

## Editor's Point of View...

Cloud Computing is an essential part of many enterprises' Data Architecture; and, not just in new enterprises, but throughout multiple industries and in companies of all sizes. Gate point Research has done a survey showing why. IT pros and business executives both like the advantages of Cloud storage. Access to data, after a disaster, came in as a plus for 63 percent of the people surveyed. Roughly 50 percent appreciated the benefits of a centralized Data Management platform, and 44 percent of the same survey group also liked the money being saved by using the Cloud. These same advantages are also available to individuals and small businesses.

The Cloud offers a variety of services to organizations without requiring major amounts of upfront cash. (Cash flow and time are the two biggest restrictions hampering experimentation.) By tapping into these resources, as needed, businesses and individuals can stay flexible and efficient, allowing for the time needed to be creative and to think. Because of the Cloud, people will have the freedom to do things they simply couldn't before. They will have the freedom to experiment, to assess, and to locate data and information from a variety of sources.

The Internet of Things is a prime target for Cloud innovation. Because of its recent evolution as an Internet communications system, IoT meshes with the Cloud seamlessly, and presents a variety of opportunities for creative individuals.

When we buy a Car, we have an option of buying individual parts of the car like tires, steering wheel, engine etc. and then start assembling it. Some parts are heavy, so we may need another person for lifting it. Some parts are electrical. We need electrician for that. Hence, there is a lot of work to do if we go for this option. What is the solution? We can select the option of buying the car. In regular Software process, we just buy the Car and start driving it. But then we have to bear the cost of keeping the Car on our premises. We need to take Car for maintenance. We have to fix issues in Car by ourselves. In Cloud computing, we just rent the Car and start driving it. There is no need to buy/rent space to store the car. As soon as we are done driving, we return it back to Cloud provider. There is no need to go for maintenance. Cloud provider will give us another Car while the earlier one is going through maintenance. No need to waste time on fixing issues in Car. We just drive the Car and for the time we are driving it.

Release automation, which accelerates the launch of innovative new services, while supporting reliability and control, can be especially useful to a new enterprise. This feature can be quite useful during a burst of IT developments, especially when launching a new line of services or products.

Regards,  
Sohan Khemka

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## Cloud Computing

Cloud Computing provides us a means by which we can access the applications as utilities, over the Internet. It allows us to create, configure, and customize 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 network, i.e., on public networks or on private networks, i.e., WAN, LAN or VPN.

Applications such as e-mail, web conferencing, customer relationship management (CRM), all run in cloud.

### What is Cloud Computing?

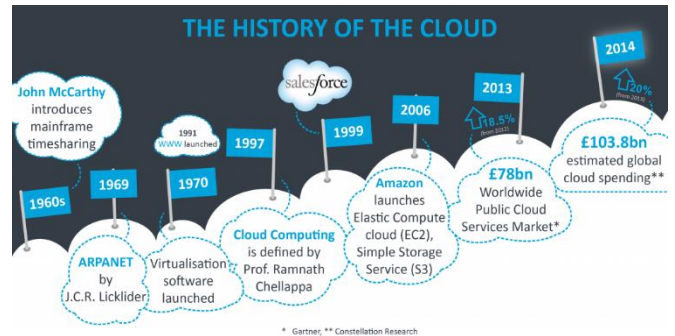
Cloud Computing refers to manipulating, configuring, and accessing the applications online. It offers online data storage, infrastructure and application.



We need not to install a piece of software on our local PC and this is how the cloud computing overcomes platform dependency issues. Hence, the Cloud Computing is making our business application mobile and collaborative.

## History

The concept of Cloud Computing came into existence in 1960 with implementation of mainframe computers, accessible via thin/static clients. Since then, cloud computing has been evolved from static clients to dynamic ones from software to services. The following diagram explains the evolution of cloud computing:



## Traditional Hosting vs. Cloud Computing

Cloud is the new frontier of business computing and delivery of software and applications, and is rapidly overtaking the traditional in-house system as a reliable, scalable and cost-effective IT solution. However, many businesses that have built their own robust data centres and traditional IT infrastructure still rely heavily on this model for security and managerial reasons.

Choosing an IT model for your business is a very important decision. Every company needs a safe and secure storage space, where data and applications can be easily accessed and running costs are kept to a minimum. If you're thinking of migrating your data from traditional IT infrastructure to cloud based platforms, read on to explore the differences between the two, to better understand the benefits of such a move.

### What is Traditional IT Infrastructure?

Traditional data centres consist of various pieces of hardware, such as a desktop computer, which are connected to a network via a remote server. This server is typically installed on the premises, and

provides all employees using the hardware, access to the business's stored data and applications.

Businesses with this IT model must purchase additional hardware and upgrades in order to scale up their data storage and services to support more users. Mandatory software upgrades are also required with traditional IT infrastructure to ensure fail safe systems are in place to in case a hardware failure occurs. For many businesses with IT data centres, an in-house IT department is needed to install and maintain the hardware.

On the other hand, traditional IT infrastructures are considered to be one of the most secure data hosting solutions and allows you to maintain full control of your company's applications and data on the local server. They are a customised, dedicated system ideal for organisations that need to run many different types of applications.

### **Cloud computing vs Traditional IT infrastructure**

Cloud computing is far more abstract as a virtual hosting solution. Instead of being accessible via physical hardware, all servers, software and networks are hosted in the cloud, off premises. It's a real-time virtual environment hosted between several different servers at the same time. So rather than investing money into purchasing physical servers in-house, you can rent the data storage space from cloud computing providers on a more cost effective pay-per-use basis.

The main differences between cloud hosting and traditional web hosting are:

#### **Resilience and Elasticity**

The information and applications hosted in the cloud are evenly distributed across all the servers, which are connected to work as one. Therefore, if one server fails, no data is lost and downtime is avoided. The cloud also offers more storage space and server resources, including better computing power. This means your software and applications will perform faster.

Traditional IT systems are not so resilient and cannot guarantee a consistently high level of server performance. They have limited capacity and are susceptible to downtime, which can greatly hinder workplace productivity.

#### **Flexibility and Scalability**

Cloud hosting offers an enhanced level of flexibility and scalability in comparison to traditional data centres. The on-demand virtual space of cloud computing has unlimited storage space and more server resources. Cloud servers can scale up or down depending on the level of traffic your website receives, and you will have full control to install any software as and when you need to. This provides more flexibility for your business to grow.

With traditional IT infrastructure, you can only use the resources that are already available to you. If you run out of storage space, the only solution is to purchase or rent another server. If you hire more employees, you will need to pay for additional software licences and have these manually uploaded on your office hardware. This can be a costly venture, especially if your business is growing quite rapidly.

#### **Automation**

A key difference between cloud computing and traditional IT infrastructure is how they are managed. Cloud hosting is managed by the storage provider who takes care of all the necessary hardware, ensures security measures are in place, and keeps it running smoothly. Traditional data centres require heavy administration in-house, which can be costly and time consuming for your business. Fully trained IT personnel may be needed to ensure regular monitoring and maintenance of your servers – such as upgrades, configuration problems, threat protection and installations.

#### **Running Costs**

Cloud computing is more cost effective than traditional IT infrastructure due to methods of

payment for the data storage services. With cloud based services, you only pay for what is used – similarly to how you pay for utilities such as electricity. Furthermore, the decreased likelihood of downtime means improved workplace performance and increased profits in the long run.

With traditional IT infrastructure, you will need to purchase equipment and additional server space upfront to adapt to business growth. If this slows, you will end up paying for resources you don't use. Furthermore, the value of physical servers decreases year on year, so the return on investment of investing money in traditional IT infrastructure is quite low.

**Security**

Cloud computing is an external form of data storage and software delivery, which can make it seem less secure than local data hosting. Anyone with access to the server can view and use the stored data and applications in the cloud, wherever internet connection is available. Choosing a cloud service provider that is completely transparent in its hosting of cloud platforms and ensures optimum security measures are in place is crucial when transitioning to the cloud.

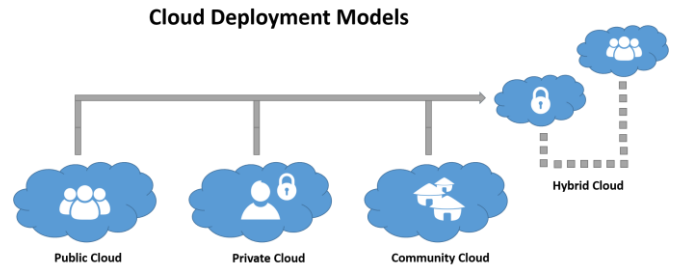
With traditional IT infrastructure, you are responsible for the protection of your data, and it is easier to ensure that only approved personnel can access stored applications and data. Physically connected to your local network, data centres can be managed by in-house IT departments on a round-the-clock basis, but a significant amount of time and money is needed to ensure the right security strategies are implemented and data recovery systems are in place.

**Basic Concepts**

There are certain services and models working behind the scene making the cloud computing

feasible and accessible to end users. Following are the working models for cloud computing:

- Deployment Models
- Service Models



**Public Cloud**

The Public Cloud allows systems and services to be easily accessible to the general public. Public cloud may be less secure because of its openness, e.g., e-mail.

**Private Cloud**

The Private Cloud allows systems and services to be accessible within an organization. It offers increased security because of its private nature.

**Community Cloud**

The Community Cloud allows systems and services to be accessible by group of organizations.

**Hybrid Cloud**

The Hybrid Cloud is mixture of public and private cloud. However, the critical activities are performed using private cloud while the non-critical activities are performed using public cloud.

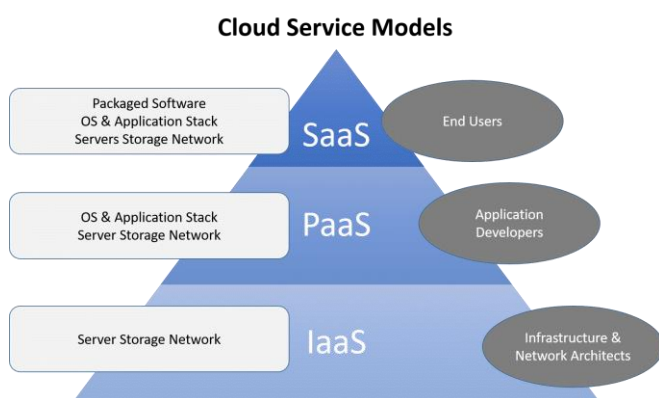
**SERVICE MODELS**

**Service Models** are the reference models on which the Cloud Computing is based. These can be categorized into three basic service models as listed below:

1. **Infrastructure as a Service (IaaS)**
2. **Platform as a Service (PaaS)**
3. **Software as a Service (SaaS)**

There are many other service models all of which can take the form like XaaS, i.e., anything as a Service. This can be Network as a Service, Business as a Service, Identity as a Service, Database as a Service or Strategy as a Service.

The Infrastructure as a Service (IaaS) is the most basic level of service. Each of the service models make use of the underlying service model, i.e., each inherits the security and management mechanism from the underlying model, as shown in the following diagram:



**INRASTRUCTURE AS A SERVICE (IAAS)**

IaaS provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc.

**PLATFORM AS A SERVICE (PAAS)**

PaaS provides the runtime environment for applications, development & deployment tools, etc.

**SOFTWARE AS A SERVICE (SAAS)**

SaaS model allows to use software applications as a service to end users.

**Cloud Computing Technologies**

There are certain technologies that are working behind the cloud computing platforms making cloud computing flexible, reliable, and usable. These technologies are listed below:

- Virtualization
- Service-Oriented Architecture (SOA)
- Grid Computing
- Utility Computing

**Virtualization**

Virtualization is a technique which allows to share single physical instance of an application or resource among multiple organizations or tenants (customers). It does so by assigning a logical name to a physical resource and providing a pointer to that physical resource when demanded.

The Multitenant architecture offers virtual isolation among the multiple tenants and therefore, the organizations can use and customize the application as though, they each has its own instance running.

**Service-Oriented Architecture (SOA)**

Service-Oriented Architecture helps to use applications as a service for other applications regardless type of vendor, product or technology. Therefore it is possible to exchange of data between applications of different vendors without additional programming or making changes to services.

**Grid Computing**

Grid Computing refers to distributed computing in which a group computers from multiple locations are connected with each other to achieve common objective. These computer resources are heterogeneous and geographically dispersed.

**Utility Computing**

Utility computing is based on Pay per Use model. It offers computational resources on demand as a metered service. Cloud computing, grid computing, and managed IT services are based on the concept of utility computing

## Cloud Infrastructure Components

Cloud infrastructure consist of servers, storage, network, management software, and deployment software and platform virtualization.

### Hypervisor

Hypervisor is a firmware or low level program that acts as a Virtual Machine Manager. It allows to share the single physical instance of cloud resources between several tenants.

### Management Software

Management Software helps to maintain and configure the infrastructure.

### Deployment Software

Deployment software helps to deploy and integrate the application on the cloud.

### Network

Network is the key component of cloud infrastructure. It allows to connect cloud services over the internet. It is also possible to deliver network as a utility over the internet i.e. the consumer can customize the network route and protocol.

### Server

Server helps to compute the resource sharing and offer other services such as resource allocation and de allocation, monitoring resources, security etc.

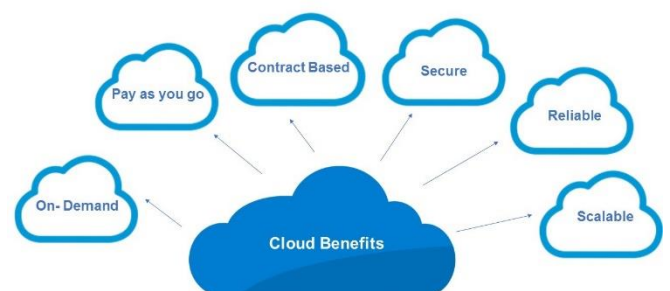
### Storage

Cloud uses distributed file system for storage purpose. Which makes cloud computing more reliable.

## Benefits

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

- One can access applications as utilities, over the Internet.
- Manipulate and configure the application online at any time.
- It does not require to install a specific piece of software to access or manipulate cloud application.
- Cloud Computing offers online development and deployment tools, programming runtime environment through Platform as a Service model.
- Cloud resources are available over the network in a manner that provides platform independent access to any type of clients.
- Cloud Computing offers on-demand self-service. The resources can be used without interaction with cloud service provider.
- Cloud Computing is highly cost effective because it operates at higher efficiencies with greater utilization. It just requires an Internet connection.
- Cloud Computing offers load balancing that makes it more reliable.



## Risks

Although Cloud Computing is a great innovation in the world of computing, there also exist downsides of cloud computing. Some of them are discussed below:

### SECURITY & PRIVACY

It is the biggest concern about cloud computing. Since data management and infrastructure management in cloud is provided by third-party, it is always a risk to handover the sensitive information to such providers.

Although the cloud computing vendors ensure more secure password protected accounts, any sign of security breach would result in loss of clients and businesses.

### LOCK-IN

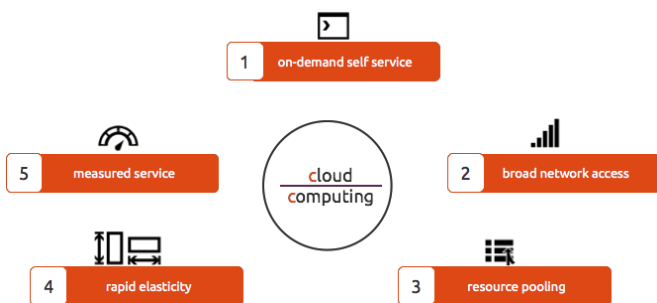
It is very difficult for the customers to switch from one Cloud Service Provider (CSP) to another. It results in dependency on a particular CSP for service.

### ISOLATION FAILURE

This risk involves the failure of isolation mechanism that separates storage, memory, routing between the different tenants.

## Characteristics

There are Five key characteristics of cloud computing.



### ON DEMAND SELF-SERVICE

Cloud Computing allows the users to use web services and resources on demand. One can logon to a website at any time and use them.

### BROAD NETWORK ACCESS

Since Cloud Computing is completely web based, it can be accessed from anywhere and at any time.

### RESOURCE POOLING

Cloud Computing allows multiple tenants to share a pool of resources. One can share single physical instance of hardware, database and basic infrastructure.

### RAPID ELASTICITY

It is very easy to scale up or down the resources at any time. Resources used by the customers or currently assigned to customers are automatically monitored and resources. It make it possible

### MEASURED SERVICE

Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, active user accounts). Resource usage can be monitored, controlled, audited, and reported, providing transparency for both the provider and consumer of the utilized service.

## 5 Real-World Examples of Cloud Computing

### 1. Examples of Cloud Storage

Ex: Dropbox, Gmail, Facebook

### 2. Marketing Cloud Platforms

Ex: Hubspot, Adobe Marketing Cloud

### 3. Cloud Computing in Education

Ex: Amazon Web Services

### 4. Examples of Cloud Computing in Healthcare

Ex: ClearDATA, Dell’s Secure Healthcare Cloud, IBM Cloud

### 5 Examples of Cloud Computing in Document Management

Ex: docManager® Digital Document Management System

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**90%** of business leaders feel that cloud-based collaboration can improve business processes

**Work flow flexibility will increase by 40%**

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