Geometric Mean Based Prioritized Multi Queue Job Scheduling in Cloud Computing"

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ABSTRACT

Cloud computing is one among the newest technologies that are extremely popular now days in IT industries and it'll continue in developing part till computers and internet era is existing. Whereas managing cloud computing, a number of problems are confronted like significant load or traffic while computation. Job scheduling is one among the answers to those problems. It's a method of mapping task to available resource. The goal of cloud job scheduling is to achieve high system output and to assign numerous computing resources to applications. The complexity of scheduling problem increases with the size of the task increasing and becomes extremely troublesome to resolve effectively. For the solution of this I will attempt to improve the multi queue job scheduling by using geometric mean based prioritized multi queue job scheduling.

Keyword: - *Cloud Computing, Job scheduling, MQS Algorithm, Comparison Matrix, Geometric Mean algorithm;*

1. CLOUD COMPUTING

Cloud computing is an approach of enabling convenient, on-demand network access to a shared pool of configurable computing resources which will be quickly provisioned and released with nominal management effort or service provider interaction. In cloud computing, the word cloud is employed for "the internet" therefore the phrase cloud computing means that "A form of Internet-based computing," where different services like servers, storage and applications are delivered to an organization's computers and devices through the net. Mainly two types of model works in cloud computing for making cloud computing feasible and accessible to end users 1) Deployment Model 2) Service Model. Public cloud, Private cloud, Hybrid Cloud includes in deployment model. Public cloud is available for public use anyone can access that cloud. Private cloud is deployed for personal organization's use. Hybrid cloud is combination of both public and private cloud. Services model include IaaS ,Paas & SaaS. IaaS service provides virtual machines, virtual storage, virtual infrastructure ,and other hardware assets as resources that clients can provision, SaaS provides a complete operating environment with applications, management, and the user interface, PaaS provides virtual machines, operating systems, applications, Services , development frameworks, transactions, and control structures.

1.1 Purpose of cloud computing.

It is **On-Demand**: Lease what you need and when you need, **Self-service provisioning**: End users can spin up computing resources for almost any type of workload on-demand, **Elasticity**: Companies can scale up as computing needs increase and then scale down again as demand decrease, **Pay:** Computing resources are measured at a granular level, allowing users to pay only for the resources and workloads they use, **Broad Network Access** Capabilities are available over network any client platform access that (mobile phone, tablet, laptop).

2. Job Scheduling.

The Job scheduling is that the fundamental thought of cloud computing systems task scheduling issues are main that relates to the efficiency of the total cloud computing system. Job scheduling could be a mapping mechanism from users' tasks to the suitable choice of resources and its execution. Job scheduling is versatile and convenient. Jobs and job streams may be scheduled to run whenever required, supported business functions, needs, and priorities. Job streams and processes will started daily, weekly, monthly, and yearly earlier, and run on demand jobs while not want for help from support workers. Different characteristics of job scheduling as follows: a) Job scheduling is global centralized – As cloud computing is a computing model that provide the centralized resource by the mirror service to multiple distributed applications, and this mirroring deployment will create heterogeneous procedures executing of interoperate become easier, that used to be troublesome to manage. Therefore, virtualized technology and mirroring services build the task scheduling of cloud computing achieve a world centralized scheduling. b) Each node in the cloud is independent – In cloud computing, the internal scheduling of every cloud node is autonomous, and the schedulers in the cloud will not interfere with the scheduling policy of these nodes. c) Job scheduling can be dynamically self-adaptive - Expanding and shrinking applications in the cloud may be necessary depend on the requirement. The virtual computing resources in cloud system may also expand or shrink at the same time. The resources are constantly changing, some resources may fails, and new resources may join in the clouds or restart.

In the traditional scheduling strategy like FCFS, SJF, EASY and CBA are not clustering the jobs based on the burst time. The basic ideas behind the scheduling algorithms are:

1) In the First Come First Serve job scheduling the task will be assign in fist come first out manner means which task come first in queue it will serve first then another one.

2) In Shortest Job First they give more priority to smallest jobs, medium and long jobs are executed after the execution of small jobs.

3) In Round Robin scheduling jobs are served in FCFS logic and the time slice of the process decide the Allocation. The process does not terminate with in the scheduled time the next job is waiting in the queue.

3. EXISTING WORK.

In base paper for job allocation multi queue scheduling algorithm is used. Three different queues are formed as small, medium and long based on ascending order measured in terms of burst time of the jobs.

1. In the small queue first 40% of jobs are stored.
2. In the medium queue next 40% of jobs are stored.
3. In the long queue lofted 20% jobs are stored.

The MQS algorithm gives importance to all the jobs because many number of client in cloud computing and each Client wants more needs and expectation. It grants equal importance for all in dynamic selection. The client submitted jobs are enter in to the service provider it consists of queue manager that sort the jobs in ascending based on burst time. The jobs are executed based on dynamic selection and enter in to cloud environment. The best allocation reduces the time and availability of space in an effective manner without compensating the quality of the system and customer needs.

4. PROPOSED METHOD.

The MQS algorithm gives importance to all the jobs because many number of client in cloud computing and each Client wants more needs and expectation. It grants equal importance for all in dynamic selection. In Propose system Geometric Mean is used for job priority. Geometric Mean method is an alternative measure of the priority and formed by taking n-th root of the matrix of row element divided by the column sum of row geometric mean. Hear in proposed method priority of task as well as priority of vms(virtual machine) is considered in term of length of the task and mips of the virtual machine. Longer task need to highly efficient resources so,the execution time of all resources and jobs are balance. And total execution time is also reduced. Using the basic step of the geometric we proposed following algorithm step.

3.1 Algorithm step:

Input: Resources (VM) [i=1....n]
Task (T) [j=1....m]
Step 1: For all VM, Capacity of each VM
Vc[i] = VM Capacity in MIPS
Step 2 : For all Task, Length of each Task

TL[j] = Length of Request in MI

Step 3 : All task divided in three different queue
>41=small,41>=85,<=86

//Priority for all task
For that apply the step OF Geometric mean method.

Step 4 : Find out priority vector for job as well as VMs using comparison matrix
Step 5 : Find out priority by using Geometric mean
Step 6 : Taking task from all three queues in 40,40,80%
Step 7 : Now higher priority taking higher efficient VMs.

3.2 Theoretical Analysis:

Table 1: VM and Task Specification

VM Capacity in MIPS	Task Length in MI
1000	400,000
1050	40,1000
950	39,9500

Create comparison matrix for VM.

T/VM	Vm1	Vm2	Vm3
Vm1	1	3	0.333
Vm2	0.333	1	0.222
Vm3	3.0	5.0	1

Table 2: Comparison matrix

Perform same procedure for job comparison. Comparison Matrix (AHP) builds a hierarchy (ranking) of decision items using comparisons between each pair of items expressed as a matrix. Paired comparisons produce weighting scores that measure how much importance items and criteria have with each other. [9]

AHP Scale of Importance for comparison pair (aij)	Numeric Rating	Reciprocal (decimal)
Extreme Importance	9	1/9 (0.111)
Very strong to extremely	8	1/8 (0.125)
Very strong Importance	7	1/7 (0.143)
Strongly to to very strong	6	1/6(0.167)
Strong Importance	5	1/5(0.200)
Moderately to Strong	4	1/4(0.250)
Moderate Importance	3	1/3(0.333)
Equally to Moderately	2	1/2(0.500)
Equal Importance	1	1 (1.000)

Table 3 : Preferences made on this scaling[9]

4. EXPERIMENTAL RESULTS

CloudSim is used in this paper to implement and simulate the proposed approach in cloud environment. Performance of proposed approach is than compare with Existing PBIL algorithm in terms of Total Execution Time. This research work considers Datacenter, VM, host and Cloudlet components from CloudSim for implementation of a proposed algorithm. Datacenter component handles service requests. VM consist of application elements which are connected with these requests, so Datacenters host should allocate VM requested by user.

In Simulation experiment, we tested above both Base paper and Proposed Work with 3 random generated tasks and virtual machines respectively. The simulated parameters are set as follows.
1) To set Virtual Machines according to the Processor is limited in [500, 2000] MIPS; bandwidth is 10 Mbps; Storage is 512 MBPS.
2) To create cloudlet according to the task length which is random between [20000, 80000].

Table 5 : The comparison of the total time of the simulation scenario.

Algorithm	Cloudlet	Execution Time(ms)
MQS algorithm	3	1200.0000000000002
Geometric mean Based prioritized Algorithm	3	300.67499999999995

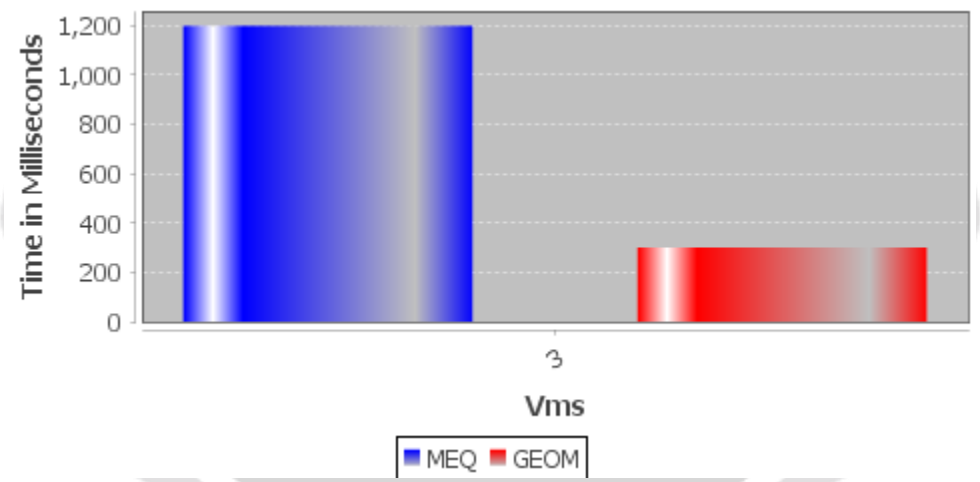

Chart 1: Total execution time comparison of 3 Task on 3 VM.

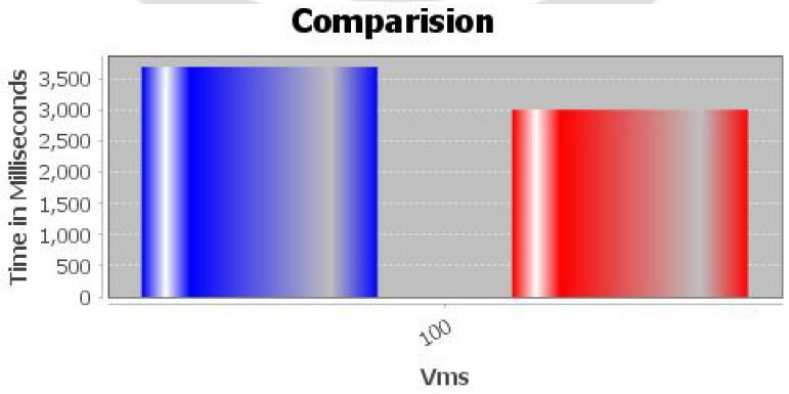

Chart 2: Total execution time comparison of 100 Task on 100 VM.

5. CONCLUSIONS.

Here we showing in existing Work MQS algorithm is proposed for Job scheduling. In this algorithm firstly all jobs are divided into three different queue small, medium, large. In this algorithm, priority will not consider for task. All task in queue perform on basis of FIFO strategy. So higher priorities task in queue have to wait for long time. In proposed work we providing to priority to all task as well as to all VMs by using geometric mean mathematical method. Using geometric mean mathematical method we will able to show job allocation for available jobs. Also geometric mean mathematical method is simple to implement and works in balanced as well as unbalanced condition.

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