



Scheduling in Cloud Computing: A Review

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Abstract: Cloud computing is an emerging technique that describes new class of network. Cloud computing share resources connected to each other via a link and uses concept of distributed computing, grid computing, utility computing and virtualization. Scheduling in cloud computing is interest of area to schedule processes that is a difficult task. Scheduling in cloud computing is to manage and control processes. Basically selection of scheduling method depends on user requirement, choosing the right scheduling method can cause maximum packet transmission, can control packet loss and can increase CPU utilization. This paper describes different scheduling method used in cloud computing such that First Come First Serve (FCFS), Priority Queue (PQ), Round Robin (RR), Multi Level Feedback Queue (MLFQ), Multi Level Queue (MLQ).

Keywords: Cloud Computing, Scheduling, Job, Resources, Processes, Task.

I. INTRODUCTION

Today cloud computing is an emerging technique which distribute data among different data centre's. As cloud computing shares resources as well as data, located on separate places accessed by user using pools created in a cloud. Due to resource sharing in cloud computing, it is necessary to maintain performance and efficient resource utilization that is a key challenge also for whom provide cloud computing environment. Cloud computing is a combination of distributed processing, parallel processing. Cloud computing use concept of grid computing and utility computing [1]. Cloud computing is a large area for researcher to research new things. Cloud computing is a on demand service that can be used anywhere, at any time, at any place. To connect with a cloud just need a connection to communicate. Cloud works on both heterogeneous and homogeneous type of resources. Cloud computing is a paid service that is pay and get service by service provider.

Figure 1. is showing simple cloud computing components. It has Central Processing Unit (CPU), Database (DB), Mobile phones, Server. In centre, it is having cloud for communication.



Figure 1. Cloud Computing Component

Scheduling in cloud computing is a difficult task because of heterogeneity in resources and operating systems. Scheduling is also a key challenge in the way of quality of services, buffering, transmitting and receiving in a network. Optimal resource allocation in cloud decides how many resources need to allocate to a process to complete its execution. Cloud computing uses dynamic nature and it is need to be scheduled carefully. Cloud provides several advantages to store data which remove requirement of storage device. So it reduces cost of buying external storage

device. Cloud computing provide processors to solve complex and large problems. Problems are solved efficiently by using multithreading concept. So cloud computing also provides high speed. These are some benefits of cloud computing but it require high speed connection for data transmission, receive and an account which provide authorization to user. Having account in cloud provide access as well as security for both user and cloud service provider.

II. PROBLEM DEFINITION

Use of TCP and UDP for transmission of packets in a network causes packet loss and a delay in packet delivery. This delay and packet loss can be a cause of losing important information. That's why a good scheduling algorithm is required to avoid packet loss and delay in packet delivery required. In sending and receiving packet from both user and server end in case of cloud, loss may be double and meaning of information can be change. As if information changes, then it is not valuable. So proper scheduling mechanism need to be adopt in cloud computing.

III. SCHEDULING

Cloud provides application scalability to the user very well. Cloud is of dynamic nature and many applications run on cloud are of real time like voice and video conferencing which requires synchronization and better scheduling. In case of email, text etc packets are allowed with a little delay but not in case of real time application. If delay occurs in real time application like video, the data inside video could be corrupted which will be of no use further for user and organization. Basic scheduling techniques are used to schedule but new scheduling techniques can be achieved merging basic scheduling method on the basis of user requirement. Basic scheduling methods are shown in Figure 2.

A. First Come First Serve:

First Come First Serve (FCFS) is a basic scheduling technique used in cloud computing. FCFS works on the

basis of first process enters in the queue and execute first. It works as a water supply pipe in which water enters from one end and exit from other end. Same work in cloud, as packet transmitted by user from one end and received from other end in the same order as they transmitted. Cloud computing use this scheduling method to transmit data in the form of packets as they are received by router at sender end and received on other router end. Then they are responded by the destination end. This is the simplest method and lower headache in scheduling. This technique is best where data is of small size. It is because if data is of small size then it executes fast and no starvation occurs.

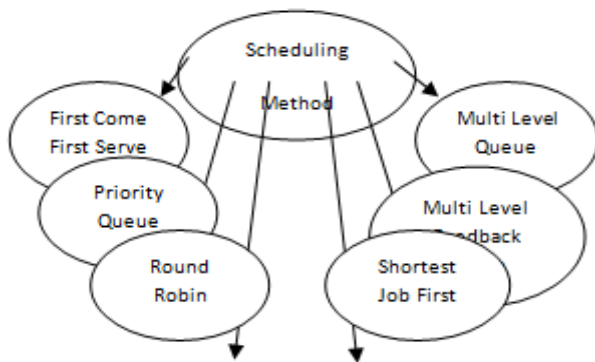


Figure 2. Scheduling Method

B. Priority Queue Scheduling:

As the drawback of starvation in FCFS, new scheduling method required to avoid starvation. Priority Queue (PQ) avoids processes to go starve. For this priority is assigned to process on the basis of their requirement by user. User assigns priority to processes and highest priority process executes first and the lowest priority process execute in the last. It is same like human, as VIP (Very Important Person) get highest priority and IP (Important Person) get medium priority and common person get low priority in traffic jam. Somehow starvation occurs for low priority process but they execute because VIP and IP are less.

C. Round Robin Scheduling:

Starvation is not fully solved by FCFS and PQ. To solve this problem a new method named Round Robin (RR) is used. Cloud computing uses this method to transmit data. In this a time quantum is used and every process executes in the given quantum. If process is of small quantum then it's complete in this quantum. It provides processes to go starve. On the basis of user requirement this scheduling method can be modified to get new scheduling.

D. Shortest Job First Scheduling:

Shortest Job First (SJF) scheduling is best where small size process needs to execute first. This scheduling method is best forever to execute processes but as the scheduling depends on the basis of user requirement somewhere it is not suitable. As in the case of real time based application, video and voice, they need to solve first. But SJF works on the basis of shortest execution time of process and in that case PQ scheduling method is best in which priority is set to high to real time application in cloud computing.

E. Multi Level Feedback Queue Scheduling:

Multi Level Feedback Queue (MLFQ) use multiple queue to transmit data in the first queue and it uses RR with

a time quantum assigns to particular queue. Each process first enters in this queue and execute according to RR and quantum. Then process enter in second queue if it did not complete in first queue, and if completed then came out of queue. Second queue also execute process in the same way as in first queue. If process did not complete in second queue then it enters in third queue and then process handle with FCFS in third queue. MLFQ have both advantages of Round Robin and First Come First Serve.

F. Multi Level Queue Scheduling:

Multi Level Queue (MLQ) scheduling uses multiple queue as in case of MLFQ but difference occur in their working. Multi Level Queue scheduling uses multiple queues with having different priority assigned to each queue. Each queue have its own scheduling. For example one queue scheduled using Round Robin and other queue scheduled using First Come First Serve. But the difference is that highest priority queue get resources first and lowest get later. The other advantage of using MLQ scheduling is that CPU utilization occur maximum. CPU (Central Processing Unit) divides between these queues for maximum CPU utilization.

All of the above scheduling methods are used in cloud computing to schedule data on routers. Scheduling method is selected on the basis of user requirement. The new scheduling method easily achieved by combining above scheduling method for better performance in cloud.

IV. RELATED WORK

Priya R.Lodha and Avinash P.Wadhe they describe different types of workflow scheduling algorithm in cloud computing. Comparison is made on the basis of working with respect to resource sharing, splitting user level and system level [1]. This paper helps in selection of best scheduling method which overcome execution time.

R. Raju and R. G. Babukarthik describe minimizing the make span using hybrid algorithm for cloud computing. In this paper they proposed hybrid algorithm which combine advantages of ACO and Cucko search [2]. Make span or completion time can be reduced with help of hybrid algorithm.

Quyet Thang NGUYEN and Nyugen QUANG-HUNG proposed virtual machines allocation in cloud computing for minimizing total execution time on each machine. The performance comparison of the proposed model is analyzed through some empirical results [3]. Each machine has lot of virtual machines assigned to different jobs for a fixed period and the objective is to minimize the cost.

Ljiljana Trazkovic describes performance analysis of scheduling disciplines. He uses OPNET Modeler to analyze different queuing mechanisms on the basis of packet transmission and packet loss [4].

S. Mohana Priya and B. Subramani proposed a new approach for load balancing in cloud computing [5]. 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.

Nidhi Jain Kansal and Inderveer Chana give a review on existing load balancing techniques in cloud computing [6]. In this paper all the existing techniques mainly focus on

reducing associated overhead, service response time and in improving performance.

V. CONCLUSION AND FUTURE WORK

As cloud use increases, scheduling become main concern for cloud service providers. Packet loss and delay in packet may occur due to bad route selection. To select a best route, proper scheduling algorithms is required for cloud computing network. This paper defines a list of scheduling algorithm. Any of them can be easily applied on cloud on the basis of requirement and new algorithm can be easily developed merging these algorithm as required. Future work is to implement these algorithm and choosing best algorithm for cloud computing.

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