

CONCEPT OF CLOUD COMPUTING (CCC)

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ABSTRACT: “Cloud computing is an umbrella term used to refer to Internet based development and services. The cloud is a metaphor for the Internet.” A number of characteristics define cloud data, applications services and infrastructure like Services or data are hosted on someone else’s infrastructure, Services or data are available from anywhere, The result is a utility computing model similar to traditional that of traditional utilities, like gas and electricity. You pay for what you would like. Cloud computing is a general term for anything that involves delivering hosted services over the Internet like Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS).

1. INTRODUCTION

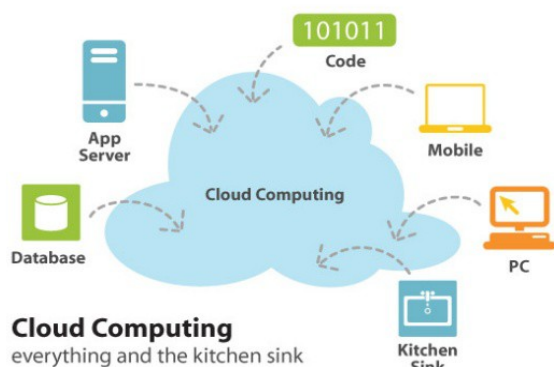
Cloud computing is an umbrella term used to refer to Internet based development and services. The cloud is a metaphor for the Internet. A number of characteristics define cloud data, applications services and infrastructure:

- Remotely hosted: Services or data are hosted on someone else’s infrastructure.
- Ubiquitous: Services or data are available from anywhere.
- Commodified: The result is a utility computing model similar to traditional that of traditional utilities, like gas and electricity. You pay for what you would like.

Cloud computing is a general term for anything that involves delivering hosted services over the Internet.

❖ **These services are broadly divided into three categories:**

- (1) Infrastructure-as-a-Service (IaaS),
- (2) Platform-as-a-Service (PaaS) and
- (3) Software-as-a-Service (SaaS).



❖ **Software as a Service (SaaS):**

SaaS is a model of software deployment where an application is hosted as a service provided to customers across the Internet. SaaS is generally used to refer to business software rather than consumer software, which falls under Web 2.0. By removing the need to install and run an application on a user’s own computer it is seen as a way for businesses to get the same benefits as commercial software with smaller cost outlay. SaaS also alleviates the burden of software maintenance and support but users relinquish control over software versions and requirements. Other terms that are used in this sphere include Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

The name cloud computing was inspired by the cloud symbol that’s often used to represent the Internet in flow charts and diagrams.

❖ **Companies offering SaaS:**

The companies below are already established in the On-Demand software or SaaS business. These companies charge their customers a subscription fee and in return host software on central servers that are accessed by the end user via the internet.

- Salesforce.com
- Google
- Net Suite
- Taleo
- Concur Technologies

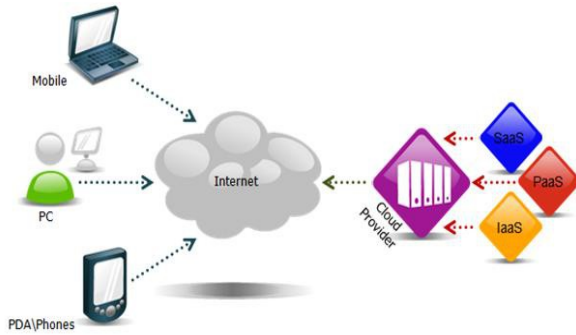
❖ **Platform as a Service :**

The platform segment of cloud computing refers to products that are used to deploy applications.

Platforms serve as an interface for users to access applications provided by partners or in some cases the customers.

Some examples included Salesforce.com's platform force.com, which allows subscribers to access their applications over the internet.

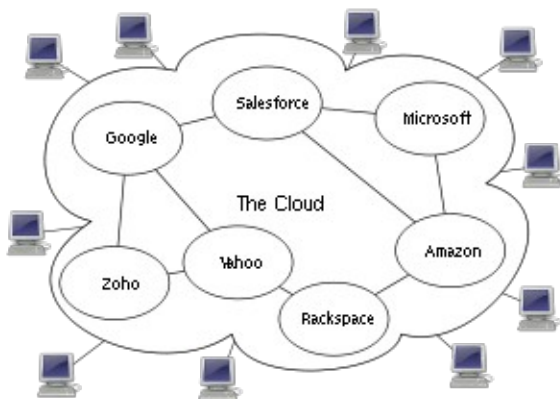
Net Suite, Amazon, Google, and Microsoft have also developed platforms that allow users to access applications from centralized servers.



❖ Companies offering Paas:

The following companies are some that have developed platforms that allow end users to access applications from centralized servers using the internet. Next to each company is the name of their platform.

- Google - Apps Engine
- Amazon.com - EC2
- Microsoft - Windows Live
- Terremark Worldwide - The Enterprise Cloud
- Salesforce.com - Force.com
- Net Suite - Suite flex
- Mosso - Mosso, a division of Rackspace
- Metrisoft - Metrisoft SaaS Platform



[Pass Services]

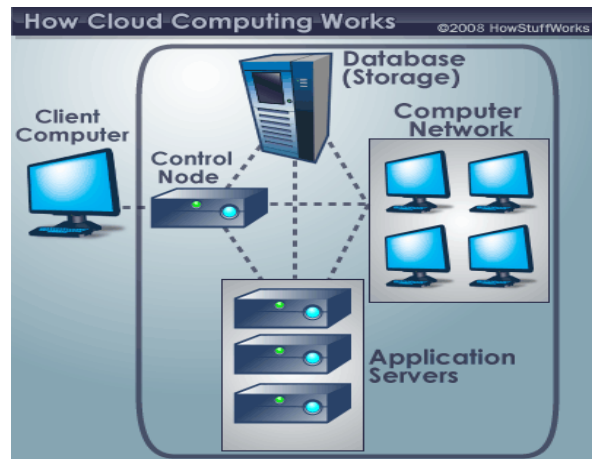
❖ How Cloud Computing Works:

Let's say you're an executive at a large corporation. Your particular responsibilities include making sure

that all of your employees have the right hardware and software they need to do their jobs. Buying computers for everyone isn't enough -- you also have to purchase software or software licenses to give employees the tools they require. Whenever you have a new hire, you have to buy more software or make sure your current software license allows another user. It's so stressful that you find it difficult to go to sleep on your huge pile of money every night.

Soon, there may be an alternative for executives like you. Instead of installing a suite of software for each computer, you'd only have to load one application. That application would allow workers to log into a Web-based service which hosts all the programs the user would need for his or her job. Remote machines owned by another company would run everything from e-mail to word processing to complex data analysis programs. It's called cloud computing, and it could change the entire computer industry.

In a cloud computing system, there's a significant workload shift. Local computers no longer have to do all the heavy lifting when it comes to running applications. The network of computers that make up the cloud handles them instead. Hardware and software demands on the user's side decrease. The only thing the user's computer needs to be able to run is the cloud computing systems interface software, which can be as simple as a Web browser, and the cloud's network takes care of the rest.



[Example of Cloud Work's]

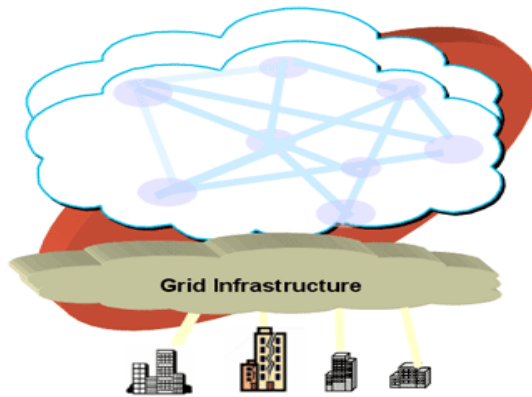
There's a good chance you've already used some form of cloud computing. If you have an e-mail account with a Web-based e-mail service like Hotmail, Yahoo! Mail or Gmail, then you've had some experience with cloud computing. Instead of running an e-mail program on your computer, you log in to a Web e-mail account remotely. The software and storage for your account doesn't exist on your computer -- it's on the service's computer cloud.

What makes up a cloud computing system? Find out in the next section.

❖ **Comparisons:**

Cloud computing can be confused with:

1. **Grid computing** — "a form of distributed computing and parallel computing, whereby a 'super and virtual computer' is composed of a cluster of networked, loosely coupled computers acting in concert to perform very large tasks"



2. **Utility computing** — the "packaging of computing resources, such as computation and storage, as a metered service similar to a traditional public utility, such as electricity";
3. **Autonomic computing** — "computer systems capable of self-management".
4. **Client-server model** — client-server computing refers broadly to any [distributed application](#) that distinguishes between service providers (servers) and service requesters (clients) **Grid computing** — "a form of [distributed computing](#) and [parallel computing](#), whereby a 'super and virtual computer' is composed of a [cluster](#) of networked, [loosely coupled](#) computers acting in concert to perform very large tasks"
5. **Mainframe computer** — powerful computers used mainly by large organizations for critical applications, typically bulk data-processing such as [census](#), industry and consumer statistics, [enterprise resource planning](#), and financial [transaction processing](#).
6. **Utility computing** — the "packaging of [computing resources](#), such as computation and storage, as a metered service similar to a traditional [public utility](#), such as [electricity](#)".
7. **Peer-to-peer** — distributed architecture without the need for central coordination, with participants being at the same time both suppliers and consumers of resources (in

contrast to the traditional client-server model)

8. **Service-oriented computing** — Cloud computing provides services related to computing while, in a reciprocal manner, service-oriented computing consists of the computing techniques that operate on software-as-a-service.

❖ **Characteristics of Cloud Computing:**

A cloud service has three distinct characteristics that differentiate it from traditional hosting.

It is sold on demand, typically by the minute or the hour;

It is elastic -- a user can have as much or as little of a service as they want at any given time; and the service is fully managed by the provider (the consumer needs nothing but a personal computer and Internet access).

Significant innovations in virtualization and distributed computing, as well as improved access to high-speed Internet and a weak economy, have accelerated interest in cloud computing.

❖ **Essential Characteristics:**

On-demand self-service.

A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service's provider.

Broad network access.

Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, laptops, and PDAs).

Resource pooling.

The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Examples of resources include

storage, processing, memory, network bandwidth, and virtual machines.

Rapid elasticity.

Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.

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, and active user accounts). Resource usage can be monitored, controlled, and reported providing transparency for both the provider and consumer of the utilized service.

❖ **Infrastructure as a Service:**

Infrastructure vendors provide the physical storage space and processing capabilities that allow for the all the services described above.

The products in this segment are slightly more varied than those in the other areas of cloud computing but include ones such as managed hosting, and development environments (such as Google gears) that allow users to build applications.

Cloud storage, such as Amazon's S3, is also considered to be part of the infrastructure segment.

❖ **Companies offering Iaas:**

Below are companies that provide infrastructure services:

- Google - Managed hosting, development environment
- International Business Machines (IBM) - Managed hosting
- SAVVIS - Managed hosting
- Terre mark Worldwide - Managed hosting
- Amazon.com - Cloud storage

❖ **Service Models:**

Cloud Software as a Service (SaaS).

The capability provided to the consumer is to use the provider's applications running on a

cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (e.g., web-based email). The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.

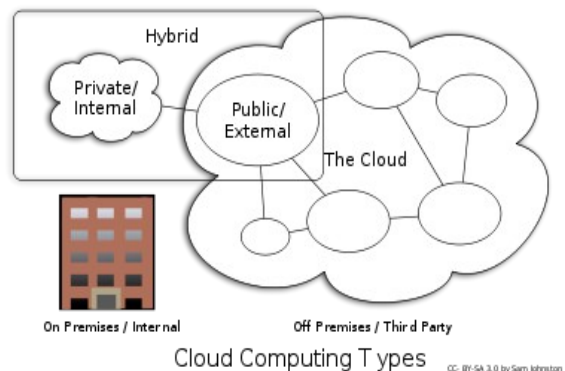
Cloud Platform as a Service (PaaS).

The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations.

Cloud Infrastructure as a Service (IaaS).

The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems; storage, deployed applications, and possibly limited control of select networking components (e.g., host firewalls).

❖ **Deployment Models:**



Private cloud. The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and

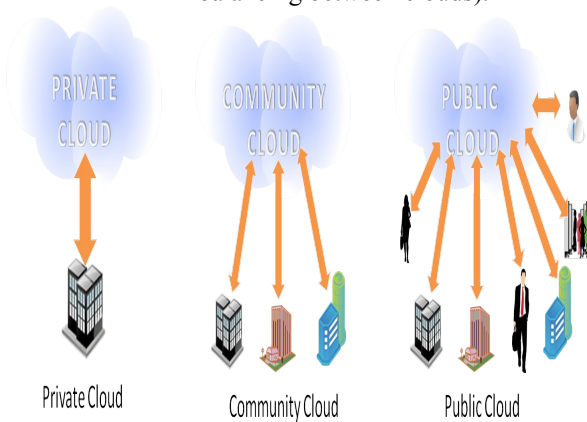
may exist on premise or off premise.

Community cloud. The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premise or off premise.

Public cloud.

The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.

Hybrid cloud. The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds).



[Development Model]

❖ **Advantages of Cloud Hosting:**

Hosting our information on an outsourced system (that is maintained by a third-party) can really free up space and cut costs. With cloud hosting, we can

- Access our data at all times – not just while in the office
- A physical storage center is no longer needed
- Most have a pay structure that only calls for payment only when used
- Relieves burden on IT Professionals and frees up their time in the office

- Easily scalable so companies can add or subtract storage based on their own needs

❖ **Disadvantages of Cloud Hosting:**

If you are going to move all of your information to data centers situated outside your company, then security should be of utmost importance.

- Lost control comes with handing over our data and information
- Depending on third-party to ensure the security and confidentiality of data and information
- If our cloud host disappears, where does our information go?

❖ **Opportunities and Challenges:**

The use of the cloud provides a number of opportunities:

- It enables services to be used without any understanding of their infrastructure.
- Cloud computing works using economies of scale. It lowers the outlay expense for start up companies, as they would no longer need to buy their own software or servers. Cost would be by on-demand pricing. Vendors and Service providers claim costs by establishing an ongoing revenue stream.
- Data and services are stored remotely but accessible from 'anywhere'.

In parallel there has been backlash against cloud computing:

- Use of cloud computing means dependence on others and that could possibly limit flexibility and innovation. The 'others' are likely become the bigger Internet companies like Google and IBM who may monopolise the market. Some argue that this use of supercomputers is a return to the time of mainframe computing that the PC was a reaction against.
- Security could prove to be a big issue. It is still unclear how safe outsourced data is and when using these services ownership of data is not always clear.
- There are also issues relating to policy and access. If your data is stored abroad whose FOI policy do you adhere to? What happens if the remote server goes down? How will you then access files? There have been cases of users being locked out of accounts and losing access to data.

2. FUTURE SCOPE:

- If you're looking to implement this, you have two options. You can host it all within your network, or you can use a device from a company that provides the server storage, such as the CherryPal. I hope you have learned a lot about cloud computing and the bright future it has in the coming years.
- Many of the activities loosely grouped together under cloud computing have already been happening and centralised computing activity is not a new phenomena: Grid Computing was the last research-led centralised approach. However there are concerns that the mainstream adoption of cloud computing could cause many problems for users. Whether these worries are grounded or not has yet to be seen.
- Cloud computing is the next big wave in computing. It also provides for better and easier management of data security, since all the data is located on a central server, so administrators can control who has and doesn't have access to the files. It has many benefits, such as better hardware management, since all the computers are the same and run the same hardware.

3. CONCLUSION:

- Cloud computing is the next big wave in computing. It has many benefits, such as better hardware management, since all the computers are the same and run the same hardware. It also provides for better and easier management of data security, since all the data is located on a central server, so administrators can control who has and doesn't have access to the files.
- There are some down sides as well to cloud computing. Peripherals such as printers or scanners might have issues dealing with the fact that there is no hard drive attached to the physical, local machine. If there are machines a user uses at work that aren't their own for any reason, that require access to particular drivers or programs, it is still a struggle to get this application to know that it should be available to the user.

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