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Integration of Cloud Computing for Load Balancing

Prof. P. A. Pawade[1], Prof. A. R. Wasukar[2]

Assistant Professor, CSE Department, JDIET, Yavatmal, India [1, 2]

Abstract: Cloud computing is a term used for anything that involves delivering hosted services. As cloud computing is a new technology which has both merits and demerits, load balancing is one of the major issue faced by cloud computing. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services), which can be rapidly provisioned and released with minimal management effort. The data centre is built with many systems where balancing is becomes a very difficult task especially for cloud computing. A cloud consists of several elements such as clients, datacenter and distributed servers. Resource sharing in a pure plug and play model that dramatically simplifies infrastructure planning is the promise of "cloud computing". Cloud computing systems fundamentally provide ac-cess to large pools of data and computational resources through a variety of interfaces. Load balancing is the process of distributing the load among various nodes of a distributed system to improve both resource utilization and job response time while also avoiding a situation where some of the nodes are heavily loaded while other nodes are idle or doing very little work. In this paper we are trying to get the idea of cloud computing in regard with load balancing.

Keywords: Virtualization, Load Balancing, Servers, Database, Cloud.

I. INTRODUCTION

This Cloud computing is an on demand service in which shared resources, information, software and other devices are provided according to the clients requirement at specific time. It's a term which is generally used in case of Internet. The whole Internet can be viewed as a cloud. Capital and operational costs can be cut using cloud computing. Cloud computing is Internet based computing where virtual shared servers provide software, infrastructure, platform, devices and other resources and hosting to customers on a pay-as-you-use basis. All information that a digitized system has to offer is provided as a service in the cloud computing model. Users can access these services available on the "Internet cloud" without having any previous know-how on managing the resources involved. Thus, users can concentrate more on their core business processes rather than spending time and gaining knowledge on resources needed to manage their business processes.

Cloud computing customers do not own the physical infrastructure; rather they rent the usage from a third-party provider. This helps them to avoid huge . They consume resources as a service and pay only for resources that they use. Most cloud computing infrastructures consist of services delivered through common centres and built on servers. Sharing resources amongst can improve, as servers are not unnecessarily left idle, which can reduce costs significantly while increasing the speed of application development. More currently though, cloud computing refers to the many different types of services and applications being delivered in the internet cloud, and the fact that, in many cases, the devices used to access these services and applications do not require any special applications.

A Cloud system consists of 3 major components such as clients, datacenter, and distributed servers. Each element has a definite purpose and plays a specific role. End users interact with the clients to manage information related to the cloud.

Clients : Generally fall into three categories as:

Mobile: Windows Mobile Smartphone, smartphones, like a Blackberry, or an iPhone.

Thin: They don't do any computation work. They only dispaly the information. Servers do all the works for them. Thin clients don't have any internal memory.

Thick: These use different browsers like IE or mozilla Firefox or Google Chrome to connect to the Internet cloud.

Now-a-days thin clients are more popular as compared to other clients because of their low price, security, low consumption of power, less noise, easily replaceable and repairable etc.

Datacenter : Datacenter is nothing but a collection of servers hosting different applications. A end user connects to the datacenter to subscribe different applications. A datacenter may exist at a large distance from the clients. Now-a-days a concept called virtualisation is used to install a software that allow multiple instances of virtual server applications.

Distributed Servers: Distributed servers are the parts of a cloud which are present throughout the Internet hosting

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different applications. But while using the application from the cloud, the user will feel that he is using this application from its own machine.

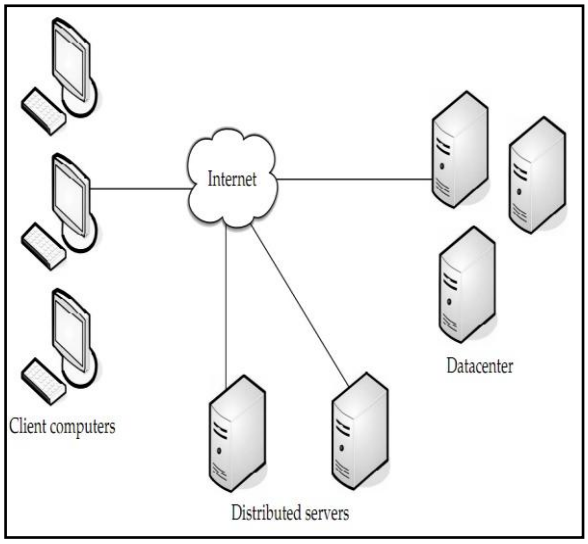

Fig. 1.1 Components of Cloud Computing

II. SERVICES PROVIDED BY CLOUD COMPUTING

Once a cloud is established, how its cloud computing services are deployed in terms of business models can differ depending on requirements. The primary service models being deployed (see Figure 1) are shown in fig.:

Fig. 2.1 Services of Cloud

A. Software as a service (SaaS)

In SaaS, the user uses different software applications from different servers through the Internet. The user uses the software as it is without any change and do not needs to make lots of changes or doesn't require integration to other systems. The provider does all the upgrades and patching while keeping the infrastructure running The client will have to pay for the time he uses the software. The software that does a simple task without any need to interact with other systems makes it an ideal candidate for Software as a Service. Customer who isn't inclined to perform software development but needs high-powered applications can also be benefitted from SaaS.

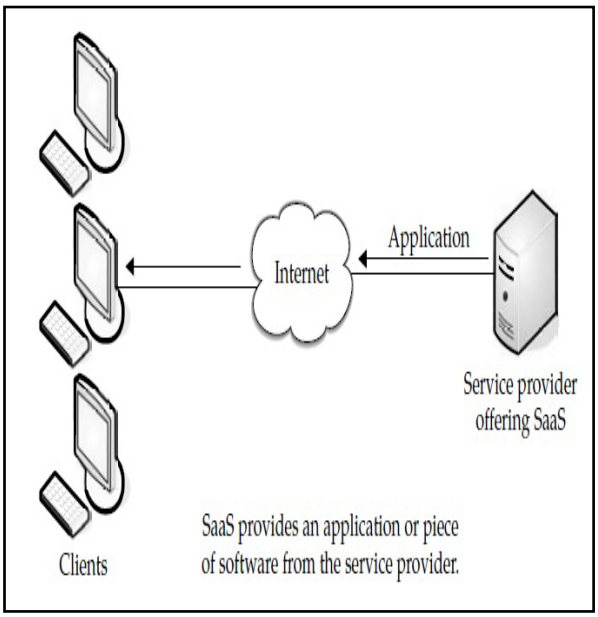

Fig. 2.2 SaaS

B. Platform as a service (PaaS)

PaaS provides all the resources that are required for building applications and services completely from the Internet, without downloading or installing a software [2]. PaaS services are software design, development, testing, deployment, and hosting. Other services can be team collaboration, database integration, web service integration, data security, storage and versioning etc.

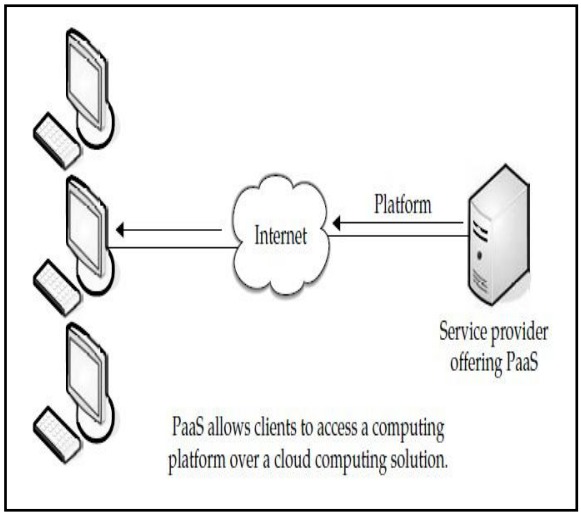

Fig 2.2: Platform as a service (PaaS)

C. Infrastructure as a service (IaaS)

IaaS, the capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited

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control of select networking components (e.g., Host firewalls) [3] [4].

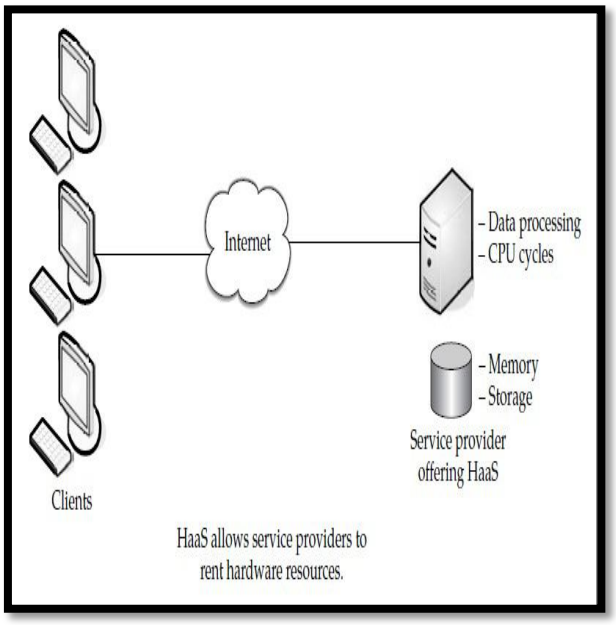

Fig 2.3: Infrastructure as a service (IaaS)

The increase in web traffic and different application in the web world is increasing day by day where millions of data are created every second, the Big Data is the big thing. Load balancing has become a very popular research field due to need of balancing the load on this heavy traffic [5]. Cloud computing as new computing technologies use virtual machine instead of physical machine to host, store and network the different nodes for their specific purpose. The load is done on CPU load, memory capacity, network. Load Balancing is done in such a way that all the load are distributed among various nodes in a distributive system. Failure of any node in the network will lead to unavailability of web resource in the web world. Load balancing should be able to provide scalability and availability [6]. Many authors agree with the definition of Cloud Computing as it consists of clusters of distributed computers (Clouds) providing on-demand resources or services over a network with the scale and reliability of a data centre

III. LOAD BALANCING

It is a process of reassigning the total load to the individual nodes of the collective system to make resource utilization effective and to improve the response time of the job, simultaneously removing a condition in which some of the nodes are over loaded while some others are under loaded. A load balancing algorithm which is dynamic in nature does not consider the previous state or behavior of the system, that is, it depends on the present behavior of the system. The important things to consider while developing such algorithm are : estimation of load, comparison of load, stability of different system, performance of system, interaction between the nodes, nature of work to be transferred, selecting of nodes and many other ones [7] . This load considered can be in terms of CPU load, amount of memory used, delay or Network load.

A. Goals of Load balancing

The goals of load balancing are:

- To improve the performance substantially
- To have a backup plan in case the system fails even partially
- To maintain the system stability
- To accommodate future modification in the system

IV. TYPES OF CLOUD COMPUTING

There are four different deployment models of cloud computing:

A. Public Cloud

Public or external cloud is traditional cloud computing where resources are dynamically provisioned on a fine-grained, self-service basis over the Internet or via and or from an off-site third-party provider who bills on a fine-grained basis.

B. Community Cloud

If several organizations have similar requirements and seek to share infrastructure to realize the benefits of cloud computing, then a community cloud can be established. This is a more expensive option as compared to public cloud as the costs are spread over fewer users as compared to a public cloud. However, this option may offer a higher level of privacy, security and/or policy compliance.

C. Hybrid Cloud

Hybrid Cloud means either two separate clouds joined together (public, private, internal or external) or a combination of virtualized cloud server instances used together with real physical hardware. The most correct definition of the term "Hybrid Cloud" is probably the use of physical hardware and virtualized cloud server instances together to provide a single common service. Two clouds that have been joined together are more correctly called a "combined cloud".

D. Private Clouds

Private clouds describe offerings that deploy cloud computing on private networks. It consists of applications or virtual machines in a company's own set of hosts. They provide the benefits of utility computing-shared hardware costs, the ability to recover from failure, and the ability to scale up or down depending upon demand.

V. APPLICATIONS OF CLOUD COMPUTING

A. Google Drive:

Built off of Google Docs, Google Drive lets you port files among PCs, tablets and smartphones. Drive comes with 5 GB of free cloud storage. And, you can create docs,

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spreadsheets, presentations, drawings and more, just like Google Docs.

B. Microsoft SkyDrive:

This app allows cloud storage and file sharing through synced folders. You can view and edit SkyDrive files from any smartphone or tablet with the SkyDrive mobile app. Though it works for both Macs and PCs, additional services like settings backup and automatic photo upload to camera roll are available for Windows 8 and Windows Phone users.

C. DropBox:

DropBox allows you to sync files and folders across various platforms. The mobile app gives you access to all your DropBox files, which you can also share with other users. There's also a DropBox for teams that's designed for small businesses.

VI. CONCLUSION

Cloud computing offers an opportunity for consumers to meet economic goals by using computing resources with small or modest up-front costs; also cloud computing promotes business agility by reducing the costs of pilot efforts, and may reduce costs to consumers through economies of scale. Cloud computing has potential to foster more efficient markets through swift leasing of computing resources. Cloud computing systems are complex networked systems that are affected by traditional computer and network security issues, such as the need to provide data confidentiality, data integrity, and system availability. By imposing uniform management practices, cloud providers may be able to improve on some security update and response issues. Clouds, however, have the potential to aggregate private, sensitive information about customers in cloud data centers. The goal of load balancing is to increase client satisfaction and maximize resource utilization and substantially increase the performance of the cloud system thereby reducing the energy consumed and the carbon emission rate. Also the purpose of load balancing is to make every processor or machine perform the same amount of work throughout which helps in increasing the throughput, minimizing the response time and reducing the number of job rejection.

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