CLOUD COMPUTING

Cloud computing is a virtualization-based technology that allows us to create, configure, and customize applications via an internet connection. The cloud technology includes a development platform, hard disk, software application and database.

Unit-1

Cloud Computing-

The term cloud computing refer to a network of the internet. It is a technology that uses remote servers on the internet to store, manage and access data online rather than the local drives. The data can be anything such as files, images, documents, audio, video and more.

There are following operation that we can do using cloud computing

Developing new applications and services

Storage back-up and recovering data

Hosting blog and websites

Delivering of software on demand

Analysis of data

Streaming videos and audios

Cloud Computing Architecture

As we know, cloud computing technology is used by both small and large organizations to store the information in cloud and access it from anywhere at anytime using the internet connection.

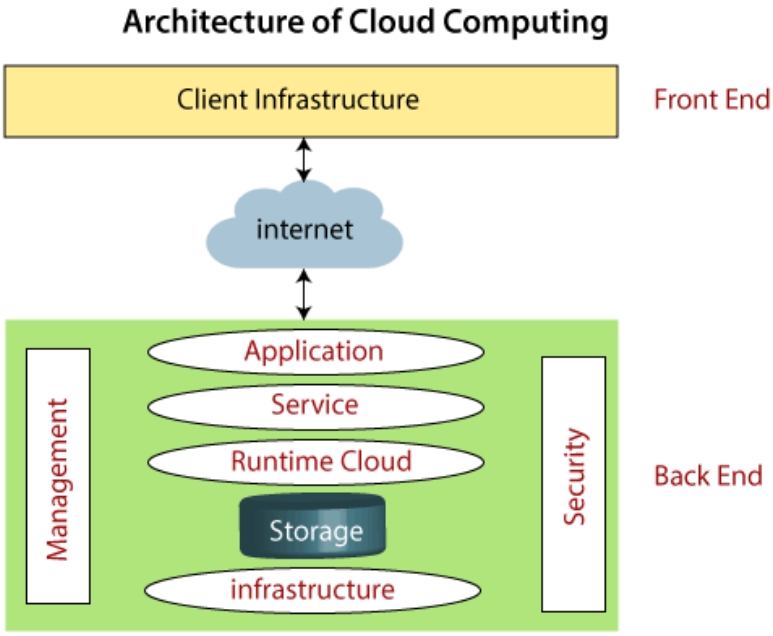
Cloud computing architecture is a combination of service-oriented architecture and event-driven architecture.

Cloud computing architecture is divided into the following two parts -

Front End

Back End

The below diagram shows the architecture of cloud computing -



Front End

The front end is used by the client. It contains client-side interfaces and applications that are required to access the cloud computing platforms. The front end includes web servers (including Chrome, Firefox, internet explorer, etc.), thin & fat clients, tablets, and mobile devices.

Back End

The back end is used by the service provider. It manages all the resources that are required to provide cloud computing services. It includes a huge amount of data storage, security mechanism, virtual machines, deploying models, servers, traffic control mechanisms, etc.

Note: Both front end and back end are connected to others through a network, generally using the internet connection.

Components of Cloud Computing Architecture

There are the following components of cloud computing architecture –

1. Client Infrastructure

Client Infrastructure is a Front end component. It provides GUI (Graphical User Interface) to interact with the cloud.

2. Application

The application may be any software or platform that a client wants to access.

3. Service

A Cloud Services manages that which type of service you access according to the client's requirement.

Cloud computing offers the following three type of services:

i. Software as a Service (SaaS) – It is also known as cloud application services. Mostly, SaaS applications run directly through the web browser means we do not require to download and install these applications. Some important example of SaaS is given below –

Example: Google Apps, Salesforce Dropbox, Slack, Hubspot, Cisco WebEx.

ii. Platform as a Service (PaaS) – It is also known as cloud platform services. It is quite similar to SaaS, but the difference is that PaaS provides a platform for software creation, but using SaaS, we can access software over the internet without the need of any platform.

Example: Windows Azure, Force.com, Magento Commerce Cloud, OpenShift.

iii. Infrastructure as a Service (IaaS) – It is also known as cloud infrastructure services. It is responsible for managing applications data, middleware, and runtime environments.

Example: Amazon Web Services (AWS) EC2, Google Compute Engine (GCE), Cisco Metapod.

4. Runtime Cloud

Runtime Cloud provides the execution and runtime environment to the virtual machines.

5. Storage

Storage is one of the most important components of cloud computing. It provides a huge amount of storage capacity in the cloud to store and manage data.

6. Infrastructure

It provides services on the host level, application level, and network level. Cloud infrastructure includes hardware and software components such as servers, storage, network devices, virtualization software, and other storage resources that are needed to support the cloud computing model.

7. Management

Management is used to manage components such as application, service, runtime cloud, storage, infrastructure, and other security issues in the backend and establish coordination between them.

8. Security

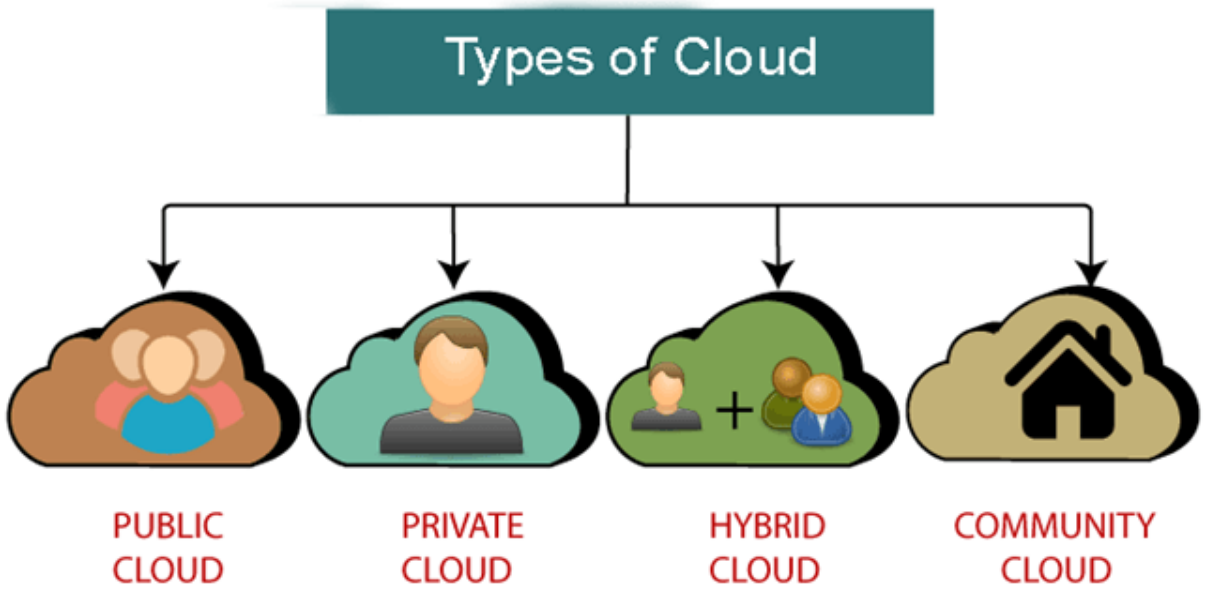
Security is an in-built back end component of cloud computing. It implements a security mechanism in the back end.

9. Internet

The Internet is medium through which front end and back end can interact and communicate with each other.

Types of Cloud

There are the following 4 types of cloud that you can deploy according to the organization's needs-



Public Cloud

Private Cloud

Hybrid Cloud

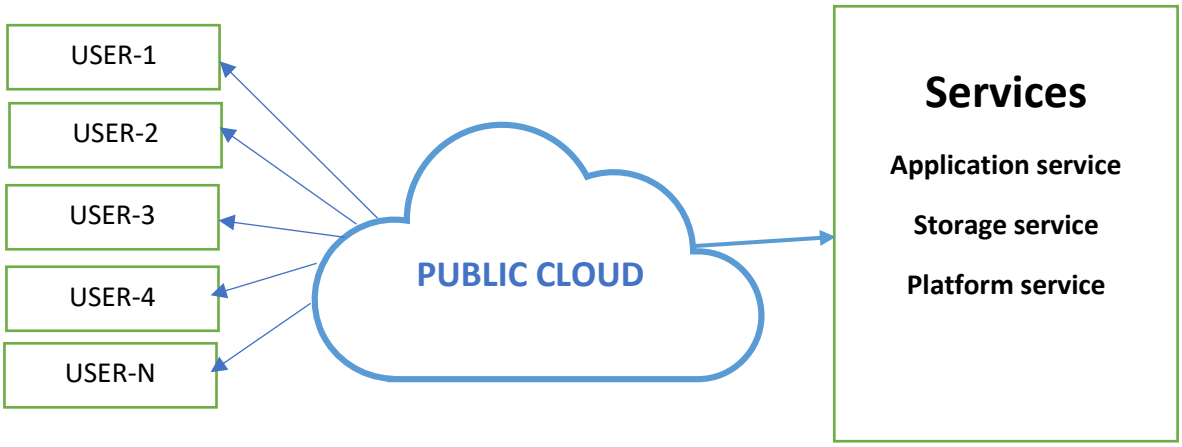
Community Cloud

Public Cloud

Public cloud is open to all to store and access information via the Internet using the pay-per-usage method.

In public cloud, computing resources are managed and operated by the Cloud Service Provider (CSP).

Example: Amazon elastic compute cloud (EC2), IBM SmartCloud Enterprise, Microsoft, Google App Engine, Windows Azure Services Platform.



Advantages of Public Cloud

There are the following advantages of Public Cloud -

Public cloud is owned at a lower cost than the private and hybrid cloud.

Public cloud is maintained by the cloud service provider, so do not need to worry about the maintenance.

Public cloud is easier to integrate. Hence it offers a better flexibility approach to consumers.

Public cloud is location independent because its services are delivered through the internet.

Public cloud is highly scalable as per the requirement of computing resources.

It is accessible by the general public, so there is no limit to the number of users.

Disadvantages of Public Cloud

Public Cloud is less secure because resources are shared publicly.

Performance depends upon the high-speed internet network link to the cloud provider.

The Client has no control of data.

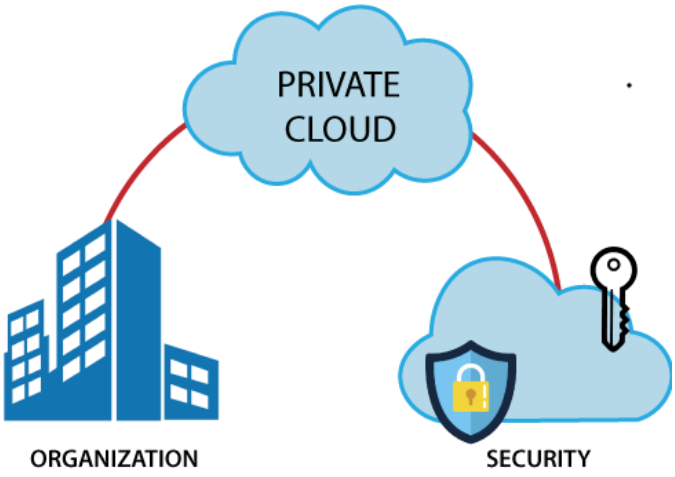
Private Cloud

Private cloud is also known as an internal cloud or corporate cloud.

Private cloud provides computing services to a private internal network (within the organization) and selected users instead of the general public.

Private cloud provides a high level of security and privacy to data through firewalls and internal hosting. It also ensures that operational and sensitive data are not accessible to third-party providers.

HP Data Centers, Microsoft, Elastra-private cloud, and Ubuntu are the example of a private cloud.



Advantages of Private cloud

There are the following advantages of Private Cloud -

1) More Control

Private clouds have more control over their resources and hardware than public clouds because it is only accessed by selected users.

2) Security & privacy

Security & privacy are one of the big advantages of cloud computing. Private cloud improved the security level as compared to the public cloud.

3) Improved performance

Private cloud offers better performance with improved speed and space capacity.

Disadvantages of Private Cloud

1) High cost

The cost is higher than a public cloud because set up and maintain hardware resources are costly.

2) Restricted area of operations

As we know, private cloud is accessible within the organization, so the area of operations is limited.

3) Limited scalability

Private clouds are scaled only within the capacity of internal hosted resources.

4) Skilled people

Skilled people are required to manage and operate cloud services.

Hybrid Cloud

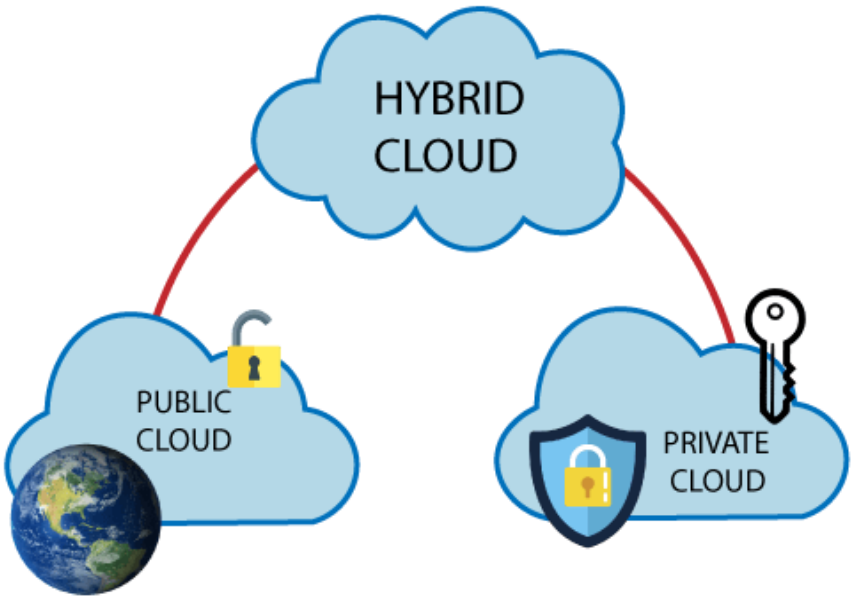
Hybrid cloud is a combination of public and private clouds.
Hybrid cloud = public cloud + private cloud

The main aim to combine these cloud (Public and Private) is to create a unified, automated, and well-managed computing environment.

In the Hybrid cloud, non-critical activities are performed by the public cloud and critical activities are performed by the private cloud.

Mainly, a hybrid cloud is used in finance, healthcare, and Universities.

The best hybrid cloud provider companies are Amazon, Microsoft, Google, Cisco, and NetApp.



Advantages of Hybrid Cloud

There are the following advantages of Hybrid Cloud -

1) Flexible and secure

It provides flexible resources because of the public cloud and secure resources because of the private cloud.

2) Cost effective

Hybrid cloud costs less than the private cloud. It helps organizations to save costs for both infrastructure and application support.

3) Cost effective

It offers the features of both the public as well as the private cloud. A hybrid cloud is capable of adapting to the demands that each company needs for space, memory, and system.

4) Security

Hybrid cloud is secure because critical activities are performed by the private cloud.

5) Risk Management

Hybrid cloud provides an excellent way for companies to manage the risk.

Disadvantages of Hybrid Cloud

1) Networking issues

In the Hybrid Cloud, networking becomes complex because of the private and the public cloud.

2) Infrastructure Compatibility

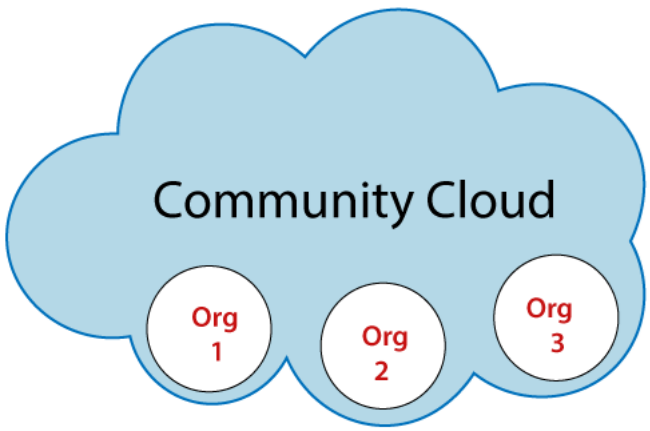
Infrastructure compatibility is the major issue in a hybrid cloud. With dual-levels of infrastructure, a private cloud controls the company, and a public cloud does not, so there is a possibility that they are running in separate stacks.

3) Reliability

The reliability of the services depends on cloud service providers.

Community Cloud

Community cloud is a cloud infrastructure that allows systems and services to be accessible by a group of several organizations to share the information. It is owned, managed, and operated by one or more organizations in the community, a third party, or a combination of them.



Example: Our government organization within India may share computing infrastructure in the cloud to manage data.

Advantages of Community Cloud

There are the following advantages of Community Cloud -

Cost effective

Community cloud is cost effective because the whole cloud is shared between several organizations or a community.

Flexible and Scalable

The community cloud is flexible and scalable because it is compatible with every user. It allows the users to modify the documents as per their needs and requirement.

Security

Community cloud is more secure than the public cloud but less secure than the private cloud.

Sharing infrastructure

Community cloud allows us to share cloud resources, infrastructure, and other capabilities among various organizations.

Disadvantages of Community Cloud

There are the following disadvantages of Community Cloud -

Community cloud is not a good choice for every organization.

Slow adoption to data

The fixed amount of data storage and bandwidth is shared among all community members.

Community Cloud is costly than the public cloud.

Sharing responsibilities among organizations is difficult.

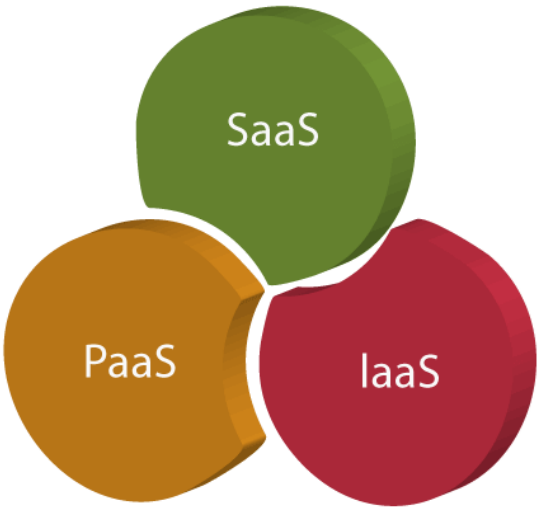
Cloud Service Models

There are the following three types of cloud service models -

Infrastructure as a Service (IaaS)

Platform as a Service (PaaS)

Software as a Service (SaaS)



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

Example: DigitalOcean, Linode, Amazon Web Services (AWS), Microsoft Azure, Google Compute Engine (GCE), Rackspace, and Cisco Metacloud.

To know more about the IaaS, **click here**.

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**".

Example: AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos, Magento Commerce Cloud, and OpenShift.

To know more about PaaS, click here.

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

Example: BigCommerce, Google Apps, Salesforce, Dropbox, ZenDesk, Cisco WebEx, ZenDesk, Slack, and GoToMeeting.

To know more about the SaaS, **click here**.

Difference between IaaS, PaaS, and SaaS

The below table shows the difference between IaaS, PaaS, and SaaS -

IaaS	Paas	SaaS
It provides a virtual data center to store information and create platforms for app development, testing, and deployment.	It provides virtual platforms and tools to create, test, and deploy apps.	It provides web software and apps to complete business tasks.

It provides access to resources such as virtual machines, virtual storage, etc.	It provides runtime environments and deployment tools for applications.	It provides software as a service to the end-users.
It is used by network architects.	It is used by developers.	It is used by end users.
IaaS provides only Infrastructure.	PaaS provides Infrastructure+Platform.	SaaS provides Infrastructure+Platform +Software.

Infrastructure as a Service | IaaS

Iaas is also known as Hardware as a Service (HaaS). It is one of the layers of the cloud computing platform. It allows customers to outsource their IT infrastructures such as servers, networking, processing, storage, virtual machines, and other resources. Customers access these resources on the Internet using a pay-as-per use model.

In traditional hosting services, IT infrastructure was rented out for a specific period of time, with pre-determined hardware configuration. The client paid for the configuration and time, regardless of the actual use. With the help of the IaaS cloud computing platform layer, clients can dynamically scale the configuration to meet changing requirements and are billed only for the services actually used.

IaaS cloud computing platform layer eliminates the need for every organization to maintain the IT infrastructure.

IaaS is offered in three models: public, private, and hybrid cloud. The private cloud implies that the infrastructure resides at the customer-premise. In the case of public cloud, it is located at the cloud computing platform vendor's data center, and the hybrid cloud is a combination of the two in which the customer selects the best of both public cloud or private cloud.

IaaS provider provides the following services -

Compute: Computing as a Service includes virtual central processing units and virtual main memory for the Vms that is provisioned to the end- users.

Storage: IaaS provider provides back-end storage for storing files.

Network: Network as a Service (NaaS) provides networking components such as routers, switches, and bridges for the Vms.

Load balancers: It provides load balancing capability at the infrastructure layer.

Advantages of IaaS cloud computing layer

There are the following advantages of IaaS computing layer -

1. Shared infrastructure

IaaS allows multiple users to share the same physical infrastructure.

2. Web access to the resources

Iaas allows IT users to access resources over the internet.

3. Pay-as-per-use model

IaaS providers provide services based on the pay-as-per-use basis. The users are required to pay for what they have used.

4. Focus on the core business

IaaS providers focus on the organization's core business rather than on IT infrastructure.

5. On-demand scalability

On-demand scalability is one of the biggest advantages of IaaS. Using IaaS, users do not worry about to upgrade software and troubleshoot the issues related to hardware components.

Disadvantages of IaaS cloud computing layer

1. Security

Security is one of the biggest issues in IaaS. Most of the IaaS providers are not able to provide 100% security.

2. Maintenance & Upgrade

Although IaaS service providers maintain the software, but they do not upgrade the software for some organizations.

3. Interoperability issues

It is difficult to migrate VM from one IaaS provider to the other, so the customers might face problem related to vendor lock-in.

Some important point about IaaS cloud computing layer

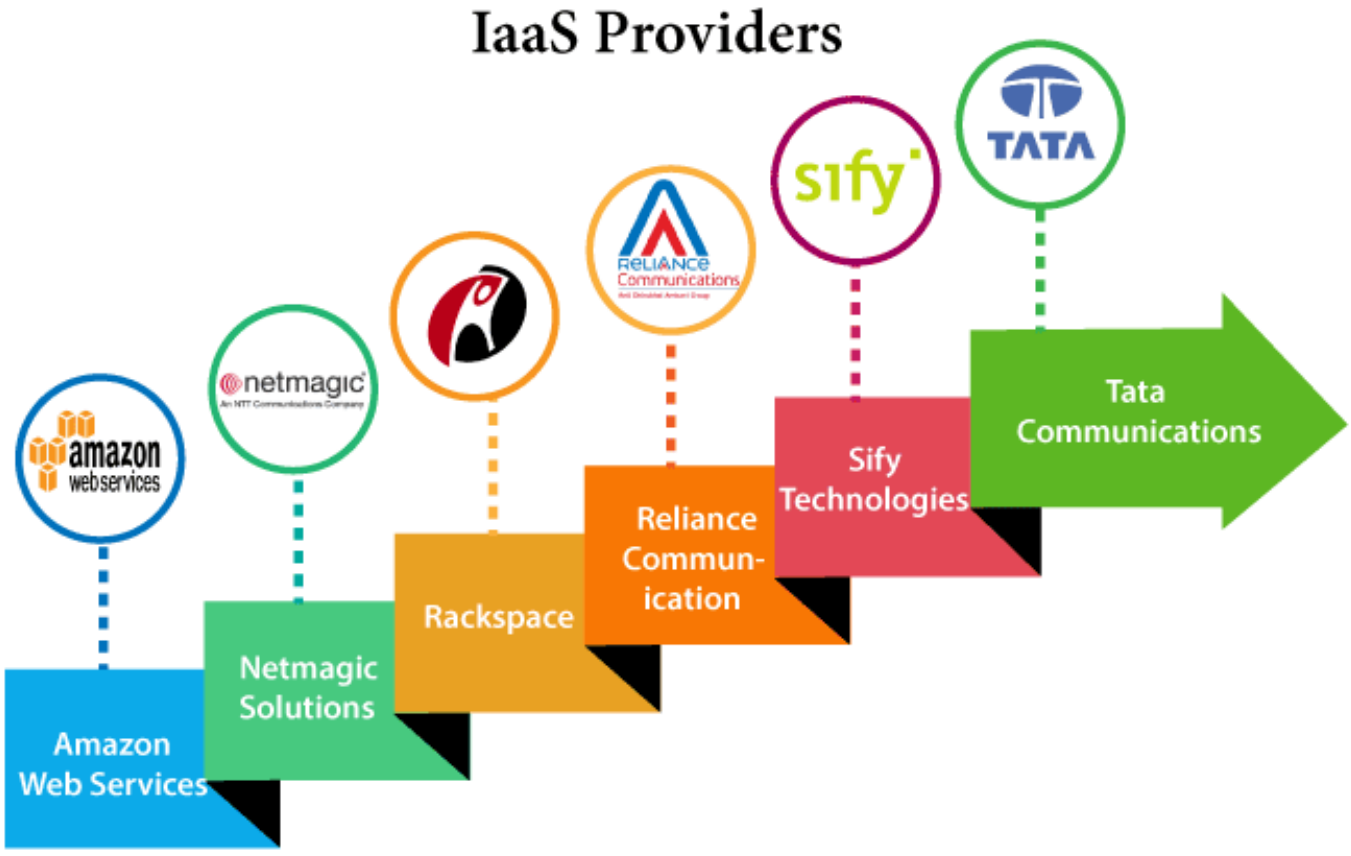
IaaS cloud computing platform cannot replace the traditional hosting method, but it provides more than that, and each resource which are used are predictable as per the usage.

IaaS cloud computing platform may not eliminate the need for an in-house IT department. It will be needed to monitor or control the IaaS setup. IT salary expenditure might not reduce significantly, but other IT expenses can be reduced.

Breakdowns at the IaaS cloud computing platform vendor's can bring your business to the halt stage. Assess the IaaS cloud computing platform vendor's stability and finances. Make sure that SLAs (i.e., Service Level Agreement) provide backups for data, hardware, network, and application failures. Image portability and third-party support is a plus point.

The IaaS cloud computing platform vendor can get access to your sensitive data. So, engage with credible companies or organizations. Study their security policies and precautions.

Top Iaas Providers who are providing IaaS cloud computing platform



IaaS Vendor	Iaas Solution	Details
Amazon Web Services	Elastic, Elastic Compute Cloud (EC2) MapReduce, Route 53, Virtual Private Cloud, etc.	The cloud computing platform pioneer, Amazon offers auto scaling, cloud monitoring, and load balancing features as part of its portfolio.
Netmagic Solutions	Netmagic IaaS Cloud	Netmagic runs from data centers in Mumbai, Chennai, and Bangalore, and a virtual data center in the United States. Plans are underway to extend services to West Asia.
Rackspace	Cloud servers, cloud files, cloud sites, etc.	The cloud computing platform vendor focuses primarily on enterprise-level hosting services.
Reliance Communications	Reliance Internet Data Center	RIDC supports both traditional hosting and cloud services, with data centers in Mumbai, Bangalore, Hyderabad, and Chennai. The cloud services offered by RIDC include IaaS and SaaS.
Sify Technologies	Sify IaaS	Sify's cloud computing platform is powered by HP's converged infrastructure. The vendor offers all three types of cloud services: IaaS, PaaS, and SaaS.
Tata Communications	InstaCompute	InstaCompute is Tata Communications' IaaS offering. InstaCompute data centers are located in Hyderabad and Singapore, with operations in both countries.

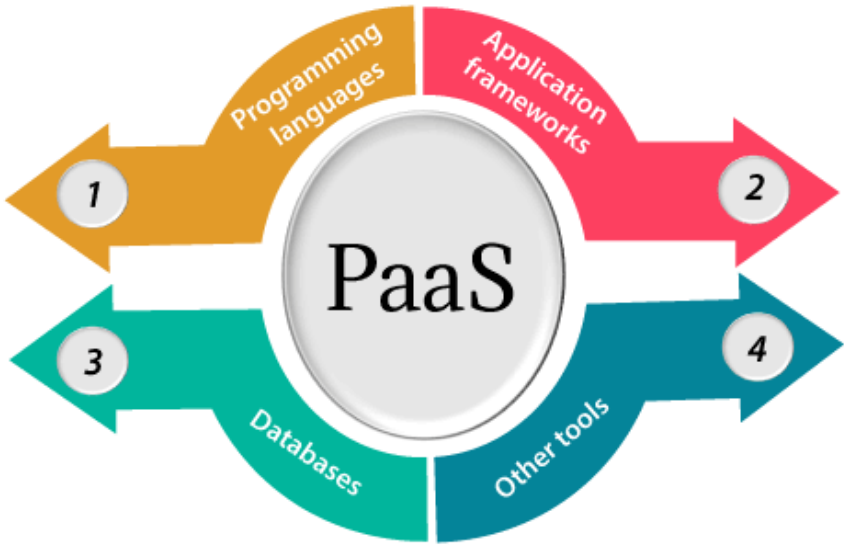
Platform as a Service | PaaS

Platform as a Service (PaaS) provides a runtime environment. It allows programmers to easily create, test, run, and deploy web applications. You can purchase these applications from a cloud service provider on a pay-as-per use basis and access them using the Internet connection. In PaaS, back end scalability is managed by the cloud service provider, so end- users do not need to worry about managing the infrastructure.

PaaS includes infrastructure (servers, storage, and networking) and platform (middleware, development tools, database management systems, business intelligence, and more) to support the web application life cycle.

Example: Google App Engine, Force.com, Joyent, Azure.

PaaS providers provide the Programming languages, Application frameworks, Databases, and Other tools:



1. Programming languages

PaaS providers provide various programming languages for the developers to develop the applications. Some popular programming languages provided by PaaS providers are Java, PHP, Ruby, Perl, and Go.

2. Application frameworks

PaaS providers provide application frameworks to easily understand the application development. Some popular application frameworks provided by PaaS providers are Node.js, Drupal, Joomla, WordPress, Spring, Play, Rack, and Zend.

3. Databases

PaaS providers provide various databases such as ClearDB, PostgreSQL, MongoDB, and Redis to communicate with the applications.

4. Other tools

PaaS providers provide various other tools that are required to develop, test, and deploy the applications.

Advantages of PaaS

There are the following advantages of PaaS -

1) Simplified Development

PaaS allows developers to focus on development and innovation without worrying about infrastructure management.

2) Lower risk

No need for up-front investment in hardware and software. Developers only need a PC and an internet connection to start building applications.

3) Prebuilt business functionality

Some PaaS vendors also provide already defined business functionality so that users can avoid building everything from very scratch and hence can directly start the projects only.

4) Instant community

PaaS vendors frequently provide online communities where the developer can get the ideas to share experiences and seek advice from others.

5) Scalability

Applications deployed can scale from one to thousands of users without any changes to the applications.

Disadvantages of PaaS cloud computing layer

1) Vendor lock-in

One has to write the applications according to the platform provided by the PaaS vendor, so the migration of an application to another PaaS vendor would be a problem.

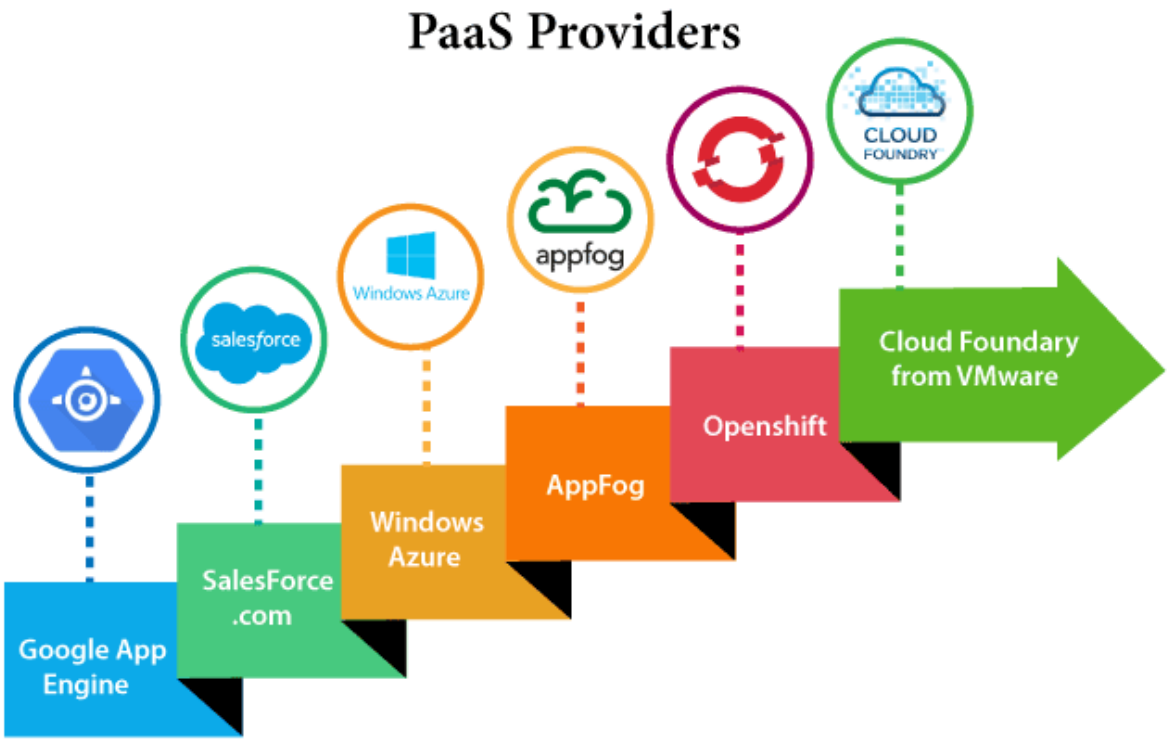
2) Data Privacy

Corporate data, whether it can be critical or not, will be private, so if it is not located within the walls of the company, there can be a risk in terms of privacy of data.

3) Integration with the rest of the systems applications

It may happen that some applications are local, and some are in the cloud. So there will be chances of increased complexity when we want to use data which in the cloud with the local data.

Popular PaaS Providers



The below table shows some popular PaaS providers and services that are provided by them -

Providers	Services
Google App Engine (GAE)	App Identity, URL Fetch, Cloud storage client library, Logservice
Salesforce.com	Faster implementation, Rapid scalability, CRM Services, Sales cloud, Mobile connectivity, Chatter.
Windows Azure	Compute, security, IoT, Data Storage.
AppFog	Justcloud.com, SkyDrive, GoogleDocs
Openshift	RedHat, Microsoft Azure.
Cloud Foundry from VMware	Data, Messaging, and other services.

Software as a Service | SaaS

SaaS is also known as "**On-Demand Software**". It is a software distribution model in which services are hosted by a cloud service provider. These services are available to end-users over the internet so, the end-users do not need to install any software on their devices to access these services.

There are the following services provided by SaaS providers -

Business Services - SaaS Provider provides various business services to start-up the business. The SaaS business services include **ERP** (Enterprise Resource Planning), **CRM** (Customer Relationship Management), **billing**, and **sales**.

Document Management - SaaS document management is a software application offered by a third party (SaaS providers) to create, manage, and track electronic documents.

Example: Slack, Samepage, Box, and Zoho Forms.

Social Networks - As we all know, social networking sites are used by the general public, so social networking service providers use SaaS for their convenience and handle the general public's information.

Mail Services - To handle the unpredictable number of users and load on e-mail services, many e-mail providers offering their services using SaaS.

Advantages of SaaS cloud computing layer

1) SaaS is easy to buy

SaaS pricing is based on a monthly fee or annual fee subscription, so it allows organizations to access business functionality at a low cost, which is less than licensed applications.

Unlike traditional software, which is sold as a licensed based with an up-front cost (and often an optional ongoing support fee), SaaS providers are generally pricing the applications using a subscription fee, most commonly a monthly or annually fee.

2. One to Many

SaaS services are offered as a one-to-many model means a single instance of the application is shared by multiple users.

3. Less hardware required for SaaS

The software is hosted remotely, so organizations do not need to invest in additional hardware.

4. Low maintenance required for SaaS

Software as a service removes the need for installation, set-up, and daily maintenance for the organizations. The initial set-up cost for SaaS is typically less than the enterprise software. SaaS vendors are pricing their applications based on some usage parameters, such as a number of users using the application. So SaaS does easy to monitor and automatic updates.

5. No special software or hardware versions required

All users will have the same version of the software and typically access it through the web browser. SaaS reduces IT support costs by outsourcing hardware and software maintenance and support to the IaaS provider.

6. Multidevice support

SaaS services can be accessed from any device such as desktops, laptops, tablets, phones, and thin clients.

7. API Integration

SaaS services easily integrate with other software or services through standard APIs.

8. No client-side installation

SaaS services are accessed directly from the service provider using the internet connection, so do not need to require any software installation.

Disadvantages of SaaS cloud computing layer

1) Security

Actually, data is stored in the cloud, so security may be an issue for some users. However, cloud computing is not more secure than in-house deployment.

2) Latency issue

Since data and applications are stored in the cloud at a variable distance from the end-user, there is a possibility that there may be greater latency when interacting with the application compared to local deployment. Therefore, the SaaS model is not suitable for applications whose demand response time is in milliseconds.

3) Total Dependency on Internet

Without an internet connection, most SaaS applications are not usable.

4) Switching between SaaS vendors is difficult

Switching SaaS vendors involves the difficult and slow task of transferring the very large data files over the internet and then converting and importing them into another SaaS also.

Popular SaaS Providers

The below table shows some popular SaaS providers and services that are provided by them -

Provider	Services
Salseforce.com	On-demand CRM solutions
Microsoft Office 365	Online office suite
Google Apps	Gmail, Google Calendar, Docs, and sites
NetSuite	ERP, accounting, order management, CRM, Professionals Services Automation (PSA), and e-commerce applications.
GoToMeeting	Online meeting and video-conferencing software
Constant Contact	E-mail marketing, online survey, and event marketing
Oracle CRM	CRM applications
Workday, Inc	Human capital management, payroll, and financial management.

Virtualization in Cloud Computing

Virtualization is the "creation of a virtual (rather than actual) version of something, such as a server, a desktop, a storage device, an operating system or network resources".

In other words, Virtualization is a technique, which allows to share a single physical instance of a resource or an application among multiple customers and organizations. It does by assigning a logical name to a physical storage and providing a pointer to that physical resource when demanded.

What is the concept behind the Virtualization?

Creation of a virtual machine over existing operating system and hardware is known as Hardware Virtualization. A Virtual machine provides an environment that is logically separated from the underlying hardware.

The machine on which the virtual machine is going to create is known as Host Machine and that virtual machine is referred as a Guest Machine

Types of Virtualization:

Hardware Virtualization.

Operating system Virtualization.

Server Virtualization.

Storage Virtualization.

1) Hardware Virtualization:

When the virtual machine software or virtual machine manager *(VMM) is directly installed on the hardware system* is known as hardware virtualization.

The main job of hypervisor is to control and monitoring the processor, memory and other hardware resources.

After virtualization of hardware system we can install different operating system on it and run different applications on those OS.

Usage:

Hardware virtualization is mainly done for the server platforms, because controlling virtual machines is much easier than controlling a physical server.

2) Operating System Virtualization:

When the virtual machine software or virtual machine manager *(VMM) is installed on the Host operating system* instead of directly on the hardware system is known as operating system virtualization.

Usage:

Operating System Virtualization is mainly used for testing the applications on different platforms of OS.

3) Server Virtualization:

When the virtual machine software or virtual machine manager *(VMM) is directly installed on the Server system* is known as server virtualization.

Usage:

Server virtualization is done because a single physical server can be divided into multiple servers on the demand basis and for balancing the load.

4) Storage Virtualization:

Storage virtualization is the *process of grouping the physical storage from multiple network storage devices so that it looks like a single storage device*.

Storage virtualization is also implemented by using software applications.

Usage:

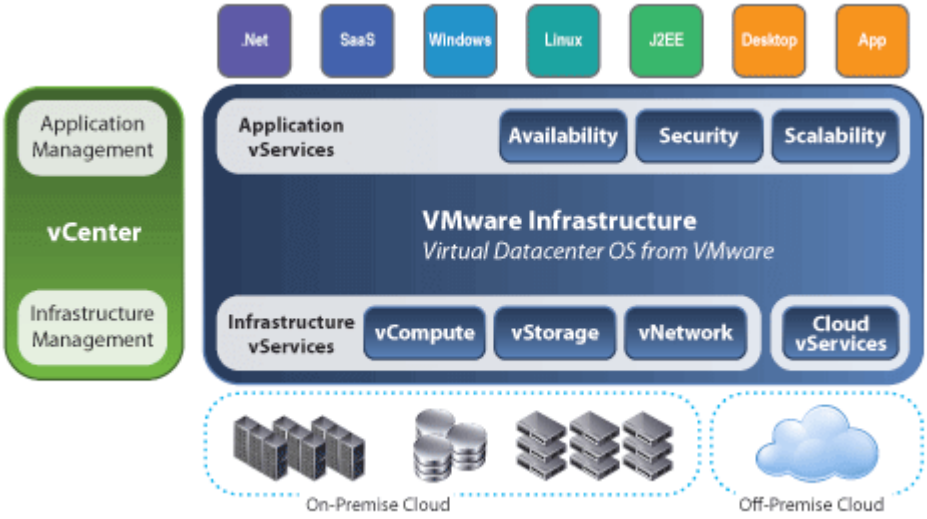
Storage virtualization is mainly done for back-up and recovery purposes.

How does virtualization work in cloud computing?

Virtualization plays a very important role in the cloud computing technology, normally in the cloud computing, users share the data present in the clouds like application etc, but actually with the help of virtualization users shares the Infrastructure.

The main usage of Virtualization Technology is to provide the applications with the standard versions to their cloud users, suppose if the next version of that application is released, then cloud provider has to provide the latest version to their cloud users and practically it is possible because it is more expensive.

To overcome this problem we use basically virtualization technology, By using virtualization, all severs and the software application which are required by other cloud providers are maintained by the third party people, and the cloud providers has to pay the money on monthly or annual basis.



Conclusion

Mainly Virtualization means, running multiple operating systems on a single machine but sharing all the hardware resources. And it helps us to provide the pool of IT resources so that we can share these IT resources in order get benefits in the business.

Data Virtualization

Data virtualization is the process of retrieve data from various resources without knowing its type and physical location where it is stored. It collects heterogeneous data from different resources and allows data users across the organization to access this data according to their work requirements. This heterogeneous data can be accessed using any application such as web portals, web services, E-commerce, Software as a Service (SaaS), and mobile application.

We can use Data Virtualization in the field of data integration, business intelligence, and cloud computing.

Advantages of Data Virtualization

There are the following advantages of data virtualization -

It allows users to access the data without worrying about where it resides on the memory.

It offers better customer satisfaction, retention, and revenue growth.

It provides various security mechanism that allows users to safely store their personal and professional information.

It reduces costs by removing data replication.

It provides a user-friendly interface to develop customized views.

It provides various simple and fast deployment resources.

It increases business user efficiency by providing data in real-time.

It is used to perform tasks such as data integration, business integration, Service-Oriented Architecture (SOA) data services, and enterprise search.

Disadvantages of Data Virtualization

It creates availability issues, because availability is maintained by third-party providers.

It required a high implementation cost.

It creates the availability and scalability issues.

Although it saves time during the implementation phase of virtualization but it consumes more time to generate the appropriate result.

Uses of Data Virtualization

There are the following uses of Data Virtualization -

1. Analyze performance

Data virtualization is used to analyze the performance of the organization compared to previous years.

2. Search and discover interrelated data

Data Virtualization (DV) provides a mechanism to easily search the data which is similar and internally related to each other.

3. Agile Business Intelligence

It is one of the most common uses of Data Virtualization. It is used in agile reporting, real-time dashboards that require timely aggregation, analyze and present the relevant data from multiple resources. Both individuals and managers use this to monitor performance, which helps to make daily operational decision processes such as sales, support, finance, logistics, legal, and compliance.

4. Data Management

Data virtualization provides a secure centralized layer to search, discover, and govern the unified data and its relationships.

Data Virtualization Tools

There are the following Data Virtualization tools -

1. Red Hat JBoss data virtualization

Red Hat virtualization is the best choice for developers and those who are using micro services and containers. It is written in Java.

2. TIBCO data virtualization

TIBCO helps administrators and users to create a data virtualization platform for accessing the multiple data sources and data sets. It provides a builtin transformation engine to combine non-relational and un-structured data sources.

3. Oracle data service integrator

It is a very popular and powerful data integrator tool which is mainly worked with Oracle products. It allows organizations to quickly develop and manage data services to access a single view of data.

4. SAS Federation Server

SAS Federation Server provides various technologies such as scalable, multi-user, and standards-based data access to access data from multiple data services. It mainly focuses on securing data.

5. Denodo

Denodo is one of the best data virtualization tools which allows organizations to minimize the network traffic load and improve response time for large data sets. It is suitable for both small as well as large organizations.

Industries that use Data Virtualization

Communication & Technology
In Communication & Technology industry, data virtualization is used to increase revenue per customer, create a real-time ODS for marketing, manage customers, improve customer insights, and optimize customer care, etc.

Finance
In the field of finance, DV is used to improve trade reconciliation, empowering data democracy, addressing data complexity, and managing fixed-risk income.

Government
In the government sector, DV is used for protecting the environment.

Healthcare
Data virtualization plays a very important role in the field of healthcare. In healthcare, DV helps to improve patient care, drive new product innovation, accelerating M&A synergies, and provide a more efficient claims analysis.

Manufacturing
In manufacturing industry, data virtualization is used to optimize a global supply chain, optimize factories, and improve IT assets utilization.