RESEARCH ARTICLE

AN EMPIRICAL STUDY ON 'CLOUD COMPUTING'

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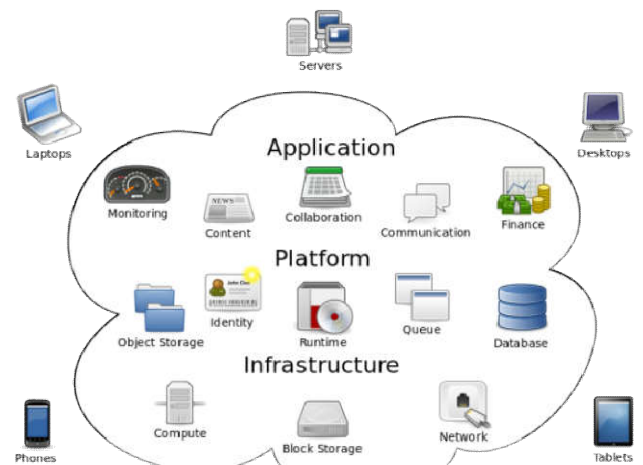| ARTICLE INFO	ABSTRACT

	In the last few years there has been a rapid exponential increase in computer processing power, communication and data storage. But still many complex and computation intensive problems, which cannot be solved by super computers. In the field of computing, a lot of changes have been observed due to the increased use and popularity of the Internet and the availability of high-speed networks. Resource sharing in a pure plug and play model that dramatically simplifies infrastructure planning is the promise of "Cloud computing". Cloud computing [1] is the development of parallel computing, distributed computing, grid computing and virtualization technologies which define the shape of a new era. Cloud computing is an emerging model of business computing. The paper aims to provide a means of understanding the model and exploring options available for complementing your technology and infrastructure needs. Also explore some of the basics of cloud computing with the aim of introducing aspects such as:
	
	    Realities and risks of the model
	    Components in the model
	    Characteristics and Usage of the model.
	
	This work aims to provide the ways to reduce security risk & also promotes the performance of cloud computing.

INTRODUCTION

The term "Cloud Computing" [2] is everywhere. Simply put, cloud computing is computing based on the Internet. In the past, people would run application or programs from software downloaded on a physical computer or server in their building. Cloud computing allows access from the same kinds of applications through the internet on a virtual server. It is the new computing example which provides large pool of dynamical scalable and virtual resources as a service on demand. Cloud computing is a complete new technology. It is the development of parallel computing, distributed computing grid computing, and is the combination and evolution of Virtualization, Utility computing. The main principle of cloud computing representation is to offer computing, storage, and software as a service, (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS),) or as a utility, Data as a Service (Daas). We just by using the need internet. Cloud computing metaphor: Cloud is a metaphor[9] to describe web as a space where computing has been pre installed and exist as a service; data, operating systems, applications, storage and processing power exist on the web ready to be shared.

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Cloud computing

The group of networked elements providing services need not be individually addressed or managed by users; instead, the entire provider-managed suite of hardware and software can be thought of as an amorphous cloud. "Cloud is a parallel and distributed computing system consisting of a collection of inter-connected and virtualized computers based on service-level agreements (SLA) which established through cooperation

between the service provider and consumers." Cloud computing is a computing example, where a large pool of systems are connected in private or public networks which provide dynamically scalable infrastructure for application, data and file storage. Cloud computing is a practical approach for to experience direct cost benefits and it has the potential to transform a data center from a capital-intensive set up. The idea is based on a very fundamental principal of reusability of IT capabilities'. The difference is that to bring compared to traditional concepts of "grid computing", "distributed computing", "utility computing", or "autonomic computing".
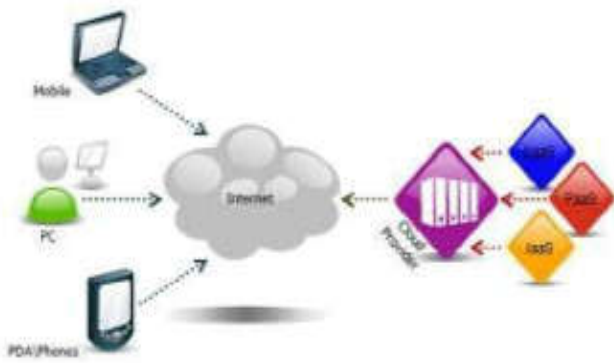

Fig. 1. Cloud computing concept

Fig. 1 shows [8] that how users can connect to the cloud services which are provided by cloud service provider by using any device over the internet. It includes scalable resources in storage, network, and compute & also contain virtualized infrastructure and provide that services to the users.

Forrester defines cloud computing as:

"A pool of abstracted, highly scalable, and managed compute infrastructure capable of hosting end-customer applications and billed by consumption."
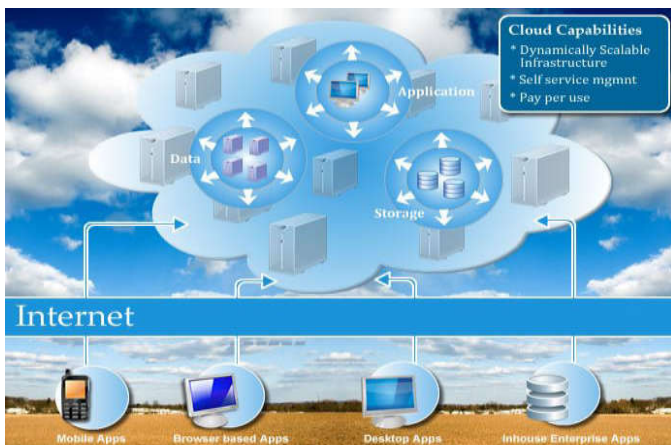
It cuts the operational and capital costs and permits the IT departments to focus on strategic projects instead of keeping the datacenter running. It provides the services on Infrastructure level, Platform level, and Software level, many features such as speed, scalability of resources, parallel processing, to choose another technology at any time to further work like 24/7 availability of services, device and location independent and security etc. Cloud computing has five essential features such as rapid elasticity, measured services, on-demand self-service, resource pooling, and board network access. As shown in Fig. 2.

Fig. 2. Five features of cloud computing

Cloud Computing Models

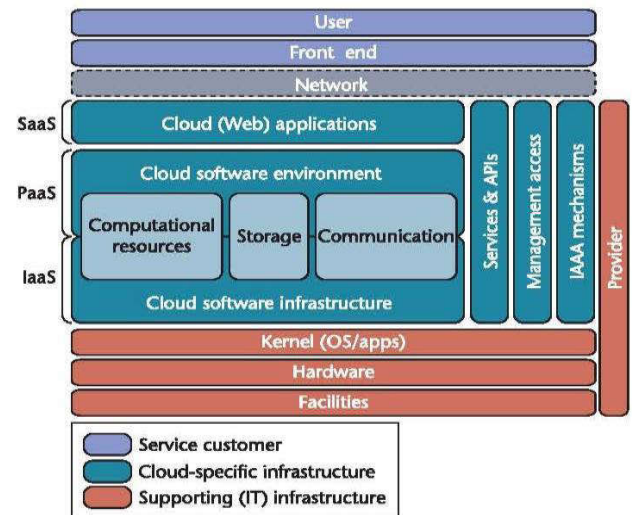Cloud service Providers [4] following 4 types of Models:-

Fig. 3. The Cloud reference architecture

Cloud reference architecture [11] that makes the most important security-relevant cloud components explicit and provides an abstract overview of cloud computing for security issue analysis.

1. **Software as a Service (SaaS):** In this model, [12] a complete application is offered to the customer, as a service on demand. A single instance of the service runs on the cloud & multiple end users are serviced. Today SaaS is offered by companies such as Google mail, Salesforce.com, Microsoft, Zoho, etc.

2. **Platform as a Service (Paas):** a layer of software or development environment is encapsulate & offered as a service, upon which other higher levels of service can be built. In this model the customer has the freedom to build his own applications, which run on the provider"s infrastructure. PaaS providers offer a predefined combination of OS and application servers, such as LAMP platform (Linux, Apache, MySql and PHP), classified J2EE, Ruby etc. Google's App Engine, Force.com, etc

3. **Infrastructure as a Service (Iaas):** IaaS provides basic storage and computing capabilities as standardized services over the network. The basic strategy of virtualization is to set up independent virtual machines (VM) that are isolated from both the underlying hardware and other VMs. Servers, storage systems, networking equipment, data centre space etc. The customer would typically deploy his own software on the infrastructure. Some common examples are Amazon'EC2, GoGrid, 3 Tera, etc.

4. **Data as a Service (Daas):** Daas Delivery of virtualized storage on demand becomes a separate Cloud service - data storage service. Notice that DaaS could be seen as a special type IaaS. DaaS allows consumers to pay for what they are actually using rather than the site license for the entire database. In addition to traditional storage interfaces such as RDBMS and file systems. Some common examples are Amazon S3, Google BigTable, and Apache HBase, etc.
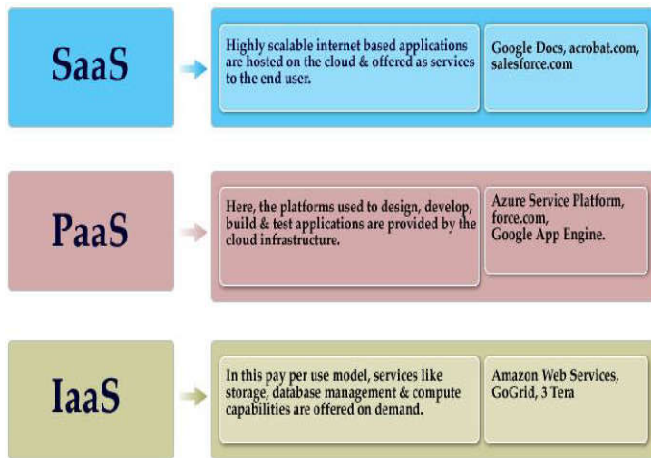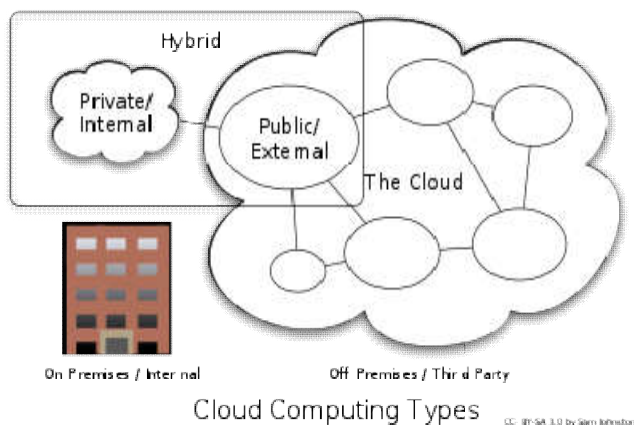

Public, Private and Hybrid Cloud

Fig. 3. Cloud computing Types

Public Cloud

Public clouds are owned and operated by third parties; they deliver better economies of scale to customers, as the infrastructure costs are spread among a mix of users, giving each individual client an attractive low-cost, "Pay-as-you-go" model. One of the advantages of a Public cloud is that they may be larger than an enterprises cloud, thus providing the ability to scale seamlessly, on demand.

Private Cloud

Private clouds are built exclusively for a single enterprise. They aim of Private Cloud is to address concerns on data security.

There are two variations to a private cloud:-

- **On-premise Private Cloud:** also known as internal clouds are hosted within one own data center.
- **Externally hosted Private Cloud:** This type of private cloud is hosted externally with a cloud provider.

Hybrid Cloud

Hybrid Clouds combine both public and private cloud models.. The Hybrid cloud environment is capable of providing on-demand, externally provisioned scale.

Cloud Computing Characteristic:

1. Dynamic computing infrastructure
2. IT service-centric approach
3. Self-service based usage model
4. Minimally or self-managed platform
5. Consumption-based billing
6. Reduced Cost
7. Increased Storage
8. Flexibility
9. Data Protection
10. Data Recovery and Availability
11. Management Capabilities
12. Disaster Recovery
13. Automatic Software updates
14. Free Capital- expenditure
15. Work from anywhere
16. Document control
17. Security

Advantages of Cloud Computing

1. Shared Resources: it shares resources to provide the services to multiple users.
2. Pay-As-You-Go: Users only need to pay those resources which are used by them. They can demand for more resources if they required
3. Better Hardware Management: It is easy for cloud service provider (CSP)[4] to manage the hardware easily because all computers run the same hardware.

Area of Cloud Computing

1. Banking
2. Insurance
3. Weather Forecasting
4. Space Exploration
5. Software as a service
6. Platform as a Service
7. Infrastructure- as -a-Service
8. Data-as-a-service

Applications

There are a few applications of cloud computing [6] as follows:

1. Cloud computing provides dependable and secure data storage center.
2. Cloud computing can realize data sharing between different equipments.
3. The cloud provides nearly infinite possibility for users to use the internet.
4. Cloud computing does not need high quality equipment for the user and it is easy to use.

Scope: Cloud computing is a tremendous innovation in the digital landscape that has changed the way IT solution are delivered and how end-users put them tom use. The cloud computing aspect is growing and will continue to do so.

Conclusion

Cloud computing is a new technology of computer network, providing the web services at lower cost comparing to normal technique. It contribute to improve the service in other related technologies like,

Grid Computing, Cluster Computing,
Utility Computing / Automatic Computing
Distributed Computing

With cloud computing, to the interface between service suppliers and multiple groups of service consumers. Cloud services will demand expertise in distributed services, procurement, risk assessment and service negotiation — these are the areas that many enterprises are only modestly equipped to handle. Cloud Computing initiatives could affect the enterprises within two to three years as it has the potential to significantly change IT.

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