Cloud Computing – A New Paradigm for Modern Computing

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Abstract— **Cloud computing is a model of information technology, which does not require big investments in powerful hardware and software. To access applications and services over the network you need only Internet access. One of the main business reasons for decisions on accessing to the alternative model of IT technology is certainly the fact that traditional approaches in terms of business users have not been successful because of the undue's TCO (Total Cost of Ownership) and too low ROI (Return on Investment) for individual IT services. Cloud Computing offers several advantages, from general to employees cost reduction. The costs are calculated according to the principle of pay as much as at some point need, providing upgrades to the provider is included in the price of services. Cloud services enable IT personnel involvement in more strategic projects, but also reduce the risks of unpredictable interruptions. The concept of cloud computing has spread rapidly through the information technology industry. The ability of organizations to tap into computer applications and other software via the cloud and thus free themselves from building and managing their own technology infrastructure seems potentially irresistible. Cloud computing is seen by many as the next wave of information technology for individuals, companies and governments. In addition to reducing operational costs, cloud technologies have become the basis for radical business innovation and new business models and for significant improvements in the effectiveness of anyone using information technology – which, these days, increasingly means most of the world.**

Keywords— **Cloud computing, Information Technology.**

I. INTRODUCTION

Over the years, the internet has grown to a very mature and stable technology. The Internet, besides the desktop systems, can now be accessed from almost anywhere by numerous means, especially through mobile Internet devices, cell phones, personal digital assistants, tablet PC's, data cards and handheld game consoles. Internet provides a platform for hosting web sites or web applications which are then accessed by the internet users using a web browsing software like Internet Explorer or Mozila Firefox etc.

II. WHAT IS A CLOUD AND CLOUD COMPUTING?

Traditional computing and business applications have always been very tedious and expensive. They would require hardware and operating system upgrades for newer versions and investments in the software licenses and infrastructure enhancements can be very costly for an organization. The data security plays an important part in business application. A regular data backup needs to be done to avoid untoward events in the future. Cloud computing is a technology that uses the internet and central remote servers to maintain data and applications. Cloud computing allows consumers and businesses to use

applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing storage, memory, processing and bandwidth. A simple example of cloud computing is Yahoo email or Gmail etc. You don't need software or a server to use them. All a consumer would need is just an internet connection and you can start sending emails. The server and email management software is all on the cloud (internet) and is totally managed by the cloud service provider Yahoo, Google etc. The consumer gets to use the software alone and enjoy the benefits. The analogy is, 'If you only need milk, would you buy a cow?' All the users or consumers need is to get the benefits of using the software or hardware of the computer like sending emails etc. Just to get this benefit (milk) why should a consumer buy a (cow) software /hardware? .Cloud computing is broken down into three layers IaaS, PaaS and SaaS. Each segment serves a different purpose and offers different products for businesses and individuals around the world

III. THE LAYERS OF THE CLOUD

A. THE IAAS LAYER (INFRASTRUCTURE AS A SERVICE)

This is the base layer of the cloud. It serves as a foundation for the other two layers, for their execution. Infrastructure as a Service is a provision model in which an organization outsources the equipment used to support operations, including storage, hardware, servers and networking components. The service provider owns the equipment and is responsible for housing, running and maintaining it. The client typically pays on a per-use basis.

The keyword behind this layer is Virtualization. Amazon EC2 is one good example of an IaaS. In Amazon EC2 (Elastic Compute Cloud) application will be executed on a virtual computer. There is choice of virtual computer that is you can select a configuration of CPU, memory and storage that is optimal for a specific application. The IaaS provider supplies the whole cloud infrastructure like servers, routers, hardware based load-balancing, firewalls, storage and other network equipment. The customer buys these resources as a service on an as needed basis. Characteristics and components of IaaS include:

- Utility computing service and billing model.
- Automation of administrative tasks.
- Dynamic scaling.
- Desktop virtualization.
- Policy-based services.
- Internet connectivity.

B. The PaaS Layer (Platform as a Service)

Platform as a Service (PaaS) is a way to rent hardware, operating systems, storage and network capacity over the Internet. The service delivery model allows the customer to rent virtualized servers and associated services for running existing applications or developing and testing new ones.

Platform as a Service (PaaS) is an outgrowth of Software as a Service (SaaS), a software distribution model in which hosted software applications are made available to customers over the Internet. PaaS has several advantages for developers. With PaaS, operating system features can be changed and upgraded frequently. Geographically distributed development teams can work together on software development projects. Services can be obtained from diverse sources that cross international boundaries. Initial and ongoing costs can be reduced by the use of infrastructure services from a single vendor rather than maintaining multiple hardware facilities that often perform duplicate functions or suffer from incompatibility problems. Overall expenses can also be minimized by unification of programming development efforts.

C. The SaaS Layer (Software as a Service)

Software as a service is a way of delivering applications over the Internet—as a service. Instead of installing and maintaining software, you simply access it via the Internet, freeing yourself from complex software and hardware management.

SaaS applications are sometimes called Web-based software, on-demand software, or hosted software. Whatever the name, SaaS applications run on a SaaS provider's servers. The provider manages access to the application, including security, availability, and performance.

IV SOFTWARE AS SERVICE

SaaS is a new model of how software is delivered. SaaS refers to software that is accessed via a web browser and is paid on a subscription basis, generally, monthly or yearly. Different from the traditional model where a customer buys a license to software and assumes ownership for its maintenance and installation, SaaS presents significant advantages to the customer. SaaS is faster and a cost effective way to getting implemented. There are no hardware, implementation or acquisition costs involved to run the application from the customer's side. It's the responsibility of the SaaS vendor to manage and run the application with utmost security, performance and reliability.

Since customers pay a subscription, they have immediate access to the new features and functionality. Unlike traditional software where upgrades would happen once a year or once in 6 months (with the vendor coming to your office with a CD), the SaaS vendor continuously pushes new updates, fixes to the application, which is immediately accessible by the customer. This reduces the length of time it takes a customer to recognize value from the software. Since the software application is delivered as a service, its important for the vendor to focus on customer service and experience. Since this is on a subscription model, the vendor is judged on a month-month basis and the pressure to innovate or risk losing business is greater. SaaS can be used by Windows, Linux, or Mac users, providing true platform independence over the Internet.

V DIFFERENT CLOUD DEPLOYMENTS

Cloud Computing can be classified into four types on the basis of location where the cloud is hosted:

- **Public Cloud**: Computing infrastructure is hosted at the vendor's premises. The customer has no visibility over the location of the cloud computing infrastructure. The computing infrastructure is shared between various organizations (fig. 1)
- **Private Cloud**: Computing architecture is dedicated to the customer and is not shared with other organizations. They are expensive and are considered more secure than Public Clouds. Private clouds may be externally hosted ones as well as in premise hosted clouds (fig. 1)
- **Hybrid Cloud**: Organizations host some critical, secure applications in private clouds. The not so critical applications are hosted in the public cloud. The combination is known as Hybrid Cloud. **Cloud bursting** is the term used to define a system where the organization uses its own infrastructure for normal usage, but cloud is used for peak loads. (fig. 1).
- **Community Cloud**: The cloud infrastructure is shared between the organizations of the same community. For example, all the government agencies in a city can share the same cloud but not the non government agencies (fig.2).
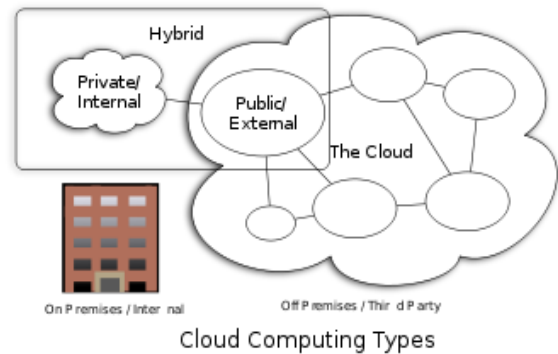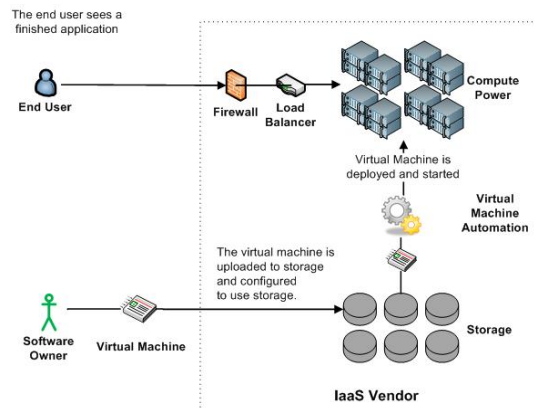

Cloud Computing Types

Fig.1

Fig. 2
Architectural diagram of Software as a Service.

VI TYPES OF CLOUD

A. *Eucalyptus Enterprise Edition*

Eucalyptus is an open-source software platform that implements IaaS-style cloud computing using the existing Linux-based infrastructure found in the modern data center. It is interface compatible with Amazon's AWS making it possible to move workloads between AWS and the data center without modifying the code that implements them. Eucalyptus also works with most of the currently available Linux distributions including Ubuntu, Red Hat Enterprise Linux (RHEL), CentOS, SUSE Linux Enterprise Server (SLES), openSUSE, Debian and Fedora. Similarly, Eucalyptus can use a variety of virtualization technologies including VMware, supports.

Eucalyptus Enterprise Edition is built upon the open source core platform and a suite of additional products and features that allow Enterprises and Service Providers to implement the most portable, scalable and high performing private cloud solution available today.

B *Amazon Elastic Cloud Compute (EC2)*

Amazon Elastic Compute Cloud (EC2) is a central part of Amazon.com's cloud computing platform, Amazon Web Services (AWS). EC2 allows users to rent virtual computers on which to run their own computer applications. EC2 allows scalable deployment of applications by providing a Web service through which a user can boot an Amazon Machine Image to create a virtual machine, which Amazon calls an "instance", containing any software desired. A user can create, launch, and terminate server instances as needed, paying by the hour for active servers, hence the term "elastic". EC2 provides users with control over the geographical location of instances that allows for latency optimization and high levels of redundancy.

C *Windows Azure*

Windows Azure is a cloud operating system on which developers can build using .NET, Java, Ruby on Rails, Python and other languages. Doug Hauger, Windows Azure GM, said that in the future Microsoft will offer an admin model that will allow developers access to the virtual machine, although they will not have to manually allocate hardware resources as they might with a traditional infrastructure-as-a-service.

VII ADVANTAGES OF CLOUD COMPUTING

There are many advantages of using cloud computing for organizations.

a. **Accessibility**: Cloud computing offers easy accessibility to the employees who can access the files and data that they need, even when they're working remotely and outside office hours.
b. **Device independence**: The information can be accessed from hand held and portable devices like a Smartphone such as a BlackBerry or iPhone.
c. **Collaborative Work**: Office staff can work collaboratively on files and documents, even when they're not physically together. Documents can simultaneously be viewed and edited from multiple locations.
d. **Cost effective**: Cloud computing is often cheaper than the traditional computing model. There is no need to buy and install expensive software because it's already installed online remotely and you run it from there.
e. **Pay as you go**: With cloud computing, you subscribe to the software, rather than buying it outright. This means that you only need to pay for it when you need it, and it also offers flexibility, in that it can be quickly and easily scaled up and down according to demand.
f. **Large storage**: Another major advantage of using cloud computing for many companies is that because it's online, it offers virtually unlimited storage compared to server and hard drive limits

VIII CONCLUSION

The cloud computing is truly a state of the art technology for many business organizations. Because of the technology's ease of adoption, significantly lower maintenance costs, and greater workflow efficiency, the cloud computing will gain widespread popularity going forward. For managers dealing with the growing demands for IT in their respective organizations, cloud computing presents an all-in-one solution, to satisfy the growing IT needs, at the same time, reducing energy usage, all at an affordable price.

IX FUTURE SCOPE

The cloud is revolutionizing computing as businesses and organizations shift from client-server model to cloud computing. In the next years, technology experts and users expect to 'live mostly in the cloud' as they work through cyberspace-based applications accessed from networked devices

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