

REVIEW ON ROUND ROBIN ALGORITHM FOR TASK SCHEDULING IN CLOUD COMPUTING

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Abstract— Cloud computing is an emerging technology which works in distributed computing with facilitates pay per model as per user demand and requirement. Cloud is developing day by day some new in cloud environment but it also faces many challenges for that, one of them is task scheduling. In that if consider task scheduling than scheduling refers to a set of policies to control the order of work to be performed by a cloud environment. A good system adapts its scheduling strategy according to the changing environment work of task, algorithm which are using to complete that task and the type of task. There are many algorithm to improve performance of task scheduling in cloud computing. In this research paper we presented a generalized algorithm for efficient execution of task with Round Robin Scheduling.

Index Terms— Task Scheduling in Cloud Computing, Task scheduling algorithms, Round Robin algorithm

1. INTRODUCTION

Cloud Computing : A Cloud computing is capable as a new idea of large scale spread computing. It has moved computing and data away from desktop and portable PCs, into large data centres [1]. Cloud computing refers to both the application delivered as services over the internet and the hardware and software of system in the datacenters that provide those services. The primary goal of Cloud Computing is to provide well-organized way in to remote and geographically distributed resources with the help of virtualization services.

Task Scheduling : Cloud computing is a capable and scalable infrastructure for computations, but maintaining that kind of workload and balancing on the participating resources is a very complex task. The task schedulers are putting more interest on the complex problem of task scheduling in which the cloud computing environment due to the uneven coming pattern of the variable length task with different set of data. The main advantage of job scheduling algorithm is to achieve a high performance computing and the best system throughput. Scheduling manages availability of cloud memory and good scheduling policy gives maximum use of resource.

The complete paper is designed in such a way that section II discusses basic task scheduling process. Section III is based on task scheduling algorithms. Section IV based on round robin basic algorithm in cloud computing. Section V used for proposed work and section VI give future work and concludes the paper.

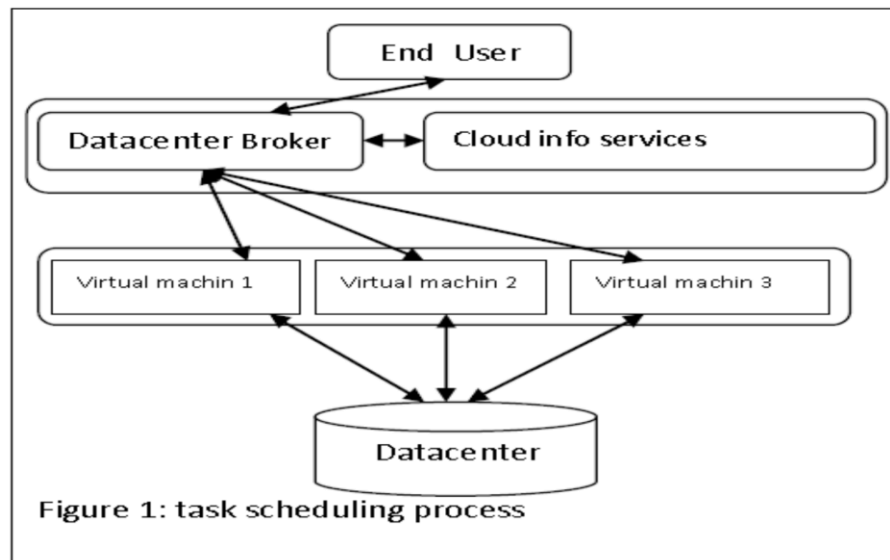
2. TASK SCHEDULING

There are many research work had happened on task scheduling for the cloud environment. But still the many new architectures and changes in the cloud environment creates a challenge to the scheduling algorithms. The goal of task scheduling is to improve the participating Virtual Machine performance in the cloud environment by distributing the load among these various resources. For task scheduling algorithm main challenges are the best possible resource utilization, maximum throughput, minimum response time and avoiding overload. Many algorithms are used to overcome this challenges and give optimal output in cloud computing.

Task Scheduling theory for cloud computing is receiving rising concentration with increase in cloud popularity. In general, task scheduling is the process of mapping tasks to available resources on the basis of tasks' characteristics .The obtainable resources should be utilize powerfully without moving the service parameter supply part of cloud.

Scheduling process in cloud can be widespread into three stages namely–

- Resource cleaning– Datacenter Broker discovers the resources present in the network system and collects stat information related to them.
- Resource investigation – Target resource is selected based on certain parameters of task and resource.
- Task submission -Task is submitted to resource selected.



3. TASK SCHEDULING ALGORITHMS

Task scheduling provides many algorithms for high performances[3]. Here we mainly discuss basic task scheduling algorithms which are First come first serve, Round robin scheduling. Randomized algorithm, Max-min algorithm, Generalized priority algorithm, Most fit task scheduling algorithm and shortest job first algorithm[5].

3.1 First Come First Serve-

FCFS is working as name advise, it is aiming at the resource with the smallest waiting queue time and that task is selected as first task. First Come First Serve (FCFS) scheduling strategy for inside scheduling which work in queue. In effect, processes are inserted into the tail of a queue when they are submitted. The next process is selected from the head of the queue when each finishes running in the queue. The weakness of prioritization does permit every process to eventually fulfill, hence no starvation. Turnaround time, waiting time and response time is at the top. The default strategy implemented by the VM provisioned is a straightforward policy that allocates a VM to the Host in First-Come-First-Serve (FCFS) basis. The disadvantages of FCFS is that it is non preemptive. The shortest tasks which are at the back of the queue have to wait for the long task at the front to finish. Its turnaround and response is quite low.

3.2 Round Robin Algorithm-

Round Robin (RR) algorithm focuses on the equality. Each job in a queue has the same implementation time and it will be executed in turn. If a job can't be completed during its own turn then it will be stored back to the queue waiting for the next turn. The benefit of RR algorithm is that each job will be executed in turn and they don't have to be waited for the previous one to get completed. But if the load is found to be heavy, RR will take a long time to complete all the jobs. The chains RR scheduling strategy for internal scheduling of jobs. The disadvantage of RR is that the largest position takes sufficient time for completion.[8]

3.3 Generalized Priority Algorithm-

Customer define the precedence according to the user require you have to define the parameter. In the proposed plan, the tasks are initially prioritized according to their size such that one having highest size has highest rank. The Virtual Machines are also ranked according to their dissimilar kind of certain value such that the one having highest priority has the highest rank. Thus, the key factor for prioritizing tasks is their size and for VM. This policy is performing better than FCFS and Round Robin scheduling.

3.4 Randomized Algorithm-

The randomized algorithm is to work as it name says that tasks are arbitrarily assign the selected resource to the available Virtual Machines (VM). The algorithm does not take into considerations the location of the VM and it will either be under heavy load or low loaded task. Then, this may result in the selection of a VM under heavy load and the task requires a long waiting time before service is obtained. The difficulty of this algorithm is rather low as it does not need any transparency or pre-processing. Where, Index is to the selected VM, $\text{random}()$ that returns a random value between 0 and 1.

3.5 Max-min Algorithm-

The max-min heuristic is similar to min-min algorithm. The minimum achievement times set is planned for each task and that with in general maximum achievement time is certain and assigned to a matching machine [6]. This algorithm does better than min-min algorithm where when short tasks outnumber long ones. For e.g. if there is one long task, max-min algorithm executes short tasks simultaneously with long task. Max-min [8] is similar to min-min. Again each job's minimum conclusion time is recognized, but a job with maximum minimum completion time is assigned a parallel processor.

3.6 Most Fit Task Scheduling Algorithm-

Most fit task scheduling algorithm (MFTF) is suitable example of On-line mode heuristic scheduling algorithm. Job which fit best in queue based on some parameters is executed first. Some time for at a time scheduler has to decide that what resource is best for which task at that time this algorithm provide the best resource means the most fit for any task or job. Most most likely this algorithm used at on-line means completely active processing and this algorithm provide always the high dependability for task scheduling.

3.7 Shortest Job First-

The process is authorized to the cloud which has minimum conclusion time. A scheduler arranges the processes with the minimum completion time in head of the queue and longest completion time in tail of the queue. This strives superior facts or estimations about the time necessary for a process to complete. This algorithm is devised for maximum throughput in most scenarios. The characteristics of shortest job first is that The real complexity with the SJF algorithm is, to know the length of the next cloud request. SJF minimizes the average waiting time because it services small processes before it services large ones. While it minimizes usual wait time, it may fine processes with high service time requests.

This all are the mostly used task scheduling algorithm at static or active level. Generally this all are working but there is some parameter which are openly pretentious. That make a decision that which algorithm is best working on which situation.

4. ROUND ROBIN ALGORITHM

Round-Robin is a simple scheduling algorithm, based on time membership between jobs in equivalent slice / quantum and in circular queue without precedence so it is simple and easy to implement, but it. So it focuses on equality between jobs, The time is separated and distance is chosen to each node. Each node is selected with a time slice in which they have to execute their task. The connivance of this algorithm is take away compared to the other two algorithms. An open foundation simulation performed the algorithm software know as cloudsim. RR used in the simulation. This algorithm simply allocate the job in round robin manner which doesn't consider the load on different machines. The benefit of this algorithm is that no work has to wait for another one to be completed as on FCFS basis and others.

Characteristics-

- Situation the quantum too little originates too many background switches and lesser the cloud good organization.
- Background the quantum too long may reason meagre answer time and moderately close by the FCFS.
- Because of far above the ground coming up times, deadlines are rarely met in a pure RR system.

There are many challenges in this algorithm, extra we have round robin which may face some challenges that it may be possible that largest has to go on infinite loop or some time not get proper output in dynamic task scheduling.

4.1 Process of Round Robin

In task scheduling this algorithm is known as processor sharing algorithm and in this algorithm we consider the number of context switches is very high. It selects the load on random basis and leads to the position where some nodes are heavily loaded and some are evenly loaded. Though the algorithm is very simple but there is an added load on the scheduler to decide the size of quantum and it has longer average waiting time, higher context switches, higher rotate time and low throughput.

Process contains three stages:

- First, In which process is moving on for Execution.
- Second, In which process is in the waiting in queue.
- Thired, migration with other process.

In every task run on that turn and new process add at the block state and when its turn comes it add at the and of queue. This can be understand by the pseudo code of this algorithm.

4.2 pseudo code of Round Robin

1. The scheduler maintains a queue of ready Processes and a list of blocked and swapped out processes.
2. The process control block of recently formed process is new to end of ready queue. The process manage block of terminating process is disconnected from the scheduling data structures.
3. The scheduler always selects the process control block at head of the ready queue.
4. When a running process finishes its portion, it is motivated to end of ready queue.
5. The event handler perform the following action,
 - a) When a process makes an input -output demand or swapped out, its process control block is isolated from complete queue to blocked/swapped out list.
 - b) When input-output process scheduled by a process finishes or process is swapped in its process control block is removed from blocked/swapped list to end of ready queue.

In this algorithm we have namely three stages which are Ready Queue, Block State and Swapped State. This algorithm simply work on basic idea of the round robin but to recognize this thing we have to know algorithm's necessary states which meanings are:

Ready Queue: In which, processes are in running stage and it is working or waiting for its next turn.

Block State: Queue is not free then it is waiting stage and waiting for free place in queue.

Swapped State: it is migrated stage.

4.3 Work flow of RR

All the implementation connected work is done with the assist of cloudsim simulator .Service Proximity Policy- The broker selects the data center according to round robin scheduling and allocates the cloudlets with different mips and mbs to the selected data center. With help of this step and algorithm we can use round robin in cloudsim for that we have diagram of flow work of round robin.

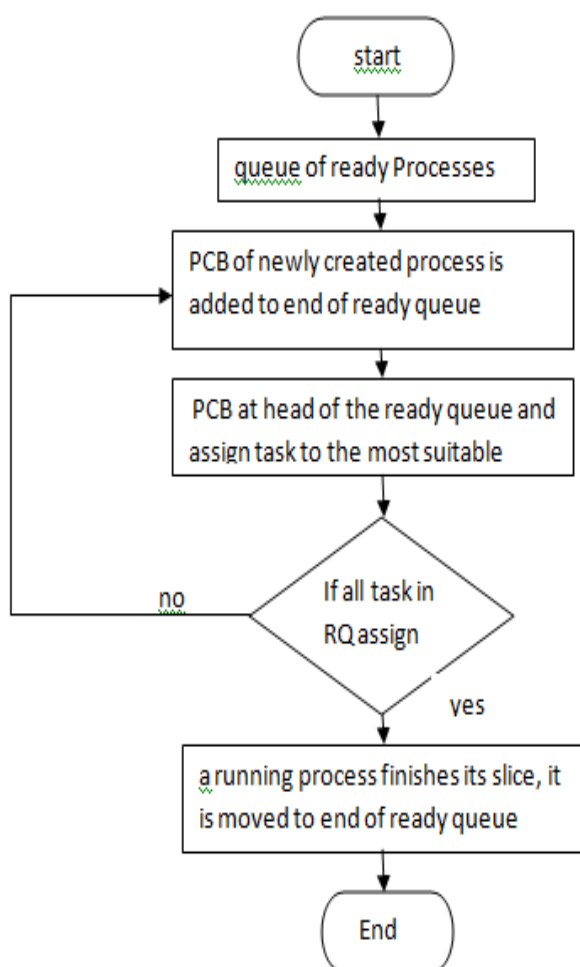


Figure 1: workflow of roundrobin

4.4 Types of RR:

MRR(Modified RR)

In MRR algorithm, Time Slice (TS) is calculated which allocates based on $(\text{range} \times \text{total no of process (N)})$ divided by $(\text{priority (pr)} \times \text{total no of process(p)})$. [11]

TSPBRR(Time Slice Priority Based RR)

TSPBRR is focus on priority and as compared to others variants. It is also observed that the Avg TAT and Avg WT in TSPBRR superior than that in MRR algorithm. [11]

Min-Max RR

RR scheduling algorithm is considered as the most widely used scheduling algorithm in research because the TQ is equally shared among the processes. In this paper a newly proposed variant of RR algorithm called Min-Max Round Robin (MMRR) scheduling algorithm is presented. The idea of this MMRR is to make the TQ repeatedly adjusted using Min-Max dispersion measure in accordance with remaining time. [16]

Group Based Time Quantum RR (GBTQRR)

RR Scheduling is a major area in the network system. Scheduling process may be user process or kernel process. A process may demand for RR. So, we need an efficient scheduling to compensate process with basic process. In the proposed algorithm, we are focusing on process only. A group based TQ is proposed in this algorithm. Each group has different TQ. [13]

Dynamic Quantum With Re-Adjusted RR

Re-Adjusted RR in which we have to arrange the processes in ascending order according to their burst time present in the ready queue. Then time quantum is calculated. For finding an optimal time quantum. [12]

Fair RR

Proposed algorithm is fair round robin algorithm because it provides enough fair scheduling when the burst time of incoming request load is having great variance. Because a complex algorithm also increases executing node's load and degrades its performance. This quite simple strategy of implementing dynamic TQ based on algorithm execution round. [15]

Priority based RR

We can select data center in Round-Robin manner to distribute requests uniformly among all the data centers within a region. There are some data centers which are faster than others so these data centers should have been selected more number of times than slower ones to get better performance and resource utilization. So we have to select the data center in proportion of their speed with priority. [14]

4.5 Benefits and challenges

Round robin used for task scheduling in cloud computing because of some benefits which are given as below:

Benefits : RR provide better answer time as compared to the other algorithms. RR is most appropriate for time sharing systems it is mainly used for that. RR style according to their weight, modified version of the usual RR. Proper operation of Resource done by RR. It give better work for static application. Every job completed without waiting previous one and cost is low than other.

Challenges: In task scheduling RR has some restrictions like, congestion and under loading situations are not handled by RR, task migrations not done in RR, It give more throughput but also more time taken, RR take more Makespan for long process, It not work influential in dynamic way and take more time for very small as well as very long process.

5 CONCLUSION

Scheduling is one of the most significant tasks in cloud computing environment. In this paper we have analyzed various scheduling algorithm which efficiently schedules the computational tasks in cloud environment. Priority is an important issue of task scheduling in cloud environments. Re-adjusted RR take dynamic TQ but it give more context switches, more total waiting time and more total TAT To solve that problem in this algorithm improve task scheduling with the help of round robin algorithm in which time quantum for every round trip is calculated. The result shows that Round Robin algorithm is more efficient than earlier algorithm.

6 FUTURE WORK

The task distribution problem on various nodes of a distributed system is solved in the present work to get better both resource consumption and job comeback time by analyzing the variants of RR algorithm. To solve problem we need to create an algorithm which will improve task scheduling with the help of round robin algorithm in which time quantum for every round trip is calculate. It will change time quantum with average burst time and average of turnaround time which decrease switch time between every job. So that algorithm is working on dynamic time quantum for each round trip. [5]

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