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# An Empirical Study on Cloud Computing

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**ABSTRACT**
Cloud computing is an Internet-based computing, where resources, software and information are shared and provided to computers and devices as per their demands. Cloud computing is the use of computing resources that are delivered as a service over a network (Internet).Cloud computing allows remote services with a user's data, software and computation. The evolution of cloud computing can handle massive data as per demand. Now a days the computational world is opting pay-for-use models , there remains no concrete definition. In this paper. we first focus on comprehensive study for describing cloud computing architecture. Then we use this knowledge to several existing cloud computing services developed by various projects worldwide such as- Google, force.com ,Amazon. We use the survey results not only to identify similarities and differences of the architectural approaches of cloud computing, but also must be aware of the security risks of having data stored on the cloud and  to identify the areas requiring the further researches.
*Keywords:-* Cloud Computing

## I.  INTRODUCTION

To understand the term cloud computing lets first analysis the term cloud and computing individually. Simply cloud means network. and also  CLOUD is something which can provide services over network, it may be the public network or the private network(LAN,WAN)  and  compute  refers  to calculate.  Finally the term Cloud Computing refers to manipulating, configuring, and accessing the applications online. It offers online data storage, infrastructure and application. Cloud computing is aimed at providing IT as a service to the cloud users on-demand basis with greater flexibility, availability, reliability and scalability with utility computing model. and also Cloud computing promises to cut operational and capital costs and, more importantly.

Cloud computing provides renting infrastructure, run time environments and services. This principle allows several practical applications and then gives different forms of cloud computing to different people. Chief information and technology officers of large enterprises see opportunities for scaling their infrastructure on demand and reshape it according to their business needs. End user takes advantages. cloud computing services can access their documents and data anytime, anywhere,   one of the most

disperse views of cloud computing can be described as follows*:*

*I don't care where my servers are, who manages them, where my documents are stored, or where my applications are hosted. I just want them always available and access them from any device connected through Internet. And I am willing to pay for this service for as a long as I need it from any device connected to the Internet.*[1]

Cloud computing provides several effective features that make it  more attractive to entrepreneurs, as described below. Such as:

*No up-front investment:* A service provider does not need to invest in the infrastructure to start gaining benefit from cloud computing. It simply rents resources from the cloud according to its own needs and pay for the usage.

*Lowering operating cost*: Resources in a cloud environment can be quickly allocated and de-allocated on demand. Hence, a service provider no longer needs to provision capacities according to the peak load. This provides huge savings since resources can be released to save on operating costs when service demand is low.

***Highly scalable***: Infrastructure providers pool large number of resources from data centres and make them easily accessible. A service provider can easily expand its service to large scales in order to handle rapid increase in service demands (e.g., flash-crowd effect). This model is sometimes called surge computing.

***Easy access***: Services hosted in the cloud are generally web-based. Therefore, they are easily accessible through a variety of devices with Internet connections. These devices not only include desktop and laptop computers, but also cell phones and PDAs.

***Reducing business risks and maintenance expenses:*** a service provider can cut down the hardware maintenance and the staff training costs By outsourcing the service infrastructure to the clouds. in addition to this a service provider shifts its business risks (such as hardware failures) to infrastructure providers, who often have better expertise and are better equipped for managing these risks.

***The cloud computing reference model:***
*Software as a Service*: Software-as-a-Service is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet SaaS is also often associated with a pay-as-you-go subscription licensing model. Mean-while, broadband service has become increasingly available to support user access from more areas around the world. Examples are Google's Gmail and Apps, instant messaging from AOL, Yahoo and Google, salesforce.com . *Infrastructure as a Service*: IaaS refers to on-demand provisioning of infrastructural resources, usually in terms of VMs. The cloud owner who offers IaaS is called an IaaS provider. Examples of IaaS providers include Amazon EC2 , GoGrid and Flexiscale .
***Platform as a Service***: PaaS refers to providing platform layer resources, including operating system support and software development frameworks. Examples of PaaS providers include Google App Engine, Microsoft Windows Azure And Force.com

***Communication-as-a-Service (CaaS)***: A CaaS model allows a CaaS provider's business customers to selectively deploy communications features and services throughout their company on a pay-as-you go basis for service(s) used. CaaS is designed on a utility-like pricing model that provides users with comprehensive, flexible, and usually simple to understand
service plans.[2]

## II.  CLOUD COMPUTING ARCHITECTURE

The Cloud Computing architecture comprises of many cloud components, each of them are loosely coupled. Each of the ends are connected through a network, usually through Internet. We can Divide the cloud architecture into two parts such as:
- Front End
- Back End

*Front End:*
*Front End* refers to the client part of cloud computing system. It consists of interfaces and applications that are required to access the cloud computing platforms, e.g., Web Browser.

*Back end:*
*Back End* refers to the cloud itself. It consists of all the resources required to provide cloud computing services. It comprises of huge data storage, virtual machines, security mechanism, services, deployment models, servers, etc.
It is the responsibility of the back end to provide built-in security mechanism, traffic control and protocols.  The server employs certain protocols, known as middleware, helps the connected devices to communicate with each other.

**Types of Cloud:**
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.
*Public Cloud*: A public cloud can be accessed by any subscriber with an internet connection and access to the cloud space.
*Private Cloud*: A private cloud is established for a specific group or organization and limits access to just that group.

*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 .

*Community Cloud*: A community cloud is shared among two or more organizations that have similar cloud requirements. [3]

## III. CLOUD COMPUTING-TECHNOLOGY

There are certain technologies are working behind cloud computing to make it computing flexible, reliable and usable. Such as:[4]

- Virtualization
- Service-Oriented Architecture(SOA)
- Grid Computing
- Utility Computing

*Virtualization:*

Virtualization is the ability to run multiple operating systems on a single physical system and share the underlying hardware resources.It is the process by which one computer hosts the appearance of many computers. it is also used to improve IT throughput and costs by using physical resources as a pool from which virtual resources can be allocated.

**S*ervice-Oriented Architecture:*** helps to use applications as a service for other applications regardless the type of vendor, product or technology. Therefore, it is possible to exchange of data between applications of different vendors without additional programming or making changes to services.

***Grid Computing:*** refers to distributed computing in which a group of computers from multiple locations are connected with each other to achieve common objective. These computer resources are heterogeneous and geographically dispersed. Grid Computing breaks complex task into smaller pieces. These smaller pieces are distributed to CPUs that reside within the grid.

*Utility computing***:** is based on Pay per Use model. It offers computational resources on demand as a metered service. Cloud computing, grid computing, and managed IT services are based on the concept of utility computing.

**Security :**

The information housed on the cloud is often seen as valuable to individuals with malicious intent. There is a lot of personal information and potentially secure data that people store on their computers, and this information is now being transferred to the cloud. This makes it critical for you to understand the security measures that your cloud provider has in place, and it is equally important to take personal precautions to secure your data. [5]

The first thing you must look into is the security measures that your cloud provider already has in place. These vary from provider to provider and among the various types of clouds. What encryption methods do the providers have in place? What methods of protection do they have in place for the actual hardware that your data will be stored on? Will they have backups of my data? Do they have firewalls set up? If you have a community cloud, what barriers are in place to keep your information separate from other companies? Many cloud providers have standard terms and conditions that may answer these questions, but the home user will probably have little negotiation room in their cloud contract. A small business user may have slightly more room to discuss the terms of their contract with the provider and will be able to ask these questions during that time. There are many questions that you can ask, but it is important to choose a cloud provider that considers the security of your data as a major concern.

No matter how careful you are with your personal data, by subscribing to the cloud you will be giving up some control to an external source. This distance between you and the physical location of your data creates a barrier. It may also create more space for a third party to access your information. However, to take advantage of the benefits of the cloud, you will have to knowingly give up direct control of your data. On the converse, keep in mind that most cloud providers will have a great deal of knowledge on how to keep your data safe. A provider likely has more resources and expertise than the average user to secure their computers and networks. [6]

## IV. CONCLUSION

To summarize, the cloud provides many options for the everyday computer user as well as large and small businesses. It opens up the world of computing to a broader range of uses and increases the ease of use by giving access through any internet connection. However, with this increased ease also come drawbacks. You have less control over who has access to your information and little to no knowledge of where it is stored. You also must be aware of the security risks of having data stored on the cloud. The cloud is a big target for malicious individuals and may have disadvantages because it can be accessed through an unsecured internet connection.

If you are considering using the cloud, be certain that you identify what information you will be putting out in the cloud, who will have access to that information, and what you will need to make sure it is protected. Additionally, know your options in terms of what type of cloud will be best for your needs, what type of provider will be most useful to you, and what the reputation and responsibilities of the providers you are considering are before you sign up.

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