

# An Approach for Trusted Computing Of Load Balancing In Cloud Environment

Manoj Kumar Selkare\*, Vimal Shukla

KNP College of Science & Technology, RGPV, Bhopal, M.P

\*Email: selkaremanoj@gmail.com

**Abstract** – Cloud computing is a novel approach in order to use the resource of computing where these resources may be hardware or software. This facility is delivered as a service in the communication network. This facility known as cloud, which occurred from the use of a service as a cloud, which is an abstraction for the complex infrastructure system containing diagrams. Services of cloud computing involve trusted remote user data, and computer software. This paper proposed to an approach to efficient load balancing in cloud computing.

**Keywords** – Cloud, Load Balancing, Trusted Computer.

## I. INTRODUCTION

Cloud computing can be defined as a type of distributed and parallel system consisting of a compilation of virtualized and inter-connected computers that are dynamically provisioned, and presented as one or more integrated computing resources based on service-level agreements established through negotiation between the service provider and consumers [1]. The term cloud computing can also be defined as the ability to use computing resources such as applications, storage and processing power over the internet. These computing resources are hosted and managed by “someone else” i.e. the cloud service provider.

The cloud computing is pay-per use model. Resources can be accessed on-demand by everyone at anytime from anywhere via internet. The cloud is measured by a group of resources available in the system, including hardware such as CPU, memory, storage and software size. In addition to these, resources from other computing resources are available. These resources are used to provide end-users and consumers. This service is available regarding service plans.

The key concept of the application of cloud computing is to reduce the economic burden on computing resources. To develop and maintain these services the cloud service provider can apply the rent on the consumers. Although most of the cloud service are the responsibility of the manager of cloud to provide the resources requested by end users as soon as possible in an organized and efficient manner[1].

Cloud computing or cloud, is a keyword in order to express concepts of computation that have the large number of resources for computing and they are connected with some different real time system like network or in other words the Internet. Cloud computing is a synonym of distributed system in which there is a network having the ability to execute multi program at one computer simultaneously. [13] The term cloud computing is used to refer to network-based services seems to be provided by the actual server hardware, where these services are actually accessed by the virtual machine by a software which is executing on one or more actual machines. These virtual machine does not exist physically and but it might be possible can be moved and scaled up or down on the fly without affecting the end user, without doubt, a bit like a cloud. The Cloud Computing logical diagram is shown in figure 1.

## II. ADVANTAGES OF CLOUD COMPUTING

Computer is now a fundamental part of human life. We need computers everywhere, whether for work or in research. As the use of computers in our daily life increases, so is the computing resources needed. For big companies like Microsoft and Google, to mobilize resources as and when they need is not a problem but for small businesses, accessibility of resources becomes a challenge. With the massive failure of the resources such as machines, hard disk, software bugs, etc., this can be a problem for such communities. Cloud Computing offers a solution to this situation.

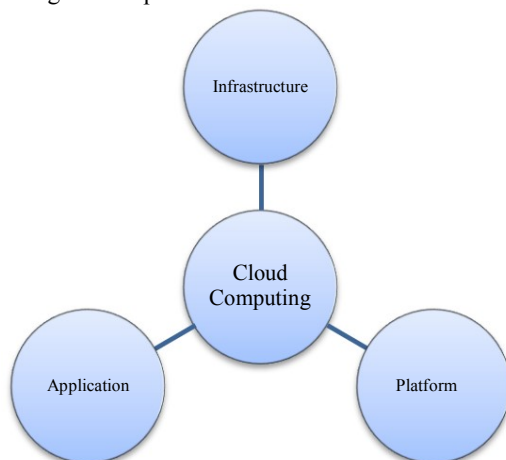


Fig.1. Cloud Computing Logical Diagram

The progress of Cloud Computing is huge with respect to business and personal uses. Cloud computing users can utilize the online resources on rent. Among many advantages or benefits, some are discussed here [3].

**A. Scalability:**

Scalability is the capability of a system to enhance the output under an augmented load when resources are added. Resources can be servers, hardware, storage and networking. The user can use the cloud computing resources according to his needs without having to buy resources quickly.

**B. Virtualization:**

In cloud computing, virtualization is a conception where users have a unique view of available resources, regardless of their position in the physical device. Therefore, it is advantageous to provide users with services with less physical resources.

**C. Mobility:**

Cloud computing means mobility since the users have full access to the applications at any instance of time by the use of internet.

**D. Reduced infrastructure costs:**

The pay per use model is supported in the cloud. In fact, it allows an organization to pay for the resources they need, do not make the investment in the resources available in the cloud. In addition, the supplier requires no infrastructure maintenance or upgrade costs. Increased storage: users or customers of cloud computing can store more data in the cloud than in private computer systems, they use regularly. It not only relieves the purchase of additional storage space, but also improves the performance of your regular system, as it is less busy. On the other hand, data or programs can be accessed at any time via the Internet, as they are available in the cloud.

### III. CLOUD COMPUTING

Cloud computing [2] is an emerging paradigm of business computing infrastructure viable information on the Internet that can be accessed from a Web browser by customers to meet their needs. This is a type of computing that is characterized by the availability of resources in a scalable and dynamic way of application, where the resource is used to represent the infrastructure, platforms, software, and storage. It promises to abolish the need for costly computer equipment companies and institutions alike. Cloud computing is, generally, defined for all matters related to the provisioning of hosting services over the Internet. It is based on the notion of computing resources, networking, storage and shared applications provided by a third party. There are different types of clouds. These can be deployed as private, public, and hybrid clouds. [2] In the private cloud, infrastructure is operated and managed solely by a particular organization. It can be managed by a third party also, on site or off site. In other words, a public cloud sells services to anyone on the Internet and its infrastructure will be made available to the public and are owned by an organization selling cloud

services. A private cloud is alleviation or a data centre network that offers hosted services to a limited number of customers or group of customers [17]. A hybrid cloud is a cloud computing environment that combines both public and private clouds. An organization provides and manages the resources of its own house and of others, provided externally, in the hybrid cloud. Ideally, the hybrid cloud approach allows a company to take advantage of the scalability, efficiency, flexibility and profitability

### IV. LOAD BALANCING

In general, load balancing [4] provides the ability to avoid the situation where some resources are overloaded system while others remain idle or under load. Load balancing aims to optimize resource use, minimize response time, maximize throughput and avoid single resource from being overloaded. This section provides a summary of the work related to load balancing techniques offered. Specifically, the main features are described in a wide range of approaches to load balancing.

Load balancing [4] is the process of reallocation of the total expenses of the individual nodes of the collective system, to gain a better response time and also a good use of resources. Cloud computing is an Internet computing in which load balancing is one of the difficult tasks. Several methods are used to make a better system that affect the loads on nodes in a balanced way but due to network congestion, use of bandwidth, etc, problems had occurred. These problems were solved by some existing techniques. A load balancing algorithm is dynamic in nature it means it does not taken into account the previous state or behavior of the system i.e., this algorithm depends only on the actual behavior of the system. There are several objectives related to load balancing to improve performance significantly, to maintain system stability, etc. According to the current state of the system, algorithms of load balancing can be classified into two types, which are static algorithms and dynamic. The static algorithm was necessary prior knowledge of the system and does not depend on the current system. In the case of dynamic algorithm, this is based on the current system, and is more efficient than the static algorithm.

### V. PROPOSED METHODOLOGY

The user requests for service which may include, request for storing the data at cloud data enter, processing of some useful information and to run application (software) at cloud. The request is passed to the cloud controller policy from the broker through the web browser provide as interface. The requested user communicates to the broker of the service provider through Internet. Broker sends the task (cloudlet) to the cloud controller. The virtual machine manager of cloud controller will create the list of virtual machines according to individual user request specification. Each VM has different description a different task to execute.

The simulation tools which can be used in solving the problems or fulfilling the objectives came across during the survey for the dissertation work. They are:

➤ **CLOUDSIM**

Cloudsim is a new, general, and extensible simulation framework that allows modeling, simulation, and experimentation of emerging cloud computing infrastructures and application services. In cloud computing case, the simulation tools like Cloudsim offers significant benefits to the customers and providers. For customers, it allows them to test their services in controllable environment with free of cost and to check the performance before publishing to the real clouds.

➤ **ECLIPSE:**

Eclipse is a Java-based open source platform that allows a software developer to create a customized development environment (IDE) from plug-in constituents fabricated by the Eclipse members. Though Eclipse Platform is written in Java language, it allows the developers to develop and test code written in other languages too through the plug-in constituents it supports.

➤ **ANEKA:**

Aneka is a Cloud Application Development Platform (CADP) for developing and running compute and data intensive applications. As a platform it provides users with both a runtime environment for executing applications developed using any of the three supported programming models, and a set of APIs and tools that allow the users to build new applications or run existing legacy code.

**A. Inter quartile Range (IQR) method for finding dynamic threshold**

The inter quartile range (IQR) is an estimate of variability, based on dividing a data set into quartiles. It is the difference between the upper and lower quartile in a data set.

**Steps for finding Inter quartile Range:**

1. Sort the data set in increasing order.
2. Find the median for the ordered set (Q2).
3. Divide the data set into two halves.
4. Find the mean for the first half of the ordered data set (Lower Quartile Q1).
5. Find the mean for the second half of the ordered data set (Upper Quartile Q3).
6.  $IQR = \text{Upper Quartile} - \text{Lower Quartile}$ .

Here data set describes set of the host utilization. We propose a method based on two threshold values, lower threshold and upper threshold. The mean for the first half of the ordered data set (host utilization) is used to calculate the lower threshold value, while mean of second half of the ordered data set (host utilization) is used to calculate the upper threshold value. This is shown in example as follows:

Let us assume the utilization of each host (in terms of percentage).

List of host utilization [23,65,10,75,50,84,15,30,90,12]

After sorting [10, 12, 15, 23, 30, 50, 65, 75, 84, 90]

Median =  $(30+50) / 2 = 40$

First half [10, 12, 15, 23, 30], Second half [50, 65, 75, 84, 90]

After selection of VM from VMmigrationList1 check best suitable host from Most Likely Over loaded Host List and if its utilization after allocation is greater than previous utilization on the host along with power after allocation (Power after Allocation) is less than min Power then select this host for VM migration.

In algorithm 2 we replace host list by Most Likely Over loaded Host List which is defined as follows:

The proposed algorithm finds over loaded host first and then choose the virtual machine for migration from overloaded hosts and place this VM using VM placement algorithm for Overloaded Host. After load balancing, finds an under loaded host and select all the virtual machines from that host. Place these VMs over least loaded host by using VM placement algorithm for Under loaded Host. To evaluate the performance of the proposed scheme, the CloudSim toolkit was used for simulation and forming of cloud computing environments and evaluation of resource provisioning algorithm [13]. CloudSim is a new simulation framework for designing, simulation, and testing of emerging Cloud computing infrastructures and application services. It provides built in java classes to simulate datacenter, host machine and various strategies. User can evaluate the new strategies (policies, scheduling algorithms, mapping and load balancing etc.) using these all above together. The classes of the libraries can be replaced or extended, new policies can be defined and new scenarios for utilization can be ciphered

## VI. EXPERIMENTAL RESULTS

We have analyzed different scenarios by taking 10 hosts, 20 virtual machines and various numbers of tasks (cloudlets) i.e. load to evaluate the performance of proposed algorithm. It is essential to use workload traces from real system. In this simulation we have taken different work load. We have plotted different graphs based on different work load between two strategies, proposed method and the existing method (Static threshold based VM provisioning). The performance of the proposed approach is evaluated for various parameters (i.e. Energy Consumption, Number of VM migrations, Number of SLA violation and Average SLA violation). These results can vary according to the different environment setups.

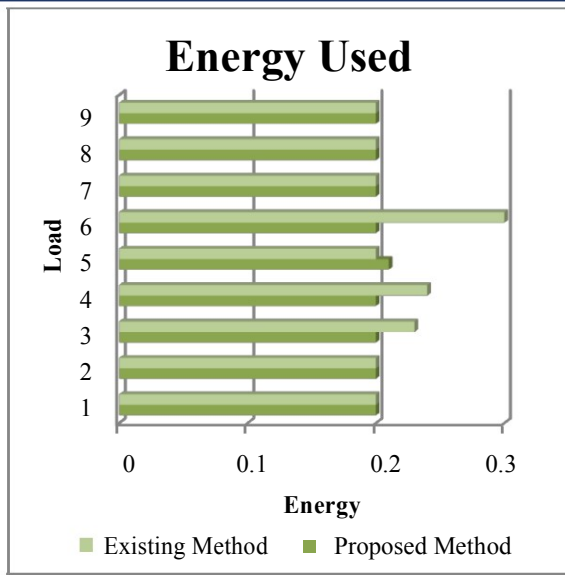


Fig.2. Energy Consumption Comparisons between Proposed and Existing Method

Energy consumption is compared for proposed method and existing method as shown in figure 2 from graph we have analyzed that proposed method; consumes less energy than existing method.

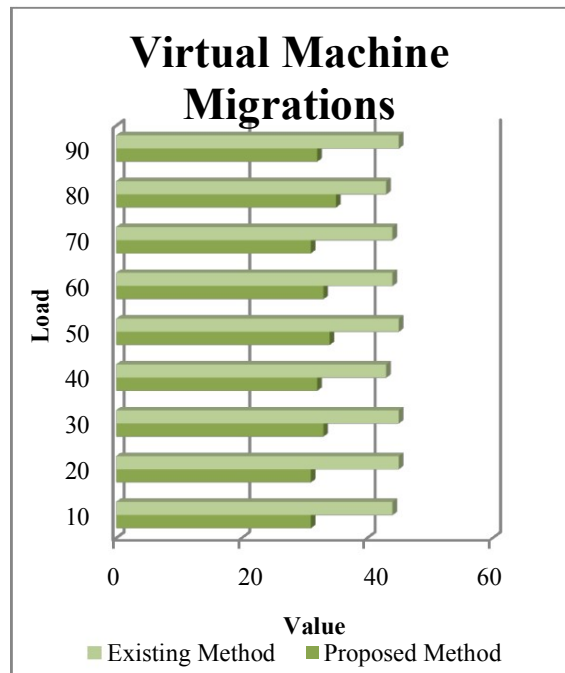


Fig.3. Number of VM Migration comparisons between Proposed and Existing method

Number of VM migrations is compared for proposed method and existing method in figure 3. From graph we have analyzed that proposed method; incurs less number of VM migrations than existing method.

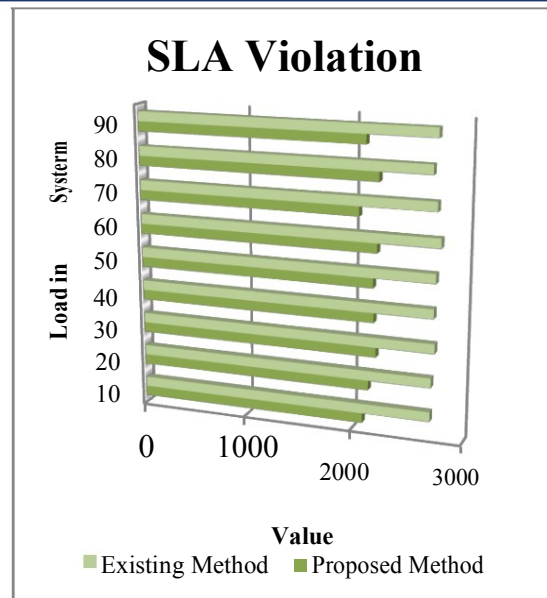


Fig.4. SLA Violation Comparisons between Proposed and Existing Method

Number of SLA violation is compared for proposed method and existing method in figure 4. From graph we have analyzed that proposed method; incurs less number of SLA violations than the existing method.

## VII. CONCLUSION

In Energy Efficient Dynamic Virtual Machine Consolidation algorithm. Host overloading may cause increase in virtual machine migration and SLA violation. The proposed method for resource allocation and load balancing is to minimize the number of virtual machine migrations and SLA violation.

## REFERENCES

- [1] R. Buyya, S. Venugopal, J. Broberg, and I. Brandic, Cloud Computing and Emerging IT Platforms: Vision, Hype, and Reality for Delivering Computing as the 5th Utility. Future Generation Computer Systems, 25(6): 599-616, Elsevier Science, June 2009.
- [2] Rodrigo N Calheiros, Rajiv Ranjan, Anton Beloglazov, Cesar AF De Rose, and Raj Kumar Buyya. CloudSim: A toolkit for modelling and simulation of cloud computing environments and evaluation of resource An Efficient VM Scheduling Technique in Cloud Computing Environment Page 59 provisioning algorithms. Software: Practice and Experience,41(1):23 50, 2011.
- [3] Eeraj Jan Qaisar, "Introduction to Cloud Computing for Developers Key concepts, the players and their offerings," Information Technology Professional Conference, IEEE©2012.
- [4] <http://www.vmware.com/ap/cloud-computing.html>
- [5] Komal Singh Patel and A. K. Sarje, "VM Provisioning Method to Improve the Profit and SLA Violation of CloudServiceProviders",IEEEInternational

- Conference, Cloud Computing in Emerging Markets (CCEM) 11-12 Oct. 2012.
- [6] YatendraSahu, R.K. Pateriya, and Rajeev Kumar Gupta, (2013) "Cloud Server Optimization with Load Balancing and Green Computing Techniques Using Dynamic Compare and Balance Algorithm,"5th International Conference on Computational Intelligence and Communication Networks© IEEE.
- [7] R. Buyya, A. Beloglazov, and J. Abawajy, "Energy-Efficient Management of Data Center Resources for Cloud Computing: A Vision, Architectural Elements, and Open Challenges", in proceedings of the 2010 International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA 2010), Las Vegas, USA, July 12-15, 2010.
- [8] Beloglazov and R. Buyya, "Adaptive Threshold-Based Approach for Energy-Efficient Consolidation of Virtual Machines in Cloud Data Centers", in Proc. 8th International Workshop on Middleware for Grids, Clouds and e-Science, Ney York : ACM, 2010.
- [9] Jing Huang, Kai Wu, and Melody Moh, "Dynamic virtual migration algorithms using enhanced energy consumption model for green cloud data centers," IEEE ©2014.
- [10] Mohammadalulhaquemoni, Romasaqasim, and Rashedur M rahman, "Energy-aware VM consolidation approach using combination of heuristics and migration control", IEEE ©2013.
- [11] K. Yang, J. Gu, T. Zhao and G. Sun , " An Optimized Control Strategy for Load Balancing based on Live Migration of Virtual Machine ", in Proc.6th Annual China grid Conference ( China Grid), Liaoning : IEEE, 2011.
- [12] P. Gt zijaba Leelipushpam and Dr.J.Sharmila, "Live VM migration techniques in cloud environment –A Survey," proceedings of 2013 IEEE Conference on Information and Communication Technologies (ICT 2013).
- [13] Khiyaita, A., et al. "Load balancing cloud computing: state of art." Network Security and Systems (JNS2), 2012 National Days of. IEEE, 2012.
- [14] Anton Beloglazov, jemalAbawajy, and RajkumarBuyya, "Energy aware resource allocation heuristics or efficient management of data center for cloud computing," future generation computer systems (FGCS), volume 28, Issue 5, Elsevier science, the Netherlands 2012.
- [15] R.N. calheiros, R.Ranjan, A.Beloglazov, and R.Buyya, (2011) "CloudSim a toolkit for modelling and simulation of cloud computing environments and evaluation of resource provisioning algorithms," Software-practice and Experience.
- [16] Cloud computing demystifying SaaS, PaaS and IaaS. [www.cloudtweaks.com/2010/05/cloud-computing-demystifying-saaspaas-and-iaas/](http://www.cloudtweaks.com/2010/05/cloud-computing-demystifying-saaspaas-and-iaas/), 2010.
- [17] Manishaben Jaiswal, "Cloud Computing And Infrastructure", International Journal of Research and Analytical Reviews , E-ISSN 2348-1269, P- ISSN 2349-5138, Volume.4, Issue 2, Page No pp.742-746, June 2017.