



Study on Different Scheduling Algorithm for Cloud Computing

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Abstract-- Cloud computing is a rising technology in distributed computing which facilitate pay per model as per user command and requirement. Cloud consists of a set of virtual machine which includes both computational and storage facility. Now a day, cloud computing technology is used all over. Cloud provides many facilities due to its vast area such that sharing of resources for different purposes. The primary aim of cloud computing is to give most suitable access to remote scattered resources. Cloud is developing day by day and faces many challenges, one of them is scheduling. In this context, Scheduling becomes a necessary factor to discuss. Scheduling points to a set of rules to control the order of work to be fulfilled by a system. A good scheduler fit its scheduling policy according to the varying situation and the type of task. To efficiently increase the working of cloud computing environments, job scheduling is one the main job performed in order to get highest profit. In this work, we compare three scheduling algorithms, first-in-first-out (FIFO), round robin and shortest job First algorithms. This paper we focus some existing different scheduling algorithm and issues related to them in cloud computing.

Keywords --Cloud computing, Scheduling, FIFO, SJF, RR

I. INTRODUCTION

Cloud computing is an world wide web based development and use of technology and its one among the advanced and future latest computing model wherever applications and knowledge services are make available over the net. C C are often outlined as a new method of computing within which dynamically scalable and some time virtualized resources are provided as a services over the web. At this point most of the business organizations and academic institutions use cloud environment. Cloud computing is service targeted to produce top quality and affordable info services by pay-per-use model within which guarantees are offered by the cloud service suppliers. It is a good idea to create many normal computers together to get a super computer and this computer can do plenty of things. It is known to be the concept of cloud computing. Cloud computing has become vital technology trend, and lots of experts expect that cloud computing will restyle IT processes and the Technology marketplace. It's among the buzzwords in today's era. Whether we open an IT magazine or open any web site, cloud computing concept is everywhere. As the count of clients for the access of same data increases, catastrophe may occur. Cloud Computing offers various service models. It can be software as a service model that offers software on a single platform. It can be platform as a service model which offers a platform from where the software and data can be accessed. Or it can be infrastructure as a service which provides the safety and backup services. Job Scheduling is that the one of the most important distinguished activities that performed within the entire cloud computing environment. To boost the efficiency of the work load of cloud computing, scheduling is one of the tasks performed to urge most profit. The main purpose of the scheduling algorithms in cloud environment is to create use of the resources properly.

Job scheduling algorithms is one of the most difficult theoretical problems in the cloud computing area. Some intensive researches have been done in the area of job scheduling of cloud computing. Jobs are queued and collected into a set when they arrive in the batch mode. The scheduling algorithm can begin a set amount time. Scheduling is the most main activities that execute in the cloud computing environment. To enhance the potency of the work load of cloud computing, scheduling is one of the tasks performed to get maximum profit. Most aim of the scheduling algorithms in cloud environment is to make use of the sources properly while managing the load between the resources so that to get the minimum execution time.

II. SCHEDULING IN CLOUD

The Job management is that the primary idea of cloud computing systems task scheduling problems are main that relates to the efficiency of the complete cloud computing system. Job scheduling may be a mapping mechanism from users' tasks to the correct choice of resources and its execution. Job scheduling is flexible and convenient. Jobs and job streams can be scheduled to run whenever required, based on business functions, needs, and priorities. Job streams and processes can set up daily or weekly or monthly and yearly in advance, and run on demand jobs without need for help from support workers.

III. SCHEDULING CHARACTERISTICS

Job scheduling is global centralized – As cloud computing is a computing model that offer the centralized resource by the mirror service to multiple distributed applications. Virtualized technology and mirroring services create the task scheduling of cloud computing reach a worldwide centralized scheduling.

Each node within the cloud is autonomous – In cloud computing, the internal scheduling of each cloud node is independent, and therefore the schedulers within the cloud won't interfere with the scheduling policy of these nodes. The scalability of job scheduling - The scale of resources offer from cloud supplier may be restricted in early stages. The size of the abstract virtual resources might become massive, and therefore the application demand continues increasing. In the cloud, task scheduling must meet the scalability features, so that the throughput of the task scheduling within the cloud might not be too low

Job scheduling can be dynamically self adaptive - Increasing and shrinking applications within the cloud also be necessary depend on the need. The virtual computing resources in cloud system may additionally expand or shrink at the identical time. The resources are perpetually dynamical, some resources might fail; new resources may take part the clouds or restart.

The set of job scheduling - Task scheduling is split into two parts: one is employed as a unified resource pool scheduling, and primarily chargeable for the scheduling of applications and cloud API; the other is for the unified port resource scheduling within the cloud.

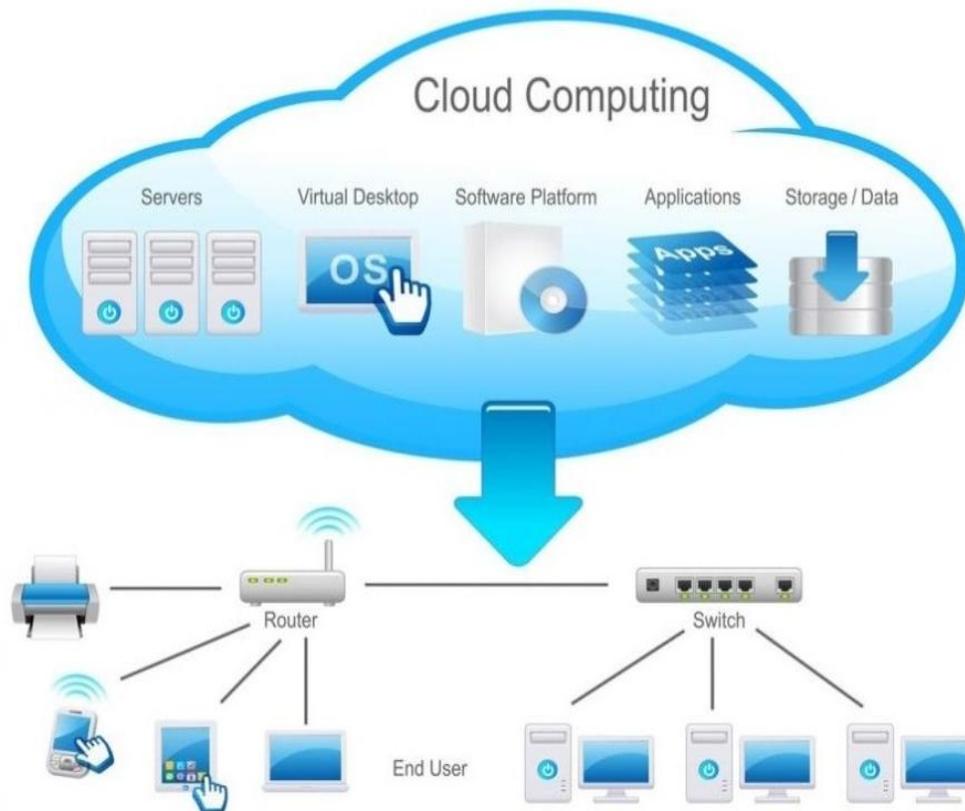


Fig 1. Cloud computing layout diagram

IV. CLOUD COMPUTING MODEL

As cloud is accessible everywhere through a link by which user can connect through cloud. Due to wide area of cloud, scheduling techniques need to be chosen very carefully. Cloud differs in size according to service supplier and its use. Cloud are often used in personal organizations such that private cloud and for public use as public cloud. Combination of both public and private cloud is formed as hybrid cloud. Cloud can be accessed using varieties of devices specified via PC, portable computer and multimedia systems and cell phones. The diagram given below shows that is used as cloud computing network for our analysis.

Figure 2 is containing several equipments and these are as:

User: - User request for application. Task is generated at this end.

Switch: Used to joint several connections at a single point.

Cloud: - Cloud is working like a long distance internet connection.

Load balancer: - 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 fig 2.

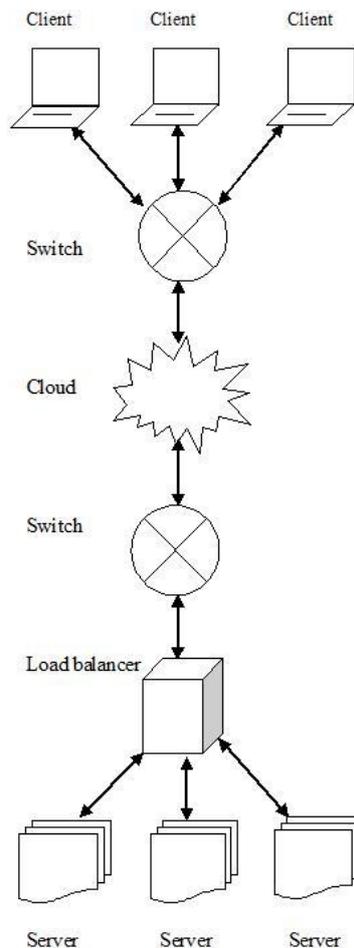


Fig 2. cloud computing network

V. RELATED WORK REVIEW

Following are the scheduling algorithms that are presently enforced in cloud. The foremost objective of these conventional and meta-heuristics scheduling algorithms are appropriate use of resources. Few algorithms are reviewed below with respect to the author and their work.

Dharamendra Chouhan, S. M. Dilip Kumar and Jerry Antony Ajay ^[1] suggested a MLFQ scheduling method using M/M/C queues for grid computing. In this article, design of MLFQ is split into multiple prioritized queues. This approach provides resources to gridlets that starve within 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 ^[2] gives a review of different types of workflow scheduling algorithm in cloud computing. This paper compares different types of workflow scheduling algorithms. Their 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.

Nishant.S.Sanghani, R.J. Khimani, K.K. Sutaria, Pooja. P. Vasani ^[3] proposed a Pre-emptable shortest job next scheduling algorithm. This algorithm is projected that in a private cloud. This paper they combine the pre-emption technique of Round-robin algorithm with shortest process next (PSN). This algorithms produce cost benefits and improve the response time and execution time.

Poonam Devi, Trilok Gaba ^[4] proposed a Shortest Job scheduling algorithm. This algorithm is proposed in a public cloud environment. In this paper includes the allocation of resources on dissimilar clouds under over-load and under-load conditions.

Qicao, Zhi-Bo Wei , Wen- Mao Gong ^[5] described a Optimized Activity based Costing algorithm. In this paper implementation of the optimized algorithm is compared with the traditional task scheduling algorithm. The key goal of this optimized algorithm is to get more profit as compare to the traditional ones. ABC is the scheduling algorithm of measuring the object's cost as well as the performances of activities

Huankai Chen, Frank Wang, Na Helian, Gbola Akanmu ^[6] described a Min-Min scheduling Algorithm. In this paper an improved load balanced algorithm is introduced on a base of Min-min algorithm in order to minimize the makespan and maximize the use of resource.

Umarani Srikanth G. , V . Uma Maheswari , P. Shanthi , Arul Siromoney ^[7] proposed Ant colony Optimization technique. The basic idea for Ant colony optimization is to simulate the foraging behavior of ant colonies. When a group of ants tries to search a food, they use a pheromone (chemical) to communicate with each other. Another paper that

implements the ACO based modified algorithm in scheduling but in grid environment and proposed the modified pheromone rule.

S.Selvarani, G. Sudha Sadhasivam ^[8] suggested an Improved Cost Based algorithm. This algorithm improves the traditional cost-based scheduling algorithm for making appropriate mapping of tasks to resources. It grouped tasks according to the processing capabilities of available resources.

VI. EXISTING SCHEDULING ALGORITHM

Some of the Job Scheduling Algorithms are given below

First Come First Serve Scheduling Algorithm (FCFS) ^[9] – Also known as First in First out. It is one amongst best and simplest Scheduling algorithms. we have it allocate the Central Processing Unit in the order in which the process arrive. It assumed that ready queue is managed as first in first out which implies that the first job are going to be processed first with no other preferences.

Shortest Job First Scheduling Algorithm (SJF) ^[10] - It is a scheduling technique that selects the task with the smallest execution time. The jobs are queued with the smallest execution time placed first and the job with the longest execution time placed last and given the lowest priority. This Scheduling algorithm is deal with different approach in this algorithm CPU is allocated to the process with least burst time.

Round-Robin Scheduling Algorithm (RR) ^[11] - It is one of the simplest and broadly used scheduling algorithms. A small unit of time, called time slices is defined. All runnable processes are reserved in a circular queue. The processor scheduler goes around this queue, allocating the CPU to each process for a time interval of one quantum. New processes are added to the tail of the queue. The processor scheduler picks the first process from the queue, sets a timer to interrupt after one quantum, and dispatches the process .If the process is still running at the end of the quantum, the CPU is preempted and the process is added to the tail of the queue. If the process finishes before the end of the quantum, the process itself releases the CPU.

Priority Scheduling Algorithm ^[12] - This algorithm is preemptive in which all things are based on the priority. Each process in the system is based on the priority whereas highest priority job can run first whereas lower priority job can be made to wait. The biggest problem of this algorithm is starvation of a process.

Genetic Algorithm (GA) ^[13] – Genetic algorithm is a problem solving method that uses genetics as its model of problem solving. It is a search system to find optimized solution. Each solution is represented through a chromosome. Genetic algorithm is a method of scheduling in which the tasks are assigned resources according to individual solutions, which tells about which resource is to be assigned to which task. GA is based on the biological concept of population generation. In Genetic Algorithm the initial population is generated randomly. Genetic algorithm is a random searching method.

VII. COMPARISON OF ALGORITHMS

Table 1. Comparison of different scheduling algorithms

Algorithm	Parameters	Objective / Allocation	Waiting time
PSJN	Cost and Time	Effective and Fast execution	Lesser
Shortest Job Scheduling	Arrival time, process time, deadline and IO requirement	Effective resource allocation under defined parameter	Lesser
Optimized algorithm	Cost, profit and priority	Measure the cost and performance more accurately	More
Cost based algorithm	Cost and task grouping	Minimizing the cost and completion time	Lesser
Min Min Algorithm	Makespan	Promised the guarantee regarded the provided resources	Lesser
Ant algorithm	Pheromone updating rule	Enhance the performance of basic ACO	More
ACO	Cost and time	Improve the efficiency and reliability in all conditions	More
FCFS	Simplest scheduling algorithm	CPU is allocated in the order in which the process arrive	More
SJF	Difficult to understand	CPU is allocated to the process with least CPU burst time	Lesser than FCFS
Priority algorithm	Difficult to understand	Based on priority, the higher priority job can run first	Lesser
RR algorithm	Performance heavy depends upon the size of time quantum	The preemption take place after a fixed interval of time	More than all
Genetic algorithm	Complexity depends on the task to be scheduled	There is a greedy algorithm and pick the best job to allocate the cpu	Less

The above table shows the number of the scheduling algorithms and comparison between them on the basis of complexity, allocation, waiting time and type of system. Complexity defines which type of algorithm is simple or easy to use in processing. Allocation defines how the jobs are assigned to the resources. Waiting Time defines which of the algorithm takes more time for processing. Type of System defines which algorithm is suitable for which type of system. The First Come First Serve algorithm is a simplest algorithm for scheduling but waiting time to process the tasks is much more in this. This algorithm is suitable for batch type of systems. In Shortest Job First algorithm the waiting time is less than FCFS. This algorithms process the task first having least CPU burst time. Priority algorithm is difficult to understand because how priority can be assigned to the task is a difficult task. Here waiting time is less because task with higher priority processed first. This algorithm is suitable for both batch and time sharing systems. In R R algorithm waiting time is more than all because after a fixed time interval the next task will execute. So problem faced when one task is very heavy and other one is with very simple and small calculations. Genetic algorithm is a bio inspired artificial intelligent scheme and its complexity depends on the task. The best selected task executes first so waiting time is less here.

VIII. CONCLUSION

In this paper, we discuss the different types of scheduling algorithms and also compared with each other. Most suitable technique for scheduling is the heuristic technique. Scheduling is one of the foremost vital tasks in cloud computing atmosphere. This paper we've analyzed varieties of programming algorithmic rules and tabulated varied parameter. FCFS algorithm has some disadvantages like processing time of each job must be known in advance and it is suitable only for batch process. The key drawback of this scheme is that the average time is often quite more. In SJF long jobs may wait longer because it has to wait not only for jobs that are in the system at the time of its arrival, but also for all short jobs that are in the system at the time of its arrival. In Priority Algorithm only higher priority jobs get chance to execute. In Round-robin scheduling, like other first-come, first-served methods, doesn't give special priority to more important tasks. This shows that there is a need to propose a new scheme which achieves all the objectives and as well as provide better performance. So, our future work will use cloud computing algorithm based on queuing model to reduce the time of routing end users request and decrease the waiting time.

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