BCS-011 : COMPUTER BASICS AND PC SOFTWARE

June 2017

1.

(a) Convert the following decimal numbers to binary number and hexadecimal number : (i) 57

 (ii) 0.215

Ans:

(i)

$(57)_{10}$ to binary

2	57	1
2	28	0
2	14	0
2	7	1
2	3	1
	1	

$(57)_{10} = (111001)_2$

$(57)_{10}$ to hexadecimal

16	57	9
	3	

$(57)_{10} = (39)_{16}$

(ii)

$(0.215)_{10}$ to binary.

$(0.215)_{10}$ = binary

		Integer part
0.215×2	0.43	0
0.43×2	0.86	0
0.86×2	1.72	1
~~0.72 xx2~~ 0.72×2	1.44	1

∴ $(0.215)_{10} = (0.0011)_2$

$(0.215)_{10}$ to hexadecimal.

$(0.215) \times 16$	3.44	3
0.44×16	7.04	7
0.04×16	0.64	0
0.64×16	10.24	10 (A)

∴ $(0.215)_{10} = (0.370A)_{16}$.

(b) How is the access time on a disk defined ? Explain the components of access time with the help of an example.

Ans: Access time on a magnetic disk refers to the total time it takes for the disk to locate and transfer data. A track on a disk is selected in random fashion, but data is written to or read from a sector in serial fashion. In order to access information from a disk, the disk address of the desired data has to be specified. The disk address is specified in terms of track number, surface number and the sector number. Information is always written from the beginning of a sector and can be read only from the track beginning. A track on a disk is selected in random fashion, but data is written to or read from a sector in serial fashion. In order to access information from a disk, the disk address of the desired data has to be specified. The disk address is specified in terms of track number, surface number and the sector number. Information is always written from the beginning of a sector and can be read only from the track beginning.

It involves the seek time and latency time.

The time required to position the read/write head over proper track is called the seek time. Seek time varies depending on the position of the arm assembly when a read/write command is received. Seek time will be maximum if the arm assembly is positioned on the outer most track and the track to be reached is the inner most one and it will be zero if the arm assembly is already on the desired track. The average seek time is thus specified for most systems which is generally between few milliseconds to fractions of a second. For a

fixed-head system, it is always 0 because there is a head for each track and no head movement is required for accessing a particular track.

Once the heads are positioned on the desired track, the head on the specified surface is activated. Since the disk is continuously rotating, this head should wait for the desired data (specified sector) to come under this head. This rotational waiting time i.e. time required to bring the needed data (i.e. starting position of the addressed sector) under the read/write head is called the latency time. Latency time is also a variable and depends on the following two parameters:

* Distance of the desired data from the initial position of the head on the specified track. * Rotational speed of the disk

The total access time for a disk is equal to the seek time plus the latency time.

Access time = Seek time + Latency time

The average access time for most disk systems is usually between 10 to 100 milliseconds.

Example:

Consider a hard disk with: 4 surfaces

64 tracks/surface

128 sectors/track

256 bytes/sector

The disk is rotating at 3600 RPM

Since seek time is not given we consider it as 0.

Latency time => 60 sec -> 3600 rotations

1 sec -> 60 rotations

Latency time= (1/60) sec = 16.67 msec.

 Average Rotational latency time = (16.67)/2 = 8.33 msec.

Average Access time = Seek time+ latency time

                                =0+8.33 msec.

 =8.33msec

(c) Explain the components of a memory system and, the role of cache memory in the memory hierarchy.

Ans: The memory system of a computer consists of several components that work together to store and manage data. The key components of a memory are:

1. Primary Memory / Main Memory : It is also known as main memory or semi-conductor memory. It is the computer's main memory and stores data temporarily. Data stored in primary memory can be directly accessed by the CPU. It is a fast and large memory but is slower than processor memory. Primary memory has faster access time, smaller storage capacity and higher cost per bit storage. The size of the main memory is kept small because of its high cost. It is a volatile type of memory. Primary memory is the part of the computer that stores current data, programs and instructions. It stores programs and data which are currently needed by the CPU. Primary memory temporarily stores data and instructions that the CPU needs while performing tasks. This allows for quick access and processing, as accessing data from main memory is significantly faster than from secondary memory.

2. Secondary Memory : It is also known as auxiliary memory. It has much larger capacity than main memory but is slower. It is non-volatile type of memory. Secondary memory cannot be accessed directly by the CPU. Hard-disk and floppy disks are the most common secondary memories used in computers. Secondary storage systems offer large storage capacities, low cost per bit and medium access times. Secondary memory is external memory and saves data permanently. Secondary memory is mainly used for bulk storage (mass storage) of programs, data and other information. It is used to store the data permanently at a cheaper cost. It stores system software, compiler, assembler and useful packages, large data files etc. Secondary memory provides large storage space so that one can store large data like videos, images, audios, files etc. permanently.

3. Registers : Registers are a type of computer memory built directly into the processor or CPU that is used to store and manipulate data during the execution of instructions. These are small, high-speed storage locations within the CPU that hol data temporarily for processing. Registers are used for quick data access during arithmetic operations and instruction execution. CPU registers hold the most frequently used data.

4. Virtual Memory : It is a memory management technique that allows a computer to use hard drive space as an extension of RAM. Virtual memory serves as an extension of the computer's physical memory, providing extra storage by utilizing space on the hard drive.

5. Memory controller : This component manages the flow of data between the CPU and the memory. It ensures that the correct data is sent to the CPU at the right time and helps optimize memory performance.

It acts as a high-speed buffer between main memory and the CPU. The cache memory is placed in between CPU and main memory. Cache memory access time is about 0.5 to 2.5 ns which is much less than that of the main memory. Because of its very high cost, the capacity of the cache memory deployed is 2 to 3 percent of that of the main memory. Cache memory is a high-speed memory, which is small in size but faster than the main memory. Cache memory can only be accessed by CPU. It holds the data and programs which are frequently used by the CPU. It is a type of 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. It is a very high-speed semiconductor memory used to enhance the speed of main memory. Cache memory is used to store temporary files, using hardware and software components. It is used to speed up access to data and applications. It is used to speed up, synchronize with a high-speed CPU and to improve its performance.

(d) List any four application softwares. Explain the purpose of each. 6

Ans:

Word Processing Software can be used to create, edit, format, save, view or print any text based document like letters, memos, reports, etc. MS Word is an example of word processing software.

Database Software can be used to store, maintain, manipulate and organize a large set of data. For example, it can be used to maintain address, phone number directory, client directory, etc. Oracle is an example of database software.

Multimedia Authoring Application can be used to create digital movies with sound, video, animation and interactive features. Mediator 9 is an example of multimedia authoring tool.

Graphics Software can be used to manage and manipulate pictures, photographs, movies, etc. Photoshop, Illustrator and MS Paint are examples of graphics software.

Spreadsheet Software can be used to create any numeric based documents or as numeric data-analysis tool. For example it can be used to make budgets, financial statements, comparative charts, etc. MS Excel is an example of Spreadsheet software.

(e) Draw a flow chart for a program that calculates the area of a circle. 6
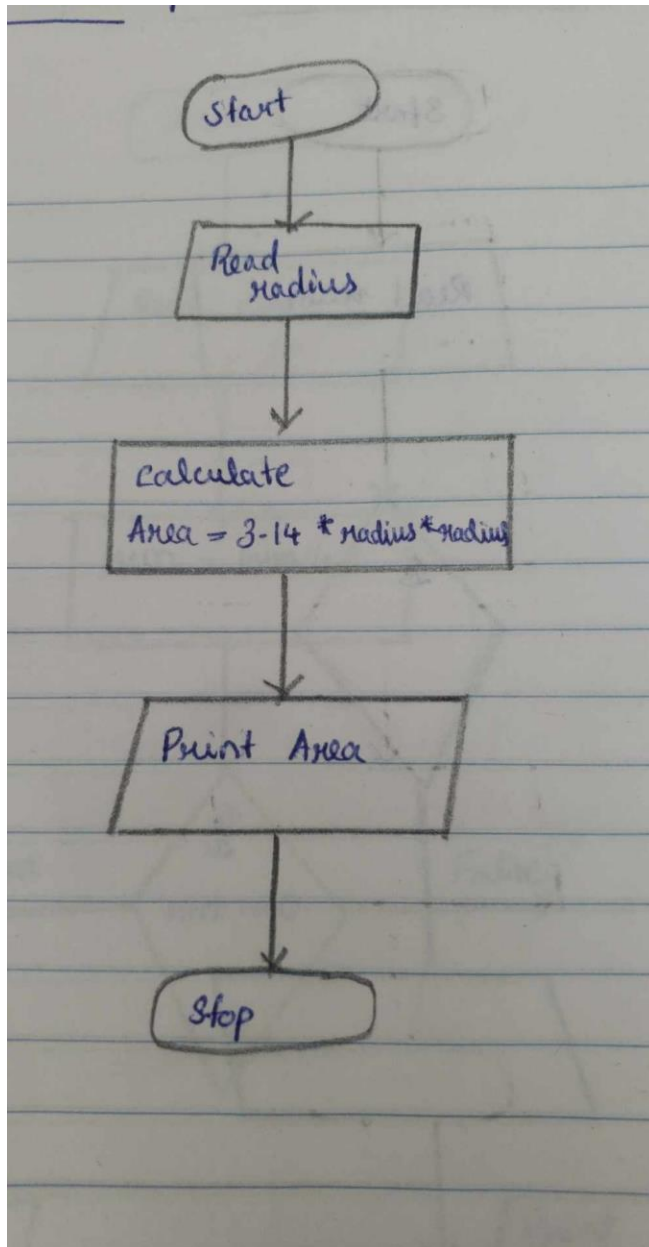
(f) What is a Blog ? What are the merits and demerits of blogging ? 4

Ans: Blog is a website where entries are written as information or news on a particular subject. A blog may combine text, images, or other media components; however, most blogs are textual. They may also provide links to other web pages or blogs. In addition, blog allows you to leave comments in an interactive format. Blogging is emerging as wonderful way to share and publish your views.

A blog need not be restricted to a single author; it can merge different kinds of ideas.

Some of the types of blogs that are currently in use on Internet are:

• Corporate and organizational blogs – may be used for projecting organizational culture and market branding.

 • Category based blogs – blogs on particular subject like travel, health, environment, music, education and many other.

• Blogs having different media and device types – a blog having only videos may be called vlog, having only links may be called linklog, there are many such categories, a log for mobile devices may be called moblog. The collective community of blogs is known as the blogoshere.

Merits of blog:

• Blogs if used properly can help your expression. It has the potential of preserving your ideas, getting comments on your ideas and developing your ideas.

• In contrast to other businesses on the market, we don't require a capital investment to start blogging.

• Blogs can be shared anywhere in the world, provided you have access to the internet and a monitor to work on.

• Blogs that are published on the internet can be accessed by anyone around the world.

Demerits of blogging:

- Blogging may result in some unforeseen consequences including legal liabilities, therefore, you should be very careful while blogging.
- Over-sharing personal details can expose bloggers to risks such as identity theft.
- Inappropriate content or comments can damage a blogger's reputation and brand.
- Building a profitable blog takes time and effort, and success is not guaranteed.

(g) List three categories of a search engine with the help of an example. What is indexing in the context of a search engine ? 5

3 categories of a search engine are:

Primary Search Engines: Such search engines use web crawlers or spiders to traverse the web and scan websites for key words, phrases, to generate database of web pages having some indexing or classification. Google and Alta Vista are examples of primary search engines.

Web directory: Web directories organize information into categories and subcategories or directories. You can search a web directory for all those entries that contain a particular set of keywords. Directories differ from search engines in the way they organize information. Yahoo is an example of web directory.

Meta search engines: This type of search engine does not compile databases. Instead, they search various individual search engines simultaneously on behalf of the user and retrieve hits from each of those databases. It passes your queries to many search engines and web directories and presents summarized results to the users. Some of the examples of meta search engines are — Dogpile, Infind, Metacrawler, Metafind and Metasearch.

Indexing: Once, the spiders have completed the task of finding information about Web pages, the search engine must store the information in such a way that you are able to use it. The search engine may provide some information relating to relevance of information may be in the form of Ranking. The search engine will try to understand and categorize the content on a web page through keywords. Thus, a search engine may store the keywords of a web page, the number of times that word appeared on the page, the URL of the page. A weighting factor that gives more weightage in case a word is found at the top of the document. Each commercial search engine uses a different formula for assigning weight to the keywords in its index. This is one of the reasons that a search for the same word on different search engines will produce different results. Since the data that is to be stored for indexing is large, therefore, search engine may encode it. The Index is created with the sole purpose, that is, it allows you to find information on the Internet quickly. In general, Index uses hashing.

(h) Explain the advantages and disadvantages of e-learning. 4

Ans: Advantages of E-learning:

• Affordability: The cost of e-learning is one of its main advantages.

• Flexibility: Users are able to access educational content from anywhere with an internet connection. This means that students can continue their learning even if they are traveling or living in remote locations. The level of participation of student in learning may improve as it provides anytime, anywhere learning.

• It improves the IT skills of individuals and may improve their time management skills.

• Self-placed learning: E-learning gives students and workers the freedom to learn at their own pace, which can be useful for those who have varied learning preferences or have difficulty with a specific subject. Students can access educational materials and complete

assignments via eLearning at their convenience and on their own timetable. Students can tailor their learning around their work and other responsibilities.

Disadvantages of e-learning:

* The interactive support that requires teacher at the other end may still be available in slotted time only. In traditional method, trainees can ask their trainers lots of questions and get immediate answers. On the other hand, in case of e-learning, the trainers usually work within their working hours and those trainees who learn out of these working hours may not be able to get an immediate response to their questions.

* The face-to-face learning experience is missing in e-learning. This can be a problem for those who learn better when they can work together with other students on the same subject.

* E-learning requires reliable internet access and electronic devices which can be a challenge for some learners.

2.

(a) What is an Operating System ? List and explain any four services/functions of an operating system. 6

Ans: Operating system: An operating system (OS) is a system software that manages computer hardware and software resources and provides common services for computer programs. An operating system is an essential software component of a computer system.

The basic objectives of an operating system are to make the computer system convenient to use and to utilize computer hardware in an efficient manner. It is the software that manages all the computer resources to optimize its performance provides common services for efficient execution of various application software and acts as an interpreter between the hardware, application programs and the user.

Operating systems performs basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk and controlling peripheral devices.

Five facilities that are provided by an operating system to a user or to a program are:

• Command processor and user interface

• File management system

- Input/output control system

- Process management

- Memory management

Command processor and user interface:

To the user, the most important and visible services provided by the OS is the user interface and the capabilities that it provides to execute commands which may not be a part of OS.

These systems consider the user interface as a separate shell that is Operating Sytem provided with the operating system and that interacts with the kernel to provide the necessary-user command capabilities. In UNIX, three different shells, the C shell, the Bourne shell, and the Korn shell are in common use, and many other shells for UNIX are available. Each of these shells provides different command structures and different capabilities.

Different types of user interface exist. The most common are the graphical user interface, or GUI, and the command line interface. The graphical user interface accepts commands primarily in the form of drop-down menus, mouse movements, and mouse clicks. The command line interface relies on typed commands which provide direct access to various methods within operating system such as File system, I/O system, and network services. UNIX allows certain class of users called superusers to use some kind of commands for changing the platform or access rights.

File Management:

The concept of a file is central to the effective use of a computer system. A file is generally loosely defined as a collection of related information such as students records employee database. It might contain graphical usage. A file may be organized internally into records or it may simply be a stream of bytes. A file constitutes a logical unit of storage, that is, logical to the person or program using the file.

The file management system provides and maintains the mapping between a file logical storage needs and the physical location where it is stored. Users and programs simply access the files by the name, and the file management system handles the details The file management system identifies and manipulates files by the names provided by their users determines the physical requirements of the file, allocate space for it, stores it in that space, and maintains the information about the file so that it may be retrieved partially or in full, later. The file management system keeps track of the available space on each

device connected to the system. The user and the user's program need not be aware of the underlying physical storage issues.

The file management system allows the retrieval and storage of files by name, keeps track of the mappings, allocates and frees space, allows the mounting and unmounting of file structures, and provides other functions required to maintain the structures of the file system.

Directory structures for each I/O device in the system and tools to access and move around these structures. The directory structure provisions are made to move easily from one structure to another.

It also protects files and limit file access to authorized users.

File management systems are particularly important in systems in which secondary storage devices are shared by multiple users, since they provide a directory system that assures that there is no duplicate use of physical storage.

Input/Output Services:

Every operating system, large or small, provides input/output services for each device in the system. The operating system includes I/O device driver programs for each device installed on the system. These drivers provide services to the file management system and are also available, through the API, to other programs for their use. The I/O device drivers accept I/O requests and perform the actual data transfers between the hardware and specified areas of memory. Devices drivers for newly installed devices are added and integrated into the operating systems. In Windows, this capability is known as plug-and-play.

Memory Management:

The purpose of the memory management system is to load programs into memory in such a way as to give each program loaded the memory that it requires for execution.

In multiprogramming operating system there are many programs residing in the Operating System memory simultaneously in the memory.

The memory management system has three primary tasks. It attempts to perform these tasks in a way that is fair and efficient to the programs that must be loaded and executed.

1. It keeps track of which parts of the memory are currently being used and by which process into memory together with the space being used and also keeps track of available space.

2. It maintains one or more queues of programs waiting to be loaded into memory as space becomes available, based on such program criteria as priority and memory requirements.

3. When space is available, it allocates memory to the programs that are next to be loaded. It also de-allocates a program's memory space when it completes execution. The deallocated space is made available for other programs.

(b) What are the characteristics and advantages of a Local Area Network ? Explain any one LAN topology with the help of a diagram. 8

Ans: A local area network (LAN) is a collection of devices connected in one physical location, such as a building, office, or home. A LAN can be small or large, ranging from a home network with one user to an enterprise network with thousands of users and devices in an office or school.

Characteristics of LAN:

• It connects computers in a single building, block or campus, i.e. they work in a restricted geographical area.

• LANs are private networks, not subject to tariffs or other regulatory controls. For the Wireless LANs there are additional regulations in several countries.

• LANs operate at relatively high speed when compared to the typical WAN (.2 to 100 MB /sec).

• There are different types of Media Access Control methods in a LAN, the prominent ones are Bus based Ethernet, Token ring.

• LAN is a low-cost and effective network type capable of connecting multiple devices on a single transmission medium.

• Setting up a LAN network can be done at low costs. If there's a need for expansion, it can be done quickly.

Advantages of LAN:

• It allows sharing of expensive resources such as Laser printers, software and mass storage devices among a number of computers.

• LAN allows for high-speed exchange of essential information.

• It contributes to increased productivity. A LAN installation should be studied closely in the context of its proposed contribution to the long range interest of the organization.

• A LAN connection is relatively inexpensive to set up and maintain.

• The local nature of a LAN also makes troubleshooting quick and cost-effective.

 • LAN is very adaptable. You can add or remove devices, move printers and computers to different areas of the building, and modify user information for existing devices with minimum hassle.

Bus topology: All of the devices in a bus topology network are linked together by a single cable, which is referred to as a bus and the cable is known as backbone cable. It has a single length of cable with a terminator at each end as shown in the figure.
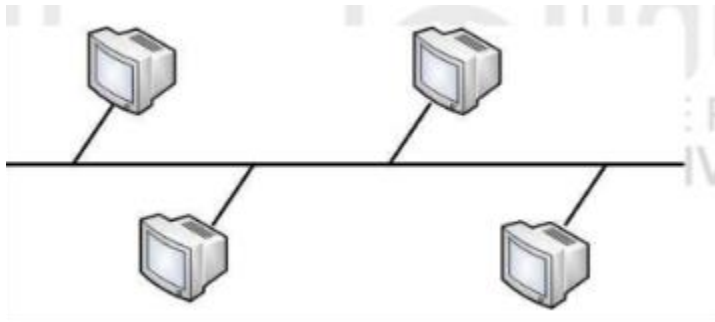
Bus topology

It is a passive topology which means only one computer at a time can send a message. Hence, the number of computers attached to a bus network can significantly affect the speed of the network. A computer must wait until the bus is free before it can transmit. Each node is connected to others nodes. The network operating system keeps track of a unique address of each node and manages the flow of data between machines.

The bus topology is the simplest and most widely used with local area network design. The computers on the bus keep on listening. When they hear data that belongs to them, they receive. When one device on the network wants to send a broadcast message to another device on the network, it first makes sure no one else on the bus is transmitting, and then it sends information out on the media. All other devices on the network see it, but only the intended recipient accepts and processes it. This is accomplished by using data frames which contain source and destination addresses.

It is simple, reliable, and easy to be used in a small sized local area network. It requires least amount of cable to connect computers together and is therefore less expensive than other cabling arrangements. If one computer on the bus fails, it does not affect the rest of

the traffic on the bus. In this topology, no two computers can transmit data at the same time. It does not cope well with heavy load which can slow down a bus considerably.

(c) Define the term 'Open Source Software'. Explain any two important features of the model used for open source software development. 6

Ans: Open Source Software is a computer software which is available along with the source code and software license that permits the code to be studied, modified and improved. It is often developed in public and collaborative manner. Open source development, follows the model of the bazaar. In an open source development model, roles are not clearly defined. The best features and functionality evolve into popular use much as good ideas evolve into popular use in the marketplace of ideas. Development is a collaborative process, resources are not scarce, and no one person or organization directs the project. The users are treated like co-developers and so they should have access to the source code of the software.

There are two competing definitions.

The Free software definition is based on the following four freedoms:

 1. The freedom to run the program, for any purpose.

2. The freedom to study how the program works, and adapt it to your needs.

3. The freedom to redistribute copies so you can help your neighbor.

4. The freedom to improve the program, and release your improvements to the public, so that the whole community benefits.

The other definition is the Open source definition promulgated by OSI.

This broader definition includes permissive software licenses. The elements are:

• Free redistribution

• Source code available

• Derivative works permitted

• Integrity of the author's source

• No discrimination against persons or groups

• No discrimination against fields of endeavor

• Distribution of license with derivative works

• License must not be specific to a product

• License must not restrict use of other software

• License must be Technological-natural

Features of open source development model are:

* Users should be treated as co-developers. The users are treated like co-developers and so they should have access to the source code of the software.

* Early releases The first version of the software should be released as early as possible so as to increase one's chances of finding co-developers early.

* High modularization: The general structure of the software should be modular allowing for parallel development on independent components.

* Several versions: There should be at least two versions of the software. There should be a buggier version with more features and a more stable version with fewer features. The buggy version (also called the development version) is for users who want the immediate use of the latest features and are willing to accept the risk of using code that is not yet thoroughly tested. The users can then act as co-developers, reporting bugs and providing bug fixes.

* Dynamic decision making structure There is a need for a decision making structure, whether formal or informal, that makes strategic decisions depending on changing user requirements and other factors.

3. (a) Discuss the following in brief : (i) Assembler (ii) Editor (iii) Interpreter (iv) Compiler 8

(i) Assembler

Ans: An assembler is a computer program that translates assembly language code into machine code. It translates human-readable assembly instructions into machine code that the computer's processor can understand. It does this by replacing each assembly instruction with the corresponding machine code representation.

Assembly language is a low-level programming language similar to machine language, but far easier to write and understand because machine language binary instructions and operands are replaced by mnemonics that are comprehensible to humans.

Just As a program written in programming language requires a translator to translate the source program in machine code, a program written in assembly language uses the utility named as assembler for translation purpose. Assembly language is the most basic programming language available for any processor.

With assembly language, a programmer works only with operations implemented directly on the physical CPU. Assembly language lacks high-level conveniences such as variables and functions, and it is not portable between various families of processors.
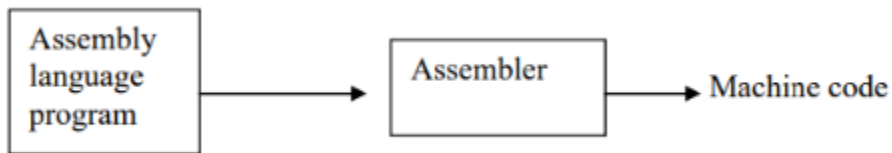
(ii) Editor

Ans: To write a program in any of the programming languages requires an editor. This is a program that is used to create text files. While saving the program, filename and extension as per programming language is required to be given e.g in C programming language f1.c, in C++ f1.cpp or f1.C, in Java f1.java etc. The extension may also depend on the conventions of the operating system used, for instance, in unix the extension for a C++ program is .C while for Windows it would be .cpp.

(iii) Interpreter

Ans: An interpreter is a program that translates each statement in the programming language into machine code and runs it. Such an arrangement means that to run the program one must always have the interpreter available.

e.g Basic , Prolog, Perl are languages that are typically interpreted.

(iv) Compiler

Ans: A language processor that converts a program written in high-level language into machine language, entire program at once, is called a compiler. Compilers produce better optimized code that generally runs faster, and compiled code is self-sufficient and can be run on their intended platforms without the compiler present.

A compiler scans whole program and then check it for syntactic and semantic error, once the code is checked for errors, it is converted into an object code. Then, it can be processed by the machine to perform the corresponding task. The common programming languages that use compilers are C, C++, C#, etc..

(b) What is port ? Explain the characteristics of Parallel, Serial, USB and Small Computer System Interface ports. 8

Ans: Port is a connecting socket, outside the system into which different types of cables are plugged. It is a specific place from which other devices can be physically connected. In

other words, a port is an interface between the motherboard and an external device of the computer. Examples of external devices attached via ports are the mouse, keyboard, monitor, microphone, speaker etc.

Parallel port:

A parallel port is an interface allowing a personal computer (PC) to transmit or receive data down multiple bundled cables to a peripheral device. A parallel port has multiple connectors and allows data to be sent simultaneously down several cables at once.

Various peripherals can be connected through parallel port, which is a parallel communication physical interface. A parallel port transmits 8 bits of a byte of data in parallel. It is used for transmitting fast data over short distances. It is used to connect a printer to a computer.

Since a parallel port transmits an entire byte at a time, it operates I/O devices at a relatively high speed. A Parallel port is primarily used to connect printers to a computer and hence it is often called a printer port.

It's called a parallel port because it transfers multiple bits of data simultaneously through multiple wires. These wires are organized in parallel, meaning they are side by side and each carries a separate bit of information.

It is used for transmitting fast data over short distances. Since a parallel port transmits an entire byte at a time, it operates I/O ports are the interfaces through which computers communicate with external devices such as printers, modems, joysticks and terminals 79 Input and Output Devices I/O devices at a relatively high speed. A Parallel port is primarily used to connect printers to a computer and hence it is often called a printer port.

Serial port: Serial port transmits one bit of a byte, one at a time as a single stream of bits. It is meant for transmitting slow data over long distances. Communication over a phone is an example of serial communication. It is a serial communication physical interface which transmits one bit at a time.

A serial port is also called a communication port and they are used for connection of external devices like a modem, mouse, or keyboard. Serial ports are cheaper and they are easier to shield from interference.It is used for transmitting slow data over long distances. Communication over a phone is an example of serial communication. It is a serial communication physical interface which transmits one bit at a time.

Universal Serial Bus(USB): A USB Port can connect up to 127 peripheral devices such as a digital camera, digital speakers, scanners, speakers etc. It permits Plug and Play – configuring of expansion cards and peripheral devices as and when they are installed. It allows USB devices to be connected to each other with and transfer digital data over USB cables.

Small Computer System Interface (SCSI) Port: SCSI-Small Computer System Interface Port allows data to be transmitted in a daisy chain to up to 7 devices at a speed higher (32 bits at a time) than those possible with serial and parallel ports. It is a fast data transmitting device and is used to connect HDD, CD ROM drives and scanners with the computer system.

(c) What are the security threats related to Internet ? How can they be prevented ? 4

Ans: Basic threats we face when using internet are:

• Confidentiality: Confidentiality is the protection of information in the system so that an unauthorized person cannot access it. No unauthorized person should be able to read or copy information that s/he is not supposed to read. Confidentiality must be well-defined, and procedures for maintaining confidentiality must be carefully implemented. A breach of confidentiality may take place through different means, for instance hacking or trojan horses etc…

• Integrity: Data integrity refers to the certainty that the data is not tampered with or degraded during or after submission. It is the certainty that the data has not been subject to unauthorized modification, either intentional or unintentional. No unauthorized person should be able to modify information. The challenges of the security program are to ensure that data is maintained inthe state that is expected by the users.

• Availability: This means that the information is available to authorised users when it is needed. No unauthorized person should be able to erase information or make it inaccessible.

Mechanisms available to safeguard one from the security threats are:

• Firewalls: Firewalls are another essential tool in defending networks against security threats. A firewall can help prevent unauthorised access to a network by blocking incoming traffic from untrusted sources.

• Antivirus: You can protect your computer against Computer Viruses and Malware (identity theft programs) through use of antivirus software, which quarantines or removes malicious software programs. Use a good antivirus software on your machine that scans email and IM attachments. Maintain a backup of your critical data and programs. Keep deleting cookies from your computer from time to time.

• Limit your wireless router range to the smallest convenient distance. Also try to maximize the security of wireless network by keeping a series of passwords.

• Keep your browser up-to-date and do not give your personal information on blogs and social networking sites.

4.

a) What is data transmission channel ? Compare and contrast Guided and Unguided channels. 8

Ans: A data transmission channel is the medium or channel through which data is sent from one device to another. These channels can be wired (like copper wires or optical fibers) or wireless (like radiowaves). Wired channels are called guided transmission channel and wireless channels are called unguided transmission channel.

Guided and unguided transmission channels:

Guided transmission channel	Unguided transmission channel
It provide a physical connection between two devices.	It is used for transmitting the signal without any physical media.
Twisted pair cable, coaxial cable and optical fiber are examples.	Microwaves, infrared waves and radio waves are examples.
It is also known as wired communication.	It is also known as wireless communication.
The signal energy propagates through wires in guided media.	The signal energy propagates through the air in unguided media.
It is used for point-to-point communication.	It is generally used for radio broadcasting in all directions.
It is cost-effective.	It is expensive.
For a shorter distance, this is the best option.	For longer distances, this method is used.
By adding more wires, the transmission capacity can be increased in guided media.	It is not possible to obtain additional capacity in unguided media.

Less susceptible to interference	More susceptible to interference.

(b) Compare and contrast the following :

(i) SRAM versus DRAM

Ans: Static RAM vs Dynamic RAM:

Static RAM	Dynamic RAM
Static RAMs retain stored information only as long as the power supply is on.	It stores information as long as the power is supplied or a few milliseconds when the power is switched off.
Six (6) transistors are needed per memory cell in a static RAM.	Dynamic RAMs required fewer transistors per memory cell.
These are expensive.	These are cheaper.
Consumes less power.	Consumes more power.
SRAM is faster compared to DRAM.	DRAM is slower when compared to SRAM.
These are used in cache memory.	These are used in main memory.
SRAM does not need to be refreshed.	DRAM requires the data to be refreshed periodically in order to retain the data.

(ii) SIMM versus DIMM

Ans:

SIMM	DIMM
SIMM stands for Single In-line Memory Module.	DIMM stands for Dual In-line memory Module.
In SIMM, Pins present in either facet are connected.	DIMM pins are freelance.
It supports 32 bit channel for data transfer.	It supports 64 bit channel for data transfer.
It consumes power of 5V.	It consumes power of about 3.3V.
SIMMs are the older technology.	DIMMs are the replacement of the SIMMs.
SIMMs are installed in pairs at a time.	DIMMs are installed one at a time.
SIMM has only one side that is usable at a time because it has only one set of connector.	DIMM has different usable pins at each side.

(iii) ROM versus PROM

Ans:

ROM	PROM
ROM stands for Read Only Memory.	PROM stands for Programmable Read Only Memory.
ROM is programmed during the manufacturing process.	PROM is manufactured as blank memory. PROM is programmed into them after manufacture .
ROM cannot be programmed by the user.	PROM can be programmed by the user.
It is a type of computer memory that can only be read from, not written to.	PROM allows you to write data to it a single time.

(iv) CD-ROM versus USB Drive

CD-ROM	USB drive
A CD is a plastic disk that stores more than 600 MB data.	A USB drive is a small device that you put into a USB port and it can store upto 256 GB data.
CDs are prone to scratches. CDs can scratch easily, which can lead to data corruption or loss.	USB drives are very durable and aren't prone to scratches.
The process of burning a CD (uploading files to a CD is known as burning) is slower when compared to pen-drive.	The process of uploading files to a Pen-drive is much faster and easier.
They have lower storage capacity.	They have higher storage capacity.
It is less portable compared to a pen-drive.	It is more portable because of its small size. It is small, lightweight, and easy to carry around.
CD-ROM can only be read by CD-ROM Readers. Normal readers cannot read the CD-ROM disks.	There is no need for extra software or complex set up procedures to use.
Most modern computers do not have CD and DVD burners.	USB ports are much more common than CD and DVD burners.
In case of CD-ROM, you can only add data once, and we can't remove data once it's burned into the disk.	USB drives are rewritable. We can add and delete files multiple times.

CD-ROMs are more sensitive to physical damages as they can be damaged more easily.	USB drives are more durable as they can withstand more drops and bumps than CDs.

(c) What is a URL ? Explain with the help of an example, the need of DNS in Internet. 4

Ans:

Ans: A URL, which stands for Universal Resource Locator. URL is the global address of a document or resource on the WWW .It is the unique web address of a website, image, document or any other resources on the web. A UPL is a type of uniform resource identifier (URI) that provides a way to access information from remote computers, like a web server and cloud storage.

Parts of a URL:

A URL consists of three parts:

The first part is used to tell the browser what kind of server it will connect to. This component of the URL is called protocol. Every URL begins with a protocol. For web pages, this is usually http or https. Other protocols that we can use in this field of an URL are FTP, smtp etc. the protocol is always followed by ”://”.

The second part of the URL is a fully Qualified Domain Name. The fully qualified domain name identifies the site running the server. The domain name (or the domain) is the name of the computer on which the data you are looking for is located (the server). Web servers use port 80 by default, but some servers has been set up to use other ports. The range of Well-Known Ports is in between 0–65535.

The first two parts of an URL are used to identify the web server of the website. Each web server has a home page and a directory to store the entire document related to the web page like images, audio, video files.

The third component of URL is an optional pathname for a particular document itself. File path is used to find the exact location of the resource we want to access.

Example: https://www.exampleurl.com/path/result.html

In the above example, the browser will connect to a web server using Hypertext Transfer Protocol Secure (HTTPS). The fully qualified domain name is www.exampleurl.com. The above is the address of the file result.html.

The Domain Name System is the phonebook of the Internet. DNS translates domain names to IP addresses so browsers can load Internet resources. Domain Name System (DNS)

should keep track of address of each computer or any other internet device and email addresses. The name servers translates the web address or email address to respective IP address.

DNS is a fundamental component of the internet that translates human-friendly domain names into IP addresses. This process allows users to access websites using easy-to-remember names instead of having to remember complex addresses.

DNS follows a hierarchical naming scheme that is supported by distributed database system to ensure no duplicate names are issued at all.

DNS allows users to easily navigate the web without needing to memorize complex addresses, which in turn makes internet usage more comfortable.

Working of DNS for identifying web addresses:

Steps for identifying web addresses:

1. First step is to enter a URL or equivalent Domain name as the address of the website that you want to access through the web browser.

2. The Web browser tries to resolve the IP address of the website by the information available in its own cache memory. If the IP address is not cached, the browser sends a request to a DNS servers. The DNS server tells the browser about the IP address of the website.

3. Once the web browser knows the IP address of the website, it then requests the web page from the web server.

4. The web server responds by sending back the requested web page. If the requested page does not exist then it will send back the appropriate error message.

5. Your web browser receives the page from the web server and displays it as per the display requirements of the web page.

For example, if we want to visit www.abc.ac.in , the following steps take place:

1. We first enter www.abc.ac.in in your browser.

2. The browser finds the IP address using DNS resolution.

3. It connects to the web server at that IP address.

4. The server sends the webpage data back to your browser.

5. The browser displays the webpage for you to see.

5.

(a) Network Interface Card

Ans: A network interface card (NIC) is an essential component of any computer that connects it to the network. It is a hardware component without which a computer cannot be connected over a network. It is also known as network interface controller, network adapter or LAN adapter. It provides the physical connection between the network and the computer. Most NICs are internal, with the card fitting into an expansion slot inside the computer. Network interface cards are a major factor in determining the speed and performance of a network.

NIC allows both wired and wireless communications. NIC is both a physical lar and a data link layer device.

The most common network interface connection today is Ethernet cards. Ethernet cards Ethernet cards that contain connections for twisted pair cables have a RJ-45 connection. The Ethernet card is sometimes also called as network adapter card. Each for the Ethernet card is identified by a unique number called the Media Access Control (MAC) address.

Advantages of NIC:

- It provides a secure, faster and more reliable connection.
- It allows us to share bulk data among many users.
- Communication speed is high.
- NICs are not expensive.
- They can be easily upgraded or replaced if needed.

Disadvantages of NIC:

- It needs a proper configuration to work efficiently.
- It is inconvenient compared to the wireless card.
- It may require regular maintenance.
- When several NICs are installed in a system, NICs can use a lot of electricity.

(b) Word Processing

Ans: A word processor (more formally known as document preparation system) is a computer application used for composition, editing, formatting and printing of any sort of printable material.

Microsoft Word is the most widely used computer word processing system.

Word processing typically implies text manipulation functions that extend beyond a basic ability to enter and change text, such as automatic generation of:

* tables of contents with section titles and their page numbers;

* tables of figures with caption titles and their page numbers;

* footnote numbering;

Other word processing functions include "spell checking" (actually checks against wordlists), "grammar checking" (checks for what seem to be simple grammar errors), and a "thesaurus" function (finds words with similar or opposite meanings. Other common features include collaborative editing, comments and annotations, support for images and diagrams and internal cross-referencing.

Few features of word processing are:

- Adding Header, Footer or Page Number to a Document

To add a graphic or text on the top or bottom of a document, a Header or Footer has to be added.

1. Click on Insert Tab, select the Header or Footer or Page Number from Header & Footer group.

2. You can select from the available gallery and choose the design required.

3. After selection, the same design chosen will appear in the document.

To add a customized design for the Header or Footer, double click on the Header or Footer area in the document. The same is opened in the design mode. After making the required changes to the design, close the Header/Footer area.
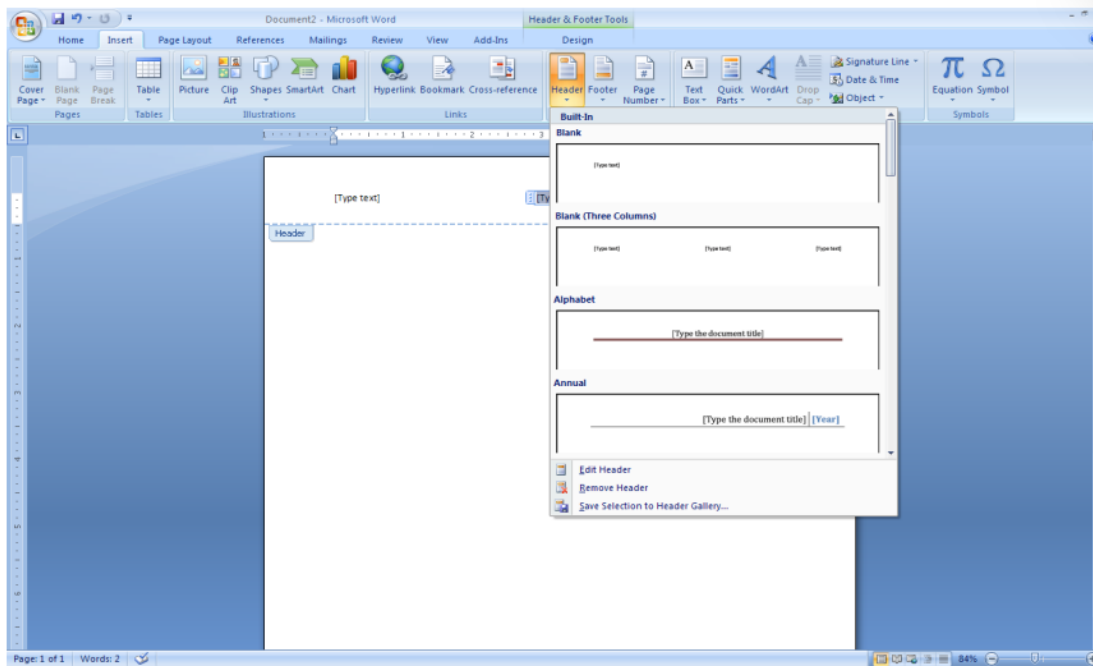
- Creating a table in word :

To insert a simple table with required number of row and columns:

1. Click in the document where the table has to be inserted.

2. On the Insert tab, in the Tables group click Table, and then under Insert Table, select the number of rows and columns required in the table.

3. The table will be drawn on the document.
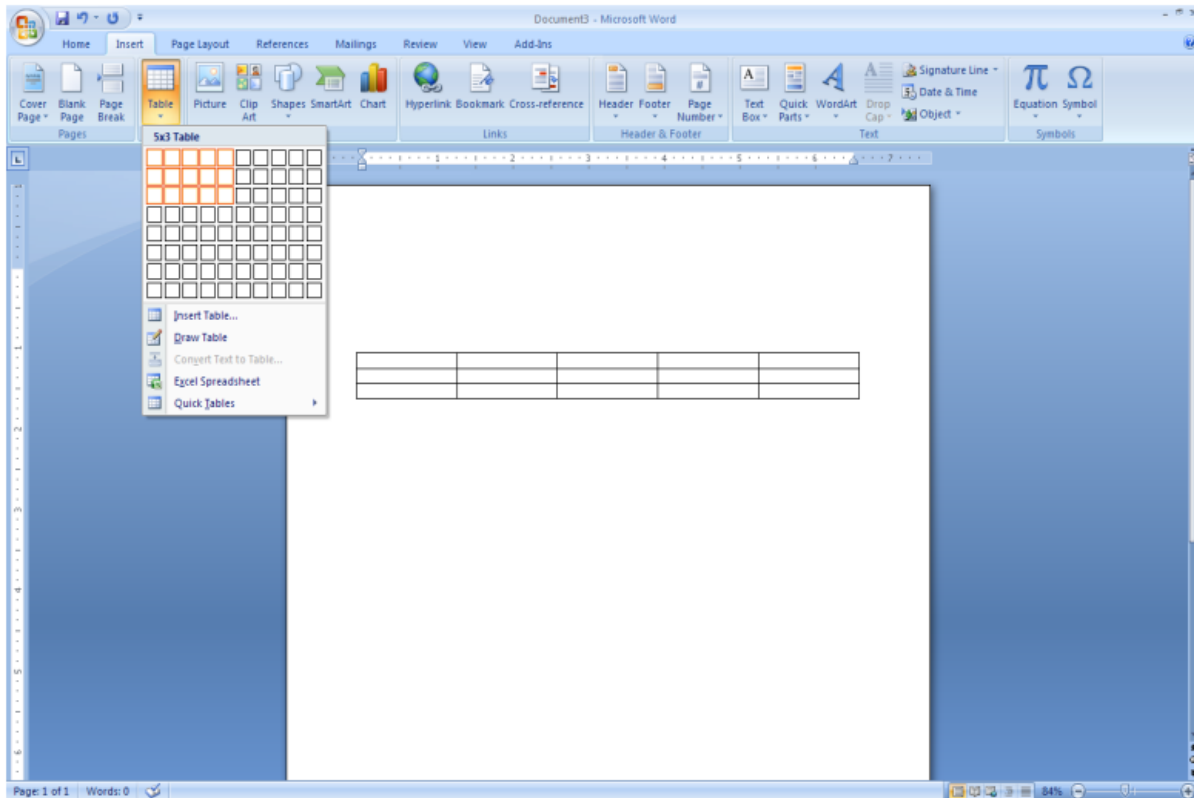
- Creating a memo for multiple recipients-mail merge

Mail merge is a software function describing the production of multiple (and potentially large numbers of) documents from a single template form and a structured data source. This helps to create personalized letters and pre-addressed envelopes or mailing labels for mass mailings from a word processing document which contains fixed text, which will be the same in each output document, and variables, which act as placeholders that are replaced by text from the data source. The data source is typically a spreadsheet or a database which has a field or column matching each variable in the template.

The mail merge process entails the following overall steps:

1. Set up the main document. The main document contains the text and graphics that are the same for each version of the merged document. For example, the return address or salutation in a form letter.

2. Connect the document to a data source. A data source is a file that contains the information to be merged into a document. For example, the names and addresses of the recipients of a letter.
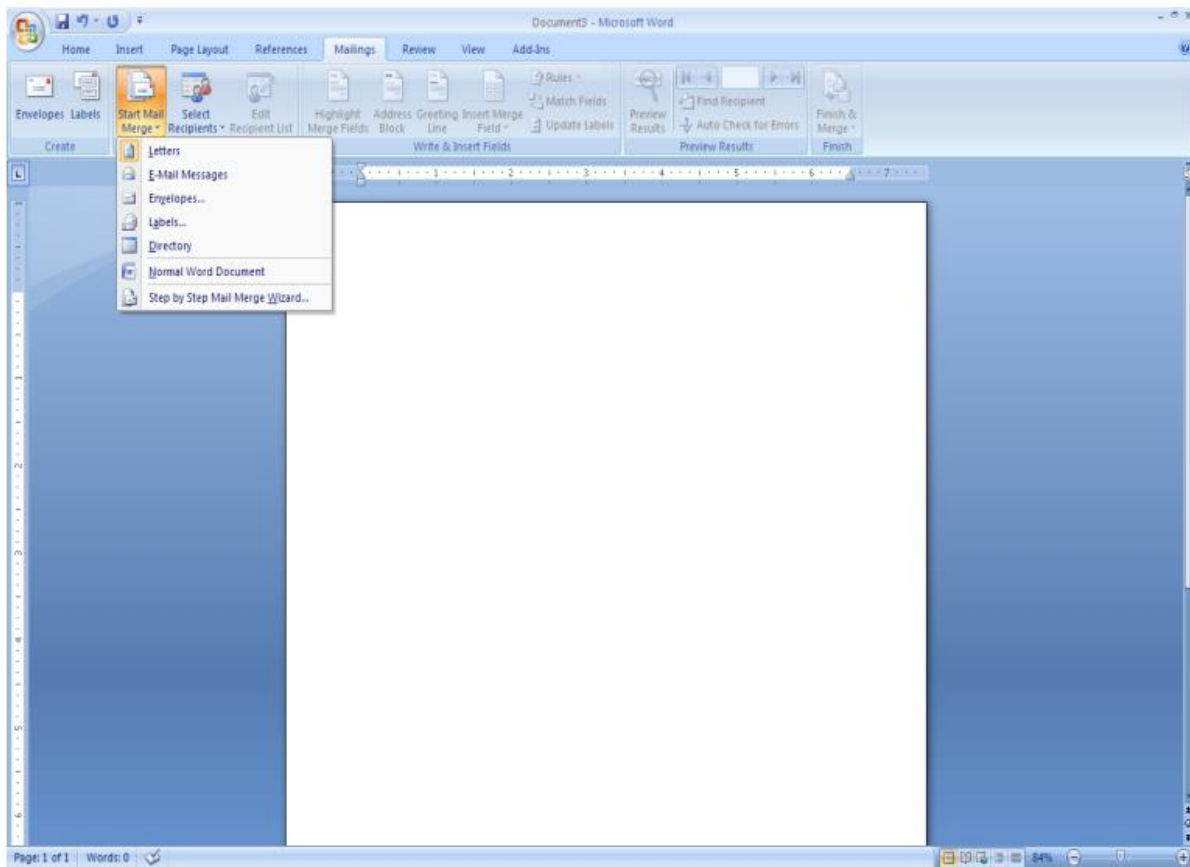
3. Refine the list of recipients or items. Microsoft Office Word generates a copy of the main document for each item, or record, in your data file. If your data file is a mailing list, these items are probably recipients of your mailing. If you want to generate copies for only certain items in your data file, you can choose which items (records) to include.

4. Add placeholders, called mail merge fields, to the document. When you perform the mail merge, the mail merge fields are filled with information from your data file.

5. Preview and complete the merge. You can preview each copy of the document before you print the whole set.
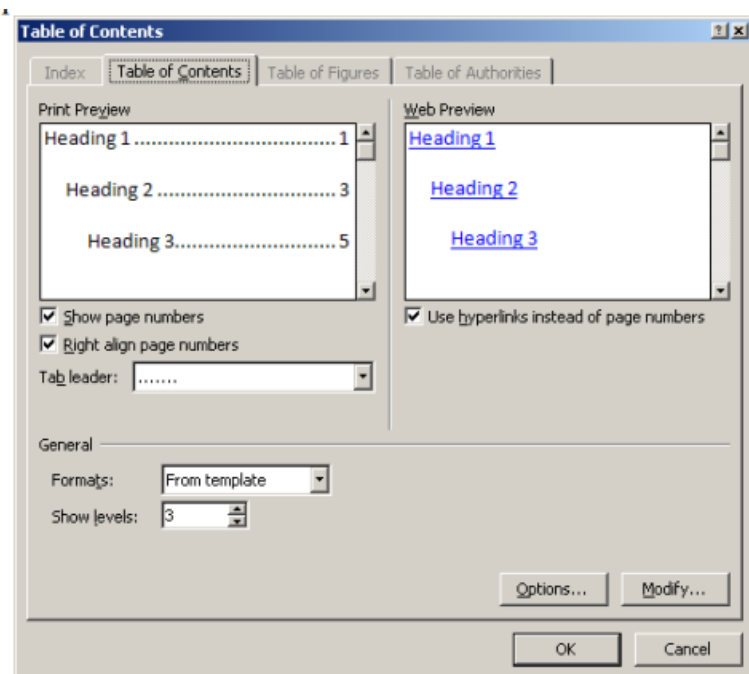
- Creating a table of contents

Table of Contents (TOC) is created by applying heading styles to the text that is to be included in the TOC. Word will search for those headings and create the TOC in the document. The Table of Contents can be selected from design gallery provided in word.

1. Select the text that is to be appear in the TOC

2. On the Home tab, in the Styles group, click the Style (Heading1, Heading2....) that you want to choose.

3. Click the place in the document where the TOC has to be inserted.

4. ON the Reference Tab, click Table of Contents on the Table of Contents group

5. Choose the TOC Style that is required
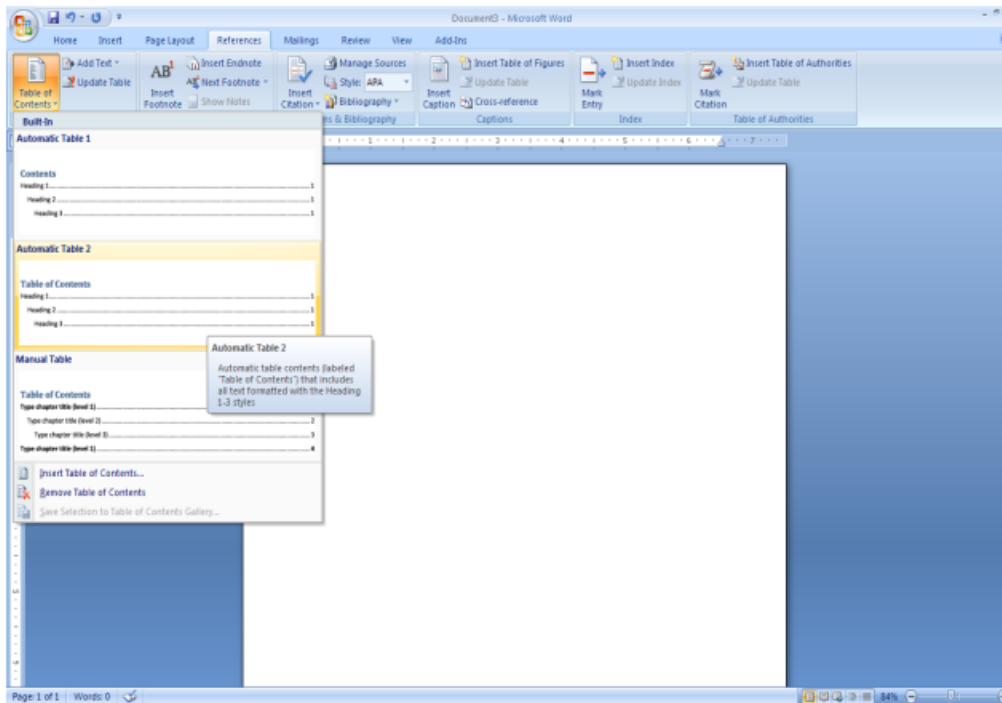
In order to create a customized Table of Contents, ON the Reference Tab, click Table of Contents on the Table of Contents group and choose the Insert Table of Contents option.

Table of Contents

Index | **Table of Contents** | Table of Figures | Table of Authorities

Print Preview

Heading 1 1

Heading 2 3

Heading 3.............................. 5

☑ Show page numbers
☑ Right align page numbers
Tab leader: ....

Web Preview

Heading 1

Heading 2

Heading 3

☑ Use hyperlinks instead of page numbers

General

Formats: From template
Show levels: 3

Options... Modify...

OK Cancel

(c) Collaboration in the context of Internet:

Ans: Collaboration is defined as an act or process of working together on a project or some intellectual activity. Collaboration involves both communication and sharing of ideas. Some of the important areas where collaboration is useful are physical science, high-energy physics, Health Science, environmental studies etc.

The collaboration helps in sharing of resources. These resources may be your intellectual efforts, hardware computing power or any other form of activity. Collaboration helps in solving complex problem domains by distributing the problems.

Most of the tools used on the internet can be used for some form of collaboration. For example, google docs is one such tool that may enable you to create a collaborative project report online. One can create a document using it and share it with your colleagues who in turn may be able to add content to it from anywhere, edit it and discuss about it using a discussion group.

Another software that can be used for collaboration is Google Wave. It allows you a shared web space for discussion or working together in a group. You may use text, photographs, maps etc. for this purpose. This software also combines collaboration with email, chat, messaging etc.

Other web-based collaboration tools are:

Zoho: Zoho is a division of ZOHO Corporation, a US-based Software Company. Zoho is a very good site for collaboration. It not only allows simple mundane tasks like group editing, document sharing, group chat, etc. but also provides some management tasks like milestone tracking, invoice creation, and other team tasks.

Volunteer Computing: It allows hardware resources to be used for the purpose of some online project.

(d) Router and Switches

Ans:

Router: A router is a networking device that forwards data packets between computer networks. A router translates information from one network to another. Router selects the best path to route a message, based on the destination address and origin. The router can direct traffic to prevent head-on collisions, and is smart enough to know when to direct traffic along shortcuts. Routers can even —listen to the entire network to determine which sections are busiest—they can then redirect data around those sections until they are removed.

If you have a LAN that you want to connect to the internet, you will need to purchase a router. the router serves as the translator between the information on your LAN and the internet. It also determines the best route to send the data over the internet. Routers maintain a map of the physical networks on a Internet (network) and forward data received from one physical network to other physical networks. The router is mainly a Network Layer device.

A router operates on the Network layer of the OSI model. It allows the users to connect several LAN and WAN. A router is more capable as compared to other network devices such as hub, switch etc. , as the router has the capability to analyze and modify the data while transferring it over a network, and it can send it to another network.
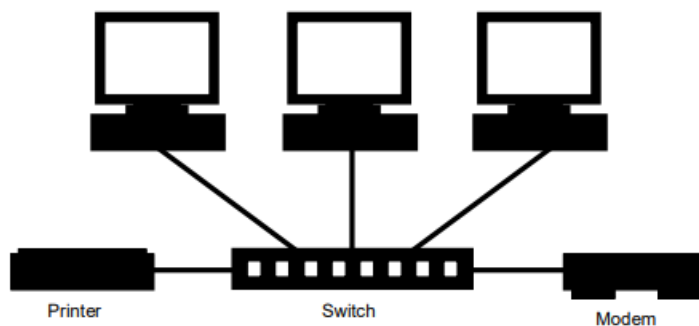
Advantages:

- Router provides the security, as LANs work in broadcast mode. The information is transmitted over the network and traverses the entire cable system. Although the data is available to each station, but the station which is specifically addressed reads the data.
- Routers provide reliability. If one network gets down when the server has stooped, or there is a defect in the cable, then the router services and other networks will not be affected.
- Routers are relatively easy to set up and manage.

Disadvantages:

- One of the main disadvantages of routers is that they may have limited bandwidth. This means that the amount of data that can be transmitted over a network is limited, which can cause delays and slowdowns.
- Routers can be expensive.
- Routers also have a limited range, which means that the signal strength decreases as the distance from the router increases. This can cause connectivity issues.

Switches: A switch is also known as switching hub. It is a device that can segment a larger local area network to reduce the traffic load. A network switch connects devices in a network to each other, enabling them to exchange data packets. One should implement a switch when you have a network with 20 or more users that have bogged down the network by excess traffic. It splits the network into two or more segments with devices that normally talk with each other. Conceptually – switching takes data from one interface and delivers it to another interface. A switch operates on the data-link layer of the OSI model.

A switch has many ports, to which computers are plugged in. When a data frame arrives at any port of a network switch, it examines the destination address, performs necessary checks and sends the frame to the corresponding device(s).

Printer   Switch   Modem

Advantages:

* Prevents traffic overloading in a network by segmenting the network into smaller subnets.

* It increases the available bandwidth of the network.

* It enhances the performance of the network.

Disadvantage:

- They are pretty expensive.
- Proper design and configuration are needed.
- Network connectivity issues are difficult to be traced through network switch.

(e) Activities in Software Project Management

Ans: The different project management activities which can be performed using the Project Management Software are:

* Scheduling:

One of the most common purposes is to schedule a series of events or tasks. The complexity of this schedule can vary considerably depending on how the tool is used. Some common challenges include:

1. Events which depend on one another in different ways

2. Scheduling team members tasks along with the resources required by them commonly termed resource scheduling.

3. Dealing with uncertainties in the estimates of the duration of each task.

* Calculating critical path

In many complex schedules, there will be a critical path, or series of events which depend on each other, and whose durations directly determine the length of the whole project. Some software applications (for example, Dependency Structure Matrix solutions) can highlight these tasks, thus helping in optimization of effort.

* Providing information

Project planning software provides information to various stakeholders of the project and can be used to measure and justify the level of effort required to complete the project. Typical information might include:

1. Tasks lists for team members

2. Allocation schedules for resources

3. Overview information on how long tasks will take to complete

4. Early warning of any risks to the project

5. Information on workload, for planning holidays

6. Historical information on how projects have progressed, and in particular, how actual and planned performance are related

7. Optimum utilization of available resources

* Timesheet Management

A good timesheet management system is essential both for the customer projects as well as internal activities within the organization. Timesheets not only help the Project Manager in managing the project in a better manner but is also useful for maintaining employee

records for payroll calculations as well as helps in improving the overall productivity of the organization.

A timesheet is a record of the number of hours an employee spends in completing a certain task. This task could be associated with a customer project or with internal business activities. The timesheet not only provides the number of actual hours that the employee may have spend on the task but also mentions details of the task involved and the kind of operations that the task involved completing. Another benefit of a good timesheet management system is that it can help management track the efficiency of employees and find ways in which they can improve the productivity in various areas.

Timesheet management systems can also help employees evaluate their own performances and understand how they can perform their tasks better.

(f) Two Data Entry Devices

Ans: Keyboard: It is the most common input device used for entering data and information into the computer system. This is the standard input device attached to all computers. The keyboard is a primary device for inputting text by pressing a set of keys. The layout of keyboard is just like the traditional typewriter of the type QWERTY. Keyboard devices can be classified into two types general purpose keyboards and special purpose keyboards. General purpose keyboard are standard keyboards used with most computer system. They are called general purpose because that have enough keys to make them useful for any type of application.

A computer keyboard has following keys :

1. Alphanumeric Keys: It includes letters and numbers.

2. Punctuation Keys: These include comma, period, semicolon etc. And

3. Special Keys: These can be function keys, control keys, arrow keys and Caps lock keys etc.

All the modern keyboards of computer are classified as:

(a) Original PC keyboard having 84 keys;

(b) Advance Technology (AT) Keyboard having 101-104 keys; and

(c) Multimedia Keyboard having 120 – 140 keys.

Mouse

A Mouse is a handy device which can be moved on a smooth surface to cause the movement of a cursor on the screen. It is a pointing device which is used to input data and information into the computer system by pointing on it. Physically, a mouse contains a small case, held under one of the user's hands with one or more buttons. For GUI-based systems a mouse is an essential pointing-device. The cursor of the mouse moves in the same direction in which the mouse ball

rolls. It controls the movement of the cursor on the computer screen and allows users to move and select folders, text, files and icons on a computer.

The name mouse is derived from its size as it is small, corded and elliptical shape device that looks like a mouse. A connecting wire of a mouse is imaginable to be the mouse's tail. A Mouse rolls on a small ball and has two or three buttons on the top. When you roll the mouse across a flat surface on the screen, sensors sense the mouse in the direction of mouse movement. The cursor moves very fast with a mouse giving you more freedom to work in any direction. It is easier and faster to move through a mouse compared to movement using keys.

Types of mouse:

Mouse could be mechanical, optical or cordless types.

Mechanical Mouse : Mechanical Mouse uses ball for the movement of cursor on the computer screen. When the ball is rolled in any direction, a sensor of the mouse detects it and also moves the mouse pointer in the same direction.

Optical Mouse : Optical Mouse uses Laser rays for the movement of cursor on the computer screen. It is an advanced pointing device. Movement is detected by sensing changes in the reflected light rather than the motion of a rolling sphere.

Cord-Less Mouse : Cord-Less Mouse is battery driven and does not need any wire for the physical connection with the motherboard. It transmits data through infrared or radio signal.

(g) Cookies in the context of Browser Software

Ans: A cookie is a small message sent by the Web server to a your web client. This message is stored by the browser as a text file. The basic purpose of cookie is to store information needed by a server at the user end only. Web browsers store the cookies they receive for a predetermined period of time, or for the length of a user's session on a website. They attach the relevant cookies to any future requests the user makes of the web server. The cookie is used to send information back to the Web Server each time the browser requests a page from the server.

For example, a website may ask you to fill up a form with the information about your name and interests. This information is packaged by the server into a cookie and sent to your Web browser which stores it for later use. The next time, you go to the same Website, your browser will send the stored cookie to the Web server along with the request for a web page. This way, server will be able to remember you and send you only that information that you had desired earlier.

Cookies are merely text files that can be deleted at any time - they are not malicious nor are they programs. Cookies cannot be used to spread viruses and they cannot take control of your hard drive. However, they contain important information about you, so they may be threat to your privacy and anonymity on the Internet.