3rd International Conference on Research Developments in Applied Science, Engineering & Management
The Indian Council of Social Science Research (ICSSR) AEM–2018
Panjab University Campus, Chandigarh (India)
19th August 2018 www.conferenceworld.in ISBN : 978-93-87793-43-9

A NOVEL APPROACH OF FAULT TOLERATED TASK ALLOCATION MECHANISM IN CLOUD ENVIRONMENT

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ABSTRACT

Cloud computing is distributed computing using which we can store, share and access data over the Internet.Cloud computing stores the data and disseminated resources in the open environment. The data processing is increasing quickly day by day in cloud environment. This leads to an uneven distribution of overall work on cloud resources. So, a proper balance of the total load over the available resources is a major issue in cloud computing paradigm. Load balancing ensures that no single node will be overloaded and used to distribute workload among multiple nodes. It helps to improve system performance and proper utilization of resources. Load balancing is one of the main challenges in cloud computing which is required to distribute the dynamic workload across multiple nodes to ensure that no single node is overwhelmed. It helps in optimal utilization of resources and hence in enhancing the performance of the system. Hence, in this research work, a load balancing algorithm has been proposed to avoid deadlocks and to provide proper utilization of all the Virtual Machines (VMs) while processing the requests received from the users. The proposed algorithm can easily find out the faults. The main contribution of the research work is to balance the entire system load while trying to improve the response time of a given set of jobs.

Keyword: Cloud computing, Datacenter, Datacenter Broker. Load balancing, Virtual machine.

I.INTRODUCTION

Cloud computing is a service that is distributed over the internet for data access, computing and cloud storage by creating scalability, elasticity and low cost. Cloud applications utilize huge information centers as well as operational servers which are utilized to host net applications plus services. To reduce the computation time and to conquer the storage space issues, most of the organization now a day's make regular use of cloud computing

from the established process of calculation. It mainly focuses on allocating data and computations over a scalable information centers of network. Cloud computing ties together all these entities and delivers them as a single integrated entity under its own sophisticated management. Cloud computing is Internet ("cloud") based development and use of computer technology ("computing"). It is a style of computing in which dynamically scalable and often virtualized resources are provided as a service over the Internet. Users need not have knowledge of, expertise in, or control over the technology infrastructure "in the cloud" that supports them. Load balancing techniques in clouds, consider various parameters such as performance, response time, scalability, throughput, resource utilization, fault tolerance, and associated overhead. One of the foremost usually used applications of load balancing is to produce quality of service from multiple servers, typically called a server data center. Load balancing is dividing work load between a set of computers in order to receive the good response time and all the nodes are equally loaded and, in general, all users get served quicker. Static load balancing algorithms are not pre-emptive and therefore each machine has at least one task assigned for itself. Its aims in minimizing the execution time of the task and limit communication overhead and delays. This algorithm has a drawback that the task is assigned to the processors or machines only after it is created and that task cannot be shifted during its execution to any other machine for balancing the load. It allows for processes to move from an over utilized machine to an underutilized machine dynamically for faster execution. An important advantage of this approach is that its decision for balancing the load is based on the current state of the system which helps in improving the overall performance of the system by migrating the load dynamically. In distributed approach, every node severally builds its own load vector. The work is divided among all the nodes of the server. They aggregate the load information of alternative nodes. Distributed approach is additional appropriate for complicated and very large systems inside the cloud computing. In centralized approach, solely one node is liable for managing and distribution among the complete cloud system model. Alternative all nodes aren't liable for handling the requests and providing the response.

II.RELATED WORK

Nguyen KhacChien et al. (2016) has proposed a load balancing algorithm which is used to enhance the performance of the cloud environment based on the method of estimating the end of service time. They have succeeded in enhancing the service time and response time of the user.

Ankit Kumar et al (2016) focuses on the load balancing algorithm which distributes the incoming jobs among VMs optimally in cloud data centers. The proposed algorithm in this research work has been implemented using Cloud Analyst simulator and the performance of the proposed algorithm is compared with the three algorithms which are pre-exists on the basis of response time.

S. Yakhchi et al. (2015) discusses that the energy consumption has become a major challenge in cloud computing infrastructures. They proposed a novel power aware load balancing method, named ICAMMT to manage power consumption in cloud computing data centers. We have exploited the Imperialism Competitive

Algorithm (ICA) for detecting over utilized hosts and then we migrate one or several virtual machines of these hosts to the other hosts to decrease their utilization. Finally, we consider other hosts as underutilized host and if it is possible, migrate all of their VMs to the other hosts and switch them to the sleep mode.

Surbhi Kapoor et al. (2015) aims at achieving high user satisfaction by minimizing response time of the tasks and improving resource utilization through even and fair allocation of cloud resources. The traditional Throttled load balancing algorithm is a good approach for load balancing in cloud computing as it distributes the incoming jobs evenly among the VMs. But the major drawback is that this algorithm works well for environments with homogeneous VMS, does not considers the resource specific demands of the tasks and has additional overhead of scanning the entire list of VMs every time a task comes. The issues have been addressed by proposing an algorithm Cluster based load balancing which works well in heterogeneous nodes environment, considers resource specific demands of the tasks and reduces scanning overhead by dividing the machines into clusters.

Shikha Garg et al. (2015) aims to distribute workload among multiple cloud systems or nodes to get better resource utilization. It is the prominent means to achieve efficient resource sharing and utilization. Load balancing has become a challenge issue now in cloud computing systems. To meets the user's huge number of demands, there is a need of distributed solution because practically it is not always possible or cost efficient to handle one or more idle services. Servers cannot be assigned to particular clients individually. Cloud Computing comprises of a large network and components that are present throughout a wide area. Hence, there is a need of load balancing on its different servers or virtual machines. They have proposed an algorithm that focuses on load balancing to reduce the situation of overload or under load on virtual machines that leads to improve the performance of cloud substantially.

ReenaPanwar et al. (2015) describes that the cloud computing has become essential buzzword in the Information Technology and is a next stage the evolution of Internet, The Load balancing problem of cloud computing is an important problem and critical component adequate operations in cloud computing system and it can also prevent the rapid development of cloud computing. Many clients from all around the world are demanding the various services rapid rate in the recent time. Although various load balancing algorithms have been designed that are efficient in request allocation by the selection of correct virtual machines. A dynamic load management algorithm has been proposed for distribution of the entire incoming request among the virtual machines effectively.

Mohamed Belkhouraf et al. (2015) aims to deliver different services for users, such as infrastructure, platform or software with a reasonable and more and more decreasing cost for the clients. To achieve those goals, some matters have to be addressed, mainly using the available resources in an effective way in order to improve the overall performance, while taking into consideration the security and the availability sides of the cloud. Hence, one of the most studied aspects by researchers is load balancing in cloud computing especially for the big

distributed cloud systems that deal with many clients and big amounts of data and requests. The proposed approach mainly ensures a better overall performance with efficient load balancing, the continuous availability and a security aspect.

Lu Kang et al. (2015) improves the weighted least connections scheduling algorithm, and designs the Adaptive Scheduling Algorithm Based on Minimum Traffic (ASAMT). ASAMT conducts the real-time minimum load scheduling to the node service requests and configures the available idle resources in advance to ensure the service QoS requirements. Being adopted for simulation of the traffic scheduling algorithm, OPNET is applied to the cloud computing architecture.

Hiren H. Bhatt et al. (2015) presents a Flexible load sharing algorithm (FLS) which introduce the third function. The third function makes partition the system in to domain. This function is helpful for the selection of other nodes which are present in the same domain. By applying the flexible load sharing to the particular domains in to the distribute system, the performance can be improved when any node is in overloaded situation.

III.PROPOSED METODOLOGY

This section describes the methodology of the work and algorithm used in it

METHODOLOGY:

To execute the proposed algorithm, FTTAM (FAULT TOLERATED TASK ALLOCATION MECHANISM) is used as following.

Input: Virtual machine/Cloudlets/Unallocated tasks.

Output: Execution time/Average time/Cost.

Algorithm: FTTAM

Step 1. Input the Cloudlets(CL) and VMs (vml) to the CloudSim.

Step 2. for each Cloudlet k in CL.

find the Instruction length of cloudlet.
Calculate the threshold length
Assign the Cloudlet as High/Low
end

Step 3. for each v in vml
Categorize the Vm as High/Low.

end

Step 4. Sort High/Low VM list in (descending)$_{mips}$

Step 5. Sort High/Low Cloudlet lets in descending $_{length}$

Step 6. Create new list Backup Cloudlet and Blacklisted Vm

Step 7. If Vm fails

Mark the vm as blacklisted
Run the Backup task at another Vm

end

Step 8. Repeat the same procedure for all the cloudlets. **Abbreviation:** vm-virtual machine
cl-cloudlets
vml-virtual machine length.
mips-million instruction per second

Flow Chart

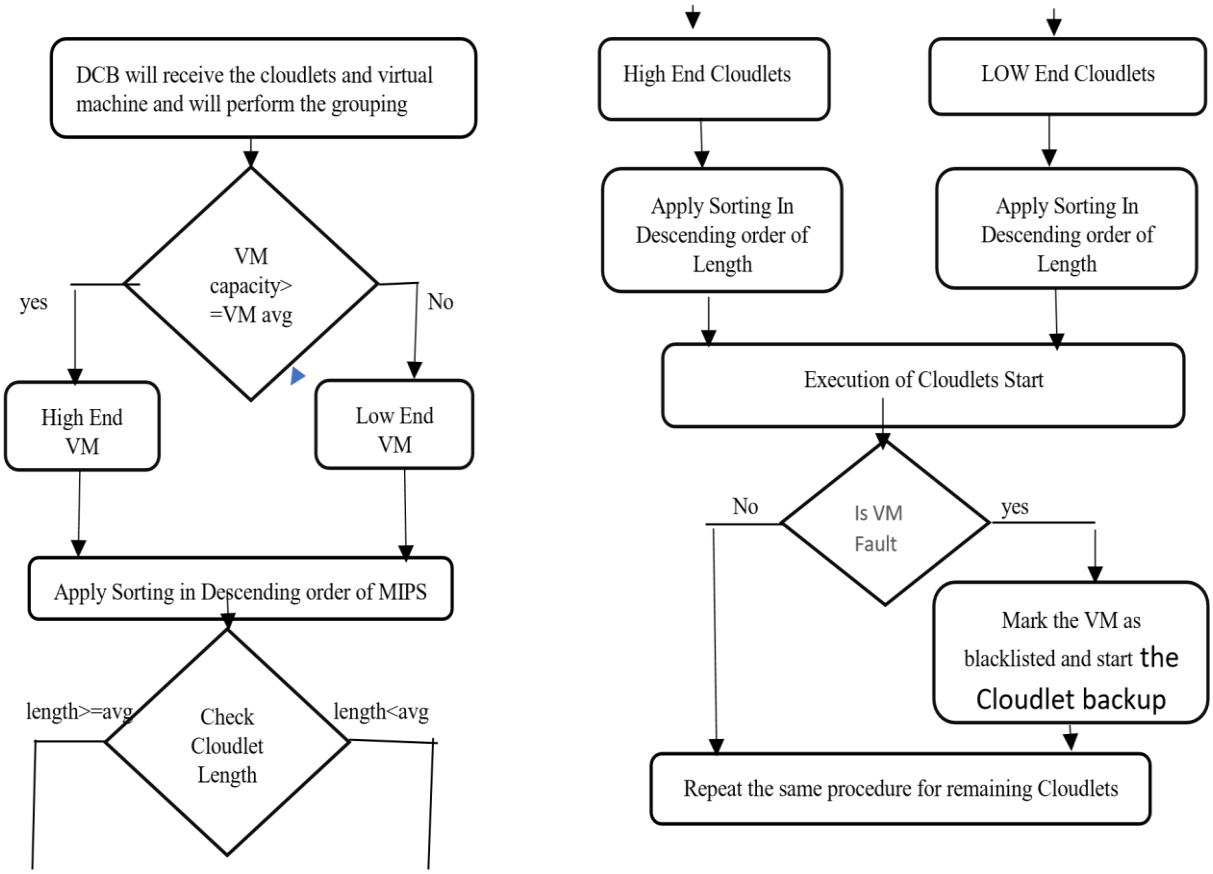

Fig 1: Flowchart of the proposed work

IV.EXPERIMENTAL SETUP

This algorithm is implemented by CloudAnalyst GUI based tool. It executes simulation and can generate a sequence of simulation experiments with small change in parameters. The main parameters are described in TABLE 1.

TABLE 1

Simulation	**Environment**
Operating System	Window 10
Programming Language	Java

Java Version	JDK8.0
Number of virtual machines Created	5
Bandwidth	100000
RAM	2048MB
Number of CPUs	1

V.RESULTS AND DISCUSSION

This section contains the performance of the proposed work. CloudSim toolkit is used to implementation and evaluation the following results as compare to existing work in TABLE 2.

TABLE 2: COMPARSION OF OVERALL PERFORMANCE

S no	No OF Cloudlets	Total Execution Time		Average Processing time		Total Processing Cost	
		Base	Proposed	Base	Proposed	Base	Proposed
1	1000	270351	266539	270.35	266.53	824842	813211
2	2000	540698	533130	270.34	266.56	1649670	1626580
3	3000	811044	799798	270.34	266.59	2474498	2440186
4	4000	1081391	1066388	270.34	266.59	3299325	3253552
5	5000	1351738	1332977	270.34	266.60	4124153	4066913
6	6000	1622084	1599646	270.34	266.60	4948981	4880521
7	7000	1892431	1866311	270.34	266.61	5773809	5694116
8	8000	2162778	2139202	270.34	266.61	6598636	6507486
9	9000	2433124	2399573	270.34	266.61	7423464	7321098
10	10000	2703471	2666112	270.34	266.61	8248292	8134309
11	20000	5406938	5332277	270.34	266.61	16496568	16268777

12	30000	8110404	7998518	270.34	266.61	24744845	24403481
13	40000	10813871	10664682	270.34	266.61	32993122	32537945
14	50000	13517338	13330843	270.34	266.61	41241399	40672404

Following different graphs are drawn based on processing time, average time and processing cost of proposed algorithm and based algorithm execution. In these graphs, y-axis represents the processing time, average time and processing cost and x-axis represents the different number of cloudlets for 5 virtual machines.

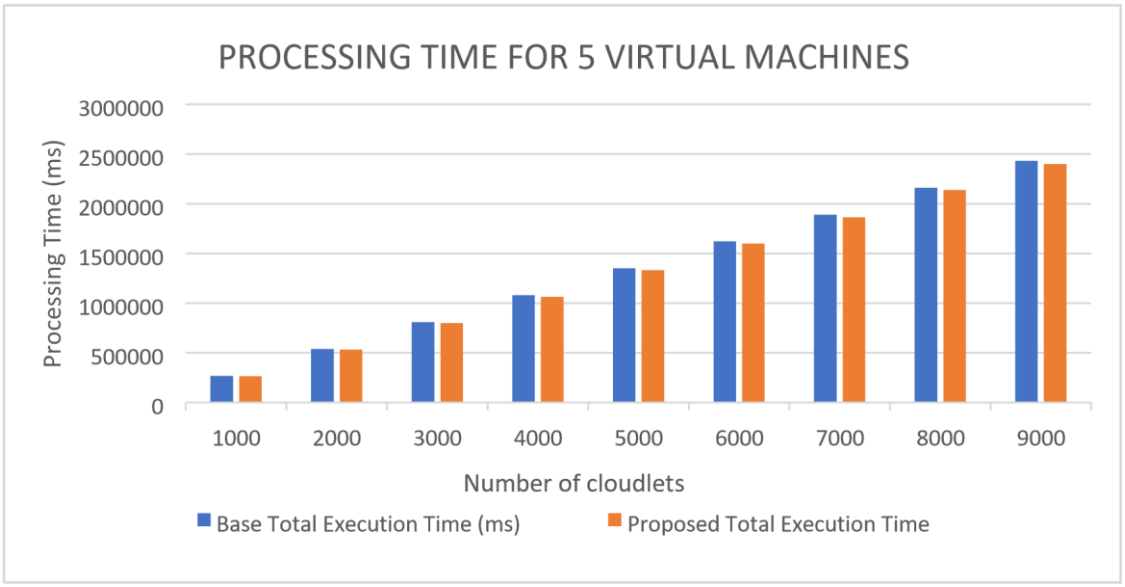

Fig 2: Processing Time with Based and Proposed Results

This graph represents the improvement of proposed processing time as compare to based work.

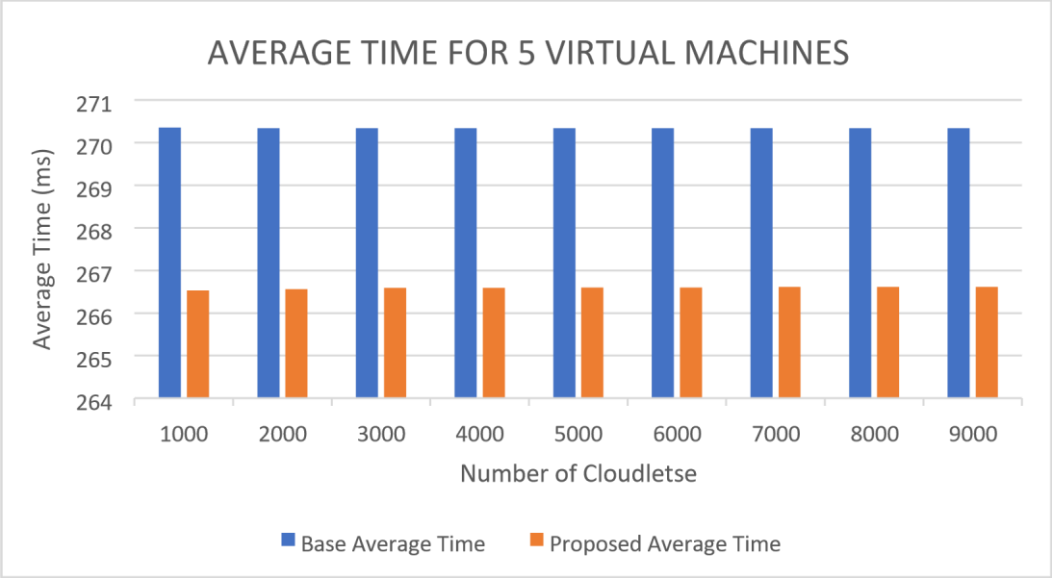

Fig 3: shows the comparison between Based Average Time and Proposed Average Time

This graph shows that the proposed algorithm has improved average time as compare to existing work.

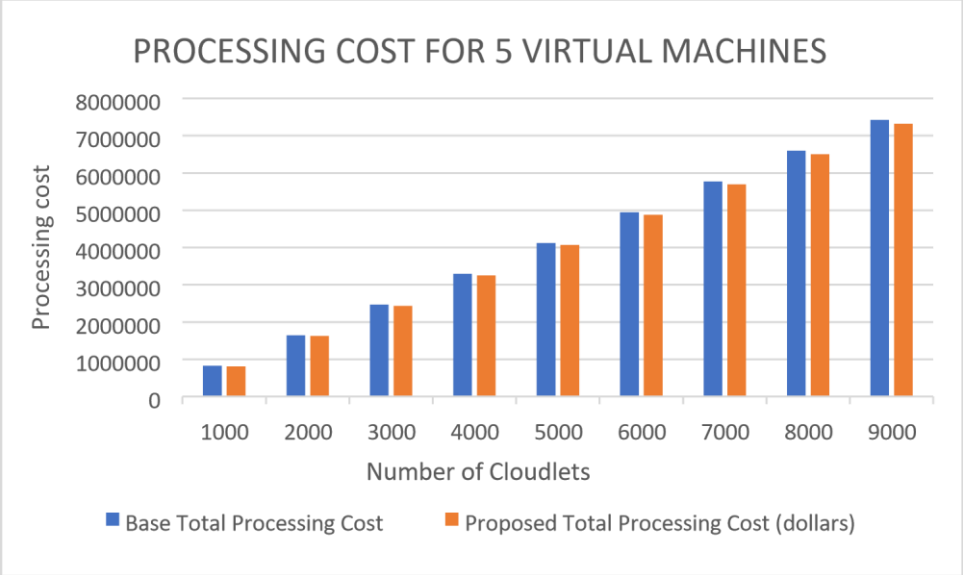

Fig 4: depicts the difference between processing costs Existing And Proposed results

This graph depicts the less processing cost as compare to based processing cost.

VI.CONCLUSION AND FUTURE SCOPE

In present days cloud computing is one of the greatest platform which provides storage of data in very lower cost and available for all time over the internet. But it has more critical issue like security, load management and fault tolerance. In this paper we are discussing load balancing approaches. Resource Scheduling is one of the most important tasks in cloud computing environment. The load balancing algorithm helps us to allocate the task efficiently to our resources. The proposed algorithm is performing better than the existing algorithm. It shows a decrease in response time (RT) and total processing cost by taking into consideration the MIPS (millions of instructions per seconds) of virtual machine and task length of the cloudlets. Finally, proposed algorithm presents better results with increase in number of cloudlets. The research work has been tested on a simulator. The results might differ in case of real cloud environment.

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