

Survey on Comparison of Various Scheduling Algorithms in Cloud Computing

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Abstract— Cloud Computing is widely known for providing services to all types of users by with the assistance of very large scalable and virtualized resources over the internet. According to recent experiments in this field, there are a number of scheduling algorithms proposed that can be used to decrease the cost of services which is provided by the cloud computing environment. Hence, through this paper, a study on various algorithms and issues related to cloud computing is done.

Keywords— Scheduling algorithms, cloud computing, types of algorithms.

I. INTRODUCTION

Cloud computing is known as a provider of dynamic services using large scalable and virtualized resources over the internet. It simply means that the cloud computing allows access to all types of applications through the internet and the data can be retrieved anytime by the user. The major drawback in this field is the scheduling and so there are multiple job scheduling algorithms are available in the cloud computing environment like FCFS, SJF, Min-Max and Round Robin. Cloud computing is an enhanced concept of basic web services and grid computing. It contains three major services. They are IaaS (Infrastructure-as-a-Service), PaaS (Platform-as-a-Service) and SaaS (Software-as-a-Service). All the services combined together and will be known as Everything-as-a-Service (EaaS). Here is a study on various algorithms.

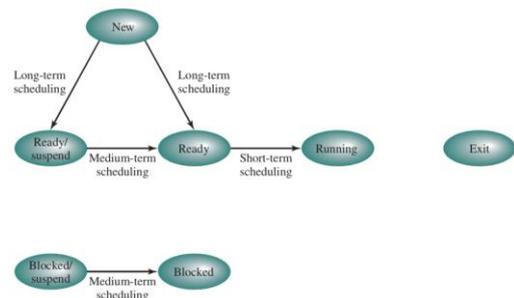
applied in the cloud environment with suitable verifications. The main advantage of job scheduling algorithm is to achieve a high performance computing and the best system throughput. Also job scheduling algorithms in cloud computing is divided into two main groups. They are Batch mode heuristic scheduling algorithms (BMHA) and online mode heuristic algorithms. In the batch mode, the jobs are collected and arranged and finally it is executed in the system. The few main examples for batch mode heuristics algorithm are First Come First Served scheduling algorithm (FCFS), Round Robin scheduling algorithm (RR), Min-Min algorithm and Max-Min algorithm. In the online mode, the order is not changed for example, the order in which the jobs are executed is the same. The example for online mode scheduling is Most Fit Task scheduling algorithm (MFTF). There various types of scheduling algorithms and they are:

- First-come, first-served scheduling (FCFS) algorithm
- Shortest Job First Scheduling (SJF) algorithm
- Shortest Remaining time (SRT) algorithm
- Non-preemptive priority Scheduling algorithm
- Preemptive priority Scheduling algorithm
- Round-Robin Scheduling algorithm
- Highest Response Ratio Next (HRRN) algorithm
- Multilevel Feedback Queue Scheduling algorithm
- Multilevel Queue Scheduling algorithm

B. Types of Scheduling Algorithms

There are also types of scheduling available and they are

- Long term scheduling
- Medium term scheduling
- Short term scheduling



C. Long Term Scheduling

When a new process is created long term scheduling is performed. If the number of ready processes in the ready queue gets very high, then there is a overhead on the operating system (i.e., processor) for maintaining the long lists, context

Algorithm	Comparison
First come first serve (FCFS)	FCFS basis means that task that comes first will be executed first.
Round robin algorithm (RRA)	In this Scheduling algorithm time is to be given to resources in a time slice manner.
Min-min algorithm	Selects smaller tasks to be executed first.
Max-min algorithm	Selects bigger tasks to be executed first.
Priority based scheduling algorithm	Each process is assigned a priority, and priority is allowed to run. Equal-Priority processes are scheduled in FCFS order.

II. SCHEDULING ALGORITHM

A. Scheduling and Types

A scheduling algorithm is the algorithm which indicates the amount of CPU time is allocated for processes and threads. The major goal of scheduling algorithm is to accomplish the following criteria.

- Number of task must be starved of resources – each and every task must get their chance in CPU time
- If priorities are being used, then the low priority task must not have any high priority task.

There are different types of scheduling algorithms that exist in distributed computing system. Most of them can be

switching and dispatching increases. Therefore, only limited number of processes are allowed in to the ready queue. The "long-term scheduler" manages this work. Long-term scheduler determines which programs are admitted into the system for processing. Once when a process or job is admitted, it becomes a process and is added to the queue for the short-term scheduler.

In few systems, a newly created process begins in a swapped-out condition, in which case it is added to a queue for the medium-term scheduler scheduling manage queues to minimize queuing delay and to optimize performance. The long-term scheduler limits the number of processes to allow for processing by taking the decision to add one or more new jobs, based on FCFS (First-Come, first-serve) basis or priority or execution time or Input/Output requirements. The title or heads unless they are unavoidable.

D. Medium Term Scheduling

When part of the main memory gets freed, the operating system looks at the list of suspend ready processes, decides which one is to be swapped in, depending on priority, memory followed by other resources. The medium term scheduling is a part of the swapping function. This scheduler works in close conjunction with the long-term scheduler. It performs the swapping-in function among the swapped-out processes. Medium-term scheduler executes frequently.

E. Short Term Scheduling

Short-term scheduler is invoked whenever an event occurs, that may lead to the interruption of the current running process. It selects among the processes that are ready to execute and allocates the CPU to one of them. It must select a new process for the CPU frequently. It must be very fast. The short term scheduler is also known as dispatcher.

III. ADVANTAGES AND DISADVANTAGES OF DIFFERENT TYPES OF SCHEDULING ALGORITHM

Advantages	Disadvantages
The First-come First-served method is better for long processes and one of the most simplest methods.	Each and every small processes should wait for its turn to utilize the cpu also, throughput is not emphasized.
The short job first scheduling minimizes the average waiting time and the throughput is high.	It does not minimize the average turnaround time and can lead to unfairness or starvation.
Non-preemptive Priority Scheduling gives good response for the highest priority processes.	Here starvation is a possibility for lowest priority processes.
Preemptive priority scheduling, priority of a process can be selected based on memory requirement, time requirement or user preference.	In this type of scheduling, a higher priority process can execute ahead of an already executing lower priority process. If lower priority process keeps waiting for higher priority processes, starvation occurs.
Round-robin is effective in a general-purpose, times-sharing system or transaction-processing system. Also overhead on processor is low.	Care must be taken during choosing the quantum value and also the throughput is low if time quantum is too small.

A. Disk Scheduling

In operating systems, seek time is a very important category. All the device requests are linked in queues and the seek time is increased which causes the system to slow down and so Disk Scheduling Algorithms are used to reduce the total seek time of any request. There are basically two types of disks and they are:

1. Fixed head disk- This has one head for each track on the disk and it requires no head movement time to service a request also it is expensive.
2. Movable head disk- It is common in use because it has a single head driven by a stepper motor that can position the head over any desired track on the disk surface.

The types of disk scheduling algorithms are:

- First come-first serve (FCFS)
- Shortest Seek Time First (SSTF)
- Elevator (SCAN)
- Circular SCAN (C-SCAN)
- LOOK
- C-LOOK

These algorithms are not tough for understanding but often tend to confuse as they all are quite similar. These algorithms are used for the keeping Head Movements to the least amount as possible. The efficiency of disk drivers is actually meant as that the disks must have fast access time and reasonable bandwidth. The two main components of access time and bandwidth of disks are

- Seek time - the time to move the heads to the cylinder that contains the desired sector.
- Rotational latency - the additional time to rotate the desired sector to the disk head.

IV. SCHEDULING IN CLOUD COMPUTING

A. Task Scheduling

Task scheduling is the process of allocating the resources to the particular job in specific time. The main objective of scheduling is to maximize the resource utilization. Minimizing the waiting time is the goal of scheduling. A good scheduling algorithm yields good system performance. In the cloud there are numerous and distinct resources available. The cost of performing tasks in cloud depends on which resources are being used so the scheduling in a cloud environment is different from the traditional scheduling. In a cloud computing environment task scheduling is a biggest and challenging issue. Many heuristic scheduling algorithms have been proposed, but more improvement is needed to make system faster and more responsive. The traditional scheduling algorithms like First Come First Serve, Shortest Job First, Round Robin, Min-Min, Max-Min algorithms are not much better solution to scheduling problems with cloud computing. And so, we will need a better solution for this kind of problem. The scheduling is widely differentiated into as

- Dynamic scheduling
- Static scheduling

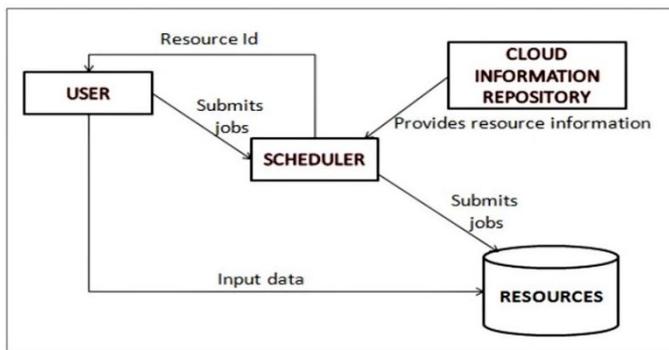
In the static scheduling where the required data are pre-fetched and the task execution at different stages are pipelined.

And in dynamic scheduling where the task or job components may not be known. are not known beforehand and whereas the task execution time

S.No	Algorithm	Comparison	Scheduling Method
1.	A Priority based Job Scheduling Algorithm in Cloud Computing	It has less finish time.	Dependency mode
2.	Resource-Aware-Scheduling algorithm (RASA)	It is used to reduce makespan.	Dependency mode
3.	Extended Max-Min Scheduling Using Petri Net and Load Balancing	It is used for efficient load balancing.	Batch mode
4.	Improved Cost-based Algorithm for Task Scheduling	Improves the computation /communication ratio.	Batch mode
5.	An Optimistic Differentiated Job Scheduling System for Cloud Computing	The QoS requirements of the cloud computing user and the maximum profits of the cloud computing service provider are achieved.	Dependency mode
6.	Performance and Cost Evaluation of Gang Scheduling in Cloud Computing System with Job Migrations and Starvation Handling	The application of migrations and starvation handling had a significant effect on the model.	Batch mode
7.	Reliable Scheduling Distributed in Cloud computing (RSDC)	It is used to reduce processing time.	Batch mode

B. Scheduling Model in Cloud

Scheduling Model in Cloud



Two basic constraints should be met. A task cannot be executed on two or more processors simultaneously, and a processor cannot execute on two or more tasks. Under these premises, a feasible scheduling algorithm is that the scheduling can make all tasks meet their deadlines. An algorithm is optimal in the sense that no other feasible scheduling exists if the task set cannot be scheduled by this algorithm. A good scheduling technique also helps in proper and efficient utilization of the resources.

V. CONCLUSION

This paper presents common scheduling approaches in computational cloud. Scheduling mechanism is an important issue in case of cloud computing. Scheduling mechanism is very much necessary to improve the server and resource utilization also to increases the performance of the computer. To perform better cloud, proper scheduling algorithm or

method will be needed. Scheduling is the process to schedule data during transmission for uploading and downloading. Using scheduling bandwidth of network can be utilized efficiently and response time can be deducted. So we need algorithm that improve availability and reliability in cloud computing.

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