A COMPUTER GLOSSARY

– A –

Accumulator – A class of register in the central processing unit that supports the production of an arithmetic or logic result.

Ada – A new Department of Defense standard programming language designed specifically to support the development and maintenance of real-time embedded mission-critical applications. The language was specified by an international committee of computer scientists; it contains many features generally accepted as being beneficial to this class of application. The language, which is just entering the production stage, is named after Ada, the Countess of Lovelace (Lord Byron's only daughter and the associate of Babbage), who is credited with being the world's first programmer. Ada is a trademark of the Department of Defense.

Address – The location of a word in memory; all memory is accessed by address.

Algol – ALGOrithm Language; this was the first of the block-structured computer languages. Long used as a standard for documentation of algorithms, it had a profound effect on the development of languages such as Pascal, PL/I, and Ada.

ALU – Arithmetic logic unit; the portion of the central processing unit that supports the basic arithmetic and logic operations (such as adding, shifting, comparing, and setting status flags).

APL – A Programming Language; a high-order language primarily for interactive mathematical applications. It operates on arrays (e.g., vectors and matrixes) and uses a very compact syntax with a special character set.

Application software – The software designed primarily by users in support of an application; a tool that helps the user in his work.

Application tools – Software systems that provide desired sets of features in a user-friendly manner (e.g., a word processor, an automated spread sheet, and a personal calendar).

Artificial intelligence – There are various definitions, but the key characteristic seems to be the ability of artificial intelligence to make decisions using inference with a knowledge base.

ASCII – American Standard Code for Information Interchange; a standard set of 7-bit codes used by computers to represent printing and control characters. The code is generally padded with a leading bit to produce an 8-bit code that is stored as a byte.

Assembler – The system software tool used to translate an assembly language program into processible code.

Assembly language – A programming language in which the language instruction set is very similar to the machine instruction set. Also called symbolic assembly language.

Asynchronous transmission – A technique for transmitting data in which one character at a time is sent with variable intervals of time between character transmissions (cf. Synchronous transmission).

– B –

Backup – Saving duplicates of programs and data in order to retain a recent version in the event of the destruction of the current version.

Basic – Beginner's All-Purpose Symbolic Instruction Code; a high-order language used primarily for interactive programming. It is very common on microcomputers. Originally designed as a tool for teaching programming, it is now also used for system development.

Baud – The unit of measure for transmission of bits of information per second (common values include 110, 300, 1200, 2400, 4800, and 9600).

Benchmark – A program that executes a representative set of functions and whose performance can be quantified. Benchmarks are frequently used to compare the performances of different systems. When used with database or multiprogrammed systems, benchmarks may not reflect operational responses.

Binary – A number system to the base 2 in which all digits are either 0 or 1. The digits in the binary system are called bits, for *bi*nary digi*t*s.

Bit – A binary integer; the smallest unit of information in a digital computer. It takes the values 1 and 0.

Block – The unit of information normally transmitted to and from a disk or other secondary storage device. In the case of a random access device, access is to a block that contains a group of characters, words, or records.

Boolean logic – A class of processing named for George Boole (1815-1864) who developed an algebra with logical operations. Common computer operations include AND and OR comparisons of bit configurations.

Bootstrap – A sequence of starting instructions that initiates a sequence of instructions to start a process.

Bubble memory – A form of memory in which information is recorded as bubbles of magnetism. Currently of limited use, this technology may eventually be able to provide large, inexpensive mass storage.

Buffer – A generic term for a portion of memory used to temporarily retain data. A buffer may be limited to a single character or it may contain 512 or more characters, depending on its use.

Bug – An error in a computer program. Bugs are usually present in programming; they are removed by debugging. When not removed, they are called defects.

Bus – A path for transferring electrical signals. In some microcomputers, a single bus is used to interface modules. The S-100 bus is a 100-line bus that has become standard for many microcomputers.

Byte — A single set of 8 bits used to contain either a binary number or a single character. This is the most common unit of measurement for mass storage (e.g., a 5M hard disk has 5M bytes, 5M characters, or 5 × 1,048,476 × 8 bits); see M and Megabytes.

– C –

Central processing unit (CPU) — The component of a computer in which the computation or processing is performed.

Character — Any printable single element, such as a letter, digit, or punctuation mark.

Chip — A slice of semiconductor material (usually silicon) upon which is printed an integrated circuit.

CMOS — Complementary MOS (metal-oxide semiconductor); a technology to produce memories that use very little power and are faster than MOS. CMOS is not well suited to very-large-scale integration.

Cobol — COmmon Business Oriented Language; a high-order language used primarily for business applications. It is very common on larger computers and is the most widely used of all mainframe languages.

Compiler — The system software tool used to translate a high-order language program into processible instructions.

Computer — The section of the computer system that contains the processor and memory. In a microcomputer system, this is generally the least expensive portion. The other components are called peripherals.

Console — An interactive terminal tied to a computer and assigned specific functions (e.g., the computer operator's terminal). With many military systems, the console may include additional functions (e.g., a radar operator's console).

Control language — A system language used to provide information about the job to be run. Sometimes called job control language.

Controller — A device used to manage the interfacing of a peripheral device to the computer.

Control unit — The part of the central processing unit that manages the step-by-step processing performed within the unit. It is programmed in microcode.

Core memory — An older technology for memory in which information was recorded on small magnetic cores. Although the technology is no longer used, memory still is occasionally called core when the contents are not lost with a power outage.

CPS — Characters per second; a measure of printing speed.

CPU — See Central processing unit.

CRT — Cathode ray tube; the display tube used for video terminals and television; sometimes used as a generic term to include the keyboard and electronics associated with the tube.

Cursor — A special display character on a video terminal that indicates where the next character will be displayed.

Cycle time — The period of time between the clock pulses that synchronize the actions within the central processing unit. Each central processing unit step requires a single cycle; a single instruction may require more than one cycle. The unit of measure is the megahertz. Processing speeds for the computer are measured in millions of instructions per second (MIPS).

– D –

Daisy wheel — A device used in a letter-quality printer in which each letter is on a spoke from a central hub. Daisy wheels are available in many fonts.

Data counter — A class of register in the central processing unit that contains the address of the data to be processed.

DBMS — Data base management system; an application tool that allows the user to define an integrated database and then store, retrieve, and query it. A DBMS is generally associated with the form it uses in the definition of its data model (or schema); the three basic types are network, hierarchical (or tree), and relational (cf. File management system).

Debug — To remove errors from a program. Errors are called bugs before system release; after that they are called defects. The term is said to have originated in the early days of very large computers when a machine failure was traced to the presence of insects.

Decision support systems — These are management information systems to which modeling tools have been added. The modeling tools range in complexity from electronic spread sheets to linear programming or statistical analysis systems. DSS is also used as a generic title for information support environments.

Defect — In software, a failure on the part of a completed system to perform as specified (or advertised). The use of this term reflects an attempt on the part of the software community to establish methods for achieving zero-defect products.

Development — The process in which an initial statement of needs is transformed into a tested, operational application.

Diagnostics — A sequence of test cases designed to determine if any errors exist. ''Diagnostics'' is generally reserved for hardware faults; ''test case'' is the more common term for certifying software.

Disk — A generic name for a storage device in which a thin, flat base is covered with a magnetic medium upon which data are stored. The disk spins rapidly, and a head reads from or writes information onto the magnetic medium. Any portion of the disk may be read (i.e., directly accessed). (For different kinds of disks, see Hard disk, Floppy disk, and Winchester disk.)

Disk drive unit — The unit that contains the disk. In some cases, the disk (or floppy disk) is removable, and the unit is that piece of hardware designed to accept and process the disk.

DMA — Direct memory access; a technique for interfacing a high-speed input/output device to the computer so that data can be read from or written into memory without any central processing unit action. The use of DMA is sometimes called cycle stealing.

Documentation — Descriptive information about the hardware and software. It includes user manuals, tutorials, reference manuals, and design information.

Dump — The listing of the contents

of computer memory to show its state at a point where a failure occurred.

— E —

EBCDIC — Extended Binary Coded Decimal Interchange Code; a standard set of 8-bit codes used to represent characters and control characters. It is generally used with larger computers; the ASCII set is more common for microcomputer equipment.

Emulation — A program or system that causes the current system to behave like some target system. The current system is said to emulate the target system. For example, a computer program that interprets and executes the instruction set of another computer emulates the second computer. Emulation may involve a processing penalty but is frequently useful in test and conversion applications.

EPROM — Erasable programmable read-only memory; the functional equivalent of read-only memory; this type of memory can be both written onto the chip and erased for reuse of the chip.

Evolution — This is a more positive name for the post-release modification of a system. Such modification generally represents over half of the total system cost and absorbs the efforts of about half of the programming staff. It is generally recognized that most systems evolve, that the evolution destroys the structure of the system, and that at some point it is less expensive to discard the system than to correct it. The fact that so many programmers are assigned to maintaining existing systems leads to shortages in programmers for developing new systems. This, in turn, results in backlogs for both development and modification.

Execute — To perform a task or job.

Exponent — In common use, the exponent represents the number of times a base number is used as a factor. In the floating-point representation, the exponent is a power of 2 that is to be multiplied by the mantissa. The floating-point exponent is also called the characteristic.

— F —

Fault tolerance — In hardware, the concept of reliability is tied to the probability that a component will fail (i.e., wear out). In software, on the other hand, bits do not wear out, and reliability is tied to the probability that all errors have been found. Because software is very complex, this probability is nonzero. Thus, fault tolerance refers to the concept of system design in which failures and errors are anticipated and tolerated (i.e., recovery is part of the system design).

Fifth-generation computer — A Japanese activity has been given this name. Its goal is to produce a new generation of computers by the 1990s that will incorporate very-large-scale integration (VLSI) and parallelism to support applications implemented by use of artificial intelligence paradigms. The four previous generations were vacuum tube, transistor replacement of vacuum tubes, LSI, and VLSI. The first four generations of computers are based on the von Neumann model with a single processor and a serial program that sequences program steps and data to the processor. The fifth-generation computer is one of the many alternatives to the von Neumann architecture.

File — A collection of data, generally stored on some secondary storage medium, that contains data organized in a predefined format. The unit stored in a file is called a record, which is made up of fields or data elements.

File management system — This provides one or more access methods to retrieve records from files. Common access methods are sequential (providing access only to the first or next record), random (providing access only to individual records), and index sequential (providing access to random records or to the next record after a previous access).

Fixed point — An internal representation for binary numbers in which a binary point is assumed to be to the right of the rightmost bit. Also called integers, fixed-point numbers may be 1 or 2 bytes in length and may or may not have a sign bit. The most common is 2 bytes with a sign bit.

Floating point — An internal representation for large fractional numbers that stores the information in a binary form of scientific notation. There is a mantissa and an exponent; it is usually 4 bytes in length. Double precision adds 4 more bytes to the mantissa; there is also a triple-precision floating point.

Floppy disk — A form of disk that records the information on a plastic base housed in a rigid envelope. Standard sizes are 5¼ and 8 inches, with some 3-inch disk units now being introduced.

Forth — A stack-oriented language that supports efficient programs in a microcomputer environment. The name was chosen to imply that this was a new — the fourth — generation of computer language. Unfortunately, labels were limited to a length of five characters in early implementations, hence the name Forth.

Fortran — FORmula TRANslation system; a high-order language used primarily for scientific and engineering applications. The large investment in program libraries has made it a de facto standard for such applications. Djkstra has said that we do not know what the language of the twenty-first century will look like, but we do know that it will be called Fortran.

Fourth-generation languages — There is a class of proprietary products (or tools) that are advertised as a fourth-generation language (4GL). The tools generally provide some nonprocedural query language, a report generator, and other data-processing tools. The name is derived from the concept that the first three generations were machine code (1s and 0s), assembly languages, and high-order languages.

Function keys — Special-purpose keys on a keyboard. Each has a special meaning to the hardware or software; none of these keys is normally found on a standard typewriter.

— G —

Generators — A software tool that transposes a set of statements into an executable program. Also called program generators and application generators, depending upon the technique used.

Gigabyte — One billion bytes (or, to be more accurate, 1024 megabytes).

Graphics — This is the drawing of data representations using only lines and blocks of continuous-tone color. As the name implies, graphics were at first simply line graphs. With advances

in technology, color, shades of gray, and lines of various formats are now also used (cf. Image processing).

– H –

Hard disk – A disk made of rigid material, as opposed to the base of the floppy disk. Hard disks have more capacity than floppy disks. Frequently, hard disks are configured in stacks, jukebox fashion.

Hardware – The equipment that includes the computer and the associated peripherals that comprise the computer system. The hardware does not include the software that is the set of instructions used to make the hardware perform a desired task.

Hexadecimal – A number system to the base 16 using the characters 0, 1, 2, . . . , 9, A, B, C, D, E, F. The advantage of this system is that each digit corresponds to a 4-bit pattern. The bits in a byte can be written as two hexadecimal digits.

High-order languages – Programming languages that use application-oriented statements to describe a function to be performed (e.g., let $x = y + 2$) (cf. Assembly language).

– I –

Image processing – This is the processing of continuous-tone displays. Images may be black and white or color. Resolution is a function of the number of pixels (picture elements) used. Images may use representative colors or tones or may use color as an additional dimension of information (e.g., false color for remote sensing).

Ink-jet printer – A nonimpact printer that forms output by spraying ink from a small jet. High-resolution color outputs can be achieved with this technology.

Input/output – Those processing functions that involve input to or output from the computer (e.g., printing or writing data to be stored on disk).

Instruction register – A register in the central processing unit that contains the code for the instruction to be processed.

Interface – *Logical:* The data that are passed between two components or modules. *Physical:* The equipment or standards used to define how data are to be passed between two components.

I/O – See Input/output.

I/O port – The physical and logical interconnection between the computer and its input/output peripherals.

– J –

JCL – Job control language; see control language.

Job – One or more tasks to be executed.

– K –

K – The abbreviation for that power of 2 that is closest to 1000 (i.e., 2^{10}, or 1024); see Kilobytes.

Keyboard – An input device that is configured like the typical typewriter keyboard.

Kilobytes – Thousands of bytes, where a thousand is the power of 2 closest to 1000 (i.e., 2^{10}, or 1024).

– L –

Library – A collection of programs available for reuse in other applications. Also program library.

Life cycle – The software life cycle describes the process of software development. There are several life cycle models, the most popular of which is the hardware-based model consisting of software requirements, top level design, detailed design, code and debug, test and accept, and operations and maintenance. This life cycle is generally depicted as a sequence of stages drawn waterfall fashion. The distribution of effort frequently follows a 40-20-40 rule for precode activities, code and debug, and test and accept. Post-acceptance costs range from 50 to 80% of the total life cycle cost. About two-thirds of the maintenance costs are for enhancement (see Evolution).

Lisp – LISt Processing language; this language was developed around 1960 to support research in artificial intelligence; it remains a de facto standard for artificial intelligence in the United States. An alternate language, Prolog, is used for the fifth-generation computers.

LSI – Large-scale integration; electronic component parts in which up to 100,000 electrical elements are combined in one chip.

– M –

M – The abbreviation for that power of 2 that is closest to 1,000,000 (i.e., 2^{20}, or 1,048,576); see Megabytes.

Magnetic tape – A medium used to store digital information from which data must be read sequentially, compared with the disks' direct access.

Magnetic tape unit – A unit interfaced with the computer that processes magnetic tape.

Mainframe computer – A large computer generally costing $500,000 or more.

Maintenance – The modification of a software system once it becomes operational; this includes removal of defects and the introduction of new functions (see also Evolution).

Mantissa – That part of a floating-point number that represents the value to be multiplied by the power of 2 recorded in the exponent.

Mass storage – Secondary memory that resides on an external device. Mass storage is used to retain data and programs that are too voluminous to be stored in memory. Data and programs are copied from mass storage to memory in order to be processed and from memory to mass storage in order to be saved. Mass storage is also called permanent storage; examples are disk, magnetic tape, and floppy disk.

Matrix printer – A printer in which printed characters are made up of individual dots. The printing head moves across the line with pins to produce the dots that form the letters. By means of multiple passes, some matrix printers now approach letter quality output.

Megabytes – Millions of bytes, where a million is the power of 2 closest to 1,000,000 (i.e., 2^{20}, or 1,048,576).

Megahertz – Millions of cycles per second (MHz). This is the basic unit for cycle time. Values from 1 to 12 MHz are common for microcomputers.

Memory – That portion of the computer that stores instructions and data for use by the central processing unit; sometimes also called working storage. Memory is always accessible by the central processing unit; contrast

this with mass storage, which must be read into memory to be processed.

Microcode – The low-level sequence of elementary instructions processed by the central processing unit in order to produce a machine language instruction. Also called microinstruction.

Microcomputer – A small computer using a microprocessor chip. The microcomputer is usually packaged with a keyboard. In personal computer systems, there is generally also a floppy disk unit and a display. A microcomputer system may offer multiuser support comparable to that of a small minicomputer.

Microsecond – A millionth of a second.

Millisecond – A thousandth of a second.

Minicomputer – A smaller computer generally costing $150,000 or less. Normally multiuser with mass storage.

MIPS – Millions of instructions per second; this is a measure of the processing power of a computer. Because each instruction may require more than one machine cycle, it is a better measure of throughput than the cycle time. For parallel processors used with artificial intelligence applications, MIPS stands for millions of inferences per second.

MIS – Management information system; the term became popular in the early 1970s to describe systems that used database technology to extract and organize enterprise information for management decision-making. By the 1980s it was recognized that simple information retrieval was insufficient, and modeling tools were added to produce decision support systems.

Modem – MOdulator-DEModulator; this device is used to link a computer or terminal to a telephone line. It converts a digital signal to an audio signal and vice versa.

Monitor – A display unit, generally a cathode ray tube. When integrated with a keyboard and electronics, it is a video display terminal (VDT).

MOS – Metal-oxide semiconductor; a technology commonly used for producing memory in large-scale integration. MOS memories lose their information when power is lost.

Multiplexing – The process of interleaving or transmitting two or more different sets of signals using the same bus or communication facility.

Multiprogramming – The organization of a system to allow concurrent execution of more than one separate task. All multiuser systems and time-sharing systems use multiprogramming.

Multiuser system – A computer system designed for use by more than one user or task at the same time. Most moderate to large interactive systems are multiuser systems.

MUMPS – Massachusetts General Hospital Utility Multiuser Programming System; a high-order language used primarily for interactive database applications on medium to small computers. Since it was originated by the medical computing community, many nonmedical applications have been developed for MUMPS.

– N –

Nanosecond – A billionth of a second.

Network – This term is usually used to describe the linking of computers and devices by means of communications. Long-haul networks link nodes (computers) over great distances. Local area networks link computers within a limited geographic area (e.g., within a building complex). The term is also used to describe the organization of data in a database management system.

– O –

Ones complement – A string of bits is said to be the ones complement of another string of bits if for every 1 in the first string there is a 0 in the second and vice versa. For example, 1001 and 0110 are 1s complements of each other. Some computers used this type of representation for negative numbers in fixed point (cf. Twos complement).

Operating system – That portion of the system software that acts like an interface between the programs and the hardware. It allows the equipment to perform the tasks desired by the applications. It also supports application development. Common operating systems are MVS for IBM mainframes, UNIX (a trademark of Bell Laboratories) for medium-sized computers, and CP/M and MS-DOS for single-user microcomputers.

Operations – The use and running of tested, correct programs, applications, and tools.

– P –

Paging – The treatment of program memory as a sequence of smaller memory segments called pages. Pages within a program need not be located in sequential memory locations. In fact, the concept of virtual memory allows the user to think of the program's memory space as being much larger than the amount of physical memory available; it does this by keeping in working storage only those pages currently in use.

Parallel I/O – An interfacing technique used for input/output devices in which all the bits in a byte or word are transmitted together. Parallel interfaces require at least as many lines as there are bits to be transmitted (cf. Serial I/O).

Pascal – A high-order language that combines many of the more advanced features of block-structured languages. It is a general-purpose language and is available on both large computers and personal computers. First designed for teaching applications, the basic syntax has been incorporated in a more powerful language called Modula-2.

PC board – Printed circuit board; a board designed to support electronic circuits. Printed circuit implies that some conductive circuits have been applied to the board.

Peripherals – Equipment used as an adjunct to the computer to produce the final computer system (e.g., input/output equipment).

Personal computer – This term is undergoing change; it refers to a single-user, stand-alone microcomputer system applied to personal applications such as word processing.

PL/I – A high-order language first introduced in the late 1960s for use on the IBM third-generation computers. It combines the functionality of Fortran and Cobol in a block-structured language similar to Algol.

Privileged mode – Some instructions are normally reserved for use by

the operating systems program because inadvertent use can result in system failure. These are called privileged instructions and can be used only by programs in the privileged mode.

Program — A collection of instructions that defines how a task should be performed. The program must be translatable into machine instructions that will perform the desired task.

Program counter — A class of register in the central processing unit that contains the address of the next instruction to be processed.

Programming — The process of transferring design concepts into a language that can be translated into machine instructions; the writing of computer programs.

Programming language — A true language that translates knowledge about a task to be performed into instructions that can be processed by a computer.

Prolog — A language for LOGic PROgramming, used for artificial intelligence applications. It combines a relational database with pattern-matching to implement a predicate calculus.

PROM — Programmable read-only memory; read-only memory that will allow programs to be stored through the use of special equipment. The end user cannot differentiate between PROM and ROM.

– R –

RAM — Random access memory; memory that can be both read from and written into. Selection of the word is by address, hence random access. This type of memory is used by programs loaded from mass storage.

Real-time clock — An input/output device that provides an external source of time. It is used to compute time of day and processing intervals. It is different from the clock that produces the central processing unit cycle time signal.

Record — A logical grouping of fields (or data elements) that are written into or read from a secondary storage medium. Records are physically stored in blocks; records are logically organized as files.

Register — A high-speed memory location within the central processing unit used to temporarily store or manipulate values.

Relation — A mathematical term for defining the contents of a set (e.g., (Mary, Jane) in the "mother of" relation or (3, 9) in the "square" relation). Databases can be organized as relations (two-dimensional arrays or tables). The advantages of relational databases are their simple structure, well-defined mathematical behavior, and normal forms.

Report generators — An application tool that facilitates the preparation of programs that print reports.

Requirements — A statement of needs; it tells what a proposed application must do.

ROM — Read-only memory; memory that can be read from but not written into. It is generally used for system software. The read-only property ensures that it will not be destroyed accidentally. It is also random access.

Routine — An alternative term for program.

RPG — See Report generators; also a specific language for report generation.

– S –

Sector — The physical unit of the disk recording surface that contains a block of data. The location of sectors is specified either through recording special bit patterns by a process called formatting or through the use of a physical mark on the disk. The former is called soft sectored, the latter, hard sectored.

Serial I/O — An interfacing technique used for input/output devices in which the bits in a byte or word are transmitted one after the other. Serial interfaces require only 2 to 4 lines for the data and control signals. It is an economical approach to low-data-rate transmissions (cf. Parallel I/O).

Shifting — The process of moving a string of bits either to the left or the right. The shifting process may set vacant bits to zeros; in that case, shifting is equivalent to multiplying or dividing by powers of 2.

Simulation — A program that models part of a real-world system to test or understand aspects of its behavior. There are languages designed to support the creation of simulations. The form of a simulation is independent of the system it models (cf. Emulation).

Single-user system — A computer system designed for use by only one user at a time. Most personal computers are single-user systems.

Software — The information used by a computer to determine what it should do. By extension, software includes the documentation. Some software (system software) is supplied with the computer equipment; other software (application software) is purchased or developed to meet the needs of a user.

STARS — Software Technology for Adaptable, Reliable Systems; a Department of Defense technical initiative, built upon the achievements of the Ada program, to develop an integrated and automated software environment that covers the entire software life cycle; see also VHSIC.

Subroutine — An alternative term for program. Implies that it will be used by other programs.

Supercomputer — This class of computer is designed for large-scale computational problems. It frequently is supported by vector processors that allow parallel computation for certain classes of problems.

Synchronous transmission — A technique for transmitting data in which a continuous string of characters is transmitted. Synchronous transmission is very fast; it requires more complex protocols (cf. Asynchronous transmission).

System software — Software designed primarily for use by the hardware and the developers of applications (cf. Application software).

– T –

Task — A set of functions to be performed by the execution of a sequence of computer programs.

Test — The process by which the developers verify that the product has no errors and performs all the necessary functions correctly.

Text processor — An application tool that facilitates the input, management, and printing of textual information. Many text processors are now similar to word processors (cf. Word processor).

Time sharing — The use of a large multiprogrammed computer system in which each user typically requires only a small portion of the total resource. Commercially, time sharing involves the sale of computer resources as a utility.

Track – The portion of the disk surface that can be read without changing the position of the read/write head.

Twos complement – A string of bits is said to be the 2s complement of another string if the sum of the two strings is a power of 2. The 2s complement is constructed by adding 1 to the 1s complement; for example, 1001 and 0111 are 2s complements of each other; their sum is 10000, or 2^4. Some computers use this representation for negative numbers (cf. Ones complement).

– U –

User – One who uses the system. For system software, the user is frequently perceived to be a programmer. For application software, the user should be considered a nonprogrammer.

User friendly – A software application that is easy to use and is not intimidating.

– V –

VHSIC – Very-high-speed integrated circuits; electronic microchips intended to produce a hundredfold increase in speed over their predecessors. While there are obstacles to be overcome before VHSIC technology can be produced cost effectively, it is one of two major computer-related Department of Defense technical initiatives; see also STARS.

Video terminal – An output device that is a nonpermanent display; usually a cathode ray tube, but other technologies are also used. Also called a video display terminal.

VLSI – Very-large-scale integration; electronic component parts in which over 100,000 electrical elements are combined in one chip.

von Neumann bottleneck – John von Neumann was one of the pioneers of digital computing. He is generally recognized as the father of the stored program used with a binary digital computer. In his analysis of organisms and automata, he believed that living organisms required redundancy and parallelism, while machines – which were faster – should be serial. This serial path between the memory and processor is sometimes called the von Neumann bottleneck because it limits throughput to the performance of a single processor. Parallelism bypasses the bottleneck.

– W –

Winchester disk – A specific technology for a hard disk. It usually contains a nonremovable disk in a sealed unit. Because of its relatively low manufacturing cost, it is the technology generally used for microcomputer hard disk systems.

Windowing – A method by which an interactive output display is divided into windows, each of which may be written to independently. With some of the new high-resolution devices, windows can be temporarily superimposed on existing displays in order to respond to a query.

Word processor – A fixed system designed to manage the input, modification, and printing of textual information (cf. Text processor, a tool that provides general-purpose computers a comparable capability).

Words – A unit of memory that can be read directly. Generally measured in bits or bytes (e.g., 16-bit words).

Working storage – Memory that is used by programs. The information in working storage is discarded on completion of the job.