

Cloud Computing



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Cloud Computing

It can be defined as the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a personal computer or a local server .The companies which are offering these computing services are called cloud providers and typically charge for cloud computing services based on usage.

Types of Cloud Services:

1. SaaS
2. PaaS
3. IaaS

1. **SaaS:**

SaaS Stands for software-as-a-Service . It is a way of delivering services and applications over the internet. Instead of installing and maintaining the software, we simply access it via the Internet, freeing ourselves from the complex software and the hardware management.It removes the need to install and run applications on our own computers or in the data centers and eliminates the expenses of hardware as well as software maintenance.

It provides a complete software solution which you purchase on a pay-as-you-go basis from a cloud service provider.Most of the SaaS applications can be run directly from a web browser without any downloads or installations required. These applications are sometimes called Web-based software, hosted software or on-demand software.



Advantages of SaaS :

1. **Cost Effective:** Only Pay for what you use
2. **Reduced time:** Users can run most of the SaaS application directly from their web browser without needing to download and install any software. This will reduce the time spent in installation and configuration, and can reduce the issues that can get in the way of the software deployment.
3. **Accessibility:** We can Access application data from anywhere.
4. **Automatic updates:** Rather than purchasing new software, customers rely on a SaaS provider to automatically perform updates.
5. **Scalability:** scalability allows the users to access the services and features on demand.

The various companies providing software as a service are Cloud9 Analytics, Cloud Switch, Salesforce.com, Microsoft Office 365, Eloqua, Cloud Tran and dropBox.

2. PaaS:

PaaS stands for PLATFORM AS A SERVICE . It is a category of cloud computing that provides a platform and environment to allow developers to build applications and services over the internet. Its services are hosted in the cloud and accessed by users simply via their web browser.

A PaaS provider hosts the software and hardware on its own infrastructure. As a result, it frees users from having to install in-house hardware and software to develop or run a new application. Thus, the deployment and development of the application takes place independent of the hardware.

The consumer does not control or manage the underlying cloud infrastructure including network, servers, OS, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.

Advantages of PaaS :

1. Simple and convenient for users :

PaaS provides much of the infrastructure and other IT services, which users can access anywhere via a web browser.

2. Cost Effective :

It charges for the services provided on a per-use basis thus eliminating the expenses one may have for on-premises software and hardware.

3. Efficiently managing the lifecycle:

It is designed to support the complete web application lifecycle i.e. building, testing, deploying, managing and updating.

4. Efficiency:

PaaS allows for higher-level programming with reduced complexity thus, the overall development of the application can be more effective

The various companies providing Platform as a service are Amazon Web services, Windows Azure, Google App Engine, Salesforce, cloud Bess and IBM smart cloud.

3. IaaS:

IaaS stands for INFRASTRUCTURE AS A SERVICE. It is a service model that delivers computer infrastructure on an outsourced basis to support various operations. Typically IaaS is a service where infrastructure is provided as an outsource to enterprises such as devices, networking equipment's, database and web servers.

It is also known as **Hardware as a service (HaaS)**. IaaS customers pay on a per-use basis, typically by hourly, weekly or monthly. Some providers may also charge customers based on the amount of virtual machine space they use.

It simply provides the underlying operating systems, networking, security, and servers for developing such services, applications, and for deploying development tools, databases, etc.

Advantages of IaaS :

1. **Cost Effective** :It Eliminates capital expense and reduces ongoing cost and IaaS customers pay on a per use basis, typically by hourly, weekly or monthly.
2. **Website hosting**: Running websites can be less expensive than traditional web hosting.
3. **Security**: The Providers may provide better security than your existing software.
4. **Maintenance**: There is no need to manage underlying data centre or introduction of new releases of the development or underlying software. This is all handled by the IaaS Cloud Provider.

The various companies providing Infrastructure as a service are Amazon web services, IBM, Rackspace, Openstack, Bluestack and Vmware.

Difference Between Public and Private Cloud :

S.No.		Private Cloud	Public Cloud
1	Infrastructure	Single-Tenant: Dedicated hardware and network for once business managed by an in-house technical team	Multi-Tenant: Shared network hosted off site and managed by once service provider
2	Business requirement	High performance , customization , security and control options	It has affordable solutions that provide room for growth
3	Best use	Protect your most sensitive applications and data	Disaster recovery and application testing for smaller , public facing companies
4	Scalability	Can be managed in house. Extreme performance-fine-grained control for both compute and storage	Depends on the service Level Agreement(SLA) but usually easy via self-managed tool the customer will use
5	Support and maintenance	Your technical administrators	Cloud service provider's technical team
6	Cost	Large upfront cost to implement the software , hardware and staff resources. Growth and Maintenance must also be built into ongoing costs	Affordable option offering a pay as you go service fee. OpEx- Pay as you go , scale down as needed , scale up , charged by the minute.
7	Security	Isolated network environment. Enhanced security to meet data protection legislation	Basic security compliance. Some may offer bolt-on security options
8	Performance	High performance from dedicated server	Competing users can reduce performance levels



Virtual Server:

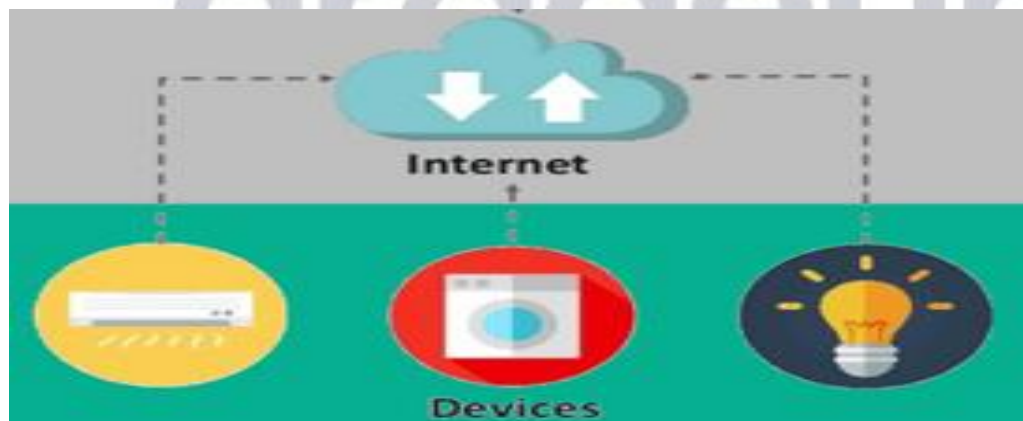
It mimics the functionality of a physical dedicated server. Multiple virtual servers may be implemented on a single bare metal server, each with its own OS, software and independent provisioning. A virtual machine server uses virtualization software, virtual infrastructure, and abstracts the physical server's computer resources to create virtual environments.

IoT:

IoT stands for Internet of Things. It is a network of physical objects or people called "things" that are embedded with the software, electronics, network, and sensors that allows these objects to collect and exchange of data. The main goal of IoT is to extend to internet connectivity from standard devices like computer, tablet, mobile to relatively dumb devices like a toaster.

It makes virtually everything "smart," by improving aspects of our life with the power of data collection, the AI algorithm, and the networks.

How it works :



The entire IOT process starts with the devices themselves like smartwatches, smartphones, electronic appliances like Washing Machine, TV which helps you to communicate with the IOT platform.

There are four fundamental components of an IoT system:

- 1) **Sensors/Devices:** They are a key component that helps you to collect live data from the surrounding environment. All this data may have various levels of complexities. It could be as simple as temperature monitoring sensor, or it may be in the form of the video feed.
A device may have various types of sensors present which may perform multiple tasks apart from sensing. Example, A mobile phone is a device which has multiple sensors like camera, GPS but your smartphone is not able to sense these things.
- 2) **Connectivity:** All of the collected data is sent to a cloud infrastructure. The sensors must be connected to the cloud using various mediums of communications. These communication mediums include mobile or satellite networks, Wi-Fi, Bluetooth, WAN, etc.
- 3) **Data Processing:** Once that the data is collected, and it reaches to the cloud, the software performs processing on the gathered data. This process can be just checking the temperature, reading on devices like heaters or AC. It can sometimes also be very complex like identifying objects, using computer vision on video.
- 4) **User Interface:** The information needs to be available to the end-user in some way which can be achieved by triggering alarms on their phones or sending them notification through text message or email. Example, the user has a camera installed in his home. He/she wants to access video recording and all the feeds with the help of a web server

Applications of IoT:

1. Smart thermostats
2. Connected Cars
3. Activity trackers
4. Smart outlets
5. Parking sensors
6. Connect Health
7. Smart home
8. Smart city



Challenges of IoT :

The challenges of IoT as follows :

- Insufficient updating or testing
- There is a concern regarding data security and privacy
- Complex software
- Constant power supply is needed by the device which is difficult
- Data volumes





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