Course: Computer applications/Skills/ITC/CAB Program: BS Dental

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Total Marks: 50 Instructor: Zakir Rahim

Name: Sheraz Ahmad ID# 13812

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Q1. (a) Differentiate between open source software and applications software? (6)

Ans

Free Software:
“Free software” means software that respects users’ freedom and community. Roughly, it means that the users have the freedom to run, copy, distribute, study, change and improve the software. refers to the software which uses the code freely available on the Internet.  The code can be copied, modified or deleted by other users and organizations. As the software is open to the public, the result is that it constantly updates, improves and expands as more people can work on its improvement.

The term “free software” is sometimes misunderstood—it has nothing to do with price. It is about freedom.

Open Source Software:
Open Source Software is something which you can modify as per your needs, share with others without any licensing violation burden. When we say Open Source, source code of software is available publicly with Open Source licenses like GNU (GPL) which allows you to edit source code and distribute it. Read these licenses and you will realize that these licenses are created to help us. It is opposite to OSS and means the software which uses the proprietary and closely guarded code. Only the original authors of software can access, copy, and alter that software. In a case with closed source software, you are not purchasing the software, but only pay to use it.

1. Coined by the development environments around software produced by open collaboration of software developers on the internet.
2. Later specified by the Open Source Initiative (OSI).
3. It does not explicitly state ethical values, besides those directly associated to software development.

(Application software)

 (app for short) is a program or group of programs designed for end users. Examples of an application include a word processor, a spreadsheet, an accounting application, a web browser, an email client, a media player, a file viewer, simulators, a console game or a photo editor. The collective noun application software refers to all applications collectively.[1] This contrasts with system software, which is mainly involved with running the computer.

GNU Image Manipulation Program (GIMP), version 2.10, a free and open source image editing application

Applications may be bundled with the computer and its system software or published separately, and may be coded as proprietary, open-source or university projects.[2] Apps built for mobile platforms are called mobile apps.

In information technology, an application (app), application program or application software is a computer program designed to help people perform an activity. Depending on the activity for which it was designed, an application can manipulate text, numbers, audio, graphics and a combination of these elements. Some application packages focus on a single task, such as word processing; others, called integrated software include several applications.[3]

User-written software tailors systems to meet the user's specific needs. User-written software includes spreadsheet templates, word processor macros, scientific simulations, audio, graphics, and animation scripts. Even email filters are a kind of user software. Users create this software themselves and often overlook how important it is.

(b) Write different features of system software? (6)

Ans

## What is System Software?

System Software is a set of programs that control and manage the operations of computer hardware. It also helps application programs to execute correctly.

System Software are designed to control the operation and extend the processing functionalities of a computer system. System software makes the operation of a computer more fast, effective, and secure. Example: Operating system, programming language.

Types of System Software:

* Operating systems:- Operating system software helps you for the effective utilization of all hardware and software components of a computer system.
* Programming language translators:- Transforms the instructions prepared by developers in a programming language into a form that can be interpreted or compiled and executed by a computer system.
* Communication Software : - Communication software allows us to transfer data and programs from one computer system to another.
* Utility programs: - Utility programs are a set of programs that help users in system maintenance tasks, and in performing tasks of routine nature

## Features of System Software

An important feature of System Software are:

* System Software is closer to the system
* Generally written in a low-level language
* The system software is difficult to design and understand
* Fast in speed
* Less interactive
* Smaller in size
* Hard to manipulate

Q2. (a) Discuss different functions of operating system? (6)

Ans

An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

Some popular Operating Systems include Linux Operating System, Windows Operating System, VMS, OS/400, AIX, z/OS, etc.

Following are some of important functions of an operating System.

* Memory Management
* Processor Management
* Device Management
* File Management
* Security
* Control over system performance
* Job accounting
* Error detecting aids
* Coordination between other software and users

## Memory Management

Memory management refers to management of Primary Memory or Main Memory. Main memory is a large array of words or bytes where each word or byte has its own address.

Main memory provides a fast storage that can be accessed directly by the CPU. For a program to be executed, it must in the main memory. An Operating System does the following activities for memory management −

* Keeps tracks of primary memory, i.e., what part of it are in use by whom, what part are not in use.
* In multiprogramming, the OS decides which process will get memory when and how much.
* Allocates the memory when a process requests it to do so.
* De-allocates the memory when a process no longer needs it or has been terminated.

## Processor Management

In multiprogramming environment, the OS decides which process gets the processor when and for how much time. This function is called process scheduling. An Operating System does the following activities for processor management −

* Keeps tracks of processor and status of process. The program responsible for this task is known as traffic controller.
* Allocates the processor (CPU) to a process.
* De-allocates processor when a process is no longer required.

## Device Management

An Operating System manages device communication via their respective drivers. It does the following activities for device management −

* Keeps tracks of all devices. Program responsible for this task is known as the I/O controller.
* Decides which process gets the device when and for how much time.
* Allocates the device in the efficient way.
* De-allocates devices.

## File Management

A file system is normally organized into directories for easy navigation and usage. These directories may contain files and other directions.

An Operating System does the following activities for file management −

* Keeps track of information, location, uses, status etc. The collective facilities are often known as file system.
* Decides who gets the resources.
* Allocates the resources.
* De-allocates the resources.

## Other Important Activities

Following are some of the important activities that an Operating System performs −

* Security − By means of password and similar other techniques, it prevents unauthorized access to programs and data.
* Control over system performance − Recording delays between request for a service and response from the system.
* Job accounting − Keeping track of time and resources used by various jobs and users.
* Error detecting aids − Production of dumps, traces, error messages, and other debugging and error detecting aids.
* Coordination between other softwares and users − Coordination and assignment of compilers, interpreters, assemblers and other software to the various users of the computer systems.

(b) Explain the use of File Transfer Protocol and TelNet services ? (8)

Ans

FTP and [Telnet](http://www.differencebetween.net/technology/internet/difference-between-telnet-and-ssh/%22%20%5Co%20%22telnet%20vs%20ssh) are two very old protocols, that are used on networks to add certain functionalities. [FTP](http://www.differencebetween.net/technology/difference-between-dpi-and-pixels/%22%20%5Co%20%22ftp%20vs%20http) is a File Transfer Protocol, and its only concern is to facilitate the transfer of files from one point to another, along with a few [management](http://www.differencebetween.net/business/differences-between-management-and-marketing/%22%20%5Co%20%22Management%20vs%20Marketing) capabilities like making and deleting directories. Telnet is a bit more like a ‘jack of all trades’, as it is simply a connection protocol that allows a user to connect to a remote server that is listening for Telnet commands. Once the connection is established, the user can then [issue](http://www.differencebetween.net/language/difference-between-issue-and-problem/%22%20%5Co%20%22Issue%20vs%20Problem) commands to the server computer, and examine the responses that are sent back.

Although both started out as command line tools, GUIs later appeared that greatly simplified the use of FTP. Instead of knowing all the commands and typing out all the filenames, some dedicated applications let you browse a local drive and a remote drive, as if you are using a file explorer. It keeps all the commands invisible to the user, thereby lessening the learning curve. This is not really possible with Telnet, as there are a wide range of commands and parameters that can be issued to the server.

Due to the age of both software, they do not have any built-in security measures. Even usernames and passwords are sent in plain text, making them vulnerable to sniffing. With later modifications, people can now use secure versions of FTP, called FTPS and SFTP. On the other hand, Telnet has [been](http://www.differencebetween.net/language/difference-between-been-and-being/%22%20%5Co%20%22Been%20vs%20Being) largely replaced by SSH, due to the addition of security measures. As Telnet has been superseded by SSH, making it secure seems redundant.

. FTP is a protocol used specifically for transferring files to a remote location, while Telnet allows a user to issue commands remotely.

2. FTP can be used with a command line, a dedicated application, and even with most web browsers, while Telnet is restricted to the command line.

3. There are ways to use FTP in a secure environment, while Telnet will always be unsecured.

4. FTP is a well-known and reliable method of uploading files to web servers, while Telnet is now commonly used in diagnosing network services.

Q3. (a) Explain Metropolitan Area Network (MAN) with a suitable example? (7)

Ans

A metropolitan area network (MAN) is a network that interconnects users with computer resources in a geographic area or region larger than that covered by even a large local area network ([LAN](https://searchnetworking.techtarget.com/definition/local-area-network-LAN)) but smaller than the area covered by a [wide area network (WAN)](https://searchnetworking.techtarget.com/definition/WAN-wide-area-network). The term is applied to the interconnection of networks in a city into a single larger network (which may then also offer efficient connection to a wide area network). It is also used to mean the interconnection of several local area networks by bridging them with [backbone](https://searchnetworking.techtarget.com/definition/backbone) lines. The latter usage is also sometimes referred to as a campus network.

Examples of metropolitan area networks of various sizes can be found in the metropolitan areas of London, England; Lodz, Poland; and Geneva, Switzerland. Large universities also sometimes use the term to describe their networks. A recent trend is the installation of wireless MANs.

he Metropolitan Area Network (MAN) has many and varied applications; the main ones are:

• Deployment of VoIP services (Voice over [Internet](https://ecomputernotes.com/computernetworkingnotes/services-and-applications/what-is-internet) [Protocol](https://ecomputernotes.com/computernetworkingnotes/computer-network/protocol)), in the metropolitan area, allowing eliminating the “obsolete” traditional lines of analog or ISDN telephony, eliminating the current expenditure of these lines.

Interconnection of local area networks (LAN).

• Deployment of Wi-Fi zones without wireless Backhaul (Femtocell) freeing all Wi-Fi channels for access, this in practice means more than 60% improvement in the connection of Wi-Fi users.

• [Computer](https://ecomputernotes.com/fundamental/introduction-to-computer/what-is-computer) to [computer](https://ecomputernotes.com/fundamental/introduction-to-computer/what-is-computer) interconnection.

• Local video surveillance systems.

• CAD / CAM transmission.

• Walkways for wide area networks (WAN).

• They also allow the transmission of voice, data and video traffic with high latency guarantees, which is why it is necessary to install a metropolitan area network at the corporate level, for corporations that have multiple dependencies in the same capital area.

## MAN public or private

• A metropolitan area network can be public or private.

• An example of a private MAN would be a large department or administration with buildings distributed throughout the city, transporting all voice and data traffic between buildings through its own MAN and routing external [information](https://ecomputernotes.com/fundamental/information-technology/what-do-you-mean-by-data-and-information) through public operators.

• The data could transport between the different buildings, either in the form of packages or over fixed bandwidth channels.

• Video applications can link buildings for meetings, simulations, or project collaboration.

An example of public MAN is the infrastructure that a telecommunications operator installs in a city to offer broadband services to its customers located in this geographical area.

**Network nodes**: Citizen area networks allow to execute and exceed 600 access nodes to the network, which makes it very useful for public and private environments with a large number of jobs.

**Network extension**: The networks of metropolitan area allow to reach a diameter around 50 km, depending on the scope of network training of the type of cable used, as well as the technology used. This diameter is considered sufficient to house a metropolitan area. They cover a city and can connect many, forming more networks.

**Distance between nodes**: Metropolitan area networks allow distances between access nodes of several kilometers, depending on the type of cable. These distances are considered sufficient to connect different buildings in a metropolitan area or private camp.

**High reliability**: Reliability referred to the error rate of the network while it is in operation — the error rate defined as the number of erroneous bits that transmitted over the network. In general, the error rate for optical fiber is lower than that of copper cable with equal length. The error rate not detected by the error detection mechanisms is of the order of 10-20. This feature allows metropolitan area networks to work in environments where errors can be disastrous, such as air traffic control.

The creation of municipal metropolitan networks would allow municipalities to have a high-performance infrastructure by providing them with a network similar to that of [Internet](https://ecomputernotes.com/computernetworkingnotes/services-and-applications/what-is-internet) service providers. In this way, the town hall can connect new offices, remote users, or video cameras on public roads.

**High security**: Fiber optic offers a safe means because it is not possible to read or change the optical signal without physically interrupting the link.

(b) Define topology? Which topology would you chose to setup a local area network and why? (7)

Ans

Topology is the mathematical study of the properties that are preserved through deformations, twistings, and stretchings of objects. Tearing, however, is not allowed. A circle is topologically equivalent to an ellipse (into which it can be deformed by stretching) and a sphere is equivalent to an ellipsoid.

Create Network

1. Identify the local services that you want available on the network. Identify network-attached printers, network disk drives, any server that will share printers or disks.

2. Identify how many devices will have to connect to the network. Each device, server or workstation will require a unique address.

3. Run cables to workstations where possible. A wired LAN will always get better performance and be more secure than a wireless LAN. Wherever possible, run a cable to servers, printers, IP phones or work locations. Run a cable to any area where you are likely to work. Use standard Ethernet cables or building wiring as installed according to the TIA-568 standard.

4. Select and purchase a switch or cable router. The simple secure way to connect to the Internet is to use a cable router. Many makes and models are available. If the model you choose does not have enough ports to connect all of your computers, then you will need to purchase a switch as well.

5. Configure the WAN port of the cable router. Configuration details will vary from vendor to vendor. Key information you will need to configure the WAN port will be supplied by your internet service provider.

6. Configure the LAN ports of your cable router. Most cable routers will act as a Dynamic Host Configuration Server, or DHCP server. This means that the router will give addresses to workstations automatically. Be certain that the address pool has enough addresses for all of the workstations. Make certain that there are enough addresses outside of the range for any hosts that need static addresses. For example, a network address with a mask of 255.255.255.0 has a total of 254 hosts. If the dynamic pool has 200 addresses available, that means the remaining 54 addresses are available to give printers or servers static addresses.

7. Connect the wires for the network. Workstations and servers can be connected with standard Ethernet cables. Connect the switch to the cable router LAN ports by using the up-link or straight port on the switch. If the switch does not have an up-link port, connect any standard port of the switch to a LAN port on the cable router with an Ethernet crossover cable. Ethernet rossover cables can be purchased at any electronics store.

8. Test the services and Internet connectivity. Test each of the workstations to ensure they can connect to the Internet and test any local servers and printers. Print test pages on the shared printers. Tests read and write permissions on shared file servers by copying files to the servers and copying files from the server to a workstation.
Tips & Warnings

* Purchase a cable router with wireless capabilities to give you more flexibility.
* Make sure cable lengths do not exceed 100 meters, or about 300 feet.
* Do not run cables in air ducts unless they are fire rated. Check local building codes.

Q4. In your opinion, what are the different types of common media used for storage, access and transmission of information? Explain each type in detail? (10)

Ans:

In data communication terminology, a transmission medium is a physical path between the transmitter and the receiver i.e it is the channel through which data is sent from one place to another. Transmission Media is broadly classified into the following types: \

1. Guided Media:
It is also referred to as Wired or Bounded transmission media. Signals being transmitted are directed and confined in a narrow pathway by using physical links.

Features:

* High Speed
* Secure
* Used for comparatively shorter distances

There are 3 major types of Guided Media:

(i) Twisted Pair Cable –
It consists of 2 separately insulated conductor wires wound about each other. Generally, several such pairs are bundled together in a protective sheath. They are the most widely used Transmission Media. Twisted Pair is of two types:

1. Unshielded Twisted Pair (UTP):
This type of cable has the ability to block interference and does not depend on a physical shield for this purpose. It is used for telephonic applications.

Advantages:

* + Least expensive
	+ Easy to install
	+ High speed capacity
	+ Susceptible to external interference
	+ Lower capacity and performance in comparison to STP Short distance transmission due to attenuation
1. Shielded Twisted Pair (STP):
This type of cable consists of a special jacket to block external interference. It is used in fast-data-rate Ethernet and in voice and data channels of telephone lines.

Advantages:

* + Better performance at a higher data rate in comparison to UTP
	+ Eliminates crosstalk
	+ Comparitively faster
	+ Comparitively difficult to install and manufacture
	+ More expensive
	+ Bulky

(ii) Coaxial Cable –
It has an outer plastic covering containing 2 parallel conductors each having a separate insulated protection cover. Coaxial cable transmits information in two modes: Baseband mode(dedicated cable bandwidth) and Broadband mode(cable bandwidth is split into separate ranges). Cable TVs and analog television networks widely use Coaxial cables.

Advantages

* High Bandwidth
* Better noise Immunity
* Easy to install and expand
* Inexpensive

Dis advantages: Single cable failure can disrupt the entire network.

iii) Optical Fibre Cable –
It uses the concept of reflection of light through a core made up of glass or plastic. The core is surrounded by a less dense glass or plastic covering called the cladding. It is used for transmission of large volumes of data.

The cable can be unidirectional or bidirectional. The WDM (Wavelength Division Multiplexer) supports two modes, namely unidirectional and bidirectional mode.

Advantages:

* Increased capacity and bandwidth
* Light weight
* Less signal attenuation
* Immunity to electromagnetic interference
* Resistance to corrosive materials

Disadvantages:

* Difficult to install and maintain
* High cost
* Fragile

2. Unguided Media:
It is also referred to as Wireless or Unbounded transmission media.No physical medium is required for the transmission of electromagnetic signals.

Features:

* Signal is broadcasted through air
* Less Secure
* Used for larger distances

There are 3 major types of Unguided Media:

(i) Radiowaves –
These are easy to generate and can penetrate through buildings. The sending and receiving antennas need not be aligned. Frequency Range:3KHz – 1GHz. AM and FM radios and cordless phones use Radiowaves for transmission.

Further Categorized as (i) Terrestrial and (ii) Satellite.

(ii) Microwaves –
It is a line of sight transmission i.e. the sending and receiving antennas need to be properly aligned with each other. The distance covered by the signal is directly proportional to the height of the antenna. Frequency Range:1GHz – 300GHz. These are majorly used for mobile phone communication and television distribution.

iii) Infrared –
Infrared waves are used for very short distance communication. They cannot penetrate through obstacles. This prevents interference between systems. Frequency Range:300GHz – 400THz. It is used in TV remotes, wireless mouse, keyboard, printer, etc.

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