

# Impact of Cloud Computing on IT Industry: A Review & Analysis

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**Abstract— Cloud Computing, the long-held dream of computing as a utility, has the potential to transform a large part of the IT industry, making software even more attractive as a service. Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the data centres that provide those services. The services are referred to as Software as a Service (SaaS). Cloud Computing also provides two more types of services i.e. Infrastructure as a Service (IaaS), Platform as a Service (PaaS). With the significant advances in Information and communications Technology (ICT) over the last half century, there is an increasingly perceived vision that computing will one day be the 5th utility (after water, electricity, gas, and telephony). The paper reviews and explores the actual meaning of Cloud Computing, also demonstrates a dissection of the cloud computing into three main layers, and illustrates their interrelations as well as their inter-dependency on preceding technologies. The paper also highlights and discusses the drastic change which Cloud computing has brought and describes its impact on IT Industry.**

**Keywords— Cloud Computing; ICT; SaaS; PaaS; IaaS**

## I. INTRODUCTION

Cloud “Cloud” computing – a relatively recent term, builds on decades of research in virtualization, distributed computing, utility computing, and more recently networking, web and software services. Cloud Computing is a more recent and latest version of Grid Computing. It implies a service oriented architecture, reduced information technology overhead for the end-user, great flexibility, reduced total cost of ownership, on demand services and many other things [1]. Cloud Computing, the long-held dream of computing as a utility, has the potential to transform a large part of the IT industry, making software even more attractive as a service and shaping the

way for designing IT hardware. Cloud Computing can be considered now as a Pay and Use service. More you Pay, more services you get. It has become the 5 essential utility (after water, electricity, gas, and telephony) with its growing features and demands the day is not far when the world would become the slave of Cloud Computing.

The speed with which the clouds are forming and Multiplying strongly suggests that cloud computing will not only meet many of the needs of enterprise computing as we have come to know it, but also could form the digital platform for a shaping strategy guiding next generation enterprises in their migration to and participation in such ecosystems.

It may be interpreted to mean data center hosting and then subsequently dismissed without catching the improvements to hosting called utility computing that permit near real time, policy-based control of computing resources. Or it may be interpreted to mean only data center hosting rather than understood to be the significant shift in Internet application architecture that it is.

### *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 is a concept where applications and files are hosted on a “cloud” consisting of thousands of

computers and servers, all linked together and accessible via the Internet.

- A. With cloud computing, everything you do is now web based instead of being desktop based. You can access all your programs and documents from any computer that's connected to the Internet.
- B. With traditional desktop computing, you run copies of software programs on each computer you own. The documents you create are stored on the computer on which they were created (PC centric).
- C. With cloud computing, the software programs you use aren't run from your personal computer, but are rather stored on servers accessed via the Internet.

Cloud Computing - cloud services and storage are accessible from anywhere in the world over an Internet connection as shown in figure 1.

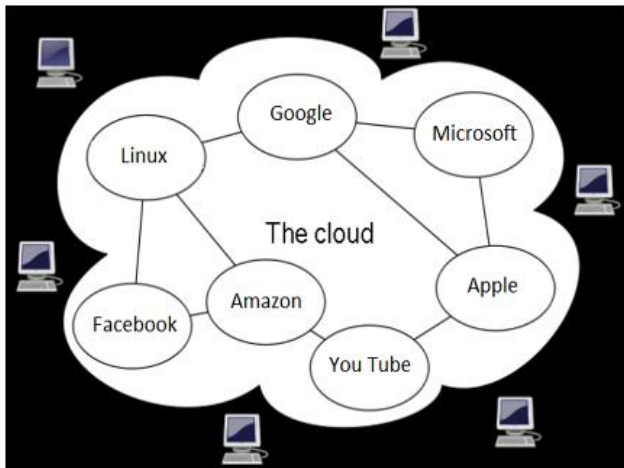


Figure: 1

Clouds do not have a clear and complete definition in the literature yet, which is an important task that will help to determine the areas of research and explore new application domains for the usage of the Clouds.

To understand Cloud computing clearly, the main available definitions are extracted from the literature (shown in Table 1) have been analyzed and taken together to actually understand what the actual meaning of Cloud Computing is.

Various Definitions of Cloud Computing:

Author	Year	Definition
M Klems	2008	You can scale your infrastructure on demand within minutes or even seconds, instead of days or weeks, thereby avoiding under-utilization (idle servers) and over-utilization (blue screen) of in-house resource [2].
R.Buyya	2008	A Cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computes that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements established through negotiation between the service provider and consumers[3].
R. Bragg	2008	The key concept behind the Cloud is Web application, a more developed and reliable Cloud. Many find it's now cheaper to migrate to the Web Cloud than invest in their own server farm, it is a desktop for- people without a computer [4].
P. McFedries	2008	Cloud Computing, in which not just our data but even our software resides within the Cloud, and we access everything not only through our PCs but also Cloud-friendly devices, such as smart phones PDAs, the mega computer enabled by visualization and software as a service. This is utility computing powered by massive utility data centres [6] [7].
G. Gruman and E. Knorr	2008	Cloud is all about: SaaS i.e. utility computing, Web Services and PaaS i.e. Internet integration, commerce platforms [5].

Vaquero, Rodero- Merino Caceres, Lindner	2008	Clouds are a large pool of easily usable and accessible visualized resource (such as hardware, development platforms and or services). These resources can be dynamically reconfigured to adjust to a variable load (scale), allowing also for an optimum resource utilization. This pool of resources is typically exploited by a pay-per-use model in which guarantees are offered by the Infrastructure Provider by means of customized SLAs[8].
Gartner, Gruman, Galen	2009	Cloud computing describes a new supplement, consumption, and delivery model for IT services based on Internet protocols, and it typically involves provisioning of dynamically scalable and often virtualized resources[9][10].
Lan Whadcock	2009	It is a byproduct and consequence of the ease-of-access to remote computing sites provided by the internet. This frequently takes the form of web-based tools or applications that users can access and use through a web browser as if it was a program installed locally on their own computer [11].

Table 1

*Features of Cloud Computing:*

- a. Cloud provides the resources which are on demand as there is isolation so no need to actual sharing.
- b. It is heterogeneous in nature.
- c. It adds the virtualization to the data and hardware resources too.
- d. It deals with end user security.

- e. Up-to-date Clouds are operated by single companies, but we envision federated Clouds facing similar problems as grids [13], [14].
- f. Clouds are easily usable hiding the deployment details from the user [15], [16].
- g. Cloud users are usually billed using a pay per-use model. More advanced payment models and SLA enforcement in a federated Cloud are just starting to be explored that will tear down one of the barriers to moving traditional applications to the Cloud: the loss of cost control [17].
- h. Clouds are also provides limited set of features exposed (i.e. they present a higher abstraction level to the user). For instance, the Simple Storage Service by Amazon can be regarded as a limited data Grid when compared to the CERN data Grid [18].

II. UNDERSTANDING CLOUD ARCHITECTURE

Cloud computing infrastructures as shown in figure 2 can allow enterprises to achieve more efficient use of their IT hardware and software investments. They do this by breaking down the physical barriers inherent in isolated systems, and automating the management of the group of systems as a single entity. 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.

- A. Users select a task or service (either starting an application or opening a document).
- B. These services
  - a. Carve out the necessary resources in the Cloud
  - b. Launch the appropriate web application
  - c. Opens the requested document.
- C. Web application is launched
- D. System’s monitoring functions track the usage of the cloud so that resources are apportioned and attributed to the proper users.
- E. With cloud storage, data is stored on multiple third-party servers, rather than on the dedicated servers.
- F. When storing data, the user sees a virtual server that is, it appears as if the data is stored in a particular place with a specific name.

G. In reality, the user's data could be stored on any one or more of the computers used to create the cloud.

Data stored in the cloud is secure from accidental erasure or hardware crashes, because it is duplicated across multiple physical machines

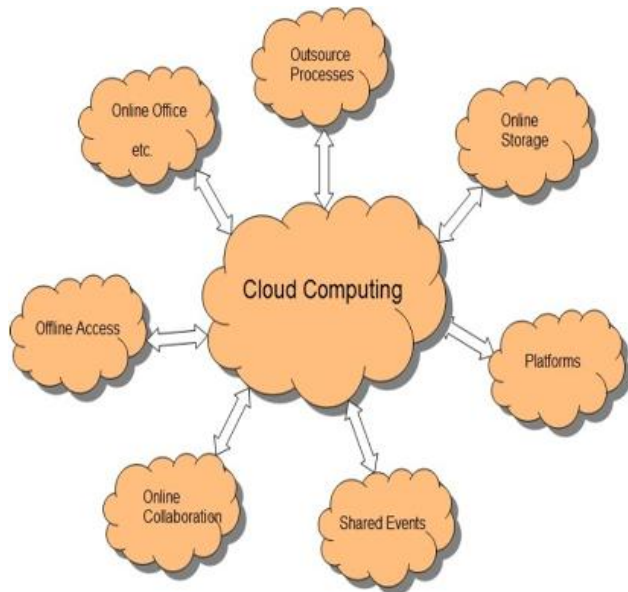


Figure: 2

### III. CLOUD COMPUTING PLAYERS

As a key player in the IT field, India is poised to be a Billion Dollar market in the next 5 years according to a study by an IT infrastructure firm. The study claims that this growth will be driven by the rapid increase in data such as text and media moving online. Some numbers shared in the study are quite interesting, it is expected that information stored online will reach a staggering 2.3 million petabytes (from 40,000 petabytes.) India's top IT firms, Infosys, TCS, Wipro and Tech Mahindra have cloud projects to their names. The competition is fierce as the market is nascent and big international names like Microsoft, IBM have dedicated resources as well. Support from the government to get basic infrastructure (cheaper and faster Internet) in place will go a long way in ensuring India's IT prominence [18].

### IV. IMPACT OF CLOUD COMPUTING

The Cloud has become the way that people live now. It has become the part and way of life. If an example of Facebook is taken about 500 million people today keep their photo albums in the Cloud. Over 87,000 companies in the world use the Cloud. Some of them are tiny little start-ups, others are some of the largest organizations in the world. Dell, for instance has deployed our collaboration

tool across 100,000 employees in recent days. Accordingly, it could be said that Cloud computing means, the technology being used at the other end is invisible and irrelevant as far as the customer's concerned. The Cloud is not about technology, it is the abstraction of technology for delivering pure services. The Cloud has finally led to the civilization of services because, in the case of Cloud computing, what you pay for is what you get [19].

An effects of cloud computing is going to be completely related to the adoption of the new technology of course, there are a number of issues that may slow down this adoption, such as a lack of understanding of the cloud by firms, risk, security, privacy, interoperability issues, reliability, data control and loss of IT control. For this reason, our research suggests that policy makers should promote as much as possible a quick adoption of cloud computing. Concrete interventions include: [20]

- Global agreements in favor of unlimited flow of data across borders.
- Agreements between European countries and industry leaders on a minimum set of technological standards and process standards to be respected in the delivery of cloud computing services to guarantee data privacy, security, and move ability, and promote a healthy communication of the new technology;
- Introduction of economic reasons for the adoption of cloud computing and a specific promotions.
- Introduction of public support to the rearrangement of employment within the IT Industries.

These plans may be considered in a way to improve the process of adoption of the new technology and to support the propagation of its benefits. [20]

### V. 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.

Cloud computing infrastructures are next generation platforms that can provide tremendous value to companies of any size. They can help companies achieve more efficient use of their IT hardware and software investments and provide a means to accelerate the adoption of innovations. Cloud Computing increases profitability by improving the resource utilization. Costs are driven down by delivering appropriate resources only for the time those resources are needed.

The paper concludes that Cloud Computing would become 5th Utility in the coming years. The impact of Cloud Computing on IT Sector could be considered a success.

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