Ist Mid Term Exam Session 2017-18 Subject: Cloud Computing (VIII CSE-B)

Q1. State the difference between full and para virtualization?

- Para-virtualization is different from full virtualization, where the unmodified OS does not know it is virtualized and sensitive OS calls are trapped using binary translation at run time. In para-virtualization, these instructions are handled at compile time when the non-virtualizable OS instructions are replaced with hypercalls.
- The advantage of para-virtualization is lower virtualization overhead, but the performance advantage of para-virtualization over full virtualization can vary greatly depending on the workload. Most user space workloads gain very little, and near native performance is not achieved for all workloads.
- As para-virtualization cannot support unmodified operating systems (e.g. Windows 2000/XP), its compatibility and portability is poor.
- Para-virtualization can also introduce significant support and maintainability issues in production environments as it requires deep OS kernel modifications. The invasive kernel modifications tightly couple the guest OS to the hypervisor with data structure dependencies, preventing the modified guest OS from running on other hypervisors or native hardware.
- The open source Xen project is an example of para-virtualization that virtualizes the processor and memory using a modified Linux kernel and virtualizes the I/O using custom guest OS device drivers.

Q2. Explain architecture of cloud computing also discuss challenges and benefits of cloud computing?

Cloud Computing provides us means by which we can access the applications as utilities over the internet. It allows us to create, configure, and customize the business applications online.

What is Cloud?

The term Cloud refers to a Network or Internet. In other words, we can say that Cloud is something, which is present at remote location. Cloud can provide services over public and private networks, i.e., WAN, LAN or VPN. Applications such as e-mail, web conferencing, customer relationship management (CRM) execute on cloud.

What is Cloud Computing?

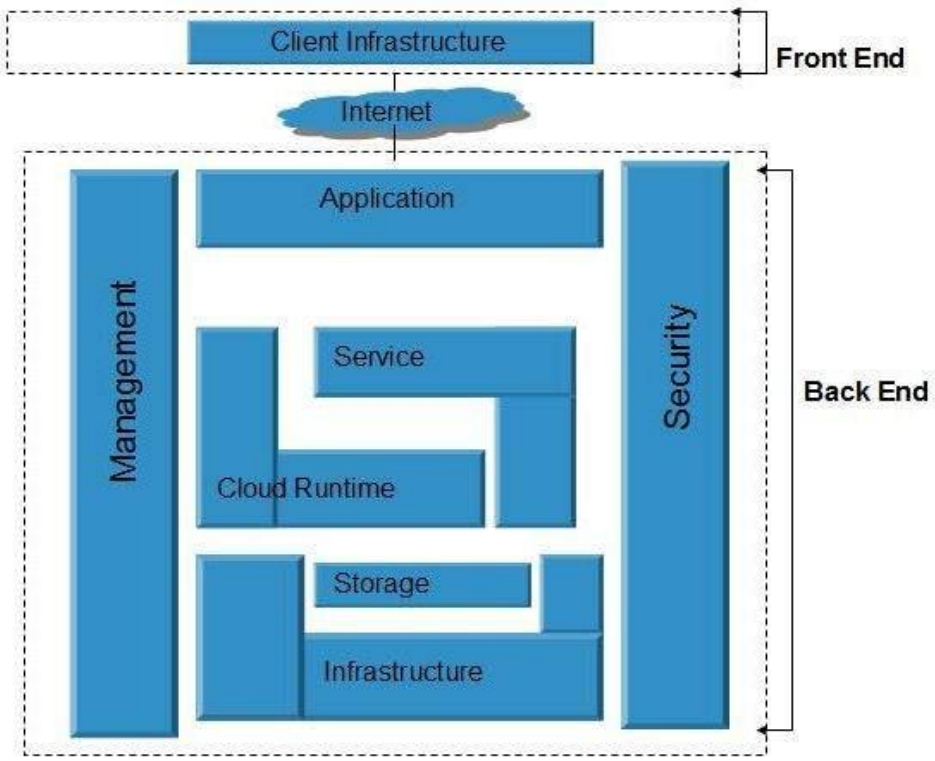
Cloud Computing refers to manipulating, configuring, and accessing the hardware and software resources remotely. It offers online data storage, infrastructure, and application. Cloud computing offers **platform independency,** as the software is not required to be installed locally

on the PC. Hence, the Cloud Computing is making our business applications **mobile** and **collaborative.**

Cloud Computing architecture comprises of many cloud components, which are loosely coupled. We can broadly divide the cloud architecture into two parts:

- Front End
- Back End

Each of the ends is connected through a network, usually Internet. The following diagram shows the graphical view of cloud computing architecture:



Front End

The **front end** refers to the client part of cloud computing system. It consists of interfaces and applications that are required to access the cloud computing platforms, Example - Web Browser.

Back End

The **back End** refers to the cloud itself. It consists of all the resources required to provide cloud computing services. It comprises of huge data storage, virtual machines, security mechanism, services, deployment models, servers, etc.

- It is the responsibility of the back end to provide built-in security mechanism, traffic control and protocols.
- The server employs certain protocols known as middleware, which help the connected devices to communicate with each other.

Q3. State the differences between Cloud & Grid Computing?

1. The applications build on the cloud are business specific applications such as web-based application typically used by thin clients or for handheld devices. On the other hand, Grid focuses on the research-based application with the help of distributed independent administrative units working altogether for solving a larger computing problem.
2. Cloud uses client-server architecture, in contrast, grid uses distributed computing architecture.
3. The cloud computing infrastructure is operated by a centralized management whereas in grid computing there is a decentralized management system where different sites are spread globally, and each site has an independent administration.
4. The cloud users pay as they use (i.e., utility pricing or metered billing), where a user doesn't have to pay as he/she releases the resources. As against, there is no defined business model in grid computing.
5. Services on the cloud are highly flexible and real time and it can scale up rapidly. On the contrast, the grid provides scheduled services with low flexibility.
6. Grid infrastructure can deal with interoperability with ease whereas cloud doesn't support interoperability and can lead to vendor lock-in, which makes it difficult to migrate from one cloud service provider to another.
7. Resources can be pooled in a centralized or seldom in a decentralized manner in Cloud computing. On the other hand, resources are used in a de-centralized manner in grid computing.
8. In grid infrastructure, the resources are limited while in the cloud there is a magnificent pool of resources. Grids can be made using cloud infrastructure.

Q4. Explain SaaS, PaaS, IaaS services provided by Microsoft azure?

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.

PaaS

Platform as a service (PaaS) is a complete development and deployment environment in the cloud, with resources that enable you to deliver everything from simple cloud-based apps to sophisticated, cloud-enabled enterprise applications. You purchase the resources you need from a cloud service provider on a pay-as-you-go basis and access them over a secure Internet connection.

Like IaaS, PaaS includes infrastructure—servers, storage and networking—but also middleware, development tools, business intelligence (BI) services, database management systems and more. PaaS is designed to support the complete web application lifecycle: building, testing, deploying, managing and updating.

PaaS allows you to avoid the expense and complexity of buying and managing software licenses, the underlying application infrastructure and middleware or the development tools and other

resources. You manage the applications and services you develop and the cloud service provider typically manages everything else.

Advantages:

By delivering infrastructure as a service, PaaS offers the same advantages as IaaS. But its additional features—middleware, development tools and other business tools—give you more advantages:

Cut coding time. PaaS development tools can cut the time it takes to code new apps with pre-coded application components built into the platform, such as workflow, directory services, security features, search and so on.

Add development capabilities without adding staff. Platform as a Service components can give your development team new capabilities without your needing to add staff having the required skills.

Develop for multiple platforms—including mobile—more easily. Some service providers give you development options for multiple platforms, such as computers, mobile devices and browsers making cross-platform apps quicker and easier to develop.

Use sophisticated tools affordably. A pay-as-you-go model makes it possible for individuals or organisations to use sophisticated development software and business intelligence and analytics tools that they could not afford to purchase outright.

Support geographically distributed development teams. Because the development environment is accessed over the Internet, development teams can work together on projects even when team members are in remote locations.

Efficiently manage the application lifecycle. PaaS provides all of the capabilities that you need to support the complete web application lifecycle: building, testing, deploying, managing and updating within the same integrated environment.

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.

Q5. Explain SaaS, PaaS, IaaS services provided by Amazon Cloud?

Infrastructure as a Service (IaaS):
Infrastructure as a Service, sometimes abbreviated as IaaS, contains the basic building blocks for cloud IT and typically provide access to networking features, computers (virtual or on dedicated hardware), and data storage space. Infrastructure as a Service provides you with the highest level of flexibility and management control over your IT resources and is most similar to existing IT resources that many IT departments and developers are familiar with today.

Platform as a Service (PaaS):
Platforms as a service remove the need for organizations to manage the underlying infrastructure (usually hardware and operating systems) and allow you to focus on the deployment and management of your applications. This helps you be more efficient as you don't need to worry about resource procurement, capacity planning, software maintenance, patching, or any of the other undifferentiated heavy lifting involved in running your application.

Software as a Service (SaaS):

Software as a Service provides you with a completed product that is run and managed by the service provider. In most cases, people referring to Software as a Service are referring to end-user applications. With a SaaS offering you do not have to think about how the service is maintained or how the underlying infrastructure is managed; you only need to think about how you will use that particular piece software. A common example of a SaaS application is web-based email where you can send and receive email without having to manage feature additions to the email product or maintaining the servers and operating systems that the email program is running on.