Cloud Computing: Alternative to Enormous In-House Data Centers

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Abstract-**The time will come to prove that computing will one day be the 5th utility after water, electricity, gas and telephony. That will provide the basic level of computing services such as supporting files needed to run any type of software. It aims to share data, calculations, and services transparently among users. It became a hot issue concern to advantages those are reduction in costs, increase in business flexibility and/or provide business continuity.**

This paper defines the cloud computing, cloud deployment model, cloud delivery model and its benefits. It also includes the detail explanation of technique to use of cloud computing with an example. It also tries to build awareness among companies and professionals to use cloud computing as an alternative tool for large in-house data centers.

Keywords **- Cloud computing, Data Center, Engine, Networks.**

I. INTRODUCTION

The cloud computing services are being used automatically while accessing online images or use of web-mail or a social networking site. The fundamental concept of cloud computing is that computing is in cloud. It refers to accessing software and storing the data in "Cloud".

Many formal definition have been proposed in both academic and industry, the one provided by the U.SNIST [National Institute of Standards and Technology] [1] is that "Cloud computing is model for enabling convenient on-demand network access to shared pool of configurable computing resources (e.g. network, server, storage, application and services) that can be rapidly provisioned and released with minimum management effort or service provider interaction".

In other words, cloud computing is delivery of its computing services over internet. It   allows individuals and companies, to use software and hardware, which are managed by third party at remote location; those cloud services include online file storage, social networking sites, and web-mail and business applications.

II. HISTORY

The concept of cloud and cloud computing is actually as old as Internet itself.

- In August 2006 –Search engine conference in San Joser California Z Google CEO Eric Schmidt introduced the term "Cloud Computing" to the world.
- In February 2007 –Google Docs were introduced.
- Where other contributors include Amazon web service, sales force .com etc.
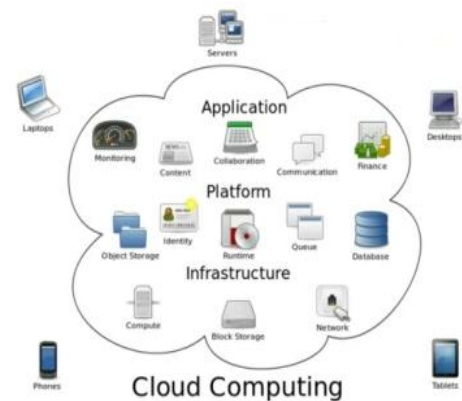
III. CLOUD COMPUTING OVERVIEW

Figure1. Architecture of Cloud Computing

The name of Cloud computing comes from the use of cloud shaped symbol which represent complex structure that abbreviated as 'Cloud'[2] as shown in Figure1.The word 'Computing' is being used for model which consists services that are commoditized and delivered in a manner similar to traditional utilities such as water, electricity, gas and telephony. Such a model users are free to access any type of services, based on their requirements, without regard to where services are hosted. Cloud computing provides the computing with internet that includes the virtually optimized data center and data. Any organization or user simply connects to cloud and use available resources on the basis of pay for use. This help for company to reduction in cost and scaling up the resources. Cloud computing servers consist of highly

Optimized virtual data centers and also consist of software, hardware and information resources for user as and when they needed.

For ever changing business, organization needed to invest time and budget to scale up their IT infrastructure such as hardware, software and services. Where cloud computing has property of scale up and scale down according to business need.

IV. DEPLOYMENT MODELS OF CLOUD COMPUTING

A.   Private clouds-

Private cloud services offered over the internet or over a private network to only selected users, not for general public or people. The cloud infrastructure is operated solely within a single organization, and managed by the organization or a third party regardless whether it is located in premise or off premise. Private cloud can be built and managed by a company's own cloud provider. In the "hosted private" model a company like Sun who acts as a private cloud, can install, configure and operate the infrastructure to support a private cloud within a company or enterprise [3].

B. Public Cloud-

Public cloud services offered over the internet and available to anyone who wants to purchase the service. This is the dominant form of current Cloud computing deployment model. The public cloud is used by the general public cloud consumers and the cloud service provider has the full ownership of the public cloud with its own policy, value, profit, costing, and charging model. Many popular cloud services are public clouds including Amazon EC2 [4], Google App. Engine [5] and Force.com.

Public cloud is most often hosted away from customer's premises and they provide a way to reduce customers risk and cost by providing a flexible even temporary extension to enterprise infrastructure [6].

C. Hybrid Cloud-

This cloud infrastructure is a combination of private and public clouds. This remains unique entity but is bound together by standardized or proprietary technology that enables data and application portability e.g. cloud bursting for load-balancing between clouds. There are various uses of hybrid cloud that are to optimize their resources, for improving their core competencies, by managing peripheral business functions onto the cloud [7].

V.   SERVICE MODELS OF CLOUDCOMPUTING

There are three basic service models as shown in figure 2.

Figure2.Service Models of Cloud Computing.

- Infrastructure as a Service [IAAS]–

    Infrastructure as a Service or IAAS is delivery of computer hardware i.e. Servers, networking technology, storage and data center space as a service. It may include the delivery of operating system and virtualization technology to manage the resources. Using IAAS, organization can have infrastructure models such as computing power and storage capacity. Currently, the most high profile IAAS operation is Amazon's Elastic Compute Cloud (EC2). It provides a Web interface that allows customers to access virtual machines. Users of EC2 can request the use of any operating system as long as developer does all the work.[8]

- Software as a Service [SAAS]-

    One of the first implementation of cloud services was Software as a Service. It provides organization with reads to use application. They use combination of cloud based computing power and storage capacity [9]. Microsoft provides various online services such as BPOS (Business productivity online service and Microsoft dynamic), CRM i.e. Customer Relation Management as SAAS. Web Lims act SAAS model that have been implemented 1998 [10].

- Platform as a Service [PAAS]-
    PAAS is a development platform, supporting the full "Software Lifecycle" which allows cloud consumers to develop cloud services and applications (e.g. SAAS) directly on the PAAS cloud. Hence the difference between SAAS and PAAS is that SAAS only hosts completed cloud applications whereas PAAS offers a development platform that hosts both completed and in-progress cloud applications. This requires PAAS, in addition to supporting application hosting environment, to possess development infrastructure including programming environment, tools, configuration management, and so forth. An example of PAAS is GoogleApp Engine.

VI. WORKING OF CLOUD COMPUTING

Now a day, every organization is launching their rules, strategies, product information, tenders and requirements etc. on web-site. Trends of community are also increasing to use such web-site to fulfill their demands. In this case there is a possibility to access a same web-site by number of users, at a same time. Accessing the website at a same time by number of users causes to server slows down, data loss and congestion in network. These problems are harmful to popularity and business strategies of organization. To face such problems, established organizations were using number of servers, but it increases the cost and risk of maintenance.

The alternative solution to such problem is to use of cloud computing technology. Cloud computing infrastructure makes it easier for big companies as well as for small companies, to treat their computing system as a pool of resources rather than a set of independent environment that has to manage individually.
Overall, the cloud embodies that following four basic characteristics.

i.   *Elasticity and ability to scale up and scale down-*
The service provider can't anticipate how customers will us the service. One customer might use the service three times during the peak selling season, whereas another might use it as a primary development platform for all of its application.

Therefore, the service needs to be available all the time and it has to be designed to scale upward for high periods of demand and downward for lighter ones. Scalability also means that an application can scale when additional users are added and when application requirements change.

ii.   *Self Service provisioning-*
Customers can easily get cloud services without going through a lengthy process. The customer simply requests an amount of computing storage, software, process or other resources from service provider.

iii.   *Application programming interfaces-*
A standardized interface lets the customer more easily link a cloud service, such as customer relationship management system, without having to resort to customer programming.

iv.   *Billing and metering of services*
A cloud environment needs a built-in-service that bills customer and to calculate that bill, usage has to be metered.

VII.   BENEFITS
- Eliminates the need for companies to host their own servers and purchase expensive software.
- Major cost saving for large businesses that manage and store large amount of data.

- Remove the need for more and expensive hardware such as memory.
- Allow users to access data across broad network on an as needed basis.
- Increases speed and elasticity of the release of certain capabilities.

VIII.   RISK OF CLOUD MODEL

- Immature vendors and new business models bring the risk of failure

- Availability and possibility of data lock –in: - Where customers are unable to extract their data.

- The risk of "bugs" and removing errors in large-scale distributed system.

- Network latency or issues with the provider's services can cause performance issues.

IX. CONCLUSION

Cloud computing is beneficial for the organizations and individuals. It is concluded that instead of installing a suite of software for each computer. The target can be achieved by loading one application. That application would allow users to log into web-based services which host all the programs.
Data Centers are known to be expensive to operate and they consume huge amounts of electric power. For example, the Google data center consumes power as much as a big city. As Clouds are emerging tool as next-generation data centers and aim to support universal service-oriented applications, it is important that they should designed to be energy efficient to reduce both their power bill and carbon footprint on the environment. Thus considering the benefits one can say that "Sky is the limit for cloud computing".

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