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Cloud Computing Mid Exam

Question 1

* cloud computing helps companies especially startups reduce the time to market and cut down capital expenses. This is possible using the various feature of cloud computing, especially its service oriented architecture is one of the main features that helps in this regard.
* Companies or startups need not spend their time and capital on the software and the environment setup because cloud provides them instantaneously.
* Furthermore, the startups can choose the cloud services as per their requirement from the service oriented architecture.
* cloud computing provides three different services.
  - Software as a service (SaaS)
  - Platform as a service (PaaS)
  - Infrastructure as a service (IaaS).
* SaaS mainly helps startups as applications that are provided need little management and can be easily used by the organisation.
* Paas provides the platform for developing your application and also tools in helping to test.

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* Iaas provides you the infrastructure (hardware) letting you do all the work required such as setting up environment, installing softwares, applications etc.
* Since cloud provides various services it is easy to use and saves our time by reducing the time to market our application as most of your requirements are already present in the cloud and all you need to do is contact a cloud service provider.
* Since cloud is a pay per use model, you only pay for what you use. This cuts down the capital expenses.
* Also since cloud is managed by the cloud service provider it also cuts down the maintanence costs therefore reducing your expenses.
* Therefore, cloud using its various features helps reduce time to market and reduce capital expenses.

Question 2

Cloud scalability: cloud scales down resources based on your requirements. When the demand increases it scales up your resources and when the demand decreases it automatically scales down.

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* Cloud offers scalability using the specialized software called virtual machine manager (VMM) that helps scale your resources.
* Cloud achieves this mechanism by taking periodic snapshots of the resources being used and if it detects high demand it scales up or else it scales down.

Example
* Consider a scenario where you are running your application on cloud.
* currently there is no demand and cloud allots a minimum resources, say 1GB RAM and 2 CPU processors.
* suddenly you start receiving clients, the VMM takes periodic snapshots of resources used and when it detects that resources present aren't enough it scales them up.
* So when the number of clients on your application are high it automatically detects scale resources to meet requirements.
* After sometime all the clients sign off the VMM detects underutilization of resources and scales down resources.

Cloud fault tolerance - Cloud fault tolerance is the ability to continue providing its services even when one or more components of cloud fails.

* cloud achieves fault tolerance by using the backup

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components for the components that failed. These may include hardware, software etc.

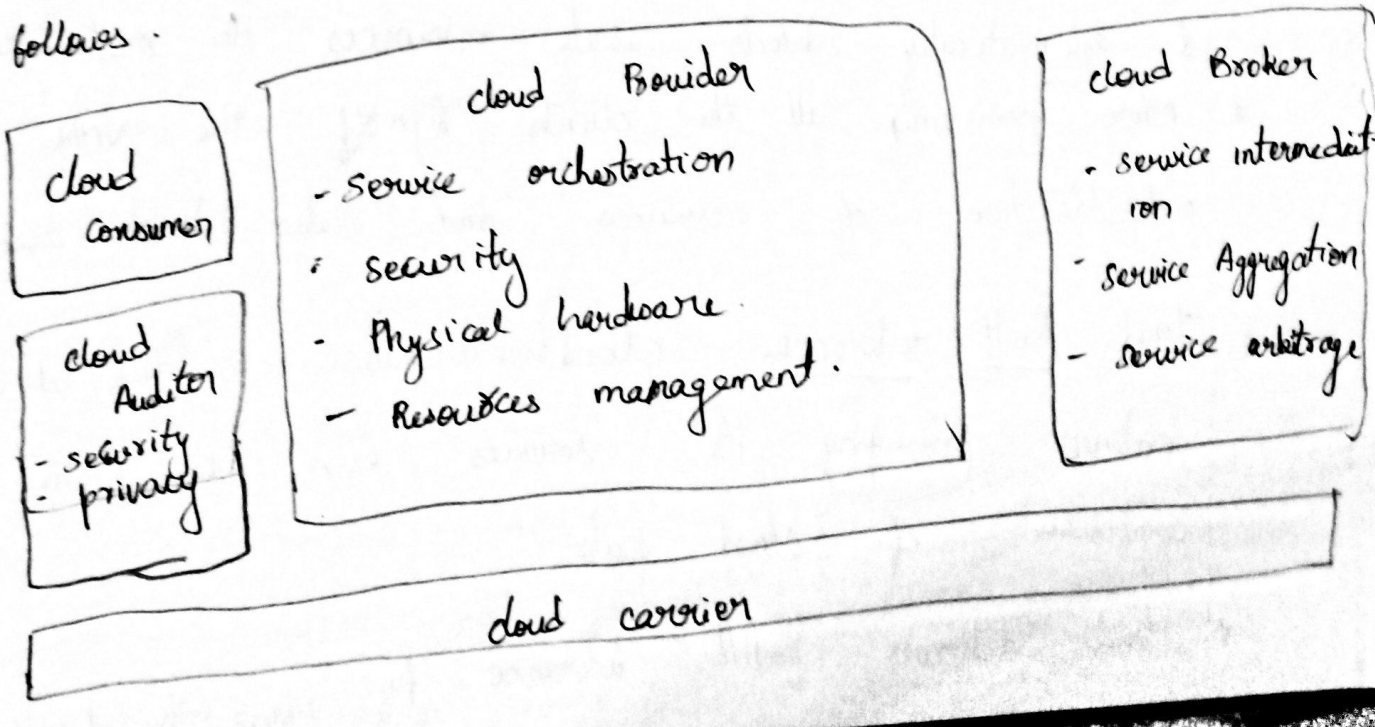
* Also since cloud nodes are geographically distributed hence even if one node gets compromised or out of service your services will be provided from other data centers.

Example:

* Your application is running on cloud and suddenly one day the data center gets compromised.
* Cloud uses the backup data and components to run your services in a different data center which is nearby.

Question 3

a) The cloud computing reference architecture is as follows.



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Benefits
* Each component in the architecture benefits in its own way and ensure the working of cloud.
* Separation of concerns is achieved.
* various new features can be achieved - cloud Broker provides service aggregation etc features.
* Improved security, privacy.

b)
* Security and privacy is integrated into this architecture by the addition of cloud Auditor.
* The cloud Auditor monitors and logs the cloud and when it detects anomalies it takes necessary action.
* The cloud carrier ensure the safety of the message transmitted.
* cloud achieves the security (CIA - confidentiality, Integrity, Availability) by Encryption, hashing and constant monitory.
* By Encryption/decryption cloud ensures privacy and by hashing it ensures the correctness.

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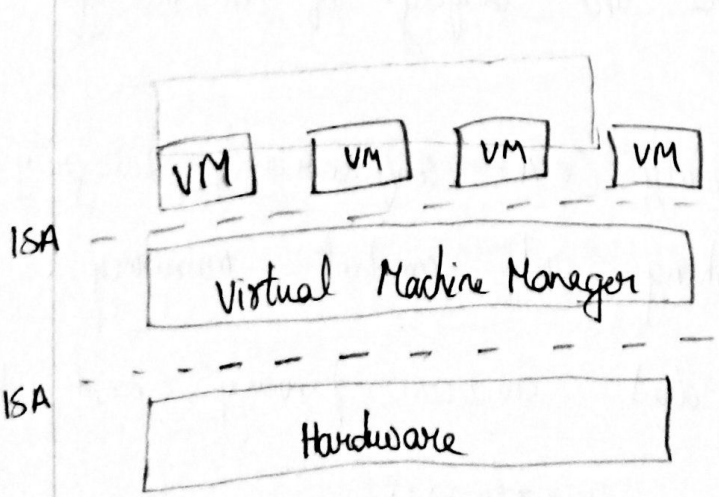
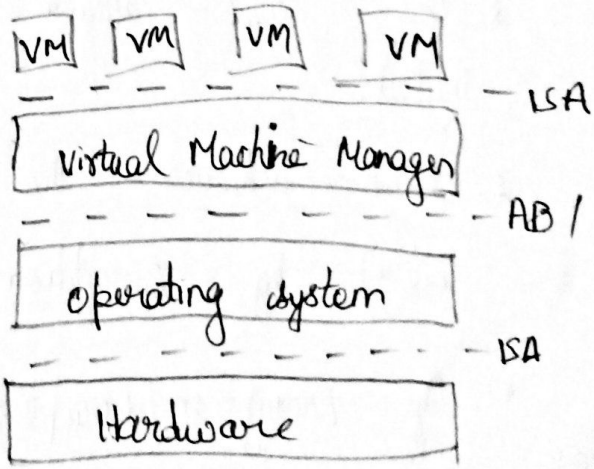
Question 4)

Type I hypervisor	Type II hypervisor
- Resides on top of hardware - communicates with hardware using ISA. - More efficient - More secure - Example - Microsoft HyperV	- Resides on Host's Operating System. - communicates with hardware via OS, hypervise $\xrightarrow{ABI}$ OS $\xrightarrow{ISA}$ hardware - less efficient — ① - less secure - bugs in os may compromise the hypervisor. - Example - vmware, oracle virtualbox

① less efficient because of intervention of os, convert ABI to ISA and then relay them to hardware.



Type - 1 Hypervisor



Type 2 hypervisor.

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Question 5

* since Internet is a must in cloud computing you need Internet to access the cloud.
* You receive various services from the cloud's data centers because they are connected to Internet and hence you need internet to access cloud services.
* When you close Internet access, you are no more connected to the cloud and hence you cannot use cloud computing anymore.
* When Internet is not available Dew computing is useful.
* In Dew computing we duplicate cloud computing hence almost achieving the same services of the cloud offline.
* Edge computing can also be preffered due to its faster responsiveness.