

Mid Semester Assignment (Spring - 2020)
Cloud Computing

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Instructor: M Omer Rauf

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Total Marks: 30

Note: Attempt all Questions. Answers should be in your own words. Plagiarism will not be tolerated, if detected, it will lead to failure.

Question No. 1: (10)

- a. Explain essential characteristics of cloud computing.
- b. Explain in detail the key properties of cloud computing.

Question No. 2: (10)

- a. Explain in detail different service models of cloud computing.
- b. Explain in detail different deployment models of cloud computing.

Question No. 3:
(10)

- a. Explain in detail roles and boundaries in cloud.
- b. Explain in detail cloud risk and challenges.

Answers

Question No. 1(a)

Essential characteristics of cloud computing are,

- **On-demand self-service:**

Cloud computing resources can be provisioned without human interaction from the service provider. In other words, a manufacturing organization can provision additional computing resources as needed without going through the cloud service provider. This can be a storage space, virtual machine instances, database instances, and so on.

- **Broad network access:**

Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g, mobile phones, tablets and laptops).

- **Resource pooling:**

Cloud computing resources are designed to support a multi-tenant model. Multi-tenancy allows multiple customers to share the same applications or the same physical infrastructure while retaining privacy and security over their information. It's similar to people living in an apartment building, sharing the same building infrastructure but they still have their own apartments and privacy within that infrastructure. That is how cloud multi-tenancy works.

- **Rapid elasticity:**

One of the great things about cloud computing is the ability to quickly provision resources in the cloud as manufacturing organizations need them. And then to remove them when they don't need them. Cloud computing resources can scale up or down rapidly and, in some cases, automatically, in response to business demands. It is a key feature of cloud computing. The usage, capacity, and therefore cost, can be scaled up or down with no additional contract or penalties.

- **Measured service:**

Customers are charged for the services they use and the amounts. There is a metering concept where customer resource usage can be monitored, controlled, and reported, providing transparency for both the consumer and provider of the utilized service.

Question No. 1(b)

key properties of cloud computing are,

- **Cloud computing is user centric:**

Once as a user are connected to the cloud, whatever is stored there whether documents, messages, images, applications, whatever becomes authorized to the user access them. In addition, not only is the data, but one can also share it with others. In effect, any device that accesses your data in the cloud also becomes yours.

- **Cloud computing is task-centric:**

Instead of focusing on the application and what it can do, the focus is on what one needs done and how the application can do it for us. Traditional applications like word processing, spreadsheets, email and so on etc are becoming less significant than the documents they create.

- **Cloud computing is powerful:**

Connecting thousands or hundreds of computers together in a cloud creates a wealth of computing power impossible with a single desktop PC.

- **Cloud computing is accessible:**

Because data is stored in the cloud, users can instantly retrieve more information from multiple repositories from anywhere in the world. We are not limited to a single source of data, as we do with a desktop PC.

- **Cloud computing is intelligent:**

With all the various data stored on the computers in a cloud, data analysis and mining are very important and necessary to access that information in an intelligent manner.

- **Cloud computing is programmable:**

Many of the tasks necessary with cloud computing must be automated. For example, to protect the integrity of the data, information stored on a single computer in the cloud must be replicated on other computers in the cloud. If that one computer goes offline, the cloud's programming automatically redistributes that computer's data to a new computer in the cloud so that it may not get lost, so it is safe kept safe and secure in cloud.

Question No. 2(a)

Service models are the reference models on which the cloud computing is based. These can be categorized into three basic service models,

- **Infrastructure as a service(IaaS):**

IaaS, as the most flexible of the cloud models, allows your business to have complete, scalable control over the management and customization of your infrastructure.

In the IaaS model, the cloud provider hosts your infrastructure components that would traditionally be present in an on-site data center (such as servers, storage and networking hardware). Your business, however, would maintain control over operating systems, storage, deployed applications, and possibly limited control of

select networking components(e.g host firewalls).

- **Platform as a service(PaaS):**

With this model, a third-party vendor provides your business with a platform upon which your business can develop and run applications.

Because the vendor is hosting the cloud infrastructure which supports the platform, PaaS eliminates your need to install in-house software or hardware. Your business would not manage or control the underlying cloud infrastructure, but you would maintain control over the deployed applications.

- **Software as a service(SaaS):**

The SaaS model allows your business to quickly access cloud-based web applications without committing to installing new infrastructure. The applications run on the vendor's cloud, which they, of course, control and maintain. The applications are available for use with a paid licensed subscription, or for free with limited access. SaaS does not require any installations or downloads in your existing infrastructure, which in turn eliminates the need to install, maintain, and update applications on each of your computers.

Question No. 2(b)

It define the type of access to the cloud, i.e, how the cloud is located?
Cloud can have any of the four types of access: public, private, hybrid, community.

- **Public cloud:**

This type of cloud services is provided on a network for public use. Customers have no control over the location of the infrastructure. It is based on a shared cost model for all the users, or in the form of a licensing policy such as pay per user. Public deployment models in the cloud are perfect for organizations with growing and fluctuating demands. It is also popular among businesses of all sizes for their web applications, webmail, and storage of non-sensitive data.

- **Private cloud:**

It is a cloud based infrastructure used by stand-alone organizations. It offers greater control over security. The data is backed up by a firewall and internally, and can be hosted internally or externally. Private clouds are perfect for organizations that have high-security requirements, high management demands, and availability requirements.

- **Community cloud:**

It is a mutually shared model between organizations that belong

to a particular community such as banks, government organizations, or commercial enterprises. Community members generally share similar issues of privacy, performance, and security. This type of deployment model of cloud computing is managed and hosted internally or by a third party vendor.

- **Hybrid cloud:**

This model incorporates the best of both private and public clouds, but each can remain as separate entities. Further, as part of this deployment of cloud computing model, the internal, or external providers can provide resources. A hybrid cloud is ideal for scalability, flexibility, and security. A perfect example of this scenario would be that of an organization who uses the private cloud to secure their data and interacts with its customers using the public cloud.

Question No. 3(a)

Common roles associated with cloud based interaction and relationships include the cloud provider, cloud consumer, cloud service owner, and cloud resource administrator.

An organizational boundary represents the physical scope of IT resources owned and governed by an organization. A trust boundary is the logical perimeter that encompasses the IT resources trusted by an organization.

- **Organization boundary:**

Physical perimeter that surround a set of IT resources that are owned and governed by an organization.

- **Trust boundary:**

Logical perimeter that typically spans beyond physical boundaries to represent the extent to which IT resources are trusted.

- **Cloud provider:**

Organization provides cloud-based IT resources responsible for making cloud services available to cloud consumers.

- **Cloud consumer:**

Organization that has a formal contract or arrangement with a cloud provider to use IT resources made available by the cloud provider user cloud service consumer to access a cloud providers.

- **Cloud service owner:**

Person or organization that legally owns a cloud service can be the cloud consumer or provider.

Question No. 3(b)

Challenges and risks in cloud computing,

- **Cloud migration:**

Cloud migration is the process of moving data, applications, and other important informations of an organization from its on-premises either desktops or servers to the cloud infrastructure, and this can also involve in moving data between different cloud setups.

- **Data security:**

CSPs are responsible to provide cloud's security, but they're not responsible for your application, servers, and security of data. The security risks of cloud computing have become a reality for every organization, be it large or small. That's why it is important to implement a secure BL cloud tool that can leverage proper security measures also ensure the provider has strict data recovery policies in place.

- **Bandwidth cost:**

Though organizations and businesses can save money on hardware using cloud, but they have to pay extra for the bandwidth they use to access their workloads. However, it doesn't charge much for smaller apps, but data intensive applications need more bandwidth which can costs higher.

- **Lack of expertise:**

With the quick advancements and improvements in cloud technologies, more and more organizations are clouds to place their workloads. However, they face difficulties to keep up with the tools which require particular expertise. Organizations can deal with this challenge by providing cloud technologies training to their system administrator along with development staff.

- **Managing multiple clouds:**

Challenges facing cloud computing haven't just been concentrated in one, single cloud. The state of multi-cloud has grown exponentially in recent years. Companies are shifting or combining public and private clouds and, as mentioned earlier, tech giants like Alibaba and Amazon are leading the way.