

Cloud Computing

Although “cloud computing” is quite a recent term, elements of the concept have been around for years. It is the maturation of Internet. Cloud Computing is the fine end result of a long chain; Mainframe Computing (1965-1985), PC Computing (Timeframe : 1985+), Network Computing 1990+, Application Computing (1993+), Internet (1994), Web Computing (1998), grid computing, Virtualization (2007) and then Cloud Computing.

According to NIST (National Institute of Standards and Technology) “Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction”. Cloud Computing services are generally divided into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS). Cloud computing is a huge step in the entire IT world as well as the business world. It could create a move along with a new generation of products and services. Moreover, Cloud Computing could create a new awareness of the greater Internet. It also presents a number of new challenges in data security, privacy, control, compliance, application integration, and service quality.

There are some other names for cloud computing such as Elastic Computing, Utility Computing, On Demand Computing etc., Actually all these names denote some particular characteristic of cloud computing. But in brief, cloud computing connects hardware, software and service in a network.

Essential Characteristics of Cloud Computing:

- On-Demand Self-Service
- Rapid Elasticity
- Location Independence
- Resource Pooling
- Measured Service

On Demand Self Service

This feature of Cloud computing enables a user to avail any services with out any third party interference. This is very crucial characteristics of cloud computing by the virtue of this feature a customer is always in the driving seat regarding its present and future needs. He has to just find out and expand the business. This change from “buy-and-own” to “pay-as-you-go” has broad implications for activities. IT solutions are no more issue for an enterprise. It has just to demand for more services which are provided just on a demand note.

Rapid Elasticity

Scaling capacity up and down for a cloud service is commonly called elasticity. 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. In cloud computing an enterprise (user) can have as much of services as they want, at any given time.

Location Independence

Another characteristic of cloud computing is the fact that it is network based, and accessible from anywhere, from any standardized platform (i.e. mobile phones, laptops, and PDAs). The customer has no knowledge on the exact location where the resources are stored. Cloud computing also provides the users with a variety of services on the network with broader data spaces, multiple value added services, new software, many advanced processing techniques and much more accessibility to a highly rich and capable network.

Resource Pooling

Resource pooling allows the pooling of computing resources to serve multiple consumers. So the computing resources in the cloud are shared to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. The software or hardware resources are parked under a pool which can be used by any customer on demand.

Measured Services

The major benefit of cloud computing is the flexibility to scale up or down the IT infrastructure depending on the enterprise needs. The cloud provider acts like an electric utility, measuring the amount of service provided and react accordingly (both in terms of billing the client, and updating hardware and software as appropriate).

The Essential Services

- Infrastructure-as-a-Service (IaaS)
- Platform-as-a-Service (PaaS)
- Software-as-a-Service (SaaS)

Software-as-a-Service (SaaS): In Cloud Computing Software is provided as an application on-demand. There is no implied language, development methodology, or tool specifically attributed to SaaS. It is based on a "one-to-many" model whereby an application is shared across multiple clients and it can be characterized as "Software deployed as a hosted service and accessed over the Internet."

Software as a service (or SaaS) is a way of delivering applications over the Internet-as a service. Instead of installing and maintaining software, you simply access it via the Internet, freeing yourself from complex software and hardware management. SaaS applications are sometimes called Web-based software, on-demand software, or hosted software. Whatever the name, SaaS applications run on a SaaS provider's servers. The provider manages access to the application, including security, availability, and performance. SaaS customers have no hardware or software to buy, install, maintain, or update. Access to applications is easy: you just need an Internet connection. This types of cloud computing delivers a single application through the browser to thousands of customers using a multitenant architecture. On the customer side, it means no upfront investment in servers or software licensing; on the provider side, with just one app to maintain, costs are low compared to conventional hosting.

Platform-as-a-Service (PaaS): It is all about providing, a platform in the cloud, upon which applications can be developed and executed. It gives programmers and IT professionals the resources they need to develop and deploy applications without the added cost and complexity of managing their own hardware and software layers on-site. Facilities provided include things like database management, security, workflow management, application serving, and so on.

Infrastructure-as-a-Service (IaaS): The proposition here is the offering of compute power and storage space on demand. Cloud computing is proving to be a step change in the way we design, build, implement, deliver and manage our IT to support the business agenda. The benefits of IaaS, in addition to the ability to scale, are the costs to get started and the ability to pay only for what you use. For a startup or small business, one of the most difficult things to do is keep capital expenditures under control. By moving your infrastructure to the cloud, you have the ability to scale as if you owned your own hardware and data center (which is not realistic with a traditional hosting provider) but you keep the upfront costs to a minimum. The IaaS provider supplies the whole cloud infrastructure viz. servers, routers, hardware based load-balancing, firewalls, storage and other network equipment.

Cloud computing deployment models:

- Public Cloud
- Private Cloud
- Community Cloud
- Hybrid Cloud

Public Cloud

Public Cloud, like anything else with the name public (public transport, public toilets, public library) means just that. A service or utility that is generally available to the public. Public cloud or external cloud describes cloud computing in the traditional mainstream sense, whereby resources are dynamically provisioned on a fine-grained, self-service basis over the Internet, via web applications/web services, from an off-site third-party provider who bills on a fine-grained utility computing basis. In simple, For use by multiple organizations on a shared basis and hosted and managed by a third party service provider.

Private Cloud

Private cloud is also referred as internal cloud or on-premise cloud, a private cloud intentionally limits access to its resources to service consumers that belong to the same organization that owns the cloud. In other words, the infrastructure that is managed and operated for one organization only, primarily to maintain a consistent level of control over security, privacy, and governance.

Community Cloud

A community cloud may be established where several organizations have similar requirements and seek to share infrastructure so as to realize some of the benefits of cloud computing. The costs are spread over fewer users than a public cloud (but more than a single tenant). This option offers a higher level of privacy, security, and/or policy compliance. In addition, it can be economically attractive as the resources (storage, workstations) utilized and shared in the community are already exploited and have reached their return of investment. Examples of community clouds include Google's Web App hosting service.

Hybrid Cloud

A hybrid cloud is the "virtual joining" of two or more 'heterogeneous cloud segments'. The joins could be within the same data center, across data centers or across cloud providers. At the joining of 'homogeneous cloud segments' (e.g., two vClouds) is generally not considered a hybrid cloud. A hybrid cloud is a single logical cloud composed of two or more distinct physical clouds.

According to analysts at Gartner, a leading IT research and advisory company, "By 2011, early technology adopters will forgo capital expenditures and instead purchase 40 percent of their IT infrastructure as a service. Increased high-speed bandwidth makes it practical to locate infrastructure at other sites and still receive the same response times. Enterprises believe that as service-oriented architecture (SOA) becomes common, 'cloud computing' will take off, thus untying applications from specific infrastructure."

There are plenty of benefits for working with a cloud computing, and many out weigh the reasons why not to use cloud computing. Cloud computing is still growing and many government bodies and company organizations already use this type of network for their businesses. Cloud computing allows them to focus on what matters and not to worry about technology side of things. Cloud computing has opened a new horizon of services in the 21st century. Like every technology, it also addresses certain questions and anxieties. But it is very clear that cloud computing has its place.