



Enhancement of Security and Energy Efficiency in Cloud Computing

Renu Kumari, Vinod Kr. Saroha, Sanjeev Rana

Abstract: This paper focuses on the job scheduling in cloud environment. Here the task has been scheduled in cloud and fog. Cloud provides services to heavy application while fog provides service to lighter application. The job scheduler would be helpful to reduce burden of cloud and help in energy optimization. The jobs are scheduled according to their types and priority. Various job scheduling algorithm such as gang scheduling, FCFS and round robin mechanism have been discussed in this research for load balancing and improve the compilation time. The simulation has been made using Matlab on virtual machines.

Keywords: Cloud computing, Load balancing, Fog node, Gang scheduler, FCFS, ROUND ROBIN

I. INTRODUCTION

Cloud computing has been known as new technology. It is popular as it is considered new expansion of computing performed in parallel. Distributed computing allows data to be stored in distributed and reliable manner. The grid computing has been considered as collection data for Virtualization. This is considering utility computing frequently. Cloud computing is giving the services like Software-as-a-Service. They also provide Infrastructure-as-a-Service along with Platform-as-a-Service. Such type of computing could improve availability of IT resources. It has several benefits over different computing methodologies. Operator might utilize IT infrastructure. It is done using pay according to user need mode. This is providing benefits and minimizes the expenses. Cloud computing provides platform independency because there is no need to setup software on personal computer. Cloud computing provides several benefits and they are listed below:

1. Cloud computing provide the online operation apparatus.
2. It allows user to access remote applications with the help of internet
3. It is easy to modify and organize application by the user with the help of internet

1. Clients are provided platform independent access of cloud resources that are available on internet.
2. Its efficiency is high and it does most advantageous exploitation so it is decidedly cost effective.
3. Load matching characteristic of cloud computing correspond to that it is more consistent.

II. LOAD BALANCING

A load balancer has been considered as a significant device. It is capable to distribute network as well as software over a cluster of servers. Load balancing is capable to improve responsiveness. It is also increasing the application availability. The load balancer has been used to work for the client and the server. It is able to accept the network and application traffic. The traffic across several backend servers has been distributed by the load balancer. For this purpose several techniques has been used. To balance the application of several servers, a load balancer has been used. It is capable to reduce individual server load. By balancing the load of multiple servers, the failure of any one application server is avoided. Therefore to improve the overall application availability and responsiveness, load balancing has been made. Load balancing has been known as one of straightforward technique. It has been used to scale an application server system. If there is the increment in the demand of application, new servers adds to the resource pool. Immediately after that the load balancer starts to send traffic to the new server. The capabilities of Core load balancing involves such as: Layer 4 (L4) load balancing, Layer 7 (L7) load balancing etc. Global server load balancing is extending core L4 and L7 capabilities. Thus they have been applicable over servers that are geographically distributed. In the fundamental load balancing setup, the requests of the clients are sending to the IP address of a virtual server that is configured. This virtual server provides them to the load-balanced application servers. It has been done as per the preset pattern that has been referred as load balancing algorithm. Load balancers are used to increase capacity or concurrent users and reliability of applications.

III. PROPOSED WORK

This section presents the proposed model which is more convenient to run the proposed algorithm. Next this section also describes the proposed algorithm in detail followed by its description. They are discussed as follows

A. Proposed Model

The proposed model is based on scheduling based cloud computing where scheduler is connected to fog nodes.

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The multiple processes will be managed by gang scheduler and gang scheduler will provide service to multiple processors from fog nodes that are connected to IP network. IP network is acting as interface between fog node and cloud storage. Proposed system is the integration of multiple sub system such Gang scheduler, Fog node, IP network, cloud storage, Distributed intelligence the intelligence of distributed things is embarrassingly parallel. It allows the user to exploit the computation of large scale. It also carries spatial distribution of computing resources. These types of properties enable to resolve the related issues.

B. Algorithm

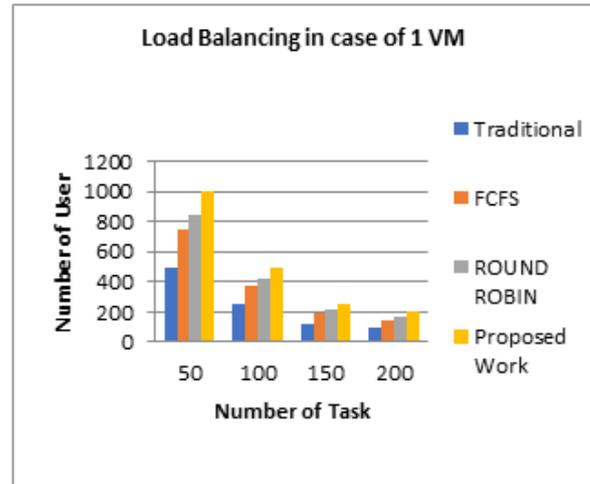
1. Capture request from multiple processes and transfer to gang scheduler.
2. Gang scheduler would allot resources to different process after getting feedback from fog nodes.
3. *Fog nodes* considered as infrastructure that is implementing mini-cloud. There may be other proposals which provide different definition of *fog node*. IP network is here to share the load of cloud using distributed intelligence mechanism.
4. DAI is a technique for solving complex planning, learning, and problems of decision making. The nodes of Distributed intelligence mechanism have ability to act without any support. Partial solutions have been connected with the transmission of nodes. Such are referred as asynchronously. Distributed intelligence mechanism systems are elastic and robust by their virtue. These are loosely coupled by necessity.

Each similar task in multitasking has different kinds of chores and various procedures to execute and run the different CPUs at the same time duration. This case of projects or process is predicted as a gang. Scheduling a process that is based on that kind of grouping is called gang scheduling.

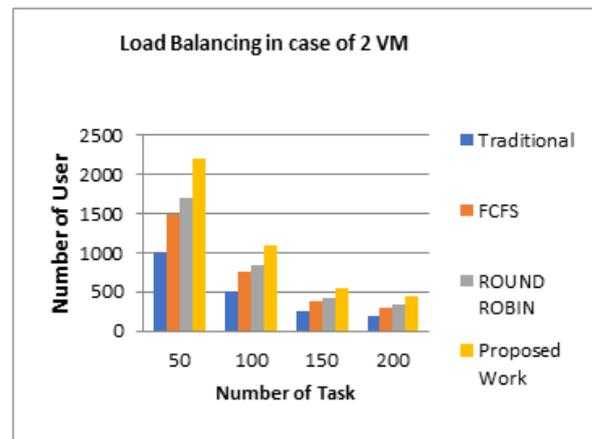
IV. COMPARATIVE ANALYSIS AND PERFORMANCE EVALUATION

In the research work, the comparative analysis of **load balancing** in case of Traditional gang scheduling, FCFS, ROUND ROBIN and PROPOSED WORK has been provided. The load balance has been calculated for different set of task after executing then on the different virtual machines. Fig. 5 (a) to (d) shows the performance of Traditional gang scheduling, FCFS, ROUND ROBIN and PROPOSED WORK. Fig. 5 (a) is representing the load balancing provided by the traditional and proposed work in case of 1 VM. Fig 5(b) is representing the load balancing provided by the traditional and proposed work in case of 2 VM. The comparative analysis has cleared that the proposed algorithm performs better then all three existing algorithm. The coparative analysis of compilation time has been presented here in case of Traditional gang scheduling, FCFS, ROUND ROBIN and PROPOSED WORK. The compilation time has been calculated for different set of task after executing them on the different virtual machines. And fig. 6 (a) to (d) shows the performance of the Traditional gang scheduling, FCFS, ROUND ROBIN and PROPOSED WORK. Here the **compilation time** of proposed work would be **less** than other approaches in case of number of

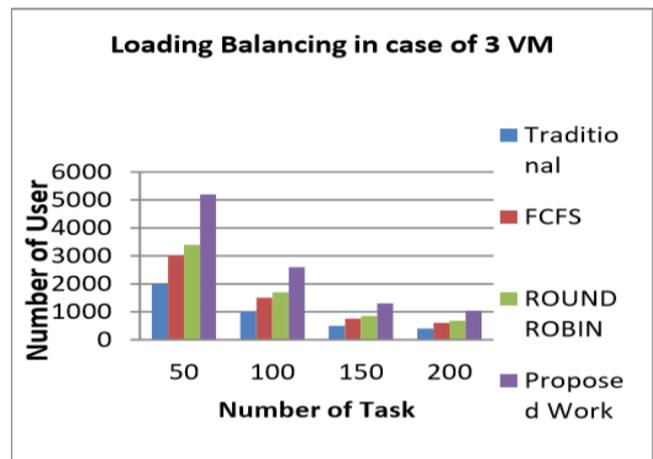
task in case of 3, 5, 7, 10VM. And the proposed algorithm perform better then all three existing algorithm Here the **load balancing** of proposed work would be **more** than other approaches in case of number of task in case of 1, 2, 3, 5VM. The comparative analysis of compilation has cleared that the proposed algorithm performs better then all traditional algorithms.



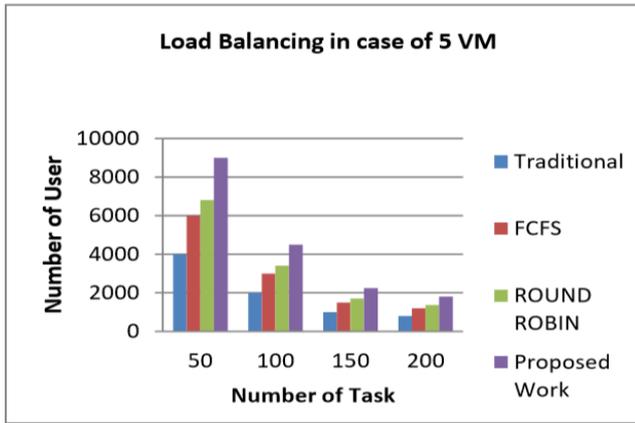
5 (a)



5 (b)



5 (c)

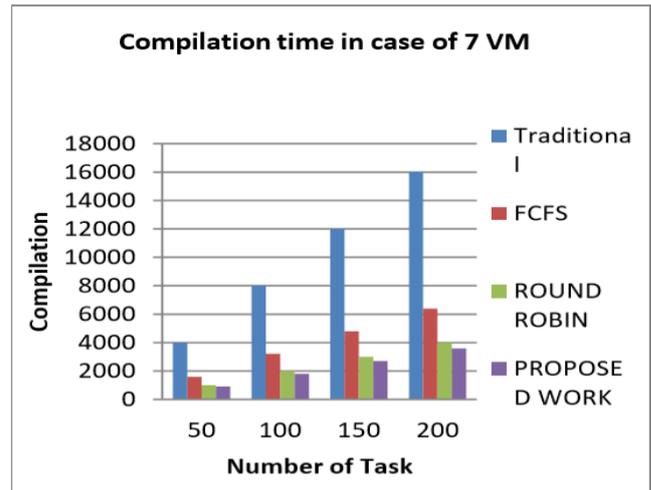


5 (d)

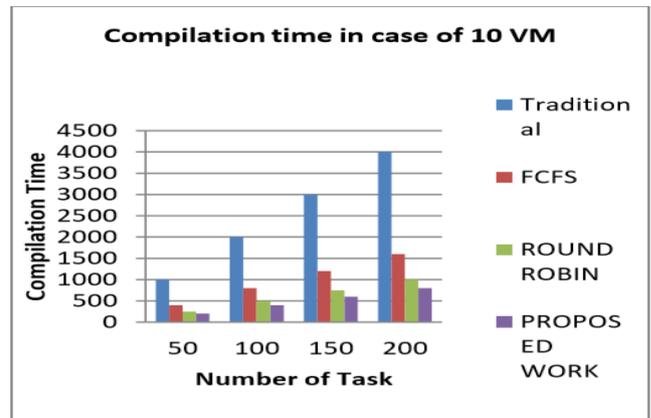
Fig.5 Load balancing: (a) 1 VM, (b) 2 VM, (c) 3VM, (d) 5VM.

Compilation time: -

The following chart represents the comparative analysis of **compilation time** in case of Traditional gang scheduling, FCFS, ROUND ROBIN and PROPOSED WORK. We calculate the compilation time for different set of task after executing then on the different virtual machines. And fig. 6 (a) to (d) shows the performance of the algorithm. Here the **compilation time** of proposed work would be **less** than other approaches if the number of task is 3, 5, 7, 10VM. And the proposed algorithm perform better then all three existing algorithm.

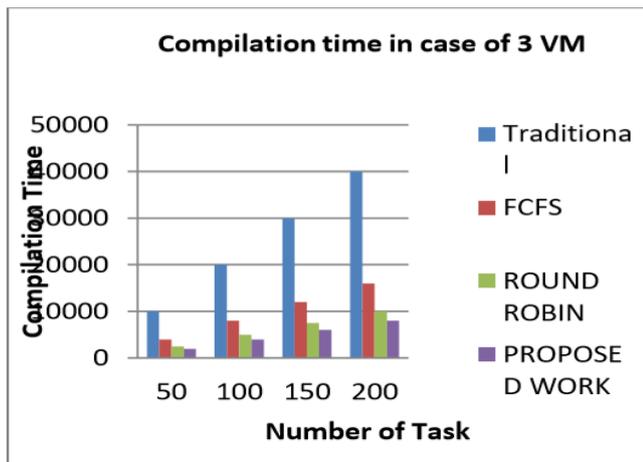


6 (c)

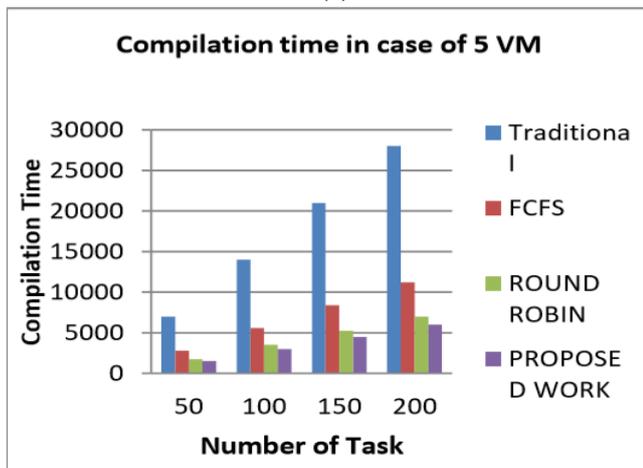


6 (d)

Fig.6 Compilation time: (a) 3 VM, (b) 5VM, (c) 7VM,(d) 10VM.



6 (a)



6 (b)

V. CONCLUSION

In proposed work, burden of jobs have been shared in internal-cloud and external-layer of cloud. The proposed work schedule arrived jobs according to nature. Some task need to be processed by internal cloud. But some task processed externally. This has lead to increase in performance. The proposed work has thus played a significant role for increasing the overall performance during fog computing operations. Here the compilation time, waiting time, load balancing, throughput and execution time, resource utilization has been considered. In case of proposed work the waiting, compilation and execution time has been decreased. But the throughput and load balancing got increased. The proposed work has been proven better approach as compare to FCFS, ROUND ROBIN and traditional work.

VI. FUTURE SCOPE

Scope of proposed work is that it has increased the efficiency by reducing the burden of jobs. Such work is beneficial in case of internal-cloud and external-layer of cloud.

The proposed work would handle the job by scheduling arrived jobs. It would be done according to type of jobs arrived. The proposed work would play a significant role in increasing the overall performance in case of cloud computing operations. This system would take less compilation time, waiting time. Proposed work would boost the capability of load balancing and though put. The proposed work would be better approach from FCFS, ROUND ROBIN and traditional work.

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