Final Term Paper (Spring - 2020)
Cloud Computing

Name:	Aamir Saleem	ID #:	12290

Semester: 8th (Section A) **Date: 25, June, 2020**
Time: 6 hours **Total Marks: 50**
Instructor: M Omer Rauf

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.

Answer:

To elaborate the what is network and cloud storage. First of all I will explain that what is network storage. Then I will explain the cloud storage in detail.

1. ***Network Storage:*** The network storage is further divided into three types. Which are given as followed. And to elaborate each of the following I will consider four types of variables. Ie. Usage, Benefits, Consolidation, Advanced Features and Benefits

    i. *Low End Network Access Storage*
        1. Usage:
            a. These devices are fast and speedy.
            b. They have simple file storage.
            c. And have some extra file storage available means we can extend this storage.
        2. Benefits
            a. These devices are low cast means cheaper to purchase and are available in the market.
            b. These devices are simple to install and needs no special kind of training and technical support.
        3. Consolidation
            a. Consolidation means a consolidated desktop storage.
        4. Advanced Features and Benefits
            a. These features involve simple backup strategy which is very simple to take backup and easy to maintain.
            b. Not very time consuming.
            c. Simple to transfer
    ii. *Midmarket Network Access Storage*
        1. Usage:

a. This type of storage provide access to shared files and large volume of data.
            2. Benefits
                a. These are low cost devices and can be easily extended
                b. And can be scaled to multiple terabytes.
                c. And for the scalability purpose no special skills is required.
            3. Consolidation
                a. Here it includes multiple file servers which serves different resources.
            4. Advanced Features and Benefits
                a. It provides the facility of clustering
                b. And point in time snapshot

        iii. *High End Network Access Storage*
            1. Usage:
                a. This provides access to large volume of files
                b. And also integrates with the SAN. Storage Area Network.
            2. Benefits
                a. These devices are low cast
                b. These are scalable and
                c. Have migration path.
            3. Consolidation
                a. Consolidates many file servers.
                b. And potential for Network Access Storage and Storage Area Network.
            4. Advanced Features and Benefits
                a. Provide the facility of Clustering
                b. Provide the facility of replication
                c. Provide Gateway to SAN.
                d. Provide Multiprotocol Support and Management.

2. ***Cloud Based Storage:*** Now I will explain in detail the Cloud Based Storage in detailed.
    a. C- Computer
    b. L- Login
    c. O- Off- Side
    d. U- Uploading
    e. D- Downloading
        1. These cloud terminologies have been made just to remember the acronym of CLOUD.

Cloud storage has replaced all the traditional file storage systems in a very effective way. And the process is in progress. Which will take some more time to replace the conventional file storage system to be permanently replaced by cloud.
Because traditional file storages have many drawbacks due to which they are not reliable storages. Therefore, the cloud storage replaced them very quickly.

And whenever we talked about the IT Sector which is always worried about when they want to switch to a new software platform or new technologies and to hire new employees for that. But due to cloud storage services the cost of IT Sector has been reduced so much.

There are so many free cloud service providers which can provide their services for file storage and file search for a limited storage whereas users may purchase more storage according to their needs.

Know I will explain the acronym made for the CLOUD.

1. **C- Computer**
   a. When we talk about computer means everything connected to the internet. For example, Laptop, Desktop, iPhone, Mobile, etc. and the cloud can access them all in terms of storage. And if you store a file on the cloud from any device you can access them anywhere anytime and at any device. You will only need to have internet connection to access the desired file on the cloud.
2. **L- Login**
   a. The login section is consisting of three things. Which provide access to the cloud services. That includes
      i. Your Personal Information
      ii. Email ID
      iii. Password and for passwords you will have to remember that it would be a strong one to crack because all of your data will be stored online so be remember to keep your password as strong as possible.

   what are they providing?
   - One Drive 5GB
   - Google Drive 15 GB
   - iCloud 5GB
   - Dropbox 2 GB
      - All of the above-mentioned storage capacities are free up to that limit it will cast you if you want beyond that limit.

3. **O- Off- Site**

Advantages	Dis-advantages
Save storage Space	Potential Security Threats
Improve disaster Recovery	Requires Internet Connection
Increase collaboration	Terms of Agreement

4. **U- Uploading**
   a. Transferring data from your computer to a larger computer system   (The CLOUD).
5. **D- Downloading**

   To download a file from the large computer system (The CLOUD) to your laptop or desktop so that's all about the downloading.

Question No. 2:   (20)

a. Explain in detail web application and multitenant technology.
   Answer:

Web Application: A web application may be defined as "an application is a computer program that utilizes web browsers and web technology to perform tasks over the Internet".

Explanation:
Millions of businesses use the Internet as a cost-effective communications channel. It lets them exchange information with their target market and make fast, secure transactions. However, effective engagement is only possible when the business is able to capture and store all the necessary data, and have a means of processing this information and presenting the results to the user.
Web applications use a combination of server-side scripts (PHP and ASP) to handle the storage and retrieval of the information, and client-side scripts (JavaScript and HTML) to present information to users. This allows users to interact with the company using online forms, content management systems, shopping carts and more. In addition, the applications allow employees to create documents, share information, collaborate on projects, and work on common documents regardless of location or device.
How it works:
Web applications are usually coded in browser-supported language such as JavaScript and HTML as these languages rely on the browser to render the program executable. Some of the applications are dynamic, requiring server-side processing. Others are completely static with no processing required at the server.
The web application requires a web server to manage requests from the client, an application server to perform the tasks requested, and, sometimes, a database to store the information. Application server technology ranges from ASP.NET, ASP and ColdFusion, to PHP and JSP.
Here's what a typical web application flow looks like:
1. User triggers a request to the web server over the Internet, either through a web browser or the application's user interface
2. Web server forwards this request to the appropriate web application server
3. Web application server performs the requested task – such as querying the database or processing the data – then generates the results of the requested data
4. Web application server sends results to the web server with the requested information or processed data
5. Web server responds back to the client with the requested information that then appears on the user's display.

Example of a web application:
Web applications include online forms, shopping carts, word processors, spreadsheets, video and photo editing, file conversion, file scanning, and email programs such as Gmail, Yahoo and AOL. Popular applications include Google Apps and Microsoft 365.
Google Apps for Work has Gmail, Google Docs, Google Sheets, Google Slides, online storage and more. Other functionalities include online sharing of documents and calendars. This lets all team members access the same version of a document simultaneously.
Benefits of a web application
• Web applications run on multiple platforms regardless of OS or device as long as the browser is compatible
• All users access the same version, eliminating any compatibility issues
• They are not installed on the hard drive, thus eliminating space limitations
• They reduce software piracy in subscription-based web applications (i.e. SaaS)

• They reduce costs for both the business and end user as there is less support and maintenance required by the business and lower requirements for the end user's computer

Conclusion:
Increased Internet usage among companies and individuals has influenced the way businesses are run. This has led to the widespread adoption of web applications as companies shift from traditional models to cloud-based and grid models. Web applications give businesses the ability to streamline their operations, increase efficiency, and reduce costs.
These online apps such as email clients, word processors, spreadsheets, and other programs provide the same functionality as the desktop versions. However, they have an added advantage of working across multiple platforms, having a broader reach, and being easily accessible from anywhere.

Now we explain the <u>multitenant technology</u> in detail.

Multitenant Technology:

Before moving to multitenant technology in detailed let's start with a Single Tenant.
– A single instance of the software and supporting infrastructure serve a single customer. With single tenancy, each customer has his or her own independent database and instance of the software. Essentially, there is no sharing happening with this option.

Whereas the Multi-Tenant
– Multi-tenancy means that a single instance of the software and its supporting infrastructure serves multiple customers. Each customer shares the software application and also shares a single database. Each tenant's data is isolated and remains invisible to other tenants.

Benefits of Multitenant Technology:
 Some of the major benefits of the multitenant technology are given below.
• Lower costs through economies of scale: With multi-tenancy, scaling has far fewer infrastructure implications than with a single-tenancy-hosted solution because new users get access to the same basic software.
• Shared infrastructure leads to lower costs: SaaS allows companies of all sizes to share infrastructure and data center operational costs. There is no need to add applications and more hardware to their environment. Not having to provision or manage any infrastructure or software above and beyond internal resources enables businesses to focus on everyday tasks.
• Ongoing maintenance and updates: Customers don't need to pay costly maintenance fees to keep their software up to date. Vendors roll out new features and updates. These are often included with a SaaS subscription.
• Configuration can be done while leaving the underlying codebase unchanged: Single-tenant-hosted solutions are often customized, requiring changes to an application's code. This customization can be costly and can make upgrades time-consuming because the upgrade might not be compatible with your environment.
Multi-tenant solutions are designed to be highly configurable so that businesses can make the application perform the way they want. There is no changing the code or data structure, making the upgrade process easy.

Multi-tenancy architecture also allows Digital Guardian to efficiently service everyone from small customers, whose scale may not warrant dedicated infrastructure, to large enterprises that need access to the cloud's virtually unlimited compute resources. Software development and maintenance costs are shared, driving down expenditures, resulting in savings that are passed onto you, the customers.

In short there are many benefits of using multitenant technology especially SAAS and its need of the day.

----

b. Explain in detail cloud security threats.

Answer: Security is the major role player in the cloud-based companies it remains the highest concern of IT professionals all over the world. Below are stated some of the highest security threats to cloud based computing;

- *__Data Loss:__* Data loss often happens due to natural or man-induced disasters, as a result of the physical destruction of the servers or human error. However, it can also be a result of a targeted attack. Regardless of the cause, the result will be the same: you lose all of the data you've been collecting for years.

- *__Data Breach:__* A data breach (or leak) is possibly the most widespread cloud security concern. It usually happens as a result of cloud computing security attacks, when unauthorized users or programs gain access to confidential data and can view, copy, or transmit it.

- *__Denial of Service (DOS):__* Another type of cloud computing security attack, a Denial of Service (DoS) attack can shut down cloud services, which makes them temporarily (or indefinitely) unavailable to users. This is done by either flooding the system with extensive traffic, which the servers simply can't tolerate, or by crashing it by taking advantage of the bugs and vulnerabilities.

- *__Account Hijacking:__* Account hijacking is the most common security threat to Cloud computing. Hackers breach in to users account by guessing their passwords and gaining access to their personal or official data.

- *__Insider Threats:__* Apart from external security threats in cloud computing, there are enough internal risks. For example, your own employees can cause privacy violations or major data leaks. This can be due to targeted malicious behavior or simply a result of human error. Moreover, they can serve as an entry point for malware, e.g. by using their devices for work-related tasks as a part of the BYOD policy.

- *__Insecure APIs:__* Even if your own systems are safe, there are often third-party services that can introduce additional cloud security risks. Namely, IoT solutions are typically considered a threat to data privacy: devices, such as connected cars, health monitors, and home appliances, collect and transmit tons of sensitive data in real time. As a result, intruders can hijack your data by hacking your APIs, not the cloud itself.

- *__CrptoJacking:__* Cryptojacking was widely adopted last year, largely due to the growing cryptocurrency frenzy. In this type of cloud computing security attack, hackers use your computing resources to process cryptocurrency transactions by installing a crypto mining script on your servers without your consent. This leads to an increased CPU load and, as a result, can significantly slow down your system.

Question No. 3: (10)

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

    Answer:

- • **Advantages:**

    1: Reliability: Cloud Computing is very reliable in a sense that data is stored in a complete secure manner, it cannot be changed or tampered by anyone. Several copies of data are stored along the original data, so that it can be assured that the data will not be lost in any kind of situation. If the database crashes somehow, the data is then retrieved from other backup databases. There is no chance of failure or loss of data because of the multiple backup functions in the cloud. Data can be accessed/stored/retrieved from anywhere at any time.

    2: Economical Factor: Cloud based computing is very low cost. Cloud computing provides services to companies at amazingly low costs. The company can use storage, processing power regardless of the requirements of a server. This also helps in reducing the cost of building and managing an infrastructure. Cloud computing also minimizes the administrative and operational costs. Small startup businesses can also use cloud computing as their platform because of the low cost/ economical factor.

    3: Manageability: The fuss & hardships of dealing and maintaining server issues fades away with the use of cloud computing services. All the services related technicalities are taken care of by the service provider and you will enjoy the luxury of a simple web-based user interface to access your applications, services, and services.

    4: Data Centralization: It is benefit of cloud computing that all data is stored at one single platform. So that it can be accessed from the most remote places without any hurdle. Centralized data can be accessed from anywhere at any time with ease.

- • **Disadvantages:**

    1: Lower Bandwidth: Lower bandwidth reduces the benefits of the clouds such that it cannot use properly. A satellite connection can lead to quality disruption, due to higher latency or higher bandwidth. For example, if there is a huge, unexpected load on the cloud server then the server will definitely lag its performance. Preventing it from its higher capability.

    2: Lack of Support: Cloud Computing companies sometimes fail to provide proper support to the customers. Moreover, they want customers to depend fully on FAQs, which can be a tedious job.

    3: Security Issues: Although Cloud Computing is very secure. but still it requires an IT consulting firm's assistance & advice. Neglecting this can lead to the fact that the business will become vulnerable to the hackers and the threats.

    4: Internet Connectivity: Using cloud-based services requires a frequent and reliable internet connection. If there are no internet cloud services cannot be used. If there is no proper internet connection then there is no way to gather data from the cloud.

----

      b. Collaborative meeting in cloud.

Answer: Collaborative meeting in cloud strengthens business relationships by enabling everyone to meet using virtually any device, for a business-quality video collaboration experience that combines video, voice, and content sharing technologies.

Collaborative meeting in cloud brings together industry-leading video conferencing infrastructure and proven, scalable, WebEx cloud conferencing services to deliver an exceptional meeting experience. With collaborative meeting in cloud technology anyone can host video-optimized meetings, which are available to anyone, anywhere, on any device.
CMC helps enable people to meet with others in a way that suits their working day.

CMC Features:

- Inviting others to meet in your personalized, always-available virtual meeting place quickly and easily, anytime.
- Create instant meetings whenever needed, add a third person to your conversation, or start new meetings
- Reserve the conference rooms and media resources required for scheduled meetings for defined audiences

CMC Advantages:

- *Is very Simple:* Intuitive controls allow users to create, launch, and join meetings easily without any   hurdle, without any complication, easy to use.
- *Totally Proven:* Take advantage of industry-leading video and web conferencing
- *Highly Scalable:* Superior scale can enable over 1000+ participants to join a single meeting. Latest modern conferencing allows many people to join & participate.
- *Universal/Global:* Is globally reachable with consistent quality & seamless usable interaction.
- *Very Flexible:* CMC is available in cloud, on-premises, and hybrid deployment options.

CMC Benefits:

- CMC Improves business relationships, business agility, and collaboration throughout the entire organization.
- Enhance decision making. Enable everyone to see, hear, and share information and work together quickly and easily, with high-quality video and intuitive meeting controls.
- Users can respond quickly and effectively to their customers, and improve customer satisfaction and loyalty.
- CMC Offers video throughout the organization easily and effectively, with highly scalable solutions.
- Protects your IT investment with software-upgradeable solutions that supports business growth.
- Underpin your IT strategy with the flexibility to choose cloud, on-premises or a hybrid deployment model.

CMC Examples:

- Project kick-offs, status meetings, sign-offs, and post-mortems
- Discovery / requirements gathering meetings

- Working committee meetings
- Board meetings
- Brainstorming sessions
- Emergency response coordination
- Strategy sessions
- Negotiation and mediation sessions