Module II

Data Storage in the cloud: Understanding, Advantages and Disadvantages of Cloud Based Data Storage; Service Oriented architecture- understanding SOA, web service; Implementing real time application over cloud platform.

CLOUD

The ***cloud*** is simply a network of computers. It refers to a network of computers owned by one person or company, where other people or companies can store their data. On your personal machine, everything is stored on one physical storage device – your hard drive. ***Cloud storage*** refers to a virtual storage area that can span across many different physical storage devices. When you use cloud storage, some of your files may be on a physical server in New York while other files are on a physical server in California. Since most users do not know where their physical files are, using cloud storage can be thought of as a vague, untouchable thing – much like a cloud itself!

Most data you access via the internet that is not stored on your personal computer is part of the cloud. For example, if you use an internet-based email service like Gmail, Yahoo, or Live, you can access your email anywhere you have an internet connection. This is because the data is stored on servers owned by the respective e-mail providers, not your local machine. Your email is in the cloud. Although the cloud is more like an idea than something you can physically touch, the computers that make up the "cloud" require physical space. The facilities that store the physical equipment used by the cloud are called ***data centers***. Sometimes you may also hear the term server farm.

Data centers can be anywhere in the world. They are generally in warehouses that have complex cooling systems to keep the computers from overheating.

CLOUD STORAGE SERVICES

There are many cloud storage services available and many offer a free plan for a limited amount of space. Depending on your needs, a free plan might be plenty for you. This is a list of just a few available cloud storage services.

Dropbox.com

Dropbox.com is one of the most popular cloud storage services available. It was started in 2007 by a man that kept forgetting to carry his flash drive around. Dropbox uses encryption to help keep your data secure and everything you upload is automatically private. Dropbox offers different plans for individuals and businesses but it starts off giving each individual 2 gigabytes of free storage.

Google Drive

Google Drive allows users to store a variety of files. It gives users the opportunity to share files with certain email addresses, publicly, or anyone that has the link to the file (for example, if you email a link to your friends). It provides 15 gigabytes of storage for free and if you have a Gmail address, you already have access to Google Drive. Google Drive also allows users to collaborate and make changes to files at the same time. This can be helpful for teams and groups.

Apple iCloud

iCloud was launched by Apple in 2011. It allows users to always have access to the latest information from their Apple devices (iPhone, iPad, Mac, etc.). iCloud is particularly useful for sharing photos, calendars, etc. with other users. You do not have to have an Apple device to have an iCloud account, but you can only access your information when using an Apple device or a PC to which you've downloaded the iCloud software. However, you can get web-only access to your account that allows you to create new documents—use 'Pages' to create letters, flyers, and more; use 'Numbers' to create spreadsheets; and use 'Keynote' to create presentations. You have 1 gigabyte of free storage for any documents you create in iCloud.

OneDrive

OneDrive is Microsoft's cloud storage service. It offers 7 gigabytes of free storage for new users and users can purchase additional storage space. It has Office Web Apps support, which means that users can create, edit and share Microsoft Office documents directly within a web browser.

Amazon Cloud Drive

Amazon.com offers a cloud storage service that gives users 5 gigabytes of free storage. If you have an Amazon.com account, you can log into the cloud storage service using your existing username and password.

ADVANTAGES OF CLOUD STORAGE

1. **Cost:** Purchasing physical storage can be expensive. Without the need for hardware cloud storage is exceptionally cheaper per GB than using external drives.
2. **Accessibility:** Using the cloud for storage gives you access to your files from anywhere that has an internet connection.
3. **Recovery:** In the event of a hard drive failure or other hardware malfunction, you can access your files on the cloud. It acts as a backup solution for your local storage on physical drives.
4. **Syncing and Updating:** When you are working with cloud storage, every time you make changes to a file it will be synced and updated across all of your devices that you access the cloud from.
5. **Security:** Cloud storage providers add additional layers of security to their services. Since there are many people with files stored on the cloud, these providers go to added lengths to make sure your files don't get accessed by someone who shouldn't

DISADVANTAGES OF CLOUD STORAGE

1. **Internet Connection:** Cloud based storage is dependent on having an internet connection. If you are on a slow network, you may have issues accessing your storage. In the event you find yourself somewhere without internet, you won't be able to access your files.
2. **Costs:** There are additional costs for uploading and downloading files from the cloud. These can quickly add up if you are trying to access lots of files often.
3. **Hard Drives:** Cloud storage is supposed to eliminate our dependency on hard drives. Some business cloud storage providers require physical hard drives as well.
4. **Support:** Support for cloud storage isn't the best, especially if you are using a free version of a cloud provider. Many providers refer you to a knowledge base.

5. **Privacy:** When you use a cloud provider, your data is no longer on your physical storage. So, who is responsible for making sure that data is secure. That's a gray area that is still being figured out.

SERVICE ORIENTED ARCHITECTURE (SOA)

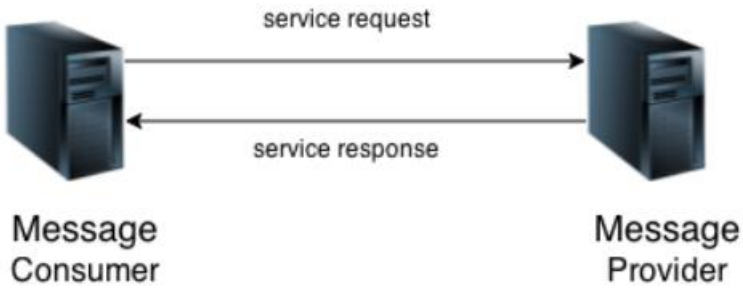
A Service-Oriented Architecture or SOA is a design pattern which is designed to build distributed systems that deliver services to other applications through the protocol. It is only a concept and not limited to any programming language or platform.

What is Service?

A service is a well-defined, self-contained function that represents a unit of functionality. A service can exchange information from another service. It is not dependent on the state of another service. It uses a loosely coupled, message-based communication model to communicate with applications and other services.

Service Connections

The figure given below illustrates the service-oriented architecture. Service consumer sends a service request to the service provider, and the service provider sends the service response to the service consumer. The service connection is understandable to both the service consumer and service provider.



Service-Oriented Terminologies

1. **Services -** The services are the logical entities defined by one or more published interfaces.
2. **Service provider -** It is a software entity that implements a service specification.
3. **Service consumer -** It can be called as a requestor or client that calls a service provider. A service consumer can be another service or an end-user application.

4. **Service locator -** It is a service provider that acts as a registry. It is responsible for examining service provider interfaces and service locations.
5. **Service broker -** It is a service provider that pass service requests to one or more additional service providers.

Characteristics of SOA

The services have the following characteristics:

- They are loosely coupled.
- They support interoperability.
- They are location-transparent
- They are self-contained.

Advantages of SOA

SOA has the following advantages:

1. **Easy to integrate -** In a service-oriented architecture, the integration is a service specification that provides implementation transparency.
2. **Manage Complexity -** Due to service specification, the complexities get isolated, and integration becomes more manageable.
3. **Platform Independence -** The services are platform-independent as they can communicate with other applications through a common language.
4. **Loose coupling -** It facilitates to implement services without impacting other applications or services.
5. **Parallel Development -** As SOA follows layer-based architecture, it provides parallel development.
6. **Available -** The SOA services are easily available to any requester.
7. **Reliable -** As services are small in size, it is easier to test and debug them.

WEB SERVICES

Web services are the types of internet software that uses standardized messaging protocol over the distributed environment. It integrates the web-based application using the REST, SOAP, WSDL, and UDDI over the network. For example, Java web service can communicate with .Net application.

Features of web Services

- Web services are designed for application-to-application interaction.
- It should be interoperable.
- It should allow communication over the network.

Components of Web Services

The web services must be able to fulfil the following conditions:

- The web service must be accessible over the internet.
- The web service is discoverable through a common mechanism like UDDI.
- It must be interoperable over any programming language or Operating System.

Uses of Web Services

- Web services are used for reusing the code and connecting the existing program.
- Web services can be used to link data between two different platforms.
- It provides interoperability between disparate applications.