**Cloud Computing Practicals**

**Cloud Computing:** Cloud Computing refers to manipulating, configuring,and accessingthe 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.

**Benefits of Cloud Computing:**

Cloud Computing has numerous advantages. Some of them are listed below -

1. **Low Cost:** To run cloud technology, users don’t require high power computer & technology as because the application will run on the cloud and not on user’s PC. It only required the internet connectivity.
2. **Storage capacity**: The Cloud storage capacity is unlimited &amp; generally offers a huge storage capacity of 2000-3000 GBs or more based on the requirement.
3. **Low cost of IT infrastructure**: As discussed earlier, the investment will be less if an organization uses Cloud technology; even the IT staffs and server engineers are also not required.
4. **Increase computing power**: Cloud servers have a very high-capacity of running and processing tasks as well as the processing of applications.
5. **Reduce Software Costs**: Cloud minimizes the software costs as users don’t need to purchase software for organizations or every computer.

**Types of Cloud:**

There are differentiating four different types of cloud:

1. Public Cloud
2. Private Cloud
3. Hybrid Cloud.
4. Community Cloud.
5. **Public Cloud**:- Public Cloud allows systems and services to be easily accessible to general public. The IT giants such as Google, Amazon and Microsoft offer cloud services via Internet. The Public Cloud Model is shown in the diagram below.
6. **Private Cloud:** Private Cloudallows systems and services to be accessible within an organization. The Private Cloud is operated only within a single organization. However, it may be managed internally by the organization itself or by third-party. The private cloud model is shown in the diagram below.
7. **Hybrid Cloud**: Hybrid Cloud is a mixture of public and private cloud. Non-critical activities are performed using public cloud while the critical activities are performed using private cloud.
8. **Community Cloud :** Community Cloud allows system and services to be accessible by group of organizations. It shares the infrastructure between several organizations from a specific community. It may be managed internally by organizations or by the third- party.

**Cloud Computing Services(Service Model):**

The three major Cloud Computing Offerings are

##### Software as a Service (SaaS)

1. Platform as a Service (PaaS)

##### Infrastructure as a Service (IaaS)

**Infrastructure as a Service | IaaS**

IaaS is also known as **Hardware as a Service (HaaS)**. It is a computing infrastructure managed over the internet. The main advantage of using IaaS is that it helps users to avoid the cost and complexity of purchasing and managing the physical servers.

## Characteristics of IaaS

There are the following characteristics of IaaS -

* Resources are available as a service
* Services are highly scalable
* Dynamic and flexible
* GUI and API-based access
* Automated administrative tasks

# Platform as a Service (PaaS)

PaaS cloud computing platform is created for the programmer to develop, test, run, and manage the applications.

## Characteristics of PaaS

There are the following characteristics of PaaS -

* Accessible to various users via the same development application.
* Integrates with web services and databases.
* Builds on virtualization technology, so resources can easily be scaled up or down as per the organization's need.
* Support multiple languages and frameworks.
* Provides an ability to "**Auto-scale**".

# Software as a Service (SaaS)

SaaS is also known as "**on-demand software**". It is a software in which the applications are hosted by a cloud service provider. Users can access these applications with the help of internet connection and web browser.

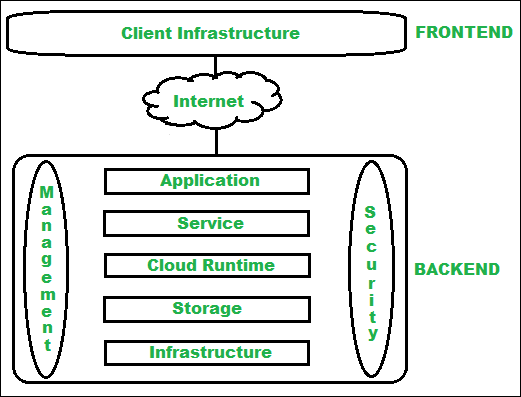
## Characteristics of SaaS

There are the following characteristics of SaaS -

* Managed from a central location
* Hosted on a remote server
* Accessible over the internet
* Users are not responsible for hardware and software updates. Updates are applied automatically.
* The services are purchased on the pay-as-per-use basis

**Architecture of Cloud Computing:**

1. **Frontend**
2. **Backend**



1. **Frontend :**

Frontend of the cloud architecture refers to the client side of cloud computing system. Means it contains all the user interfaces and applications which are used by the client to

access the cloud computing services/resources. For example use of a web browser to access the cloud platform.

**Client Infrastructure –** Client Infrastructure refers to the frontend components. It contains the applications and user interfaces which are required to access the cloud platform.

1. **Backend :**

Backend refers to the cloud itself which is used by the service provider. It contains the resources as well as manages the resources and provides security mechanisms. Along with this it includes huge storage, virtual applications, virtual machines, traffic control mechanisms, deployment models etc.

1. **Application –**

Application in backend refers to a software or platform to which client accesses. Means it provides the service in backend as per the client requirement.

1. **Service –**

Service in backend refers to the major three types of cloud based services like SaaS, PaaS and IaaS. Also manages which type of service the user accesses.

1. **Cloud Runtime –**

Runtime cloud in backend refers to provide of execution and runtime platform/environment to the virtual machine.

1. **Storage –**

Storage in backend refers to provide flexible and scalable storage service and management of stored data.

1. **Infrastructure –**

Cloud Infrastructure in backend refers to hardware and software components of cloud like it includes servers, storage, network devices, virtualization software etc.

1. **Management –**

Management in backend refers to management of backend components like application, service, runtime cloud, storage, infrastructure, and other security mechanisms etc.

1. **Security –**

Security in backend refers to implementation of different security mechanisms in the backend for secure cloud resources, systems, files, and infrastructure to end-users.

1. **Internet –**

Internet connection acts as the medium or a bridge between frontend and backend and establishes the interaction and communication between frontend and backend.

**Conclusion:** Cloud Computing enables a convenient and on demand network access to wide range of resources. The different services and also the deployment model allow flexible service provider interaction with minimal human intervention**.** It saves cost but also can lead to risk issues and suspension of resources when in huge quantity.

## What is vm?

A virtual machine, commonly shortened to just VM, is no different than any other physical computer like a laptop, smart phone, or server. It has a CPU, memory, disks to store your files, and can connect to the internet if needed. While the parts that make up your computer (called hardware) are physical and tangible, VMs are often thought of as virtual computers or software-defined computers within physical servers, existing only as code.

## How does a virtual machine work?

Virtualization is the process of creating a software-based, or "virtual" version of a computer, with dedicated amounts of CPU, memory, and storage that are "borrowed" from a physical host computer—such as your personal computer— and/or a remote server—such as a server in a cloud provider's datacenter. A virtual machine is a computer file, typically called an image, that behaves like an actual computer. It can run in a window as a separate computing environment, often to run a different operating system—or even to function as the user's entire computer experience—as is common on many people's work computers. The virtual machine is partitioned from the rest of the system, meaning that the software inside a VM can't interfere with the host computer's primary operating system.

### What is a hypervisor?

A hypervisor is a function that abstracts -- isolates -- operating systems (OSes) and applications from the underlying computer hardware. This abstraction enables the underlying [host machine](https://searchservervirtualization.techtarget.com/definition/host-virtual-machine-host-VM) hardware to independently operate one or more [virtual machines](https://searchservervirtualization.techtarget.com/definition/virtual-machine) as guests, enabling multiple guest VMs to effectively share the system's physical compute resources, such as processor cycles, memory space and network bandwidth.

A hypervisor would be used by someone who wants to [consolidate space on a server](https://searchservervirtualization.techtarget.com/tutorial/Server-consolidation-and-virtualization-project-planning-guide) or run multiple isolated applications on a single server. Hypervisors are commonly supported in virtualization software, such as vCenter Server.

### Types of hypervisors

Hypervisors are traditionally implemented as a software layer -- such as [VMware vSphere or Microsoft Hyper-V](https://searchservervirtualization.techtarget.com/answer/Hyper-V-vs-VMware-comparison-What-are-the-differences) -- but hypervisors can also be implemented as code embedded in a system's firmware. There are two principal types of hypervisor: [Type 1 and Type 2 hypervisors](https://searchservervirtualization.techtarget.com/feature/Whats-the-difference-between-Type-1-and-Type-2-hypervisors).

#### Type 1 hypervisors

Type 1 hypervisors are deployed directly atop the system's hardware without any underlying OSes or other software. These are called [*bare-metal*](https://searchservervirtualization.techtarget.com/definition/bare-metal-hypervisor) hypervisors and are the most common and popular type of hypervisor for the enterprise data center. Examples include vSphere and Hyper-V.

#### Type 2 hypervisors

Type 2 hypervisors run as a software layer atop a host OS and are usually called [*hosted*](https://searchservervirtualization.techtarget.com/definition/hosted-hypervisor-Type-2-hypervisor) hypervisors, such as VMware Workstation Player or Parallels Desktop. Hosted hypervisors are often found on endpoints such as personal computers.

### What are hypervisors used for?

Hypervisors are important to any system administrator or system operator because virtualization adds a crucial layer of management and control over the data center and enterprise environment. Staff members not only need to understand how the respective hypervisor works, but also how to perform related management tasks such as VM configuration, migration and snapshots.

[The role of a hypervisor](https://searchservervirtualization.techtarget.com/tip/Understanding-hosted-and-bare-metal-virtualization-hypervisor-types) is also expanding. Storage hypervisors, for example, are used to virtualize all the storage resources in the environment to create centralized storage pools that admins can provision, without having to concern themselves with where the storage was physically located. Today, storage hypervisors are a key element of software-defined storage. Networks are also being virtualized with hypervisors, enabling networks and network devices to be created, changed, managed and destroyed entirely through software without ever touching physical network devices. As with storage, network virtualization is appearing in broader software-defined network or software-defined data center platforms.

