

A

Algorithm

The term algorithm is a procedure or formula for solving a problem. A computer program can be viewed as an elaborate algorithm. In mathematics and computer science, an algorithm usually means a small procedure that solves a recurrent problem.

Analog and digital filters

In signal processing, the function of a filter is to remove unwanted parts of the signal, such as random noise, or to extract useful parts of the signal, such as the components lying within a certain frequency range.

Analog and digital signals

In many cases, a signal is initially in the form of an analog electrical voltage or current, produced for example by a microphone or some other type of transducer. In some situations the data is already in digital form - such as the output from the readout system of a CD (compact disc) player. An analog signal must be converted into digital (i.e. numerical) form before DSP techniques can be applied. An analog electrical voltage signal, for example, can be digitised using an integrated electronic circuit (IC) device called an analog-to-digital converter or ADC. This generates a digital output in the form of a binary number whose value represents the electrical voltage input to the device.

Analog ICs

Analog ICs (also known as linear ICs) deal with analog signals. An analog signal can vary continuously its amplitude i.e. signal strength as well as its frequency. Almost all real world signals are analog in nature. For example, when a person speaks, both volume (signal strength) as well as sound pitch (signal frequency) can vary continuously. Therefore, analog ICs are truly ubiquitous, playing a role in almost every type of electronic equipment.

Application-Specific Integrated Circuits (ASICs)

They are logic devices designed for specific applications either for one particular product or in a vertical market. ASICs range from full custom designs to standard products, which can be programmed with certain logic functions. ASICs can be classified as full custom, semi custom and programmable based on the way they are built.

Asynchronous Transfer Mode (ATM)

Asynchronous Transfer Mode (ATM) is a network technology based on transferring data in *cells* or *packets* of a fixed size. The cell used with ATM is relatively small compared to units used with older technologies. The small, constant cell size allows ATM equipment to transmit video, audio, and computer data over the same network, and assure that no single type of data hogs the line.

B

BIOS

BIOS (basic input/output system) is a program used by personal computer's microprocessor to get the computer system started after you turn it on. It also manages data flow between the computer's operating system and attached devices such as the hard disk, video adapter, keyboard, mouse, and printer.

Bridges

This device allows the segmentation of a network into two, smaller networks. The Bridge will make both portions of the network more efficient by monitoring data traffic on both sides of the network. Bridges know the addresses of each computer on both sides of the network, it can act as a traffic cop keeping unnecessary traffic from entering the wrong side, but letting data through when appropriate. All the components of the network must share the same way of communicating, or Protocol.

Bus

In a computer or on a network, a bus is a transmission path on which signals are dropped off or picked up at every device attached to the line. In general, the term is used in two somewhat different contexts: (1) A bus is a network topology or circuit arrangement in which all devices are attached to a line directly and all signals pass through each of the devices. Each device has a unique identity and can recognize those signals intended for it. (2) In a computer, a bus is the data path on the computer's motherboard that interconnects the microprocessor with attachments to the motherboard in expansion slots (such as hard disk drives, CD-ROM drives, and graphics adapters).

C

Cables

Cables connect all the components of a network, transferring data from one device to another. plug in cables from additional computers. Many Hubs can also boost a signal as it passes along a cable with a built-in device called a Repeater.

Cell Switching

Cell switching is a networking technique. It combines aspects of both circuit and packet switching to produce networks with low latency and high throughput. The fast processing of fixed length cells maintains a constant rate data channel. Asynchronous Transfer Mode (ATM) is currently the most prominent cell switched technology; digital voice, data, and video information can simultaneously travel over a single ATM network.

Circuit Switching

Circuit switching systems, sometimes called connection-oriented networks, are ideal for communications that require information to be transmitted in real-time. Voice services have been traditionally supported via circuit-based techniques. For over a century, the telecommunications infrastructure developed around this technology. It has two major disadvantages. The first is that an entire communication channel must remain dedicated to two users regardless of whether they actually need the full channel capacity for the entire time. This is especially inefficient for data communications characterized by bursty traffic where there are peak periods of data transmission followed by periods in

Circuit

A circuit is a path between two or more points along which an electrical current can be carried. However in telecommunications, a circuit is a discrete (specific) path between two or more points along which signals can be carried. A network is nothing but an arrangement of circuits.

CISC(Complex Instruction Set Computer or Computing)

CISC refers to computers designed with a full set of computer instructions that were intended to provide needed capabilities in the most efficient way. Later, it was discovered that, by reducing the full set to only the most frequently used instructions, the computer would get more work done in a shorter amount of time for most applications. Since this was called reduced instruction set computing (RISC), there was now a need to have something to call full-set instruction computers - thus, the term CISC.

Client/Server computing

Client/Server is one of the major ways to operate a network system. This system has many workstations, or Clients, connected to one or more File Servers--powerful computers that are used to store resources, provide clients with access to those resources, and provide security. Network operating systems, such as Novell Netware and Windows NT Server, provide the mechanism by which all components in the network integrate. Multiple users can access the same resources simultaneously.

Coaxial Cable

This cable has a copper core surrounded by insulation covered by copper braid or metallic foil. This cable is very resistant to outside electrical interference and comes in a thin or thick size.

Complex PLDs (CPLD)

Complex PLDs are similar to standard cells. They are characterized by a regular building block structure of wide-input logic cells, termed macrocells, and use of a centralized logic interconnect scheme. FPGAs are characterized by a narrow-input logic cell and use a distributed

interconnect scheme. PLDs are faster, generally easier to use and have more predictable timing than FPGA designs, but FPGAs have higher integration and high input/output (I/O) capability.

D

Device Management

The path between the operating system and virtually all hardware not on the computer's motherboard goes through a special program called a driver. Much of a driver's function is to be the translator between the electrical signals of the hardware subsystems and the high-level programming languages of the operating system and application programs. Drivers take data that the operating system has defined as a file and translate them into streams of bits placed in specific locations on storage devices, or a series of laser pulses in a printer.

Digital IC

Digital ICs can be classified into three segments Memory, Microcomponents (MCS) and Logic. A Digital ICs has a discrete set of inputs and outputs. These inputs and outputs can be represented as a series of binary digits or bits. Each bit can have only one of the two values '0' or '1'.

Digital Signal Processors (DSP)

DSP are one of the most important MCUs. They are designed to offer best performance while executing 'vector operations' like sum-of-products with floating point data. Such operations are extremely common in manipulating real world data in digital form. DSP chips are primarily used in communications applications. DSPs are programmable processors that manipulate signals by analyzing, enhancing, filtering and modulating them. DSPs have been one of the fastest growing segments in the semiconductor industry, driven by the importance of processing digital signals in communications applications.

Diode

A diode is the simplest semiconductor device and is created by joining a p type semiconductor with an n type semiconductor. It has the useful property of allowing the flow of current in only one direction and is often used as a rectifier.

Discrete devices

Discrete devices are the simplest semiconductors as they typically have only one circuit element (and usually a single function), such as a diode or single transistor.

E

Embedded system

An embedded system is a combination of computer hardware and software, either fixed in capability or programmable and is specifically designed for a particular kind of application device. Industrial machines, automobiles, medical equipments, cameras, household appliances, airplanes, vending machines, and toys (as well as the more obvious cellular phone and PDA) are among the myriad possible hosts of an embedded system. Embedded systems that are programmable are provided with a programming interface, and embedded systems programming is a specialized occupation.

F

Fast Ethernet

Fast Ethernet is a local area network (LAN) transmission standard that provides a data rate of 100 megabits per second (referred to as "100BASE-T"). Workstations with existing 10 megabit per second (10BASE-T) Ethernet card can be connected to a Fast Ethernet network. (The 100 megabits per second is a shared data rate; input to each workstation is constrained by the 10 Mbps card.)

Fiber Optic Cable

Fiber optic cable transmits light particles rather than electronic signals. It consists of a glass core surrounded by Teflon or PVC. Because it transmits light, information can pass along this cabling at the speed of light.

Fibre Channel

Fibre Channel is a technology for transmitting data between computer devices at data rates of up to 1 or 2 Gbps (and 10 Gbps in the near future). Fibre Channel is especially suited for connecting computer servers to shared storage devices and for interconnecting storage controllers and drives. Since Fibre Channel is three times as fast, it has begun to replace the Small Computer System Interface (SCSI) as the transmission interface between servers and clustered storage devices.

Field-programmable gate array

A field-programmable gate array (FPGA) is an integrated circuit (IC) that can be programmed in the field after manufacturing. FPGAs are similar in principle to, but have vastly wider potential application than, programmable read-only memory (PROM) chips. FPGAs are used by engineers in the design of specialized ICs that can later be produced hard-wired in large quantities for distribution to computer manufacturers and end users. Ultimately, FPGAs might allow computer users to tailor microprocessors to meet their own individual needs.

File Server

The file server is the central computer in a network. Depending on the size of the network, the server has to be very fast and capable of storing a large amount of data, both temporarily and permanently. This computer contains and runs the Operating System that facilitates the sharing of files and the running of computer programs among all the computers in the network.

File Transfer Protocol (FTP)

This protocol service allows a client computer to search a Web server for files it can copy and download into its permanent computer storage. You would use this protocol, for example, to download shareware applications.

Firmware

Firmware is programming that is inserted into programmable read-only memory (programmable ROM), thus becoming a permanent part of a computing device. Firmware is created and tested like software (using microcode simulation). When ready, it can be distributed like other software and, using a special user interface, installed in the programmable read-only memory by the user.

Full Custom ASIC

Full Custom ASICs are designed from scratch for complex, one-of-a-kind applications. Full custom ASICs require maximum design effort and have the longest time-to-market. Given these disadvantages, they are being replaced by other design methodologies.

G

Gate Array ASIC

Gate Array ASICs implement the logic function of an ASIC as a combination of gates. The ASIC is implemented as a large array of standard gates, which are interconnected as per the designer specifications.

General Purpose Logic or Standard logic

It includes ICs performing standard functions like gates, adders, multiplexers, flip-flops and registers. These ICs have low degree of integration and tend to be commodity items. These are used in a wide range of applications in equipment in various market segments.

Gigabit Ethernet

Gigabit Ethernet, a transmission technology based on the Ethernet frame format and protocols used in local area networks (LANs), provides a data rate of 1 billion bits per second (one gigabit). Gigabit Ethernet is defined in the IEEE 802.3 standard and is currently being used as the backbone in many

enterprise networks. Gigabit Ethernet is carried primarily on optical fiber (with very short distances possible on copper media). Existing Ethernet LANs with 10 and 100 Mbps cards can feed into a Gigabit Ethernet backbone.

H

Hubs

Also known as concentrators, Hubs are central connection points for cables from workstations, servers, and peripheral components in a network. Hubs allow the expansion of a network by providing ports in which to

Hybrid network

Hybrid network is a combination of two or more basic network topologies. Instances where two basic network topologies are connected together and retain the basic network character cannot be classified as a hybrid network. For example, a tree network connected to a tree network is still a tree network. Therefore, a hybrid network is created only when two different basic network topologies are connected, and the resulting network topology fails to meet any one of the basic topology definitions. For example, ring and star networks connected together exhibit hybrid network topologies.

Hyper Text Transfer Protocol (HTTP)

This protocol service enables World Wide Web Servers and World Wide Web clients to transfer data. You would use this protocol to view a web page.

I

IC

An Integrated Circuit (IC) is an electronic circuit in which several circuit elements are created and connected together on a continuous substrate (single chip) to accomplish specific function(s). The circuit elements may be active e.g. transistors or diodes or passive e.g. resistors or capacitors. The complexity and level of integration in an IC can vary from less than a hundred components in Small Scale Integration (SSI) to over hundreds of millions of components in Very Large Scale or Ultra Large Scale Integration (VLSI/ULSI). Transistors are the most important components in an IC. Hence, the complexity of the IC is also described by number of transistors contained in it. ICs can be broadly classified as Analog and Digital.

IEEE

The IEEE (Institute of Electrical and Electronics Engineers) describes itself as "the world's largest technical professional society -- promoting the development and application of electrotechnology and allied sciences for the benefit of humanity, the advancement of the profession, and the well-being of our members."

Industrial/Medical/Military

This category includes semiconductors found in industrial applications such as process control, imaging, and automatic test equipment to military and aerospace applications such as embedded computers for radar and sonar applications. Semiconductors are also making impressive advances in the medical field. Applications include pacemakers with embedded processors that can record patient medical histories and cochlear implants that can restore hearing in the profoundly hearing impaired.

IP core

An IP (intellectual property) core is a block of logic or data that is used in making a field programmable gate array (FPGA) or application-specific integrated circuit (ASIC) for a product. IP cores are part of the growing electronic design automation (EDA) industry trend towards repeated use of previously designed components. Ideally, an IP core should be entirely portable - that is, able to easily be inserted into any vendor technology or design methodology.

L

Local Area Networks (LAN)

A Local Area Network (LAN) is one which is located in a relatively small area, such as a building, school, or lab. Typically, a rather powerful and fast computer, the file server, is connected by cables to a number of other pcs known as workstations or clients. The file server stores files shared by all of the computers in the network and all of the software that controls the network.

Logic gate

A logic gate is an elementary building block of a digital circuit. Most logic gates have two inputs and one output. At any given moment, every terminal is in one of the two binary conditions *low* (0) or *high* (1), represented by different voltage levels. The logic state of a terminal can, and generally does, change often, as the circuit processes data.

Logic

Logic ICs include all digital ICs other than memory or MCUs. They can be classified into general-purpose logic ICs and ASICs.

M

MCS (Microcomponents)

Microcomponents (MCS) are complex ICs that provide programmable logic control functions. Microcomponents are very complex but versatile ICs. They are the 'brains' that process and control the flow of data in most real life applications. Microcomponents are classified as microprocessors, microcontrollers and microperipherals.

Media Access Control(MAC) layer

In the Open Systems Interconnection (OSI) model of communication, the Media Access Control layer is one of two sub layers of the Data Link Control layer and is concerned with sharing the physical connection to the network among several computers. Each computer has its own unique MAC address. Ethernet is an example of a protocol that works at the Media Access Control layer level. The other Data Link Control sub layer is the Logical Link Control layer.

Memory

Memory ICs are stand-alone devices used to store data. Memory capacity is measured in bits or bytes. Memory capacity is typically described in larger units like a kilobyte, megabyte or gigabytes.

Mesh

Mesh topology is similar to a hierarchical structure except that there are more interconnections between nodes at different levels, or even at the same level. At a minimum, there are at least two nodes with two or more paths between them. In a fully interconnected mesh, each node is connected to every other node although this is cost prohibitive and therefore seldom implemented. The PSTN is a classic example of mesh topology with multiple interconnections making the network virtually failsafe.

Message Switching

Message switching, also known as a *store-and-forward system*, accepts a message from a user, stores it, and forwards it to its destination according to the priority set by the sender. Its primary advantage is that the sender and receiver do not need to be online simultaneously. The storage time may be so minimal so that forwarding is almost instantaneous. If the receiving device is unavailable, or if the switching device is waiting for more favorable rates, the messages may be stored for longer periods. In any case, the network queues messages and releases the originating device. Its two disadvantages are longer response time as compared with circuit or packet switching and the added cost of storage facilities in the switching device. An example is a domestic or international Telex.

Microcode

Microcode is programming that is ordinarily not program-addressable but, unlike hardwired logic, is capable of being modified. Microcode may sometimes be installed or modified by a device's user by altering programmable read-only memory (PROM) or erasable programmable read-only memory (EPROM). IBM uses this term in preference to firmware.

Microcontrollers

(MCU) are simpler devices compared to microprocessors. Microcontrollers are

mainly used as embedded controllers i.e., a stand-alone system on a chip which controls the functions of a piece of equipment through a predetermined set of instructions. MCUs contain some internal memory in which the control instructions can be programmed. These embedded controllers are widely used in industrial environment e.g. motor drive controllers. 'Smart' home appliances like automatic washing machines also used microcontrollers.

Microperipherals

(MPR) are the devices that control input/output functions for computer and electronic equipment peripherals. They are used with MPUs or MCUs to augment or enhance the overall CPU system performance. MPRs usually require a CPU for initialization or run time support. System logic or PC chipsets are typical microperipherals.

Microprocessors

(MPUs) are also referred as Central Processing Units (CPU). They are the real 'brains' of computers. Microprocessors are the most complex ICs. For example, the Intel Pentium 4 processor has over 42 million transistors. Microprocessors are also the most versatile semiconductor devices. They can perform virtually any application in the digital domain. They are used for general purpose computing in PDAs, desktops, laptops or servers.

Middleware

In the computer industry, middleware is a general term for any programming that serves to "glue together" or mediate between two separate and often already existing programs. A common application of middleware is to allow programs written for access to a particular database to access other databases.

Multi-user operating systems

A multi-user operating system allows many different users to take advantage of the computer's resources simultaneously. The operating system must make sure that the requirements of the various users are balanced, and that each of the programs they are using has sufficient and separate resources so that a problem with one user doesn't affect the entire community of users. Unix, VMS, and mainframe operating systems, such as MVS, are examples of multi-user operating systems. It's important to differentiate here between multi-user operating systems and single-user operating systems that support networking. Windows 2000 and Novell Netware can each support hundreds or thousands of networked users, but the operating systems themselves aren't true multi-user operating systems. The system administrator is the only user for Windows 2000 or Netware. The network support and the entire remote user logins the network enables are, in the overall plan of the operating system, a program being run by the administrative user.

N

Network

In information technology, a network is a series of points or nodes interconnected by communication paths. Networks can interconnect with other networks and contain sub networks.

Network Communication Protocol

In order for two computers to communicate with one another, they must have an agreed-upon set of rules with which to do so. This set of rules is known as Protocol. Out of the different protocols available to networks, the most widely used is called TCP/IP Protocol. Protocols exist at several levels in a telecommunication connection. There are hardware telephone protocols. There are protocols between each of several functional layers and each corresponding layer at the other end of a communication. Both end points must recognize and observe a protocol. Protocols are often described in an industry or international standard.

NETWORK OPERATING SYSTEMS

An operating system is software installed on a computer that allows the computer user to interact with the computer. It coordinates and manages the programs on the computer, the computer memory, the computer processor, all peripheral computer devices, etc. An example of a computer operating system is Microsoft Windows XP. A network needs a special type of operating system that can handle all of the functions stated above as well as facilitate access to all computer applications and processes among multiple computers. While the Server has a network operating system, the clients will run a standard desktop operating system such as Windows 95. An example of a Network Operating System installed on a server is Microsoft NT Server.

Non-Volatile

It retains data stored even when power supply is removed. As such they represent 'permanent' storage. The commonly used non-volatile memories are ROM, PROM, EPROM, EEPROM and Flash.

Network Interface Cards (NIC)

This card, which is housed inside the computer on the motherboard, provides the physical connection between the network and the computer station. The speed of a network card is important in determining the speed and efficiency of a network. There are three common types of Network Interface Cards: Ethernet Cards, LocalTalk Connectors, and Token Ring Cards.

O

Operating system

An operating system (sometimes abbreviated as "OS") is a program that, after being initially loaded into the computer by a boot program, manages all the other programs in a computer. The other programs are called *applications* or

application programs. The application programs make use of the operating system by making requests for services through a defined application program interface (API). In addition, users can interact directly with the operating system through a user interface such as a command language or a graphical user interface (GUI).

Optoelectronics

Optoelectronic devices transform electrical signals into light waves and vice versa. These generally include photodiodes, LEDs, receivers, low-cost lasers, CCDs and other image sensors, amongst others.

P

Packet Switching

Packet switching permits data or digital information to proceed over virtual telecommunications paths that use shared facilities and are in use only when information is actually being sent. It is made possible by breaking information streams into individual packets, which are blocks of data characters delimited by header and trailer records, and routing them using addressing information contained within the packet. In contrast to a circuit switched network where connections are physically switched between stations, a packet-switched network establishes virtual connections between stations. Reliability of a network specifies the ability of a packet to reach its destination.

PACKET

It turns out that everything you do on the Internet involves packets. For example, every Web page that you receive comes as a series of packets, and every e-mail you send leaves as a series of packets. Networks that ship data around in small packets are called packet switched networks. On the Internet, the network breaks an e-mail message into parts of a certain size in bytes. These are the packets. Each packet carries the information that will help it get to its destination -- the sender's IP address, the intended receiver's IP address, something that tells the network how many packets this e-mail message has been broken into and the number of this particular packet. The packets carry the data in the protocols that the Internet uses: Transmission Control Protocol/Internet Protocol (TCP/IP). Each packet contains part of the body of your message. A typical packet contains perhaps 1,000 or 1,500 bytes.

PCB (Printed Circuit Board)

Circuits used to be very complex with arrangement of valves, wires, screws, connecting strips and various other bits of hardware. In order to overcome this, (PCBs) were introduced. The transistors in the PCBs allowed miniaturization of circuitry as all the components were soldered onto a PCB

made up of thin copper tracks on and insulating base such as fiberglass. The copper tracks interconnected all the components and replaced the old-fashioned 'hard-wiring'. Components were soldered directly onto the PCB.

PCI

PCI is now installed on most new desktop computers, not only those based on Intel's Pentium processor but also those based on the PowerPC. PCI transmits 32 bits at a time in a 124-pin connection (the extra pins are for power supply and grounding) and 64 bits in a 188-pin connection in an expanded implementation. PCI uses all active paths to transmit both address and data signals, sending the address on one clock cycle and data on the next. Burst data can be sent starting with an address on the first cycle and a sequence of data transmissions on a certain number of successive cycles.

PCI-X

PCI-X (Peripheral Component Interconnect Extended) is a new computer bus technology (the "data pipes" between parts of a computer) that increases the speed that data can move within a computer from 66 MHz to 133 MHz. The technology was developed jointly by IBM, HP, and Compaq. PCI-X doubles the speed and amount of data exchanged between the computer processor and peripherals.

Private Network

A private network is built for exclusive use by a single organization. When traffic among a company's business locations is sufficiently high, it may be cheaper to shift the internal traffic from public switched networks to a private switched network. It can be designed to address specific communications requirements of the organization as it is built around particular traffic patterns. Also, it gives the company full control of the network's operation and potentially superior security. At times, the flexibility and autonomous operation may be bought at a higher cost.

Programmable Logic Devices

Programmable Logic Devices have the fastest time-to-market since the customers program the final logic of the ASIC directly. However, manufacturing cost is higher than that of semi-custom ASICs due to additional complexity involved in making the device programmable.

Public Network

A public network refers to a network owned by a common carrier for use by its customers. The term is usually applied to the PSTN, but it could also mean packet switched public data networks. The public data network is typically operated by a telecommunications administration or a recognized private operating agency for the specific purpose of providing data transmission services for the public. The advantage of a public network is that it provides

services or access to locations that a company might not otherwise be able to afford. As the capital and operational costs are shared by a number of users, the common carrier can achieve good utilization of its network and provide high-quality services at a reasonable cost.

R

Real-time operating systems (RTOS)

They are used to control machinery, scientific instruments and industrial systems. An RTOS typically has very little user-interface capability, and no end-user utilities, since the system will be a sealed box when delivered for use. A very important part of an RTOS is managing the resources of the computer so that a particular operation executes in precisely the same amount of time every time it occurs. In a complex machine, having a part move more quickly just because system resources are available may be just as catastrophic as having it not move at all because the system is busy.

Register

In a computer, a register is a small set of data holding places that are part of a computer microprocessor and that provide a place for passing data from one instruction to the next sequential instruction or to another program that the operating system has just given control to. A register must be large enough to hold an instruction - for example, in a 32-bit instruction computer, a register must be 32 bits in length. In some computer designs, there are smaller registers - for example, *half-registers* - for shorter instructions. Depending on the processor design and language rules, registers may be numbered or have arbitrary names.

Ring

Ring is a network topology or circuit arrangement in which each device is attached along the same signal path to two other devices and forms a path in the shape of a ring. Each device in the ring has a unique address. To avoid collisions, information flow is unidirectional, and a controlling device intercepts and manages the flow to and from every station on the ring by granting a token or permission to send or receive. The advantages of the ring network are that it is easy and inexpensive to install, and even if one connection is down, the network will still work. Its disadvantages are that the network must be shut down for reconfiguration, and it is difficult to troubleshoot. The token ring, Fiber Distributed Data Interface (FDDI), and Synchronous Optical Network (SONET) are examples of ring networks.

RISC (Reduced Instruction Set Computer)

RISC is a microprocessor that is designed to perform a small number of computer instructions so that it can operate at a higher speed (perform more millions of instructions per second, or MIPS). Since each instruction type that a

computer must perform requires additional transistors and circuitry, a larger list or set of computer instructions tends to make the microprocessor more complicated and slower in operation.

Routers

A Router is like a super-intelligent Bridge. It translates information from one network to another. Routers know the addresses of computers in the network, but also all other components, including hubs, bridges, and other routers. It can direct information between networks with different Protocols, and can re-direct traffic around busy areas. If a Bridge may be considered a traffic cop, a Router may be considered a traffic cop in a helicopter!

S

Segmentation and reassembly (SAR)

In a packet-switched telecommunication network, segmentation and reassembly (SAR, sometimes just referred to as *segmentation*) is the process of breaking a packet into smaller units before transmission and reassembling them into the proper order at the receiving end of the communication. SAR is used for asynchronous transfer mode (ATM) communications. In TCP/IP, the same process is known as fragmentation.

Semi Custom ASIC

Semi Custom ASICs implement their functionality by using pre-designed building blocks. The manufacturer provides these building blocks and necessary design tools needed to implement the final circuit design. The use of pre-designed blocks reduces design effort and time-to-market.

Shielded Twisted Pair (STP)

This cable type is composed of pairs of twisted wire as well, but each pair is covered with foil or braided metal, which protects the wiring from outside electrical interference that might disrupt the flow of electrical impulses along the cable. This cable is thicker and more expensive than UTP.

Signal processing

Signals commonly need to be processed in a variety of ways. For example, the output signal from a transducer may well be contaminated with unwanted electrical "noise". The electrodes attached to a patient's chest when an ECG is taken measure tiny electrical voltage changes due to the activity of the heart and other muscles. The signal is often strongly affected by "mains pickup" due to electrical interference from the mains supply. Processing the signal using a filter circuit can remove or at least reduce the unwanted part of the signal. Increasingly nowadays the filtering of signals to improve signal quality or to extract important information is done by DSP techniques rather than by analog electronics.

Simple Mail Transfer Protocol (SMTP)

This protocol service is used for exchanging electronic mail.

Single-user, multi-tasking operating system

This is the type of operating system most people use on their desktop and laptop computers today. Windows 98 and the Mac O.S. are both examples of an operating system that will let a single user have several programs in operation at the same time. For example, it's entirely possible for a Windows user to be writing a note in a word processor while downloading a file from the Internet while printing the text of an e-mail message.

Single-user, single-tasking operating system

As the name implies, this operating system is designed to manage the computer so that one user can effectively do one thing at a time. The Palm O.S. for Palm handheld computers is a good example of a modern single-user, single-task operating system.

SONET

SONET is the American National Standards Institute standard for synchronous data transmission on optical media. The international equivalent of SONET is synchronous digital hierarchy (SDH). Together, they ensure standards so that digital networks can interconnect internationally and that existing conventional transmission systems can take advantage of optical media through tributary attachments.

Speciality Memories

It includes all memories that are not classified as volatile or non-volatile. Some of the speciality memories include FIFO (First In First Out), LIFO (Last In First Out), CAM (Content Addressable Memory)

Standard Cell ASIC

Standard cell ASIC are built by combining standard logic blocks (called cells) to form the overall logic function. The manufacturer provides a standard library of such cells. The designers choose the logic blocks and their interconnections after which the chip is fabricated.

Star

Star is a network in which all computers are connected to a central node, called a hub, which rebroadcasts all transmissions received from any peripheral node to all peripheral nodes on the network, including the originating node. Thus, all peripheral nodes may communicate with all others by transmitting to, and receiving from, the central node only. The advantages of a star network are that it is simple and robust, it is faster than ring or bus, has greater stability, is

easy to set up, reconfigure, and troubleshoot, has low configuration costs, and provides for a centralized administration and security control. If a transmission line linking a peripheral node to the central node fails, it will result in the isolation of that peripheral node, but the remaining network is not affected. The disadvantage is that if one of the hubs fails or a hub cable fails it will shut down that segment of the network. Also, a hub has limited ports, and an increase in the number of users may involve additional network expenses.

System-on-a-chip (SoC)

System-on-a-chip (SoC) technology is packaging of all the necessary electronic circuits and parts for a "system" (such as a cell phone or digital camera) on a single integrated circuit (IC), generally known as a microchip. For example, a system-on-a-chip for a sound-detecting device might include an audio receiver, an analog-to-digital converter (ADC), a microprocessor, necessary memory, and the input/output logic control for a user - all on a single microchip.

T

TCP/IP Protocol

Transmission Control Protocol/Internet Protocol is the most widely used protocol because it is the protocol for the Internet, which has become an integral part of network systems.

Topology

A topology (derived from the Greek word *topos* meaning place) is a description of any kind of location in terms of its physical layout. In the context of communication networks, a topology pictorially describes the configuration or arrangement of a network, including its nodes and connecting lines. The ring, bus, and star are the three basic network topologies.

Transistor

A transistor is built by putting a p type layer between two n type semiconductor layers (or vice-versa). It is a very versatile device with most common uses being a) Amplify an electric signal b) Act as a switch

Tree

Tree, also known as hierarchical network, is a network topology that from a purely topologic viewpoint resembles an interconnection of star networks. The individual peripheral nodes are required to transmit to and receive from one other node only, toward a central node, and are not required to act as repeaters or regenerators. The function of the central node may be distributed. The top node in the structure is called a root node.

U

Unshielded Twisted Pair (UTP)

This commonly used cable type is composed of wires twisted together in pairs (two, three, or four pairs) and covered by a cable jacket. It is thin, flexible and easy to install.

V

Virtual Private Network (VPN)

Virtual Private Networks (VPNs) are gaining popularity because they combine the advantages of both private networks and public networks. VPNs are encrypted tunnels through shared private or public networks that forward data over the shared media rather than over dedicated leased lines. The operation of a VPN is very similar to that of a telephone connection over a public telephone network. In a telephone call, there is a dedicated connection between two parties for the entire duration of the call. Similarly, a VPN is characterized by dedicated connections set up between sites on a public network and controlled by software and protocols during the connection. After the session of data transmission is terminated, the connection between the sites is abandoned. A VPN allows sharing of the Internet's structure of routers, switches, and transmission lines, while providing security for the users. The cost factor is a compelling argument for replacing a private network with a VPN because sharing leased lines in a public network such as the Internet can cut monthly recurring costs by an order of magnitude. However, using public networks for highly sensitive corporate data, such as financial information, can pose security problems.

Verilog / VHDL

Verilog is one of the two-major Hardware Description Languages (HDL) used by hardware designers in industry and academia. VHDL is the other one.

VLSI (Very Large-Scale Integration)

VLSI is the current level of computer microchip miniaturization and refers to microchips containing in the hundreds of thousands of transistors. LSI (large-scale integration) meant microchips containing thousands of transistors. Earlier, MSI (medium-scale integration) meant a microchip containing hundreds of transistors and SSI (small-scale integration) meant transistors in the tens.

Volatile Memory

It retains data stored only as long as it is connected to a power source. Loss of power implies loss of data with such memories. The most common among volatile memories are DRAM (Dynamic Random Access Memory) and SRAM (Static Random Access Memory).

W

Wide Area Networks (WAN)

A Wide Area Network (WAN) may be understood as two or more Local or Metropolitan Area Networks connected to one another. In a Wide Area Network, a school in New York can communicate with a school in another of the United States or with a school in another country. Cables underground, or lining the ocean floor, or satellite uplinks make these connections possible. The Internet is an example of a Wide Area Network.

Workstations

Also known as "clients", these are the computers that are connected to the File Server. Because the File Server is used to store data and run programs, the workstation need not have a hard drive or a floppy disk drive. However it does need a Network Interface Card(below) and networking software.