

## Load Balancing in Private Cloud using Eucalyptus

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### ABSTRACT

Cloud computing makes use of on-demand network access to the resources such as servers, storage and applications. Cloud storage refers to the delivery of storage resources to the end users over the Internet. When the utilization of private cloud storage increases, then absolutely there will be a increase in the storage demand which leads to expand additional storage nodes. So, at this particular period, the storage nodes should be balanced in terms of load. Load balancer allows us to distribute the workload and balance it between two or more cloud servers. Using a load balancer in private cloud results in guaranteed service continuity and handles high traffic. Cloud Load balancing is the process of distributing workloads and computing resources across one or more servers. This kind of distribution ensures maximum throughput in minimum response time. The workload is segregated among two or more servers, hard drives, network interfaces or other computing resources, enabling better resource utilization and system response time. Thus, for a high traffic website, effective use of cloud load balancing can ensure business continuity. This paper proposes a method to load balance a private cloud using Eucalyptus.

**Keywords:** Load balancer, Cloud Computing, Eucalyptus, Private Cloud

### I. INTRODUCTION

Cloud Computing plays an important role for providing various services. It is a style of a trendy technology meant for different systems with very large scale services which share with various number of users. It reflects the current trends in business, mobility, productivity, Big data analytics, social networking and so on to deliver software and services over the Internet <sup>[1]</sup>. Several Private cloud platforms are provided as software stacks such as Open Nebula, Open Stack, and Eucalyptus are helpful in minimizing in license costs.

Limited number of servers and thousands of users are accessing different services at same time would result in heavy traffic and huge response time. A load balancer was deployed in the cloud to distribute tasks among virtual machines, to provide response time in a quick manner and also helps in providing fault tolerance. The incoming request was taken into consideration and the load balancer was responsible to distribute traffic among virtual instances in eucalyptus cloud.

Cloud computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications [2]. A private cloud is a cloud computing platform built on your own hardware and software. It has many advantages along with some crucial issues to be resolved in order to improve reliability of cloud environment. One of the issues is load balancing. The load can be CPU load, memory capacity, delay or network load. In clouds, load balancing, as a method, is applied across different data centers to ensure network availability by minimizing use of computer hardware, software failures and mitigating recourse limitations.

In this proposed technique, the load balancing in private cloud is maintained using a open source environment which is Eucalyptus. Eucalyptus is an open source cloud platform that enables organizations to create private clouds inside their data centres using existing virtualized infrastructure [3]. Eucalyptus enables IT organizations to build Amazon Web Services (AWS)-compatible private clouds that can pool together existing virtualized IT resources and provide them to its customers in a flexible, on-demand, pay-as-you-go basis. Fig 1 shows the benefits of private cloud.

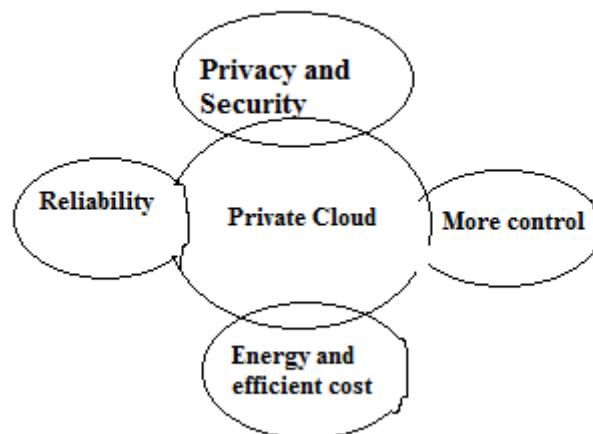


Fig. 1

## II. RELATED WORK

The main objective of Load Balancing is to maintain system firmness, improve system performance, protect from system failures and so on. This section describes different Load Balancing techniques and their related works.

Yuqi Zhang et al. [4] addressed that high Performance Computing (HPC) applications need large amount of data for computation and storage management. As it involves large amount of data the application face challenges like time cost of data movements between the data centers, and to keep a relative load balancing of data centers. Here, an algorithm (steal-and-p2p) is devised by combining the algorithms of data streaming and file sharing of

P2P system and high performance collective communication algorithm of parallel distributed system to achieve high and stable performance. Xiao Qin <sup>[5]</sup> proposed that load balancing deals with developing high-performance cluster computing platforms. The performance of I/O-intensive workloads leads to imbalance in disk I/O resources which makes the existing CPU/Memory aware load balancing schemes suffer significantly. The disk I/O resource under I/O-intensive workloads becomes a performance bottleneck.

Brototi Mondal et al <sup>[6]</sup> applied that load balancing involves selection of nodes to execute a task in that cloud and to see the effectiveness of the resources. As cloud describes both platform and type of application servers are needed for provisioning, configuring, reconfiguring and de-provisioning. The algorithm is well studied by comparing its performance with round Robin and First Come First Serve (FCFS) algorithm. Jiann-Liang Chen <sup>[7]</sup> proposed that Private and Public clouds serve as the backbone for a variety of different cloud computing service models. Currently the industry has been successfully adapting to common types of cloud computing service models like Iaas, Paas, and Saas. Cloud computing uses virtual devices to reduce server power costs and minimize hardware costs. To improve cloud computing systems performance based on Eucalyptus cloud platform, an optimal load balancing mechanism called EuQoS system is proposed.

D.S.Shaji et al. <sup>[8]</sup> addressed that the Energy efficient Load Balancing approach uses the Global Load Optimization (GLO) method which allocates the resources in a dynamic manner using load factor. Chamoli et al <sup>[9]</sup> discussed the need for Load Balancing and presented several Load Balancing techniques. Mohit Kumar et al. <sup>[10]</sup> proposed to decrease the makespan time and enhance the utilization of resources and compared Min-Min algorithm, FCFS, and SJF in all conditions. Buyya et al <sup>[11]</sup> presented that the Intercloud environment supports scaling of applications across multiple vendor clouds. Finally, their result demonstrates that federated cloud computing obtains significant performance gains with respect to response time and cost saving under dynamic workload situations. Ajit et al <sup>[12]</sup> proposed a VM level load balancing approach using weighted signature. The primary goal of their suggested approach is to analyze three existing algorithms to reduce the response time of the user. Lu et al <sup>[13]</sup> applied a load balancing for extra tasks which are migrated from overloaded virtual machine to under-loaded virtual machine at different host using particle swarm optimization algorithm.

### **III. PRIVATE CLOUD COMPUTING**

A cloud computing model in which an enterprise uses a proprietary architecture and runs cloud servers within its own data center is a private cloud computing platform. The main characteristics of private cloud are its single-tenant architecture, on-premises hardware, direct control of underlying cloud infrastructure <sup>[14]</sup>.

Load balancing is used to distribute a larger processing load to smaller processing nodes for enhancing the overall performance of system. In cloud computing environment load balancing is required distribute the dynamic local workload evenly between all the nodes. Load balancing helps in fair allocation of computing resource to achieve a high user satisfaction and proper Resource utilization <sup>[15]</sup>. Load balancing is dividing the

traffic between all servers, so data can be sent and received without any delay. In cloud environment many algorithms are available that helps in proper traffic loaded between all available servers .Most of them can be applied in the cloud environment with suitable verifications.

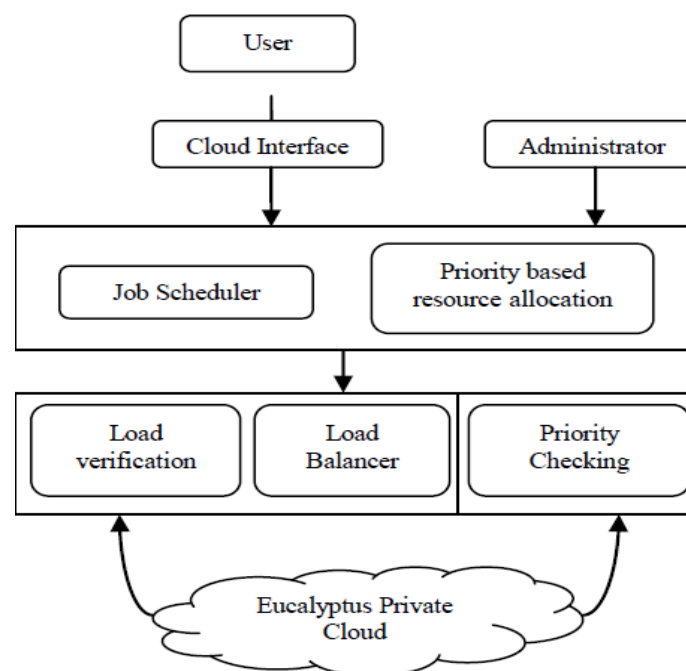


Figure. 2. Cloud Architecture

#### IV. EUCALYPTUS

Eucalyptus is an open source software platform for implementing Infrastructure as a Service (IaaS) in a private or hybrid cloud computing environment<sup>[16]</sup>.The Eucalyptus cloud platform pools together existing virtualized infrastructure to create cloud resources for infrastructure as a service, network as a service and storage as a service<sup>[17]</sup>. The name Eucalyptus is an acronym for *Elastic Utility Computing Architecture for Linking Your Programs To Useful Systems*.Eucalyptus was founded out of a research project in the Computer Science Department at the University of California, Santa Barbara, and became a for-profit business called Eucalyptus Systems in 2009<sup>[18]</sup>. Eucalyptus Systems announced a formal agreement with Amazon Web Services (AWS) in March 2012, allowing administrators to move instances between a Eucalyptus private cloud and the Amazon Elastic Compute Cloud (EC2) to create a hybrid cloud<sup>[19]</sup>. The partnership also allows Eucalyptus to work with Amazon’s product teams to develop unique AWS-compatible features.<sup>[20]</sup> The features of Eucalyptus are:

- Supports both Linux and Windows virtual machines (VMs).

- Application program interface- (API) compatible with Amazon EC2 platform.
- Compatible with Amazon Web Services (AWS) and Simple Storage Service (S3).
- Works with multiple hypervisors including VMware, Xen and KVM.
- Can be installed and deployed from source code or DEB and RPM packages.
- Internal processes communications are secured through SOAP and WS-Security.
- Multiple clusters can be virtualized as a single cloud.
- Administrative features such as user and group management and reports.

In addition to all the above mentioned features, Eucalyptus adds some more advantages like auto scaling, elastic Load Balancing , CloudWatch, Resource Tagging, Expanded Instance Types, Maintenance Mode <sup>[21]</sup>

## **V. CONCLUSION**

Cloud computing mainly deals with software, data access and storage services. Load balancing is the key issue for the storage of cloud. . It helps in proper utilization of resources and hence in enhancing the performance of the system. There are many nature inspired algorithms and optimal algorithms are applied to balance the load in cloud computing. This paper presents a concept of cloud computing in a private environment using Eucalyptus. It mainly provides security to the cloud. As a future enhancement, the private cloud can be taken in to account and the same can be experimented with Eucalyptus software to show the accurate results of the load balancing.

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