Comparison of Various Scheduling Algorithm in Multiuser Environment of Mobile Cloud Computing

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Abstract- *Mobile systems are ahead more importance, and new promising models like Mobile Cloud Computing are evolving. Mobile Cloud Computing provides an infrastructure where data storage and processing happened outside the mobile node. Specifically, there is a major interest in the use of the services gained by taking advantage of the distributed resource pooling provided by neighbouring mobile nodes in a clear way. Mobile cloud computing (MCC) is basically cloud computing in which at least some of the devices involved are mobile. Scheduling with meta-heuristic algorithms is one of the active research area in Mobile cloud computing. The objective of cloud job scheduling is to reach high system throughput and to allocate different computing resources to various applications. The Complexity of scheduling problem increases with the size of the job and becomes highly difficult to solve efficiently. Many different techniques have been proposed to solve this problem. Some of the approaches are based on heuristic techniques that provide an optimal or near optimal solution for tasks i.e., large in size. In this paper various scheduling algorithms in different environments with their respective parameters will be analysed.*

Keywords- Scheduling ,Mobile Cloud Computing, Data Center, Make Span, Pre-emption

I. INTRODUCTION

Mobile Cloud Computing is a combination of Mobile Computing and Cloud Computing. It is an emerging technique. In recent times, it is found that the researchers are involved in using cloud for performing scientific applications and the big organizations are also switching over to hybrid cloud. Various composite applications involve parallel processing to execute the jobs efficiently. Owing to the communication and synchronization among parallel processes there is a decrease in use of CPU resources. It is essential for a data center to achieve the utilization of nodes while maintaining the level of response of parallel jobs. The Mobile cloud computing is more appealing an increased number of applications to run in the remote data centers. Numerous complex applications require parallel processing capabilities. Some of the parallel applications illustrate a decrease in utilization of CPU resources whenever there is an increase in parallelism if the tasks are not schedule correctly then it reduces the computer performance.

The central goal of my proposed protocol is to

- Increase the utilization of servers allocated to the tasks
- To process the tasks having higher priority.
- Increase the resource utilization.
- Reduces the completion time (makespan) of MapReduce jobs
- Reducing the waiting time
- Reducing the switching time

II. NECESSITY OF SCHEDULING

Mobile Cloud computing has newly received substantial attention, as an auspicious approach for delivering Information and Communication Technologies (ICT) services as a utility. In the mechanism of providing these services it is needed to increase the utilization of datacenter resources which are operating in most dynamic workload environments. Data centers are the more important parts of Mobile Cloud Computing. In a single data center generally hundreds and thousands of virtual servers run at any instance of time, hosting many jobs and at the same time the cloud system has receiving the batches of job requests. During this context, one has to notice few target servers out many powered on servers, which can fulfil a batch of incoming jobs. So Task scheduling is valuable concern which is greatly affects the performance of cloud service provider. Traditional approach that are used in optimization are deterministic, fast, and give perfect answers but frequently tends to get stuck on local optima. Complexity of the task scheduling problem belongs to Non Polynomial –complete involving enormously large search space with consistently large number of potential results and takes much longer time to find the optimal answer. There is no handy and well outlined methodology to solve the problems under such conditions. Though in cloud, it is tolerable to find near finest solution, rather in a short period of time. In this framework IT people are focusing on heuristic methods.

2.1 SCHEDULING IN MOBILE CLOUD:

There are numerous algorithms for scheduling in mobile cloud computing. The main advantage of scheduling algorithm is to attain a high performance. The main examples of scheduling algorithms are FCFS, Round-Robin, Min-Min algorithm, Max-

Min algorithm and meta- heuristic algorithms (ACO, GA, Simulated annealing, PSO

a. First Come First Serve Algorithm: Task in the queue which comes first is served. This algorithm is simple and fast. Fig.1 shows the task execution in first come first serve basis. Here the process in the ready queue which has been comes is first served. Remaining processes are waiting in the waiting queue.

b. Round Robin Algorithm: In the round robin scheduling, processes are dispatched in a FIFO method but are given a limited amount of CPU time called a time-slice or a quantum.
If a process does not complete before its CPU-time expires, the CPU is pre-empted and given to the next process waiting in a queue. The pre-empted process is then located at the back of the ready list.

c. Min–Min Algorithm: This algorithm selects small jobs to be executed firstly, which in turn large job delays for long time.

d. Max – Min algorithm: This algorithm chooses large jobs to be executed firstly, which in turn small job delays for long time.

e. Most fit task scheduling algorithm: In this algorithm job which fit best in queue are executed first. This algorithm has high failure ratio.

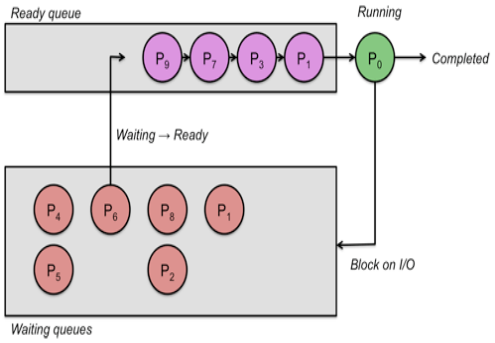

Fig. 1: First Come First Serve Scheduling

f. Priority scheduling algorithm: The basic idea of this algorithm is straightforward: each process is assigned a priority, and priority is permitted to run. Equal-Priority processes are scheduled in FCFS method. The shortest-Job-First (SJF) algorithm is a special instance of general priority scheduling algorithm. An SJF algorithm is simply a priority algorithm where the priority is the inverse of the predicted next CPU burst. In the sense, the longer the CPU burst, the lower the priority and vice versa. Priority can be defined either internally or externally. Internally defined priorities use some measurable quantities or potentials to compute priority of a process.

Table 1. CALCULATED TURNAROUND TIME OF FCFS, SJF (NP), SJF

Burst Time	Arrival Time	PRIORTY	FCFS	SJF(NP)	SJF(P)
23	0	3	23	23	428
34	5	1	523	766	766
34	3	3	321	698	698
12	6	4	660	169	147
8	8	2	744	83	62
10	4	5	358	111	90
31	1	1	54	631	631
23	2	4	120	495	495
9	3	5	272	92	71
16	6	1	593	301	279
1	5	2	547	24	9
12	8	3	756	181	159
15	9	9	778	269	247
6	6	1	666	47	26
7	2	5	127	54	33
9	3	4	348	101	80
11	5	8	369	133	123
7	8	9	763	75	54
4	9	6	822	35	14
15	5	2	455	254	232

2.2 SCHEDULING PROCESS:

Scheduling process in mobile cloud can be categorized into three stages namely

- Resource discovering and filtering – Datacenter Broker determines the resources present in the network system and collects status information related to them.
- Resource selection – Target resource is selected based on some parameters of jobs and resource. This is deciding stage.
- Task submission -Task is submitted to resource selected.

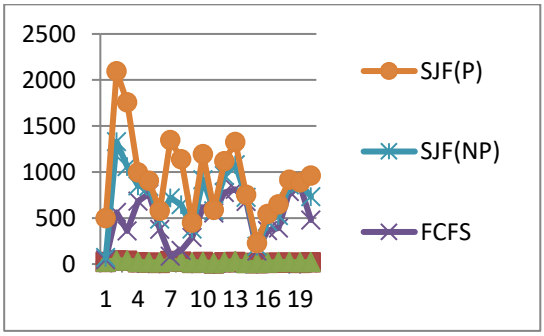

Fig 2. COMPARING TURNAROUND TIME OF FCFS, SJF (NP), SJF

III. EXISTING SCHEDULING ALGORITHM

The Following scheduling algorithms are currently prevalent in clouds.

3.1RESOURCE-AWARE-SCHEDULING ALGORITHM (RASA):

Saeed Parsa and Reza Entezari-Maleki [2] proposed a new task scheduling algorithm RASA. It contains two traditional scheduling algorithms; Max-min and Min-min. RASA uses the advantages of Max-min and Min-min algorithms and also has their disadvantages. Even though the deadline of each task, arriving rate of the tasks, cost of the task execution on each of the resource, cost of the communication are not measured.

3.2 RSDC (RELIABLE SCHEDULING DISTRIBUTED IN CLOUD COMPUTING):

Arash Ghorbannia Delavar,Mahdi Javanmard , Mehrdad Barzegar Shabestari and Marjan Khosravi Talebi[1] proposed a reliable scheduling algorithm in cloud computing environment. In this algorithm major task is divided to sub jobs. In order to balance the jobs the request and acknowledge time are calculated separately. The scheduling of each job is done by computing the request and acknowledges time in the form of a shared job. So that efficiency of the system is increased.

3.3 AN OPTIMAL MODEL FOR PRIORITY BASED SERVICE:

Dr. M. Dakshayini, Dr. H. S. Guruprasad [3] proposed a new scheduling algorithm based on priority and admission control scheme. In this algorithm priority is assigned to every admitted queue. Admission of each queue is decided by calculating tolerable delay and service cost. Advantage of this algorithm is that this policy with the proposed cloud architecture has achieved very high (97%) service completion rate with certain QoS. As this policy provides the highest precedence for highly paid user service-requests, complete servicing cost for the cloud also increases.

3.4 A PRIORITY BASED JOB SCHEDULING ALGORITHM:

Shamsollah Ghanbari, Mohamed Othman proposed a new scheduling algorithm based on multi – criteria and multi - decision priority driven scheduling algorithm. This scheduling algorithm contains of three level of scheduling: object level, attribute level and alternate level. Here, priority can be fixed by job resource ratio. Then priority vector compared with each queue. This algorithm has higher throughput and less finish time.

3.5 EXTENDED MAX-MIN SCHEDULING USING PETRI NET AND LOAD BALANCING:

El-Sayed T. El-kenawy, Ali Ibraheem El-Desoky, Mohamed F. Al-rahamawy[5] has proposed a new algorithm based on impact of RASA algorithm. Improved Max-min algorithm is based on the expected execution time as a substitute of complete time as a selection basis. Petri nets are used to model the simultaneous behavior of distributed systems. Max-min demonstrates attaining schedules with comparable lower make span rather than RASA and original Max-min.

3.6 AN OPTIMISTIC DIFFERENTIATED JOB SCHEDULING SYSTEM FOR CLOUD COMPUTING:

Shalmali Ambike, Dipti Bhansali, Jaee Kshirsagar, Juhi Bansiwal[6] has proposed a differentiated scheduling algorithm with non-preemptive priority queuing model for activities done by cloud user in the Mobile Cloud Computing environment. In this method one web application is created to do some activity similar to one of the file uploading and downloading then there is need of efficient job scheduling algorithm. The Qos requirements of the cloud computing user and the maximum profits of the cloud computing service provider are achieved with this algorithm.

3.7 IMPROVED COST-BASED ALGORITHM FOR TASK SCHEDULING:

Mrs.S.Selvarani, Dr.G.Sudha Sadhasivam [7] proposed an improved cost-based scheduling algorithm for making efficient mapping of jobs to available resources in cloud. The improvisation of old activity based costing is proposed by new job scheduling strategy for cloud environment where there may be no relation between the overhead application base and the way that different tasks cause overhead cost of resources in cloud through mobile. This scheduling algorithm splits all user tasks based on priority of each task into three different lists. This scheduling algorithm measures both resource cost and computation performance, it also improves the computation/communication ratio.

3.8 PERFORMANCE AND COST EVALUATION OF GANG SCHEDULING:

Ioannis A. Moschakis and Helen D. Karatza has proposed a gang scheduling algorithm with job migration and

starvation handling in which scheduling parallel jobs, applied in the areas of Grid and Cluster computing. The number of Virtual Machines(VMs) available at any time is dynamic and scales giving to the demands of the jobs being serviced. The aforementioned model is calculated through simulation in order to examine the performance and overall cost of Gang Scheduling with migrations and starvation handling. Results highlight that this scheduling can be effectively arranged on Clouds, and that cloud platforms can be viable for HPC or high performance enterprise applications

IV. CONCLUSIONS

Scheduling is one of the vital tasks in mobile cloud computing environment. In this paper we have analyze different scheduling algorithm and tabulated various parameter. We have noticed that disk space management is serious issue in virtual environment. Existing scheduling algorithm gives high throughput and cost effective but they do not consider reliability and availability. So we need algorithm that improves availability and reliability in cloud computing environment.

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