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Sec - A

Q1b) Virtualization is the process of creating software based, or virtual representation of something such as virtual application, servers, storage & network. It is the single most effective way to reduce IT expenses while boosting efficiency & agility for all size businesses.

Q1c) Full Virtualization → virtual machine permits the execution of the instructions with running of unmodified OS in an entire isolated way.

Para Virtualization → In this virtual machines doesn't emulate full hardware of OS but rather provides a different API which is utilized when OS is subjected to ~~alteration~~ alteration.

Q2a) i) On demand self service
ii) Broad network access
iii) Rapid elasticity
iv) Resource pooling
v) Measured service

Sec - B

Q2d) Public Cloud → Computing in which service provider makes all resources public over the internet. It is connected to the public internet. It is best for the companies which need an infrastructure to accomodate large number of customers & mostly on projects which has diverse organisation

Private Cloud → Computing in which service provider makes all resources public over the internet. It only supports connectivity for the private network. It has only authentic users & single-occupant architecture. The infrastructure & services are maintained & deployed over a private network. H/w & S/w are dedicated only to a private company. It is the best for the companies which needs an infrastructure which has high performance, high security & privacy due to it's best adaptability & flexibility

→ Here is a table of differences on the next page.

Public Cloud	Private Cloud
→ Cloud computing infrastructure shared to public by service provider over the internet.	→ Cloud computing infrastructure shared to private org. by service provider over the internet.
→ Multi Tenancy.	→ Single Tenancy
→ It hosted at service provider site.	→ It is hosted at service provider site or enterprise
→ It is connected to the public internet.	→ It only supports connectivity over the private internet
→ Scalability is very high & reliability is moderate.	→ Scalability is limited, reliability is very high.

Q2 → Cloud storage is a cloud computing model that stores data on the internet through a cloud computing provider who manages & operates data storage as a service. It's delivered on demand with pay-as-you-go capacity & costs & eliminates buying & managing your own data storage infrastructure.

→ 5 Advantages of Cloud computing are :-

i) Accessibility → Using the cloud for storage gives you access to your files from anywhere that has an internet connection.

ii) Recovery → In the event of a hard drive failure or other malfunction, you can access your files on the cloud. It acts as a backup for your local storage.

iii) Cost → Purchasing physical storage can be expensive. Without the need of hardware, cloud storage is exceptionally cheaper / GB than using external drives.

iv) Syncing & updating → When you are using cloud storage, every time you make changes to a file it will be synced & updated across all of your devices that you access the cloud from.

v) Security → Cloud storage provides additional layers of security to their services. Since there are many people with files stored on the cloud, there are ways to add layers to make sure your files don't get accessed by someone who shouldn't.

Q3a) Cloud computing is used for enabling global access to mutual pools of resources such as servers, apps, data, storage & computer networks. It can done on either a third-party server located in a data center or a privately owned cloud.
But there are also many challenges involved in cloud computing & if you are not prepared to deal with them, you won't reap the benefits.

i) Cost → cloud computing really is affordable, but as we know, upto some limit it is free then we have to pay for it.

ii) Service provider Reliability → The capacity & capability of a technical service provider are as important as price. The service provider must be available when you need them.

iii) Personnel Security → Industry personnel & provisioning plays a vital role in cloud security. However the more people you have accessing your cloud account, the less secure it is.

iv) Data Privacy → Sensitive & personal information that is kept in the cloud should be defined as being for internal use only, not to be shared with third parties.

Sec-e

Q3b → Virtualization is the creation of virtual servers, infrastructure, devices & computing resources. Virtualization changes the h/w-s/w relations & is one of the foundational elements of cloud computing technology that helps utilize the capabilities of cloud computing to the full.

→ There are several techniques for fully h/w resources & satisfying the virtualization requirements as originally presented by Popek & Goldberg.

i) Binary translation & native execution

This technique uses a combination of binary translation for handling privileged and sensitive instructions & direct execution technique for user-level instructions. This technique is very efficient both in terms of performance & in terms of compatibility with the guest OS, which doesn't need to know that it is virtualized.

ii) OS assisted virtualization

In this technique, the guest OS is modified to the virtualization-aware (communicate through hypercalls with the hypervisor, so as to handle privileged & sensitive instructions). Because modifying the guest OS to enable paravirtualization is easy.

paravirtualization can significantly reduce the virtualization overhead. However it has poor compatibility, it assumes support OS that cannot be modified (unless).

iii) Hardware assisted Virtualization

As an alternative approach to binary translation & in an attempt to enhance performance & compatibility, hardware providers started virtualization at the hardware level. In hardware-assisted virtualization, privileged & sensitive calls are set to automatically trap to the hypervisor. This eliminates the need for binary translation or paravirtualization. Moreover, since the translation is done on the hardware level, it significantly improves performance.