Cloud Computing

Chapter 1

Overview of Cloud Computing

Cloud Computing provides us means of accessing the applications as utilities over the Internet. It allows us to create, configure, and customize the applications online.

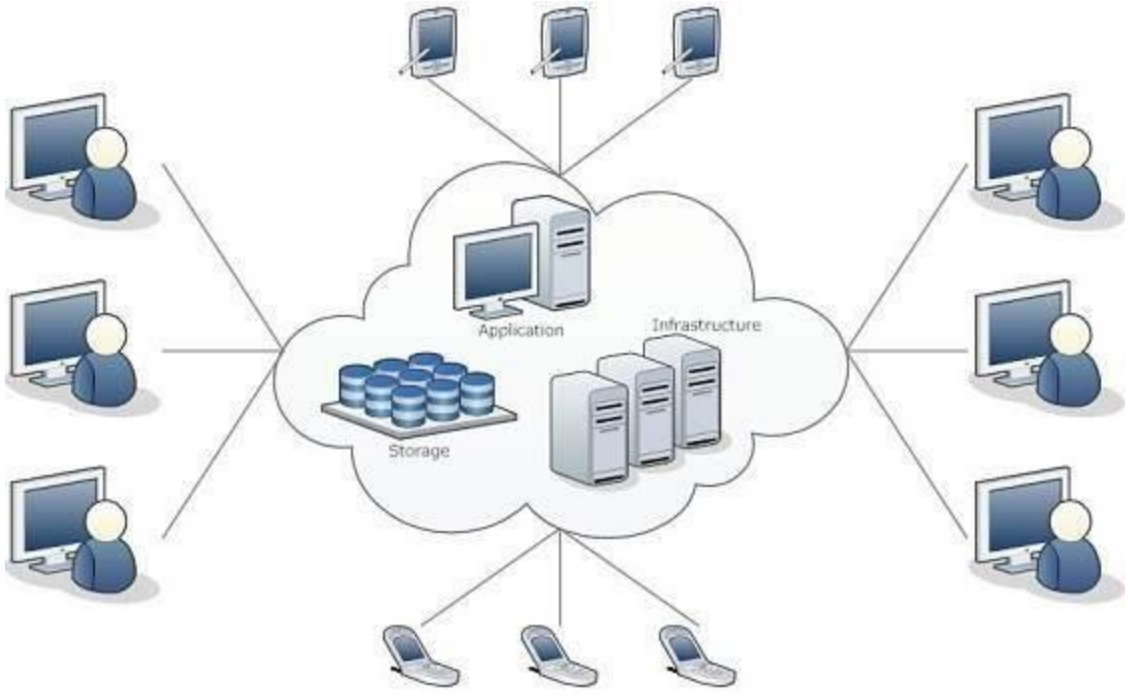
What is Cloud?

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.

The cloud itself is a set of hardware, networks, storage, services, and interfaces that enable the delivery of computing as a service. Cloud services include the delivery of software, infrastructure, and storage over the internet (either as separate components or a complete platform) based on user demand.

The world of the cloud has lots of participants:

✓ The **end user** doesn't really have to know anything about the underlying technology. In small businesses, for example, the cloud provider becomes the de facto data center. In larger organizations, the IT organization oversees the inner workings of both internal resources and external cloud resources.

✓ **Business management** needs to take responsibility for overall governance of data or services living in a cloud. Cloud service providers must provide a predictable and guaranteed service level and security to all their constituents.

✓ The **cloud service provider** is responsible for IT assets and maintenance.

Overall, the cloud embodies the following four basic characteristics:

- Elasticity and the ability to scale up and down
- Self-service provisioning and automatic deprovisioning
- Application programming interfaces (APIs)
- Billing and metering of service usage in a pay-as-you-go model

Elasticity and scalability:

The service provider can't anticipate how customers will use the service. One customer might use the service three times a year during peak selling seasons, whereas another might use it as a primary development platform for all of its applications. Therefore, the service needs to be available all the time (7 days a week, 24 hours a day) and it has to be designed to scale upward for high periods of demand and downward for lighter ones. ***Scalability*** **also means that an application can scale when additional users are added and** when the application requirements change**. This ability to scale is achieved by providing *elasticity*.** Think about the rubber band and its properties. If you're holding together a dozen pens with a rubber band, you probably have to fold it in half. However, if you're trying to keep 100 pens together, you

will have to stretch that rubber band. Why cana single rubber band accomplish both tasks? Simply, it is elastic and so is the cloud. : **Elasticity refers to the ability to flex to meet the needs and preferences of users on a near real-time basis, in response to supply and demand triggers.** In the cloud context, elasticity refers to the ability of a service or an infrastructure to adjust to meet fluctuating service demands by automatically provisioning or de-provisioning resources or by moving the service to be executed on another part of the system.

Self-service provisioning:

Customers can easily get cloud services without going through a lengthy process. The customer simply requests an amount of computing, storage, software, process, or other resources from the service provider. Contrast this on-demand response with the process ata typical data center. When a department is about to implement a new application, it has to submit a request to the data center for additional computing hardware, software, services,

or process resources. The data center gets similar requests from departments across the company and must sort through all requests and evaluate the availability of existingresources versus the need to purchase new hardware. After new hardware is purchased, the data center staff has to configure the data center for the new application. These internal procurement processes can take a long time, depending on company policies. Of course, nothing is as simple as it might appear. **While the on-demand provisioning capabilities of cloud services eliminate many time delays**, an organization still needs to do itshomework. These services aren't free; needs and requirements must be determined before capability is automatically provisioned.

Application programming interfaces (APIs):

Cloud services need to have standardized APIs. These interfaces provide the instructions on how two application or data sources can communicate with eachother. A standardized interface lets the customer more easily link a cloud service, such asa customer relationship management system with a financial accounts management system,without having to resort to custom programming.

Billing and metering of services:

A cloud environment needs a built-in service that bills customers. And, of course, to calculate that bill, usage has to be *metered* (tracked). Even free cloud services (such as Google's Gmail

or Zoho's Internet-based office applications) are metered.

Emergence of Cloud Computing:

Before emerging the cloud computing, there was Client/Server computing which is basically a centralized storage in which all the software applications, all the data and all the controls are resided on the server side.

If a single user wants to access specific data or run a program, he/she need to connect to the server and then gain appropriate access, and then he/she can do his/her business.

Then after, distributed computing came into picture, where all the computers are networked together and share their resources when needed.

On the basis of above computing, there was emerged of cloud computing concepts that later implemented.

- *At around in 1961, John MacCharty suggested in a speech at MIT that computing can be sold like a utility, just like a water or electricity.*
- *But of course time has passed and the technology caught that idea and after few years we mentioned that:*
- *In 1999, Salesforce.com started delivering of applications to users using a simple website. The applications were delivered to enterprises over the Internet, and this way the dream of computing sold as utility were true.*
- *In 2002,* **Amazon** *started Amazon Web Services*, providing services like storage, computation and even human intelligence. However, only starting with the launch of the **Elastic Compute Cloud** in 2006 a truly commercial service open to everybody existed.
- *In 2009,* **Google Apps** *also started to provide cloud computing enterprise applications.*
- **Microsoft** *launched* ***Windows Azure***, and companies like **Oracle** and **HP** have all joined the game. This proves that today, cloud computing has become mainstream.

Evolution of cloud computing:

Cloud computing can be seen as an innovation in different ways. From a technological

perspectiveit is an advancement of computing, applying virtualization concepts to utilize hardware more efficiently. Yet a different point of view is to look at cloud computing from an IT deployment perspective. In this sense cloud computing has the potential to revolutionize the way, how computing resources and applications are provided, breaking up traditional value chains and making room for new business models. In the following section we are going to describe the emergence of cloud computing from both perspectives.

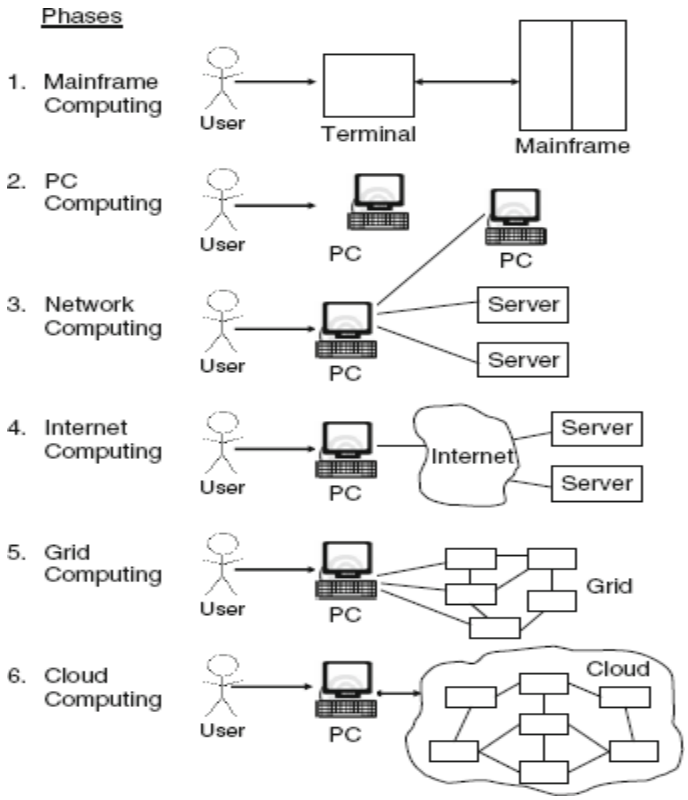
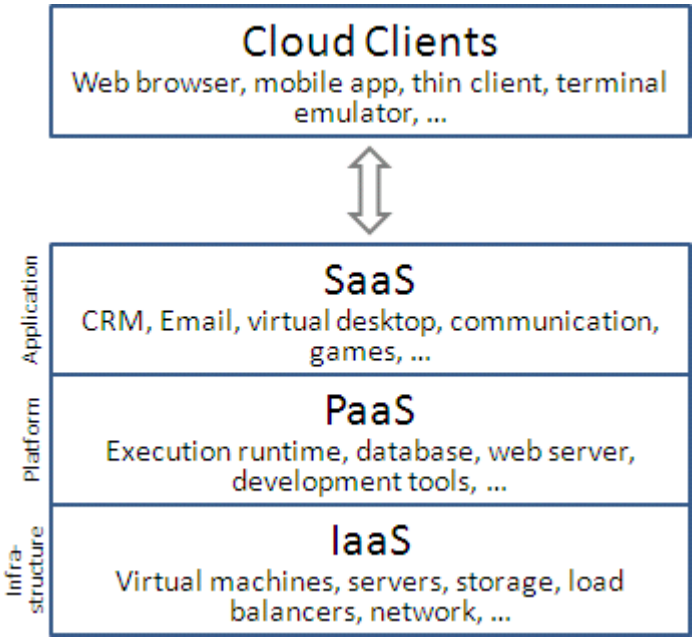


Fig: Evolution of Computing Paradigms from mainframe to cloud computing

Cloud Based Service Models:

The services given by the service provider to the customers or users through cloud computing technology are said cloud services. Service Provider's server gives both the hardware and software necessary and thus easy in management for both user and the cloud service provider. **Cloud computing providers offer their services according to three fundamental models: Infrastructure as a service (IaaS), platform as a service (PaaS), and**

software as a service (SaaS) where IaaS is the most basic and each higher model abstracts from the details of the lower models.



IaaS: In this most basic cloud service model, providers offer computers, as physical or more often as virtual machines, and other resources. The virtual machines are run asguests by a hypervisor, such as Xen or KVM. Management of pools of hypervisors by the cloud operational support system leads to the ability to scale to support a large number of virtual machines. **Other resources in IaaS clouds include images in a virtual machine image library, raw (block) and file-based storage, firewalls, load balancers, IP addresses, virtual local area networks (VLANs), and software bundles.** Amies, Alex; Sluiman, Harm; Tong IaaS cloud providers supply these resources on demand from their large pools installed in data centers. For wide area connectivity, the Internet can be used or—in carrier clouds -- dedicated virtual private networks can be configured

To deploy their applications, cloud users then install operating system images on the machines as well as their application software. In this model, it is the cloud user who is responsible for patching and maintaining the operating systems and application software. **Cloud providers typically bill IaaS services on a utility computing basis, that is, cost will reflect the amount of resources allocated and consumed. STaaS -** STorage As A Service. This service comes

under IaaS, which manages all the storage services in cloud computing. There are many security issues in this service. They are Data Integrity, Confidentiality, Reliability, etc.

IaaS refers not to a machine that does all the work, but simply to a facility given to businesses that offers users the leverage of extra storage space in servers and data centers.

Examples of IaaS include: Amazon CloudFormation (and underlying services suchas Amazon EC2), Rackspace Cloud, Terremark, Windows Azure Virtual Machines, Google Compute Engine, and Joyent.

PaaS: In the PaaS model, cloud providers deliver a computing platform typically including operating system, programming language execution environment, database,and web server. Application developers can develop and run their software solutions on a cloud platform without the cost and complexity of buying and managing the underlying hardware and software layers. **With some PaaS offers, the underlying computer and storage resources scale automatically to match application demand such that cloud user does not have to allocate resources manually.**

Examples of PaaS include: Amazon Elastic Beanstalk, Cloud Foundry, Heroku, Force.com, EngineYard, Mendix, Google App Engine, Windows AzureCompute and OrangeScape.

SaaS: In this model, cloud providers install and operate application software in the cloud and cloud users access the software from cloud clients. The cloud users do not manage the cloud infrastructure and platform on which the application is running. This eliminates the need to install and run the application on the cloud user's own computers simplifying maintenance and support. What makes a cloud application different from other applications is its scalability. This can be achieved by cloning tasks onto multiple virtual machines at run-time to meet the changing work demand. Load balancers distribute the work over the set of virtual machines. This process is transparent tothe cloud user who sees only a single access point. **To accommodate a large number of cloud users, cloud applications can be multitenant, that is, any machine serves more than one cloud user organization.** It is common to refer to special types of cloud based application software with a similar naming convention: desktop as a service, business process as a service, test environment as a service,

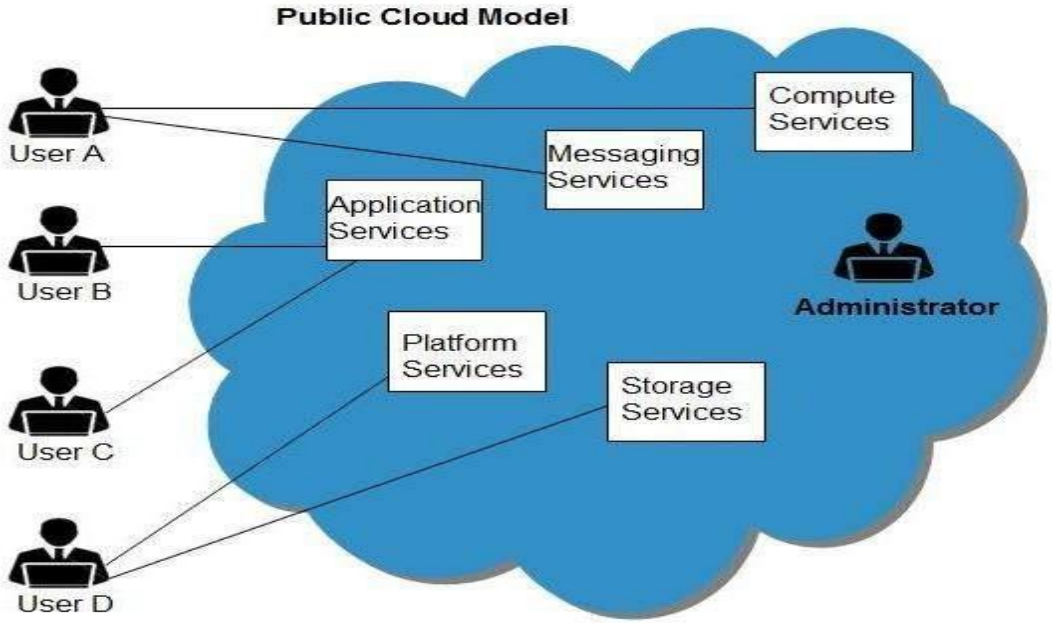
communication as a service. The pricing model for SaaS applications is typically a monthly or yearly flat fee per user, so price is scalable and adjustable if users are added or removed at any point.

Examples of SaaS include: Google Apps, Microsoft Office 365, and Onlive.

Cloud Computing Deployment Models (Types):

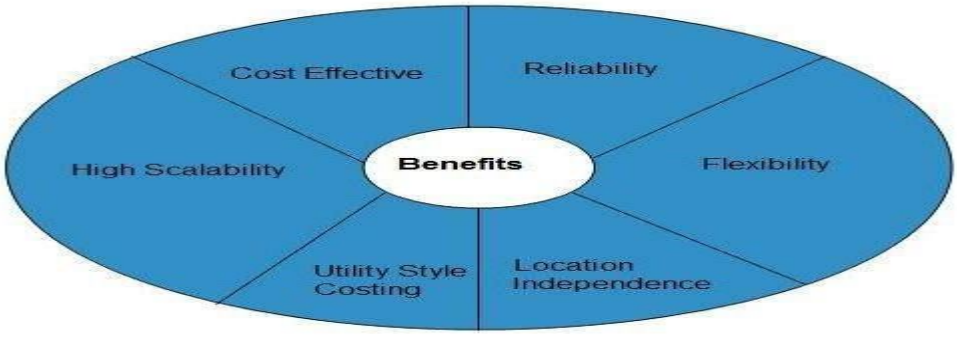
Public Cloud

Public Cloud allows systems and services to be easily accessible to general public. The IT giantssuch as Google, Amazon and Microsoft offer cloud services via Internet. The Public Cloud Model is shown in the diagram below.



Benefits

There are many benefits of deploying cloud as public cloud model. The following diagram showssome of those benefits:



1. Cost Effective

Since public cloud shares same resources with large number of customers it turns out inexpensive.

2. Reliability

The public cloud employs large number of resources from different locations. If any of theresources fails, public cloud can employ another one.

3. Flexibility

The public cloud can smoothly integrate with private cloud, which gives customers a flexibleapproach.

4. Location Independence

Public cloud services are delivered through Internet, ensuring location independence.

5. Utility Style Costing

Public cloud is also based on pay-per-use model and resources are accessible whenever customerneeds them.

6. High Scalability

Cloud resources are made available on demand from a pool of resources, i.e., they can be scaledup or down according the requirement.

Disadvantages

Here are some disadvantages of public cloud model:

1. Low Security

In public cloud model, data is hosted off-site and resources are shared publicly, therefore doesnot ensure higher level of security.

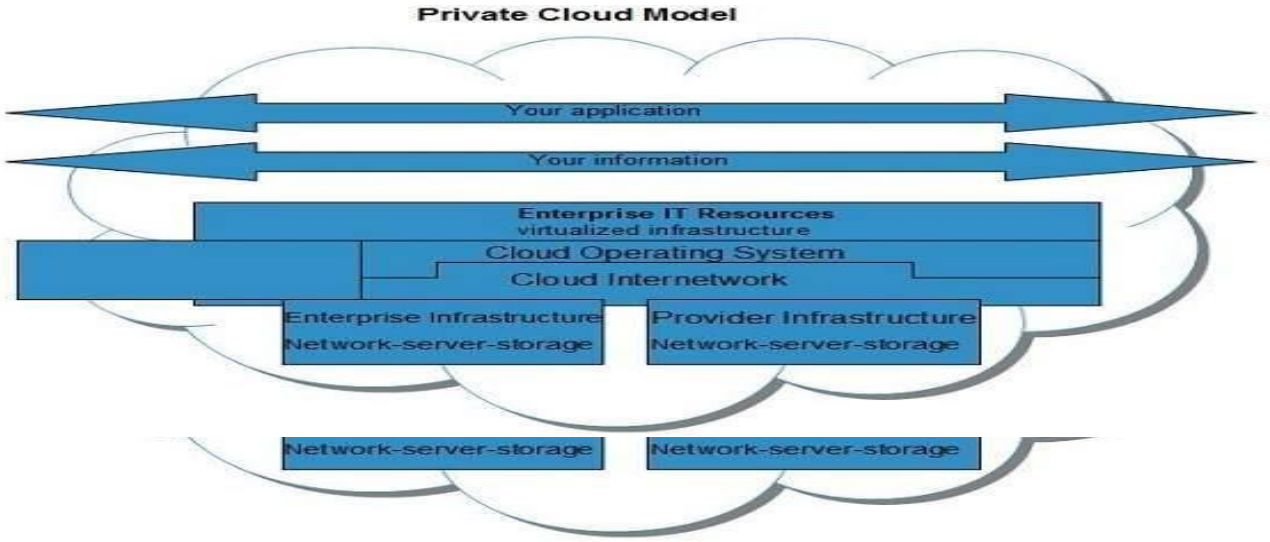
2. Less Customizable

It is comparatively less customizable than private cloud.

Private Cloud

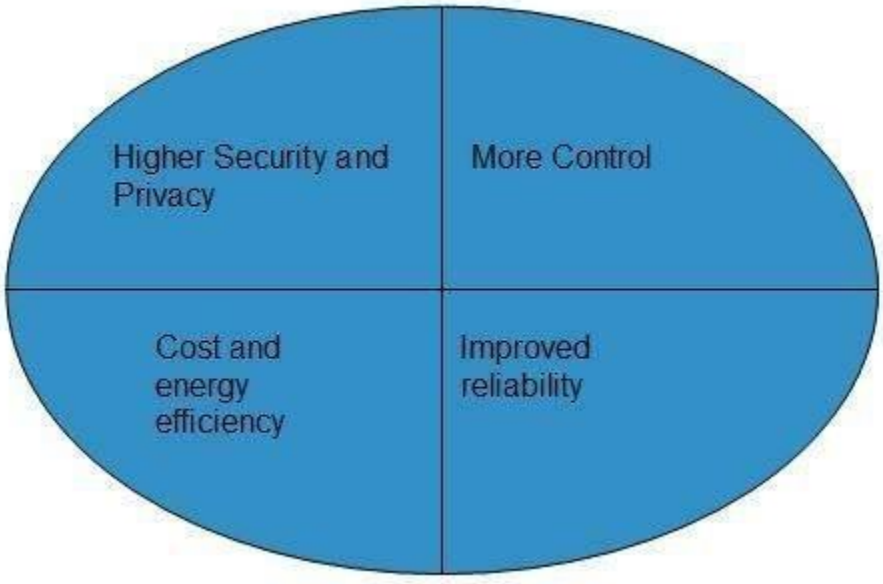
Private Cloud allows systems and services to be accessible within an organization. The Private Cloud is operated only within a single organization. However, it may be managed internally by

the organization itself or by third-party. The private cloud model is shown in the diagram below.



Benefits

There are many benefits of deploying cloud as private cloud model. The following diagram showssome of those benefits:



1. High Security and Privacy

Private cloud operations are not available to general public and resources are shared from distinctpool of resources. Therefore, it ensures high security and privacy.

2. More Control

The private cloud has more control on its resources and hardware than public cloud because it isaccessed only within an organization.

3. Cost and Energy Efficiency

The private cloud resources are not as cost effective as resources in public clouds but they offermore efficiency than public cloud resources.

Disadvantages

Here are the disadvantages of using private cloud model:

1. Restricted Area of Operation

The private cloud is only accessible locally and is very difficult to deploy globally.

2. High Priced

Purchasing new hardware in order to fulfill the demand is a costly transaction.

3. Limited Scalability

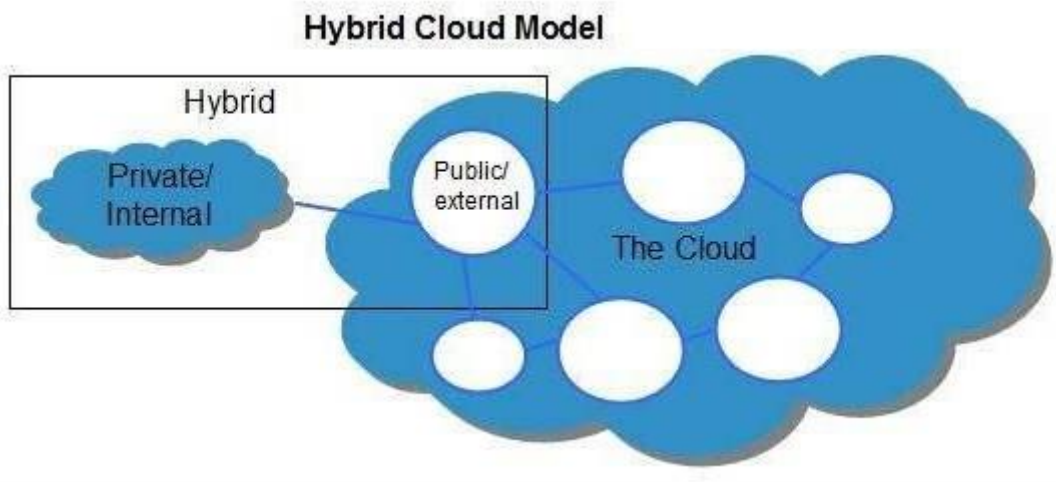
The private cloud can be scaled only within capacity of internal hosted resources.

4. Additional Skills

In order to maintain cloud deployment, organization requires skilled expertise

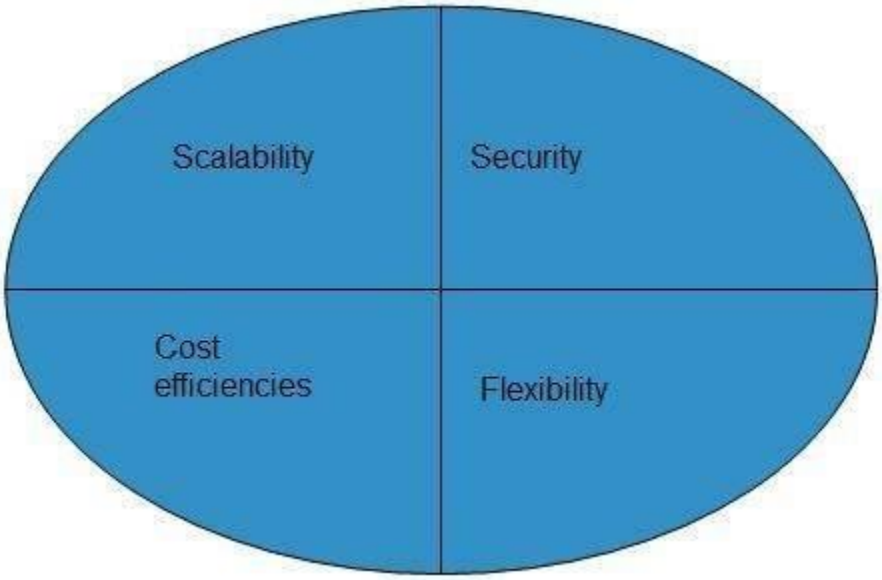
Hybrid Cloud Model

Hybrid Cloud is a mixture of public and private cloud. Non-critical activities are performed usingpublic cloud while the critical activities are performed using private cloud. The Hybrid Cloud Model is shown in the diagram below.



Benefits

There are many benefits of deploying cloud as hybrid cloud model. The following diagram showssome of those benefits:



1. Scalability

It offers features of both, the public cloud scalability and the private cloud scalability.

2. Flexibility

It offers secure resources and scalable public resources.

3. Cost Efficiency

Public clouds are more cost effective than private ones. Therefore, hybrid clouds can be costsaving.

4. Security

The private cloud in hybrid cloud ensures higher degree of security.

Disadvantages

1. Networking Issues

Networking becomes complex due to presence of private and public cloud.

2. Security Compliance

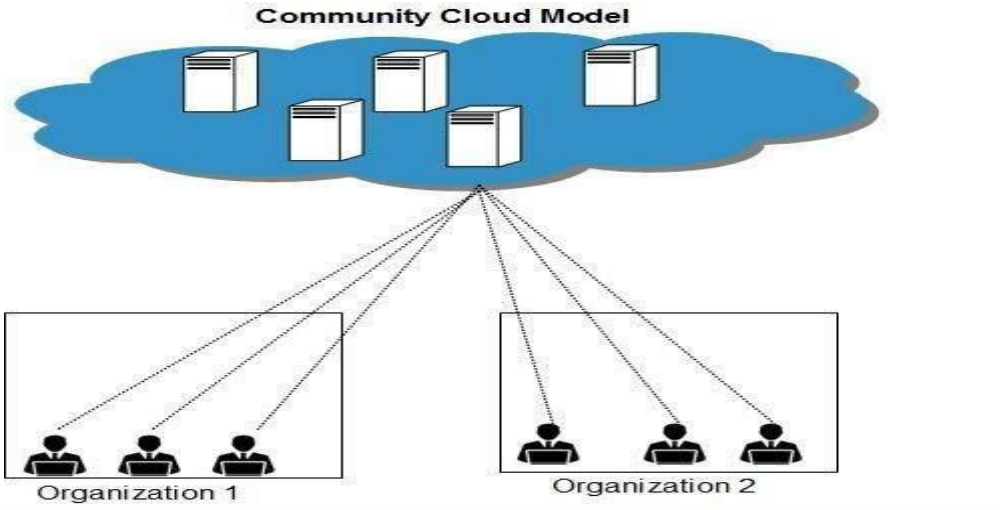
It is necessary to ensure that cloud services are compliant with security policies of the organization.

3. Infrastructure Dependency

The hybrid cloud model is dependent on internal IT infrastructure, therefore it is necessary toensure redundancy across data centers.

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. The Community Cloud Model is shownin the diagram below.



Benefits

There are many benefits of deploying cloud as **community cloud model.**

1. Cost Effective

Community cloud offers same advantages as that of private cloud at low cost.

2. Sharing Among Organizations

Community cloud provides an infrastructure to share cloud resources and capabilities among severalorganizations.

3. Security

The community cloud is comparatively more secure than the public cloud but less secured than the privatecloud.

Benefits of using cloud models:

Because customers generally do not own the infrastructure used in cloud computing environments, they can forgo capital expenditure and consume resources as a service by just paying for what they use. Many cloud computing offerings have adopted the utility computing and billing model described above, while others bill on a subscription basis. **By sharing computing power among multiple users, utilization rates are generally greatly improved, because cloud computing servers are not sitting dormant for lack of use.** This factor alone can reduce infrastructure costs significantly and accelerate the speed of applications development.

A beneficial side effect of using this model is that computer capacity increases dramatically, since customers do not have to engineer their applications for peak times, when processing loads are greatest. Adoption of the cloud computing model has also been enabled because of the greater availability of increased high-speed bandwidth. With greaterenablement, though, there are other issues one must consider, especially legal ones.

The following are some of the possible benefits for those who offer cloud computing-based services and applications:

- **Cost Savings —** Companies can reduce their capital expenditures and use operational expenditures for increasing their computing capabilities. This is a lowerbarrier to entry and also requires fewer in-house IT resources to provide system support.

- **Scalability/Flexibility —** Companies can start with a small deployment and grow to a

large deployment fairly rapidly, and then scale back if necessary. Also, the flexibility of cloud computing allows companies to use extra resources at peak times, enabling them to satisfy consumer demands.

- **Reliability —** Services using multiple redundant sites can support business continuity and disaster recovery.

- **Maintenance —** Cloud service providers do the system maintenance, and access is through APIs that do not require application installations onto PCs, thus further reducing maintenance requirements.

- **Mobile Accessible —** Mobile workers have increased productivity due to systems accessible in an infrastructure available from anywhere.

Challenges for cloud computing

The development of efficient cloud applications inherits the challenges posed by thenatural imbalance between computing, I/O, and communication bandwidths of physical systems; these challenges are greatly amplified due the scale of the system, its distributed nature, and by the fact that virtually all applications are data-intensive. Though cloud computing infrastructures attempt to automatically distribute and balance the load, the application developer is still left with the responsibility to place the data close to the processing site and to identify optimal storage for the data. One of the main advantages of cloud computing, the shared infrastructure, could also have a negative impact as perfect performance isolation is nearly impossible to reach in a real system, especially when the system is heavily loaded. The performance of virtual machines fluctuates based on the load, the infrastructure services, the environment including the other users. Reliability is also a major concern; node failures are to be expected whenever a large numbers of nodes cooperate for the computations. Choosing an optimal instance, in terms of performance isolation, reliability, and security, from those offered by the cloud infrastructure is another critical factor to be considered. Of course, cost considerations play also a role in the choiceof the instance type. Many applications consist of multiple stages; in turn, each stage may involve multiple instances running in parallel on the systems of the cloud and communicating among them. Thus, efficiency, consistency, and communication

scalability of communication are major concerns for an application developer. Indeed, due to shared networks and unknown topology, cloud infrastructures exhibit inter-node latency and bandwidth fluctuations which affect the application performance.

The following are some of the notable challenges associated with cloud computing, and although some of these may cause a slowdown when delivering more services in the cloud,most also can provide opportunities, if resolved with due care and attention in the planning stages.

- **Security and Privacy —** Perhaps two of the more "hot button" issues surrounding cloud computing relate to storing and securing data, and monitoring the use of the cloud by the service providers. These issues are generally attributed to slowing the deployment of cloud services. These challenges can be addressed, for example, by storing the information internal to the organization, but allowing it to be used in thecloud. For this to occur, though, the security mechanisms between organization andthe cloud need to be robust and a Hybrid cloud could support such a deployment.

- **Lack of Standards —** Clouds have documented interfaces; however, no standards are associated with these, and thus it is unlikely that most clouds will be interoperable. The Open Grid Forum is developing an Open Cloud Computing Interface to resolve this issue and the Open Cloud Consortium is working on cloud computing standards and practices. The findings of these groups will need to

  mature, but it is not known whether they will address the needs of the people deploying the services and the specific interfaces these services need. However, keeping up to date on the latest standards as they evolve will allow them to be leveraged, if applicable.

- **Continuously Evolving —** User requirements are continuously evolving, as are the requirements for interfaces, networking, and storage. This means that a "cloud," especially a public one, does not remain static and is also continuously evolving.

- **Compliance Concerns —** The Sarbanes-Oxley Act (SOX) in the US and Data Protection directives in the EU are just two among many compliance issuesaffecting cloud computing, based on the type of data and application for which the cloud is being

used. The EU has a legislative backing for data protection across all member states, but in the US data protection is different and can vary from state to state. As with security and privacy mentioned previously, these typically result in Hybrid cloud deployment with one cloud storing the data internal to the organization.

Top Applications of Cloud Computing

Cloud technology offers several applications in various fields like business, data storage, entertainment, management, social networking, education, art, GPS, to name a few.

The major types of cloud computing service models available are Platform as a Service (PaaS), Infrastructure as a Service (IaaS), and Software as a Service (SaaS). Plus, there are platforms like Public Cloud, Private Cloud, Hybrid Cloud, and Community Cloud.

Let's start elaborating on the top 7 applications of cloud computing.

1. Online Data Storage

Cloud Computing allows storage and access to data like files, images, audio, and videos on the cloud storage. In this age of big data, storing huge volumes of business data locally requires more and more space and escalating costs. This is where cloud storage comes into play, where businesses can store and access data using multiple devices.

The interface provided is easy to use, convenient, and has the benefits of high speed, scalability, and integrated security.

2. Backup and Recovery

Cloud service providers offer safe storage and backup facility for data and resources on the cloud. In a traditional computing system, data backup is a complex problem, and often, in case of a disaster, data can be permanently lost. But with cloud computing, data can be easily recovered with minimal damage in case of a disaster.

3. Big Data Analysis

One of the most important applications of cloud computing is its role in extensive data analysis. The extremely large volume of big data makes it impossible to store using traditional data management systems. Due to the unlimited storage capacity of the cloud, businesses can now store and analyze big data to gain valuable business insights.

4. Testing and Development

Cloud computing applications provide the easiest approach for testing and development of products. In traditional methods, such an environment would be time-consuming, expensive due to the setting up of IT resources and infrastructure, and needed manpower. However, with cloud computing, businesses get scalable and flexible cloud services, which they can use for product development, testing, and deployment.

5. Antivirus Applications

With Cloud Computing comes cloud antivirus software which is stored in the cloud from where they monitor viruses and malware in the organization's system and fixes them. Earlier, organizations had to install antivirus software within their system and detect security threats.

6. E-commerce Applications

Ecommerce applications in the cloud enable users and e-businesses to respond quickly to emerging opportunities. It offers a new approach to business leaders to make things done with minimum amount and minimal time. They use cloud environments to manage customer data, product data, and other operational systems.

7. Cloud Computing in Education

E-learning, online distance learning programs, and student information portals are some of the key changes brought about by applications of cloud computing in the education sector. In this new learning environment, there's an attractive environment for learning, teaching, experimenting provided to students, teachers, and researchers so they can connect to the cloud of their establishment and access data and information.

What is Cloud Storage?

Cloud storage is a cloud computing model that stores data on the Internet through a cloud computing provider who manages and operates data storage as a service. It's delivered on demand with just-in-time capacity and costs, and eliminates buying and managing your own data storage infrastructure. This gives you agility, global scale and durability, with "anytime, anywhere" data access.

How Does Cloud Storage Work?

Cloud storage is purchased from a third party cloud vendor who owns and operates data storage capacity and delivers it over the Internet in a pay-as-you-go model. These cloud storage vendors

manage capacity, security and durability to make data accessible to your applications all around the world.

Applications access cloud storage through traditional storage protocols or directly via an API. Many vendors offer complementary services designed to help collect, manage, secure and analyze data at massive scale.

Benefits of Cloud Storage

Storing data in the cloud lets IT departments transform three areas:

1. **Total Cost of Ownership.** With cloud storage, there is no hardware to purchase, storage to provision, or capital being used for "someday" scenarios. You can add or remove capacity on demand, quickly change performance and retention characteristics, and only pay for storage that you actually use. Less frequently accessed data can even be automatically moved to lower cost tiers in accordance with auditable rules, driving economies of scale.
2. **Time to Deployment.** When development teams are ready to execute, infrastructure should never slow them down. Cloud storage allows IT to quickly deliver the exact amount of storage needed, right when it's needed. This allows IT to focus on solving complex application problems instead of having to manage storage systems.
3. **Information Management.** Centralizing storage in the cloud creates a tremendous leverage point for new use cases. By using cloud storage lifecycle management policies, you can perform powerful information management tasks including automated tiering or locking down data in support of compliance requirements.

Cloud Storage Requirements

Ensuring your company's critical data is safe, secure, and available when needed is essential. There are several fundamental requirements when considering storing data in the cloud.

Durability. Data should be redundantly stored, ideally across multiple facilities and multiple devices in each facility. Natural disasters, human error, or mechanical faults should not result in data loss.

Availability. All data should be available when needed, but there is a difference between production data and archives. The ideal cloud storage will deliver the right balance of retrieval times and cost.

Security. All data is ideally encrypted, both at rest and in transit. Permissions and access controls should work just as well in the cloud as they do for on premises storage.

Types of Cloud Storage

There are three types of cloud data storage: object storage, file storage, and block storage. Each offers their own advantages and have their own use cases:

1. **Block storage** divides large volumes of data into smaller units called *blocks*. Each block is associated with a unique identifier and placed on one of the system's storage drives. Block storage is fast, efficient and provides the low latency required by applications such as databases and high-performance workloads.
2. **File storage** organizes data in a hierarchical system of files and folders; it is commonly used with personal computer storage drives and network-attached storage (NAS). Data in a file storage system is stored in files, and the files are stored in folders. Directories and subdirectories are used to organize the folders and locate files and data. A file storage-based cloud can make data access and retrieval easier, with this hierarchical format being familiar to users and required by some applications.
3. **Object storage** stores data as objects, which consist of three components: data stored in a file, metadata associated with the data file and a unique identifier. Using the RESTful API, an object storage protocol stores a file and its associated metadata as a single object and assigns it an identification (ID) number. To retrieve content, the user presents the ID to the system and the content is assembled with all its metadata, authentication and security. Object-based storage systems allow metadata to be customized, which can streamline data access and analysis. With object storage, data can be stored in its native format with massive scalability.

Cloud service requirements

1. Efficiency / cost reduction
2. Data security
3. Scalability
4. Mobility
5. Disaster recovery
6. Control
7. Market reach
8. Automatic Software Updates

1. Efficiency / cost reduction

By using cloud infrastructure, you don't have to spend huge amounts of money on purchasing and maintaining equipment.

2. Data security

Cloud offers many advanced security features that guarantee that data is securely stored and handled. Cloud storage providers implement baseline protections for their platforms and the data they process, such authentication, access control, and encryption.

3. Scalability

Different companies have different IT needs — a large enterprise of 1000+ employees won't have the same IT requirements as a start-up. Using cloud is a great solution because it enables enterprise to efficiently — and quickly — scale up/down according to business demands.

4. Mobility

Cloud computing allows mobile access to corporate data via smartphones and devices, which is a great way to ensure that no one is ever left out of the loop. Staff with busy schedules, or who live a long way away from the corporate office, can use this feature to keep instantly up-to-date with clients and coworkers.

5. Disaster recovery

Data loss is a major concern for all organizations, along with data security. Storing your data in the cloud guarantees that data is always available, even if your equipment like laptops or PCs, is damaged. Cloud-based services provide quick data recovery for all kinds of emergency scenarios.

6. Control

Cloud enables you complete visibility and control over your data. You can easily decide which users have what level of access to what data.

7. Market reach

Developing in the cloud enables users to get their applications to market quickly.

8. Automatic Software Updates

Cloud-based applications automatically refresh and update themselves.

Cloud and dynamic infrastructure

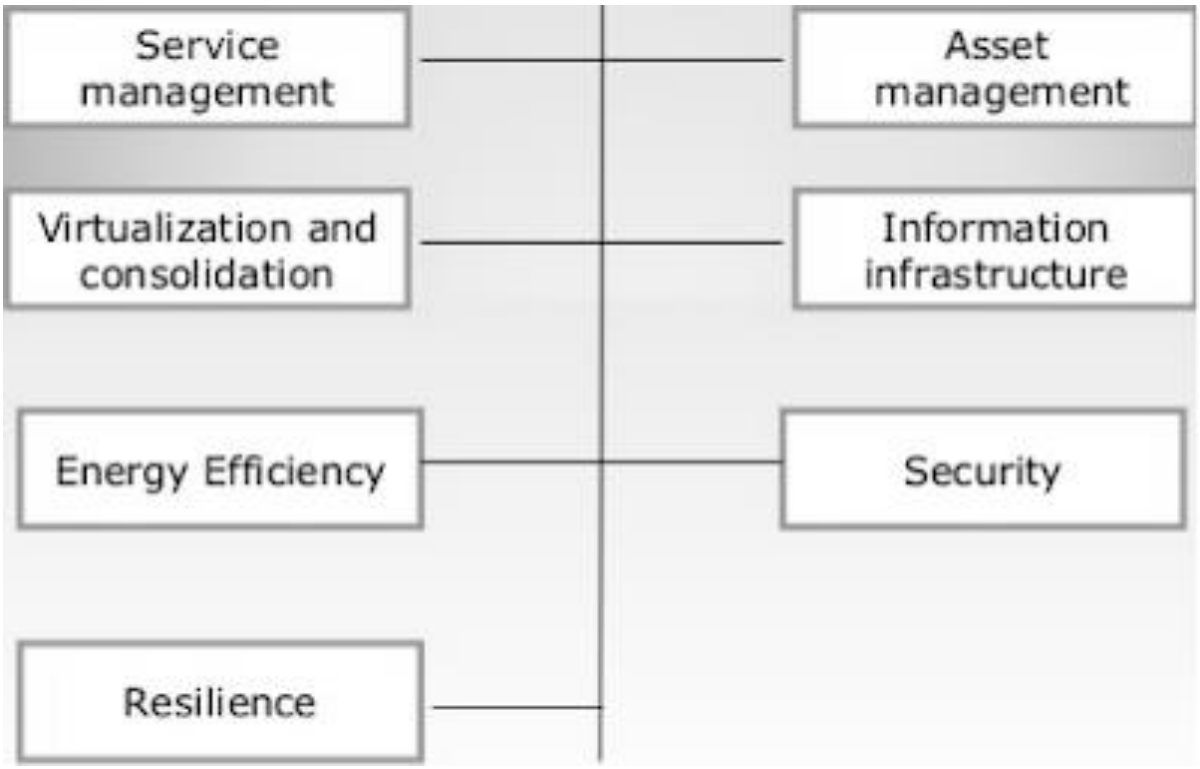


fig : Cloud and Dynamic infrastructure

1. Service management

This type of special facility or a functionality is provided to the cloud IT services by the cloud service providers. This facility includes visibility, automation and control to delivering the first class IT services.

2. Asset-Management

In this the assets or the property which is involved in providing the cloud services are getting managed.

3. Virtualization and consolidation

Consolidation is an effort to reduce the cost of a technology by improving its operating efficiency and effectiveness. It means migrating from large number of resources to fewer one, which is done by virtualization technology.

4. Information Infrastructure

It helps the business organizations to achieve the following : Information compliance, availability of resources retention and security objectives.

5. Energy-Efficiency

Here the IT infrastructure or organization sustainable. It means it is not likely to damage or effect any other thing.

6. Security

This cloud infrastructure is responsible for the risk management. Risk management Refers to the risks involved in the services which are being provided by the cloud-service providers.

7. Resilience

This infrastructure provides the feature of resilience means the services are resilient. It means the infrastructure is safe from all sides. The IT operations will not be easily get affected.

Cloud adoption

Cloud adoption means adopting a service or technology from another cloud service provide.

1. Adoption term states that accepting the services of new Technology.
2. Adoption means following some kind of new trend or existing trend or a technology.
3. This Cloud adoption is suitable for low priority business applications.
4. It supports some interactive applications that combines two or more data sources.
5. For example:-if a marketing company requires to grow his business in the whole country in a short span of time then it must need a quick promotion or short promotion across the country.
6. Cloud Adoption is useful when the recovery management, backup recovery based implementations are required.
7. It will work well with research and development projects.
8. It means the testing of new services ,design models and also the applications that can be get adjusted on small servers.
9. Applications which requires different level of infrastructure throughout the day or throughout the month should be deployed through the cloud.
10. The applications whose demand is unknown can also be deployed using clouds.

Benefits of cloud adoption:

1. Data security
2. Increased resource sharing
3. Flexibility
4. Business agility
5. Facilitates innovation
6. Great efficiency at lower price
7. Better collaboration
8. Better backup