A Hybrid Aproach Toward Improving Performance of Load Balancing in Cloud Computing

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Abstract— Cloud computing is a new emerging are in academics and industry. In cloud computing various service providers provide different services to customers for data storage, data processing. Cloud analyst is tool that is much useful for development and simulation of cloud environment before actual deployment is real world application. In the processing of cloud analyst various service broker polices and load balancing polies have been used for response of different users. In this paper a new hybrid approach has been purposed for load balancing in cloud computing. This approach use PSO based optimization for allocation VM's to different user base requests.

Keywords— *Cloud Computing, Load Balancing, FCFS, RR, GA, PSO*

I. INTRODUCTION

Cloud Computing : Cloud computing involve achieving coherence and economies of scale by using the sharing of resources. This is just like the electricity grid over a network. Cloud computing is a very wider concept of converged infrastructure and services. Cloud resources are relocated on demand and also shared by multiple users .This can work for allocating resources to users. This technique improve the use of computing power thus reducing environmental damage as well as since less power, air conditioning, rack space etc are required to perform variety of function. In cloud computing multiple users access a single server to fetch and change their data without buying license for different application.

Cloud Computing Application : Distributed computing is online improvement and use of Internet based processing and stockpiling. The cloud standards emerged from a direct mechanical need to enhance the asset use without affecting on buyer prerequisites, i.e. utilize the accessible assets all the more proficiently. At first server farms and server ranches utilized burden administration instruments much the same as the base Cloud standards, to guarantee high accessibility as per the current usage.

- **Infrastructure as a service (IaaS) and platform as a service (PaaS):** With regards to IaaS, utilizing a current framework on a pay-every utilization plan is by all accounts a conspicuous decision for managements retaining money on the expense of contributing to obtain, oversee and keep up an IT base. There are likewise examples where associations swing to PaaS for the same reasons while additionally looking to build the velocity of advancement on a prepared to-utilize stage to convey applications.
- **Private cloud and hybrid cloud:** Among the numerous motivations for utilizing cloud, there are two circumstances where associations are investigating approaches to evaluate a portion of the applications they hope for to convey into their neighborhood through the utilization of a cloud (particularly an open cloud). While on chronicle of test and betterment it might be restricted in time, embracing a half and half cloud methodology considers testing application workloads, hence giving the solace of a situation without the beginning speculation that may have been rendered futile ought to the workload testing come up short.
- **Test and development:** Likely the best situation for the utilization of a cloud is a test and improvement environment. This involves procuring a financial idea, setting up your surroundings through physical resources, huge labor and time. At that point come the establishment and arrangement of your stage. This can frequently augment the time it takes for an undertaking to be finished and stretch your developments.
- **Big data analytics:** One of the angles offered by utilizing distributed computing is the capacity to take advantage of immeasurable amounts of both organized and unstructured information to bridle the advantage of extricating business esteem. Retailers and suppliers are currently extricating data got from buyers' purchasing examples to focus on their publicizing and promoting battles to a specific section of the populace.
- **File storage:** Cloud can offer you the likelihood of putting away your records and getting to, putting away and recovering them from any web-empowered interface. The web administrations interfaces are typically straightforward. Whenever and place you have high accessibility, rate, versatility and security for your surroundings.
- **Fiasco recuperation:** This is yet another advantage got from utilizing cloud taking into account the expense viability of a debacle recuperation (DR) arrangement that accommodates a quicker recuperation from a lattice of distinctive physical fields at a much lower expenses that the conventional DR site with settled resources, inflexible systems and a much higher expense.

LOAD BALANCING:

Load balancing is the technique which makes sure that every processor within the system or every node in the network consume equal amount of strength and ends up approximately equal amount of work at any instant of time. The load can be spotted as data uploading capacity, CPU load or network delay. To improve both resource utilization and job response time, Balancer is responsible to distribute the load among various nodes of a distributed system. It also help in come over from the situation where few nodes are heavily loaded while rest other nodes are idle or lightly loaded. Now these days the load is balance, developers are focusing on related issues like how to increase network bandwidth and trims response time and postponement in the data transfer. Cost has become the main challenging issues in cloud computing so coordinators are need to be take care of cost at the time of providing the solution of the above stated issue of load balancing. To reform the performance of cloud architecture various load balancing mechanisms should be followed in a managed way. Overloaded nodes across the server and storage side often lead to performance degradation and are more vulnerable to different failures. Therefore, in cloud computing load balancing is needful to equally and evenly dynamic distribution of load over all available nodes.

II. LITERATURE REVIEW

Wang En Dong et al [1] "Oriented Monitoring Model of Cloud Computing Resources Availability" In this paper author recommended this paper researches on QoS-arranged cloud computing assets accessibility. Initial, a checking model of cloud computing resources accessibility is made. At that point, as indicated by the dynamic procedure of the electing a Template (Heading 2) cloud computing benefit, the accessibility of cloud computing resources is examined from QoS of a solitary cloud resource node which is portrayed by basic attribution and extraordinary attribution to QoS of some cloud assets which are associated by arrangement model, parallel model and blend model to give administration. By three models and the investigation of the single cloud administration asset, the accessibility of distributed computing administration is observed.

Qiang Guan et al [2] "A Cloud Dependability Analysis Framework for Characterizing System Dependability in Cloud Computing Infrastructures" In this paper author needs to say that we show a cloud constancy examination (CDA) structure with instruments to describe disappointment conduct in distributed computing foundations. We plan the disappointment metric DAGs (coordinated a cyclic diagram) to break down the connection of different execution measurements with disappointment occasions in virtualized and non-virtualized frameworks. We think about numerous sorts of disappointments. By looking at the created DAGs in the two situations, we pick up understanding into the effect of virtualization on the cloud dependability. This paper is the principal endeavor to study this critical issue. Likewise, we exploit the recognized measurements for disappointment location. Trial results from an on-grounds distributed computing test bed demonstrate that our methodology can accomplish high recognition precision while utilizing a little number of execution measurements.

Priyanka Gautam et al [3] "Extended Round Robin Load Balancing in Cloud Computing" In this paper creator recommended to balance the load on different data centers according to the task/cloudlets received and to allocate the appropriate data center or virtual machine to handle new cloudlets. The proposed work is basically an extension of round robin scheduling and randomized scheduling algorithm. The concept is further extended to support the cloudlets with different mips and mbs with the added functionality of random cloudlets/task selection. The proposed technique consider both cloudlets and processing time and file transfer time while selecting appropriate hosts for cloudlet(job) submission on distributed resource with an objective to minimize execution time and cost. The extended normal round robin scheduling method which have a primary condition for cloudlets to be of same processing time (MI) and processing size (MB). Some results of the starting and finishing times of cloudlets:

Task Id	**Starting and finishing time of cloudlets**		
	Start Time	Time	Finish Time
7	517.44	0.1	517.54
2	535.64	0.1	535.74
12	757.6	0.1	757.7
11	787.77	0.1	787.87
1	833.73	0.1	833.83
6	883.44	0.1	883.83
3	1057.69	0.1	1057.79
9	1067.97	0.1	1068.07
5	1096.63	0.1	1096.73
13	1127.4	0.1	1127.5
8	1161.14	0.1	1161.24
10	1254.87	0.1	1254.97

Task	Starting and finishing time of cloudlets		
0	1275.15	0.1	1275.25
14	1297.18	0.1	1297.28
4	1362.09	0.1	1362.19

Bhavan Bidarkar et al [4] "Round Robin Approach for Better VM Load Balancing in cloud computing" There are three types of VM Load Balancer that is Round Robin, Throttled and active monitoring load balancing algorithms. 1. Round Robin Load Balancer, 2. Active Monitoring Load Balancer, 3. Throtted Load Balancer. The Round Robin algorithm does not save the start of perivious allocation of a VM to a request from a given user base while the same state is saved in RR VM load balancer. Some results of overall response time and data center processing time are given below:

No. of VM's	Overall Response Time of RR Load Balancing		
	Avg(ms)	Min(ms)	Max(ms)
5	300.06	237.06	369.12
10	300.4	237.06	369.12
15	300.5	237.06	369.12
20	300.7	237.4	370.02
25	300.9	237.4	370.02

No. of VM's	Data Center processing time for RR Load Balancing		
	Avg(ms)	Min(ms)	Max(ms)
5	0.34	0.02	0.61
10	0.51	0.02	1.51
15	0.85	0.02	1.51
20	1.04	0.06	1.51
25	1.21	0.11	1.51

Brotoi Mondal1 et al [5] "Load Balancing in Cloud Computing using Stochastic Hill Climbing-A Soft Computing Approach", Cloud computing offers information and give numerous resources to users. There are two main families of procedures for solving a optimization problem. Complete method which guarantees either to find a valid assignment exists. The other Incomplete methods may not guarantee correct answer for all inputs. A variant of hill climbling[9] (SHC) is one of the incomplete approach for solving such optimization problems. The soft Computing based approach has been compared with two approaches with two approaches Round Robin and First Come First Serve.

Cloud Confi-guration	Overall Average Response Time Using Five Data Centers			
	DC Specification	RT in (ms) using SHC	RT in (ms) using RR	RT in (ms) using FCFS
CC1	Each with 25 VMs	235.86	243.57	251.03
CC2	Each with 50 VMs	230.84	238.06	244.04
CC3	Each with 75 VMs	229.46	233.88	239.87
CC4	Each with 25,50,75 VMs	225.64	231.16	238.97

Cloud Confi-guration	Overall Average Response Time Using Six Data Centers			
	DC Specification	RT in (ms) using SHC	RT in (ms) using RR	RT in (ms) using FCFS
CC1	Each with 25 VMs	235.86	243.97	251.26
CC2	Each with 50 VMs	230.84	238.34	244.04
CC3	Each with 75 VMs	229.46	233.67	239.87
CC4	Each with 25,50,75 VMs	225.64	231.496	238.97

Yiqiu Fang et al [6] "A Task Scheduling Algorithm Based on Load Balancing in Cloud Computing" Efficient assignment planning instrument can meet clients' requirements, and enhance the resource use, along these lines improving the general execution of the cloud computing environment. Be that as it may, the errand booking in matrix registering is frequently about the static assignment necessities, and the resources usage rate is additionally low. By new elements of cloud computing, for example, adaptability, virtualization and so on, this paper talks about a two levels errand booking component in light of burden adjusting in cloud computing. This assignment booking instrument can meet client's necessities, as well as get high resource use, which was demonstrated by the reproduction results in the CloudSim toolbox.

Mayur S. Pilavare1 et al [7] "A Novel Approach Towards Improving Performance of Load Balancing Using Genetic Algorithm in Cloud Computing". In the proposed work comparison of different techniques are done and observed. By observing the system we can conclude that the GA selected processors on the random basis and performs the GA over that here the processor higher fitness value are taken for use and the VM there having lowest fitness value are left as so. Simulation done using cloud simulator and results are

displayed according to the DCs and variation of virtual machines. Different algorithm compared are SHC, RR, FCFS algorithm for overall response time and processing time.

Task Id	Overall Response Time and Processing time		
	Start Time	Time	Finish Time
7	517.44	0.1	517.54
2	535.64	0.1	535.74
12	757.6	0.1	757.7
11	787.77	0.1	787.87
1	833.73	0.1	833.83
6	883.44	0.1	883.83
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8	1161.14	0.1	1161.24
10	1254.87	0.1	1254.97
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No. of VM's	Overall Response Time for RR Load Balancing		
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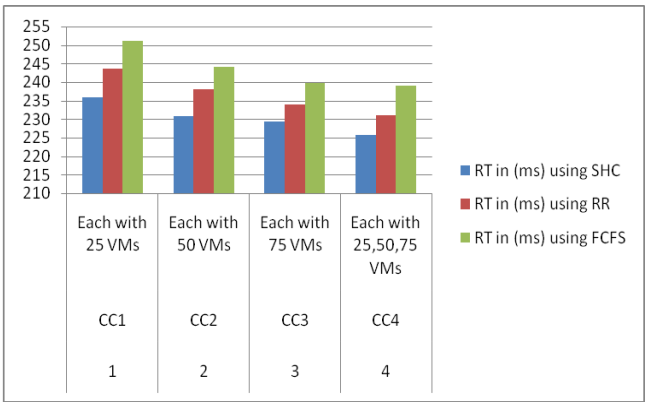
25	300.9	237.4	370.02

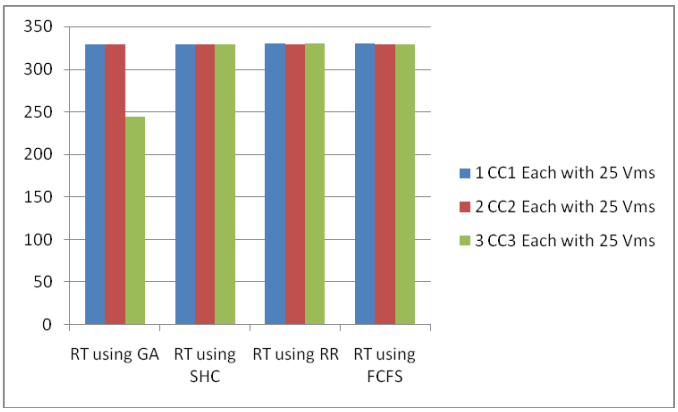
No. of VM's	Data Center Processing Time for RR Load Balancing		
	Avg(ms)	Min(ms)	Max(ms)
5	0.34	0.02	0.61
10	0.51	0.02	1.51
15	0.85	0.02	1.51
20	1.04	0.06	1.51
25	1.21	0.11	1.51

Cloud Confi-guration	Overall Average Response Time Using Five Data Centers				
	DC Specifi-cation	RT using GA	RT using SHC	RT using RR	RT using FCFS
CC1	Each with 25 Vms	329.01	329.02	330	330.11
CC2	Each with 25 Vms	328.97	329.01	329.42	329.42
CC3	Each with 25 Vms	244.00	329.34	329.67	329.44

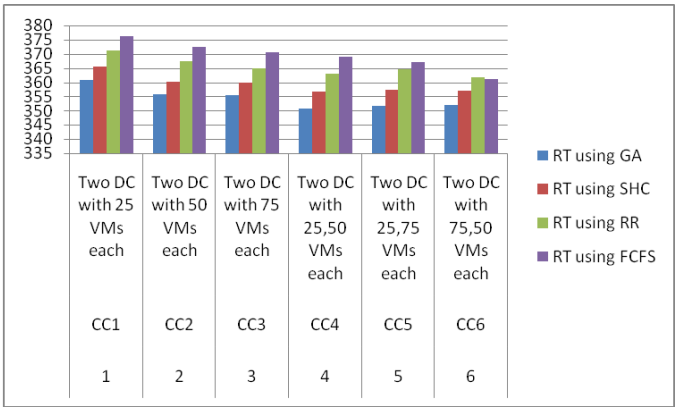
Cloud Confi-guration	Result comparison of GA with SHC, RR, FCFS using one data center				
	DC Specification	RT using GA	RT using SHC	RT using RR	RT using FCFS
CC1	Two DC with 25 VMs each	360.77	365.44	371.27	376.34
CC2	Two DC with 50 VMs each	355.72	360.15	367.49	372.52
CC3	Two DC with 75 VMs each	355.32	359.73	364.78	370.56
CC4	Two DC with 25,50 VMs each	350.58	356.72	362.91	368.87
CC5	Two DC with 25,75 VMs each	351.56	357.23	364.45	367.23
CC6	Two DC with 75,50 VMs each	352.01	357.04	361.61	361.01



Comparison of Data Centers Processing Time for Round Robin Load Balancing



Overall average Response Time (RT) using five data center



Result comparison of GA with SHC, RR, FCFS using one data center

III. PROBLEM FORMULATION

Cloud computing is became known as a new beau idea of large-scale distributed computing. In cloud computing environment, the irregular arrival of tasks with random utilization of CPU service time requirements can load a specific resources densely, while the other resources are idle or are less loaded. Load balancing is a methodology to distribute workload across number of computers, or other resources over the network. Study of the existing algorithms on Load Balancing to develop a base for the development of proposed Load Balancing Algorithm. In the processing of load balancing on the cloud environment different approaches have been used. In the previous approaches FCFS, RR, and SJF has been used for load balancing in the cloud computing. In this load balancing the major issue is about response time by the servers too different clients available in the network. The servers use the virtual machines on the system for different purposes. Bandwidth and number of jobs have been defined for every virtual machine available in the network.

To overcome the issue of maximum response time an artificial intelligence approach that is particle swarm optimization has been implemented for allocation of virtual machines on the cloud environment.

IV. PROPOSED WORK

In the purposed work cloud job scheduling and load balancing policy has been used for allocation of virtual machine to different user bases requests. In this process user base has been deployed in different regions of the world that transmit their request to different datacenters allocated by third party cloud server. These datacenters have memory capacity, bandwidth and processors that divide their memory to different VM's for allocation to different user bases for respond their requests. In the purposed work cloud analyst tool has been used for responding simulation of cloud environment that use different cloud service model, load balancing policies and cloud service brokers.

Various components cloud-sim execution has been described below.

- **User Base**

User based is a component that used to represents a group of users, their requests; peak hours; region and size average peak users and average off peak users available that transmit their request on cloud environment.

- **DataCenterController**

Data center controller is the component that has been used to control all the activities that has been occurred on cloud environment. Datacenter memory, number of virtual machines, sharing policy has been decided through data centered controller. Virtual machine cost and data transmission cost has been defined by this module.

- **InternetCharacteristics**

Internet characteristics is component of cloud analyst tool that has been used for defining different bandwidth from one region to another region and for delay matric that can be allowed to data transmission between a datacenter to other datacenter and user base to datacenter.

- **VM LoadBalancer**

Load balancing policy is component that has been used in cloud job scheduling to manage load on different cloud center in such a way so that minimum time taken has been

done by cloud service provider to respond user requests. In this paper round robin load balancing policy has been modified using nature inspired approaches that works in collaboration with Genetic algorithm and pollination based optimization approach.

- **CloudApplication ServiceBroker**

Cloud service broker policy is used to route traffic routing between different user bases and datacenters. These service broker policies have been used for data transmission from user base to datacenter on the basis of credentials available in service broker policy. Three main service broker policies have been defined by the cloud analyst simulation tools that are closest data center, optimize response time and reconfigure dynamically with load. The closest data center trails the traffic to the closest data center in terms of network latency from the source user base. The reconfigure dynamically with load routing policy works in the sense that whenever the performance of any particular data center degrades below a given threshold value then the load of that data center is equally distributed among other data centers

In the purposed work load balancing policies have been used for management of load on different services that has been used for cloud request response. These policies have been used and results have been obtained and discussed in next section.

- **User Base Configuration**

In this section user bases have been deployed in different regions of the world and these user bases have been configured for transmitting different request for transmission data to different datacenters.

User base configuration parameters

a. Name

This parameter define name of the user base that has been deployed in cloud simulation environment.

b. Region

This parameter define region of the user base that has been deployed in cloud simulation environment. The whole world map has been divided into six different regions number from 0 to 5.

c. Request/user/hour

In this parameter number of request have been defined by a particular use in an hour has been defined. On the basis of these request loads have been transmitted on cloud environment.

d. Size/request/

In this parameter size of the request has been defined. The size has been defined in bytes. Large number of bytes responds to transmit a heavy request on cloud.

e. Peak hours

This parameter defines peak hours that have been used user bases. Peak hours belong to time in which maximum users are using cloud services.

f. Average peak and off-peak users

In this parameter average numbers of user have been defined in peak hours and in off peak hours.

- **Data center Configuration**

In the processing of jobs of different datacenter various parameter for simulation has been defined at datacenters.

a) Name

This parameter define name of the datacenter that has been deployed in cloud simulation environment.

b) Region

This parameter define region of the datacenter that has been deployed in cloud simulation environment. The whole world map has been divided into six different regions number from 0 to 5.

c) Architecture and OS

In this parameter architecture and operating system used by datacenters have been defined. In this 32-bit architecture Linux based operating system has been used for simulation.

d) VMM

Virtual machine management has been used for defining virtual machine architecture in cloud computation. XEN open source virtual machine architecture has been used for data management. XEN divided CPU memory into different multi processors system that acts as virtual machines.

e) Cost

In the cost parameter of datacenters configuration various types of costs has been defined. VM cost, Memory cost, storage cost and data transmission cost has been defined for different datacenters that have been deployed.

f) Physical H/W Units

Number of physical units of H/w has been defined and these hardware units have been configured by providing id, memory, and storage, number of processors, processor speed and VM policy.

- **Internet characteristics Configuration**

a) Transmission Delay between regions

Transmission delay of data from one region to other region has been defined in the internet characteristics. On the basis of internet characteristics different matrix has been defines to compute transmission delay region to another.

R/R	Transmission Delay Matrix in ms					
	0	**1**	**2**	**3**	**4**	**5**
0	25	100	150	200	250	100
1	100	25	250	500	350	200
2	150	250	25	150	150	200
3	250	500	150	25	500	500
4	250	350	150	500	25	500
5	100	200	200	500	500	25

b) Bandwidth between Regions

Bandwidth between different regions defines provided bandwidth for data transmission from one region to another using internet connection. Bandwidth has been defined in Mbps.

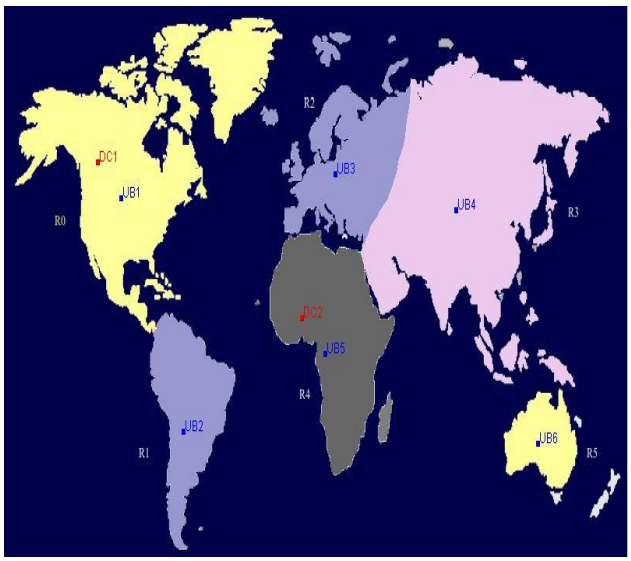
R/R	Bandwidth Matrix in mbps					
	0	**1**	**2**	**3**	**4**	**5**
0	2000	1000	1000	1000	1000	1000
1	1000	800	1000	1000	1000	1000
2	1000	1000	2500	1000	1000	1000
3	1000	1000	1000	1500	1000	1000
4	1000	1000	1000	1000	500	1000
5	1000	1000	1000	1000	1000	500

V. RESULT & DISCUSSION

In the purposed work different simulations have been done for load balancing in cloud computing using different load balancing policies. In purposed work simulation model have been developed by deploying various user bases and datacenters in different regions. These user bases have been allocated in different regions for transmitting requests to different users for processing their request. Datacenters have been used for responding user request by allocating virtual machines for different user requests.

Simulation configuration :

In the purposed work six user bases and two datacenters have been defined in cloud computing environment. These user bases and datacenters have been allocated in different regions for processing. Region boundaries have been defined by different color regions.



User base and DC allocation in Cloud Analyst

This figure represents location of different userbases and datacenters in different regions.

Name	User Base Configuration					
	R	Req user/ Hr	Size	Peak Hr	Peak users	Normal users
UB1	0	600	100	1-3	1500	100
UB2	1	1600	1000	3-5	500	1000
UB3	2	2000	1000	5-7	500	1000
UB4	3	1000	1000	7-9	1600	600
UB5	4	1000	1000	9-11	2000	700
UB6	5	7000	300	11-12	2000	800

This table represents user base configuration that has been used for simulation of cloud computing environment.

Name	Data Center Configuration					
	R	Cost Vm / hr	Memory cost/s	Data transfer / Gb	Speed	H/w Units
DC1	0	0.1	0.5	0.1	10000	2
DC2	4	0.1	0.8	0.1	10000	3

This table represents datacenter configuration that has been used for simulation of cloud computing environment.

Other Simulation Parameters	
Parameter	**Value**
User Grouping Factor in User Base	1000
Request Grouping Factor	10
Executable instruction length/request	100
Load Balancing Policy	RR, RR+GA, RR+PSO
Simulation Duration	60.0 min
VM Image Size	10000
VM Memory	512
VM Bandwidth	1000
Data Center Architecture	X86
Data Center OS	Linux
Data Center VMM	Xen

On the basis of these simulation parameters various different load balancing policies have been used for simulation of cloud computing. On the basis of these simulations various parameters have been evaluated for performance evaluation of purposed approach.

Performance evaluation parameters

Various performance evaluation parameters have been computed for performance evaluation of purposed work. These parameters are used for performance evaluation of purposed approach.

1) Over all Response Time

Over all response time has been measured for user base request completion and datacenter processing time. These parameters provide information about time taken by cloud service provider to respond requests.

2) Data center Request servicing Time

Datacenter request servicing time provide information about a single data centers for serving requests of different user bases.

3) Cost analysis

Cost analysis parameters provide information about different load balancing approaches using data transmission cost and total VM cost occurred.

Para-meter	Overall Response Time using different policies		
	RR	**RR+GA**	**RR+PSO**
ORT	278.46	272.72	271.91
DRPT	99.13	97.47	96.73

Data Center	Different Data Centers request servicing time using different policies		
	RR	**RR+GA**	**RR+PSO**
DC1	114.88	112.83	111.86
DC2	35.55	33.66	33.66

This table represents Datacenter request servicing time using different load balancing approaches

Cost	Total Data Transfer Cost using different policies		
	RR	RR+GA	RR+PSO
DC1	2958.10	2951.98	2945.23
DC2	1470.58	1450.29	1457.03

This table represents Datacenter request servicing time using different load balancing approaches

VI. CONCLUSION

Cloud computing is used for responding different user requests. There are many problems in load management in service providing. In this paper load balancing in cloud computing has been donning using new purposed approach that uses optimization for allocation VM on the basis of fitness and number of requests allocating to virtual machine. In this process fitness of all VM's has been measured and on the basis of global fitness VM has been allocated to user base request for response. In the proposed approach round robin hybrid wit particle swarm optimization has been used for load balancing and by analyzing various performance evaluation parameters we can conclude that proposed approach provide better results in terms of overall response time and datacenter processing time.

REFERENCES

[1] WANG EN DONG, WU NAN ; LI XU *"ORIENTED MONITORING MODEL OF CLOUD COMPUTING RESOURCES AVAILABILITY"*, 13874396, 1537 – 1540, IEEE, 2013

[2] QIANG GUAN, CHI-CHEN CHIU, SONG FU *"A CLOUD DEPENDABILITY ANALYSIS FRAMEWORK FOR CHARACTERIZING SYSTEM DEPENDABILITY IN CLOUD COMPUTING INFRASTRUCTURES"*, ISSN 978-1-4673-4849-2, 11 – 20, IEEE, 2012

[3] PRIYANKA GAUTAM1, RAJIV BANSAL2, *"EXTENDED ROUND ROBIN LOAD BALANCING IN CLOUD COMPUTING"*, ISSN: 2319-7242, IJECS, 2014

[4] BHAVANA BIDARKAR1, SHAKHEELA ATTIKERI2, RAMYA S. PURE3 *"ROUND ROBIN APPROACH FOR BETTER VM LOAD BALANCING IN CLOUD COMPUTING"*, ISSN: 2277-5668, IJEIR, 2014

[5] BROTOTI MONDAL1, KOUSIK DASGUPTA2, PARAMARTHA DUTTA3 "LOAD BALANCING IN CLOUD COMPUTING USING STOCHASTIC HILL CLIMBING-A SOFT COMPUTING APPROACH", SCIVERSE SCIENCEDIRECT, 2012

[6] YIQIU FANG "A TASK SCHEDULING ALGORITHM BASED ON LOAD BALANCING IN CLOUD COMPUTING", CONF. ON CLOUD COMPUTING, 2010, PP 271-277.

[7] MAYUR S. PILAVARE, AMISH DESAI "A NOVEL APPROACH TOWARDS IMPROVING PERFORMANCE OF LOAD BALANCING USING GENETIC ALGORITHM IN CLOUD COMPUTING", IEEE SPONSORED 2ND INTERNATIONAL CONFERENCE ON INNOVATION IN INFORMATION EMBEDED AND COMMUNICATION SYSTEM,

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