

# Cloud Computing: A silver Lining in the Dark

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## ABSTRACT

"My information? It's safe right up there in the clouds" – Indeed this is what today's generation proudly says when it comes to the storage of their never-ending data. The term "cloud computing" is everywhere right from defense to healthcare. In the simplest terms, it means storing and accessing data or information online. This technology enables to create, configure and customize several applications in the form of services over the internet. IT companies, being constantly under the pressure to deliver the expected products before deadline have been hugely dependent on the cloud lately. Focussing on achieving the goal of being the most sought-for field in the entire IT industry, cloud computing is emerging as a model of "Everything as a Service (XaaS)". This paper presents a study on all the basic information one needs to know about cloud computing, i.e., its pros, cons, deployment models, service models and applications.

## Keywords

Cloud Computing, Saas, Paas, Iaas, public, private, community, hybrid, cloud.

## 1. INTRODUCTION

Cloud computing, in the simplest terms, can be referred to as the approach of computing that shares information, software platforms and other resources amongst various computers and other computing-oriented devices upon demand by the client of that cloud service. So, it can be said that it is an effort to provide all the computing tasks as a Service over the internet. This concept represents a shift from the age-old traditional practice of provision of computing as a product that is purchased to computing as a service that is delivered to the consumers over the internet from large-scale data centers – or the "cloud" [1].

This allows the end user to use the cloud computing resource without any major limitations, i.e., it can be used at any time, from any arbitrary platform such as a cell-phone, mobile computing platform or even the commonly used desktop. A few of the current major cloud service providers in the market are Hewlett Packard, Amazon, IBM, Microsoft and Google. One of the major characteristics of this concept is "On Demand Self-Service", which enables the safe handling of massive amount of data.

The layout of this paper is explained as follows-Section-2 describes the various service models of cloud computing. Section-3 contains the deployment model of cloud computing. Section-4 throws light on the pros and cons of cloud computing, section-5 focuses on the applications of cloud

computing and last but not the least, section 6 is the conclusion part.[2]

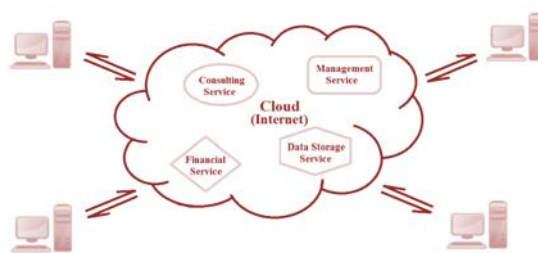


Fig 1: Representation of Cloud Computing

## 2. SERVICE MODELS OF CLOUD COMPUTING

There are certain models working behind the scene making the cloud computing feasible and accessible to the end users. Service Models are the reference models on which the Cloud Computing is based. They can be classified into 3 different classes according to their abstraction level and the resources as shown in figure 2. [3]

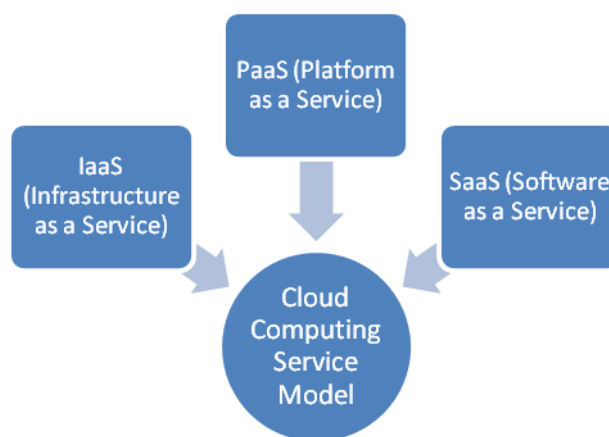


Fig2: Cloud computing Service Model

### 2.1 Saas

Software as a service - In a cloud-computing environment, SaaS comprises of software that is owned, delivered and managed remotely by one or more providers and that is

offered in a pay-per-use manner. Utility Computing. SaaS in simple terms can be defined as “Software deployed as a hosted service and accessed over the Internet.” The typical user of a SaaS offering usually has neither knowledge nor control about the underlying infrastructure. Applications can be accessed through a network from various clients (mobile phone, web browser, etc) by the application user in the form of utilities. Also, it doesn’t require any sort of client installation, just a browser or other client device and network connectivity.

## 2.2 Paas

Platform as a service-This kind of cloud computing provides development environment as a service. The customer can use the provider’s equipment to develop his own program and deliver it to the users through Internet and servers. The consumer controls the applications that run in the environment, but does not control the operating system, hardware or network infrastructure on which they are running. The platform is typically an application framework. The difference between Paas and Saas is that SaaS only hosts completed cloud applications where PaaS offers a development platform for both completed and in-progress cloud applications. PaaS offers an environment where developers can develop can create and deploy applications and need not know how much memory and how many processors their application will be using.

## 2.3 IaaS

Infrastructure as a service - Infrastructure as a service delivers a platform virtualization outsourced service. The consumer can control the environment as a service .Rather than purchasing servers, software, data center space or network equipment, consumers can simply buy those resources as a fully operating system, storage, deployed applications and possibly networking components such as firewalls and load balancers, but not the cloud infrastructure beneath them. IaaS model focuses on enabling technologies. It offers a service to get a virtual server in few minutes and pay only for the resources that they use.IaaS is also referred to as HaaS (Hardware as a Service) sometimes.[3]

## 3. DEPLOYMENT MODELS OF CLOUD COMPUTING

A cloud can be deployed using any of the below mentioned strategies [5]

### 3.1 Public Cloud

In simple terms, public cloud services are characterized as being available to clients from a third party service provider via the Internet like Google, Amazon. The term “public” does not always mean free, even though it can be free or fairly inexpensive to use. A public cloud does not mean that a user’s data is publicly visible; public cloud vendors typically provide an access control mechanism for their users. They provide an elastic, cost effective means to deploy solutions [4][5].

### 3.2 Private Cloud

The private cloud represents a model where a single organization’s stand up cloud capacity and only the member of organizations are allowed to consume the capacity. This model can be used by both government and large enterprises. The difference between a private cloud and a public cloud is that in a private cloud-based service, data and processes are managed within the organization without any restrictions of

network bandwidth, security exposures and legal requirements that using public cloud services might entail.

## 3.3 Community cloud

A community cloud is controlled and used by a group of Organizations that have shared interests, such as specific security requirements or a common mission. The members of the community share access to the data and applications in the cloud.

## 3.4 Hybrid Cloud

A hybrid cloud is a combination of a public and private cloud that interoperates. In this model users typically outsource non business-critical information and processing to the public cloud, while keeping business-critical services and data in their control. [6]

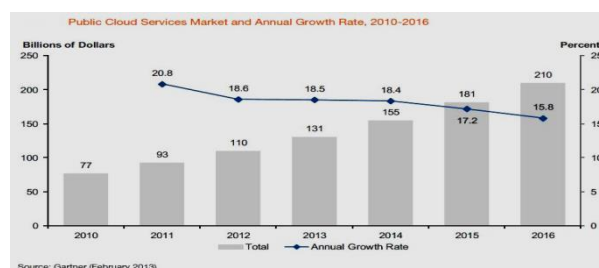
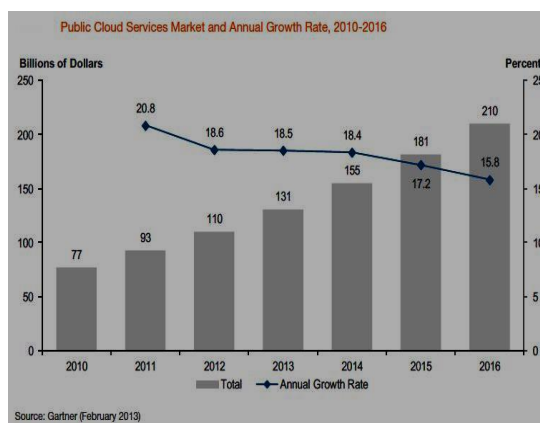


Fig3

## 4. ADVANTAGES AND DISADVANTAGES OF CLOUD COMPUTING

### 4.1 Advantages of Cloud Computing

- Back up recovery is very easy in Infrastructure as a service (IaaS) provide, hence there is efficient incident response whenever data need to be recovered.
- The cloud computing environment is scalable.
- Less Setup Costs can be considered as a major advantage for cloud computing.
- Failure in Hardware management can also be localized and rectified with relative ease.
- In addition to the IT industry, this environment can also be adopted by small scale industries as show in graph 1.



Graph: Public cloud Service Market and Annual Rate, 2010-2016

## 4.2 Limitations of cloud computing

- The information saved in the cloud is not particularly segregated; instead it is distributed all over the network of that cloud. This causes problems when a certain set of data is to be segregated.
- The efficiency of a cloud is determined by the kind of service that it provides. Sourcing a reliable service provider providing the desired quality
- The Quality of service is a key determining factor in the efficiency of a cloud network. A reliable service provider providing desired quality of service may be difficult to source and the process set-up could turn out to be time consuming.
- Another major drawback is the dependence on network connectivity. Network failure can result in loss to the company by causing extensive time delays.
- A major disadvantage in cloud computing is that it is under the maintenance and supervision of a third-party. Hence the confidentiality and security measures are less secured. [7]

## 5. APPLICATIONS OF CLOUD COMPUTING

### 5.1 File Storage and Sharing

Cloud file-sharing services have become near-ubiquitous among enterprise users. The availability of cheap, easy-to-use and accessible cloud file-sharing services means users have more freedom and choice than ever before. Dropbox pioneered simplicity and ease of use, and so quickly picked up users inside the enterprise. Similar services have followed Dropbox's lead and now there are dozens, including well-known ones such as Google Drive and SkyDrive.[8]

### 5.2 Cloud Database

A cloud database is a database that typically runs on a cloud computing platform. There are two common deployment models for this purpose - users can run databases on the cloud independently, using a virtual machine image, or they can purchase access to a database service, maintained by a cloud database provider. Of the databases available on the cloud, some are SQL -based and some use a non-SQL data model.

### 5.3 Clouderm

Cloud CRM stands for "Cloud Customer Relationship Management" which essentially refers to any cloud-based technology that streamlines and harnesses a company's customer data for improved customer service and overall revenue. Customer relationship management is a term that refers to the system through which businesses market, sell, and deliver services to clients. Various CRM solutions are available from different providers that can be tailored to the needs of the business, whether it is a small to mid-sized business or an enterprise organization. Enabling companies of any size to capture customer information and analyze the data to achieve better product deliverance and ultimate customer service, CRM solutions used to only be stored in central databases consisting of hardware and network infrastructure. Now, with the advancement of cloud technologies, many companies are drifting away from the hard locations of data and moving to Internet-based solutions. Putting CRM in the cloud means businesses do not have to purchase expensive

hardware or software, and the solutions are much less time-consuming to maintain.

### 5.4 Private and Hybrid Clouds

Private clouds give IT departments many of the benefits of the public cloud with the added benefit of having an isolated network and computing resources that bring additional security. Hybrid clouds, enabled by technologies such as RackConnect™, allow IT-departments to connect public cloud, private cloud, dedicated hosted and on-premise infrastructure to gain the optimum combination of control and agility.

### 5.5 Test & Development

A software company that is deploying a new line of business software, or building a software application to sell in the market, usually requires two or more 'QA environments' – each one being a setup of servers, storage and networking. Instead of buying and maintaining these QA environments, software development teams can create them in the cloud. Development teams will benefit from the agility of creating instances in minutes, the efficiency of paying only for the infrastructure needed at any given point in time and from the efficiency of not having to manage and maintain the infrastructure. Additional instances can be set for testing and training purposes with the same efficiency.

### 5.6 Email

Email is another mission critical application that is fairly mature and standardized, prime to move to the cloud. For years, CIOs have expressed a desire to outsource email. It makes no sense to host an Exchange server under a desk at a company of any size. Independent professionals to large multinational companies should move their email to the cloud as soon as possible. [9]

### 5.7 Defense

Technology has always played the key role in defining the outcome of war. In the case of information and communication technology (ICT), the research and development has unleashed vast potential for civilian and military applications, which vary from simple logic execution to high-end supercomputing. As cloud computing has made inroads in the operations of private sector, it is slated to perform a central role in the functioning of governments and defense and security agencies. The emerging cloud computing can find applications in defense sector as it offers numerous advantages over traditional information technology (IT) systems such as scalability, agility and interoperability.

### 5.8 Healthcare

A feasible cloud strategy for a health care facility could be to use a public cloud infrastructure to allow public access to generic health information or retrieve medical resources. Hospitals and health clinics could use a public cloud for remote storage of their own medical data, not the patients'. Basically, a public cloud could offer the healthcare industry service agility and cost savings. A private cloud, instead, could be used to connect healthcare providers to transfer electronic documents and share health information on patients like clinical applications such as EHRs and pharmacy orders.

## 5.9 Disaster recovery

Cloud computing capacity and scalability means that disaster recovery, once reserved for the rich and famous, is now accessible to everyone. In the past decade, though, virtualization has lowered the bar to disaster recovery. By running a hypervisor at a remote site, organizations can eliminate the need for exact hardware replicas at the DR site, greatly reducing costs and overhead.

## 5.10 Agriculture

Today's agriculture is embedded with advance services like GPS, sensors etc that enable to communicate to each other, analyze the data and also exchange data among them. IT provides services in the form of cloud to agriculture. Agriculture-Cloud and IT offers expertise service to farmers regarding cultivation of crops, pricing, fertilizers, and disease detail method of cure to be used etc. Scientists working at Agriculture research stations can add their discoveries, suggestions regarding modern techniques for cultivation, usage of fertilizers, can obtain cultivation history of the region, etc.

## 6. CONCLUSION

With Cloud Computing as a new way to consume IT services, we can be much more flexible and productive in utilizing dynamically allocated resources to create and to operate. Cloud will continue to evolve as the foundation for the future Internet where we will be interconnected in a web of content and services.

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