

# GLOSSARY

The purpose of this glossary is to present definitions for some of the terms that are often used in the field of computers and data processing.

*Abacus* The earliest device that qualifies as a digital computer. It permits the user to represent numbers by the position of beads as a rack. Simple addition and subtraction can be carried out rapidly and efficiently by positioning the beads appropriately.

*Access time* The time interval between the instant at which data is called for from a storage device and the instant delivery begins.

*Accumulator* A local storage area, called a register, in which the result of an arithmetic or logic operation is formed.

*Acoustic coupler* A special type of modem (communications device) which allows an ordinary telephone to be used with a computer device for data transmission.

*Ada* A high level programming language named after Ada

Augusta, a friend of Charles Babbage. It is a general purpose programming language developed at the request of the U.S. Department of Defense for use in military applications.

*Adder* A logic circuit capable of forming the sum of two or more quantities.

*Address* An identification, presented in the form of a name, label, or number, for designating a particular location in storage area.

*Address register* A local storage register which contains the address of the next instruction to be executed.

*ALGOL (ALGOritmic Language)* An algebraic, high-level language similar to FORTRAN that is widely used in Europe.

*Algorithm* A sequence of precise and unambiguous instructions for solving a problem in a finite number of operations.

*Alphanumeric* Pertaining to a character set that contains

letters, digits, and usually other special characters such as the comma, dollar sign, plus sign, etc.

**ALU (Arithmetic Logic Unit)** The unit of a computing system which performs all mathematical and logical operations. It is one of the components of the central processing unit (CPU) of the computer.

**Analog computer** A computer that operates on data which is in the form of continuously variable physical quantities such as electrical current.

**ANSI (American National Standards Institute)** A U.S. based national organization that establishes uniform standards in several fields.

**APL (A Programming Language)** A very powerful high-level language that is well suited for specifying complex algorithms. It is a real-time language usually used in an interpretive and interactive manner and was developed primarily for scientific applications.

**Application program** Software designed for a specific purpose such as pay calculation, processing of examination results, stores accounting and inventory control, etc.

**Application programmer** A person who prepares application programs.

**Architecture** The organization and interconnection of the various components of a computer system.

**Artificial intelligence** A branch of computer science that deals with computers that possess reasoning, learning, and thinking capabilities that resemble those of humans.

**ASCII (American Standard Code for Information Interchange)** A standard coding system for computers. ASCII-7 is a 7-bit code and its extended version, ASCII-8 is an 8-bit code.

**Assembler** A computer program which translates an assembly language program to its machine language equivalent.

**Assembly language** A low-level programming language in which mnemonics are used to code operations and alphanumeric symbols are used for addresses. This language lies between high-level languages (FORTRAN, COBOL, etc.) and machine language (the 1s and 0s the computer understands).

**Asynchronous communication** Communication between units operating independently.

**Audio response** An output medium that produces verbal responses from the computer system.

**Auxiliary storage** A storage that supplements the primary internal storage of a computer. Often referred to as secondary storage, this section of the computer's memory is characterized by low cost per bit stored, but it generally has an operating speed far slower than that of the primary storage.

**Background processing** The automatic execution of lower-priority (background) computer programs when higher-priority (foreground) programs are not using the system resources.

**Backup** Alternate facilities of programs, data files, hardware equipments, etc., that are used in case the original one is destroyed, lost, or fails to operate.

**Bandwidth** The range of frequencies available for data transmission. The wider the bandwidth of a communications system, the more data it can transmit in a given period of time.

**Base** The total number of digits (symbols) available to represent numbers in a positional number system.

**BASIC (Beginners All-Purpose Symbolic Instruction Code)** An easy-to-learn high-level interactive programming language frequently used with personal computers and in timesharing environments.

**Batch processing** The running of several computer programs one after another without the need of a human operator to run each program individually. This is also known as stacked job processing because several jobs are stacked together and processed in groups (batches) for efficient operation.

**Baud** A unit for measuring data transmission speed. It is used to describe the capacity of a carrier. In general usage, baud is identical to bits per second.

**BCD (Binary Coded Decimal)** One of the early coding systems used by computers which is based on the idea of converting each digit of a decimal number into its binary equivalent rather than converting the entire decimal value into a pure binary form. For example, the decimal number 42 is represented by 0100 0010 in 8-4-2-1 BCD notation.

**Binary** A characteristic or property involving a selection, choice, or condition in which there are two possibilities.

**Binary number system** A number system with a base of two.



It consists of two digits - 0 and 1.

*Bit* Acronym for binary digit which stands for one binary piece of information. This can be either 0 and 1.

*Block* A group of related items (records, characters, etc.) handled as a unit during input and output. A section of program coding treated as a unit.

*Blocking factor* The number of logical records in a physical record.

*Boolean algebra* An algebra that deals with logical propositions which are either true or false and to simplify such propositions. This algebra is suitable for use with binary number system and is very useful in designing logic circuits used by the processors of computer systems.

*Boolean function* A mathematical function in Boolean algebra. For example,  $w = x + y.z$ .

*Boolean variable* A variable used in Boolean algebra. It can assume a value true or false.

*Branch statement* An instruction that transfers program control to one or more possible paths.

*Broadband channel* The fastest carriers which have data transfer rates of 1 million baud (bits/second) or more. These data communication systems handle high volumes of data and are used for high speed computer to computer communication or for simultaneous transmission of data to several different devices.

*Buffer* A small storage area used to store information on a temporary basis for compensating the difference in rates of flow of data between various computer devices. For example, when data flows from an I/O device to the CPU, it passes through a buffer.

*Bug* An error in a computer program.

*Bus* Circuits that provide a communication path between two or more devices of a digital computer system. For example, the path between a CPU, storage, and peripherals.

*Byte* A fixed number of adjacent bits that represent a particular character or symbol. Normally a byte consists of eight bits.

*Cache memory* A small high speed memory which is used to increase the speed of processing by making current programs and data available to the CPU at a rapid rate.

*CAD (Computer Aided Design)* Use of computers to automate design operations.

*CAI (Computer Aided Instruction)* A general term that refers to a learning situation in which the student interacts with (and is guided by) a computer through a course of study aimed at achieving certain instructional goals. Also called CAE (Computer Aided Education).

*Call statement* A program statement which transfers program control to a subroutine.

*CAM (Computer Aided Manufacturing)* Use of computers to automate manufacturing operations.

*Canonical form* A Boolean function whose terms contain all variables (or their compliments). This is the unreduced form of the Boolean function in minterm or maxterm form.

*Card* A punched hole input-output media of constant size, thickness, and shape adapted for punching in a pattern which has meaning. Also called punched card.

*Card punch* An output device that places data onto computer cards. It converts data from a binary format in main storage to coded hole patterns in a punched card.

*Card reader* An input device that converts data coded onto punched cards into a binary format for entry into main storage. It transfers data contained on computer cards to the computer system.

*Card sorter* A unit record device not connected electronically to the computer system which is used to sort cards.

*Carrier* Any device that is used to transmit data from one location to another.

*Chain printer* A printer in which the characters are embossed on a chain or a band. The chain is in the form of loop which rotates at a high speed and print heads are activated to print specified characters.

*Channel (1)* A path for carrying signals between a source and a destination. (2) A track on a magnetic tape or a band on a magnetic drum.

*Character addressable storage* A storage device in which each character has one unique location with its own address. Another name for character addressable storage is variable word length storage.

*Character printer* A printer with a print mechanism that



prints one character at a time.

**Charge-coupled device (CCD)** A completely electronic storage device fabricated on semiconductor chips. It stores data as pockets of charge in a semiconductor.

**Chip** A thin wafer of silicon on which integrated electronic components are deposited.

**Circuit switching** The simplest method of data communication in which a dedicated physical path is established between the sending and the receiving stations through the nodes of the network for the complete duration of information exchange.

**COBOL (Common Business Oriented Language)** A high-level programming language developed for business data processing applications.

**CODASYL** An acronym for Conference On DATA SYstems Languages. This is a committee that helps to establish programming standards for various programming languages.

**Code** A set of rules outlining the way in which data may be represented within a computer system.

**Coding** The process of writing computer instructions in a programming language.

**Coding sheet** The form on which program instructions are written. Each programming language has its own unique coding sheets.

**Collate** To combine items from two or more sequenced files into a single one.

**Collating sequence** An ordering assigned to the characters of a character set to be used for sequencing purposes. A commonly encountered collating sequence involves the special characters, letters, and digits, in that order.

**COM (Computer Output Microfilm)** An output device that records computer output on microfilm.

**Combinational circuit** A group of logic gates interconnected to form a logic circuit.

**Comment** An entry in a computer program for the purpose of documentation or explanation. They are used within a program to assist anyone reading the source program listing. They do not contain any program logic and are ignored (not translated) by the language processor.

**Communications channel** A medium through which data (in the form of electrical signals) is transferred from one location to another.

**Communications processor** A processing unit that coordinates networks and data communications. Within a computer network, it ensures that data flows to and from different computer systems correctly and efficiently.

**Communications protocol** A set of rules and procedures established to interconnect and communicate between computers. It provides a method for orderly and efficient exchange of data by establishing rules for the proper interpretation of controls and data transmitted as raw bits and bytes.

**Communications satellite** A microwave relay station precisely positioned 36000 Kms. above the equator with an orbit speed that exactly matches the earth's rotation speed. It is used for data transmission between any two randomly chosen points in a very-very large area.

**Compile** To convert or translate a program written in a high-level language to an absolute or machine language form. Usually a single source statement yields more than one machine instruction.

**Compiler** A system software package that converts a high-level language program to machine language.

**Complement** For a number which has  $n$  digits in it, a complement is defined as the difference between the number and the base raised to the  $n^{\text{th}}$  power minus one. For example, complement of  $37_{10} = 10^2 - 1 - 37 = 62_{10}$ . In Boolean algebra, the complement of a variable is the reverse (NOT) of its value. For example, complement of  $A$  is  $\bar{A}$ .

**Computer** An electronic equipment designed to automatically accept and store input data, process them, and produce output results under the direction of a detailed step-by-step stored program of instructions.

**Computer graphics** The area of computer science which is concerned with the generation, manipulation and display of pictures with the aid of a computer.

**Computer network** A distributed data processing system in which multiple computers are linked together for the purpose of data communication and resource sharing.

**Computer operator** A person in the computer centre whose duties include setting up the processor and peripheral equipments, starting the program run, checking on



processor operation, and unloading equipments at the end of a run.

*Computer system* The various components (input and output devices, storage, CPU) of a computer integrated together to perform the steps called for in the program being executed.

*Connector symbol* Used in a flowchart to represent a junction in a flow line, this symbol is often used to transfer flow between pages of a lengthy chart.

*Console* The part of a computer system that enables human operators to communicate with the computer.

*Constant* A value, written into a program instruction, that does not change during the execution of the program.

*Control program* An operating system program which controls the operations and management of resources of a computer system. The control program's major functions are job scheduling, input/output scheduling, and program monitoring.

*Control Unit* The part of the central processor which directs the sequence of operations, interprets the coded instruction, and sees to the execution of program instructions.

*Cost/benefit analysis* A procedure for evaluation and selection of hardware and/or software in which lists are made of all the costs and benefits of each proposed data processing system.

*Counter* A device, register or storage location for storing integers that are suitably incremented or decremented to represent the number of occurrences of an event.

*CP/M (Control Program/Microprocessor)* A widely used disk operating system. It is a product of Digital Research Corporation and has become a standard for many 8-bit personal computers. Similarly CP/M-86 has become industry standard for many 16-bit personal computers.

*CPU (Central Processing Unit)* The control unit and the arithmetic logic unit of a computer system are jointly known as the CPU. It is the brain of any computer system. All calculations and comparisons are made inside the CPU and the CPU is also responsible for activating and controlling operations of other units of a computer system.

*CRT (Cathode Ray Tube)* An electronic tube with a TV like screen upon which information may be displayed.

*Cybernetics* The use of computers coupled with automatic

machinery to carry out complex operations.

*Cycle time* The time interval between the instant at which a read/write command is given to a memory and the instant when the next such instruction can be issued to the memory (also known as memory cycle time).

*Cylinder* In a disk pack, a set of corresponding tracks in all the surfaces is called a cylinder. All tracks of a cylinder are accessible by a single movement of the access mechanism.

*Daisy wheel printer* A letter-quality printer that uses a printing head with the appearance of daisy and/or a wheel. Each petal of the daisy wheel has a character embossed on it.

*DASD.* Acronym for Direct-Access Storage Device. See direct-access.

*Data* A collection of facts in raw form that become information after proper organization or processing.

*Data base* A collection of data files integrated and organised into a single comprehensive file system, which is arranged to minimize duplication of data and to provide convenient access to information within that system to satisfy a wide variety of user needs.

*Data base administrator* The one responsible for defining, updating, and controlling access to a data base.

*Data communications system* A system consisting of carriers and related devices used to transport data from one point to another.

*Data dictionary* The document that contains clear definitions of the data that will be used in setting up data base management systems.

*Data division* It is the third division of a COBOL program. Its purpose is to assign names and to allocate space within main memory for all files, records, and fields to be used by the program.

*Data element* A meaningful collection of related characters. Also called a field or data item.

*Data entry* The conversion of human readable data into a form a computer system can interpret. This is also called data preparation.

*Data processing* A series of operations that convert raw information (data) into useful information.



**Data processing system** A system that accomplishes data processing. It includes the necessary resources, which are people, materials, facilities, and equipments.

**Data processor** A digital device that processes data. It may be a computer, but in a larger sense it may gather, distribute, digest, analyze, and perform other organization or smoothing operations on data. These operations, then, are not necessarily computational. Data processor is a more inclusive term than computer.

**Data transfer rate** The speed at which data is transferred from main memory to another medium on which data are recorded. For magnetic tape, the data transfer rate is equal to the product of the tape speed and recording density.

**DBMS (Data Base Management System)** The software used for the management, maintenance, and retrieval of the data stored in a data base.

**Debugging** The process of finding and correcting program errors (bugs).

**Decimal number system** A number system with a base of 10. The ten allowable digits are 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. It is used in our day-to-day life.

**Decision symbol** A diamond-shaped symbol used in flowcharts to indicate a choice or branch in the processing path.

**Decision table** A table used for representing program logic. It displays the different conditions that could exist and the different actions that the computer should take as a result of these conditions.

**De Morgan's theorem** A theorem in Boolean algebra which states how to complement a Boolean expression.

**Design phase** A phase in the life-cycle of software system during which the detailed design of the system selected in the study phase occurs.

**Development phase** A phase in the life-cycle of a software system during which a system is constructed to meet the requirements specified in the design phase.

**Diagnostic routines** Programs used to print error messages by a computer to indicate system problems and improper program instructions.

**Digital Computer** A computer that works with discrete quantities. It uses numbers to simulate real-time processes. Compare with analog computer.

**Digitizer** An input device used to convert graphic and pictorial data into binary, numeric inputs for a digital computer.

**Direct-access** Pertaining to storage devices where the access time is effectively independent of the location of the data.

**Disk** A flat, circular plate coated with a magnetic material on which data can be stored by magnetization of portions of the flat surface.

**Disk operating system (DOS)** An operating system which contains the disk-oriented commands and that uses disk devices for permanent storage.

**Disk pack** A removable direct-access storage medium containing multiple magnetic disks mounted vertically on a single shaft.

**Diskette** A low-cost, thin, flexible magnetic disk storage device used on small computer systems. Also called a floppy disk.

**Distributed data processing (DDP)** The decentralization of a computer system through the use of multiple computers interconnected by a communications network. It facilitates data processing capabilities at the location of the end-user.

**Documentation** Documentation of a software system involves collecting, organizing, storing, and otherwise maintaining a complete historical record of programs and other documents used or prepared during the different phases of the system.

**Document reader** An optical input device that is used to read documents printed in a special type font.

**Downtime** The period during which a computer is malfunctioning or not operating correctly due to machine failures.

**Drum printer** A line printer that uses a solid, rotating, cylindrical drum on which the characters to be printed are embossed.

**Dumb terminal** A terminal that has no local processing capability.

**EBCDIC (Extended Binary Coded Decimal Interchange Code)** An 8-bit coding system developed by IBM that is used to represent characters in many modern computers.

**Edit** To modify the form or format of the data by inserting



or deleting characters where needed.

**Editor** A software used to interactively review and modify text materials and other program instructions.

**EDP (Electronic Data Processing)** Pertaining to data processing equipment that is predominantly electronic, such as an electronic digital computer.

**EDVAC (Electronic Discrete Variable Automatic Computer)** An electronic computing device similar to the ENIAC although smaller, faster, and having greater capability. It was built in 1952.

**Electronic funds transfer (EFT)** A general term referring to a cashless approach used to pay for goods and services. Electronic signals between computers are often used to adjust the accounts of the parties involved in a transaction.

**Electronic mail** A general term to describe the transmission of messages by the use of computing systems and telecommunications facilities.

**Electronic spreadsheet** An application package usually available with microcomputers that displays the equivalent of a work sheet made up of rows and columns. It may be used for anything that a person would compute or display in tabular form.

**Electrostatic printer** A high-speed printer that uses charged pins to form character matrices on chemically treated paper.

**Electrothermal printer** A high-speed printer that uses heated elements to create characters as matrices of small dots on heat-sensitive paper.

**Elementary data item** A data item which is not broken down into smaller units.

**Emulator** A program that permits one computer to execute the machine-language instructions of another computer of different make.

**End-of-tape (EOT) marker** A reflective marker that indicates the end of the usable tape.

**End user** Any individual who uses the information generated by a computer based system.

**ENIAC (Electronic Numerical Integrator And Calculator)** The first all-electronic digital computer developed by Mauchly and Eckert around 1946.

**Environment division** It is the second division of a COBOL

program. Its function is to describe the environment of the program, that is, those aspects that are dependent upon the physical characteristics of a particular computer.

**EPROM (Erasable Programmable Read Only Memory)** A semiconductor memory in case of which it is possible to erase information stored in it by exposing it to ultraviolet light. Later new information can be stored in it.

**Execution time** The total time required to execute a program on a particular system is called its execution time for that computer system.

**Executive routine** A master program in an operating system that controls the execution of other programs. It is also known as the executive, monitor, or supervisor.

**Facsimile (FAX)** Transmission of pictures, texts, maps, graphs, etc., over transmission lines, phone lines, and other carriers between geographically separated points. An image is scanned at a transmitting point and duplicated at a receiving point.

**Feasibility Study** A study to determine whether the proposed solution is technically and economically feasible in all respect.

**Fiber optic cable** A data transmission medium made of tiny threads of glass or plastic that is able to transmit huge amount of information at the speed of light.

**Field** In a record a meaningful collection of one or more related characters treated as a unit.

**Fifth generation computers** These computers will be introduced shortly. They will use a large number of processors working concurrently and independently. Simpler programming languages and knowledge based system implementations are expected in this generation.

**File** A collection of related records.

**Firmware** A sequence of instruction (software) that is substituted for hardware and stored in read-only memory (ROM).

**First generation computers** Computers built between 1949 and 1955 which used vacuum tubes and were programmed in assembly language. Few examples are ENIAC, EDVAC, EDSAC.

**First-in, first-out (FIFO)** A technique for processing jobs on a first-come, first-served basis.



**Fixed-head magnetic disk** A magnetic disk system that eliminates the use of an access mechanism by distributing all the read/write heads over the disk surfaces.

**Flop-flop** An electronic circuit which can be placed in one out of two stable states. Each state may be used to represent a binary digit.

**Floating-point numbers** Signed numbers held in a fraction-exponent format. For example, 3216 would be represented as  $0.3216 \times 10^4$  in floating-point notation.

**Floppy disk** See diskette.

**Flowchart** A pictorial representation that uses predefined symbols to describe either the logic of a computer program (program flowchart) or the data flow and processing steps of a system (system flowchart).

**Flowline** In a flowchart, flowlines with arrowheads are used to indicate the flow of operation, that is, the exact sequence in which the instructions are to be executed.

**Foreground processing** Automatic execution of high-priority (foreground) computer programs that have been designed to preempt the use of computer resources. Contrast with background processing.

**Format** The arrangement of input data, stored data, or output information.

**FORTRAN (FORmula TRANslation)** A high-level, mathematically oriented programming language used for scientific and engineering applications.

**Fourth generation computers** Computers built between 1975 and now. They use large scale integrated circuits, semiconductor memories and powerful high-level languages and operating systems.

**Frequency division multiplexing** A method used to concurrently transmit data between several transmitters and receivers over a single transmission medium. The available bandwidth of a physical medium is divided into smaller, disjoint logical bandwidths and each of the component bandwidths is used as a separate communications line (channel).

**Front-end processor** A CPU designed specifically to handle the communications processing task. Its main purpose is to off-load communications processing task from the host computer, thereby the host computer can be dedicated for applications and data processing jobs.

**Full adder** An adder which adds three binary digits and outputs a result bit and a carry bit.

**Full duplex** A method of using a communication channel in which signals can be transmitted between a source and a destination in both directions simultaneously.

**General purpose computer** A computer capable of performing a variety of business and scientific applications.

**General purpose programming language** A programming language intended to solve a number of different types of problems.

**General software package** A software package, such as payroll and word processing, developed for a general market for many users.

**Generation** In computer talk, it is a step in technology. It provides a framework for the growth of the computer industry.

**Generator** A computer program that constructs other programs to perform a particular type of operation - e.g., a report program generator.

**GIGO (Garbage in, garbage out)** Pertains to the fact that most computer errors are not machine errors; they are data errors, caused by incorrect input data. Thus, incorrect input data results in inaccurate output.

**Graphic display terminal** A visual display terminal which has a screen to display a graph or drawing as well as alphanumeric information.

**Half adder** An adder which adds two binary digits and outputs a result bit and a carry bit (if any).

**Half duplex** A method of using a communication channel in which signals can be transmitted between a source and a destination in both directions, but only in one direction at a time.

**Hard copy** Printed or filmed output from a computer device in human readable form.

**Hardware** The physical components of a computer system such as electronic, magnetic, and mechanical devices.

**Hexadecimal number system** A number system using a base of 16. Its digits range from 0 to F. It is commonly used as a shortcut notation for groups of four binary digits.

**Hierarchical network** A communications network in which



computer or processors are connected in a tree-like structure.

*Hierarchical structure* A tree-like structure used to represent files and records in a data base system.

*High-level language* A programming language whose structure is application oriented and is independent of the structure of the computer. Each statement of such a language is translated into many machine language statements.

*HIPO Charts (Hierarchy plus Input-Process-Output charts)* It is both a design tool and an aid to program documentation which is concerned with what is done rather than how a particular activity is accomplished. It presents the software functions to be performed by a system in a top-down hierarchical sequence.

*Hollerith code* A particular type of 12-bit code that uses zone and/or digit area punches to represent alphanumeric data on 80-column punched cards.

*Host computer* The main control computer in a network of distributed processors and terminals.

*Hybrid computer* A combination of an analog and a digital computer. Such a computer system utilizes the measuring capability of an analog computer and the counting capability of a digital computer.

*Identification division* The first division of a COBOL program whose purpose is to identify the name of the program and any other information about the program that would be useful for identification purposes.

*Impact printer* A printer which prints characters by causing hammers to strike against the paper on which information is to be printed.

*Indexed file* A file that includes an index directory to facilitate random access.

*Information* The result of data processing which can be used to help people make decision.

*Ink jet printer* A printing device that uses a nozzle and sprays ink onto paper to form the appropriate characters.

*Input* The source data entered into a data processing system.

*Input device* A device used to bring information into a computer or other data processing devices; for example, a

card reader.

*Instruction* A command or order given to a computer. It normally consists of a code to indicate the operation to be performed and address(es) in memory where the operand(s) would be found.

*Instruction register* A register in CPU that holds the current instruction while it is being executed.

*Integrated circuit (IC)* Refers to the miniaturization of electronic circuits such that thousands of components are formed on a small chip of silicon or wafer. This chip is able to perform a variety of functions that in the past required several different electronic components.

*Intelligent terminal* A terminal having local processing capability. It has a built-in CPU and can perform specific functions such as editing data, controlling other terminals, etc.

*Interactive system* One that permits direct communication and dialog between system users and the operating program in the CPU.

*Inter block gap (IBG)* When several records are in one block, these gaps separate the blocks of records on magnetic tape.

*Interface* Electronic circuit used to interconnect I/O devices to a computer's CPU or memory.

*Internal storage* The addressable storage in a digital computer which is directly under the control of the CPU.

*Interpreter* A language processor that translates a statement of a high-level language and immediately executes it before translating the next source language statement. It is the most common language processor for BASIC.

*Inter record gap (IRG)* The separation or gap between records on a tape.

*I/O (Input/Output)* Pertaining to the techniques, media, and devices used for man-machine interaction.

*I/O bound jobs* Jobs that require more of I/O operations as compared to computational operations.

*IOCS (Input/Output Control System)* A set of routines for handling the many detailed aspects of input and output operations.

*IPO chart (Input Processing Output chart)* An expansion of



a HIPO chart into additional levels of detail.

**ISAM (Index Sequential Access Method).** Relating to a file design technique whereby records organized in a sequential order can be accessed directly by use of an index (directory) based on some key or characteristic. Permits both sequential and random access of records.

**ISO protocol** A communication protocol to interconnect geographically dispersed heterogeneous computers. This protocol has been standardized by the International Standards Organisation (ISO).

**Job** A collection of specific tasks constituting a unit of work for a computer.

**Job Control Language (JCL)** A special purpose language used to describe to a computer's operating system the resource requirements of program fed to the computer.

**Jump** An instruction or signal which, conditionally or unconditionally, specifies the location of the next instruction and directs the computer to that instruction. A jump is used to alter the normal sequence control of the computer.

**Justification** Left justification (for alphabetic and alphanumeric data) means starting with the leftmost column. Right justification (for numeric data) means starting with the rightmost column.

**K (Kilo)** Used to represent  $2^{10} = 1024$  in computers.

**Key field.** A unique field in a record used to distinguish one record from another.

**Keypunch machine** A keyboard-actuated device that is used to record data on computer cards. It punches holes in a card to represent data.

**Key-to-disk** A device used to enter data onto a disk device.

**Key-to-tape** A device used to enter data onto a magnetic tape.

**Label** One or more characters used to identify a statement, an instruction, or a data field in a computer program.

**Label record** A machine-readable record that is used to identify a data file. It is the first record of the file.

**LAN (Local Area Network)** A digital communication system capable of interconnecting a large number of computers, terminals and other peripheral devices within a

limited geographical area, typically under 1 km across.

**Language processor** A software used to convert source program instructions to object or machine language instructions. Few examples are assembler, compiler and interpreter.

**Laser printer** A very high speed printer that uses a combination of laser-beam and electrophotographic techniques to create printed outputs at speeds in excess of 13,000 lines per minute.

**Latency time** In case of disk storage, the time taken for the desired record to come under the read/write head positioned over that track. Maximum latency time equals the time taken by disk to rotate once.

**Library routine** A tested routine maintained in a library of programs.

**Light pen** A pen shaped device that is used as an input device to computers by writing or sketching on the screen of a cathode ray tube.

**Line printer** A printer that appears to print one line at a time.

**LISP (LIST Processing)** A high-level programming language suitable for handling logical operations and non-numeric applications. It is used in the areas of pattern recognition, artificial intelligence and for simulation of games.

**Local storage** Storage areas, called registers, used by the CPU to interpret instructions and perform arithmetic and logical operations.

**Logical operators** Symbols used to show a logical relationship between two data items. Examples in FORTRAN are .EQ. for equal and .GT. for greater than.

**Logical error** An error that occurs when the actual logic of a program is different from the desired logic.

**Logic gate** An electronic circuit which operates on one or more input signals to produce standard output signals. For example, AND, OR and NOT gates. Logic gates are the building blocks of all the circuits in a computer.

**Loop** A sequence of instructions that is executed repeatedly until a terminal condition occurs.

**Low-level languages** Programming languages that normally translate from one source instruction to one object



instruction. These languages are machine dependent.

*LSI (Large Scale Integration)* The process of integrating a large number of electronic circuits on a single, small chip of silicon or other material.

*Machine language* A low-level language that is directly understandable by the computer system. Each model of a computer has a unique machine language.

*Macro flowchart* A flowchart that outlines the main segments of a program or that shows less detail.

*Macro instruction* An instruction in a source language that is equivalent to a specified sequence of machine instructions.

*Magnetic bubble memory* An electronic secondary storage made with solid-state electronic chips and have no moving parts. It uses the properties of certain materials, under applied magnetic fields, to represent binary 1s and 0s.

*Magnetic core* Tiny rings made of magnetic material that can be polarized to represent a binary 1 or 0.

*Magnetic disk* See disk.

*Magnetic-ink character recognition (MICR)* An input device that can read cards and paper documents printed with a special magnetic ink.

*Magnetic storage* Storage devices such as disks, drums, tapes, cores, etc. that utilize the magnetic properties of materials to store data.

*Magnetic tape* A secondary storage device that uses a long plastic strip coated with a magnetic material as a recording medium.

*Management information system (MIS)* An organized collection of people, procedures, and devices used to provide the right information to the right person at the right time for proper decision making.

*Mass storage* Storage systems that provide access to hundreds of billions of bytes of stored data. They are often referred to as archival storage because of the very large volumes of historical or backup data that they can store.

*Master file* A file containing relatively permanent data. This file is often updated by records in a transaction file.

*Maxterm* A Boolean quantity consisting of all terms (in its normal form or complement form) ORed together. Any

combination ( $2^n$  for  $n$  variables) of terms and complements is permissible, provided all are included in the term.

*Megabyte* One million ( $10^6$ ) bytes.

*Memory* A device or medium that can accept data, hold them, and deliver them on demand at a later time.

*Memory dump* A printout of the contents of memory.

*Merging* The combining of records from two or more ordered files into a single ordered file.

*Message switching* A method whereby messages to be transmitted between computers are all sent to a central computer, which gathers them and routes them to the appropriate destination(s).

*Microcomputer* The smallest category of computer fabricated using a microprocessor, and other integrated circuits, namely a ROM, RAM, and I/O interface chips.

*Microfiche* An output device that uses combined electronic, photo-optical, and electromechanical techniques to convert digital computer output to records that can be stored as rolls of microfilm or as frames of microfilm stored on cards called microfiche.

*Microfilm* See microfiche.

*Microflowchart* A flowchart with more details. It is also called a detailed flowchart.

*Microprocessor* A LSI chip which contains the entire CPU of a computer.

*Microprogram* Firmware programs residing in read-only memory (ROM) which aid the control unit in directing operations of a computer system.

*Microsecond* One-millionth of a second.

*Millisecond* One-thousandth of a second.

*Minicomputer* A relatively fast but small and inexpensive computer with somewhat limited input/output capabilities.

*Minterm* A Boolean quantity consisting of all terms (in its normal form or complement form) ANDed together. Any combination ( $2^n$  for  $n$  variables) of terms and complements is permissible, provided all are included in the term.

*Mnemonic* Any kind of mental trick we use to help us remember. For example, a computer may be designed to



interpret the machine code of 1111 (binary) as the subtract operation, but it is easier for a human being to remember it as SUB.

**Modem (Modulator-demodulator)** Devices used to convert digital signals (to be communicated over an analog channel such as telephone line) to sine waves at the sending end and back to digital signals at the receiving end.

**Modular approach** Dividing a project into segments and smaller units in order to simplify the analysis, design, and programming efforts.

**Modulation** The technique by which a digital signal is converted to its analog form for transmission over an analog facility.

**Monitor routine** See executive routine.

**MSI (Medium Scale Integration)** A circuit with about 100 transistors fabricated on a single chip.

**Multiplexing** The method of dividing a physical channel into many logical channels so that a number of independent signals may be simultaneously transmitted on it.

**Multiprocessing** A term used to describe interconnected computer configurations or computers with two or more independent CPUs that have the ability to simultaneously execute several programs.

**Multiprocessor** A computer system consisting of two more CPUs under a common control.

**Multiprogramming** The name given to the interleaved execution of two or more different and independent programs by the same computer.

**Nanosecond** One-billionth ( $10^{-9}$ ) of a second.

**Narrowband channel** Communication channels that handle low volumes of data, typically from 45 to 300 baud. They are used mainly for telegraph lines and low speed terminals.

**Network** An interconnection of computer systems and/or peripheral devices with carriers and data communications devices for the purpose of exchanging data and information.

**Network topology** The structure of interconnection of nodes of a computer network.

**Node** An end point of a branch in a network, or a common junction of two or more network branches.

**Nonimpact printer** A printer which performs some type of operation to the paper instead of physically striking it (as in the case of an impact printer). To print characters with nonimpact printers, the paper can be sprayed with ink, magnetized, electrically charged, heated, placed under pressure, or struck by laser beams.

**Nonvolatile storage** A storage medium that retains its contents even in the absence of power.

**Object program.** A fully compiled or assembled program that is ready to be loaded into the computer. It results from the translation of a source program by a language processor.

**Octal number system** A number system with a base of 8. The octal digits range from 0 to 7. It is commonly used as a shortcut notation for groups of three binary digits.

**Offline** A device or system not directly connected to the CPU.

**Online** A device or system directly connected to the CPU.

**Operand** The part of a machine level instruction which tells the central processor the location of the data to be manipulated.

**Operating system** An integrated set of programs that is used to manage the various resources and overall operations of a computer system.

**Operation code (op code)** The part of a machine level instruction which tells the central processor what has to be done.

**Operation phase** The life-cycle phase during which the system constructed in the development phase is used.

**Optical bar-code reader** An input device that is able to interpret combinations of marks (bars) that represent data.

**Optical Character Reader (OCR)** An input device which can read characters directly from an ordinary piece of paper by use of a scanning mechanism. These characters are written in special type fonts.

**Optical Mark Reader (OMR)** An input device that is able to interpret pencil marks on paper media.

**Output** The finished result of processing by a system.

**Output unit** The unit of a computer system that supplies information and results of computation to the outside.



example, one program can undergo input, another program can be processed, and a third program can undergo output all at the same time.

*Packed decimal* A modified form of zoned decimal that places two decimal digits into each byte of the field with the exception of the rightmost byte, which contains one digit and the sign of the field.

*Packet switching* A method of communication between computers in a network in which blocks of messages to be transmitted are formed into packets and placed on the channel. Each packet contains source and destination addresses, synchronizing, error correction and control bits. The packets are routed using the source and destination addresses.

*Page printer* A high-speed printer with a mechanism that appears to print an entire page at one time.

*Page reader* A high-capacity optical input device that is able to scan and interpret an entire page that is typed in a special font.

*Paper tape punch* An output device that converts data from a binary format in main storage to coded hole patterns punched into paper tape.

*Paper tape reader* An input device that converts data punched into paper tape into a binary format for entry into main storage.

*Paralleled adder* An adder in which all the bits of the two operands are added simultaneously.

*Parallel operation* A system changeover method whereby data is processed by both the old and the new system until performance of the new system is verified satisfactorily.

*Parity bit* An extra bit added to a string of bits that enables the computer to detect internal errors in the transmission of binary data.

*Pascal* A high-level programming language named after Blaise Pascal that facilitates the use of structured programming techniques.

*Password* A code by which a user gains access to a computer system. It is used for security purposes.

*Peripherals* The various input/output devices and auxiliary storage units of a computer system.

*Personal computer* A small and inexpensive computer

(usually a microcomputer) used by individuals for carrying out personal jobs or for applications such as entertainment, home management, and hobbies.

*PERT* An acronym for Program Evaluation and Review Technique, a technique used to facilitate the implementation of a computer system.

*Phase modulation* A form of modulation in which two binary values of digital data are represented by the shift in phase of the carrier signal. That is, a sine wave with phase =  $0^{\circ}$  represents a digital 1 and a sine wave with phase =  $180^{\circ}$  represents a digital 0.

*Phased replacement* A system changeover method in which the complete changeover to the new system takes place incrementally over a period of time. The new system is gradually implemented part by part and the old system is gradually phased out.

*Picosecond* One trillionth of a second.

*Pixel* A picture element. It is used to represent one point in a raster scan display device.

*PL/I (Programming Language One)* A high level programming language designed for handling both scientific and business applications.

*Plotter* An output device that converts computer output into a graphic, hardcopy form.

*Pointer* A data item in one record that contains the location address of another logically related record.

*Point-of-sale (POS) device* An I/O device capable of immediately updating sales and inventory records at a central CPU and producing a printed sales transaction receipt.

*Primary memory* A section of the CPU that holds program instructions, input data, intermediate results, and the output information produced during processing. Also known as primary storage, internal storage and main memory.

*Printer* An output device used to produce hard copy of computer output that is readable by humans.

*Problem-oriented languages* High-level programming languages designed for the convenient expression of a given class of problems; for example, RPG.

*Procedure division* The last division of a COBOL program that contains the logic of the program, i.e., all the



given class of problems; for example, RPG.

*Procedure division* The last division of a COBOL program that contains the logic of the program, i.e., all the instructions that the computer is to follow in solving our problem.

*Procedure-oriented languages* High-level programming languages designed for the convenient expression of procedures used in the solution of a wide class of problems; for example, FORTRAN and COBOL.

*Process bound jobs* Jobs that require more of computational operations (CPU time) as compared to I/O operations (I/O time).

*Processing* Performing arithmetic operations and/or logically manipulating input data in order to convert them into a desired output.

*Processing symbol* A rectangular figure used in flowcharts to indicate a processing operation.

*Process loop* See loop.

*Processor* A unit of a computer system that interprets instructions and executes them.

*Program* A set of sequenced instructions used to direct and control the operations of the computer in order to solve a problem or to perform a particular task. Also known as a routine.

*Program counter (PC)* A register in CPU which is used to store the address of the next instruction to be executed.

*Program Design Language (PDL)* See pseudocode.

*Program library* A collection of complete programs, subroutines, and program modules that have already been developed, tested, and documented usually as a result of other programming projects.

*Programmer* One who designs, writes, tests, and maintains computer programs.

*Programming language* A language used to express algorithms in computer understandable form.

*PROM (Programming Read-Only Memory)* Similar to read only memory with the exception that these chips can be reprogrammed by using special external equipments.

*Protocol* See communications protocol.

*Pseudocode* A programming analysis tool that is used for planning program logic. It is an imitation of actual computer instructions written in ordinary natural language such as English.

*Radix* Same as base. See base.

*Random access memory (RAM)* A storage device in which the time to retrieve stored information is independent of the address where it is stored.

*Real-time systems* Pertains to online computer processing systems which receive and process data quickly enough to produce output to control, direct, or affect the outcome of an ongoing activity or process.

*Record* A collection of related items of data treated as a unit.

*Record length* A measure of the size of a record, usually specified in units such as characters.

*Register* See local storage.

*Remote access* Accessing a computer from a distant station using communication facilities.

*Remote job entry (RJE)* A particular type of batch processing, where the input and output devices are located away from the central computer facility. The equipments for a RJE station can include terminals, card readers, card punching devices, printers, etc.

*Report program generator (RPG)* A business oriented, general purpose programming language designed to generate the output reports resulting from the processing of common business applications.

*Response time* The total elapsed time between submission of command and data to a computer and getting the result of computation.

*Ring network* A computer network in which there is no host computer for controlling other computers and in which all stations are equal.

*Robot* An automatic machine that performs routine, seemingly human tasks.

*ROM (Read Only Memory)* Special memory chips containing instructions which can be read only, therefore preventing accidental destruction of the instructions. ROM is used to store firmware.

- Routine* See program.
- RS-232-C interface* A standard interface used for interconnecting user terminals to computers. It was defined by Electronics Industrial Association (USA).
- Run time* The time required to complete a single, continuous, execution of an object program.
- Secondary storage* See auxiliary storage.
- Second generation computers* Computers built during the period 1955-64 which used transistors in CPU, magnetic core main memories, and high-level languages like FORTRAN and COBOL for programming.
- Seek time* In a disk system, the time required for a read/write head to move to the track where the record to be read or written is stored. Maximum seek time equals the time taken for the head to move from the outermost track to the innermost track.
- Semiconductor storage* A storage device whose storage elements are formed as solid-state electronic components on an integrated circuit chip.
- Sequential processing* A technique in which a number of similar items or transactions to be processed are grouped together and processed in a designated sequence.
- Serial access* A storage device or medium where the access time is dependent upon the location of the data. Magnetic tape is a typical serial access medium.
- Serial adder* An adder in which the bits of the operands are added one after another.
- Service programs* Programs commonly used in all computer centres for providing better service to users. They include programs to prepare object programs for execution, to store programs on a magnetic disk, sort data stored on secondary storage devices, etc. They are part of the operating system.
- Simplex* A way in which data can be transmitted so that the data can only flow in one direction.
- Simulation* To represent and analyze properties or behavior of a physical or hypothetical system by the behavior of a system model.
- SNOBOL* An acronym for string oriented symbolic language. A high-level language designed to manipulate strings of characters and used for nonnumeric applications.
- Soft copy* Computer output which is displayed on the screen of a terminal and provides no permanent copy.
- Software* The set of computer programs, procedures, and associated documentation related to the effective operation of a computer system.
- Solid state* Electronic components whose operation depends on the control of electric or magnetic phenomena in solids, such as transistors and diodes.
- Sort* The process of arranging data into a desired sequence.
- Source document* A document on which data that are to be recorded in machine-readable code originates, that is, the original hand written or typewritten document or a time card.
- Source program* A program written in a symbolic or high-level source language such as assembly language, COBOL, BASIC, etc.
- Special character* A graphic character that is neither a letter, a digit, nor a space character; for example, the dollar sign, comma, period, etc.
- Special purpose computer* A computer that is meant for doing only a particular type of jobs.
- Special purpose programming language* A programming language designed to handle one specific type of problem or application.
- Speech recognition* The ability to input data directly into a computer system by speaking to it.
- Spooling* A technique that has been successfully used on a number of computer systems to reduce the speed mismatch between slow speed I/O devices and fast CPU. It is the process of placing all data that comes from an input device or goes to an output device on either a magnetic disk or tape which are faster devices as compared to a card reader or a line printer.
- SSI (Small Scale Integration)* An electronic circuit with about 20 transistors fabricated on a silicon chip.
- Stack* A memory in which information which is stored last is on top and is retrieved first. Also known as LIFO (Last-in-first-out) storage.
- Stand-alone* In a distributed data processing system, it refers to a computer system that has an independent (from a central-site computer) processing and storage capability.



**Stand-alone** In a distributed data processing system, it refers to a computer system that has an independent (from a central-site computer) processing and storage capability.

**Star network** A network having a central host computer system that is attached to local computers through multiple communication lines. The local computers are not linked directly to each other and can communicate only via the host computer.

**Statement** In programming, an expression or generalized instruction in a source language.

**Storage** See memory.

**Store and forward method** A method of message transmission in a computer network in which messages are sent to a central computer which receives them, stores them and forwards them to the specified destinations.

**Stored program computer** A computer where the program to solve a problem and the necessary data are stored in its memory.

**Structured design** A system design approach in which a difficult problem is broken into smaller problems that are small enough to manage but independent enough to solve separately.

**Structured programming** An organized approach to programming involving the use of three basic control structures - sequence, branch, and loop and the use of top-down concepts to decompose main functions into lower-level components for modular coding purposes. This technique is concerned with improving the programming process through better organization of programs and better programming notation to facilitate, correct, and clear descriptions of data in control structures.

**Study phase** A system life-cycle phase during which a problem is identified, alternative solutions are studied, and the most feasible solution is selected.

**Subroutine** A standardized program written in such a way that it can be used as part of another program whenever necessary. A subroutine is normally invoked through other programs by the use of CALL statements.

**Subsystem** A system that is part of a larger system.

**Supercomputer** Computer systems characterized by their very large size and very high processing speeds. They are generally used for complex scientific applications.

**Supervisor** See executive routine.

**Swapping** Storing programs on disk and then transferring these programs into main storage as and when they are needed. The technique is used to process large programs or several programs with limited memory.

**Symbolic code** Computer instructions written with the use of English words and/or mathematical symbols instead of binary machine code. Symbolic code is also called source code or source program.

**Symbolic language** A programming language that allows computer instructions to be written with the use of English words and/or mathematical symbols instead of binary machine code.

**Synchronous** The time between successive bits, bytes or events is constant. All equipments connected together in such a system work in step strictly controlled by a clock.

**Syntax** The set of rules of a programming language that define the pattern or structure of the word order and punctuation of an instruction. It is analogous to rules of grammar in English language.

**Syntax errors** Errors in computer programs that typically involve incorrect punctuation, incorrect word sequence, undefined terms, or misuse of terms. These errors are automatically detected and pointed out by language processors.

**System** A group of integrated parts (people, methods, machines, and materials) that have the common purpose of achieving some objective(s).

**System analysis** A detailed step-by-step investigation of related procedures to see what must be done and the best way of doing it.

**System analyst** The individual responsible for planning a computer data processing system. He utilizes tools such as flowcharts, decision tables, program design language, etc. These plans are then passed to the computer programmer.

**System Commands** Commands used to communicate with the operating system of the computer.

**System design** See design phase. Pertains to a detailed description of the new system that has been selected during study phase.

**System flowchart** A flowchart that uses predefined symbols to describe data flow in a system.



**Systems programmer** A person who prepares system programs, that are part of an operating system, designed to simplify the use of the computer.

**Systems software** A set of one or more programs designed to control the operation of a computer system. They are general programs written to assist humans in the use of computer system and for making the operation of the computer system more effective and efficient.

**Tape density** The amount of data that can be placed over a given length of tape. The density is usually expressed in bytes or characters per inch. Typical densities range from 500 bytes per inch to 6250 bytes per inch.

**Teleconferencing** A system in which persons sitting at CRT screens see and talk to each other via a computer-communications network. It saves travelling cost and the valuable time of executives that would otherwise be lost by route.

**Telecommunications** Transmission of data between computer system and/or terminals at different locations through telephone facilities.

**Teletypewriter terminal** A terminal that has a keyboard and a printing device.

**Teletypewriter** An inexpensive input and output device that uses paper tape and is often used as a component of a small computer system.

**Template** A plastic or metal guide used to trace flowcharting symbols.

**Terminal** An input/output device which allows a user to communicate directly with a computer system.

**Terminal symbol** A symbol used in flowcharts to indicate the beginning (START), ending (STOP), and pauses (HALT) in the program logic flow.

**Testing** The process of making sure that the program performs the intended task.

**Thermal printer** A printing device that utilizes paper that is sensitive to heat.

**Third generation computer** Computers built between 1964 and 1975 that used integrated circuits in CPU, high speed magnetic core main memories, powerful high level languages and saw the advent of time sharing operating system.

**Throughput** The total amount of useful processing carried out by a computer system within a given time period. It is a measure of the efficiency of a computer system.

**Time division multiplexing** A method of sharing a communication channel in which the total time available in the channel is divided between several users and each user of the channel is allotted a time slice during which he may transmit a message. The channel capacity is fully utilized by interleaving a number of data streams belonging to different users into one data stream.

**Time log** A log documentation automatically maintained by many computer systems that describe in detail how the computer system was used during the day.

**Time sharing** Refers to the allocation of computer resources in a time-dependent fashion to several programs simultaneously. It facilitates a large number of users to simultaneously use a computer for processing their jobs which may be of different nature.

**Top-down approach** A disciplined approach to system design or program design in which top-level functions are decomposed into a hierarchy of understandable lower-level modules for better management and easy handling.

**Tracing routines** Routines to aid the programmer in following the logic of a program during execution of the program.

**Track** In case of magnetic disk storage, one of many circular concentric rings used for storing data. In case of magnetic tape storage, a horizontal strip, or channel, running the full length of the tape and used for recording data.

**Transaction file** A file in which current data are stored for subsequent processing usually in combination with a master file. Also called a detail file.

**Transistor** A controlled electronic switch fabricated using a semiconductor. It is extensively used in the design of various electronic equipments.

**Transponder** A device mounted on a communication satellite which receives, amplifies and retransmits signals from earth stations.

**Truth table** A table which gives the output values for the various input combinations in case of a logical expression.

**Turnaround time** The elapsed time between the submission of a job to a computer system and getting its output.



**Turnkey systems** Special purpose systems in which a single vendor supplies not only the machine itself, but also all of the needed software such as that to handle general ledger, accounts payable receivable, payroll, inventory and so on.

**Unbundled** A term which means that the application software is priced separately from the computer hardware.

**Unconditional transfer** A program instruction that causes the program control to flow out of normal sequence unconditionally.

**Unit record machine** An electromechanical device used to process data punched into cards. This name came about because it is possible to place one record on one card. Each card containing data is called a unit record.

**UNIVAC** An acronym for Universal Automatic Computer. It was the first commercially available computer.

**Universal Product Code (UPC)** A universal or standardized optical bar code which normally appears on retail packages and which is read by a laser beam scanner.

**UNIX** A popular operating system for 16-bit mini and micro computers that was designed by Bell Telephone Laboratories, USA.

**Updating** The process of keeping master files accurate and up-to-date by processing it with the latest transactions contained in the transaction file.

**User** Any individual who supplies input data to, or uses information generated by, a computer based system.

**Utilities** Programs used to perform some frequently required process in the operation of a computer system-e.g., sorting, merging, transferring data files from one device to another, etc.

**Validation** The process of making sure that forms and documents from a particular transaction are correct.

**Value-added carrier** A communications company that leases networks from a common carrier and combines messages from customers into packets for point-to-point transmission.

**Variable name** In a program, the name assigned to a data field that can assume any of a given set of values.

**Verification** The process by which data contained on cards, tape, or disk is checked against the original document to make sure that no errors occurred in the data conversion

process. It is the second step of a data entry process.

**Video display unit (VDU)** An I/O device that consists of a television like screen for displaying outputs and a keyboard for entering inputs.

**Virtual storage** The capability to use online secondary storage devices and specialized software to divide programs into smaller segments for transmission to and from internal storage in order to significantly increase the effective size of the available internal storage.

**Virtual system** An extension of virtual storage concept. With virtual systems, users can share all of the computer resources as if each user had his own computer.

**VLSI (Very Large Scale Integration)** An electronic circuit with about 10,000 transistors fabricated in a single silicon chip.

**Voiceband** Data communications system that handles moderate volumes of data, typically from 300 to 9600 bauds. Phone lines that we use to talk to other people is an example.

**Voice recognition unit** An input device used with voice recognition systems that converts spoken words into binary data suitable for input to the system.

**Voice response unit** An output device that uses words or messages recorded on a magnetic medium to produce audio response.

**Volatile storage** A storage medium that loses its contents in the event of power failure or when power is switched off.

**Wide area network (WAN)** A digital communication system which interconnects different sites, computer installations and user terminals, and may also enable LANs to communicate with each other. This type of network may be developed to operate nationwide or worldwide and the transmission medium used are normally public systems such as telephone lines, microwave and satellite links.

**Winchester disk** Medium-sized, non-interchangeable metal disks permanently housed in sealed, contamination-free containers. Read/write heads are built-in with the disk. These disks are used with small, mini, and personal computers.

**Word** A group of bits or characters considered as an entity and capable of being stored in one storage location. Also fixed-size storage areas that form the primary memory of a computer system.



of characters (equal to its word-length in bytes). For such a storage device, storage space is always allocated in multiples of word-length. Its another name is fixed word-length storage.

*Word length* A measure of the size of a word, usually specified in units such as characters or bits. Each location of a computer system can store a fixed number of characters or bits called its word length.

*Word processing* The use of computers to create, view, edit, format, store, retrieve, and print text materials for human

communication.

*Zone area* The 0, 11, and 12 rows on the Hollerith card that are used in combination with digit area punches to indicate letters and some special symbols. Zone areas are also used on other punched-card codes and with internal computer codes.

*Zoned decimal* Any numeric character coded in the Extended Binary Coded Decimal Interchange Code (EBCDIC). Each decimal digit occupies one byte of storage.