IIIrd Mid Term Exam Session 2017-18 Subject: Cloud Computing (VII CSE-B)

Q1. What are the various services provided by the cloud computing and what are its advantages?

Cloud computing is the means of storing and accessing data and programs over the internet rather than on your computer's hard drive. While this may sound simple when we are talking about the different types of cloud computing for individuals, but it's an entirely different "cloud" when it comes to businesses. The following explains the 3 services offered by cloud computing for businesses:

Platform as a Service (PaaS)

PaaS clouds are created, often times inside IaaS clouds (which we will learn more about below) by specialists to deliver the scalability and distribution of any application and to aid make a company's expenses predictable.

The main benefit of this service is that for very little money you can start your application with no stress and more than basic development. Its design allows for a lot of scalability since it is based on cloud computing. The only negative of a PaaS cloud is that these services may come with some restrictions that will not work with your products under any circumstances.

Infrastructure as a Service (IaaS)

This service provides business access to essential web infrastructure such as servers, connections, storage space, without the need to buy or manage internet infrastructure themselves. The economies of specialization and scale are beneficial to the managed service provider and the business that is using the infrastructure.

For example, IaaS allows an internet business an opportunity to develop and grow in an instant.

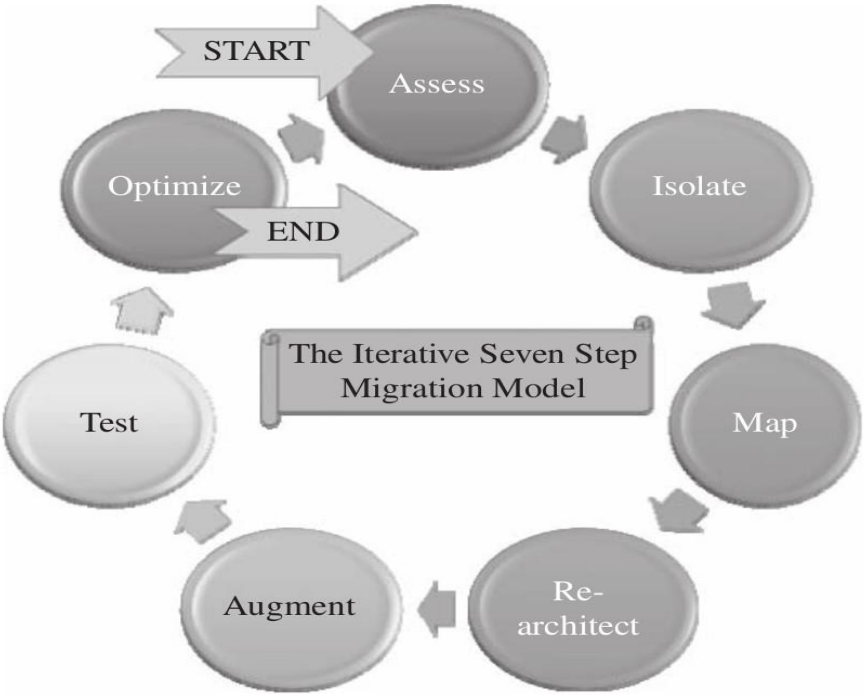
Both PaaS and SaaS clouds are grounded in IaaS clouds since the company that is providing the software as a service is also maintaining the infrastructure to run the software in the first place. By choosing an IaaS cloud, your company will have to deal with the complexity, but with it comes flexibility.

Software as a Service (SaaS)

This service offered by cloud computing is relatively mature and its phrases use those included in cloud computing. Cloud applications permit the cloud to be leveraged for software infrastructure. This reduces the burden of support, maintenance and operations because the application is run on computers that are owned by the vendor.

Q2. What are the broad approaches for migration into cloud computing? Explain.

Seven-step model of migration:



1. Conduct cloud migration assessment
    - Understand the migration issues at the application level or the code, the design, the architecture, or usage levels
    - Cost of migration: ROI (Return of investment), TCO, …
2. Isolate the dependencies
    - Isolate all systematic and environmental dependencies of the enterprise application components within the captive data center
3. Map the messaging and environment
    - Message map: displaying detailed, hierarchically organized responses to anticipated questions or concerns
    - Generate the mapping constructs between what shall remain in the local captive data center and what goes onto the cloud
4. Re-architect and implement the lost functionalities
    - Perhaps some functionality may be lost due to migration
    - Some part of the enterprise application may need to be re-architect, redesigned, and re implemented on the cloud
5. Leverage cloud function and features
    - Leverage the intrinsic features of the cloud
    - computing service to augment the
    - enterprise application
6. Test the migration

- Test the new form of the enterprise
- application (both on the captive data center
- and on the cloud as well)

7. Iterate and optimize
    - Iterate and optimize the process

Q3. What is Google App? Explain the architecture of the App?

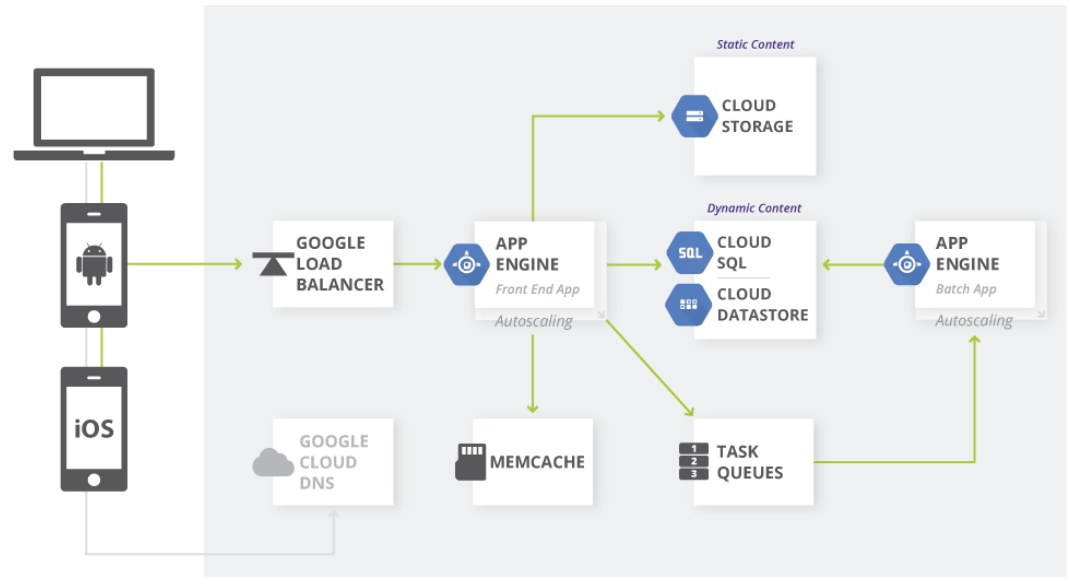
Google App Engine often referred to as **GAE** or simply **App Engine,** it is a web framework and cloud computing platform for developing and hosting web applications in Google-managed data centers. Applications are sandboxed and run across multiple servers. App Engine offers automatic scaling for web applications—as the number of requests increases for an application, App Engine automatically allocates more resources for the web application to handle the additional demand. Google App Engine is free up to a certain level of consumed resources. Fees are charged for additional storage, bandwidth, or instance hours required by the application.

Google App Engine is a Platform as a Service (PaaS) product that provides Web app developers and enterprises with access to Google's scalable hosting and tier 1 Internet service. The App Engine requires that apps be written in Java or Python, store data in Google BigTable and use the Google query language. Non-compliant applications require modification to use App Engine.

Google App Engine provides more infrastructure than other scalable hosting services such as Amazon Elastic Compute Cloud (EC2). The App Engine also eliminates some system administration and developmental tasks to make it easier to write scalable applications.

Google App Engine is free up to a certain amount of resource usage. Users exceeding the per-day or per-minute usage rates for CPU resources, storage, number of API calls or requests and

concurrent requests can pay for more of these resources.



The SDK for App Engine supports development and deployment of the application to the cloud. App Engine supports multiple application versions which enable easy rollout of new application features as well as traffic splitting to support A/B testing.

Integrated within App Engine are the Memcache and Task Queue services. Memcache is an in-memory cache shared across the AppEngine instances. This provides extremely high speed access to information cached by the web server (e.g. authentication or account information).

Task Queues provide a mechanism to offload longer running tasks to backend servers, freeing the front end servers to service new user requests. Finally, App Engine features a built-in load balancer (provided by the Google Load Balancer) which provides transparent Layer 3 and Layer 7 load balancing to applications.

Q3. Explain the data analysis application of cloud computing?

Businesses have long used data analytics to help direct their strategy to maximize profits. Ideally data analytics helps eliminate much of the guesswork involved in trying to understand clients, instead systemically tracking data patterns to best construct business tactics and operations to minimize uncertainty. Not only does analytics determine what might attract new customers, often analytics recognizes existing patterns in data to help better serve existing customers, which is typically more cost effective than establishing new business. In an ever-changing business world subject to countless variants, analytics gives companies the edge in recognizing changing climates so they can take initiate appropriate action to stay competitive. Alongside analytics, cloud computing is also helping make business more effective and the consolidation of both

clouds and analytics could help businesses store, interpret, and process their big data to better meet their clients' needs.

1. Social Media: A popular use for cloud data analytics is compounding and interpreting social media activity. Before cloud drives became practical, it was difficult processing activity across various social media sites, especially if the data was stored on different servers. Cloud drives allow for the simultaneous examination of social media site data so results can be quickly quantified and time and attention allocated accordingly.

2. Tracking Products: Long thought of as one of the kings of efficiency and forethought, it is no surprise Amazon.com uses data analytics on cloud drives to track products across their series warehouses and ship items anywhere as needed, regardless of items proximity to customers. Alongside Amazon's use of cloud drives and remote analysis, they are also a leader in big data analysis services thanks to their Redshift initiative. Redshift gives smaller organizations many of the same analysis tools and storage capabilities as Amazon and acts as an information warehouse, preventing smaller businesses from having to spend money on extensive hardware.

3. Tracking Preference: Over the last decade or so, Netflix has received a lot of attention for its DVD deliver service and the collection of movies hosted on their website. One of the highlights of their website is its movie recommendations, which tracks the movies users watch and recommends others they might enjoy, providing a service to clients while supporting the use of their product. All user information is remotely stored on cloud drives so users' preferences do not change from computer to computer. Because Netflix retained all their users' preferences and tastes in movies and television, they were able to create a television show that statistically appealed to a large portion of their audience based on their demonstrated taste. Thus in 2013, Netflix's House of Cards became the most successful internet-television series ever, all thanks to their data analysis and information stored on clouds.

4. Keeping Records: Cloud analytics allows for the simultaneous recording and processing of data regardless of proximity to local servers. Companies can track the sales of an item from all their branches or franchises across the United States and adjust their production and shipments as necessary. If a product does not sell well, they do not need to wait for inventory reports from area stores and can instead remotely manage inventories from data automatically uploaded to cloud drives. The data stored to clouds helps make business run more efficiently and gives companies a better understanding of their customers' behavior.

Q4. Write Short notes on (any one)

a. IaaS

Infrastructure as a service (IaaS) is an instant computing infrastructure, provisioned and managed over the Internet. Quickly scale up and down with demand and pay only for what you use. IaaS helps you avoid the expense and complexity of buying and managing your own physical servers and other datacenter infrastructure. Each resource is offered as a separate service component and you only need to rent a particular one for as long as you need it. The cloud computing service

provider manages the infrastructure, while you purchase, install, configure and manage your own software—operating systems, middleware and applications.

Advantages:

Eliminates capital expense and reduces ongoing cost. IaaS sidesteps the upfront expense of setting up and managing an on-site datacenter, making it an economical option for start-ups and businesses testing new ideas.

Improves business continuity and disaster recovery. Achieving high availability, business continuity and disaster recovery is expensive, since it requires a significant amount of technology and staff. But with the right service level agreement (SLA) in place, IaaS can reduce this cost and access applications and data as usual during a disaster or outage.

Innovate rapidly. As soon as you have decided to launch a new product or initiative, the necessary computing infrastructure can be ready in minutes or hours, rather than the days or weeks—and sometimes months—it could take to set up internally.

Respond quicker to shifting business conditions. IaaS enables you to quickly scale up resources to accommodate spikes in demand for your application— during the holidays, for example—then scale resources back down again when activity decreases to save money.

Focus on your core business. IaaS frees up your team to focus on your organisation's core business rather than on IT infrastructure.

Increase stability, reliability and supportability. With IaaS there is no need to maintain and upgrade software and hardware or troubleshoot equipment problems. With the appropriate agreement in place, the service provider assures that your infrastructure is reliable and meets SLAs.

Better security. With the appropriate service agreement, a cloud service provider can provide security for your applications and data that may be better than what you can attain in-house.

Gets new apps to users faster. Because you don't need to first set up the infrastructure before you can develop and deliver apps, you can get them to users faster with IaaS.

b. SaaS

Software as a service (SaaS) allows users to connect to and use cloud-based apps over the Internet. Common examples are email, calendaring and office tools (such as Microsoft Office 365).

SaaS provides a complete software solution which you purchase on a pay-as-you-go basis from a cloud service provider. You rent the use of an app for your organization and your users connect to it over the Internet, usually with a web browser. All of the underlying infrastructure, middleware, app software and app data are located in the service provider's data center. The

service provider manages the hardware and software and with the appropriate service agreement, will ensure the availability and the security of the app and your data as well. SaaS allows your organization to get quickly up and running with an app at minimal upfront cost.

Advantages:

Gain access to sophisticated applications. To provide SaaS apps to users, you don't need to purchase, install, update or maintain any hardware, middleware or software. SaaS makes even sophisticated enterprise applications, such as ERP and CRM, affordable for organisations that lack the resources to buy, deploy and manage the required infrastructure and software themselves.

Pay only for what you use. You also save money because the SaaS service automatically scales up and down according to the level of usage.

Use free client software. Users can run most SaaS apps directly from their web browser without needing to download and install any software, although some apps require plugins. This means that you don't need to purchase and install special software for your users.

Mobilise your workforce easily. SaaS makes it easy to "mobilise" your workforce because users can access SaaS apps and data from any Internet-connected computer or mobile device. You don't need to worry about developing apps to run on different types of computers and devices because the service provider has already done so. In addition, you don't need to bring special expertise onboard to manage the security issues inherent in mobile computing. A carefully chosen service provider will ensure the security of your data, regardless of the type of device consuming it.

Access app data from anywhere. With data stored in the cloud, users can access their information from any Internet-connected computer or mobile device. And when app data is stored in the cloud, no data is lost if a user's computer or device fails.

c. Hadoop

Hadoop is an Apache open source framework written in java that allows distributed processing of large datasets across clusters of computers using simple programming models. A Hadoop frame-worked application works in an environment that provides distributed storage and computation across clusters of computers. Hadoop is designed to scale up from single server to thousands of machines, each offering local computation and storage.

Hadoop Architecture

Hadoop framework includes following four modules:

- **Hadoop Common:** These are Java libraries and utilities required by other Hadoop modules. These libraries provides filesystem and OS level abstractions and contains the necessary Java files and scripts required to start Hadoop.
- **Hadoop YARN:** This is a framework for job scheduling and cluster resource management.
- **Hadoop Distributed File System (HDFS™):** A distributed file system that provides high-throughput access to application data.
- **Hadoop MapReduce:** This is YARN-based system for parallel processing of large data sets.

Since 2012, the term "Hadoop" often refers not just to the base modules mentioned above but also to the collection of additional software packages that can be installed on top of or alongside Hadoop, such as Apache Pig, Apache Hive, Apache HBase, Apache Spark etc.

We can use following diagram to depict these four components available in Hadoop framework.