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Cloud Computing The Future Computation: Overview

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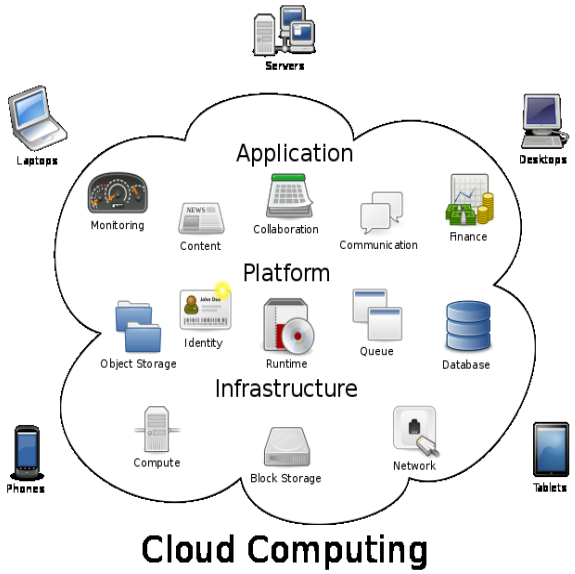
Abstract

Cloud computing is the future in computation. Clouds can help to save and serve the world, people can have everything what they want on the cloud. Cloud computing is the future next required natural step in the evolution of on-demand information technology services and products. The Cloud will be the necessary part for the Internet. It will be a style of computing in which IT-related capabilities are provided "as a service", allowing users to access technology-enabled services from the Internet (i.e., the Cloud) without knowledge, expertise, or control over the technology infrastructure that supports them. Email was possibly the first service on the "cloud".
Cloud computing is a very precise type of computing that has very large benefits. But it has some negatives as well.

What is a cloud?

Cloud computing is a term used to describe both a platform and type of application. A cloud computing platform dynamically provisions, configures, reconfigures, and deprovisions servers as needed. Servers in the cloud can be physical machines or virtual machines. Advanced clouds typically include other computing resources such as storage area networks (SANs), network equipment, firewall and other security devices.



Cloud computing also describes applications that are complete to be accessible through the Internet. These types of *cloud applications are* used large data centers and powerful servers that host Web applications and Web services. Anyone with a suitable Internet connection and a standard browser can access a cloud application.

Definition

A cloud is a pool of virtualized computer resources. A cloud can:

- Host a variety of different workloads, including batch-style back-end jobs and interactive, user-facing applications
- Allow workloads to be deployed and scaled-out quickly through the rapid provisioning of virtual machines or physical machines
- Support redundant, self-recovering, highly scalable programming models that allow workloads to recover from many unavoidable hardware/software failures
- Monitor resource use in real time to enable rebalancing of allocations when needed

Cloud computing environments support grid computing by quickly providing physical and virtual servers on which the grid applications can run. Cloud computing should not be confused with grid computing. Grid computing involves dividing a large task into many smaller tasks that run in parallel on separate servers. Grids require many computers, typically in the thousands, and commonly use servers, desktops, and laptops.

Clouds also support non grid environments, such as a three-tier Web architecture running standard or Web 2.0 applications. A cloud is more than a collection of computer resources because a cloud provides a mechanism to manage those resources. Management includes provisioning, change requests, reimaging, workload rebalancing, deprovisioning, and monitoring.

Cloud computing is the delivery of computing and storage capacity as a service to a community of end-recipients. The name comes from the use of a cloud-shaped symbols an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts services with a user's data, software and computation over a network.

There are three types of cloud computing:

- **Infrastructure as a Service (IaaS)**
  In **Iaas** model most basic cloud service model, cloud providers offer computers, as physical or more often as virtual machines, and other resources

- **Platform as a Service (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 difficulty of buying and managing the original hardware and software layers.

- **Software as a Service (SaaS)**
  In **SaaS** 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

	Service Type	Examples	Providers
1	Infrastructure as a Service **(IaaS)**	Amazon Services Cloud Hosting	Amazon GoGride
2	Platform as a Service **(PaaS)**	Google Apps Azure	Google Microsoft
3	Software as a Service **(SaaS)**	Google Docs iCloud Netsuite CRM+	Google Apple NetSuite

A cloud can be private or public. A ***public cloud*** sells services to anyone on the Internet. (**Currently, Amazon Web Services is the largest public cloud provider.)** A ***private cloud*** is a proprietary network or a data center that supplies hosted services to a limited number of people. When a service provider uses public cloud resources to produce his private cloud, is called a **virtual private cloud**. Private or public, the goal of cloud computing is to provide easy, scalable access to computing resources and IT services. Cloud computing is an on-demand service model for IT provision, often based on virtualization and dispersed computing technologies. Cloud computing architectures have:

- Highly abstracted resources
- Near instant scalability and flexibility
- Near instantaneous provisioning
- Dhared resources (hardware, database, memory, etc)
- ‘”ervice on demand’, usually with a ‘pay as you go’ billing system
- Programmatic management (e.g., through WS API).

Characteristics

- Agility improves with users' ability to re-provision technological infrastructure resources.
- Application programming interface (API) accessibility to software that enables machines to interact with cloud software in the same way the user interface facilitates interaction between humans and computers.
- Cost is claimed to be reduced and in a public cloud delivery model capital expenditure is converted to operational expenditure.
- Device and location independence enable users to access systems using a web browser regardless of their location or what device they are using (e.g., PC, mobile phone). As infrastructure is off-site (typically provided by a third-party) and accessed via the Internet, users can connect from anywhere.
- Virtualization technology allows servers and storage devices to be shared and utilization be increased. Applications can be easily migrated from one physical server to another.
- Multitenancy enables distribution of resources and costs across a large pool of users thus allowing for: Centralization of infrastructure in locations with lesser costs
- Peak-load capacity increases (users need not engineer for highest possible load-levels)
- Reliability is improved if multiple unnecessary sites are used, which makes well-made cloud computing appropriate for business stability and disaster recovery.

- Scalability and flexibility via dynamic ("on-demand") provisioning of resources on a fine-grained, self-service basis and immediate, without users having to engineer for peak loads.
- Performance is monitored and consistent and loosely coupled architectures are constructed using web services as the system interface.
- Security could improve due to centralization of data, increased security-focused resources, etc., Security is often as good as or better than other traditional systems, in part because providers are able to devote resources to solving security issues that many customers cannot afford.
- In addition, user access to safety audit logs may be complicated or impossible. Private cloud installations are in part motivated by users' desire to retain control over the infrastructure and avoid losing control of information security.
- Maintenance of cloud computing applications is easier, because they do not need to be installed on each user's computer and can be accessed from different places.
- On demand self service is listed by the The National Institute of Standards and Technology (NIST) as a feature of cloud computing.
- Cloud users should be able to obtain, configure and deploy cloud services themselves using cloud service catalogues, without requiring the assistance of IT.
- The self-service requirement of cloud computing is prompting infrastructure vendors to create cloud computing templates, which are obtained from cloud service catalogues.
- The templates contain predefined configurations used to by consumers to set up cloud services. The templates or blueprints provide the technical information necessary to build ready-to-use clouds. Each template includes specific configuration details for different cloud infrastructures, with information about servers for specific tasks such as hosting applications, databases, websites and so on. The templates also include predefined Web service, the operating system, the database, security configurations and load balancing.

Benefits

- Cloud computing infrastructures can allow enterprises to achieve more efficient use of their IT hardware and software investments
- Cloud computing is an example of an ultimately virtualized system, and a natural evolution for data centers that employ automated systems management, workload balancing, and virtualization technologies.
- A cloud infrastructure can be a cost efficient model for delivering information services, reducing IT management complexity, promoting innovation, and increasing responsiveness through real time workload balancing.
- The Cloud makes it possible to launch Web 2.0 applications quickly and to scale up applications as much as needed when needed. The platform supports traditional Java™ and Linux, Apache, MySQL, PHP (LAMP) stack-based applications as well as new architectures such as MapReduce
- Large amounts of computer resource, in the form of Xen virtual machines, can be provisioned and made available for new applications within minutes instead of days or weeks.
- Many customers are interested in cloud infrastructures to serve as platforms for innovation, particularly in countries that want to foster the development of a highly skilled, high-tech work force. They want to provide startups and research organizations with an environment for idea exchange, and the ability to rapidly develop and deploy new product prototypes.

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