



Published on: 29-03-2014

Mahesh S. Darak

School of Computational Sciences,
S.R.T.M. University, Nanded.
Email: daraksir@gmail.com



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**MPGI International
Conference 2014**
(MPGIIC-2014)

International Conference
"Interdisciplinary approaches
in Commerce and Management"

On
28th & 29th March-2014



Conflict of Interest: None Declared !

Cloud Computing & its Applications in various sectors

Mahesh S. Darak, Dr. V. P. Pawar, Supriya Lohiya, Sapna Darak

School of Computational Sciences, S.R.T.M. University, Nanded.

ABSTRACT

Role of Cloud Computing is very remarkable & it is one of the emerging technology in the world of computers. The cloud computing is a better way to run your business instead of having your own resource you can use resources as services. Cloud run on a shared data centers virtually, hence the name Cloud Computing. The cloud computing are used in entertainment, medical, military operations, security issues, business and finance etc. The paper explains the concept, Services provided by cloud computing & describe the applications in various fields. This paper focuses on the role of cloud computing on various such sectors and its influence over them.

Keywords: Cloud Computing, IaaS, PaaS, SaaS, Daas

Cite this article as:

Mahesh S. Darak, Dr. V. P. Pawar, Supriya Lohiya, Sapna Darak.
Cloud Computing & its Applications in various sectors.
Asian Journal of Management Sciences.
02 (03 Special Issue);
2014; 07-11.

1. Introduction

Cloud computing is the next natural step in the evolution of on-demand information technology services and products. The Cloud is a metaphor for the Internet, based on how it is depicted in computer network diagrams, and is an abstraction for the complex infrastructure it conceals. It is 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 of, expertise with, or control over the technology infrastructure that supports them. The technical foundations of Cloud Computing include Service-Oriented Architecture (SOA) and Virtualizations of hardware and software. The goal of Cloud Computing is to share resources among the cloud service consumers, cloud partners, and cloud vendors in the cloud value chain.

Cloud computing is a kind of computing system in which various hardware, software and applications share their facilities over the internet. In general cloud computing is a technology based on virtual technology. It is a technology in which virtual techniques are used to perform many tasks through the use of Internet only [11]. Cloud computing is the technology which can be used only through internet. It provides a strong mechanism for retrieving the information by the advance computing and the virtual technology with the use of information technology. Cloud computing acts as central remote server to update the information and maintain data records. It gives the rights for storage and process of centralized data. So far, for the effective use of cloud computing, we require internet connection by the cost effective service of computing.

Types of clouds:-

There are different types of clouds that you can subscribe to depending on your needs. As a home user or small business owner, you will most likely use public cloud services.

1. Public Cloud - A public cloud can be accessed by any subscriber with an internet connection and access to the cloud space.

2. Private Cloud - A private cloud is established for a specific group or organization and limits access to just that group.

3. Community Cloud - A community cloud is shared among two or more organizations that have similar cloud requirements.

4. Hybrid Cloud - A hybrid cloud is essentially a combination of at least two clouds, where the clouds included are a mixture of public, private, or community.

Components of Cloud Computing

The fig. 1 shows different components of cloud. Each component plays unique role at different level.

COMPONENTS OF CLOUD COMPUTING

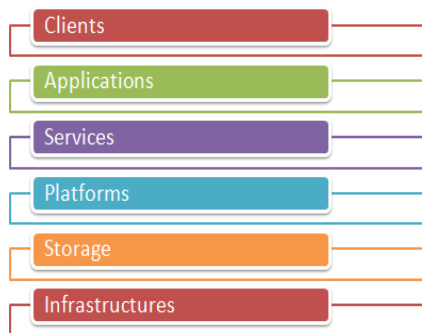


Fig. 1 Components of Cloud Computing

2.1 Clients

A cloud client consists of computer hardware and/or computer software which relies on cloud computing for application delivery

2.2 Services

A cloud service includes "products, services and solutions that are delivered and consumed in real-time over the Internet. For example, Web Services which may be accessed by other cloud computing components.

2.3 Applications

A cloud application that is delivered over the platform of the web to an end user, typically leveraging the application through a browser, often eliminating the need to install and run the application on the customer's own computer, thus alleviating the burden of software maintenance.

2.4 Platform

A cloud platform, such as Platform as a service, the delivery of a computing platform, and/or solution stack as a service, facilitates deployment of applications without the cost and complexity of buying and managing the underlying hardware and software.

2.5 Storage

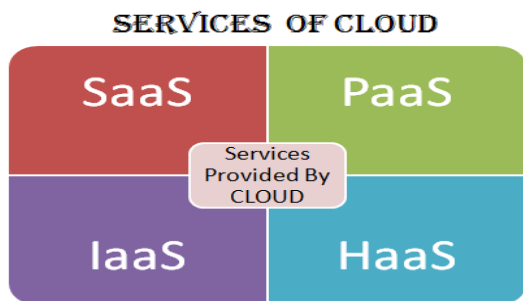
Cloud storage involves the delivery of data storage as a service, including database-like services, often billed on a utility computing basis.

2.6 Infrastructure

Cloud infrastructure, such as Infrastructure as a service, is the delivery of computer infrastructure, typically a platform virtualization environment, as a service.

• SERVICES PROVIDED BY CLOUD

The fig.2 shows services provided by the cloud. Cloud Services made available to users on demand via the Internet from a cloud computing provider's. A cloud service can dynamically scale to meet the needs of its users and because the service provider supplies the hardware and software necessary for the service, there's no need for a company to provision or deploy its own resources or allocate IT staff to manage the service. Examples of cloud services include online data storage and backup solutions, Web-based e-mail services, hosted office suites and document collaboration services, database processing, managed technical support services and more.



3.1 Software as a Service (SaaS)

SaaS is becoming an increasingly prevalent delivery model as underlying technologies that support Web services and service-oriented architecture (SOA) mature and new developmental approaches, such as Ajax. The software applications like CRM, Office Suite, Email, etc., are offered as a service through the Internet. The applications are hosted on a highly scalable infrastructure and it is offered over the internet. Users can access it using an ordinary web browser, without any need to install software in their local computer. Companies like Google, , Salesforce, Microsoft, offer their applications as a service to the end users

3.2 Platform as a Service (PaaS)

Platform as a Service (PaaS) is an abstracted and integrated cloud-based computing environment that supports the development, running, and management applications. Developers can code the applications and upload it into the platform (offered as a service) and run the application on the cloud infrastructure. It helps developers to scale their apps without worrying about building the infrastructure. The platform scales automatically based on the resource needs of the app, without any efforts from the developer. Services like Google App Engine, Bungee Connect and Force.com are examples for PaaS.

3.3 Infrastructure as a Service (IaaS)

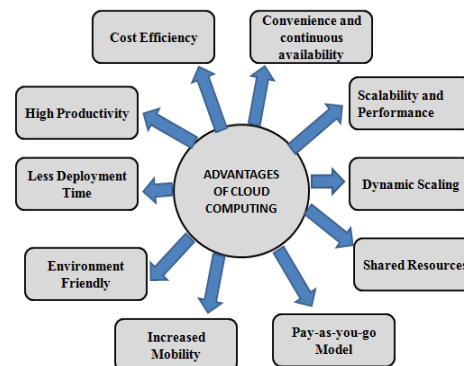
Infrastructure as a Service (IaaS) is a way of delivering cloud Computing infrastructure- servers, storage,

network and operating systems – as an on-demand service. Rather than purchasing servers, software, datacenter space or network equipment, clients instead buy those resources as a fully.

3.4 Hardware as Service (HaaS)

In Hardware as a Service (HaaS) user of the service leases the hardware for his own purposes. This option allows you to save on maintenance of the equipment, but in essence little different from “Infrastructure as a Service” except that you have the bare hardware on which you can deploy your own infrastructure using the most appropriate software.

• ADVANTAGES OF CLOUD COMPUTING



Cloud Computing is having numerous advantages for end users and the business of all sizes. The huge advantage is that there is no need to have special attention towards maintenance of infrastructure & also to have experts for maintenance of the available infrastructure. The business or the people using cloud can focus mainly on their core business rather than services & infrastructure & their maintenance.

Some pros of Cloud Computing are :-

Reduced Cost: Cloud technology is paid incrementally (you pay only for what you need), saving organizations money in the short run. Money saved can be used for other important resources.

Increased Storage: Organizations can store more data than on private computer systems.

Highly Automated: IT personnel not needed to keep software up to date as maintenance is the job of the service provider on the cloud.

More Mobility: Employees can access information wherever they are, rather than having to remain at their desks.

Allows IT to Shift Focus: No longer having to worry about constant server updates and other computing issues, government organizations will be free to concentrate on innovation.

4.1 Dynamic Scaling:

Resources can be scaled up and down as per the changing needs of the business. You can add or remove

storage space, memory and bandwidth using a self-service console without the involvement of the IT team.

4.2 Shared Resources:

Both hardware and software resources are pooled at one location and can be accessed by all the users via cloud allowing the users to leverage the scale of economy.

4.3 Pay-as-you-go Model:

Payments are calculated based on the actual time duration and amount of usage of the resources

4.4 Increased Mobility:

Makes the business globally available, without any geographical constraints, as the solution is available over the cloud.

4.5 Less or No CAPEX:

No huge initial investment, very less IT operational costs. It is best suited for most SMBs.

4.6 Cost Efficiency:

The cloud is in general available at much cheaper rates than traditional approaches and can significantly lower the overall IT expenses. At the same time, convenient and scalable charging models have emerged (such as one-time-payment and pay-as-you-go), making the cloud even more attractive.

4.7 Convenience and continuous availability:

Clouds offer services that are available wherever the end user might be located. This approach enables easy access to information and accommodates the needs of users in different time zones and geographic locations.

5. Applications of Cloud Computing

5.1 Cloud Computing in Business

The business delivery model provides a user experience by which hardware, software and network resources are optimally leveraged to provide innovative services over the Web, and servers are provisioned in accordance with the logical needs of the service using advanced, automated tools. For organizations currently using traditional infrastructures, a cloud will enable users to consume IT resources in the data center in ways that were never available before. Companies that employ traditional data center management practices know that making IT resources available to an end user can be time intensive. It involves many steps, such as procuring hardware; finding raised floor space and sufficient power and cooling; allocating administrators to install operating systems, middleware and software; provisioning the network; and Securing the environment. A cloud dramatically alleviates this problem by implementing automation, business work flows and resource abstraction that allows a user to browse a catalog of IT services, add them to a shopping cart and submit the order. After an administrator approves the order, the cloud does the rest. This process reduces the time

required to make those resources available to the customer from months to minutes.

5.2 Cloud Computing in Education

Today's IT professionals in educational institutions need to respond quickly to increasing demands from students and faculty, while coping with fixed or declining budgets and staff. In this challenging environment, cloud-based computing has become an increasingly attractive option for delivering education services more securely, reliably, and economically. It is one of the fastest-growing industries in the world. The need and demand of education never goes down. Cloud computing in education opens avenues for better research, discussion, and collaboration. It also provides a software desktop environment, which minimizes hardware problems. Cloud computing also enables classes to be run on remote locations.

5.3 Online Entertainment

Most people come on the internet for entertainment; Therefore, cloud computing is the perfect place for reaching to a varied consumer base. Cloud-based entertainment can reach any device be it TV, mobile, set top box, or any other form. Better clarity and sound quality gets cloud entertainer more customers.

❖ The consumers of Televisions now have options of going on the Internet and search for ODE (On Demand Entertainment) including (but not restricted to) games, news, video and audio. Internet giants like Amazon, Hulu, Netflix and Youtube have started cutting into Television industry's profits and have become a major force to reckon with in home entertainment segment.

❖ Cloud Computing or internet based computing, which provides on demand storage and compute power to be billed in a pay-per-use basis, comes as a perfect strategic fit to solve the puzzle of ODE. Cloud Computing can provide a solution to the issue of huge requirements in compute and storage to provide true ODE.

5.4 Telecommunication

Telecommunication companies can use cloud computing to provide both private and public cloud networks to customers and organizations for domestic and commercial purposes. Cloud communications are Internet-based voice and data communications where telecommunications applications, switching and storage are hosted by a third-party outside of the organization using them, and they are accessed over the public Internet. Cloud-based communications services enable businesses to embed communications capabilities into business applications, such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems. For —on the move business people, these can be accessed through a smart phone, supporting increased productivity while away from the office. These

services are over and above the support of service deployments of VoIP systems, collaboration systems, and conferencing systems for both voice and video. They can be accessed from any location and linked into current services to extend their capabilities, as well as stand alone as service offerings.

5.5 Finance and Banking

As the international market grew so did the need for a more condensed and easier financial reach. Cloud computing eliminates the need for having a separate banking portal and client database for every location. This means faster and better business. Despite the slow adoption of cloud computing by the banking and financial services industry with security and reliability being the major concerns, financial institutions are quickly resorting to cloud-based services to achieve increased agility and lowered total cost of ownership (TCO). Over the years financial institutions typically have been consumers of cloud-based solutions across generic and non-core services like virtualization, datacenter consolidation, storage and disaster recovery. Many financial institutions are either planning or have implemented in-house private clouds for sensitive consumer data and are utilizing the public cloud for generic services. As cloud computing capabilities mature and become more reliable, multi-tenancy and hybrid cloud models will drive increased adoption of cloud-based solutions that are focused on core services and achieve cost efficiencies and scalability.

6. Major Service Providers of Cloud Computing

6.1 Google 101-Network

Made up of millions of cheap servers, that would store staggering amounts of data, including numerous copies of worldwide web. It makes search faster, helping ferret out answers to millions of queries in a fraction of a second

6.2 Microsoft's Azure

It is a Internet-scale cloud computing and services platform hosted in MS data centers. It provides a range of functionality to build applications that span from consumer web to enterprise scenarios.

6.3 Amazon's Elastic Compute Cloud-Amazon EC2 This is a web service interface that provides resizable computing capacity in a cloud. It is designed to make web-scale computing easy for developers. It allows developers to pay only for capacity that they actually use.

6.4 IBM's CloudBurst

It is developed for the everyday user. IBM also offers private cloud computing services using IBM blue services software.

Conclusion :

Cloud computing is an emerging computing paradigm that is increasingly popular. Leaders in the industry such as Microsoft, Google, and IBM, have provide their initiatives in promoting cloud. This paper illustrates the basic concept of cloud & their services as well as field where cloud computing is used. Cloud computing is changing the way IT departments buy IT. Businesses have a range of paths to the cloud, including infrastructure, platforms and applications that are available from cloud providers as online services.

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