

6m

1. Explain the removable storage devices and their uses

Removable storage is an external media device that is used by a computer system to store data. Usually, these are referred to as the Removable Disks drives or the External Drives. Removable storage is any storage device that can be removed from a computer system while the system is running. Examples of external devices include CDs, DVDs, Blu-ray disk drives, and diskettes and USB drives. Removable storage makes it easier for a user to transfer data from one computer system to another.

The main benefit of removable disks in storage factors is that they can provide the fast data transfer rates associated with storage area networks (SANs). We have the following types of Removable Storage:

Optical discs (CDs, DVDs, Blu-ray discs)

Memory cards

Floppy disks

Magnetic tapes

Disk packs

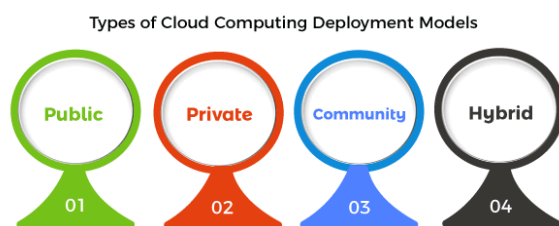
Paper storage (punched tapes, punched cards)

2. Write note on Cloud computing Deploying Model

It works as your virtual computing environment with a choice of deployment model depending on how much data you want to store and who has access to the Infrastructure.

Different Types Of Cloud Computing Deployment Models

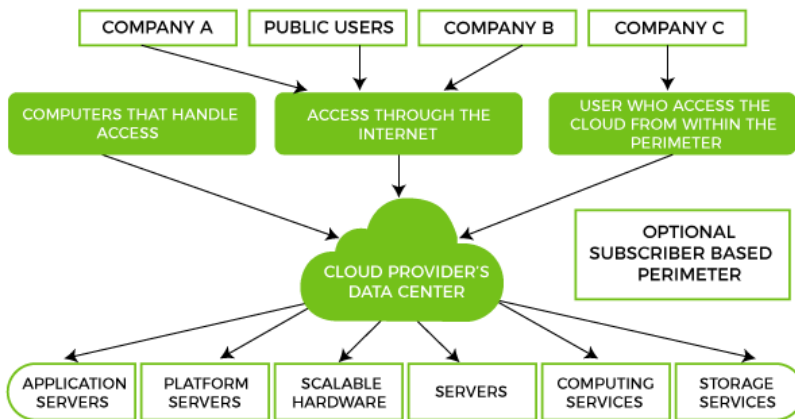
Most cloud hubs have tens of thousands of servers and storage devices to enable fast loading. It is often possible to choose a geographic area to put the data "closer" to users. Thus, deployment models for cloud computing are categorized based on their location. To know which model would best fit the requirements of your organization, let us first learn about the various types.



Public Cloud

The name says it all. It is accessible to the public. Public deployment models in the cloud are perfect for organizations with growing and fluctuating demands. It also makes a great choice for companies with low-security concerns. Thus, you pay a cloud service provider for networking services, compute virtualization & storage available on the public internet. It is also a great delivery model for the teams with development and testing. Its configuration and deployment are quick and easy, making it an ideal choice for test environments.

Public Cloud



Benefits of Public Cloud

Minimal Investment - As a pay-per-use service, there is no large upfront cost and is ideal for businesses who need quick access to resources

No Hardware Setup - The cloud service providers fully fund the entire Infrastructure

No Infrastructure Management - This does not require an in-house team to utilize the public cloud.

Limitations of Public Cloud

Data Security and Privacy Concerns - Since it is accessible to all, it does not fully protect against cyber-attacks and could lead to vulnerabilities.

Reliability Issues - Since the same server network is open to a wide range of users, it can lead to malfunction and outages

Service/License Limitation - While there are many resources you can exchange with tenants, there is a usage cap.

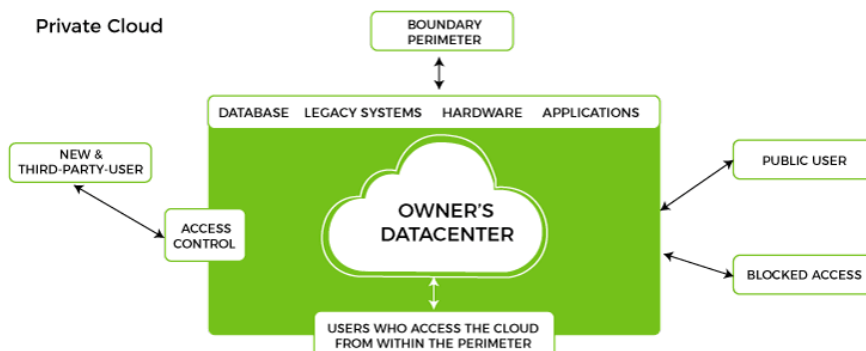
Private Cloud

Now that you understand what the public cloud could offer you, of course, you are keen to know what a private cloud can do. Companies that look for cost efficiency and greater control over data & resources will find the private cloud a more suitable choice.

It means that it will be integrated with your data center and managed by your IT team.

Alternatively, you can also choose to host it externally. The private cloud offers bigger opportunities that help meet specific organizations' requirements when it comes to customization. It's also a wise choice for mission-critical processes that may have frequently changing requirements.

Private Cloud



Benefits of Private Cloud

Data Privacy - It is ideal for storing corporate data where only authorized personnel gets access

Security - Segmentation of resources within the same Infrastructure can help with better access and higher levels of security.

Supports Legacy Systems - This model supports legacy systems that cannot access the public cloud.

Limitations of Private Cloud

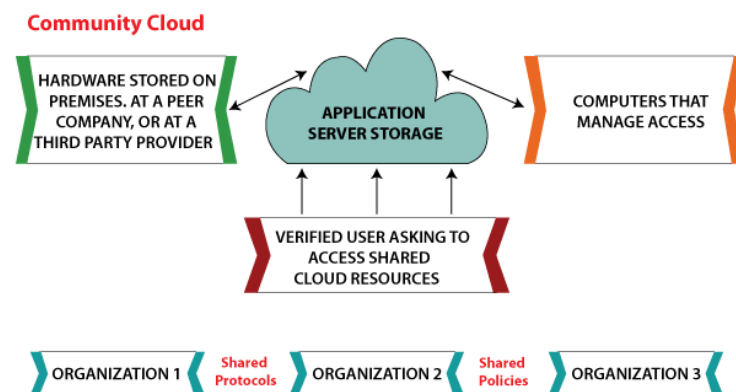
Higher Cost - With the benefits you get, the investment will also be larger than the public cloud. Here, you will pay for software, hardware, and resources for staff and training.

Fixed Scalability - The hardware you choose will accordingly help you scale in a certain direction

High Maintenance - Since it is managed in-house, the maintenance costs also increase.

Community Cloud

The community cloud operates in a way that is similar to the public cloud. There's just one difference - it allows access to only a specific set of users who share common objectives and use cases. This type of deployment model of cloud computing is managed and hosted internally or by a third-party vendor. However, you can also choose a combination of all three.



Benefits of Community Cloud

Smaller Investment - A community cloud is much cheaper than the private & public cloud and provides great performance

Setup Benefits - The protocols and configuration of a community cloud must align with industry standards, allowing customers to work much more efficiently.

Limitations of Community Cloud

Shared Resources - Due to restricted bandwidth and storage capacity, community resources often pose challenges.

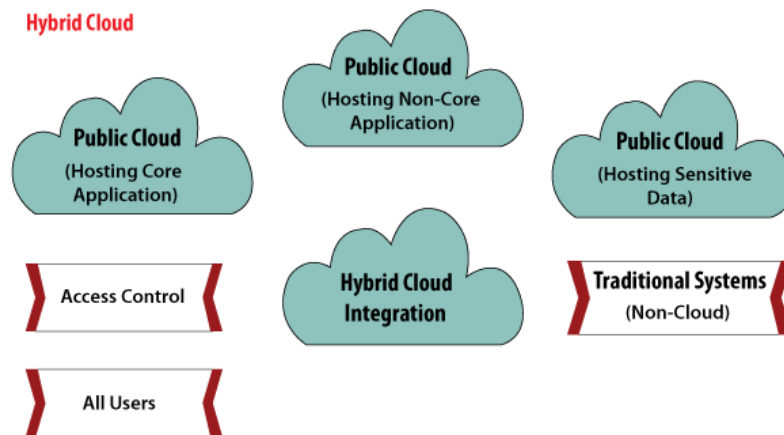
Not as Popular - Since this is a recently introduced model, it is not that popular or available across industries

Hybrid Cloud

As the name suggests, a hybrid cloud is a combination of two or more cloud architectures.

While each model in the hybrid cloud functions differently, it is all part of the same architecture. Further, as part of this deployment of the cloud computing model, the internal or external providers can offer resources.

Let's understand the hybrid model better. A company with critical data will prefer storing on a private cloud, while less sensitive data can be stored on a public cloud. The hybrid cloud is also frequently used for 'cloud bursting'. It means, supposes an organization runs an application on-premises, but due to heavy load, it can burst into the public cloud.



Benefits of Hybrid Cloud

Cost-Effectiveness - The overall cost of a hybrid solution decreases since it majorly uses the public cloud to store data.

Security - Since data is properly segmented, the chances of data theft from attackers are significantly reduced.

Flexibility - With higher levels of flexibility, businesses can create custom solutions that fit their exact requirements

Limitations of Hybrid Cloud

Complexity - It is complex setting up a hybrid cloud since it needs to integrate two or more cloud architectures

Specific Use Case - This model makes more sense for organizations that have multiple use cases or need to separate critical and sensitive data

A Comparative Analysis of Cloud Deployment Models

With the below table, we have attempted to analyze the key models with an overview of what each one can do for you:

Important Factors to Consider	Public	Private	Community	Hybrid
Setup and ease of use	Easy	Requires professional IT Team	Requires professional IT Team	Requires professional IT Team
Data Security and Privacy	Low	High	Very High	High
Scalability and flexibility	High	High	Fixed requirements	High
Cost-Effectiveness	Most affordable	Most expensive	Cost is distributed among members	Cheaper than private but more expensive than public
Reliability	Low	High	Higher	High

3. Elucidate on Cloud Computing Service Model

Cloud Service Models

There are the following three types of cloud service models -

Infrastructure as a Service (IaaS)

Platform as a Service (PaaS)

Software as a Service (SaaS)



Infrastructure as a Service (IaaS)

IaaS is also known as **Hardware as a Service (HaaS)**. It is a computing infrastructure managed over the internet. The main advantage of using IaaS is that it helps users to avoid the cost and complexity of purchasing and managing the physical servers.

Characteristics of IaaS

There are the following characteristics of IaaS -

Resources are available as a service

Services are highly scalable

Dynamic and flexible

GUI and API-based access

Automated administrative tasks

Example: DigitalOcean, Linode, Amazon Web Services (AWS), Microsoft Azure, Google Compute Engine (GCE), Rackspace, and Cisco Metacloud.

Platform as a Service (PaaS)

PaaS cloud computing platform is created for the programmer to develop, test, run, and manage the applications.

Characteristics of PaaS

There are the following characteristics of PaaS -

Accessible to various users via the same development application.

Integrates with web services and databases.

Builds on virtualization technology, so resources can easily be scaled up or down as per the organization's need.

Support multiple languages and frameworks.

Provides an ability to "**Auto-scale**".

Example: AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos, Magento Commerce Cloud, and OpenShift.

To know more about PaaS, [click here](#).

Software as a Service (SaaS)

SaaS is also known as "**on-demand software**". It is a software in which the applications are hosted by a cloud service provider. Users can access these applications with the help of internet connection and web browser.

Characteristics of SaaS

There are the following characteristics of SaaS -

Managed from a central location

Hosted on a remote server

Accessible over the internet

Users are not responsible for hardware and software updates. Updates are applied automatically.

The services are purchased on the pay-as-per-use basis

Example: BigCommerce, Google Apps, Salesforce, Dropbox, ZenDesk, Cisco WebEx, ZenDesk, Slack, and GoToMeeting.

To know more about the SaaS, [click here](#).

Difference between IaaS, PaaS, and SaaS

The below table shows the difference between IaaS, PaaS, and SaaS -

IaaS	Paas	SaaS
It provides a virtual data center to store information and create platforms for app development, testing, and deployment.	It provides virtual platforms and tools to create, test, and deploy apps.	It provides web software and apps to complete business tasks.
It provides access to resources such as virtual machines, virtual storage, etc.	It provides runtime environments and deployment tools for applications.	It provides software as a service to the end-users.
It is used by network architects.	It is used by developers.	It is used by end users.
IaaS provides only Infrastructure.	PaaS provides Infrastructure+Platform.	SaaS provides Infrastructure+Platform +Software.

4. Explain the characteristics of Cloud Computing.

On-demand self-services: The Cloud computing services does not require any human administrators, user themselves are able to provision, monitor and manage computing resources as needed.

Broad network access: The Computing services are generally provided over standard networks and heterogeneous devices.

Rapid elasticity: The Computing services should have IT resources that are able to scale out and in quickly and on as needed basis. Whenever the user require services it is provided to him and it is scale out as soon as its requirement gets over.

Resource pooling: The IT resource (e.g., networks, servers, storage, applications, and services) present are shared across multiple applications and occupant in an uncommitted manner. Multiple clients are provided service from a same physical resource.

Measured service: The resource utilization is tracked for each application and occupant, it will provide both the user and the resource provider with an account of what has been used. This is done for various reasons like monitoring billing and effective use of resource.

Multi-tenancy: Cloud computing providers can support multiple tenants (users or organizations) on a single set of shared resources.

Virtualization: Cloud computing providers use virtualization technology to abstract underlying hardware resources and present them as logical resources to users.

5. Elucidate on storage devices

A storage unit is a part of the computer system which is employed to store the information and instructions to be processed. A storage device is an integral part of the computer hardware which stores information/data to process the result of any computational work. Without a storage device, a computer would not be able to run or even boot up. Or in other words, we can say that a storage device is hardware that is used for storing, porting, or extracting data files. It can also store information/data both temporarily and permanently. Computer storage is of two types:

Primary Storage Devices: It is also known as internal memory and main memory. This is a section of the CPU that holds program instructions, input data, and intermediate results. It is generally smaller in size. RAM (Random Access Memory) and ROM (Read Only Memory) are examples of primary storage.

Secondary Storage Devices: Secondary storage is a memory that is stored external to the computer. It is mainly used for the permanent and long-term storage of programs and data. Hard Disk, CD, DVD, Pen/Flash drive, SSD, etc, are examples of secondary storage.

1. Primary storage devices

(i) RAM: It stands for Random Access Memory. It is used to store information that is used immediately or we can say that it is a temporary memory. Computers bring the software installed on a hard disk to RAM to process it and to be used by the user. Once, the computer is turned off, the data is deleted. With the help of RAM, computers can perform multiple tasks like loading applications, browsing the web, editing a spreadsheet, experiencing the newest game, etc.

SRAM: It stands for Static Random Access Memory. It consists of circuits that retain stored information as long as the power supply is on. It is also known as volatile memory. It is used to build Cache memory. The access time of SRAM is lower and it is much faster as compared to DRAM but in terms of cost, it is costly as compared to DRAM.

DRAM: It stands for Dynamic Random Access Memory. It is used to store binary bits in the form of electrical charges that are applied to capacitors. The access time of DRAM is slower as compared to SRAM but it is cheaper than SRAM and has a high packaging density.

SDRAM: It stands for Synchronous Dynamic Random Access Memory. It is faster than DRAM. It is widely used in computers and others. After SDRAM was introduced, the upgraded version of double data rate RAM, i.e., DDR1, DDR2, DDR3, and DDR4 was entered into the market and widely used in home/office desktops and laptops.

(ii) ROM: It stands for Read-Only Memory. The data written or stored in these devices are non-volatile, i.e, once the data is stored in the memory cannot be modified or deleted. The memory from which will only read but cannot write it. This type of memory is non-volatile. The information is stored permanently during manufacture only once. ROM stores instructions that are used to start a computer. This operation is referred to as bootstrap. It is also used in other electronic items like washers and microwaves. ROM chips can only store few megabytes (MB) of data, which ranges between 4 and 8 MB per ROM chip. There are two types of ROM:

PROM: PROM is Programmable Read-Only Memory. These are ROMs that can be programmed. A special PROM programmer is employed to enter the program on the PROM. Once the chip has been programmed, information on the PROM can't be altered. PROM is non-volatile, that is data is not lost when power is switched off.

EPROM: Another sort of memory is that the Erasable Programmable Read-Only Memory. It is possible to erase the info which has been previously stored on an EPROM and write new data onto the chip.

2. Magnetic Storage Devices

(i) Floppy Disk: It is also known as a floppy diskette. It is generally used on a personal computer to store data externally. A Floppy disk is made up of a plastic cartridge and secured with a protective case. Nowadays floppy disk is replaced by new and effective storage devices like USB, etc.

(ii) Hard Disk: It is a storage device (HDD) that stores and retrieves data using magnetic storage. It is a non-volatile storage device that can be modified or deleted n number of times without any problem. Most of the computers and laptops have HDDs as their secondary storage device. It is actually a set of stacked disks, just like phonograph records. In every hard disk, the data is recorded electromagnetically in the concentric circles or we can say track present on the hard disk, and with the help of a head just like a phonograph arm (but fixed in a position) to read the information present on the track. The read-write speed of HDDs is not so fast but decent. It ranges from a few GBs to a few and more TB.

(iii) Magnetic Card: It is a card in which data is stored by modifying or rearranging the magnetism of tiny iron-based magnetic particles present on the band of the card. It is also known as a swipe card. It is used like a passcode (to enter into house or hotel room), credit card, identity card, etc.

(iv) Tape Cassette: It is also known as a music cassette. It is a rectangular flat container in which the data is stored in an analog magnetic tape. It is generally used to store audio recordings.

(v) SuperDisk: It is also called LS-240 and LS-120. It is introduced by Imation corporation and it is popular with OEM computers. It can store data up to 240 MB.

3. Flash memory Devices

It is a cheaper and portable storage device. It is the most commonly used device to store data because it is more reliable and efficient as compared to other storage devices. Some of the commonly used flash memory devices are:

(i) Pen Drive: It is also known as a USB flash drive that includes flash memory with an integrated USB interface. We can directly connect these devices to our computers and laptops and read/write data into them in a much faster and efficient way. These devices are very portable. It ranges from 1GB to 256GB generally.

(ii) SSD: It stands for Solid State Drive, a mass storage device like HDDs. It is more durable because it does not contain optical disks inside like hard disks. It needs less power as compared to hard disks, is lightweight, and has 10x faster read and write speed as compared to hard disks. But, these are costly as well. While SSDs serve an equivalent function as hard drives, their internal components are much different. Unlike hard drives, SSDs don't have any moving parts and thus they're called solid-state drives. Instead of storing data on magnetic platters, SSDs store data using non-volatile storage. Since SSDs haven't any moving parts, they do not need to "spin up". It ranges from 150GB to a few and more TB.

(iii) SD Card: It is known as a Secure Digital Card. It is generally used with electronic devices like phones, digital cameras, etc. to store larger data. It is portable and the size of the SD card is also small so that it can easily fit into electronic devices. It is available in different sizes like 2GB, 4GB, 8GB, etc.

(iv) Memory Card: It is generally used in digital cameras, printers, game consoles, etc. It is also used to store large amounts of data and is available in different sizes. To run a memory card on a computer you require a separate memory card reader.

(v) Multimedia Card: It is also known as MMC. It is an integrated circuit that is generally used in-car radios, digital cameras, etc. It is an external device to store data/information.

4. Optical Storage Devices

Optical Storage Devices is also a secondary storage device. It is a removable storage device. Following are some optical storage devices:

(i) CD: It is known as Compact Disc. It contains tracks and sectors on its surface to store data. It is made up of polycarbonate plastic and is circular in shape. CD can store data up to 700MB. It is of two types:

CD-R: It stands for Compact Disc read-only. In this type of CD, once the data is written can not be erased. It is read-only.

CD-RW: It stands for Compact Disc read Write. In this type of CD, you can easily write or erase data multiple times.

(ii) DVD: It is known as Digital Versatile Disc. DVDs are circular flat optical discs used to store data. It comes in two different sizes one is 4.7GB single-layer discs and another one is 8.5GB double-layer discs. DVDs look like CDs but the storage capacity of DVDs is more than as compared to CDs. It is of two types:

DVD-R: It stands for Digital Versatile Disc read-only. In this type of DVD, once the data is written can not be erased. It is read-only. It is generally used to write movies, etc.

DVD-RW: It stands for Digital Versatile Disc read Write. In this type of DVD, you can easily write or erase data multiple times.

(iii) Blu-ray Disc: It is just like CD and DVD but the storage capacity of blu ray is up to 25GB. To run a Blu-ray disc you need a separate Blu-ray reader. This Blu-ray technology is used to read a disc from a blue-violet laser due to which the information is stored in greater density with a longer wavelength.

5. Cloud and Virtual Storage

Nowadays, secondary memory has been upgraded to virtual or cloud storage devices. We can store our files and other stuff in the cloud and the data is stored for as long as we pay for the cloud storage. There are many companies that provide cloud services largely Google, Amazon, Microsoft, etc. We can pay the rent for the amount of space we need and we get multiple benefits out of it. Though it is actually being stored in a physical device located in the data centers of the service provider, the user doesn't interact with the physical device and its maintenance. For example, Amazon Web Services offers AWS S3 as a type of storage where users can store data virtually instead of being stored in physical hard drive devices. These sorts of innovations represent the frontier of where storage media goes.

6. Enumerate types of hard disks

A hard drive is a non-volatile hardware component on a computer that acts as the storage for all digital content. It holds program files, documents, pictures, videos, music, and more.

These names come from the way they connect to the computer. So, there are PATA hard drives, SATA hard drives, SCSI hard drives, and NVMe drives.

In this article, I'm now going to elaborate on each of these interfaces and types of hard drives as concisely as possible.

Parallel Advanced Technology Attachment (PATA)

The PATA interfaces were first introduced to the market by Compaq and Western Digital in 1986. They can have up to 80GB capacity and transfer data as fast as 133 MB/S.

They were named Parallel Advanced Technology Attachment because they use a parallel ATA interface to connect to the computer. Apart from PATA, they are also called Integrated Drive Electronics (IDE) and Enhanced Integrated Drive Electronics (EIDE).

PATA interfaces are made of mechanical moving parts and are based on parallel signaling technology – meaning they transmit multiple bits of data simultaneously.

Serial Advanced Technology Attachment (SATA)

In recent times, a lot of desktop and laptop computers have gotten SATA interfaces because they have superseded PATA interfaces in size, power consumption, and even better pricing. The mode of connection to a computer remains the same as PATA, but instead of parallel signaling technology for data transmission, they use serial signaling technology. This means that they transfer data one bit at a time.

A notable advantage SATA interfaces have over PATA interfaces is the transmission of data at a rate of 150 – 300 MB/S. In addition, they have thinner cables and a cable limit of 1 meter.

Small Computer System Interface (SCSI)

SCSI interface is an upgrade over SATA and PATA interfaces for many reasons such as round-the-clock operations, speed, storage, and several others.

For connection, SCSI hard drives use a small computer system interface – which is a standard for connecting peripheral devices such as printers, scanners, and others.

Best of all, they allow the connection of peripheral devices such as printers, scanners, and other hard drives. In addition, they transmit data at 320 MB/S and you can connect them internally or externally.

Connections through SCSI on personal computers have now been replaced by the Universal Serial BUS (USB). This means that SCSI is no longer used as consumer hardware.

NVMe (Non-volatile Memory Express)

NVMe interface is a revolution. It is built for high demanding and computing-intensive tasks. So, it is an upgrade over the interfaces already discussed.

Because of its high performance and scalability, you'll find it mostly in data centers and newer computers. There are now SSDs using the NVMe interface.

Its many advantages over other interfaces are:

- lower power consumption

- multiple command queues

- reduced latency and input/output overhead – leading to better performance

- utilization of CPU to full potential

One of the disadvantages of NVMe interfaces is that they're more expensive than other interfaces.

7. Write a note on functions of client operating system

Client Operating System (OS)

Client operating system is a system which works within computer desktops and other portable devices such as laptops and smartphones. Operating systems that are installed on the client's *computer device like PC, Laptop are called client OS.*

This operating system helps computers to run.

Client OS manages different hardware components that are connected to printers, monitors and cameras.

It supports a single user at a time.

It is also capable of obtaining services from a server operating system.

When compared to a server operating system it helps in providing multiprocessing power for a minimum price.

The examples of client operating systems are – Windows, Mac.

8. Differentiate the functions of server and client operating system

Server Operating System	Client Operating System
It can be used to provide services to multiple client.	It can obtain services from a server.
It can serve multiple client at a time.	It serves a single user at a time.
It is complex operating system.	It is simple operating system.
It runs on the server.	It runs on the client devices like laptop, computer etc.
It is an operating system that is designed to be used on server.	It is an operating system that operates within desktop.
It provides more security.	It provides less security.
It has greater processing power.	It has less processing power.
It is more stable.	It is less stable.
It is highly efficient.	It is less efficient.
Examples: Red Hat, Linux.	Examples: Windows, Android.

99. Give the importance of re-building a PC.

Advantages of Building a PC

Here are some of the top benefits of building a PC:

Cheaper Long-Term. Initially, building a PC is always more expensive than buying a pre-built machine. When purchasing components individually, however, they are often better in quality than the bulk-ordered components that go into pre-built computers. This leads to an overall better build quality that makes the computer have a longer lifespan. Building a PC will actually save you money in the long run, because you will likely not need to replace or repair components as often as with a pre-built.

Easier to Fix. When a component fails inside a PC you built, it is easier to identify because you are more familiar with each part. When you buy individual computer components, they often come with extra spare parts that pre-built computers do not. These additional parts can sometimes save you from costly repair bills or unnecessary tech support visits.

Better Overall Quality. If peak performance is your goal, build a PC. Building a PC allows you to handpick every component that goes into your machine. When you have total control over your computer's internal components, the final product can have a better overall build quality. Pre-built PCs often focus on just a CPU or GPU and fill the rest of the computer with cheaper, less desirable components.

10.Kerberos provides a centralized authentication server whose function is to authenticate users to servers and servers to users. In Kerberos Authentication server and database is used for client authentication. Kerberos runs as a third-party trusted server known as the Key Distribution Center (KDC). Each user and service on the network is a principal.

The main components of Kerberos are:

Authentication Server (AS):

The Authentication Server performs the initial authentication and ticket for Ticket Granting Service.

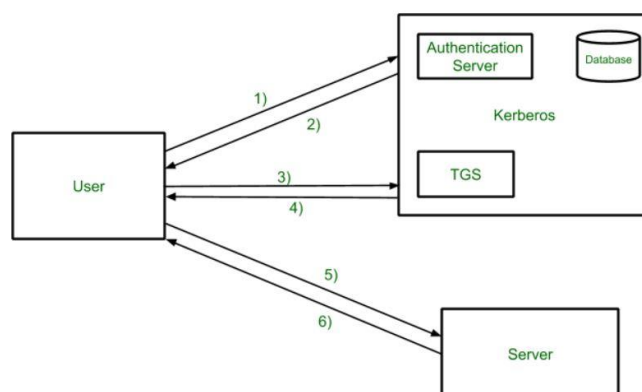
Database:

The Authentication Server verifies the access rights of users in the database.

Ticket Granting Server (TGS):

The Ticket Granting Server issues the ticket for the Server

Kerberos Overview:



Step-1:

User login and request services on the host. Thus user requests for ticket-granting service.

Step-2:

Authentication Server verifies user's access right using database and then gives ticket-granting-ticket and session key. Results are encrypted using the Password of the user.

Step-3:

The decryption of the message is done using the password then send the ticket to Ticket Granting Server. The Ticket contains authenticators like user names and network addresses.

Step-4:

Ticket Granting Server decrypts the ticket sent by User and authenticator verifies the request then creates the ticket for requesting services from the Server.

Step-5:

The user sends the Ticket and Authenticator to the Server.

Step-6:

The server verifies the Ticket and authenticators then generate access to the service. After this User can access the services.

Kerberos Limitations

Each network service must be modified individually for use with Kerberos

It doesn't work well in a timeshare environment

Secured Kerberos Server

Requires an always-on Kerberos server

Stores all passwords are encrypted with a single key

Assumes workstations are secure

May result in cascading loss of trust.

Scalability

11.

Database security is the technique that protects and secures the database against intentional or accidental threats. Security concerns will be relevant not only to the data resides in an organization's database: the breaking of security may harm other parts of the system, which may ultimately affect the database structure. Consequently, database security includes hardware parts, software parts, human resources, and data. To efficiently do the uses of security needs appropriate controls, which are distinct in a specific mission and purpose for the system. The requirement for getting proper security while often having been neglected or overlooked in the past days; is now more and more thoroughly checked by the different organizations.

We consider database security about the following situations:

Theft and fraudulent.

Loss of confidentiality or secrecy.

Loss of data privacy.

Loss of data integrity.

Loss of availability of data.

These listed circumstances mostly signify the areas in which the organization should focus on reducing the risk that is the chance of incurring loss or damage to data within a database. In some conditions, these areas are directly related such that an activity that leads to a loss in one area may also lead to a loss in another since all of the data within an organization are interconnected.

12. contents and importance of Database

The various reasons a database is important are –

Manages large amounts of data

A database stores and manages a large amount of data on a daily basis. This would not be possible using any other tool such as a spreadsheet as they would simply not work.

Accurate

A database is pretty accurate as it has all sorts of build in constraints, checks etc. This means that the information available in a database is guaranteed to be correct in most cases.

Easy to update data

In a database, it is easy to update data using various Data Manipulation languages (DML) available. One of these languages is SQL.

Security of data

Databases have various methods to ensure security of data. There are user logins required before accessing a database and various access specifiers. These allow only authorised users to access the database.

Data integrity

This is ensured in databases by using various constraints for data. Data integrity in databases makes sure that the data is accurate and consistent in a database.

Easy to research data

It is very easy to access and research data in a database. This is done using Data Query Languages (DQL) which allow searching of any data in the database and performing computations on it.

13. Elucidate on Multi-tenancy model.

Multitenancy in Cloud computing Multitenancy is a type of software architecture where a single software instance can serve multiple distinct user groups. It means that multiple customers of cloud vendors are using the same computing resources. As they are sharing the same computing resources but the data of each Cloud customer is kept separate and secure. It is a very important concept of Cloud Computing.

Multitenancy is also a shared host where the same resources are divided among different customers in cloud computing.

For Example :

The example of multitenancy is the same as working of Bank. Multiple people can store money in the same Bank. But every customer asset is different. One customer cannot access the other customer's money and account, and different customers are not aware of each other's account balance and details, etc.

Advantages of Multitenancy :

The use of Available resources is maximized by sharing resources.

Customer's Cost of Physical Hardware System is reduced, and it reduces the usage of physical devices and thus power consumption and cooling cost savings.

Save Vendor's cost as it becomes difficult for a cloud vendor to provide separate Physical Services to each individual.

Disadvantages of Multitenancy :

Data is stored in third-party services, which reduces our data security and puts it into vulnerable conditions.

Unauthorized access will cause damage to data.

Each tenant's data is not accessible to all other tenants within the cloud infrastructure and can only be accessed with the permission of the cloud provider.

14.

What Is a Black Box Model?

In science, computing, and engineering, a black box is a device, system, or object which produces useful information without revealing any information about its internal workings. The explanations for its conclusions remain opaque or “black.”

Financial analysts, hedge fund managers, and investors may use software that is based on a black-box model in order to transform data into a useful investment strategy.

Advances in computing power, artificial intelligence, and machine learning capabilities are causing a proliferation of black box models in many professions, and are adding to the mystique surrounding them.

Black box models are eyed warily by potential users in many professions. As one physician writes in a paper about their uses in cardiology: "Black box is shorthand for models that are sufficiently complex that they are not straightforwardly interpretable to humans." ¹

KEY TAKEAWAYS

A black box model receives inputs and produces outputs but its workings are unknowable.

Black box models are increasingly used to drive decision-making in the financial markets.

Technology advances, particularly in machine learning capabilities, make it impossible for a human mind to analyze or understand precisely how black box models produce their conclusions.

The opposite of a black box is a white box. Its results are transparent and can be analyzed by the user.

The term black box model can be easily misused and may merely reflect a need to protect proprietary software or a desire to avoid clear explanations.

15. Elucidate on static storage devices

Static storage devices are electronic devices that store data without the need for power. This means that they retain data even when they are turned off or disconnected from a power source. There are several types of static storage devices, including:

Solid-State Drives (SSDs): SSDs use NAND-based flash memory to store data. They are faster and more reliable than traditional hard disk drives (HDDs), and they have no moving parts, making them more durable.

USB Flash Drives: USB flash drives are small, portable storage devices that use NAND-based flash memory to store data. They are commonly used for transferring files between devices or as a backup storage device.

Memory Cards: Memory cards are small, removable storage devices commonly used in digital cameras, smartphones, and other electronic devices. They use NAND-based flash memory to store data and come in various sizes and formats, such as SD, microSD, and CompactFlash.

Read-Only Memory (ROM): ROM is a type of non-volatile memory that contains data that cannot be modified. It is commonly used to store firmware, such as the BIOS on a computer or the operating system on a smartphone.

Static storage devices have several advantages over dynamic storage devices, such as hard disk drives (HDDs) and random-access memory (RAM). They are faster, more durable, and require less power. However, they are also generally more expensive and have lower storage capacity compared to dynamic storage devices.

16. Explain different input systems in a computer.

Following are some of the important input devices which are used in a computer –

Keyboard

Mouse

Joy Stick

Light pen

Track Ball

Scanner

Graphic Tablet

Microphone

Magnetic Ink Card Reader(MICR)

Optical Character Reader(OCR)

Bar Code Reader

Optical Mark Reader(OMR)

Keyboard

Keyboard is the most common and very popular input device which helps to input data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions. Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.

Mouse

Mouse is the most popular pointing device. It is a very famous cursor-control device having a small palm size box with a round ball at its base, which senses the movement of the mouse and sends corresponding signals to the CPU when the mouse buttons are pressed.

Generally, it has two buttons called the left and the right button and a wheel is present between the buttons. A mouse can be used to control the position of the cursor on the screen, but it cannot be used to enter text into the computer.



Advantages

Easy to use

Not very expensive

Moves the cursor faster than the arrow keys of the keyboard.

Joystick

Joystick is also a pointing device, which is used to move the cursor position on a monitor screen. It is a stick having a spherical ball at its both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions.



The function of the joystick is similar to that of a mouse. It is mainly used in Computer Aided Designing (CAD) and playing computer games.

Light Pen

Light pen is a pointing device similar to a pen. It is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube.



When the tip of a light pen is moved over the monitor screen and the pen button is pressed, its photocell sensing element detects the screen location and sends the corresponding signal to the CPU.

Track Ball

Track ball is an input device that is mostly used in notebook or laptop computer, instead of a mouse. This is a ball which is half inserted and by moving fingers on the ball, the pointer can be moved.



Since the whole device is not moved, a track ball requires less space than a mouse. A track ball comes in various shapes like a ball, a button, or a square.

Scanner

Scanner is an input device, which works more like a photocopy machine. It is used when some information is available on paper and it is to be transferred to the hard disk of the computer for further manipulation.



Scanner captures images from the source which are then converted into a digital form that can be stored on the disk. These images can be edited before they are printed.

Digitizer

Digitizer is an input device which converts analog information into digital form. Digitizer can convert a signal from the television or camera into a series of numbers that could be stored in a computer. They can be used by the computer to create a picture of whatever the camera had been pointed at.



Digitizer is also known as Tablet or Graphics Tablet as it converts graphics and pictorial data into binary inputs. A graphic tablet as digitizer is used for fine works of drawing and image manipulation applications.

Microphone

Microphone is an input device to input sound that is then stored in a digital form.



The microphone is used for various applications such as adding sound to a multimedia presentation or for mixing music.

Magnetic Ink Card Reader (MICR)

MICR input device is generally used in banks as there are large number of cheques to be processed every day. The bank's code number and cheque number are printed on the cheques with a special type of ink that contains particles of magnetic material that are machine readable.



This reading process is called Magnetic Ink Character Recognition (MICR). The main advantages of MICR is that it is fast and less error prone.

Optical Character Reader (OCR)

OCR is an input device used to read a printed text.



OCR scans the text optically, character by character, converts them into a machine readable code, and stores the text on the system memory.

Bar Code Readers

Bar Code Reader is a device used for reading bar coded data (data in the form of light and dark lines). Bar coded data is generally used in labelling goods, numbering the books, etc. It may be a handheld scanner or may be embedded in a stationary scanner.



Bar Code Reader scans a bar code image, converts it into an alphanumeric value, which is then fed to the computer that the bar code reader is connected to.

Optical Mark Reader (OMR)

OMR is a special type of optical scanner used to recognize the type of mark made by pen or pencil. It is used where one out of a few alternatives is to be selected and marked.



17.

In computer networks, Ticket Granting Ticket (TGT) is a type of ticket used in the Kerberos authentication protocol to authenticate users and grant them access to network resources.

When a user logs in to a Kerberos-enabled network, they are issued a TGT by the Kerberos Authentication Server (AS). The TGT is encrypted with the user's password and contains the user's identity and a session key that will be used to encrypt subsequent communication with the network.

Once the user has obtained a TGT, they can request a Service Ticket (ST) from the Ticket Granting Server (TGS) for a specific network resource. The TGS verifies the user's identity and the validity of the TGT, and then issues a Service Ticket encrypted with a session key specific to that resource. The user can then use the Service Ticket to access the requested resource.

The use of TGTs provides several benefits, including:

Single Sign-On: Once a user has obtained a TGT, they can access multiple network resources without having to provide their credentials again.

Security: The use of encrypted tickets and session keys helps to prevent unauthorized access to network resources.

Scalability: The use of TGTs and STs allows for efficient and scalable authentication of users and resources in large networks.

Overall, TGTs are an important part of the Kerberos authentication protocol and are widely used in enterprise networks to provide secure and efficient access to network resources.

19. Explain RAM. Explain its mechanism.

RAM (Random Access Memory) is the internal memory of the CPU for storing data, program, and program result. It is a read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased.



Access time in RAM is independent of the address, that is, each storage location inside the memory is as easy to reach as other locations and takes the same amount of time. Data in the RAM can be accessed randomly but it is very expensive.

RAM is volatile, i.e. data stored in it is lost when we switch off the computer or if there is a power failure. Hence, a backup Uninterruptible Power System (UPS) is often used with computers. RAM is small, both in terms of its physical size and in the amount of data it can hold.

RAM is of two types –

Static RAM (SRAM)

Dynamic RAM (DRAM)

Static RAM (SRAM)

The word **static** indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not be refreshed on a regular basis.

There is extra space in the matrix, hence SRAM uses more chips than DRAM for the same amount of storage space, making the manufacturing costs higher. SRAM is thus used as cache memory and has very fast access.

Characteristic of Static RAM

Long life

No need to refresh

Faster

Used as cache memory

Large size

Expensive

High power consumption

Dynamic RAM (DRAM)

DRAM, unlike SRAM, must be continually **refreshed** in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory as it is cheap and small. All DRAMs are made up of memory cells, which are composed of one capacitor and one transistor.

Characteristics of Dynamic RAM

Short data lifetime

Needs to be refreshed continuously

Slower as compared to SRAM

Used as RAM

Smaller in size

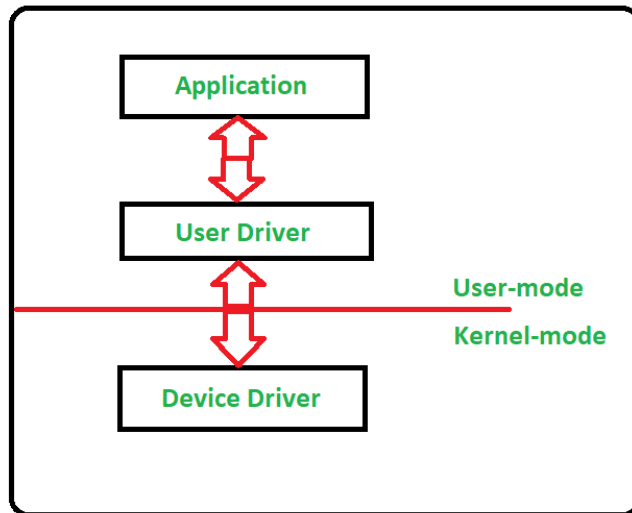
Less expensive

Less power consumption

20. Describe Device Drivers.

Device Driver in computing refers to a special kind of software program or a specific type of software application that controls a specific hardware device that enables different hardware devices to communicate with the computer's Operating System. A device driver communicates with the computer hardware by computer subsystem or computer bus connected to the hardware.

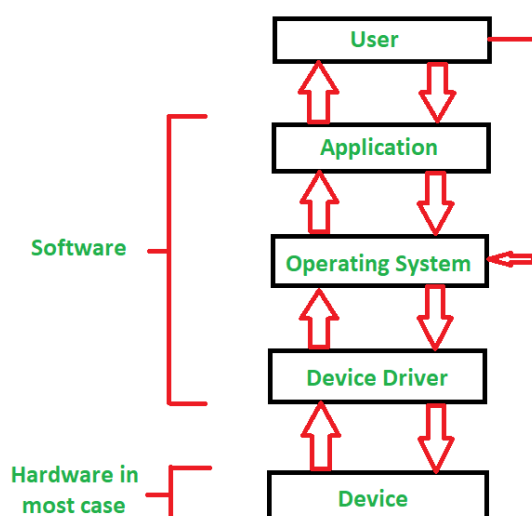
Device Drivers are essential for a computer system to work properly because without a device driver the particular hardware fails to work accordingly, which means it fails in doing the function/action it was created to do. Most use the term **Driver**, but some may say **Hardware Driver**, which also refers to the **Device Driver**.



Working of Device Driver:

Device Drivers depend upon the Operating System's instruction to access the device and perform any particular action. After the action, they also show their reactions by delivering output or status/message from the hardware device to the Operating system. For example, a printer driver tells the printer in which format to print after getting instruction from OS, similarly, A sound card driver is there due to which 1's and 0's data of the MP3 file is converted to audio signals and you enjoy the music. Card reader, controller, modem, network card, sound card, printer, video card, USB devices, RAM, Speakers, etc need Device Drivers to operate.

The following figure illustrates the interaction between the user, OS, Device driver, and the devices:



Types of Device Driver:

For almost every device associated with the computer system there exist a Device Driver for the particular hardware. But it can be broadly classified into two types i.e.,

Kernel-mode Device Driver –

This Kernel-mode device driver includes some generic hardware that loads with the operating system as part of the OS these are BIOS, motherboard, processor, and some other hardware that are part of kernel software. These include the minimum system requirement device drivers for each operating system.

User-mode Device Driver –

Other than the devices which are brought by the kernel for working the system the user also brings some devices for use during the using of a system that devices need device drivers to function those drivers fall under User mode device driver. For example, the user needs any plug-and-play action that comes under this.

Virtual Device Driver:

There are also virtual device drivers(VxD), which manage the virtual device. Sometimes we use the same hardware virtually at that time virtual driver controls/manages the data flow from the different applications used by different users to the same hardware.

It is essential for a computer to have the required device drivers for all its parts to keep the system running efficiently. Many device drivers are provided by manufacturers from the beginning and also we can later include any required device driver for our system.

21. Active Directory is a **directory service** or container which stores data objects on your local network environment. The service records data on **users, devices, applications, groups, and devices** in a hierarchical structure.

The structure of the data makes it possible to find the details of resources connected to the network from one location. In essence, Active Directory acts like a phonebook for your network so you can look up and manage devices easily.

What does Active Directory do?

There are many reasons why enterprises use directory services like Active Directory. The main reason is convenience. Active Directory enables users to log on to and manage a variety of resources from one location. Login credentials are unified so that it is easier to manage multiple devices without having to enter account details to access each individual machine.

10 Marks

1. Write a detail note on Display Arrays (All forms).

A display array, also known as a matrix display, is a type of electronic display that consists of a grid of individual pixels arranged in rows and columns. There are several forms of display arrays, including:

LED Display Arrays: LED (Light Emitting Diode) display arrays use an array of individual LEDs to create a display. They are commonly used in large outdoor displays and signs, as well as smaller indoor displays such as digital clocks and calculator displays.

LCD Display Arrays: LCD (Liquid Crystal Display) arrays use an array of liquid crystal cells to create a display. They are commonly used in electronic devices such as smartphones, televisions, and computer monitors.

OLED Display Arrays: OLED (Organic Light Emitting Diode) display arrays use an array of organic LEDs to create a display. They are commonly used in high-end smartphones and televisions, as well as in virtual reality and augmented reality devices.

Plasma Display Arrays: Plasma display arrays use an array of tiny cells containing a mixture of gases to create a display. They are commonly used in large flat-screen televisions and are known for their high contrast and deep blacks.

E-Paper Display Arrays: E-paper (Electronic Paper) display arrays use a special type of display technology that mimics the appearance of ink on paper. They are commonly used in e-readers and other electronic devices that require a low-power, high-contrast display.

Display arrays have several advantages over traditional displays, including their ability to display high-resolution images and video, their low power consumption, and their ability to display a wide range of colors. They are also highly customizable, with the ability to create displays of various shapes and sizes. However, they can be more expensive than traditional displays and may have limited viewing angles or poor performance in extreme temperatures.

2.

System files are essential files that are required for the operating system to function properly. These files contain instructions, settings, and configuration information that are used by the operating system and other software programs installed on a computer. The boot process is the process that a computer goes through when it is turned on, and it involves loading the operating system and other essential files into memory.

System Files:

There are several types of system files, including:

Boot files: These files are required to boot the operating system and include the boot loader, the Master Boot Record (MBR), and the Boot Configuration Data (BCD).

Device drivers: These files allow the operating system to communicate with hardware devices, such as printers, graphics cards, and network adapters.

Configuration files: These files contain settings and preferences for the operating system and other software programs, such as the Registry in Windows and the configuration files in Linux.

Dynamic Link Libraries (DLLs): These files contain reusable code and functions that can be shared by multiple software programs.

System executables: These are programs that are required for the operating system to function properly, such as the Task Manager in Windows and the Terminal in Linux.

Boot Process:

The boot process typically involves several stages, including:

Power-On Self-Test (POST): When a computer is turned on, it performs a POST to test the hardware components and ensure that they are functioning properly.

Boot loader: The boot loader is a program that loads the operating system into memory. It is typically stored in the MBR of the hard drive or on a separate boot partition.

Kernel initialization: The kernel is the core of the operating system, and it is loaded into memory by the boot loader. Once the kernel is loaded, it initializes the hardware devices and other essential components of the operating system.

User mode initialization: After the kernel has initialized, the operating system loads other essential files and programs, such as device drivers and configuration files.

Login screen: Once the operating system has loaded, it displays a login screen or desktop environment, depending on the configuration.

Overall, system files and the boot process are critical components of an operating system, and they ensure that a computer can function properly and run the software programs that users rely on.

3. Explain briefly about the functions of Seven Operating System

Functions of Operating Systems

Let us discuss the function of the operating system (OS) in detail.

Security

The operating system uses a password protection to protect user data it also prevents unauthorized access to programs and user data, but for external functionality we need to install malware software to protect the system.

Control over system performance

The operating system monitors overall system setup to help in improving the performance and it also records the response time between service requests and system response so that it has a

complete view of the system. This can help improve performance by providing important information that is needed at the time of troubleshooting problems.

Job Accounting

Operating systems always keep track of time and resources that are used by various tasks and users, this information can be used to track resource usage for a particular user or a group of users.

Error detecting aids

Operating systems constantly monitor the system which helps us to detect errors and also avoid the malfunctioning of computer systems.

Coordination between other software and users

Operating systems help in coordinate and assign interpreters, compilers, assemblers, and other software to the various users of the computer systems.

Memory Management

The operating system controls the primary memory or main memory. Primary memory is a large array of bytes or words where each byte or word is assigned a certain address. It is a fast storage, and it can be accessed directly by the CPU which is present inside the system. If a program wants to be executed, it should be first loaded in the main memory.

The following activities are performed by operating system for memory management –

- It keeps track of primary memory.
- Memory addresses that have already been allocated and the memory addresses of the memory that has not yet been used.
- In multiprogramming, the OS decides for how long the process must stay and the order in which processes are granted access to memory.
- It allocates the memory to a process when the process requests it and deallocates the memory when the process has terminated.

Processor Management

The OS manages the order in which processes have access to the processor, and how much processing time that each process must stay in the multiprogramming environment. This is called process scheduling.

The following activities are performed by operating system for processor management –

- Keeps track of the status of processes.
- The program to track the status is known as traffic controller.
- It allocates the CPU and deallocates the processor when it is not required.

Device Management

An OS manages device communication through respective drivers.

The following activities are performed by the operating system for device management.

- Keeping track of all devices connected to the system.
- The OS designates a program that is responsible for every device which is called the Input/output controller.
- It decides which process gets access to which device and for how long. It then allocates the devices in an effective and efficient way and de-allocates devices when they are not required.

File Management

A file system is arranged into directories for efficient navigation and usage. These directories contain other directories and other files.

The following activities are performed by operating system for file management activities –

- It keeps track of where information is stored, user access settings and status of every file and more.
- These facilities are called the file system.

4. Write a note on computer hardware. Explain its functions.

Computer hardware is a physical device of computers that we can see and touch. For e.g. Monitor, CPU, Mouse, Joystick, etc. Using these devices, we can control computer operations like input and output. These hardware components are further divided into the following categories, which are:

Input Devices

Output Devices

Storage Devices

Internal Components

Input Devices

Input devices are those devices with the help of which the user interacts with the computer. Or, In other words, with the help of input devices, the user enters the data or information into the computer. This information or data is accepted by the input devices and converted into a computer acceptable format, which is further sent to the computer system for processing.

Now we discuss some input devices:

1. Keyboard: It is the most common and main input device for computers. The data is inputted by typing on the keyboard. It consists of 104 keys in total. It contains numeric keys, alphabet keys, and different function keys as well. Earlier, it was connected to the computer via cable, now as the technology has advanced, so you can connect a keyboard using Bluetooth.

2. Mouse: A mouse is a kind of pointing device which is rolled over to control the cursor on the screen and it has functional keys like left, middle, and right buttons. Using these functional keys, on by the click of which an object is selected or to open a file by just click of a mouse. It also consists of a sensor inside which notifies its speed to the computer and according to which the cursor is moved on the screen.

3. Scanner: As the name suggests, it scans images, documents, etc., and converts them into digital form and that can be further edited and used. It works just like a Xerox machine.

4. Track Ball: It is a device much like an upside-down mouse. It does not use much space for a movement like a mouse. As the trackball remains stationary and the user moves the ball in various directions, it affects the screen movements directly.

5. Light Pen: It is a light-sensitive device and it is touched to the CRT screen where it can detect, raster on the screen as it passes by and, with the help of this user can draw anything like lines, figures or any objects.

6. Microphone: It is a kind of voice input system which can be attached to a computer system to record sounds. It converts human speech or voice into electrical signals. This electrical signal is processed by the computer and the word is recognized.

7. Optical Character Reader: It is used to detect alphanumeric characters that are written or printed on paper using a low-frequency light source. This light is absorbed by the dark areas and reflected by the light areas, now this reflected light is received by the photocells. It is like a scanner.

8. Bar Code Reader: It is used to read bar codes and convert them into electric pulse which will further processed by the computer. Here, the bar code is data that is coded into white and black lines(or light and dark lines).

Output Devices

These are the devices that are used to display the output of any task given to the computer in human-readable form.

Now we discuss some output devices:

1. Monitor: Monitor is the main output device. It is also called VDU(visual display unit) and it looks like a TV screen. The Monitor displays the information from the computer. It is used to display text, video, images, etc.

2. Printer: A printer is an output device that transfers data from the computer in a printed format by using text or images on paper. There are both colored and black & white printers. Further, there are also different types of printers, like Laser Printer, Dot-matrix printers, and Inkjet printers.

3. Plotter: It is similar to a printer but plotters are large in size. A plotter is used to generate large drawings, architectural blueprints, etc. on paper and these are high-quality images and drawings and large in size.

4. Speakers: It is a very common output device and it gives sound as an output. It is generally used to play music or anything having sound.

Storage Devices

There are some devices that are used for storage purposes and are known as secondary storage devices. Some of them were discussed below:

1. CD (Compact disc): A CD is circular in shape and made up of thin platted glass and plastic polycarbonate material. It has a storage capacity of 600 MB to 700 MB of data. It has a standard size of 12 cm with a hole in the center of about 1.5 cm and 1.2 mm in thickness.

There are basically 3 types of CDs, which are:

CD-ROM (CD – Read Only Memory): Contents of this type of CD cannot be erased by the user. Only the publisher is allowed to access the data imprinted on this CD. It is basically used for commercial purposes like for a music album or any application packages by a software company.

CD-R (CD-Recordable): In this, content or data can be stored once. After that, they can be read many times but the data or content cannot be rewritten or erased. (Kind of one-time use)

CD-RW(CD-Rewritable): As the name suggests, this type of CD is used to rewrite the content or erase previous content and again write new content many times.

2. DVD(Digital Video/Versatile Disc): A DVD is same like a CD but with some more features. A DVD comes in single and dual-layer format. It has much greater storage capacity in comparison to CD. The storage capacity of a DVD with one sided single layer is – 4.7 GB, one sided double layer – 8.5 GB, double sided single layer – 9.4 GB, double sided double layer – 17 GB. There are also some types in DVD, which are :

DVD-ROM: In this type, the contents of the DVD cannot be written on or erased by the user. This is used for applications and database for distributing them in large amounts.

DVD-R / DVD+R: DVD-R (DVD minus R) and DVD+R (DVD plus R) are two different kinds of discs and they are once recordable format. Also, they have no difference virtually.

DVD-RW / DVD+RW: This is a kind of rewritable disc and it allows up to 1,000 rewrites.

DVD-RAM: It is accessed like a hard disk. It provides high data security and storage capacity. This is a kind of rewritable disc and it allows up to 1,00,000 rewrites.

3. Hard Disk: An hard disk is a non-volatile storage device that uses its read/write heads to store digital data on a magnetic surface of a rigid plate. It is generally 3.5 inches in size for desktops and 2.5 inches in size for laptops. A hard disk can be classified further into 3 types, which are:

Internal Hard Disk: It has a common storage capacity stated as GB or TB. A system case or cabinet is the place where it is located. It can perform faster operations and its storage is fixed. It is mainly used to store large data files and programs.

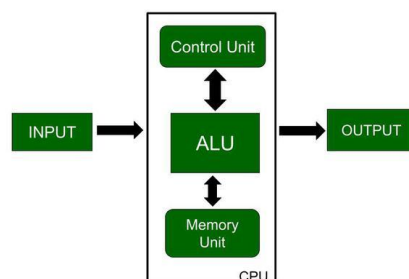
Internal Cartridges: As the Internal hard disk can't be removed from the system cabinet easily. To resolve this problem Internal Cartridges are introduced. So, Internal cartridges are easy to remove CDs. It has a storage capacity of 2 GB to 160 GB. It is used as an alternative for an internal hard disk.

Hard Disk Packs: It is used by organizations such as banks, government sector organizations to store large amounts of data. It has a storage capacity of range PB (Peta Bytes).

Internal Components

Some important hardware devices known as the internal components are discussed below:

1. CPU (Central Processing Unit): CPU is also known as the heart of the computer. It consists of three units, in general known as the control unit, Arithmetic Logical Unit (ALU), and the memory unit. Below is the block diagram of CPU is given:



As shown in the diagram input is given to the CPU through input devices. This input goes to memory and the control unit gets instructions from memory. Control unit now decide what to do with the input or instructions and transfer it to ALU. Now, ALU performs various operations like addition, subtraction, multiplication, division, and logical operations, etc. After that, the final result gets stored in a memory and finally passed to output devices to give the output. So, this is how the CPU works.

2. Motherboard: It is the main circuit board inside a computer and it contains most of the electronic components together. All the components of the computer are directly or indirectly connected to the motherboard. It includes RAM slots, controllers, system chipset, etc.

3. RAM (Random Access Memory): It is also known as temporary or volatile memory. It holds the program and data, which are currently in process or processing. All the data is erased as soon as the computer is turned off or in case of a power failure. Data stored in this memory can be changed. There are two types of RAM:-

SRAM (Static RAM): It basically consists of flip-flop using transistor or Mosfet (MOS). It is fast and has less access time. In this refreshing circuits are not required. But it is costly and requires more space. For e.g. cache memory.

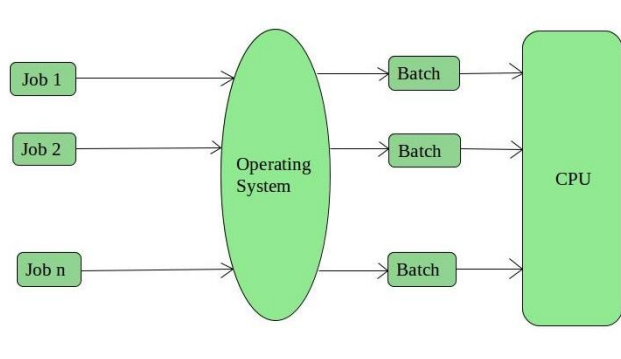
DRAM (Dynamic RAM): It consists of capacitors and the Data is stored in the form of capacitors. Capacitors charges when data is 1 and don't charge if data is 0. It requires refreshing circuits, as leakage of current in the capacitor can occur, so they need to be refreshed to the data. It is slower and has a higher access time. It is cheaper in comparison with SRAM. For e.g. Main memory.

5. What is Operating system? Explain its types? Explain with an illustration.

An Operating System performs all the basic tasks like managing files, processes, and memory. Thus operating system acts as the manager of all the resources, i.e. **resource manager**. Thus, the operating system becomes an interface between user and machine.

Types of Operating Systems: Some widely used operating systems are as follows-

1.	Batch	Operating	System	–
This type of operating system does not interact with the computer directly. There is an operator which takes similar jobs having the same requirement and group them into batches. It is the responsibility of the operator to sort jobs with similar needs.				



Advantages of Batch Operating System:

It is very difficult to guess or know the time required for any job to complete. Processors of the batch systems know how long the job would be when it is in queue

Multiple users can share the batch systems

The idle time for the batch system is very less

It is easy to manage large work repeatedly in batch systems

Disadvantages of Batch Operating System:

The computer operators should be well known with batch systems

Batch systems are hard to debug

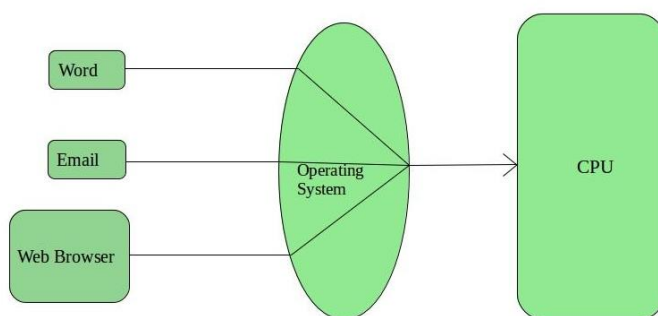
It is sometimes costly

The other jobs will have to wait for an unknown time if any job fails

Examples of Batch based Operating System: Payroll System, Bank Statements, etc.

2. Time-Sharing Operating Systems –

Each task is given some time to execute so that all the tasks work smoothly. Each user gets the time of CPU as they use a single system. These systems are also known as Multitasking Systems. The task can be from a single user or different users also. The time that each task gets to execute is called quantum. After this time interval is over OS switches over to the next task.



Advantages of Time-Sharing OS:

Each task gets an equal opportunity

Fewer chances of duplication of software

CPU idle time can be reduced

Disadvantages of Time-Sharing OS:

Reliability problem

One must have to take care of the security and integrity of user programs and data

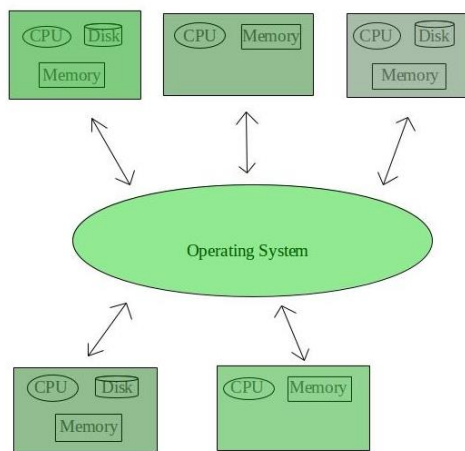
Data communication problem

Examples of Time-Sharing OSs are: Multics, Unix, etc.

3. Distributed Operating System –

These types of the operating system is a recent advancement in the world of computer technology and are being widely accepted all over the world and, that too, with a great pace. Various autonomous interconnected computers communicate with each other using a shared communication network. Independent systems possess their own memory unit and CPU.

These are referred to as **loosely coupled systems** or distributed systems. These system's processors differ in size and function. The major benefit of working with these types of the operating system is that it is always possible that one user can access the files or software which are not actually present on his system but some other system connected within this network i.e., remote access is enabled within the devices connected in that network.



Advantages of Distributed Operating System:

Failure of one will not affect the other network communication, as all systems are independent from each other

Electronic mail increases the data exchange speed

Since resources are being shared, computation is highly fast and durable

Load on host computer reduces

These systems are easily scalable as many systems can be easily added to the network

Delay in data processing reduces

Disadvantages of Distributed Operating System:

Failure of the main network will stop the entire communication

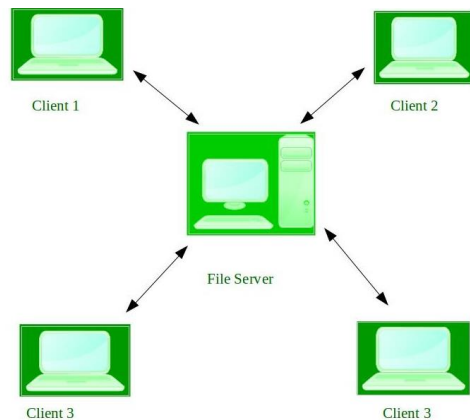
To establish distributed systems the language which is used are not well defined yet

These types of systems are not readily available as they are very expensive. Not only that the underlying software is highly complex and not understood well yet

Examples of Distributed Operating System are- LOCUS, etc.

4. Network Operating System –

These systems run on a server and provide the capability to manage data, users, groups, security, applications, and other networking functions. These types of operating systems allow shared access of files, printers, security, applications, and other networking functions over a small private network. One more important aspect of Network Operating Systems is that all the users are well aware of the underlying configuration, of all other users within the network, their individual connections, etc. and that's why these computers are popularly known as **tightly coupled systems**.



Advantages of Network Operating System:

Highly stable centralized servers

Security concerns are handled through servers

New technologies and hardware up-gradation are easily integrated into the system

Server access is possible remotely from different locations and types of systems

Disadvantages of Network Operating System:

Servers are costly

User has to depend on a central location for most operations

Maintenance and updates are required regularly

Examples of Network Operating System are: Microsoft Windows Server 2003, Microsoft Windows Server 2008, UNIX, Linux, Mac OS X, Novell NetWare, and BSD, etc.

5. Real-Time Operating System –

These types of OSs serve real-time systems. The time interval required to process and respond to inputs is very small. This time interval is called **response time**.

Real-time systems are used when there are time requirements that are very strict like missile systems, air traffic control systems, robots, etc.

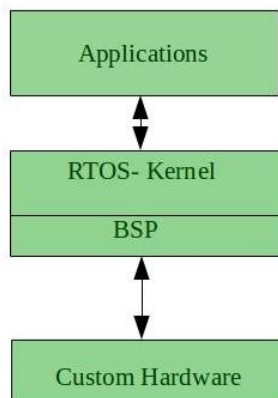
Two types of Real-Time Operating System which are as follows:

Hard Real-Time Systems:

These OSs are meant for applications where time constraints are very strict and even the shortest possible delay is not acceptable. These systems are built for saving life like automatic parachutes or airbags which are required to be readily available in case of any accident. Virtual memory is rarely found in these systems.

Soft Real-Time Systems:

These OSs are for applications where for time-constraint is less strict.



Advantages of RTOS:

Maximum Consumption: Maximum utilization of devices and system, thus more output from all the resources

Task Shifting: The time assigned for shifting tasks in these systems are very less. For example, in older systems, it takes about 10 microseconds in shifting one task to another, and in the latest systems, it takes 3 microseconds.

Focus on Application: Focus on running applications and less importance to applications which are in the queue.

Real-time operating system in the embedded system: Since the size of programs are small, RTOS can also be used in embedded systems like in transport and others.

Error Free: These types of systems are error-free.

Memory Allocation: Memory allocation is best managed in these types of systems.

Disadvantages of RTOS:

Limited Tasks: Very few tasks run at the same time and their concentration is very less on few applications to avoid errors.

Use heavy system resources: Sometimes the system resources are not so good and they are expensive as well.

Complex Algorithms: The algorithms are very complex and difficult for the designer to write on.

Device driver and interrupt signals: It needs specific device drivers and interrupts signals to respond earliest to interrupts.

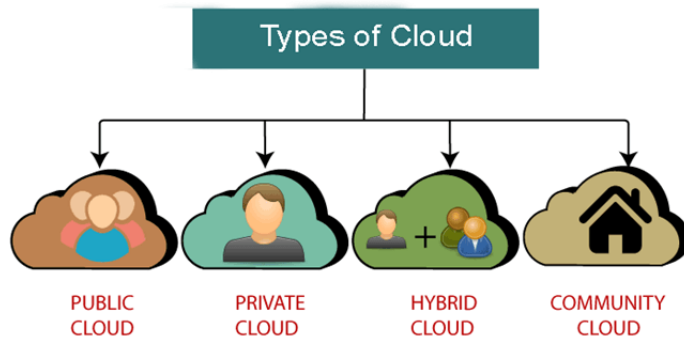
Thread Priority: It is not good to set thread priority as these systems are very less prone to switching tasks.

Examples of Real-Time Operating Systems are: Scientific experiments, medical imaging systems, industrial control systems, weapon systems, robots, air traffic control systems, etc.

6. Enumerate and explain types of Cloud computing.

ypes of Cloud

There are the following 4 types of cloud that you can deploy according to the organization's needs-



Public Cloud

Private Cloud

Hybrid Cloud

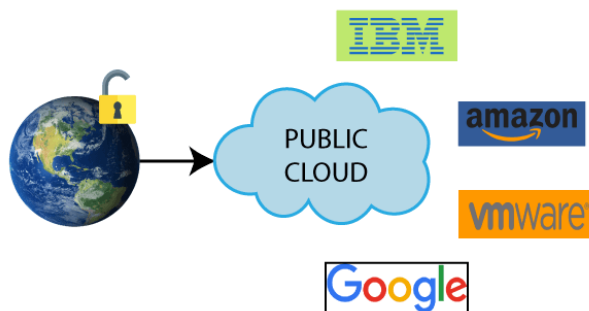
Community Cloud

Public Cloud

Public cloud is **open to all** to store and access information via the Internet using the pay-per-usage method.

In public cloud, computing resources are managed and operated by the Cloud Service Provider (CSP).

Example: Amazon elastic compute cloud (EC2), IBM SmartCloud Enterprise, Microsoft, Google App Engine, Windows Azure Services Platform.



Advantages of Public Cloud

There are the following advantages of Public Cloud -

Public cloud is owned at a lower cost than the private and hybrid cloud.

Public cloud is maintained by the cloud service provider, so do not need to worry about the maintenance.

Public cloud is easier to integrate. Hence it offers a better flexibility approach to consumers.

Public cloud is location independent because its services are delivered through the internet.

Public cloud is highly scalable as per the requirement of computing resources.

It is accessible by the general public, so there is no limit to the number of users.

Disadvantages of Public Cloud

Public Cloud is less secure because resources are shared publicly.

Performance depends upon the high-speed internet network link to the cloud provider.

The Client has no control of data.

To Read More [Click Here](#)

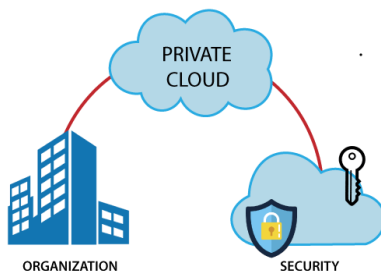
Private Cloud

Private cloud is also known as an **internal cloud** or **corporate cloud**. It is used by organizations to build and manage their own data centers internally or by the third party. It can be deployed using Opensource tools such as Openstack and Eucalyptus.

Based on the location and management, National Institute of Standards and Technology (NIST) divide private cloud into the following two parts-

On-premise private cloud

Outsourced private cloud



Advantages of Private Cloud

There are the following advantages of the Private Cloud -

Private cloud provides a high level of security and privacy to the users.

Private cloud offers better performance with improved speed and space capacity.

It allows the IT team to quickly allocate and deliver on-demand IT resources.

The organization has full control over the cloud because it is managed by the organization itself. So, there is no need for the organization to depend on anybody.

It is suitable for organizations that require a separate cloud for their personal use and data security is the first priority.

Disadvantages of Private Cloud

Skilled people are required to manage and operate cloud services.

Private cloud is accessible within the organization, so the area of operations is limited.

Private cloud is not suitable for organizations that have a high user base, and organizations that do not have the prebuilt infrastructure, sufficient manpower to maintain and manage the cloud.

To Read More [Click Here](#)

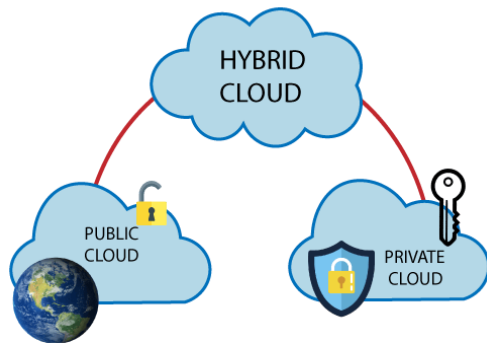
Hybrid Cloud

Hybrid Cloud is a combination of the public cloud and the private cloud. we can say:

Hybrid Cloud = Public Cloud + Private Cloud

Hybrid cloud is partially secure because the services which are running on the public cloud can be accessed by anyone, while the services which are running on a private cloud can be accessed only by the organization's users.

Example: Google Application Suite (Gmail, Google Apps, and Google Drive), Office 365 (MS Office on the Web and One Drive), Amazon Web Services.



Advantages of Hybrid Cloud

There are the following advantages of Hybrid Cloud -

Hybrid cloud is suitable for organizations that require more security than the public cloud.

Hybrid cloud helps you to deliver new products and services more quickly.

Hybrid cloud provides an excellent way to reduce the risk.

Hybrid cloud offers flexible resources because of the public cloud and secure resources because of the private cloud.

Disadvantages of Hybrid Cloud

In Hybrid Cloud, security feature is not as good as the private cloud.

Managing a hybrid cloud is complex because it is difficult to manage more than one type of deployment model.

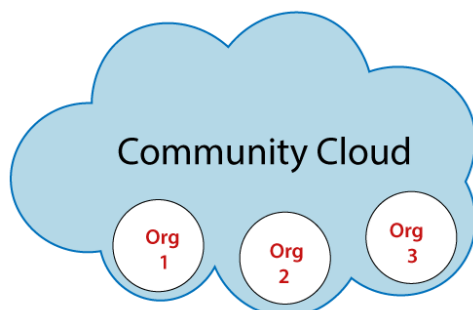
In the hybrid cloud, the reliability of the services depends on cloud service providers.

To Read More [Click Here](#)

Community Cloud

Community cloud allows systems and services to be accessible by a group of several organizations to share the information between the organization and a specific community. It is owned, managed, and operated by one or more organizations in the community, a third party, or a combination of them.

Example: Health Care community cloud



Advantages of Community Cloud

There are the following advantages of Community Cloud -

Community cloud is cost-effective because the whole cloud is being shared by several organizations or communities.

Community cloud is suitable for organizations that want to have a collaborative cloud with more security features than the public cloud.

It provides better security than the public cloud.

It provides collaborative and distributive environment.

Community cloud allows us to share cloud resources, infrastructure, and other capabilities among various organizations.

Disadvantages of Community Cloud

Community cloud is not a good choice for every organization.

Security features are not as good as the private cloud.

It is not suitable if there is no collaboration.

The fixed amount of data storage and bandwidth is shared among all community members.

To Read More [Click Here](#)

Difference between public cloud, private cloud, hybrid cloud, and community cloud -

The below table shows the difference between public cloud, private cloud, hybrid cloud, and community cloud.

Parameter	Public Cloud	Private Cloud	Hybrid Cloud	Community Cloud
Host	Service provider	Enterprise (Third party)	Enterprise (Third party)	Community (Third party)
Users	General public	Selected users	Selected users	Community members
Access	Internet	Internet, VPN	Internet, VPN	Internet, VPN
Owner	Service provider	Enterprise	Enterprise	Community

7. .Elucidate on Characteristics of Cloud Computing.

There are basically 5 essential characteristics of Cloud Computing.

On-demand self-services: The Cloud computing services does not require any human administrators, user themselves are able to provision, monitor and manage computing resources as needed

Broad network access: The Computing services are generally provided over standard networks and heterogeneous devices.

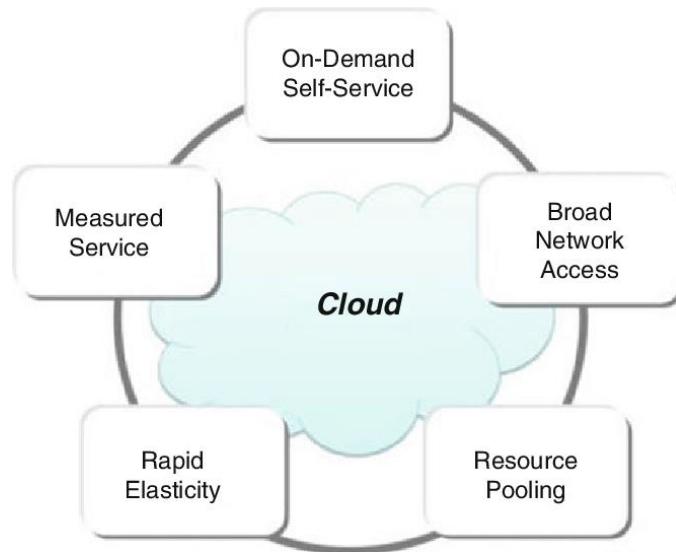
Rapid elasticity: The Computing services should have IT resources that are able to scale out and in quickly and on as needed basis. Whenever the user require services it is provided to him and it is scale out as soon as its requirement gets over.

Resource pooling: The IT resource (e.g., networks, servers, storage, applications, and services) present are shared across multiple applications and occupant in an uncommitted manner. Multiple clients are provided service from a same physical resource.

Measured service: The resource utilization is tracked for each application and occupant, it will provide both the user and the resource provider with an account of what has been used. This is done for various reasons like monitoring billing and effective use of resource.

Multi-tenancy: Cloud computing providers can support multiple tenants (users or organizations) on a single set of shared resources.

Virtualization: Cloud computing providers use virtualization technology to abstract underlying hardware resources and present them as logical resources to users.



9. Cloud computing is unsafe – Opine. (give at least 10 points)

What are the Security Risks of Cloud Computing

Cloud computing provides various advantages, such as improved collaboration, excellent accessibility, Mobility, Storage capacity, etc. But there are also security risks in cloud computing.

Some most common Security Risks of Cloud Computing are given below-

Data Loss

Data loss is the most common cloud security risks of cloud computing. It is also known as data leakage. Data loss is the process in which data is being deleted, corrupted, and unreadable by a user, software, or application. In a cloud computing environment, data loss occurs when our sensitive data is somebody else's hands, one or more data elements can not be utilized by the data owner, hard disk is not working properly, and software is not updated. Hacked Interfaces and Insecure APIs

As we all know, cloud computing is completely depends on Internet, so it is compulsory to protect interfaces and APIs that are used by external users. APIs are the easiest way to communicate with most of the cloud services. In cloud computing, few services are available in the public domain. These services can be accessed by third parties, so there may be a chance that these services easily harmed and hacked by hackers.

Data Breach

Data Breach is the process in which the confidential data is viewed, accessed, or stolen by the third party without any authorization, so organization's data is hacked by the hackers.

Vendor lock-in

Vendor lock-in is the of the biggest security risks in cloud computing. Organizations may face problems when transferring their services from one vendor to another. As different vendors provide different platforms, that can cause difficulty moving one cloud to another.

Increased complexity strains IT staff

Migrating, integrating, and operating the cloud services is complex for the IT staff. IT staff must require the extra capability and skills to manage, integrate, and maintain the data to the cloud.

Spectre & Meltdown

Spectre & Meltdown allows programs to view and steal data which is currently processed on computer. It can run on personal computers, mobile devices, and in the cloud. It can store the password, your personal information such as images, emails, and business documents in the memory of other running programs.

Denial of Service (DoS) attacks

Denial of service (DoS) attacks occur when the system receives too much traffic to buffer the server. Mostly, DoS attackers target web servers of large organizations such as banking sectors, media companies, and government organizations. To recover the lost data, DoS attackers charge a great deal of time and money to handle the data.

Account hijacking

Account hijacking is a serious security risk in cloud computing. It is the process in which individual user's or organization's cloud account (bank account, e-mail account, and social media account) is stolen by hackers. The hackers use the stolen account to perform unauthorized activities.

10. Write a detail note on printers and its types

What is Printer?

A printer is a hardware output device that is used to generate hard copy and print any document. A document can be of any type such as a text file, image, or the combination of both. It accepts input command by users on a computer or on other devices to print the documents. For example, if you have to submit a project report at your college, you need to create a soft copy of your report and print it with the help of the printer.



Printers are one of the common computer peripheral devices that can be classified into two categories that are **2D and 3D printers**. The 2D printers are used to print text and graphics on a paper, and 3D printers are used to create three dimensional physical objects.

Types of printer

Although there are different types of printers, nowadays, two types of printers are commonly used, which are inkjet and laser printers. A list of all the various types of printers is given below:

Inkjet Printers

Laser Printers

3D Printers

LED Printers

Solid Ink Printers

Dot Matrix Printers

Inkjet Printers

It is widely used by home and business computer users that prints characters by spraying the ink using magnetic plates on the paper. It contains a **paper feed assembly, ink cartridge, print head, stabilizer bar, and belt**.

Play Video

It stores the ink in cartridges, and uses separate cartridge to print several types of color documents. These colors are a combination of **cyan, magenta, yellow, and black color**. These types of printers have the ability to create high-quality pictures with the help of vivid colors. Furthermore, the inkjet printers are more affordable and easier to use as compared to other printers.



Advantages of Inkjet Printers:

The Inkjet printers have the ability to produce high-quality output.

These printers are reasonably fast and easy to use.

Additionally, these types of printers do not take warm up time.

Disadvantages of Inkjet Printer:

It may take more time to print.

Its running cost is high.

It does not allow the highlighter marker.

Sometimes, it can produce a wrong warning of an empty cartridge.

Laser printers

The laser printer is one of the common personal computer printers. It was introduced in 1971, and after that it was developed at Xerox PARC by Gary Starkweather. It uses the laser or non-impact photocopier technology to print the text and images on the paper. Whenever it gets input to print any document, a laser beam draws the document on the selenium-coated drum with the help of electric charges.

When the drum is charged, it is rolled in toner (dry ink powder). The ink follows the image, which has charged on the drum. The ink is combined with the paper, including heat and pressure, then transferred on a chunk (piece) of paper.

When the document is printed, the excess toner is collected, and an electric charge is removed from the drum. Most of the laser printers are capable of printing only in monochrome. The monochrome laser printer is around ten times cheaper than a color laser printer.



Laserjet Printer

There are many differences between a laser printer and inkjet printer, such as:

The laser printer contains dry ink, while an inkjet contains **wet ink**.

An inkjet printer is approximately ten times more expensive than the laser printer as it requires replacing the ink very frequently.

If a paper is wet, the inkjet printer will print the document with blur, but the laser printer will print clear. The inkjet printer is suitable for printing fewer documents, while the laser printer has the ability to print more documents.

Advantages of a Laser printer:

These types of printers have a higher paper capacity.

It is less expensive than the inkjet printer.

It has the ability to print documents speedily.

Furthermore, it is able to increase productivity.

Disadvantages of a Laser printer:

Laser printers may need warm up time.

Laser printers are bulky as they required the laser technology and imaging drum.

It requires high voltage leads to small carbon emissions.

3D Printers

One of the best enhancements in the history of printing technology is the 3d printer, which was developed by **Chuck Hull** in **1984**. It produces 3D objects and items by using **quality resin**. It uses materials like plastics, polymers, metal alloys, or even food ingredients.

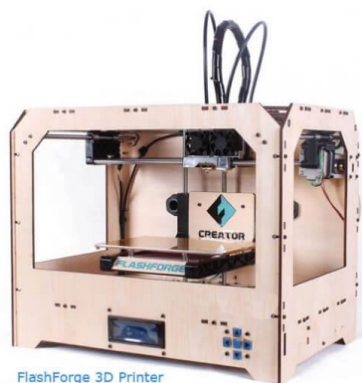


Application of 3D printers

There are many applications where 3D printers are used, such as **archaeology, aerospace engineering, information systems, dentistry, and biotechnology**. For example, it might be used to reconstruct ancient artifacts of archaeology physically, which have been destroyed with time.

How 3D printer works?

Generally, the design of an object starts in a computer-aided design (CAD) software system where its prototype is created. Then, the computer-aided design system sends this prototype to the printer in STL (stereolithography) file format. The printer then starts the process of recreating the object layer-by-layer after reading the prototype in cross-sections. The below image is a blueprint of 3d printer that is known as FlashForge.



Advantages of 3D printer:

The main advantage of a 3D printer is that it allows users to print objects in 3D .

It has the ability of full customization.

It is easy to access and cost-effective.

It prints the documents with better quality.

It provides users unlimited shapes and geometry.

Disadvantages of 3D printer:

Its initial and resin costs are high.

3D printing is still developing technology.

It consumes high energy around 50 to 100 more than injection molding.

It includes limited materials

The 3D printers are slow as they are limitless for mass customization.

LED Printers

The LED printer is mostly like a laser printer. It uses the drum, ink, and fuser system to print the black or colored documents. Initially, Casio and function developed the LED printers by focusing light throughout the whole length of the drum. These types of printers are non-impact, but instead of using a laser in the printhead they use a light-emitting diode. These printers were invented by the manufacturer OKI in 1989.



There is a difference between laser printers and LED printers; the LED printers use a strip of LEDs to create an ink-attracting static charge on the printing drum while laser printers use a laser and mirror. Although LED printers are not more popular as compared to inkjet and laser printer, they are gently gaining popularity as they provide users the unique benefits.

How LED printer works?

LED printers have a photoreceptive drum-like laser printer, which contain surface that is extremely charged with static electricity with the help of high voltage wire. In a laser printer, to draw an image or text from a circuit board, laser uses the data, which is sent to it that needs to be printed into a mirror and moves on its axis for transferring the beam on to the drum.

Whereas, in the LED printer, the negative static charge is produced by LEDs that may be located above or below the drum. The light that comes from the LED strikes the positively charged drum that erases the charge from the drum and produces a negative electrostatic charge. This charge attracts the positively charged toner particles, which stick to the negatively charged surface created by the LEDs.

When the paper enters the printer's mechanism, it gets positively charged with the help of high voltage wire and draw the toner from the negatively charged parts where it has stuck. Then, the paper moves between two heated rollers, and before it comes out from the printer, it carries the toner on the page.

Advantages of the LED printer:

The manufacturing of LED printers is cheaper than laser printers.

These types of printers mostly contain free warranty extensions.

These printers are capable of printing on thick 3D items.

Solid Ink Printers

A laser class solid ink printer is designed to save space and money on packaging. It uses a unique type of ink technology that is melted into a liquid before being used. As inkjet printers stream the ink directly on the paper, but solid ink printers are different as they stream the ink on the drum. Firstly, transferring the ink to the drum than to the printer is a better way to get a good color combination as a drum can be controlled appropriately than the moving paper. Xerox acquired the color printer division of Tektronix, Inc., in 2000. The solid ink printer was introduced in the market by Tektronix, Inc., with its crayonlike cartridges.

Advantages of solid ink printer:

The print quality of a solid ink printer is good as it produces dynamic colors and extraordinary print quality on a broad range of media like envelopes, recycled paper, transparencies, and cardstock.

The solid ink printers are easy to handle because these are made by non-toxic vegetable oils and do not melt in our hands. Unlike laser or inkjet printers, they do not spill or leak.

These types of printers are capable of printing the documents fast. Generally, it can print up to 30 pages per minute.

The ink loading in the solid printer is an easy as it includes sticks in particular shapes that only go to the correct slot. These types of printers contain the ink slot on the top of the printer, and they allow you to replace the ink at any time, including at the time of printing.

The solid ink printers are designed in that way; they comprise only three main assemblies, print drum, print head, and controller. It takes less space as compared to the color laser printer.

Furthermore, these printers and their parts are affordable than the color toner cartridges and color laser printers.

Disadvantages of a solid ink printer:

These printers may require warm-up and cool downtime.

These are sensitive to UV light, and color may fade under the sunlight with the time.

These printers consume more power than the laser printer

These printers are mainly used for a large numbers of printing. If it is turned off in the middle of the printing, it will take some time to warm up again.

Dot Matrix Printers

The dot matrix printers are also known as a pin printer that was released by **IBM in 1957**. Although, in 1970, Centronics created the first dot-matrix impact printer. It strikes an ink ribbon using print heads that place thousands of little dots to form images and text. Nowadays, as compared to laser and inkjet printers, it is less used, as its printing speed is slow and generates lower quality images. However, dot matrix printers are still in use in some sectors like package delivery companies and auto part stores.



Advantages of Dot matrix printer:

A dot matrix printer is less expensive as compared to most of the printers, and it is easily available in the market.

It has the ability to print carbon copies of a particular print out, unlike non-impact printers.

Its printing cost is lowest than the other printers.

Furthermore, its maintenance cost is less expensive than the other printers.

Disadvantages of Dot matrix printer:

The speed of the dot matrix printer is slow as compared to non-impact printers, and its output is also not of high resolution.

It creates high noise when the pins hit the ribbon to the paper.

It may be a time-consuming printer as it requires a single paper to wound up and aligned manually.

11. Explain the basics of files and directories, also give examples

In computing, a file is a collection of data or information that is stored on a computer's storage device. A directory, also known as a folder, is a container that holds files and other directories.

The following are some basic concepts of files and directories:

File: A file is a collection of data or information that is stored on a computer's storage device. A file can be of any type, such as a text file, image file, audio file, or video file. Each file has a unique name and extension, which identifies the file type. For example, "document.txt" is a text file, and "image.jpg" is an image file.

Directory: A directory is a container that holds files and other directories. A directory can be created to organize files into specific categories or to group related files together. Directories can be nested within other directories, forming a hierarchical structure. For example, a directory named "Documents" can contain other directories such as "Work," "School," and "Personal."

Path: A path is the location of a file or directory on a computer's storage device. A path can be either absolute or relative. An absolute path specifies the location of a file or directory from the root of the file system, while a relative path specifies the location of a file or directory relative to the current directory. For example, an absolute path on a Windows system might be "C:\Users\John\Documents\document.txt," while a relative path might be "Documents\document.txt."

File system: A file system is a method used by operating systems to organize and store files on a computer's storage device. Examples of file systems include NTFS, FAT32, and HFS+. A file system provides a hierarchical structure of directories and files, and it tracks the location of each file on the storage device.

Examples of files and directories include:

Documents folder: This is a directory that can contain various files such as text documents, spreadsheets, and presentations.

Music folder: This is a directory that can contain audio files such as MP3, WAV, and FLAC files.

Image.jpg: This is a file that contains an image in JPEG format.

Program.exe: This is a file that contains an executable program.

In summary, files and directories are basic concepts of computing that are used to organize and store data on a computer's storage device. Understanding how files and directories work is essential for managing and organizing files effectively.

12. Discuss the functioning of power on self-test of PC

The power on self-test (POST) is a diagnostic process that a computer performs when it is powered on. The purpose of the POST is to check that the essential hardware components of the computer are functioning correctly before the operating system (OS) is loaded. The POST checks various components such as the CPU, RAM, hard disk, and other hardware components to ensure that they are functioning correctly.

The following are the basic steps that occur during the POST process:

Power on: When the computer is powered on, the POST process is initiated.

CPU check: The POST first checks the CPU to ensure that it is working correctly. The CPU test involves checking that the CPU is properly seated, that its internal cache is functioning correctly, and that the CPU is running at the correct clock speed.

RAM check: The next step of the POST is to check the computer's RAM. This check involves verifying that all RAM modules are properly seated and that they are functioning correctly. The POST also checks the amount of RAM installed in the system to ensure that it matches the configuration in the BIOS.

Power supply check: The POST then checks the power supply to ensure that it is supplying the correct voltage to the system. This check involves verifying that the power supply is providing the correct voltages to the motherboard and that there are no voltage spikes or drops.

Peripheral check: The POST then checks various peripherals such as the hard disk, CD/DVD drive, and other devices to ensure that they are properly connected and functioning correctly.

BIOS check: Finally, the POST checks the BIOS to ensure that it is functioning correctly. The BIOS check involves verifying that the BIOS is properly configured and that it has the correct settings for the hardware components installed in the system.

If the POST process detects any errors, it will display an error message or beep code that indicates the source of the problem. The error message or beep code can help the user or technician diagnose the problem and take the appropriate steps to resolve it.

In summary, the power on self-test (POST) is a diagnostic process that a computer performs when it is powered on. The POST checks various hardware components to ensure that they are functioning correctly before the operating system (OS) is loaded. If any errors are detected during the POST process, the computer will display an error message or beep code that indicates the source of the problem.

13.

Loopback processing is a feature in Group Policy that allows administrators to apply user policies based on the computer that the user is logging on to, rather than the user's organizational unit (OU) or group membership. This is useful in scenarios where a computer is shared by multiple users and needs to have different policies applied depending on the user that is currently logged on.

In a typical Group Policy implementation, user policies are applied based on the user's location in the Active Directory OU structure, while computer policies are applied based on the location of the computer object in the Active Directory OU structure. This means that user policies are not affected by the location of the computer object, and vice versa. However, in some scenarios, administrators may need to apply user policies based on the computer that the user is logging on to.

Loopback processing can be enabled in two modes: Replace mode and Merge mode.

Replace mode: In this mode, the user policies that are applied to the computer object overwrite any user policies that are applied to the user object. This means that the user policies that are applied to the computer object are used for all users that log on to that computer.

For example, if a computer object has a Group Policy Object (GPO) that applies a screen saver policy to all users that log on to that computer, and the loopback processing is set to Replace mode, the screen saver policy for all users that log on to that computer will be the one defined in the GPO that is linked to the computer object.

Merge mode: In this mode, the user policies that are applied to the user object are combined with the user policies that are applied to the computer object. This means that both sets of user policies are applied to the user when they log on to that computer.

For example, if a user object has a GPO that applies a wallpaper policy, and the computer object has a GPO that applies a screen saver policy, and loopback processing is set to Merge mode, both the wallpaper policy and the screen saver policy will be applied to the user when they log on to that computer.

Loopback processing can be configured at the GPO level or the computer level, and it can be enabled for specific GPOs or for all GPOs that apply to a computer. It is important to note that loopback processing can have a significant impact on the user experience and can affect the performance of the computer, so it should be implemented carefully and only in scenarios where it is necessary.

14. Explain common computer ports.

A computer port is a connection point on a computer where peripherals, devices, or other computers can be plugged in or connected to transfer data, signals, and power. Here are some common computer ports:

USB (Universal Serial Bus) Port: USB ports are the most common ports found on computers today. They are used to connect a variety of peripherals such as printers, scanners, external hard drives, cameras, and other devices.

Ethernet Port: An Ethernet port is used to connect a computer to a wired network. It is commonly used to connect to the internet, local area network (LAN), or other devices on the network.

HDMI (High-Definition Multimedia Interface) Port: HDMI ports are used to connect computers to high-definition displays such as HDTVs, monitors, or projectors. It can transmit both audio and video signals.

VGA (Video Graphics Array) Port: VGA ports are used to connect computers to analog displays such as CRT monitors, older projectors, and some older HDTVs.

DisplayPort: DisplayPort is a digital display interface used to connect computers to high-definition displays such as monitors, projectors, or HDTVs. It can transmit both audio and video signals.

Audio Ports: Audio ports are used to connect speakers, headphones, microphones, and other audio devices to a computer. They include 3.5mm headphone jacks, microphone jacks, and line-in jacks.

Thunderbolt Port: Thunderbolt ports are used to connect high-speed peripherals such as external hard drives, monitors, and other devices to a computer. Thunderbolt ports support fast data transfer rates and can transmit both video and audio signals.

FireWire Port: FireWire ports are used to connect high-speed peripherals such as external hard drives, cameras, and other devices to a computer. They are similar to USB ports but offer faster data transfer rates.

Serial Port: Serial ports are used to connect legacy devices such as older printers, scanners, and modems to a computer. They are less common today and have been largely replaced by USB and Ethernet ports.

These are some of the most common computer ports. It is important to ensure that you have the appropriate ports available on your computer to connect the devices and peripherals you need.

15.

What are Serial Ports?

Serial Ports provide an interface to connect serial lines to prepare a serial communication. Serial ports are the types of computer ports through which the data bits are transmitted as a single stream of binary 0s and 1s in the form of electric signals. Serial ports provide only a single transmission path that can be a single wire, a pair of wires, or a single channel in case of wireless communication.

Serial ports are the oldest communication interfaces that are mainly used to connect printers and modem to the computer system. But in modern computers, serial ports are used to connect modern devices like flat-screen monitors, security cameras, GPS devices, etc. Serial ports are sometimes also called COM Ports (or Communication Ports).

A serial port uses a DB-9 connector, a 9-pin D-Shaped Connector which connects to the transmission line. A serial port provides serial communication using one line and thus has no dependency on other wire's speed and its length can be extended as per the need.

What are Parallel Ports?

A parallel port is another type of computer port to connect a peripheral device to the computer system. As its name implies, a parallel port can transmit multiple bits of data all together at the same time. Therefore, in the case of parallel ports, the rate of data transmission is relatively high as compared to series ports because these transmit data without any hold-up. Parallel ports are mainly used to connect those computer peripheral devices that require high bandwidth. The most common examples of such devices are printers, monitors, projectors, etc.

Parallel ports provide an interface to connect multiple lines to prepare a parallel communication to send large data at a time. Parallel ports are used in connecting printers, hard-drives, CD-drives, etc. All line's speed should be the same to avoid error and cross-talk issues. To avoid such issues, the wires are kept small in length. A parallel port uses a D-25 connector, a 25 pin D-Shaped connector that connects to the transmission wires.

A **USB port** is a standard cable connection interface for personal computers and consumer electronics devices. USB stands for Universal Serial Bus, an industry standard for short-distance digital data communications. USB ports allow USB devices to be connected to each other with and transfer digital data over USB cables. They can also supply electric power across the cable to devices that need it.

Both wired and wireless versions of the USB standard exist, although only the wired version involves USB ports and cables.

