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

**Open source software**

Open source software is a software having source code that anyone can review, change, and enhance.

"Source code" is that part of software that most computer users don't ever see; it's the code computer programmers manipulate to change how a piece of software, program or application works. Programmers who have access to a computer program's source code can improve that program by adding features to it or fixing parts that don't always work correctly.

Open source software is some what different software. Its authors make it available to others its source code who can view that code, copy it, learn from it, alter it, or share it.

Examples: LibreOffice and the GNU Image Manipulation Program

**Applications software**

Application software is a kind program or group of programs which are designed for end users. Examples of an application software include a word processor, an application software, an accounting application, a web browser, a spread software an email client, a media player, a file viewer, simulators ,a photo editor, a console game etc. The application software refers to all applications together. This is with contrast with system software, which is generally involved with running the computer.

Applications may be bundled with the computer and its system software or may be published distinctly, and may be coded as proprietary, open-source or university projects. Apps that are built for mobile platforms are referred as mobile apps.

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

**Different features of system software**

- System Software is closer to the system
- Generally written in a low-level language
- The system software is hard to design and understand
- It is fast in speed
- It is less interactive
- It is much smaller in size

- it is quite hard to manipulate

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

It is an interface between a computer user and computer hardware. It is a software which performs all the basic tasks like file management, memory management, process management, handles input and output, and controls peripheral devices such as disk drives and printers.

It is a program which acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs.

Following are some of important functions of an operating System.

Processor Management

Memory Management

File Management

Security

Device Management

Coordination between other software and users

Control over system performance

Job accounting

Error detecting aids

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

#### **Use of file transfer protocol**

The File Transfer Protocol (FTP) is a typical network protocol which used for the transfer of computer files between a client and server on a computer network.

FTP is mainly built on a client-server model architecture which uses separate control and data connections between the client and the server. FTP users may validate themselves with a clear-text sign-in protocol, normally in the form of a username and password, but can connect anonymously when the server is configured to allow it. For secure transmission which protects the username and password, and encrypts the content, FTP is often secured with SSL/TLS (FTPS) or replaced with SSH File Transfer Protocol (SFTP).

The first FTP client applications were command-line programs which were developed before operating systems had graphical user interfaces, and are still shipped with most Windows, Unix, and Linux operating systems. Many FTP clients and automation utilities have since been established for desktops, servers, mobile devices, and hardware, and FTP has been incorporated into productivity applications, such as HTML editors.

#### **Use of TelNet services**

It is an application protocol used on the Internet or local area network that provides a bidirectional interactive text-oriented communication facility while using a virtual terminal connection. User data is interspersed in-band with Telnet control information in an 8-bit byte oriented data connection over the Transmission Control Protocol (TCP).

Traditionally, Telnet provided access to a command-line interface on a remote host. However, because of serious security concerns when using Telnet over an open network such as the Internet, its use for this purpose has diminished considerably in favor of SSH.

The term telnet is also used to refer to the software that instruments the client part of the protocol. Telnet client applications are available for nearly all computer platforms. Telnet is also used as a verb. To telnet means to create a connection using the Telnet protocol, either with a command line client or with a graphical interface. For example, a common directive might be: "To change your password, telnet into the server, log in and run the passwd command." In most cases, a user would be telnetting into a Unix-like server system or a network device (such as a router).

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

A Local Area Network (LAN) delivers a quick, short link between network devices. Most homes and offices have a LAN which permits personal computers and workstations to easily distribute data between one another at a high rate of transfer. A LAN also empowers users to approach other devices, for example printers, modems, or local servers. They are privately preserved and managed and offer services to relatively small geographical areas. A LAN can serve as few as one user or as many as thousands. Since a LAN covers a small area, noise and error are minimized.

Both a Metropolitan Area Network (MAN) and Wide Area Network (WAN) caters network communications over larger geographical areas. The chief difference between the two lies within the size of the regions being served.

A Metropolitan Area Network is a class of network that serves a large geographical area between 5 to 50 kilometers in range. This geographical area can comprise several buildings, such as a college campus, occasionally referred to as a campus network, or an area as large as a city (metropolitan area).

These networks are much larger than a LAN, but smaller than a WAN, usually offering communications through fiber optic cable, and typically works within Layer 2, or the data link layer, of the OSI model. Typically, a MAN does not belong to any particular organization, but rather a conglomerate of users or a single network provider which takes charge of the service, owns its hardware and other equipment, and sells access to the network to end users. In this respect, levels of service must be considered and agreed upon between each user and the MAN provider.

A Wide Area Network provides coverage far greater than a MAN. A WAN connects LANs and MANS, example of a WAN being the Internet. While a WAN, which operates similarly to a MAN, can span the globe, a MAN is only capable of covering an area between 5 to 50 kilometers in range.

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

The Geometric representation of how the computers are connected to each other is referred as topology.

There are five types of topology in computer networks:

1. Mesh Topology
2. Star Topology
3. Bus Topology
4. Ring Topology
5. Hybrid Topology

In mesh topology every device is connected to every other device on the network through a devoted point-to-point link. It means that the link only carries data for the two connected devices only. If we have  $n$  devices in the network then each device must be connected with  $(n-1)$  devices of the network. Number of links in a mesh topology of  $n$  devices will be  $n(n-1)/2$ .

In star topology each device in the network is connected to a central device which is called hub. Unlike Mesh topology, star topology doesn't permit direct communication between devices, a device must have to communicate through a hub. If one device wants to send data to other device, it first sends the data to hub and then the hub transmit that data to the designated device.

In ring topology each device is linked with the two devices on either side of it. There are two dedicated points. This structure forms a ring, that is why it is known as ring topology. If a device wants to send data to another device then it sends the data in one direction, each device in ring topology has a repeater, if the received data is planned for other device then repeater advances this data until the intended device receives it.

A combination of two or more topologies is known as hybrid topology. For example a combination of star and mesh topology is known as hybrid topology.

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?

In computers, a storage medium is used to place, keep and retrieve electronic data. It refers to a physical device or component in a computing system that receives and preserves information relating to applications and users. The plural form is *storage media*.

Early forms of storage media comprised computer paper tape. Holes punched in the paper resembled to a single bit of data. A paper tape reader would translate each punched hole and convert it to a number. Paper tape was replaced by magnetic tape, which finally evolved to magnetic floppy disk.

Media used in computer storage collect messages in the form of data, through software commands from the computer system. The commands regulate the type of storage media needed to hold the data, based on its business value, submission implications or other factors. In tiered storage, data is moved among disk, flash and cloud storage based on automated software policies.

A storage medium may be internal to a computing device, such as a computer's hard drive, or a removable device such as an external hard drive or universal serial bus (USB) flash drive. There are different types of storage media, for example magnetic tape, non volatile memory cards, rotating fixed disk and solid-state drives (SSDs), based on non volatile flash memory. The term *storage* includes all data, and can be primary or secondary storage. Primary storage refers to data that is kept in memory for fast recovery by a computer's processor. Secondary storage is data placed on hard disk or tape to ensure backup and long-term retention.

A storage device may be a type of storage media, or a piece of storage hardware prepared with storage media. For example, storage arrays decouple storage media from servers. Storage arrays include electromechanical hard disk drives (HDDs), SSDs or a combination of each, attached to separate servers and networking.

Storage media can be arranged for access in many ways. Some well-known arrangements include:

network-attached storage (NAS); and

storage area network (SAN)

redundant array of independent disks (RAID)

A hard disk provides a high-capacity substitute to magnetic storage media. It comprises metal platters covered with a magnetic layer. The platters generally spin continuously when a computer is on, storing data in different sectors on the magnetic disk.

Magnetic disk remains the dominant media for backup storage appliances, active archives and long-term retention.

Optical disk technology uses lasers for write once, read many (WORM) data. The use of lasers allows high-density optical disk to store more data than magnetic HDDs. Examples include Blu-ray, DVDs and CD-ROMs for read-only data.

An SSD is installed in x86 computers to allow companies to use server-side flash as an alternate or helper to networked storage arrays.

Flash memory does not depend on moving mechanical parts. This gives flash devices advantages in speed over traditional disks. In flash memory, chunks of data must be erased to allow new data to be written to the microchip.

USB flash drives are also known as nearline storage, a storage medium that is not constantly connected to network servers or the internet. Usually, this makes most removable media, such as encrypted cartridges or SATA drives, safe from infection by Trojan horses, viruses or worms.