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Cloud Computing

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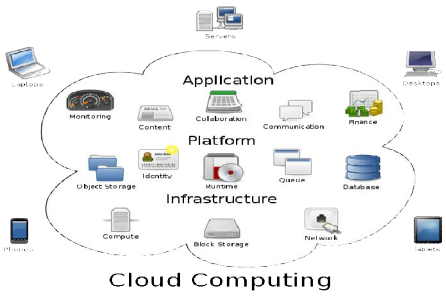
I. INTRODUCTION

Cloud computing is such a type of computing environment, where business owners outsource their computing needs including application software services to a third party and when they need to use the computing power or employees need to use the application resources like database, emails etc., they access the resources via Internet. Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). The name comes from the use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts remote services with a user's data, software and computation.

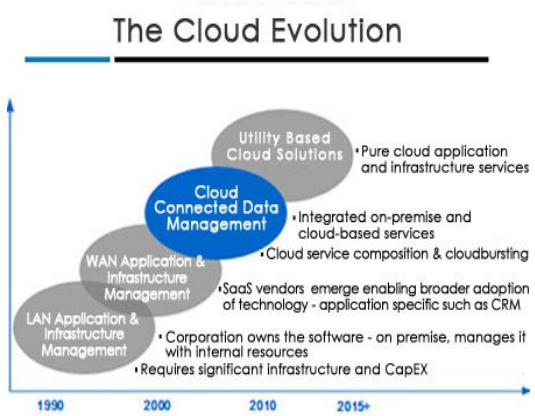
Cloud Computing is a technology that uses the internet and central remote servers to maintain data and applications. Cloud computing allows consumers and businesses to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing data storage, processing and bandwidth.



II. HISTORY

The origin of the term *cloud computing* is obscure, but it appears to derive from the practice of using drawings of stylized clouds to denote networks in diagrams of computing and communications systems. The word *cloud* is used as a metaphor for the Internet, based on the standardized use of a cloud-like shape to denote a network the cloud symbol was used to represent the Internet as early as 1994.

In early 2008, Eucalyptus became the first open-source, AWS API-compatible platform for deploying private clouds. In early 2008, Open Nebula, enhanced in the RESERVOIR European Commission-funded project, became the first open-source software for deploying private and hybrid clouds, and for the federation of clouds. By mid-2008, Gartner saw an opportunity for cloud computing "to shape the relationship among consumers of IT services, those who use IT services and those who sell them" and observed that organizations are switching from company-owned hardware and software assets to per-use service-based models. On March 1, 2011, IBM announced the Smarter Computing framework to support Smarter Planet. Among the various components of the Smarter Computing foundation, cloud computing is a critical piece.



III. TYPES OF CLOUD

Public cloud

Public cloud applications, storage, and other resources are made available to the general public by a service provider. These services are free or offered on a pay-per-use model. Generally, public cloud service providers like Amazon AWS, Microsoft and Google own and operate the infrastructure and offer access only via Internet (direct connectivity is not offered).

Community cloud

Community cloud shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party and hosted internally or externally. The costs are spread over fewer users than a public cloud (but more than a private cloud), so only some of the cost savings potential of cloud computing are realized.

Hybrid cloud

Hybrid cloud is a composition of two or more clouds (private, community or public) that remain unique entities but are bound together, offering the benefits of multiple deployment models. By utilizing "hybrid cloud" architecture, companies and individuals are able to obtain degrees of fault tolerance combined with locally immediate usability without dependency on internet connectivity. Hybrid cloud architecture requires both on-premises resources and off-site (remote) server-based cloud infrastructure.

Private cloud

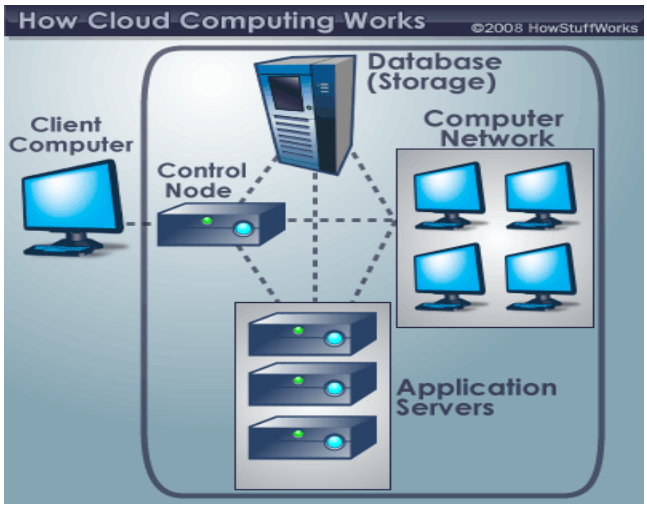
Private cloud is cloud infrastructure operated solely for a single organization, whether managed internally or by a third-party and hosted internally or externally. Undertaking a private cloud project requires a significant level and degree of engagement to virtualizes the business environment, and it will require the organization to reevaluate decisions about existing resources. When it is done right, it can have a positive impact on a business, but every one of the steps in the project raises security issues that must be addressed in order to avoid serious vulnerabilities.

IV. 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.

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.

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. 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.



V. CLOUD ARCHITECTURE

Cloud architecture, the systems architecture of the software systems involved in the delivery of cloud computing, typically involves multiple cloud components communicati ng with each other over a loose coupling mechanism such as a messaging queue.

Cloud computing providers offer their services according to three fundamental models: infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS) where IaaS is the most basic and each higher model abstracts from the details of the lower models. In 2012 network as a service (NaaS) and communication as a service (CaaS) were officially included by ITU (International Telecommunication Union) as part of the basic cloud computing models, recognized service categories of a telecommunication-centric cloud ecosystem.

Infrastructure as a service (IaaS)

In this most basic cloud service model, IaaS providers offer computers, as physical or more often as virtual machines, and other resources. To deploy their applications, cloud users install operating system images and their application software on the cloud infrastructure. In this model, it is the cloud user who is responsible for patching and maintaining the operating systems and application software. Cloud providers typically bill IaaS services on a utility computing basis, that is, cost reflects the amount of resources allocated and consumed.
Examples of IaaS providers include Amazon CloudFormation, Amazon EC2, Windows Azure Virtual Machines, DynDNS, Google Compute Engine, HP Cloud, Joyent, Rackspace Cloud, ReadySpace Cloud Services, and Terremark.

Platform as a service (PaaS)

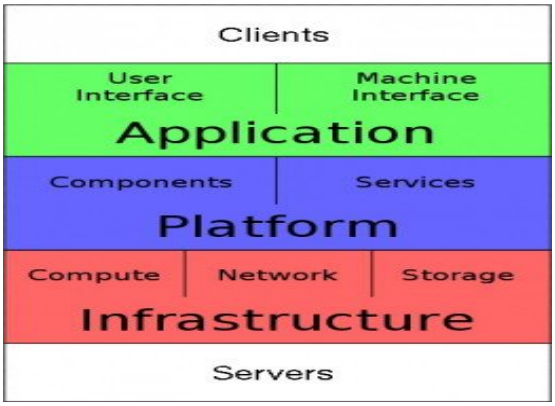
In the PaaS model, cloud providers deliver a computing platform typically including operating system, programming language execution environment, database, and web server. Application developers can develop and run their software solutions on a cloud platform without the cost and complexity of buying and managing the underlying hardware and software layers. With some PaaS offers, the underlying computer and storage resources scale automatically to match application demand such that cloud user does not have to allocate resources manually.
Examples of PaaS include: Amazon Elastic Beanstalk, Cloud Foundry, Heroku, Force.com, EngineYard, Mendix, Google App Engine, Windows Azure Compute and OrangeScape.

Software as a service (SaaS)

In the 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. This can be achieved by cloning tasks onto multiple virtual machines at run-time to meet the changing work demand. To accommodate a large number of cloud users, cloud applications can be multitenant, that is, any machine serves more than one cloud user organization.
Examples of SaaS include: Google Apps, Microsoft Office 365, and Onlive.

Network as a service (NaaS)

A category of cloud services where the capability provided to the cloud service user is to use network/transport connectivity services and/or inter-cloud network connectivity services. NaaS involves the optimization of resource allocations by considering network and computing resources as a unified whole. Traditional NaaS services include flexible and extended VPN, and bandwidth on demand. NaaS concept materialization also includes the provision of a virtual network service by the owners of the network infrastructure to a third party (VNP – VNO)



Cloud Storage

Cloud storage is a model of networked online storage where data is stored on multiple virtual server, generally hosted by third parties, rather than being hosted on dedicated servers.

VI. CLOUD VOCABULARY

Cloudburst

The term cloudburst is being use in two meanings, negative and positive:

- **Cloudburst (negative)**: The failure of a cloud computing environment due to the inability to handle spike in demand.

- **Cloudburst (positive)**: The dynamic deployment of a software application that runs on internal organizational compute resources to a public cloud to address a spike in demand.

Cloudstorming

The act of connecting multiple cloud computing environments

Cloud Provider

An organization that makes a cloud computing environment available to others, such as an external or public cloud.

VII. BENEFITS

- Reduced Cost
- Increased Storage
- Highly Automated
- Flexibility
- More Mobility
- Allows IT to Shift Focus
- Scalability
- Instant

VIII. REMARKS

The main advantage of using cloud computing facility is that customers do not have to pay for infrastructure installation and maintenance cost. As a user of cloud computing you have to pay the service charges according to your usage of computing power and other networking resources.

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