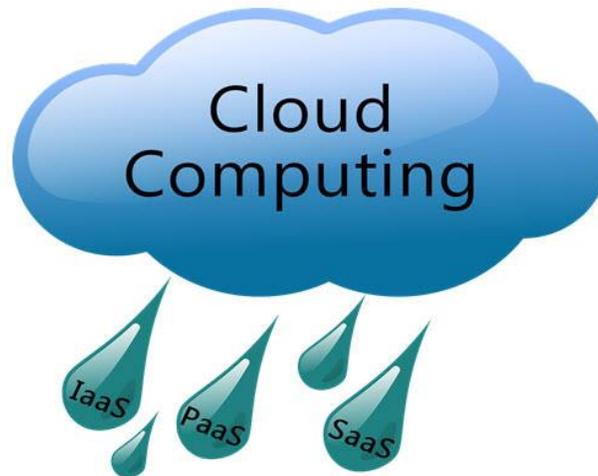


1. **Cloud Computing:** Cloud computing is the technology that uses the internet to maintain data and applications. Cloud Computing provides software, data access and storage services to the user as per the location of their preferences, duration to their liking and application of their choice. In other words we can say that cloud computing can be defined as delivering computing power(CPU, RAM, Network Speeds, Storage OS software) a service over a network (usually on the internet) rather than physically having the computing resources at the customer location.

Example: Amazon Web Services (AWS), Azure, Google Cloud

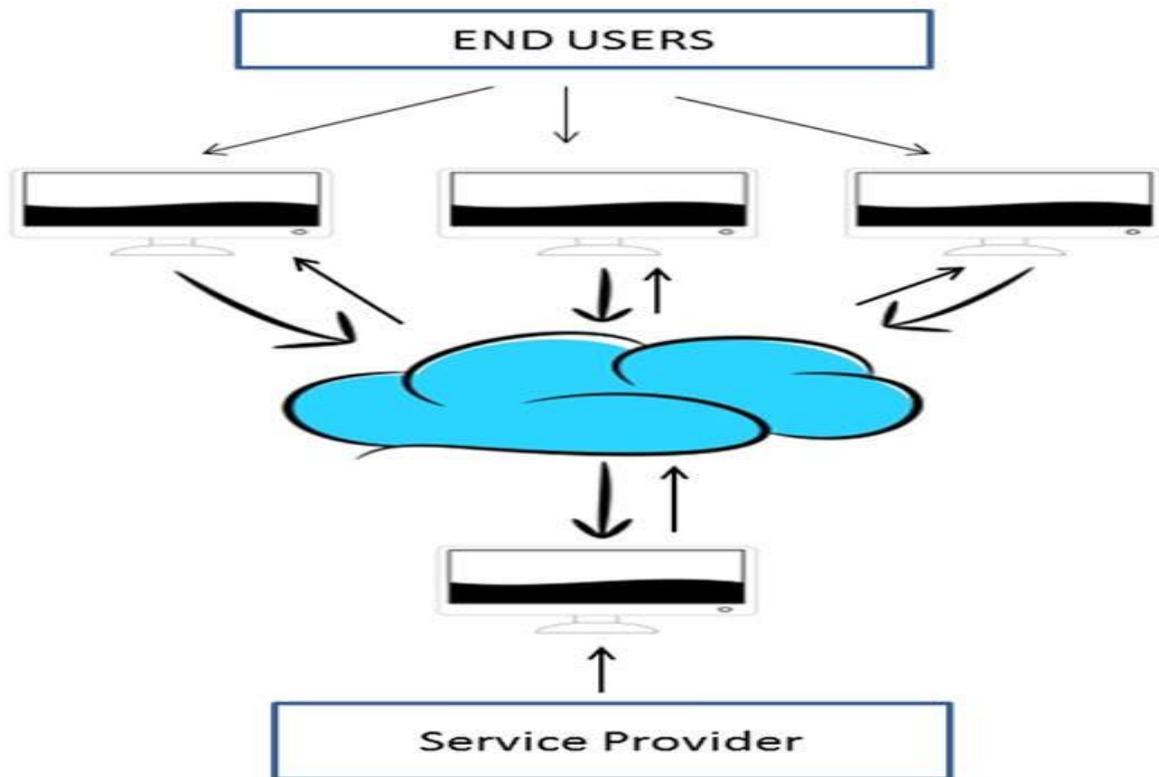


Let's learn Cloud computing with an example -

Whenever you travel through a bus or train, you take a ticket for your destination and hold back to your seat till you reach your destination. Likewise other passengers also takes ticket and travel in the same bus with you and it hardly bothers you where they go. When your stop comes you get off the bus thanking the driver. Cloud computing is just like that bus, carrying data and information for different users and allows to use its service with minimal cost.

Why the Name Cloud?

The term "Cloud" came from a network design that was used by network engineers to represent the location of various network devices and there inter-connection. The shape of this network design was like a cloud.



Why Cloud Computing?

Reasons to support With increase in computer and Mobile user's, data storage has become a priority in all fields. Large and small scale businesses today thrive on their data & they spent a huge amount of money to maintain this data. It requires a strong IT support and a storage hub. Not all businesses can afford high cost of in-house IT infrastructure and back up support services. For them Cloud Computing is a cheaper solution. Perhaps its efficiency in storing data, computation and less maintenance cost has succeeded to attract even bigger businesses as well.

Cloud computing decreases the hardware and software demand from the user's side. The only thing that user must be able to run is the cloud computing systems interface software, which can be as simple as Web browser, and the Cloud network takes care of the rest. We all have experienced cloud computing at some instant of time, some of the popular cloud services we have used or we are still using are mail services like gmail, hotmail or yahoo etc.

While accessing e-mail service our data is stored on cloud server and not on our computer. The technology and infrastructure behind the cloud is invisible. It is less important whether cloud services are based on HTTP, XML, Ruby, [PHP](#) or other specific technologies as far as it is user friendly and functional. An individual user can connect to cloud system from his/her own devices like desktop, laptop or mobile.

Cloud computing harnesses small business effectively having limited resources, it gives small businesses access to the technologies that previously were out of their reach. Cloud computing helps small businesses to convert their maintenance cost into profit. Let's see how?

In an in-house IT server, you have to pay a lot of attention and ensure that there are no flaws into the system so that it runs smoothly. And in case of any technical glitch you are completely responsible; it will seek a lot of attention, time and money for repair. Whereas, in cloud computing, the service provider takes the complete responsibility of the complication and the technical faults.

Benefits of Cloud Computing

The potential for cost saving is the major reason of cloud services adoption by many organizations. Cloud computing gives the freedom to use services as per the requirement and pay only for what you use. Due to cloud computing it has become possible to run IT operations as a outsourced unit without much in-house resources.

Following are the benefits of cloud computing:

1. Lower IT infrastructure and computer costs for users
2. Improved performance
3. Fewer Maintenance issues
4. Instant software updates
5. Improved compatibility between Operating systems
6. Backup and recovery
7. Performance and Scalability
8. Increased storage capacity
9. Increase data safety

Types of Clouds

There are four different cloud models that you can subscribe according to business needs:

1. **Private Cloud:** Here, computing resources are deployed for one particular organization. This method is more used for intra-business interactions. Where the computing resources can be governed, owned and operated by the same organization.
2. **Community Cloud:** Here, computing resources are provided for a community and organizations.
3. **Public Cloud:** This type of cloud is used usually for B2C (Business to Consumer) type interactions. Here the computing resource is owned, governed and operated by government, an academic or business organization.
4. **Hybrid Cloud:** This type of cloud can be used for both type of interactions - B2B (Business to Business) and B2C (Business to Consumer). This deployment method is called hybrid cloud as the computing resources are bound together by different clouds.

The biggest differences between public, private and hybrid cloud are described in the table below.

<i>Difference</i>	<i>Private</i>	<i>Public</i>	<i>Hybrid</i>
<i>Tenancy</i>	Single tenancy: there's only the data of a single organization stored in the cloud.	Multi-tenancy: the data of multiple organizations is stored in a shared environment.	The data stored in the public cloud is usually multi-tenant, which means the data from multiple organizations is stored in a shared environment. The data stored in private cloud is kept private by the organization.
<i>Exposed to the Public</i>	No: only the organization itself can use the private cloud services.	Yes: anyone can use the public cloud services.	The services running on a private cloud can be accessed only the organization's users, while the services running on public cloud can be accessed by anyone.
<i>Data Center Location</i>	Inside the organization's network.	Anywhere on the Internet where the cloud service provider's services are located.	Inside the organization's network for private cloud services as well as anywhere on the Internet for public cloud services.
<i>Cloud Service Management</i>	The organization must have their own administrators managing their private cloud services.	The cloud service provider manages the services, where the organization merely uses them.	The organization itself must manage the private cloud, while the public cloud is managed by the CSP.
<i>Hardware Components</i>	Must be provided by the organization itself, which has to buy physical servers to build the private cloud on.	The CSP provides all the hardware and ensures it's working at all times.	The organization must provide hardware for the private cloud, while the hardware of CSP is used for public cloud services.
<i>Expenses</i>	Can be quite expensive, since the hardware, applications and network have to be provided and managed by the organization itself.	The CSP has to provide the hardware, set-up the application and provide the network accessibility according to the SLA.	The private cloud services must be provided by the organization, including the hardware, applications and network, while the CSP manages the public cloud services.

Cloud Computing Services

The three major Cloud Computing Offerings are

- **Software as a Service (SaaS):** SaaS or software as a service is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network (internet). SaaS is becoming an increasingly prevalent delivery model as underlying technologies that supports **Service Oriented Architecture (SOA) or Web Services**. Through internet this service is available to users anywhere in the world.

Traditionally, software application needed to be purchased upfront & then installed it onto your computer. SaaS users on the other hand, instead of purchasing the software subscribes to it, usually on monthly basis via internet.

Anyone who needs an access to a particular piece of software can be subscribe as a user, whether it is one or two people or every thousands of employees in a corporation. SaaS is compatible with all internet enabled devices.

Many important tasks like accounting, sales, invoicing and planning all can be performed using SaaS.

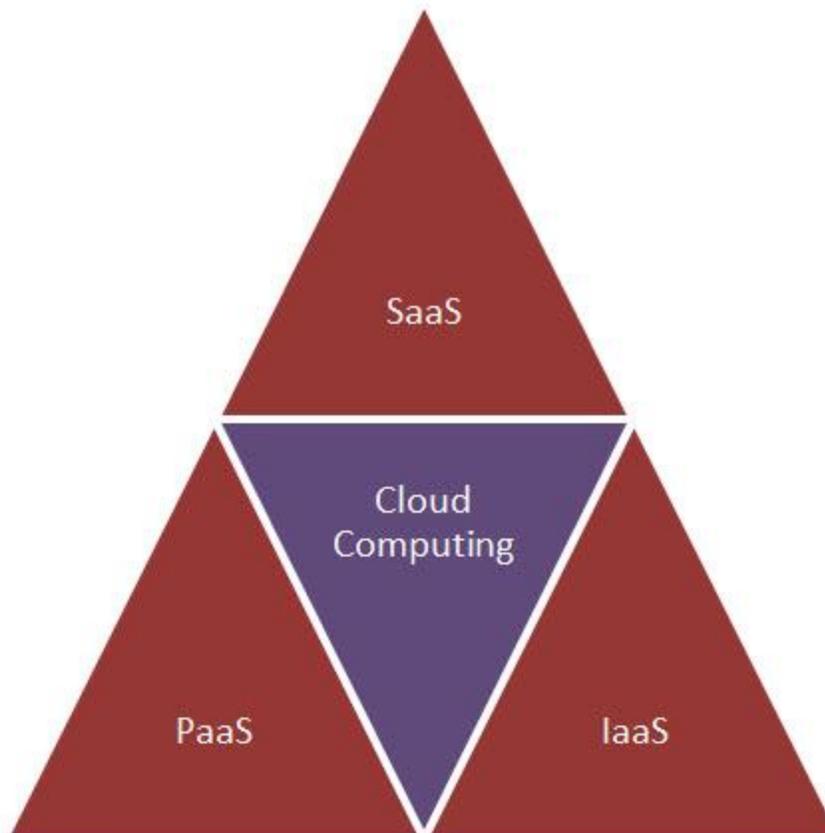
- **Platform as a Service (PaaS):** Platform as a service, is referred as PaaS, it provides a platform and environment to allow developers to build applications and services. This service is hosted in the cloud and accessed by the users via internet.

To understand in a simple terms, let compare this with painting a picture, where you are provided with paint colors, different paint brushes and paper by your school teacher and you just have to draw a beautiful picture using those tools.

PaaS services are constantly updated & new features added. Software developers, web developers and business can benefit from PaaS. It provides platform to support application development. It includes software support and management services, storage, networking, deploying, testing, collaborating, hosting and maintaining applications.

- **Infrastructure as a Service (IaaS)**

Different business use some or all of these components according to their requirement.



PaaS (Platform as a Service)

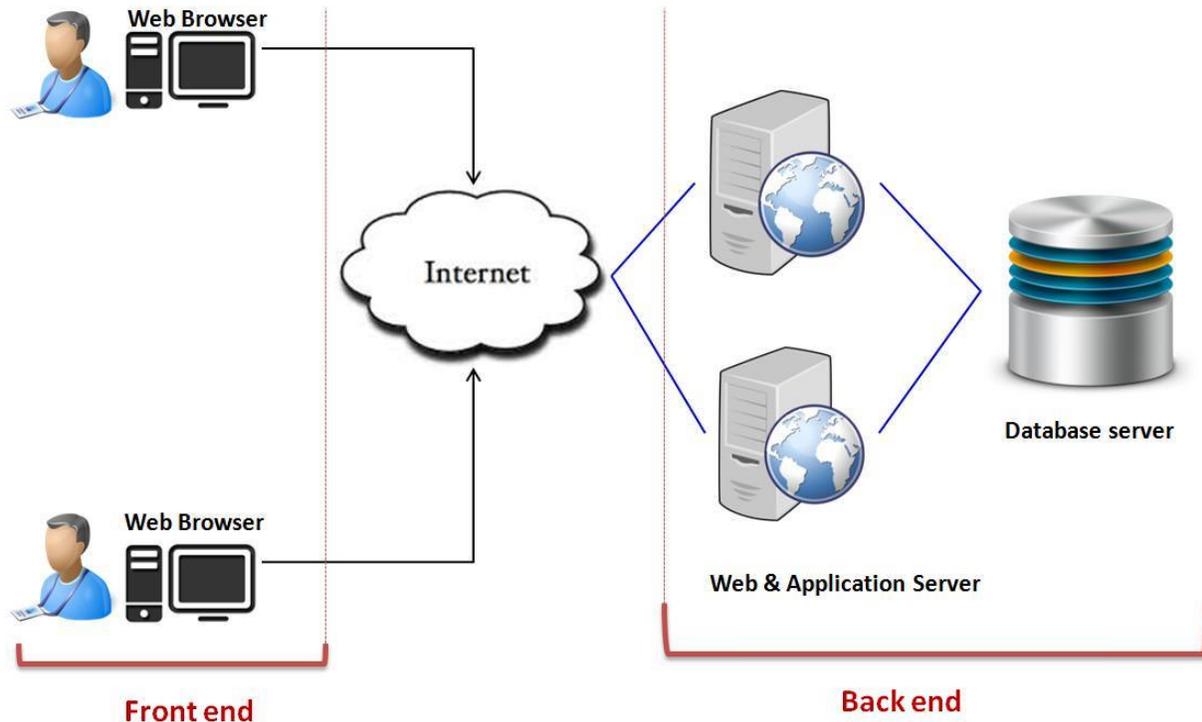
IaaS (Infrastructure as a Service)

IaaS (Infrastructure As A Service) is one of the fundamental service model of cloud computing alongside PaaS(Platform as a Service). It provides access to computing resources in a virtualized environment “the cloud” on internet. It provides computing infrastructure like virtual server space, network connections, bandwidth, load balancers and IP addresses. The pool of hardware resource is extracted from multiple servers and networks usually distributed across numerous data centers. This provides redundancy and reliability to IaaS.

IaaS(Infrastructure as a service) is a complete package for computing. For small scale businesses who are looking for cutting cost on IT infrastructure, IaaS is one of the solutions. Annually a lot of money is spent in maintenance and buying new components like hard-drives, network connections, external storage device etc. which a business owner could have saved for other expenses by using IaaS.

What is Cloud Computing Architecture?

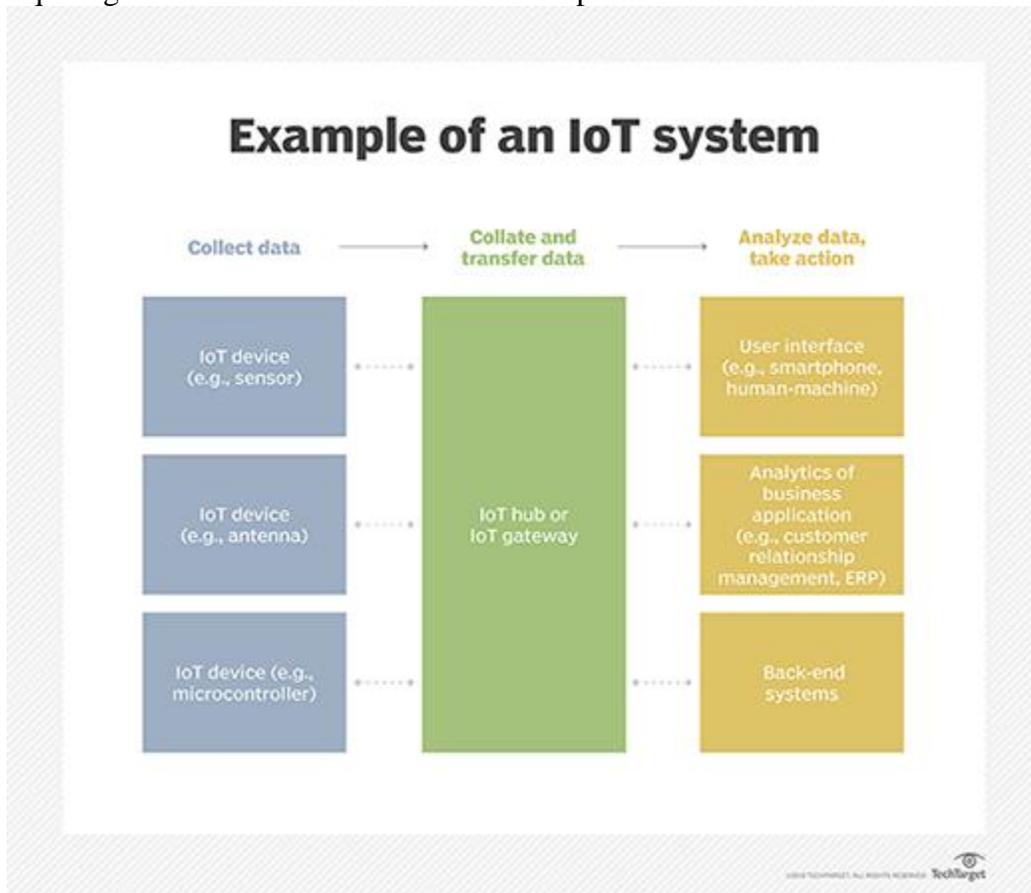
Let's have a look into Cloud Computing and see what Cloud Computing is made of. Cloud computing comprises of two components front end and back end. Front end consist client part of cloud computing system. It comprise of interfaces and applications that are required to access the cloud computing platform.



While back end refers to the cloud itself, it comprises of the resources that are required for cloud computing services. It consists of virtual machines, servers, data storage, security mechanism etc. It is under provider's control.

Cloud computing distributes the file system that spreads over multiple hard disks and machines. Data is never stored in one place only and in case one unit fails the other will take over automatically. The user disk space is allocated on the distributed file system, while another important component is algorithm for resource allocation. Cloud computing is a strong distributed environment and it heavily depends upon strong algorithm.

2. **IoT:** The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.



The internet of things offers a number of benefits to organizations, enabling them to:

- Monitor their overall business processes;
- Improve the customer experience;
- Save time and money;
- Enhance employee productivity;
- Integrate and adapt business models;
- Make better business decisions; and
- Generate more revenue.