http://www.jctjournals.com

ISSN(ONLINE):2278 - 3814

Volume-12, Issue-07, July 2023

JOURNAL OF COMPUTING TECHNOLOGIES (JCT)

International Journal

Page Number: 01-06

Load Balancing Technique for Detection of Depression Using Cloud Computing

[1]*Priya Sah*, [2]*Prof. Varsh Thakur*

[1]*M.Tech Scholar*, [2]*Assistant Professor*,

[1,2] *Mittal Institute Of Technology, Bhopal*

Abstract— Cloud computing is emerging technology in current scenario of data storage and computation. The umbrella of cloud computing offering various services over internet such as infrastructure, software and platform of application. The process of services required multiple resources of cloud computing for delivering of services. The virtual machine is utility component of cloud computing systems. The performance of cloud computing system depends on the management of virtual machine and allocation of resources. Load balancing is approach to resolve issue of resource allocation and load balancing. The process of load balancing categories in two working different modes such as static load balancing and dynamic load balancing. The process of static load balancing approach applies the conventional CPU scheduling algorithms for allocation of resources and virtual machine. The limitation of static load balancing overcomes form dynamic load balancing approach. The dynamic load balancing approach deals with swarm intelligence algorithms. The swarm intelligence provides several heuristic and meta- heuristic algorithms for the scheduling of tasks in cloud computing systems. The existing system may not get the exact map of the workload load with the Virtual Machine (VM) before the execution of the tasks.

Keywords— Cloud Computing, Load Balancing, Virtual Machine, Cloud Sim, and PSO.

I. INTRODUCTION

In the ongoing years, distributed computing has developed as another stage for current circulated figuring condition which encourages the registering assets to the clients over the Internet. The cloud specialist co-ops dispense figuring assets (equipment and programming) on a rented premise to the client on pay per use mode. In distributed computing condition, there is 3 kind of administration models, for example, programming as an assistance ($SaaS$), Platform as a help ($PaaS$) and $IaaS$. The target of the IaaS administration gives is to expand the income and giving QoS to the clients. Generally, a solicitation from the clients come as virtual machines (VMs)[1]. The $IaaS$ gives a virtualization stage by making VMs that help clients in achieving their assignments inside a sensible time. In this manner, to accomplish the ideal targets, the processing assets of the framework should be overseen proficiently and plan the undertakings keenly to limit the makespan. Every client application is generally partitioned into a lot of errands and they should be planned on the reasonable VMs.

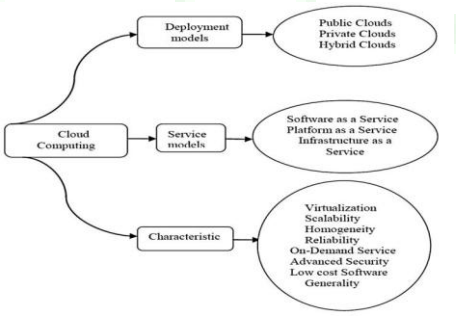


Figure 1 Cloud Computing Overview.

1.2 Edge Datacenter (Edc)

Fog computing shows a segment of the covering features of cloud with additional attributes, for instance, zone care and edge datacenter (EDC) game plan. Incalculable EDCs are geologically passed on to offer convenient, $low\ latency\ data$ straightforwardness over consistent requesting and responses. Circulated registering is standard to versatile estimation and planning of gigantic proportion of data (named as bigdata). This is in like manner notable for limit, and provisioning of benefits as showed by customer requirements [2]. Starting late, fog enrolling has been discussed to move $the\ cloud\ resources$ for the $EDCs$, where $EDCs$ are passed on beyond compose edges.

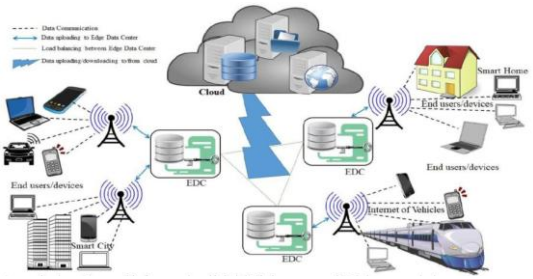


Figure 2: individual components and EDCs inter communication.

1.3 Load Balancing

Load balancing is a fundamental undertaking in distributed computing condition to accomplish the greatest usage of assets. Burden adjusting calculation might be *static or dynamic*, unified or conveyed with their upsides and downsides. Static burden adjusting plan are anything but difficult to execute and screen yet neglects to demonstrate heterogeneous condition of the cloud. On the opposite powerful calculations are hard to actualize however best fitted in heterogeneous condition. Dissimilar to incorporated calculation *where all the* distribution and booking choice are made by a solitary hub. In conveyed approach the heap adjusting calculation are *executed together by all* hubs *present in the* framework.

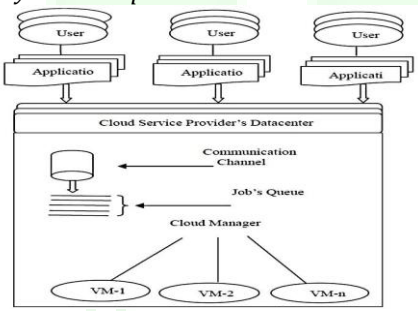


Figure 3: Cloud Architecture for Load Balancing

II. LITERATURE REVIEW

Shahbaz Afzal and colleagues [1] this essay provides a thorough and encyclopedic analysis of load balancing approaches. The benefits and drawbacks of current approaches are emphasized, and significant issues are resolved in order to design effective load balancing algorithms in the future. Additionally, the paper offers a fresh perspective on load balancing in cloud computing. The information was gathered between and in this work, a multilevel taxonomy-based classification that bases its decision on five criteria was presented. The "Nature of Algorithm" criterion was the most significant one employed in this paper. We divided the articles into two main categories based on this criterion: Ten of them are proactive in nature, while the other 25 are reactive.

Shadab Siddiqui and coworkers [2] for load balancing in cloud computing, the suggested QPSL Queuing Model uses an M/M/k queue with FIFO queue discipline. The model uses a Poisson distribution to estimate waiting lines and an exponential distribution to estimate service rates. For load balancing on various parameters, the suggested QPSL queuing model is also contrasted with other current queuing models. The suggested method organizes user requests in the queue using the QPSL queuing paradigm. In cloud computing, the QPSL queuing model provides consumers with improved service availability during periods of high load compared to the M/M/1 and M/M/k queuing models.

Tamilvizhi and colleagues [3] The suggested work offers a novel viewpoint on implementing a fault-tolerant mechanism that integrates the use of cloud servers, cloud selection to prevent network congestion, health monitoring for fault detection, and migration techniques to address problems as they arise. Large User on Demand Cloud Computing can expand the categorization, evaluation, and prediction of cloud resources. A more effective result was achieved when an Amazon EC2 cloud server was used to simulate the suggested concept. This proposed research project will be applicable to several real-time applications and will raise the QoS standards for potential future enhancements.

In addition to Vijayakumar Polepally [4], by dispersing an equal load while using less power, the load balancing technology aims to maintain a trade-off on servers. As a result, the load balancing method based on the constraint measure is presented in this work. Each virtual machine's capacity and load are first calculated. The load balancing algorithm is used to distribute the jobs if the virtual machine's load exceeds the balanced threshold value. The load balancing algorithm presented in this research depends on the constraint measure (CMLB). The load and capacity of each virtual machine are first determined before the jobs are distributed among the virtual machines according to the round-robin scheduling algorithm.

In addition to Subhadarshini Mohanty [5], in this article, a JAYA algorithm that employs fewer control parameters and produces a more optimized output is employed for load balancing in a cloud. To evaluate the effectiveness of the suggested algorithm, comparisons with other evolutionary strategies are made. Tasks are mapped in a certain way in the proposed algorithm JAYA to balance load equitably by taking into account various VMs and the completion time of each task. In order to compare the effectiveness of the algorithms, tests are also done with PSO and GA.

Among others, Abiodun K. Moses [6] the load balancing method proposed in this paper (MMRR) combines the maximum-minimum and round-robin algorithms in such a way that jobs with long execution times are distributed using maximum-minimum and tasks with short execution times are distributed using round-robin. In order to improve cloud services for customers, cloud analyst tool software was utilized to introduce the new load balancing approaches and conduct a comparison analysis with the current algorithm. In conclusion, the suggested hybrid load balancing method of Round Robin and Maximum Minimum significantly improved cloud services.

Abderraziq Semmoud [7] is one example. The distributed load balancing solution we suggest in this paper is based on an adaptive starvation threshold. It makes an effort to maintain system stability, maximize server usage, reduce overall migration costs, and minimize cloud response times

while balancing the load among the servers. With the proposed approach, system stability is maintained while makes pan and VM idle time are reduced. To do this, our approach restricts task migration when VM load exceeds a starvation threshold, an adaptive limit. The threshold is changed frequently to account for the amount of idle time and the volume of requests that have been fulfilled. This approach improves the QoS of the cloud computing system by taking into account the priority level values of the jobs in addition to balancing the load.

Subhadarshini Mohanty and others Using the advantages of the particle swarm optimization (PSO) technique, et al. [8] have suggested a met heuristic load balancing algorithm using Particle Swarm

Optimization (MPSO). The suggested strategy tries to reduce task overhead and maximize resource utilization. Along with the best solutions of the initial PSO, random mutation of best solutions for getting new solutions is used in performance comparisons with Genetic Algorithm (GA) and other well-known algorithms on several measures like makes pan calculation and resource utilization. In addition, a deterministic approach to producing some solutions using VM is presented. In terms of makes pan and typical resource usage, multi-PSO produces better results.

Among others, Sambit Kumar Mishra [9] this work load balancing is a crucial component of cloud job scheduling. The cloud network is subject to a variety of loads, including memory load, CPU demand, network load, etc. The process of load balancing involves identifying overloaded and under loaded nodes and then distributing the load among them. To maximize various performance metrics in cloud computing, researchers put forth a variety of load balancing strategies. We have provided a taxonomy for cloud-based load balancing techniques. A succinct description of this study discusses performance parameters that have been considered in the literature and their consequences. In this study, we have discussed numerous load balancing methods in various cloud computing settings. A system architecture is presented with unique models for the host and virtual machine.

Awatif Ragmani and colleagues [10] In order to enhance load balancing in the cloud environment, this study presents a novel hybrid algorithm based on fuzzy logic and ant colony optimization (ACO) ideas. Unfortunately, the enormous number of requests handled and the servers available at any given time render the traditional load balancing algorithms useless. The suggested algorithm takes into account the cloud's load balancing and response time goals. Additionally, the performance this algorithm uses an evaporation process from the pheromone experiment to prevent an earlier convergence to suboptimal solutions

III. PROBLEM IDENTIFICATIONS & OBJECTIVE

Allocation of resource and management of process in cloud computing play an important role for balancing of load. *Load balancing is process* in which process the dedicated *resource* fully utilized and generate maximum profit in business. The conventional process of cloud computing used the process of task scheduling for the load balancing. Now a days the cloud user volume is increases. The huge volume of users' needs $inter - cloud\ load\ balancing$ process. The $inter - cloud\ load\ balancing$ is new area of research. In this area share two or more different cloud resources. The sharing of resources provides the concept of elastic load balancing. In elastic load balancing virtual machine play an important role for the sharing of resources. The intercloud sharing of resource faced a problem of HTTP traffic and the process of allocation is low. These issues discuss in problem statement of interclub resource sharing [27, 28].

IV. IMPLEMENTATION SOFTWARE AND ARCHITECTURE

4.1 Overview

Load balancing is major issue in public cloud computing. The public cloud computing infrastructure consists of hardware, software and platform for the execution of public demand and request. For the handling of multiple requests of user cloud computing process used job scheduling and task scheduling process. The job and task scheduling process perform by job scheduler, for the selection of resource and job scheduler used scheduling algorithm such as first come fist and round robin.

4.2 Cloud Load Balancing

In cloud computing, the limited numbers of resource allocate the maximum consumer and handle maximum job profit. Due to this reason the process of cloud scheduling is overloaded and the performance of cloud computing is decrease. For the improvement of job scheduling and allocation of job required the process of load balancing technique. Initially cloud load balancing technique divided into two sections one is static load balancing technique and other is dynamic load balancing technique. The static load balancing technique used CPU scheduling such as round robin, first come first served and other static algorithm. Now a day's used dynamic algorithm such as genetic algorithm, ant colony optimization and many more algorithm based on heuristic function. Various authors and researcher used a concept of fuzzy logic and other classical set theory approach.

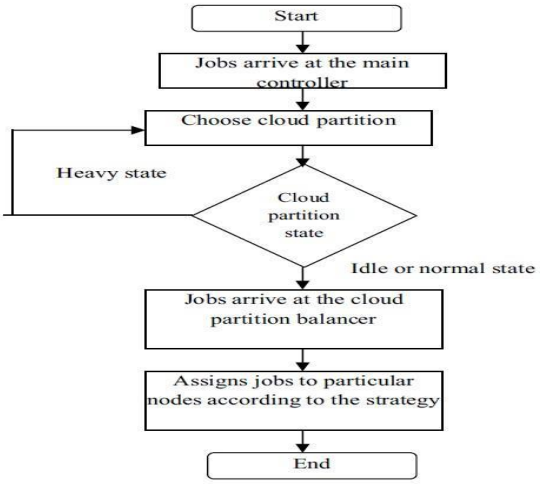


Figure 5 job allocation processes in public cloud computing model

4.3 Load Balancing Algorithms

Here discuss the load balancing selection algorithm. How to used different mode of load balancing algorithm for the process of job allocation and job selection. The process of categorization of algorithm depends on the process of work started and load balancing policy. The policy of load balancing divided into three section one is data sender, data receiver and combination of both.

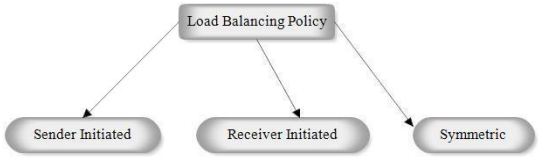


Figure 6 shows that distribution of load balancing policy

4.4 Genetic Algorithms

Genetic algorithm well knows method of searching and optimization algorithm. The process of genetic algorithm based on the dynamic population in the form of chromosome and genes selection. The selection of chromosome and genes based on fitness constraints algorithm. in genetic algorithm used three types of fitness selection algorithm such as wheel technique, rank based technique and parity based technique. The process of genetic algorithm define in three phase. The phase of genetic algorithm defines in flow chart.

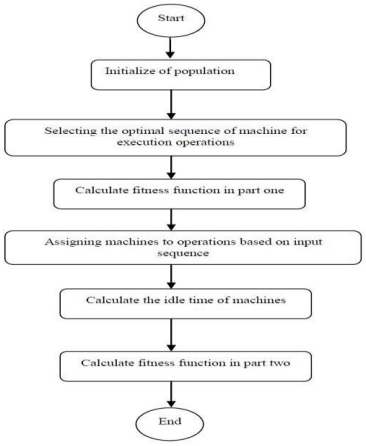


Figure 7 shows that working process of genetic algorithm

V. EXPERIMENTAL DETAILS

To associate *with various* organizations *in the cloud and to* keep up the benefits in a *balanced manner to fulfill the* need of advantages/establishment *by those* organizations, a couple of methodologies are required. Considering a middle course of action of components in the three normal cloud organizations, for instance, *Infrastructure as a Service* (*IaaS*), *Platform as a Service* (*PaaS*) and *Software as a Service* (*SaaS*).To survey the execution of appropriated registering methodologies in circulated figuring condition for the store modify and resource organization, here we are using various amounts of frameworks, for instance, ICLB, DAG and proposed methodology. *For the further* execution and assessment for execution appraisal *we used java programming* tongues with Net Beans *IDE* 8.0.1 instruments for finish use/comes about procedure

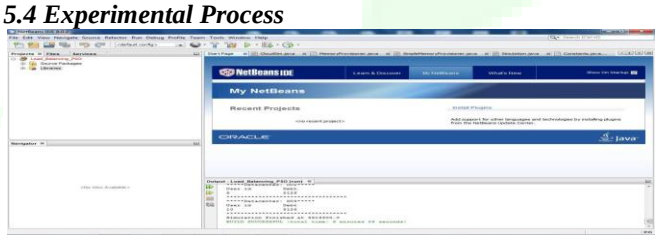
5.2. Introduction Of Java

Java is a programming tongue *made by James Gosling from Sun Microsystems* (*Sun*) *in* 1991. *The primary* straightforwardly available type *of* (*Java* 1.0) *was* released in 1995. *The Java virtual machine* (*JVM*) is an item utilization *of a PC that executes programs like a* veritable machine.

5.3 Cloud Analyst

Cloud Analyst is a GUI construct device that is produced in light of CloudSim design. CloudSim is a toolbox that permits doing demonstrating, recreation and other experimentation. The primary issue with CloudSim is that all the work should be done automatically. It permits the client to do rehashed recreations with slight change in parameters effortlessly and rapidly. The cloud expert permits setting area of clients that are creating the application furthermore the area of the server farms. In this different design parameters can be set like number of clients, number of demand produced per client every hour, number of virtual machines, number of processors, measure of capacity, system data transmission and other fundamental parameters. In view of the parameters the instrument registers the reenactment result and shows them in graphical shape. The outcome incorporates reaction time, preparing time, cost etc.By performing different reenactments operation the cloud supplier can decide the most ideal approach to distribute assets, in light of demand which server farm to be chosen and can advance cost for giving services.[29, 30] Cloud processing is the developing interne based innovation which accentuates business registering.

5.4 Experimental Process



Figur 8: *Shows the input page for analysis of database in* Cloud Computing Environment.

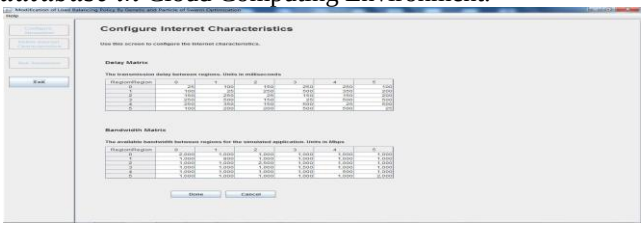


Figure 9: *Shows the Internet Characteristics and it's configuration* in *Cloud Computing Environment.*

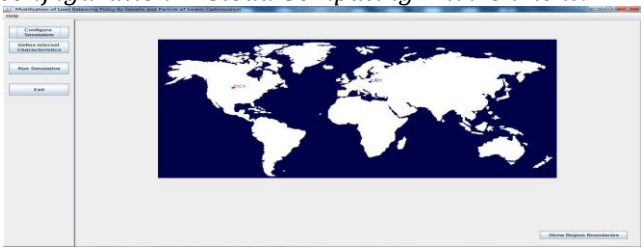


Figure 10: *Shows the Data center and User Database Cloud Computing Environment.*

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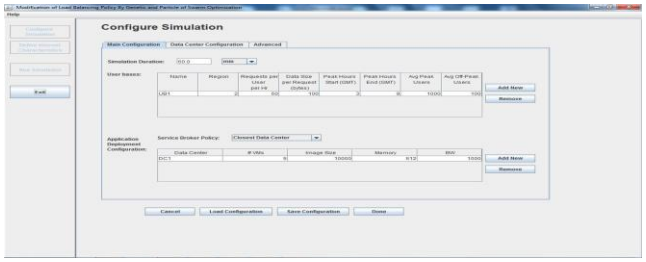


Figure. 11: *Shows the configuration Simulation* of *User Database and Data center* in *Cloud Computing Environment.*

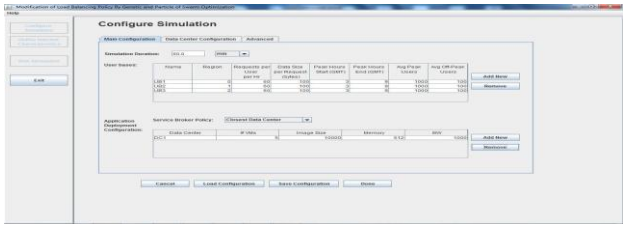


Figure 12: Shows the Addition of New Database to the user database in *Cloud Computing Environment.*

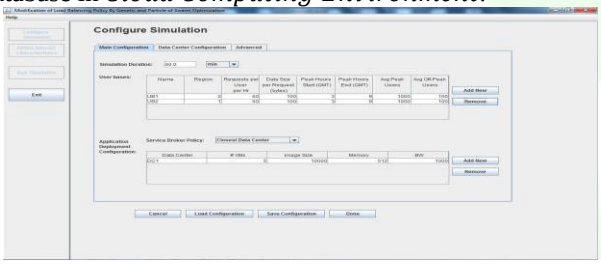
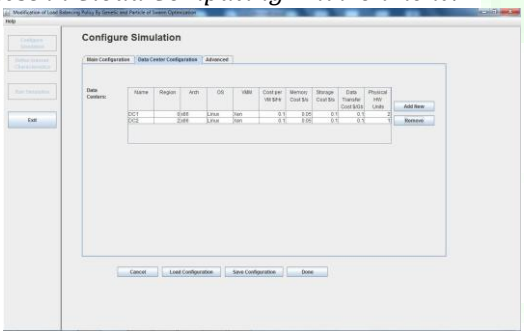


Figure 13: Shows the Removal of Database from user Database *in Cloud Computing Environment.*



Figur 14: Shows the Data Center Configuration in *Cloud Computing Environment.*

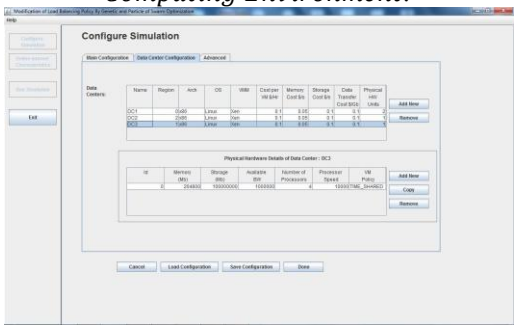


Figure 15 Shows the Addition of Data into Data Center in *Cloud Computing Environment.*

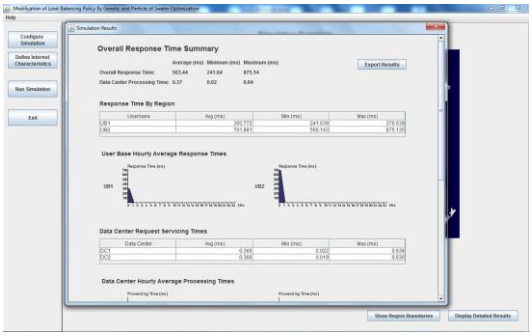


Figure 16: *Shows the response time and processing time* for ICLB Method in Cloud Computing Environment.

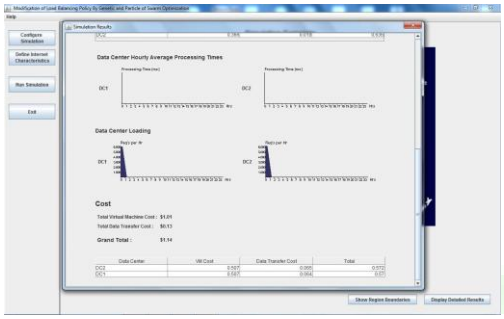


Figure 17: Shows the Data Center loading chart for ICLB Method in Cloud Computing Environment.

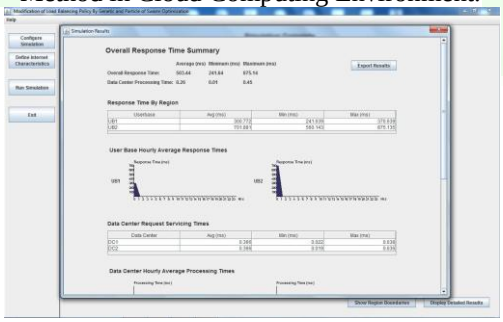


Figure 18: *Shows the Overall Response Time and Data Center Processing Time* for DAG method in *Cloud Computing Environment.*

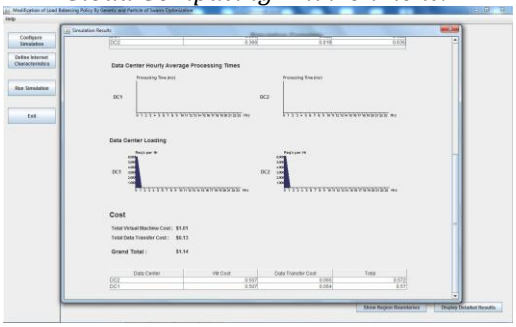


Figure 19: Shows the data loading on Data Center in *Cloud Computing Environment.*

Figure 20: *Shows the Overall Response Time* for User Database in *ud Computing meEnvironnt.*

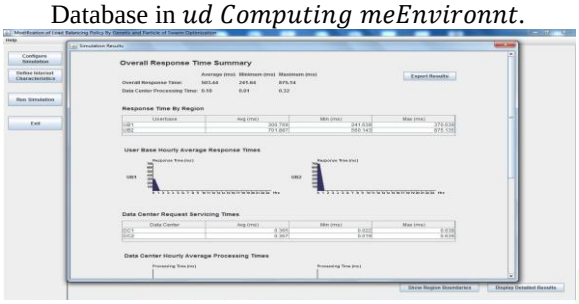


Figure 21: *Shows the Overall Response Time and Data Center Processing Time* for Proposed in *Cloud Computing Environment.*

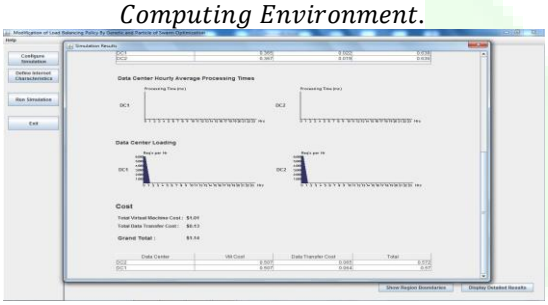


Figure 22: Shows the loading of data on Data Center for Proposed in *Cloud Computing Environment.*

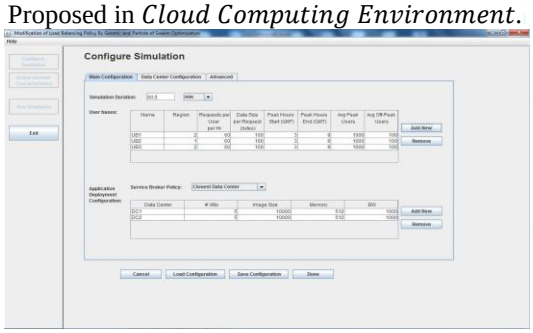


Figure 23: Shows the loading of new data of User Database in *Cloud Computing Environment.*

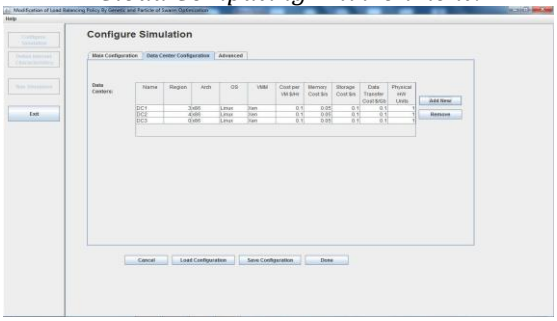


Figure 24: Shows the loading of new data of Data Center in *Cloud Computing Environment.*

Figure 25: *Shows the regions of user database* and *data center* in *Cloud Computing Environment.*

VI. CONCLUSION AND FUTURE WORK

6.1 Conclusions

The efficiency of cloud based infrastructure based on load balancing factor of different component of cloud computing. The load balancer plays a major role in cloud based services. The cloud based services interact with user and dedicated cloud infrastructure.The interaction of user and cloud operation request to transfer the load to virtual machine and other resources. For the improvement of load efficiency in cloud computing various researcher and cloud designer used swarm based job and task scheduling technique. The swarm based task scheduling technique is very efficient in compassion of old and traditional technique such and FCFS and round robin technique.

In this dissertation used particle swarm optimization algorithm for load balancing policy in cloud environments. The particle swarm optimization set the diverse property of virtual machine and request job. The define fitness constraints function partially allocated job for dedicate machine and the distribution of job according to the process job scheduler.

For the evaluation of performance used cloud simulator software such is called cloud analyst. The cloud analysis software is bag of composition of cloud environment and load balancing policy. In scenario of policy design two services one is genetic algorithm policy and other is PSO based policy. The PSO based policy reduces the load effect approx 10-12% in compression of genetic algorithm.

6.2 Suggestions For Future Work

The particle swarm optimization based load balancing policy is very efficient for the proper allocation of job according to dedicated virtual machine. The partial allocation of job allocation policy faced problem of minimum time span. The minimum time span factor effect the efficiency factor of particle swarm optimization policy.

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