



International Journal of Advanced Research in Computer Science and Software Engineering

Research Paper

Available online at: www.ijarcsse.com

Analyzing High Performance Cloud Computing: A Perspective Approach

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Abstract: Cloud computing is an emerging technology due to its ubiquitous features. It has emerged due to the limitations of available computer communication setup. Cloud is an attempt to migrate application independent of hardware and operating system without affecting network performance using virtualization. Being cloud supports Pay Per Use (PPU) system, expectations extends for high performance, security, load balancing and better transaction depending on public, private or hybrid cloud. This paper focuses on current setup and existence, steps for why and how to switch over onto the cloud, disclosing some facts that really matters into the long run of business.

Keywords: Ubiquitous, cloud Computing, Pay Per Use (PPU), load balancing, virtualization.

I. Introduction

Cloud computing shall be defined as “a model for enabling ubiquitous convenient on demand network access to a social pool of configurable computing resources like network, server, storage applications and services, that can be rapidly provisioned and released with minimal management efforts or service provides interaction” as per National Institute of Standard and Technology (NIST). Even though cloud is an emerging technology, it has got many challenges to face basically with data transfer and its security. Load balancing on the World Wide Web has become next to impossible due to factors like shared database, dynamic node and need for access to the applications irrespective of geographical and economical zone.

The Current Organizational Setup and Limitations

Most of the organizations have a broad bad or leased line connection (5-100MBPS) to connect to the internet. This connection is shared among the number of terminals using traditional components like Router, Switch, Bridge, Local Area Network (LAN) Cables, connected to the LAN cards in the given Topology. Among the essential components of an organization, Web Server, File Transfer Protocol (FTP) Server, Email Server, Application Server, Database and Media Server are some of the basic components that are needed to run organization smoothly in digital era. Each Server occupies dedicated Hardware Components, Operating System, Power, and Regular Management. On a broader scale, connectivity is shown as in Fig-1.



Fig-1 Wide Area Network

(Source-concept Draw Solutions Park)

The available Vertical Satellites (VSAT) are connected to the main satellite using wireless connections. VSAT intern provides connection to the service providers like Bharat Sanchar Nigam Limited (BSNL), Mahanagar Telephone Nigam Limited (MTNL), Vodafone etc. It is further extended to different organization with available plans and charges.

Some of the limitations in the current Network Architecture are:

- i. Low bandwidth for end user (in kbps).
- ii. Noise in the channel.
- iii. Problems with data security.
- iv. Applications are Operating System (OS) and Hardware Dependence.
- v. Badly managed network with human errors.
- vi. High Cost of maintenance.

Need to switch over to the Cloud

A person, whose daily transactions are limited to 10 Gigabits (GB), does not have to worry, But organization like banks, need to switch over on to the Personal Cloud to enjoy the seamless banking.

It is a general observation that on every new year Short Message Service (SMS) is halted, the servers goes down during the financial year closure due to low on hardware resources. Railway Servers not responding or busy is a common problem again due to hardware dependencies as the transactions per minutes are in thousand. To overcome these problems, Cloud Computing is the best probable solution.

Hence to have a Personal Cloud, 10 simple steps are given below considering the challenges like lack of control, application portability, transparency and security while designing a personal cloud.

10 steps while building a Cloud

a) Determine a Cloud goal.

While designing the architecture of the cloud, one needs to confirm if any other solution is available rather than Cloud and for which purpose it shall be utilized for.

b) Have realistic expectations.

Depending upon the organizational problem one shall decide to select the type of cloud to be designed and utilized to its maximum having realistic goals and expectations. Even though it minimizes the cost and maintenance factors, but it is still in its puberty. So, higher expectations may lead to failure or Denial of Service (DOS) attack.

c) Understand workload and services.

Cloud do support Platform As A Service(PAAS), Infrastructure As A Service (IAAS), Software As A Service (SAAS) and Authorization and Authentication As A Service (AAAS). Depending on the organizational needs and workload which includes daily transactions, data transfer, data storage one shall occupy resources and services on the cloud.

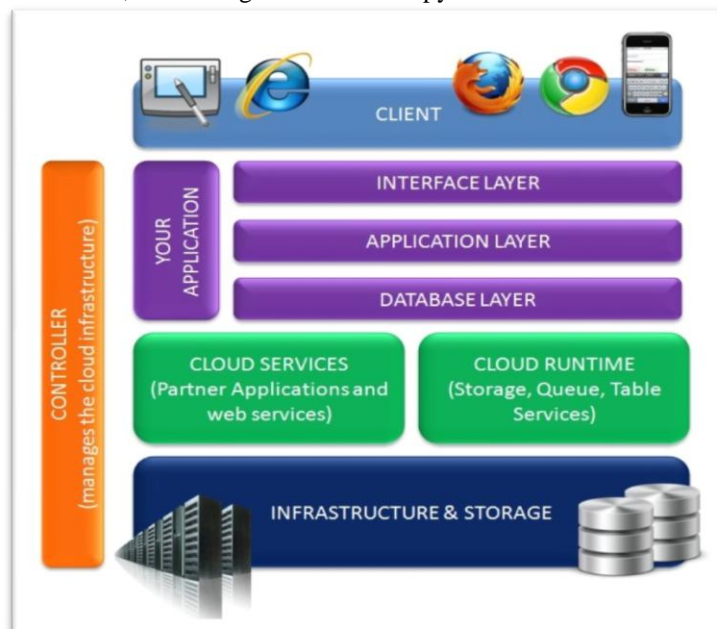


Fig-2 Cloud Architecture

Source: Sri Prakash, Information Technology Consultant

d) *Get on the path to Virtualization.*

The goal of Cloud Computing is to grant access to resources which are independent of hardware and operating system. Virtualization is a process of encapsulating the application in to the container which becomes portable. This container shall be relocated to any system in case of hardware or operating system failure without losing the settings and session control.

e) *Understand standardization and automation.*

Considering the available architecture of the network including wireless and wired technology with a list of topologies, we have a range of operating systems which shall be categorized into client and server operating system. In this diverse system every administrator has automated the setup as per their requirements which are termed as Community Clouds or Private Clouds. Using configured Router for communication with service providers is a standardized way on the web.

f) *Consider Charge Back and Show Back.*

From the list of Cloud service providers like Amazon, Google and others, they have dedicated application to count the services provided per minute or hour and generate bill per consumption of resources.

g) *Keep everything on proper place.*

A systematic and planned resource uploaded on the cloud, minimizes data storage, cost of data transfer and not forgetting the integrity and security of data.

h) *Prioritize monitoring.*

Before setting the Cloud up, one needs to priorities what and how to monitor. An automated application with said configuration helps.

i) *Perform future proofing.*

When any software solution is provided for user, before delivery the software undergoes software development cycle, of whose major components are types of testing. Black Box and White Box Testing shall definitely help to avoid future problems after uploading the solution on the cloud.

j) *Remember we all are together.*

Cloud Computing is in its puberty expecting upgradations in all of its layers. Standardization from the leading and dedicated organizations across the globe and implementing the said changes in public and community cloud shall help to stay together for better business.

Once we have cloud on the place, next task is to accelerate services for the best performance. But unless and until, we change the current setup in organization, one has to face these facts.

Facts about the Cloud Technology and the future

1. Cluster of servers

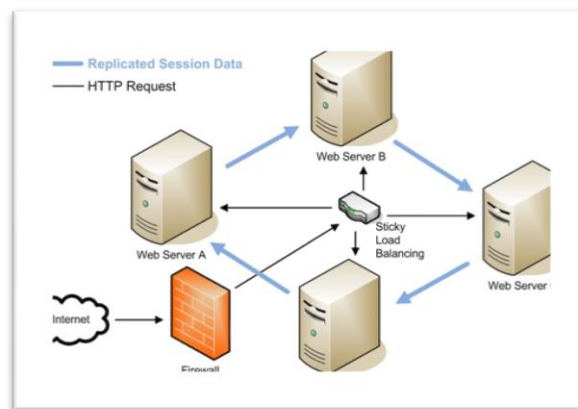


Fig 3-Server Cluster

Source: Oracle iPlanet Web Server 7.0.9 Administrator's Guide

Clusters are best solutions for shared databases which are the results of web applications that are designed using standard web applications like Java Script, HTML and PHP. Servers having same or different operating systems are connected forming

a cluster and intern a database. Whenever a user request for information, the request shall be accepted by the server until it reaches its maximum limit. Once reached peak, the requests are transferred to the next server in Active Directory Cluster (ADC). Internally active controller authenticates the users to grant and revoke the resources. If the active directory controller fails, the authentication fails keeping a session open for hacker to attack. This issue needs to be dealt seriously which is more important than data redundancy in the cluster.

2. Application server

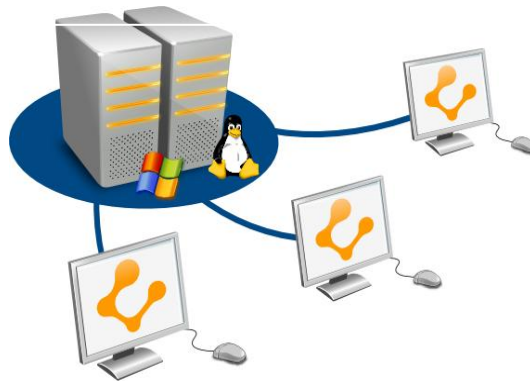


Fig 4- Application Servers
Source: ulteo SAS (ubuntu 10.04)

Applications servers are basically terminals servers similar to that of main frame. The terminal servers have application servers installed on the operating system with high end configuration and processing power. Machines which have thin client application software installed as hardware or software are granted permissions to communicate with the application server in an organization. This minimizes the installation, configuration, updates and maintenance cost. Since the end user communicates with application server using dumb, smart or intelligent terminal on the Cloud, one needs to have access to the services in the organization. Even though using Load Balancing and Virtualization Cloud shall support you for better performance, unless and until we have higher bandwidth speed properly configured for each terminal in an organization, we shall be only paying for the services without utilizing to its maximum.

3. Virtualization

Traditionally if we want to transfer the applications and from one server to another due to power failure or any other reason, one has to take a backup of database, setting up related applications and services. Once done we need to reinstall operating system on another piece of hardware restoring applications, database and settings. This process consumes time up to 24 hours or more and money. Virtualization helps by easily transferring the container that includes required settings for seamless services. This is done by using clients installed software like Virtual Box or VMware Fusion. The server installed piece of software is called hypervisor like Vsphere that is used as management software. During the installation if client software one shall configure the required amount of RAM, processor, storage and so on with different servers. The management software is installed on the administrating terminal which connects the client servers giving graphical view for further processing. The fact here to worry about is even though hypervisor (management software) is free and open source, one has to pay for professional license copy about \$3000 (approximately Rs 1, 50,000) and other services integrated to have configured cloud successfully working in organization.

4. Sharing instances of Operating system in the cloud

Instead of having hosted servers in the company with specified requirements, the Cloud Technology is allowing the users to pay for instances of the servers available on the data centers. The user has to log on, specify the requirements hardware and software, the duration required for and pay for the same. The major limitation here is that, once the access is granted on the cloud for data storage assuming a public cloud, the data center may be located in Boston and the user is accessing it from Maharashtra. In this case the data needs to be relocated into the nearest data center say in Mumbai for highest speed. Assuming a data in Terabits (TB) per hour, the user has to pay for data transfer from Boston to Mumbai. With the fluctuating internet speed end user hardly have access to applications and services in Kbps.

5. Conclusion

This paper is an attempt to introduce core facts about Cloud Computing. The organization that is planning to switch over on to the cloud depending on the organizational needs, 10 simple but important steps are to be considered design public, private or hybrid cloud. Once important information is uploaded on the cloud and the access to the source is denied using multiple

attacks, the administrator loses the control and the information. To avoid this situation some facts are given that cannot be neglected in the long run of setting up of cloud computing in the organization. Hence systematic allocation of organizational resources that are portable within Virtualized world frames for further computing.

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