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A Study on Cloud Computing: A Colossal Discovery for Storage and Delivery Solution in IT Arena

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ABSTRACT
The management of any industry gives top priority on "Storage" and "Delivery" as these are the two keys and vital areas which decide to enhance the acceptability of the Company in a greater way. Less expenditure on Delivery and Storage of Products will immensely contribute to the bottom-line. So providing proper and better infrastructure and logistics for these areas will definitely give a company to meet the requirements of their customers in a timely and effective manner. Information Technology Industry is no exception from these stark realities. Storage and Delivery of the data more efficiently has been a challenge always for IT Industry since its birth. Their relentless efforts and pursuits on research and development for Storage and Delivery of data results the development of Cloud Computing.

KEYWORDS: *Cloud Computing, SaaS, IaaS, PaaS, DaaS, AbiCloud, Eucalyptus, Nimbus, OpenNebula.*

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I. INTRODUCTION

Cloud Computing opens up vistas of vast opportunities to the public to avail various services. A new computing technique - temporary utilization of computing infrastructure over the network, distributed as service that sums up Cloud computing [1].

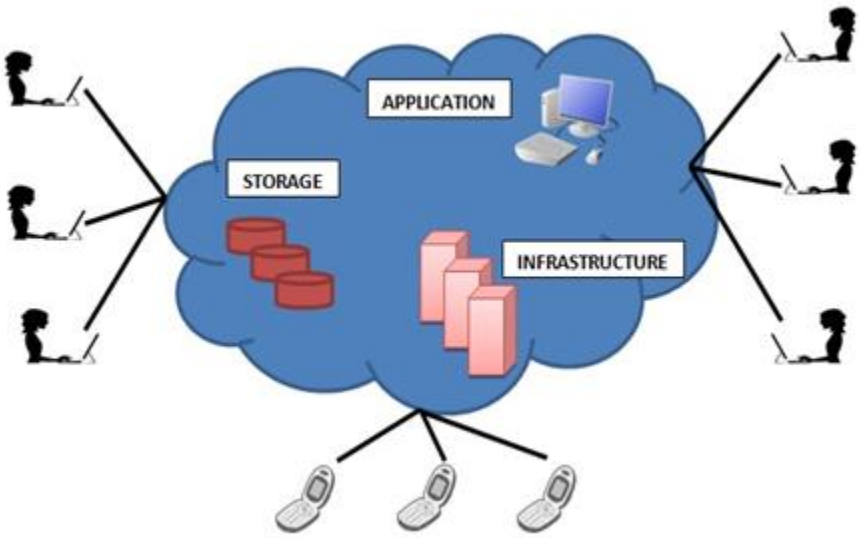

FIG 1: Cloud Computing

A. Salient Features of Cloud Computing:

1. Offers safe and dependable data storage center.
2. Can realize data sharing between different equipment.
3. Offers vast and infinite possibility for users to use the internet.
4. Does not need high quality tools and equipment for the user and it is very user friendly.
5. On Demand Self Service that user can provision computing capabilities viz. server time and network storage automatically without human intervention.
6. Broad Network Accessibility through the internet from wide range of devices.
7. Resource Pooling or shared infrastructure. Example of resources include storage, processing, memory, network bandwidth and virtual machines.
8. Rapid elasticity gives user a feeling that the capabilities available for provisioning are unlimited and buying of any quantity at any time.
9. Measured Service - Services can be measured thereby ensuring transparency for both provider and user if the utilized availed service.

B. Benefits of Cloud Computing:

1. Cost Savings: Cloud computing permits user to reduce his capital expenditure and use operational expenditures for increasing his computing capabilities. It reduces the barrier to entry for new services and needs fewer in-house IT resources to give system support.
2. Scalability/Flexibility: Companies can start with a small deployment and grow to a large deployment in a desired manner and scale back if situation warrants. Flexibility of cloud computing permits companies to use extra resources at peak times, thus enabling them to take care of customers' growing demands.
3. Reliability: Services using multiple redundant sites can support business continuity disaster recovery.
4. Maintenance: By extending the system maintenance and access by APIs that do not require application installations onto PCs, further reduction of maintenance requirements.
5. Mobile Accessibility: Increased productivity due to systems accessible in an infrastructure available from anywhere and anytime.
6. Maximum economic benefits can be derived and availed in cloud computing services and applications

C. Cloud computing can be divided into the following:

1. Development of parallel, dummy,proxy or /alternative computing.
2. Distributed Computing.
3. Grid computing.
4. Virtualization technologies.
5. Utility Computing.

II. DIFFERENT MEANS OFCLOUD COMPUTING

The service models of Cloud Computing are as follows [2]:

1. Software-as-a-Service (SaaS)

End user can buy, access, use an application /services available in the cloud where he does not run the underlying cloud infrastructure. In other words they put their applications in a hosting platform, which can be accessed through networks from different parties by application users. They do not have control over the cloud infrastructure which often engages multi-tenancy system architecture, viz, different cloud users' applications are organized in a single logical platform in the SaaS cloud to curtail expenditure of scale and optimization with regard to speed, security, availability, disaster recovery and maintenance. Examples of SaaS - SalesForce.com, Google Mail, Google Docs, and so forth.

2. Infrastructure-as-a-Service (IaaS)

In this model capability provided to the customer can be provision processing, storage, networks, other computing resources, run arbitrary software without controlling the underlying cloud infrastructure but has control over operating systems, storage, available applications and limited management of networking components. Cloud user can directly use IT infrastructures (processing, storage, networks and other fundamental computing resources) provided in the IaaS cloud. Virtualization is widely and extensively used in IaaS cloud in order to integrate/decompose physical resources in an ad-hoc and temporary method to meet growing or shrinking resource demand from cloud users The main idea of virtualization is to make available independent virtual machines (VM) that are isolated from boththeunderlyinghardwareandotherVMs. It is to be noted that this idea is different from the multi-tenancy model, which tends to change the application software architecture so

that multiple instances (from multiple cloud users) can run on a single application (i.e. the same logic machine). An example of IaaS is Amazon'sEC2.

3. Platform-as-a-Service (PaaS)

Customers can buy access to the platforms, enables them to deploy his own software and applications in the Cloud without controlling the underlying infrastructure. One can deploy applications created using programming languages and tools.PaaS can also be development platform supporting the full "Software Lifecycle" which allows cloud users to make services and applications (e.g. SaaS) directly on the PaaS cloud. When one looks at the difference between SaaS and PaaS,SaaS only hosts completed cloud applications whereas PaaSoffers a development platform that offers both.

4. Data as a Service (DaaS)

The supply of virtualized storage on demand becomes a separate Cloud service - data storage service. It is to be noted that DaaS can be treated as a special entity IaaS. The idea is that on-premise enterprise database systems are often tied in a prohibitive upfront cost in dedicated server, softwarelicense, post-delivery services and in-house IT maintenance. DaaS permit users to pay for what they are actually using rather than the site license for the entire database. Inaddition to traditional storage interfaces such as RDBMS and file systems, some DaaS offerings provide table-style abstractions that are designed to scale out to store and retrieve a huge amount of data within a very compressed timeframe, often too large, very expensive or too slow for most commercial RDBMS to cope with. Examples of this kind of DaaS include Amazon S3, Google BigTable, and Apache HBase, etc.

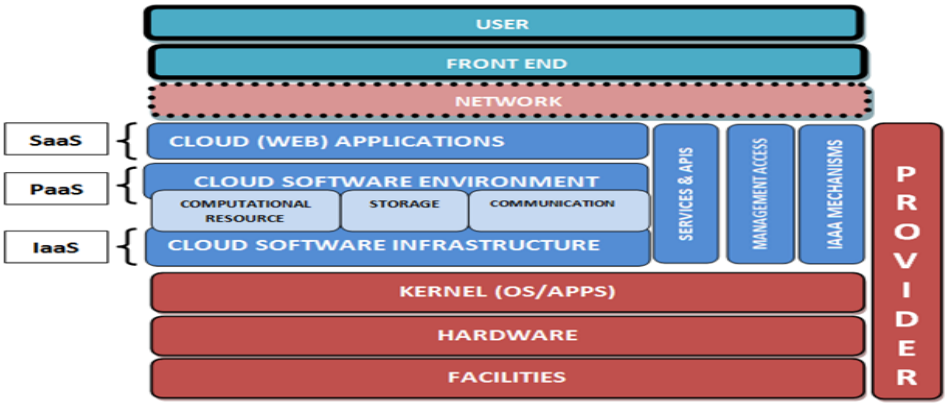

FIG 2: Service Models of Cloud Computing

III. CLOUD COMPUTING DEPLOYMENT MODELS

A. **Private Cloud:** This is meant for a tailor-made requirement of an entity. It can be either managed by the entity or a third party which may exist on premise or off premise [3].

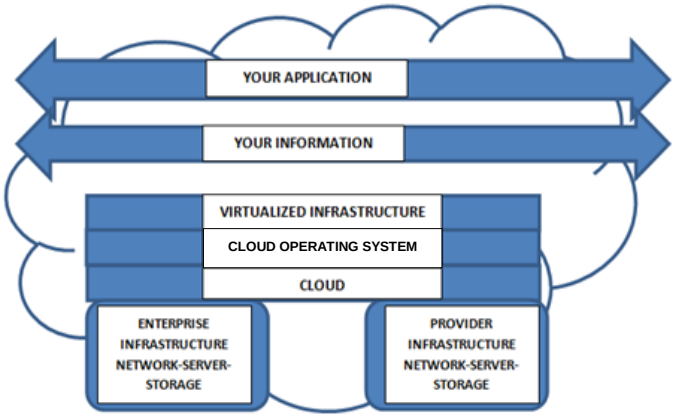

FIG 3: Private Cloud

B. **Community Cloud:** This can be shared by several organizations and backup a specific community which has common goals/policies/concerns. It can be either managed by the organization or a third party which may exist on premise or off premise.

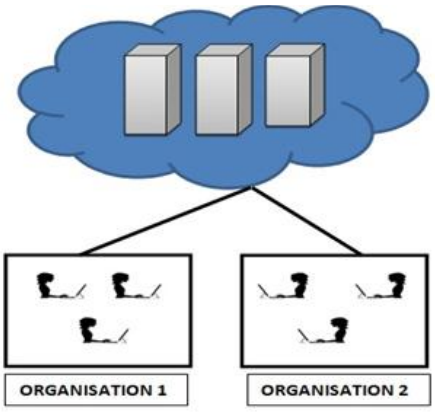

FIG 4: Community Cloud

C. **Public Cloud:** This is meant for public on commercial basis by the service provider. User can develop and deliver service in this plat form with little capital.

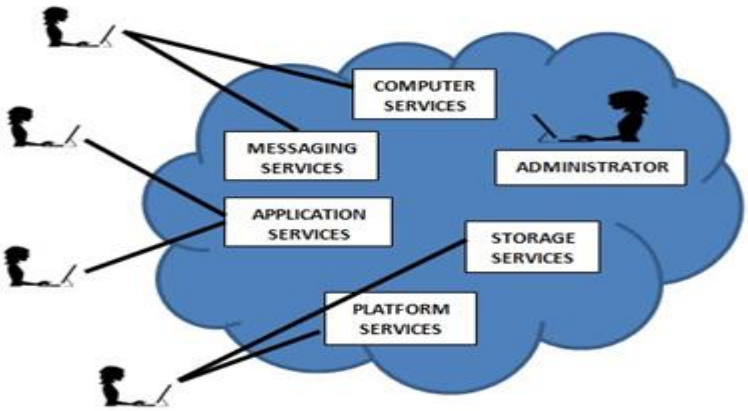

FIG 5: Public Cloud

D. **Hybrid Cloud:** This is a combination of two or more clouds) which existunique entities but stay together by standardized/proprietary technology which enables data and application portability. This gives customer a great advantage as he has to pay only for what he uses.

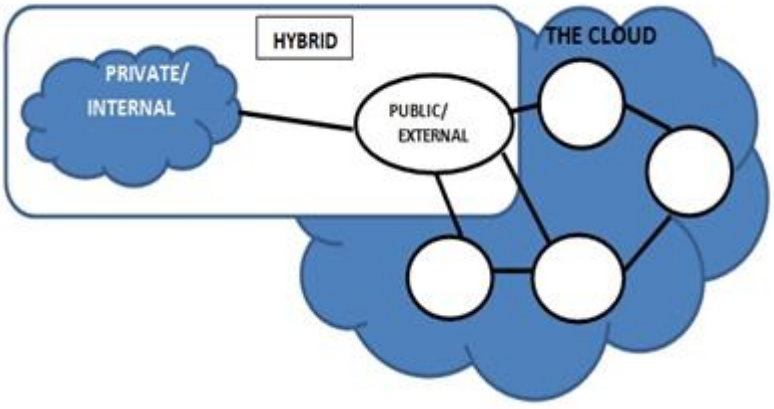

FIG 6: Hybrid Cloud

+General public are now-a-days extensively and widely availing the services like Face book, You Tube, Gmail, Hotmail, Yahoo etc.

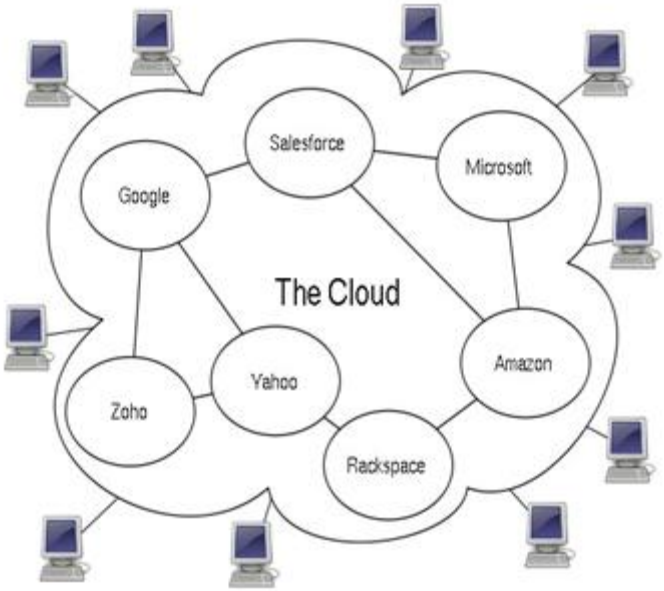

FIG 7: Cloud Computing

It reduces frightening and cumbersome management burden. Cloud.com is a web as space where computing has been made and stands for ready to use service; data, operating systems, applications, storage and processing power exist on the web ready to be shared. To users, cloud computing is a Pay-per-Use-On-Demand mode that can easily access shared IT resources through the Internet. Where the IT resources include network, server, storage, application, service and so on and they can be deployed with much quick and easy manner and least management and also interactions with service providers. Cloud computing can much improve the availability of IT resources and owns many advantages over other computing techniques. Users can use the IT infrastructure with Pay-per-Use-On-Demand mode; this would benefit and save the cost to buy the physicalresources that may not be available.

IV. CLOUD COMPUTING ARCHITECTURE:

Cloud Computing architecture consists of many cloud components, which are loosely coupled [4]. It is divided into two parts:

A. Front End
B. Back End

Each of the ends is connected through a network, mainly Internet. The following diagram shows the graphical view of cloud computing architecture:

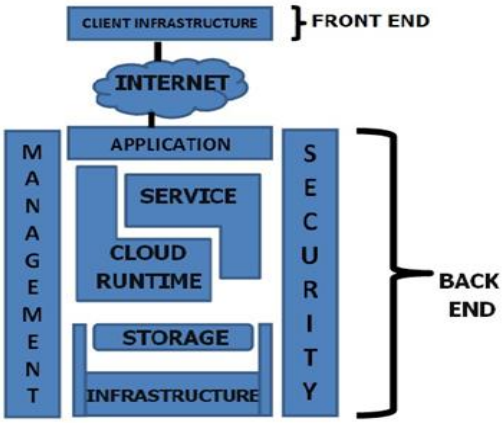

FIG 8: Cloud Computing Architecture

A. Front End

The 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, Example - Web Browser.

B. Back End

The 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 comprises of certain protocols known as middleware, which help the connected devices to communicate with each other.

V. WELL KNOWN CLOUD COMPUTINGPLATFORMS[5]

A. AbiCloud

Abicloud is a cloud computing platform. It can be used tomake,integrateandmanagepublic aswellasprivatecloud in the homogeneous environments. Using Abicloud, usercan easily and automatically deploy and manage the server, storagesystem,network,virtualdevicesandapplicationsand so on. The main difference between Abicloud and other cloud computing platforms is its powerful web-based management function and its core encapsulation method. Using the Abicloud, user can finish deploying a new service by just dragging a virtual machine with mouse. This is much easier and flexible than other cloud computing platformsthat deploy new services through commandlines.

Abicloud is used to deploy and implement private cloud as well as hybrid cloud according to the cloud providers requestandconfiguration.ItalsomanageEC2 according to the rules of protocol. Besides, apply the Abicloud, a whole cloud platform based on Abicloud can be packed and redeployed at any other Abicloud platform. This is essential for the transformation of the working environment and will make the cloud deployment process much easier andflexible.

B. Eucalyptus

Eucalyptus (Elastic Utility Computing Architecture for Linking Your Programs to Useful Systems) mainly is used to develop open-source private cloud platform.Eucalyptus is an elastic computing structure that is used to connect theusers'programstotheusefulsystems,itisanopen-source infrastructure using clusters or workstation implementation of elastic, utility, cloud computing and a popular computing standards based on a service level protocol that permit users lease network for computing capability.

Currently, Eucalyptus is compatible with EC2 from Amazon, and may support more other kinds of clients with minimum modification and extension.

C. Nimbus

Nimbus is an open tool set and also a cloud computing solution providing IaaS. It permits users lease remote resources and build the required computing environment through the deployment of virtual machines.

In general, all these functional components can be classified as three kinds. One kind is client-supported modules which are used to support all kinds of cloud clients. Context client module, cloud client module, reference client module and EC2 client module are all belonging to this kind of component. The second kind of component is mainly service-supported modules of cloud platform, providing all kinds of cloud services. It includes a context agent module, web service resource framework module, EC2 WSDL module and a remote interface module. The third kind of component is the background resource managementmodules which are mainly used to manage all kinds of physical resources on the cloud computing platform, including work servicemanagement.

D. OpenNebula

This is also an open source cloud service framework. It allows user deploy and manage virtual machines on physical resources and it can set user's data centers or clusters to flexible virtual and nimbus is that nimbus implementsremoteinterfacebasedonEC2orWSRFthrough infrastructure that can automatically adapt to the change of the service load. The main difference of OpenNebula which user can process all security related issues, while OpenNebula does not. OpenNebula is also an open and flexible virtual infrastructure management tool, which can use to synchronize the storage, network and virtual techniques and allow users dynamically deploy services on the distributed infrastructure according to the allocation strategies for data center and remote cloud resources. Through the interior interfaces and OpenNebula data center environment, users can easily deploy any types ofclouds [6].

VI. CONCLUSION

Like an ever expanding galaxy, Information Technology industries are growing infinitely. Cloud computing has revolutionized the very idea of orthodox and conventional computing methods. Cloud computing in its expanding mode is all geared up to flap its wings to fly sky high in order to serve world population for their every moment need. By embracing the new and vibrant technologies that are forthcoming from Cloud computing saga will contribute all round development and potential growth story of e-governance and e-commerce are foretold[7][8][9][10].

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