ISSN:0975-9646

Analysis of different Scheduling Algorithms under Cloud Computing

Sunny Kumar Shivani Khurana
Research Scholar Assistant Professor

Department Of Computer Science
CT College of Engineering and Technology Shahpur, Jalandhar

Abstract: Today cloud computing technology is used everywhere. Cloud computing technology use increases due to its variety of facility. As cloud provide many facilities due to its vast area such that sharing of resources for different purposes scheduling become a necessary factor to discuss. In our paper different types of scheduling is applied in cloud computing network using servers on which load is balanced randomly. Applied scheduling methods in this paper are First in First out, Round Robin, Priority Queue, Multi Level Feedback Queue and Multilevel Queue scheduling methods. This paper is showing results on the basis of two parameter throughput and response time i.e. object response time and page response time. To evaluate results OPNET simulator is used.

Key points: - Cloud Computing, Scheduling, User, Server, HTTP Application, Response Time.

1. INTRODUCTION

Cloud computing is an old technology and its use is increasing day by day due to its variety of facilities. A numerous type of applications are running through cloud which are stored in data centers. Data centers are combination of storage place which acts like database. For example applications like we chat are running using cloud. All data is stored in data centers and user just retrieve information from these data centers which is required and other information is available for other users an high security is also possible for end user using cloud. As cloud use internet connection it shares all connecting devices such that server, printer, central processing unit etc. Cloud is provided by many companies but it can be created by connecting different machines with each other through a link via data transfer is possible. Cloud uses different concepts of computing such that distribution and virtualization. To perform better cloud needs a good scheduling algorithm. Using scheduling bandwidth of network can be utilized efficiently and response time can be deducted. Scheduling is the process to schedule data during transmission for uploading and downloading. Scheduling schedule application jobs and distribute load between machines to avoid circumstances of hanging. If proper scheduling is not achieved according to our requirement several errors can occur and it will produce errors like a few numbers of resources as their full capacity is not used and it is going vain. Scheduling is not an easy task in cloud and it is because several users can request for same application at a same time. Each user need to get access at same time without any interruption and for this scheduling becomes an important issue in cloud computing environment. To choose a scheduling algorithm for cloud computing environment in this paper each scheduling algorithm is applied one by one and a comparison is given running HTTP applications of different load. First section is giving introduction to cloud computing and scheduling, second section is presenting related work, in section 3 cloud model used is discussed, section 4 is for application running in our cloud network and section 5 is containing comparison using performance metrics throughput and response time i.e. object response time and page response time, last section is about conclusion and future scope.

2. RELATED WORK

Dharamendra Chouhan, S. M. Dilip Kumar and Jerry Antony Ajay (2013) proposed a MLFQ scheduling technique using M/M/C queues for grid computing [1]. In this paper, architecture of MLFQ is divided into multiple prioritized queues. This approach provides resources to gridlets which starve in the lower priority queue for long time to get resources. As a result, the response time of the starved gridlets decreases and overall turnaround time of the scheduling process decreases. They did comparison with FCFS and machines used via MLFQ are more than FCFS.

Priya R.Lodha, Mr. Avinash P.Wadhe (2013) gives a review of different types of workflow scheduling algorithm in cloud computing. This paper compares different types of workflow scheduling algorithms [2]. There working with respect to the resource sharing. They systemize the scheduling problem in cloud computing and present a cloud scheduling hierarchy, mainly splitting into user-level and system-level.

Sabyasachi Mukherjee and O. S. Khanna (2013) describe a DSCP based scheduling algorithm for real-time traffic in differentiated service networks. In this paper they proposed DSCP (Differentiated service code point) with WFQ (Weighted Fair Queue) [3] scheduling method to do classification of traffic and it provide fair amount of bandwidth for data traffic. They performed comparison with FIFO (First in First out) and PQ (Priority Queue) scheduling method.

Ahmad Karim (2011) performed VoIP Performance Over different service classes under various scheduling technique [4]. In this paper he investigate the behavior of two VoIP

service classes, one is excellent effort and the other is interactive voice, using different scheduling method including First in First out (FIFO), Priority Queue (PQ), Custom Queue (CQ) and Modified Weighted Round Robin (MWRR) on the basis of two parameter, packet end-to-end delay (sec) and packet delay variation. According to their analysis for high load PQ is best and for low load CQ is better as compared to other methods.

Ala'a Z. Al-Howaide1, Ahmad S. Doulat2, Yaser M. Khamayseh3 (2011) performed evaluation of different scheduling algorithms in wimax. In this study present a simulation to measure the performance of several scheduling algorithms in WiMAX [5], which are Priority algorithm, Round-Robin (RR), Weighted Round Robin (WRR), Weighted Fair Queuing on the basis of size and number of BS output queue. According to this paper queue size didn't affect output. RR method is best according to queue management system.

Amir Nahir, Ariel Orda, and Danny Raz (2013) proposed a method that works on schedule first, manage later: network-aware load balancing [6]. In this they proposed a novel scheme that incurs no communication overhead between the users and the servers upon job arrival, thus removing any scheduling overhead from the job's critical path. This approach is based on creating several replicas of each job and sending each replica to a different server. Upon the arrival of a replica to the head of the queue at its server, the latter signals the servers holding replicas of that job, so as to remove them from their queues.

Young Choon Lee and Albert Y. Zomaya (2013) describe a stretch out and compact: workflow scheduling with resource abundance. They develop an algorithm named as CPF (Critical Path First) to schedule resource efficiently [7]. Scheduling is compacted by rearranging tasks making use of idle/inefficiency slots present in the schedule due to synchronization. They have compared the performance of scheduling algorithm with three algorithms and evaluated the efficacy of this scheduling algorithm by applying it to those four scheduling algorithms. This algorithm reduces resource usage up to 33%.

R. Raju and R. G. Babukarthik (2012) describe minimizing the make span using hybrid algorithm for cloud computing [8]. In this paper they proposed hybrid algorithm which combine advantages of ACO and Cucko search. Make span or completion time can be reduced with help of hybrid algorithm. Speed of execution increases using combination of both methods.

Quyet Thang NGUYEN and Nyugen QUANG-HUNG (2012) proposed virtual machine allocation in cloud computing for minimizing total execution time on each machine [9]. The performance comparison of the proposed model is analyzed through some empirical results. Each machine has lot of virtual machine assigned to different jobs for a fixed period. Propose solution aims to minimize the cost.

Ljiljana Trazkovic (2012) describes performance analysis of scheduling disciplines [10]. He uses OPNET Modeler to analyze different queuing mechanisms on the base of packet transmission and packet loss. According to this paper WFQ is best for FTP traffics while PQ and WFQ good for VOIP. In case of FIFO, delay is more and that is unacceptable.

S. Mohana Priya and B. Subramani (2013) proposed a new approach for load balancing in cloud computing named as RASA (Resource aware scheduling algorithm) [11]. It is a combination of min-min and max- min algorithm. They proposed the algorithm which uses active monitoring load balancing and resource aware scheduling algorithm for improved resource utilization and scheduled load balancing for high performance in cloud system. The Proposed Load balancing algorithm is divided into three parts. The first phase is the initialization phase. In the first phase, the expected response time of each Virtual Node is to be found. In second Phase, efficient Virtual Node is found. Last Phase return the ID of efficient Virtual Node.

Nidhi Jain Kansal and Inderveer Chana (2012) give a review on existing load balancing techniques in cloud computing [12]. In this paper all the existing techniques mainly focus on reducing associated overhead, service response time and in improving performance. But new techniques need to develop that can be energy efficient and improve performance of cloud computing by balancing load on all nodes and also improve resource utilization.

3. CLOUD COMPUTING MODEL

As cloud is accessible everywhere through a link by which user can connect through cloud. So due to vast area of cloud, scheduling method needs to be chosen very carefully. Cloud differs in size according to service provider and its use. Cloud can be used for private organizations such that private cloud and for public use as public cloud. It also can be used as a combination of both public and private cloud as hybrid cloud according to requirement. Cloud can be accessed using several types of devices such that via computer, laptop and multimedia cell phones. Below a diagram is shown that is used as cloud computing network for our evaluation.
Figure 1 is containing several equipments and these are as:

User: - User is generating request for application. Task is generated at this end.
Switch: - Switch is used to joint several connections at a single point.
Cloud: - Cloud is working like a long distance internet connection.
Load balancer: - Load balancer is used to distribute load randomly to servers.
Server: - Servers are used to execute user requests and applications are running at this point.

These are connected as shown in diagram via a duplex link.

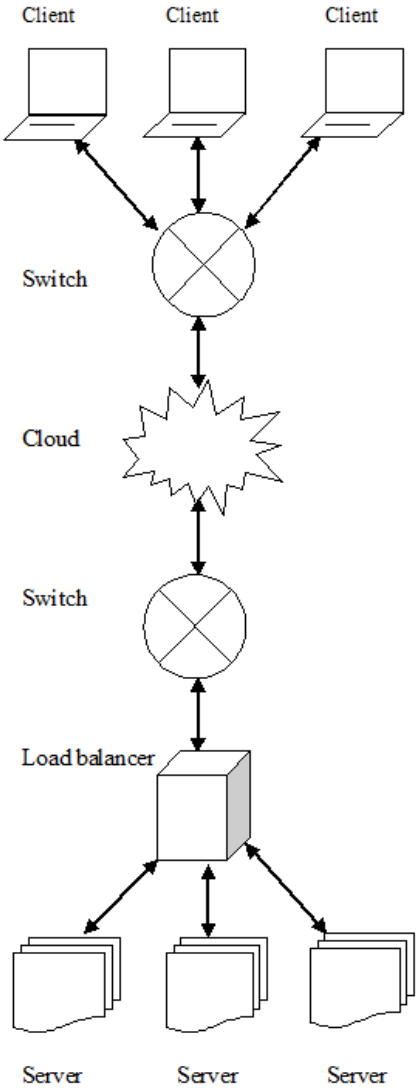

Figure 1. Cloud Computing Network Model

4. APPLICATION

To find out best scheduling methods for cloud computing network an application is run named as HTTP Application. Variety of HTTP applications is executed in cloud network and these are: -

HTTP Light Browsing: - In this low load application is generated and it browses light data from server on user request.

HTTP Searching: - In this simple searching is done on demand of user.

HTTP Image Browsing: - In this profile images are browsed from server end.

HTTP Heavy Browsing: - In this profile heavy HTTP data is browsed through network from server ends to maximize load.

By using these type of HTTP applications response time and throughput for different scheduling algorithms is evaluated to make a fair comparison in between them.

5. COMPARISON

Results are evaluated using OPNET IT Guru simulator in cloud computing environment on the basis of performance metrics throughput and response time. Response time is measured in two categories object response time and page response time.

First throughput is obtained suing First in First out, Round Robin, Priority Queue, Multilevel Feedback Queue and Multilevel Queue scheduling method inn cloud computing environment. Comparative results are shown in figure 2.

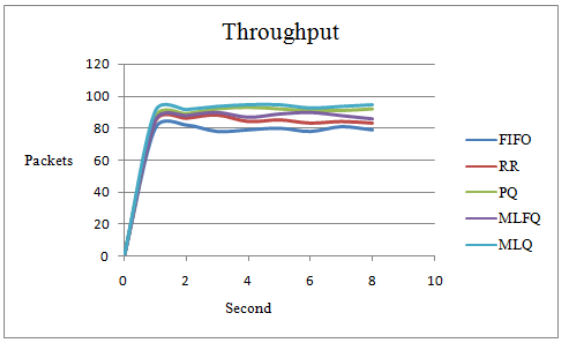

Figure 2. Comparison of throughput

From figure 2 it is clear showing that output obtained using Multilevel Queue scheduling method is high as compared to other scheduling methods. Lowest output is obtained in case of First in First out scheduling method. Priority Queue scheduling method is giving maximum output after Multilevel Queue scheduling method.

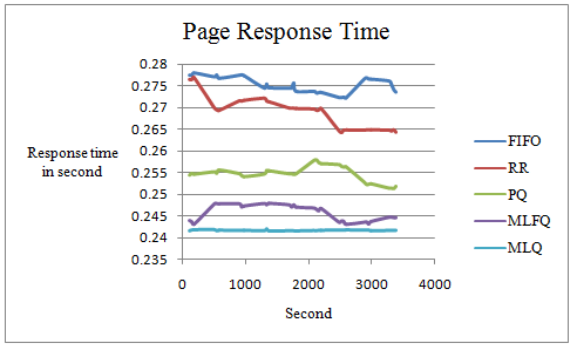

Figure 3. Comparison of page response time

From figure 3 it is clear that response time taken in a page to response is very low in case of Multilevel Queue scheduling method as compared with other applied scheduling methods.

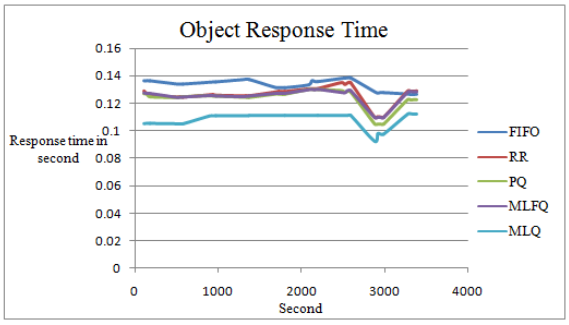

Figure 4. Comparison of object response time

From figure 4 again clear that object response time is low in case of Multilevel Queue scheduling method.

6. CONCLUSION

As each scheduling method is applied on by one and a reliable comparison is done between them to find out best scheduling method for cloud computing environment via running HTTP application. From figure 2, 3and 4 using metric throughput, page response time and object response time respectively the conclusion found out that Multilevel Queue scheduling method is best scheduling method for cloud computing environment. After that Multilevel Feedback Queue and Priority Queue scheduling methods are good as compared with remaining scheduling methods. It is because throughput is much higher in case of Priority Queue scheduling as compared with Multilevel Feedback Queue scheduling but response time is good in case of Multilevel Queue scheduling method as Compared with Priority Queue scheduling method. Less efficient scheduling method found among all applied scheduling method is First in First out scheduling method. In future these scheduling methods can be applied running other application. According to user requirement these methods can be combined to form new scheduling methods.

REFERENCES

1. Dharmendra Chouhan, S. M. Dilip Kumar "A MLFQ Scheduling Technique using M/M/c Queues for Grid Computing" IJCSI Vol 10, issue 2, No 1, March 2013.
2. Priya R. Lodha and Avinash P. Wadhe,"Study of Different Types of Workflow Scheduling Algorithm in Cloud Computing" IJARCSEE Volume 2, Issue 4, aapril 2013.
3. Sabyasachi Mukherjee and O. S. Khanna "Fairness Evaluation of a DSCP Based Scheduling Algorithm for Real-Time Traffic in Differentiated Service Networks" IJIEE Vol. 3, No. 4, July 2013.
4. Ahmad Karim"VoIP Performance Over different Service Classes Under Various Scheduling Techniques" AJBAS 5(11): 1416-1422-CC, 2011.
5. Ala'a Z. Al-Howaide1, Ahmad S. Doulat2, Yaser M. khamayseh3 "Performance Evaluation of Different Scheduling Algorithms in Wimax" 2011.
6. Amir Nahir, Ariel Orda, Danny Raz "Schedule first, Manage Later: Network-Aware Load Balancing" IEEE 2013.
7. Young Choon Lee and Albert Y. Zomaya "Stretch out and Compact: Workflow scheduling with Resource Abundance" IEEE 2013.
8. R.Raju and R. G. Babukarthik," Minimizing the Makespan Using Hybrid Algorithm for Cloud Computing" 3rd IEEE 2013.
9. Quyet Thang NGUYEN and Nyugen QUANG-HUNG," Virtual Machine Allocation In Cloud Computing For Minimizing Total Execution Time On Each Machine" 978-1-4673-2088-7/13 IEEE, 2013.
10. Ljiljana Trazkovic," Performance Analysis Of Scheduling Disciplines" SPRING 2012.
11. S. Mohana Priya and B. Subramani," A New Approac For Load Balancing In Cloud Computing" IJEACS 2013.
12. Nidhi Jain Kansal and Inderveer Chana,"A Review On Existing Load Balancing Techniques In Cloud Computing" JISAC 2012.
13. Pinal Salot "A Survey Of Various Scheduling Algorithm In Cloud Computing Environment" IJRET 2013.
14. Ritu Garg, Awadhesh Kumar Singh "Enhancing the Discrete Particle Swarm Optimization based Workflow Grid Scheduling using Hierarchical Structure" IJCNIS, May 2013.
15. Mohsen Abdoli, Reza Entezari-Maleki, and Ali Movaghar " A Rank-based Hybrid Algorithm for Scheduling Data- and Computation-intensive Jobs in Grid Environments" Springer 2013.
16. Salman Meraji*, M. Reza Salehnamadi "A Batch Mode Scheduling Algorithm for Grid Computing" JBASR 2013.