Q. 1) What is cloud ? Explain its feature and deployment model.

Ans :-

Cloud Computing :-

It is the practice of using a network of remote servers hosted on the internet to store, manage and process data, rather than a local server or a personal computer.

Cloud computing is the delivery of on-demand computing services over the internet on a pay-as-you-go basis

Features of cloud computing :-

1) Pay for what you use
   scale up = pay more
   scale down = pay less
2) No server space required
3) No experts required for hardware and software maintenance.
4) Better data security
5) Disaster recovery
6) High flexibility
7) Automatic software updates
8) Teams can collaborate from widespread locations.
9) Data can be accessed and shared anywhere over the internet.
10) Rapid implementation.

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Deployment Model of Cloud Computing :-

i) Public cloud
ii) Private cloud
iii) Hybrid cloud

1) Public Cloud :

The cloud infrastructure is made available to the general public over the internet and is owned by a cloud provider. e.g. AWS, Microsoft Azure, IBM's Blue cloud and sun cloud.

2) Private cloud :

The cloud infrastructure is exclusively operated by a single organization. It can be managed by the organization or a third party and may exist on-premise or off-premise. e.g. AWS, VMware.

3) Hybrid cloud :

It consists the functionalities of both public and private cloud e.g. federal agencies opt for private clouds when sensitive information is involved. Also, they use the public cloud to share datasets with general public or other goverment departments.

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Q. Q) What is virtualization ? What are the benefits and mechanism used for virtualization ?

Ans :- Virtualization :-

- When we use cloud computing, we are accessing pooled resources using a technique called virtualization.
- Virtualization assigns a logical name for a physical resource and then provides a pointer to that physical resource when a request is made.
- Virtualization provides a means to manage resources efficiently because the mapping of virtual resources to physical resources can be both dynamic and facile.
- Virtualization is dynamic in that the mapping can be assigned based on rapidly changing conditions, and it is facile because changes to a mapping assignment can be nearly instantaneous.
- These are among the different types of virtualization that are characteristic of cloud computing.

- Access : A client can request access to a cloud service from any location.

- Application : A cloud has multiple application instances and directs requests to an instance based on conditions.

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- CPU : Computers can be partitioned into a set of virtual machines with each machine being assigned a workload. Alternatively, systems can be virtualized through load-balancing technologies.

- Storage : Data is stored across storage devices and often replicated for redundancy.

- To enable these characteristics, resources must be highly configurable and flexible.
- We can define the features in software and hardware that enable this flexibility as conforming to one or more of the following mobility patterns :
  - P2V : Physical to Virtual
  - V2V : Virtual to Virtual
  - V2P : Virtual to Physical
  - P2P : Physical to Physical
  - D2C : Datacenter to cloud
  - C2C : Cloud to Cloud
  - C2D : Cloud to Datacenter
  - D2D : Datacenter to Datacenter.

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Q. 3) What are cloud deployment model ?

Ans :- Cloud Deployment Models :-

- A deployment model defines the purpose of the cloud and the nature of how the cloud is located.
- The NIST definition for the four deployment models is as follows :

1) Public cloud :

The public cloud infrastructure is available for public use alternatively for a large industry group and is owned by an organization selling cloud services.

2) Private cloud :

The private cloud infrastructure is operated for the exclusive use of an organization. The cloud may be managed by that organization or a third party. Private clouds may be either on- or -off- premises.

3) Hybrid cloud :

A Hybrid cloud combines multiple clouds (private, community of public) where those clouds retain their unique identities, but are bound together as a unit. A hybrid cloud may offer standardized or proprietary access to data and applications, as well as application portability.

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4) Community cloud :

A community cloud is one where the cloud has been organized to serve a common function or purpose.

- It may be for one organization or for several organizations, but they share common concerns such as their mission, policies, security, regulatory compliance needs, and so on.
- A community cloud may be managed by the constituent organization(s) or by a third party.

Q 4) Explain different types of hypervisor with example.

Ans : Hypervisor is mainly classified into two
1) Type 1 / Native / Bare Metal Hypervisor
2) Type 2 / Hosted Hypervisor.

Type 1 Hypervisor :

- This is also known as Bare Metal or Embedded or Native Hypervisor.
- It works directly on the hardware of the host and can monitor operating systems that run above the hypervisor
- It is completely independent from the operating system.

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- The hypervisor is small as its main task is sharing and managing hardware resources between different operating systems.
- A major advantage is that any problems in one virtual machine or guest operating system do not affect the other guest OS running on the hypervisor.
- Examples ; VMware ESXi Server, Microsoft Hyper-V, Citrix / Xen Server

Type 2 Hypervisor :

- This is also known as Hosted Hypervisor.
- In this case, the hypervisor is installed on an operating system and then supports other operating systems above it.
- It is completely dependent on host operating system for its operations
- While having a base operating system allows better specification of policies, any problems in the base operating system affects the entire system as well even if the hypervisor running above the base OS is secure.
- Examples : VMware Workstation, Microsoft Virtual PC, Oracle Virtual Box.

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Q. 5) What are the features of google file system.

Ans:

Features of Google file system are as follows:

1) GFS was designed for high fault tolerance.
2) Master and chunk servers can be restarted in a few seconds and with such a fast recovery capability, the window of time in which data is unavailable can be greatly reduced.
3) Each chunk is replicated at least three places and can tolerate at least two data crashes for a single chunk of data.
4) The shadow master handles the failure of the GFS master.
5) For data integrity, GFS makes checksums on every 64 kB block in each chunk.
6) GFS can achieve the goals of high availability, high performance and implementation.
7) It demonstrate how to support large scale processing workloads on commodity hardware designed to tolerate frequent component failures optimized for huge files that are mostly appended and read.

Q. 6) What is need of virtualization, define server virtualization, application virtualization and presentation virtualization.

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There are five major needs of virtualization which are described below:

1) Enhanced Performance :

Currently, the end user system i.e. pc is sufficiently powerful to fulfill all the basic computation requirements of the user, with various additional capabilities which are rarely used by the user.

2) Limited use of hardware & software resources :

The limited use of the resources leads to under utilization of hardware and software resources. An efficiency of IT infrastructure could be increase by using these resources after hours for other purposes.

3) Shortage of space :

The regular requirement of additional capacity, whether memory storage or compute power leads data centers raise rapidly. This leads to the diffusion of a technique which is known as server consolidation.

4) Eco-friendly initiatives :

At this time, corporations are actively seeking for various methods to minimize their expenditures on power which is consumed by their systems.

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5) Administrative costs :

The rise in demand for capacity surplus, that convert into more servers in a data center, accountable for a significant increase in administrative costs.

Server Virtualization :

Server virtualization is the masking of server resources, including the number and identity of individual physical servers, processors and operating servers system from server users. The server administrator uses a software application to divide one physical server into multiple isolated virtual environments. The virtual environment are sometimes called virtual private servers, but they are also known as guests, instances, containers or emulations.

Application Virtualization :

It is software technology that encapsulates computer programs from the underlying operating system on which it is executed. A fully virtualized application is not installed in the traditional sense. although it is still executed as if it were. The application behaves at runtime like it is directly interfacing with the original OS

and the resources managed by it, but can be isolated or sandboxed to varying degrees.

Presentation Virtualization :

Presentation virtualization is an application and desktop virtualization solution. It is a solution not only viable for large enterprises, but small and medium scale businesses and not-for-profit organizations. Presentation virtualization can reduce the cost of ownership, reduce energy costs, ease manageability and increase user productivity. It is a mature technology and remains the most deployed centralized desktop virtualization solution.

Q. 7) Compare bare metal hypervisor and hosted metal hypervisor.

	Bare metal hypervisor	Hosted metal hypervisor
i)	It is also known as Type 1 hypervisor	It is also known as Type 2 hypervisor.
ii)	It works directly on the hardware of the host & can monitor OS that run above the hypervisor.	In this case, hypervisor is installed on an ~~os~~ OS and then supports other operating system above it.

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	Bare metal hypervisor	Hosted metal hypervisor
iii)	It is completely independent from the operating system.	It is completely dependent on host operating system for its operation.
iv)	A major advantage is that any problems in one virtual machine or guest operating system do not affect the other guest OS running on the hypervisor	Any problems in the base operating system affect the entire system as well even if the hypervisor running above the base OS is secure.
v)	Interact directly with hardware layer	No direct interaction with the Hardware layer.
vi)	It will deliver much better performance than a Hosted hypervisor	Overall performance will depends upon the OS, which hosts these hypervisor.
vii)	Mostly used in Data-centre virtualization solutions	Useful for virtual lab environments and can be used in personal computers.
viii)	eg. VMware ESXi server Microsoft Hyper-V Citrix/Xen Server.	eg. VMware workstation Microsoft virtual pc Oracle Virtual Box.

Q 8) What are advantages and disadvantages of Cloud computing.

Ans : Advantages of cloud computing is shown as :

* Cost savings
* Reliability
* Manageability
* Strategic Edge
* High speed
* Excellent accessibility
* Backup & restore data

* Cost savings :

The most significant reason behind shifting to cloud computing is that it takes considerably lesser cost than an on premise technology.

* Reliability :

With a managed service platform cloud computing is much more reliable and consistent than in-house IT infrastructure.

* Manageability :

Cloud computing provides enhanced and simplified IT management & maintenance capabilities through central administration of resources.

* Strategic Edge :

Ever increasing computing resources give you a competitive edge over competitors, as the time you require for IT procurement is virtually nil.

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* High Speed :

Cloud computing lets you deploy the service quickly in fewer clicks.

* Excellent accessibility :

Storing the information in cloud allows you to access it anywhere and anytime regardless of the machine making it highly accessible and flexible technology of present times.

* Back-up and restore data :

Once the data is stored in cloud, it is easier to get the back-and recovery of that, which is quite a time taking process on premise.

* Disadvantages of cloud computing :
* Vulnerability to attacks
* Network connectivity dependency
* Downtime
* Limited control
* Vendor lock in

* Vulnerability to attacks :

Storing data in cloud may pose serious challenge of information theft since in cloud every data of your company is online.

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* Network connectivity dependency:
Cloud computing entirely dependent on the internet.

* Downtime:
Your cloud providers may sometimes face technical outages which can happen due to various reasons such as loss of power low internet connectively, data centres going out of service for maintenance etc.

* Limited control:
Cloud customers may face limited control over their deployments.

* vendor lock in:
Hosting and running the applications of current cloud platform on some other platform may cause support issues configuration complexities and additional expenses.

Q. 9) Explain different openstack cloud services with architecture.

Ans: There are different openstack cloud services as shown below:

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* Openstack compute (Nova):
It controls the cloud computing fabric (the core component of an infrastructure service) written in python it creates an abstraction layer for virtualiz commodity server resources such as CPU, RAM, network adapters, and hard drives, with functions to improve utilization & automation.

* Openstack Networking (Neutron / Quantum):
Networking (Neutron), formerly called quantum, includes the capability to manage LANs with capabilities for virtual LAN (VLAN) Dynamic Host configuration protocol, and Internet protocol version 6

* Openstack Identity Management (keystone)
It manages a directory of users as well as a catalog of openstack services they can access. It purpose it to expose a central authentication mechanism across all openstack components.

* openstack object storage (swift):
It is based on Rackspace cloud files product & is a redundant storage system ideal for scale-out storage.

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* Openstack Block Storage (cinder) :-
It manages block level storage that compute instance use. Block storage lends itself well to scenarios with strict performance constraints such as databases and file systems.

* Openstack Image Service (Glance) :
It provides support for VM images, specifically the system disks to be used in launching VM instances. It has capabilities for snapshots and backups.

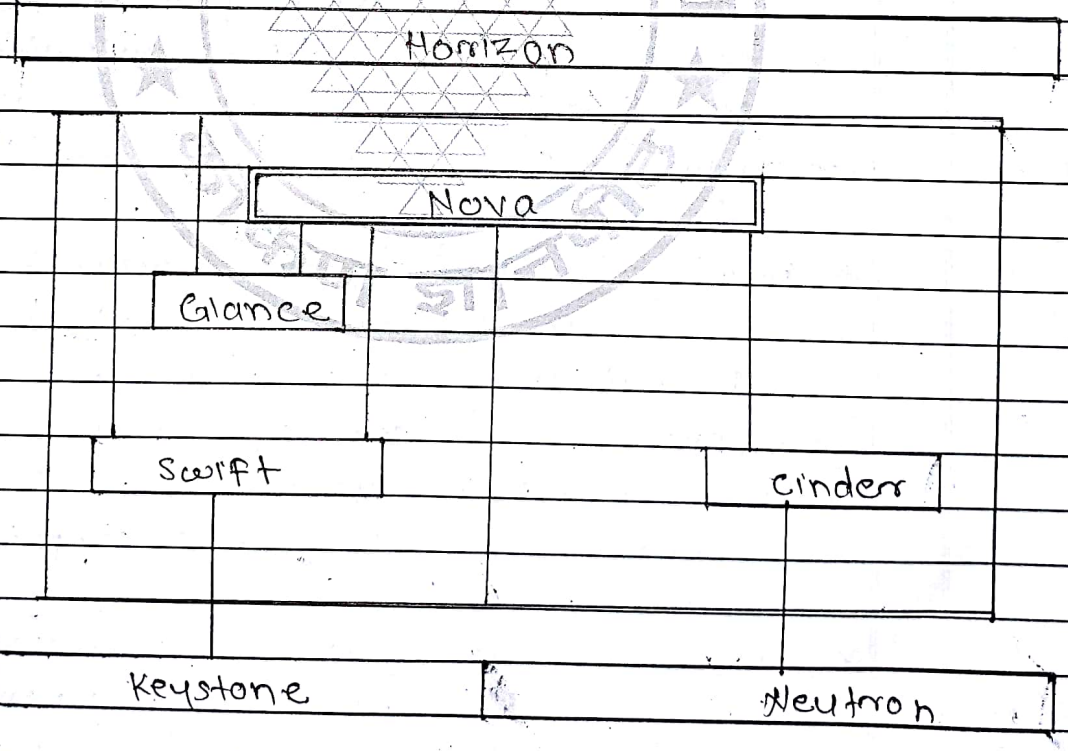

fig. Openstack Architecture.

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behavior considerably deviates ... mining is that while it can identify connections between behaviors and/or variables, it does not necessarily identify a causal relationship. For example, an application may ... such as the propensity to purchase airline tickets

Q 10) Explain benefits & challenges of mobile cloud computing.

Ans :- Benefits of mobile cloud computing :-

* Business save money :
Mobile cloud computing tools help to reduce capital expenditures by enabling employees and other users to share applications and resources with minimal investment on software & hardware

* More features on their mobile phones :
Cloud computing has changed the mobile market by making applications such as location-based social networks and home security tools.

* Developers reach greater market :
This is due to the fact that all cloud applications go through the same browser and should work seamlessly regardless of the mobile operating system the end user has on their phone or other mobile computing device.

* Developers cut costs and increase revenues :
Develops also reduce expenditures while being able to keep a bigger chunck of the profits.

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* More new mobile network provides can join the game :

Due to mobile cloud computing the market of mobile network providers has expanded and become a more equal playing field. It's also good for the marketplace because it increases the drive for innovation.

Challenges in mobile cloud computing

* Low bandwidth :

Mobile cloud use radio waves which are limited as compare to wired network.

* Security and privacy

It is harder to manage threats on mobile devices as compared to desktop devices because in a wireless n/w there are more chances of absence of the information from the network.

* Service Availability

Users often find complaints like transportation crowding, breakdown of network, out of coverage.

* Alternation of Networks :

Mobile cloud computing is used in different operating system, so it has to be compatible with different OS.

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information about known terrorists. However, while possibly re-affirming a particular
profile, it does not necessarily mean that the application will identify a person whose

Q. 11) Explain Iaas, Paas and Saas with example.

Ans:- There are three services models of cloud services as below:

1) Iaas
2) Paas
3) Saas

1) Iaas :

It is stands for Infrastructure as a service.

- Iaas is a cloud service that provides basic computing infrastructure
- Services are available on pay-for-what-you-use model.
- Iaas providers include amazon web services, Microsoft Azure and Google compute Engine.
- Users : IT Administrators.

e.g. amazon EC2.

2) Paas :

It stands for platform as a service

- Paas provides cloud platforms & runtime environments for developing, testing & managing applications.
- It allows software developers to deploy applications without requiring all the related infrastructure.

→ users : software Developers

e.g. Amazon EBS

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3) SaaS :

It stands for software as a service.

- In SaaS, cloud providers host and manage the software application on a pay-as-you-go pricing model
- All software and hardware are provided and managed by a vendor so you don't have to maintain anything
- Users : End customers
- e.g. Office 365, Google apps.

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