Final Term Paper (Spring - 2020)
Cloud Computing

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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: (20)

a. Explain in detail network and cloud-based storage.

ANS: **NETWORK:** A network means communication between two or devices connected through some hardware components. In other words network in computing is a group of two or more devices that can communicate. The scale can range from a single PC sharing out basic peripherals to massive data centers located around the world all networks allows to share information and resources. Computer networks serve a number of purposes some are mentioned below:

- Communications such as email and chat rooms.
- Shared hardware such as printers and input devices.
- Shared data and information through the use of shared storage devices.
- Shared software which is achieved by running applications on remote computers.

Some of the hardware components that can be used in networks are:

- **Repeaters:** Electronic devices that amplify communication signals and filter noise from interfering with the signals.
- **Hubs:** It have multiple ports allows a packet of data to be copied and sent to all the network.
- **Bridges:** Allows information to flow only to specific destinations through segments.
- **Routers:** Devices that forward packets between networks by processing the information in the packet.

- **Firewalls:** Blocks unsafe network requests sources but allow requests for safe ones.

There are different types of networks, classified according to there characteristics such as connection types, wired or wireless, scale of the network, and its topology. There are 5 different types of topology:

1. **Mesh Topology:** in this each device is connected to other device on the network through a point-to-point link.

2. **Star Topology:** In star topology each device in the network is connected to a central device called hub.

3. **Bus Topology:** In bus topology there is a main cable and all the devices are connected to it through dropping lines.

4. **Ring Topology:** In this topology each device is connected with the two devices on either side of it. There are two point to point links a device has with the devices on the either side of it. It forms ring that's why it is ring topology.

5. **Hybrid Topology:** A combination different topology working together is known as hybrid topology, example a combination of star and mesh topology is known as hybrid topology.

Network types include local area networks, wide area networks, metropolitan area networks and backbone networks.

Cloud-based storage: It is a cloud computing model that stores data through Internet. Cloud computing provider who manages and operates data storage as a service. It's delivered on demand with just in time capacity and costs. Eliminates buying and managing your own data storage. This gives you global scale and durability with anytime and anywhere data access.

There are three types of cloud data storage: object storage, file storage, and block storage. Each offers their own use cases:

1. **Object Storage:** Applications developed in the cloud often take advantage of object storage's vast characteristics. Applications from scratch that require scale and flexibility, and can also be used to import existing data stores for analytics, backup, or archive.

2. **File Storage:** Applications that need to access shared files and require a file system. This type of storage is often supported with a Network Attached Storage (NAS) server

3. **Block Storage:** Applications like databases or ERP systems often require dedicated low latency storage for each host. This is to direct-attached storage (DAS) or a Storage Area Network (SAN).

Pros and cons: As with any other cloud-based technology, cloud storage offers some distinct advantages. But it also raises some concerns for companies over security and administrative control.

Pros: The pros of cloud storage include the following:

- **Off-site management**: This frees your staff from tasks associated with storage, such as procurement, installation, administration, and maintenance. Staff can focus on other priorities.
- **Quick implementation**: Accelerates the process of setting up and adding to your storage capabilities. You can provision the service and start using it within hours or days depending on how much capacity is involved.
- **Cost-effective**: You pay for the capacity you use. This allows your organization to treat cloud storage costs as an ongoing operating expense.
- **Scalability**: You can scale up as much as you need capacity is virtually unlimited.
- **Business continuity**: Storing data offsite supports business continuity in the event that a natural disaster or terrorist attack cuts access to your premises.

Cons: Cloud storage cons include the following:

- **Security**: Security concerns are common with cloud services. Cloud storage providers try to secure their infrastructure with up-to-date technologies but occasional breaches occurres.
- **Administrative control**: Being able to view your data, access it, and move it at will is another common concern with cloud resources. Offloading maintenance and management to a third party offers advantages but also can limit your control over your data.
- **Latency**: Delays in data transmission to and from the cloud can occur as a result of traffic congestion, especially when you use shared public internet connections.

- **Regulatory compliance**: Certain industries, such as healthcare and finance, have to comply with strict data privacy which may prevent companies from using cloud storage for certain types of files, such as medical and investment records.

Question No. 2: (20)

a. Explain in detail web application and multitenant technology.

ANS: **Web Application:** A software program that runs on a web server. Unlike desktop applications which are launched by your operating system. Unlike desktop applications, web applications can be accessed anywhere using a web browser like Google Chrome or Apple Safari. The user can determine which machine he will use to access the web application. Web applications are updated centrally so that the applications are always up to date. Security can also be applied. It provides:

- Real-time web application performance analysis

- Auto discovery of all URLs and end user activity to simplify setup

- End user experience for web pages including metrics for page errors, page rates and unique users

- Geographic heat maps

The user accesses a web application through web browser or mobile application, requesting web server over the Internet. There may be security measures e.g firewalls or cloud access security brokers. The web server forwards the request to the web application server. The web application server performs the requested task such as processing the data, then generates the results of the requested data. The web application server sends the results back to the web server. the web server delivers the requested information to the client's desktop/mobile device, and the information appears on the display.

Multitenant technology: The multitenant application design was created to enable multiple tenants(users) to access the same application simultaneously. Each tenant has its own view that it uses, administers and customizes. Dedicated instance of the software while remaining unaware of other tenants that are using the same application. It ensure that tenants do not have access to data and configuration information that is not their own. Tenants can customize features of the application such as:

- **User Interface:** Tenants can define a specialized look and feel for their application interface.
- **Business Process:** Customize the rules, logic and workflows of the business processes that are implemented in the application.
- **Data Model:** Tenants can extend the data schema of the application to include, exclude or rename.
- **Access Control:** Independently control the access rights for users and groups.

Multitenant application is significantly more complex than that of single tenant applications. Multitenant applications need to support the sharing of various artifacts by multiple users like portals and databases.

Characteristics of multitenant applications include:

- **Usage Isolation**: The usage behavior of one tenant doesn't affect the availability and performance of others.
- **Data Security:** Tenants cannot access data that belongs to other tenants.
- **Recovery**: Backup and restore procedures are separately for the data of each tenant.
- **Application Upgrade:** Tenants are not negatively affected by the upgrading.
- **Scalability:** The application can scale to accommodate increases in usage.
- **Metered Usage**: Tenants are charged only for the application processing and features.
- **Data Tier Isolation:** Tenants can have individual databases and tables. Alternatively databases and tables can be designed to be shared by tenants.

A multitenant application that is being concurrently used by two different tenants

b. Explain in detail cloud security threats.

ANS: Now adays every business and governments are upgrading more and more to the cloud to work smart. Some organizations remain resistant to the data security in cloud computing. Cloud computing is continually transforming the way companies

store and share data and workloads. The volume of cloud utilization is increasing leading to a greater mass that is potentially at risk.

The main security risks of cloud computing are:

1. **Compliance violations**
2. **Loss of data**
3. **Identity theft**
4. **Malware infections and data breaches**
5. **Diminished customer trust and potential revenue loss**

The concerns are understandable. When implemented correctly cloud computing security is just as reliable as traditional. It is becoming more critical to maintain privacy and security with more data and software being migrated to the cloud. The IT groups must consider the cloud security risks and implement solutions to ensure the security of client data stored and processed in the cloud.

Question No. 3: (10)

a. **Briefly describe following.**
    a. **Advantages and disadvantages of cloud computing.**

ANS: As we know that Cloud computing is trending almost everywhere in the world. Every company switched their services on the cloud to rise the company growth. But inventions always comes up with advantages as well as disadvantages and some are following below:

ADVANTAGES

1. **Back up:** Once the data is stored in the cloud, it is easier to get back-up and restore that data using the cloud.
2. **Improved collaboration:** improve collaboration by allowing groups of people to quickly and easily share information in the cloud via shared storage.
3. **Excellent accessibility:** allows us to easily access store information anywhere, anytime in the whole world using an internet connection.
4. **Low maintenance cost:** reduces both hardware and software maintenance costs for organizations.
5. **Mobility:** allows us to easily access all cloud data via mobile.
6. **Unlimited storage capacity:** offers us a huge amount of storing capacity for storing our important data such as documents, images audio etc at one place

7. **Data security:** Data security is one of the biggest advantages of cloud computing ensures that data is securely stored and handled.

DISADVANTAGES

A list of the disadvantage of cloud computing is given below:

1. **Internet Connectivity:** We know in cloud computing every data (image, audio, video, etc.) is stored on the cloud and we access these data through the cloud by using the internet connection. If you do not have good internet connectivity you cannot access these data. However, we have no any other way to access data from the cloud.
2. **Vendor lock-in**: Vendor lock-in is the biggest disadvantage of cloud computing. Organizations may face problems when transferring their services from one to another. As different vendors provide different platforms, that can cause difficulty moving from one cloud to another.
3. **Limited Control:** As we know that cloud infrastructure is completely owned, managed, and monitored by the service provider. The cloud users have less control over the function and execution of services within a cloud infrastructure.
4. **Security:** Cloud service providers implement the best security standards to store important information. But you should be aware that you will be sending all your sensitive information i.e a cloud computing service provider. There may be a chance that your information might get hacked by Hackers.

b. Collaborative meeting in cloud.

ANS: It allows anyone to enjoy consistent video collaboration experiences from mobile and desktop with services and solutions they can use at home or in the office. Users can meet any way they want like instantly or by scheduling a meeting. Enable everyone to meet using virtually there are different software and apps for it Example: ZOOM, GOOGLE CLASSROOM

It helps enable people to meet with others in a way that suits their working day. You can:

- Invite others to meet in your personalized always-available anytime.

- Create instant meetings whenever needed. You can add a third person to conversation.

- Reserve the conference rooms and media resources for defined audiences.

This video conferencing infrastructure helps you with flexible cost-effective scale. Extend the scale and reach of your video meetings. Link your on-premises video deployment Meeting Center cloud-based web conferencing. The opportunity to join any meeting from any location using WebEx, as well as video-enabled devices. There are some points:

- Simple: allow you to create and join meetings easily

- Proven: Take advantage of industry and web conferencing

- Scalable: It can enable over 500 participants to join a single meeting

- Global: Enjoy global reach with consistent quality