for outputs, inputs, and file/storage and processing requirements. It also includes specifying any constraints and the costs and benefits associated with the system.

Resolution. (1) Referring to the number of pixels displayed across and down on a display screen. A common resolution is 640 pixels across by 480 pixels down. (2) Referring to the number of spots printed across and down in one square inch on a page. A common laser printer resolution is 300 dots per inch, meaning 300 spots across and 300 spots down per square inch.

Resource object. A device or service such as a printer or a file-server object.

Ribbon cable. A group of attached parallel wires commonly used to connect a printer or disk drive to a computer.

Ring network. An approach for linking terminals or personal computers by using a closed-loop communication channel.

RISC. An acronym for reduced instruction-set computer. RISC is a combination of hardware and software that reduces the number of instructions in a computer's instruction set and attempts to execute each instruction as quickly as possible.

Robot. A programmable general-purpose motion machine.

ROM. An acronym for read-only memory. A permanent memory that the microprocessor can read information from, but whose contents can neither be erased nor written over – thus the name, read-only memory. ROM stores the instructions that start up the computer when the power is turned on, and stores some additional programs.

Rule. A statement about the relationships of various facts or data.

S

Save. To store information in a file.

Scanner. A device that examines a pattern and converts it into a digital representation suitable for computer processing. Patterns can then be manipulated into a form suitable for the applica-tion.

Scientific visualization. Image-processing techniques that are used to interpret and visualize data captured by cameras, scanners, and sensors. By turning these data into three-dimensional moving images, researchers are able to gain new insight into problems that are difficult or impossible to interpret with numbers or words.

Scrolling. Using directional keys (cursor control keys) to move the contents of a display screen up, down, left, or right.

Search time. The time required to rotate the needed record under the read/ write head of a magnetic disk.

Second generation. Refers to computers in the time period 1958-1964, which used transistors to replace vacuum tubes.

Secondary storage. The component of a computer system in which programs and data are stored while not in use.

Sector. The smallest block of physical data that can be written to or read from a disk device.

Seek time. The time required to position the read/write head over the proper track on a magnetic disk.

Segmentation. A memory management technique for allocating and addressing memory.

Semiconductor. A material (usually silicon) with properties between those of a conductor and insulator. Its resistance can be changed by electricity.

Sensor. An instrument capable of directly encoding a physical event, which is used as an input device for computer systems.

Sequencer. Software that can capture, edit, and play back music.

Sequential file. A file organization method that involves storing records in a predetermined sequence based on one or more key fields.

Serial. The transmission, processing, or storage of data one bit at a time.

Server. A computer running software that fulfills requests from clients across a network. (See also Client).

Shareware. Referring to a marketing method in which a software publisher distributes copies of a software package for free, often encouraging potential us-ers to

give copies to their friends. A potential user tries out the software, and, if satisfied, pays the software publisher.

Silicon. A nonmetallic element that is commonly used in the fabrication of integrated-circuit chips.

Silicon compiler. A program used in the development of integrated circuits that translates high-level block diagrams into detailed transistor circuits.

Simulation. A computerized representation of a process or set of activities.

Single tasking. A technique in which an operating system runs one application program or task at a time.

Smart sensor. Devices that combine a computer and a sensor on a single silicon chip.

Soft copy. The recording of an image (computer output) on a surface such as a display screen.

Software. Programs that control the functions of a computer system.

Software development. The process of analyzing the requirements of a system, then designing, writing, and testing the software.

Software engineering. The application of scientific and mathematical principles to the design and development of producing software.

Software maintenance. The job of modifying existing programs to fix bugs or make requested changes.

Software piracy. The term used to describe the illegal or unauthorized copying of software.

Sort. To arrange records in a file into a preidentified sequence, such as alphabetically or numerically from lowest to highest.

Source code. The set of statements that make up a computer program.

Source document. A tangible piece of paper or form from which data are entered as input to a computer system.

Source program. See Source code.

Special-purpose computer. A computer that is dedicated to a single purpose.

Special-purpose program. Programs that are dedicated to performing single-use tasks, for example, medical billing, patient tracking, or contract writing. Also called special-purpose application software.

Speech coding. A technique for voice output from a computer that uses prerecorded human speech as the source of the output.

Speech recognizer. A device for voice input that is capable of recognizing an individual person's voice.

Speech synthesis. A technique for voice output that uses phonemes or basic speech sounds to imitate the human voice.

Spelling checker. A program that checks documents for spelling errors. Also called a spelling corrector.

Spool. An acronym for Simultaneous Peripheral Operations On-Line. A program that allows printing to occur simultaneously with other computer operations.

Spreadsheet program. A program that models the way in which financial people solve problems, such as budgeting and estimating.

SQL. See Structured query language.

Standard cell. A technique for designing integrated circuits by which predefined functions, such as processing elements and memories, are obtained from libraries and used in the design process.

Star network. A central controller with a separate communication channel attached to each device connected to it.

Statistical multiplexing. A technique for allocating a communication channel among several users on the basis of idle time on the channel. A statistical multiplexer fills the idle time gaps between transmissions with parts of other transmissions.

Stereoscopic display. A device that is used to create the illusion of depth on the flat surface of a display screen. In addition, the user must wear polarized glasses to see the stereoscopic effect.

Stored-program concept. The storage of data and instructions using the same memory so that the computer can become a general-purpose system. It is used in lieu of hand wiring the computer each time a specific task is to be per-formed.

Strategy. A plan of action designed to cope with change, competition, and uncertainty.

Streaming tape. A form of magnetic tape that is specifically designed to store backup copies of disk files. Also called cartridge tape.

Structure. In database programs, the manner in which the fields of a record are organized or interrelated. It is also called record structure.

Structure chart. A diagram that serves as a model for modularizing a structured program. (See also Hierarchy chart).

Structured analysis. The examination of a complex problem by dividing it into simple functions.

Structured design. The process of designing the components of a computer program and their interrelationships in the best possible way.

Structured programming. The application of top-down design methods to programming.

Structured programming language. A programming language that facilitates the idea of breaking the program into smaller units or modules to allow clearer expressions of the problem and simpler organisation.

Structured query language. A query language which manipulates data in a relational database. (See also Query language).

Structured walk-through. A peer review designed to evaluate and challenge specifications. The proposed specifications are presented to other analysts, programmers, or system developers for feedback, comments, and criticism.

Subroutine. A part of a program that can be executed repeatedly by a single statement.

Supercomputers. The fastest computers made.

Supervisor. The operating-system control program responsible for deciding which application program will have use of the CPU.

Switch. A device capable of making or breaking one or more connections in a circuit. Also called a gate.

Synchronous transmission. Data communications in which a synchronizing clock signal is used to transmit large blocks of data between sending and receiving devices.

Synthesizer. A device that electronically generates sound instead of picking it up with a microphone.

System. (1) In general systems theory, a set or arrangement of parts acting together to perform a function. (2) In systems analysis, a network of interrelated procedures performed by people with the aid of tools or machines.

System flowchart. A graphic representation of the components, flow, and relationships among elements of a system.

System software. Programs or commands used to control the operation of the computer system.

Systems analysis. The process of understanding a user's needs and, from those needs, deriving the functional re-quirements of a system

Systems analyst. A person in an organization who performs the interfacing between users and programmers.

Systems life-cycle. An approach used in system design and software development that proceeds from definition to design and development to implementation.

T

Table. In relational database terminology, a table consists of rows and columns. Each row identifies a record and each column corresponds to a field. Also called a relation.

Tape drive. A device that stores data recorded on magnetic tape. A form of mass storage.

Technology. (1) The practical application of knowledge. (2) Activities that are directed toward the satisfaction of human needs that produce alterations in the material world.

Telecommunications. Communications over a long distance.

Telecommuting. The electronic transportation of information instead of the physical transportation of people.

Template. A master document from which other documents can he created. Templates can be found in word processing, spreadsheet, and database pograms.

Terabyte. A unit of measure equivalent to 2^{40}, or 1,099,511,627,776 bytes. Used to measure capacities of large-scale mass-storage devices.

Teraflop. A unit of measure equivalent to one-trillion floating-point operations per second. A combination of the Greek teras, which means one trillion, and flop, short for floating-point operations per second.

Terminal. A device that is used in communication systems to enter or receive data.

Terminal emulation. Personal computer software that emulates a remote terminal. One example is the IBM 3270 Terminal Emulation program.

Text database. A collection of words such as articles in the Wall Street Journal or a series of legal abstracts. Text databases are stored either on-line or on CD ROM optical disks and include the means to search through massive amounts of data to answer specific questions.

Thermal printer. A printer that uses a selected pattern of clots to form images that are transferred by heat onto specially coated paper.

Thermal-transfer printer. A printer that uses heat to melt wax particles that contain ink, which are then transferred to paper.

Thin-film disk. A disk that contains a metallic layer as opposed to a magnetic-oxide layer on its surface. This permits higher recording density because the read/write head can travel closer to the disk's surface owing to more precise tolerances.

Thin-film, head. A disk read/ write head made from the same photolithographic process as integrated circuits. It permits individual data bits to be stored closer to each other on the surface of the disk.

Third generation. Referring to computers in the time period 1964-1977, which used integrated circuits to replace transistors.

Throughput. The total volume of work performed by a system in a given period of time.

Time-division multiplexing. Dividing a communication channel on the basis of fixed time intervals. Many digital channels, for example, are divided into 24 time slots less than a millionth of a second long, which repeat in cycles of 24. Thus, each user's data are separated in time from all other users' data.

Time-sharing. A method that allows multiple users of a computer system to share the computer, giving the illusion of having simultaneous access.

Token. In local-area networks, the electronic equivalent of an envelope. A token contains a fixed amount of information and a destination address.

Token-ring network. A type of local-area network in which a single token passes from computer to computer and carries messages around the network.

Top-down approach. A technique used by systems analysts and software developers that refers to starting with the whole problem and developing more and more detail as the solution develops.

Top-down structured design. An approach for program design that involves proceeding from general terms to finer and finer details until no more detail is necessary.

Topology. In a computer network, the interconnection of devices and communication channels into a network configuration.

Total systems concept. An MIS con-cept popular in the late 1960s in which a single centralized repository of information would represent all the organization's activities.

Touch screen. A plastic membrane or set of infrared sensors placed over a display screen to enable the user to select actions or commands by touching the screen.

Touch technology. A technology that senses the location of your finger as it nears or touches a screen or touch-sensitive pad.

Track. Refers to concentric circles where data are stored on a disk.

Track density. The number of tracks per inch on a disk.

Transaction. An event about which data are recorded and processed, for example, a request for a seat on an airline flight.

Transaction file. A type of file in which records created during the input process are stored until needed for further processing.

Transaction-oriented processing. A type of processing in which transactions activate processing, such as an air-line reservation system.

Transcribed input. Data that are captured by transcribing them from source documents onto another medium that is capable of being input to a computer system. (See also Direct source input; Source document).

Transistor. A combination of the words transfer and resistor. A device that regulates the flow of electric current through a combination of conductivity and resistance. A transistor is most often used to switch electricity on and off.

Transparent. A term used by computer designers to indicate a function that the user is not directly aware of. In effect, the user "sees right through it" and does not notice that it is around.

Trojan horse. An unauthorized program hidden inside or attached to a legitimate program. (See also Virus program; Worm).

Tuple. A row in a two-dimensional database, (See also Attribute; Relation).

Turnkey. A computer system that includes all the necessary hardware and software that is built, tested, and installed by the vendor.

Tutorial. A set of instructions designed for self-taught learning about computers.

U

UART. An acronym for universal asynchronous receiver transmitter. An integrated circuit that performs the function of translating parallel data into serial data, and vice versa.

ULSI. An acronym for ultra-large-scale integration.

Ultra-large-scale integration (ULSI). A technique that etches 100 million to 1 billion transistors and other circuit elements on a single chip.

Unicode standard. A 16-bit code that specifies a unique set of binary digits that represents characters from the world's scripts and provides a consistent international character standard. The code can support up to 65,536 (2lfa) characters. (See also ASCII; EBCDIC).

UNIX. A trademark of Bell Laboratories. An operating system designed for minicomputers and microcomputers.

UPC. An acronym for Universal Product Code, a bar code consisting of thick and thin stripes that can be read by an optical reader. Used primarily to identify supermarket items.

Update. A term for the modification of records in a master file by replacing older information with more current information.

Upward compatible. A term used when a new piece of equipment or computer system can produce identical results as the equipment or system it replaces.

User analyst. A systems analyst who is in an organizational department other than the data-processing department.

User diagnostics. A series of test programs designed to determine where problems might exist in hardware. For example, a test program can discover if memory is not func-

tioning, and point out the location of the nonfunctioning memory.

User friendly. A term describing how easy a system or program is to learn and use and how gently it tolerates errors or mistakes on the part of the user.

User group. An informal organization of people who use the same type of computers or software and have regular meetings to swap information and programs.

User interface. That portion of a program that handles the human interaction with the program.

Utilities. (1) In system programming, programs that perform functions that are required by many of the programs using the system. (2) In database systems, programs that allow a user to maintain a database.

V

Variable-length operations. The type of operations performed by character (byte) – addressable computers.

Vertical recording. A recording technique that stands the magnetic particles on the surface of a disk on end so that the north-south poles point up and down or vertically toward the surface of the disk. This effectively increases the density of the

disks because more magnetic fields can be packed into a given area on the disk.

Very-large-scale integration (VLSI). A technique that etches 100,000 to 100 million transistors and other circuit elements on a single chip.

VGA. Short for video graphics array, an IBM video chip on the PS/2 system board that provides 640- by 480-pixel

resolution and a 256-color palette on the display screen. (Seea\soCGA)/iGA,XGA).

Video capture board. A board that plugs into an expansion slot and turns full-motion video signals into digitized files.

Video conference. A conference held by means of one- or two-way interactive television.

Videotex. A form of electronic publishing.

View. In a database, a group of data associated with a specific user.

Virtual circuit. A logical connection between nodes in a communication network that can be accomplished with many different physical circuits during the trans-mission of messages.

Virtual memory. A technique for storing programs or data on mass-storage devices and creating the illusion that data are in memory by swapping pages or segments in and out of memory when needed.

Virtual-memory operating system. A type of operating system that automatically manages program overlays, bringing them in and out of memory as needed.

Virtual reality. An information environment generated by computer technology that combines visual, auditory, and tactile interaction to create the illusion of realistic objects and sensory experiences. Also called a virtual environment.

Virus program. A program developed specifically to interfere with a computer's normal operation. It is called a virus because, like its biological counterpart, it can clone copies of itself and then infect other programs with those copies.

Vision system. A robotic system that uses a television camera coupled with image-processing software to allow a robot to see.

Visualization. A term that applies to representing complex mathematical phenomena or simulations with images. The more visual the representation of data, the easier it is to completely and more accurately understand the data. (See also Scientific visualization).

VLSI. An acronym for very-large-scale integrated circuit. VLSI etches 100,000 to 100 million transistors and other circuit elements on a single chip.

Voice mail. A technology in which spoken messages are digitized, stored in computers, and later retrieved by the recipient.

Voice recognizer. See Speech recognizer.

Voice training. The process of recording an individual's voice patterns when speaking specific commands. The voice

patterns are stored for future matching when the device is actually in use.

Volatile file. A file in which a high percentage of records accessed are changed or records are added or deleted.

Volatile storage. Memory devices, such as dynamic random -access memory (DRAM), that lose all data when electric power is cut off.

Von Neumann computer. The traditional form of computer architecture, named after John von Neumann (1903-1957), in which the computer has one central processor and one memory connected via a single channel. Also used to indicate a computer in which programs and data share the same memory.

W

Wait state. The time during which the system bus is idle. Wait states occur when memory is busy responding to a request from the processor. A zero wait state means that the memory is fast enough not to make the processor wait while memory reads or writes data.

Wafer. A thin disk of pure silicon on which multiple copies of integrated circuits are fabricated.

What-if analysis. Use of a spreadsheet to compare alternatives.

Wide-area network (WAN). A geo -graphically dispersed communication network linking computers for the purpose of communicating with one another. An example is a nationwide network of airline reservation terminals.

Winchester disk. A high-speed, medium- to large-capacity, sealed magnetic-storage medium for computer systems.

Window. A variable-sized rectangular area on a display screen.

Word processing. An application program designed to compose, revise, print, and file written documents.

Word recognizer. A device for voice input that is capable of responding to individually spoken words or commands.

Word size. The term used to describe the size of operand registers and buses in computer systems. Also called word length.

Word wrap. A feature of many computer programs that allows you to continue typing beyond the end of a line without having to press the return key.

Workgroup computing. Computer and communication technology that facilitates the process of people working together in groups that are electronically connected.

Workstation. A type of small computer targeted to the needs of high-performance specialized applications, such as computer-aided design and publishing, modeling, and visualization.

Worm. A program that reproduces itself by creating copies of itself. (See also Virus program).

Write. A programming statement that causes a permanent copy of a block of data to be recorded on a storage medium, such as a disk or tape.

Write-once optical disks. Blank disks that are recorded on by the user. To write data, a powerful beam of laser light burns tiny spots or pits into the coating that covers the surface of these disks. Once burned in, the spots are not erasable. Also called write-once, read-mostly, or WORM.

Write-protect ring. A plastic ring that prevents writing on the tape when removed from the back of a tape reel.

WYSIWYG. An acronym for what-you-see-is-what-you-get. The display of in-formation in a form that very closely resembles what will eventually be printed. The term is often used in word processing, desktop publishing, and typesetting.

X

XGA. Short for extended graphics adapter, an IBM display standard that provides 1024- by 768-pixel resolution and a 256-color palette on the display screen. (See also CGA; EGA; VGA).