Comparative Study of Scheduling Mechanisms In Cloud Computing

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Abstract: - Cloud Computing is an emerging paradigm in the area of parallel and distributed computing. Clouds consist of a collection of virtualized resources, which include both computational and storage facilities .It facilitates users to access shared computing resources through internet on demand. The main purpose to search on this paper to get the deep knowledge about the scheduling mechanisms of cloud computing, also to get their comparisons. The scheduling mechanisms of cloud computing are based on performance and cost evaluation, resource scheduling, task scheduling.

I.   INTRODUCTION

Cloud computing the new calculation model, is the next generation network computing technologies. The National Institute of Standards and Technology (NIST) defines the cloud computing as,

"A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction"[1].

Cloud Computing builds super computers which provides data storage, analysis and scientific computing services through the distributed computing model. Through Cloud Computing the virtualization technology will be distributed in the network. Calculation node must be put into dynamic system, all kinds of application system according to the need for computing resources, storage space and various software service, fully realize the dynamic function. In general, cloud computing is a business purpose to forming the field network revolution, it is the development of parallel computing, distributed computing, and the grid computing and increased new features. Users request a calculation, data center according to the task of segmentation and assigned suitable child nodes running, and the results of the calculation results are formed together and then returned to the user.

In addition, there are many research findings are applied to solve the scheduling problems i.e. genetic algorithms; neural networks; artificial intelligence and distributed research which regards solving the research fields. Here in this paper we are going to discuss about Scheduling Mechanisms of Cloud Computing

II.   SCHEDULING MECHANISMS OF CLOUD COMPUTING:

1. Task Scheduling
2.   Gang Scheduling (Based on Performance & Cost Evaluation)
3.   Resource Scheduling

III.   TASK SCHEDULING

Task scheduling is one of the best researches, there are many experts, scholars published papers and journals project to discuss the task scheduling problem. In addition, many research findings are applied to solve the scheduling problems i.e. genetic algorithms; neural networks; artificial intelligence and distributed research which regards solving the Research fields.

1.1 **The Task Classification Based On Qos**

The Service of Quality (QoS) is internet properties of a security mechanism, in cloud computing environment. QoS is to measure the user's cloud computing application. Service satisfaction with the degree of important factors, cloud computing service function and performance evaluation will no longer be the traditional evaluation such as speed, and cost-effective etc, but with customer satisfaction as the goal, with the service quality to measure because the user's diversity, on cloud computing homework scheduling and resource allocation put forward higher request. According to the QoS parameters first task will be required in classification procession, which can be more accurate and timely, the task allocation to the most appropriate resources, generally consider QoS parameters have the following items:

(1) Network bandwidth: when a customer's communication bandwidth is high, such as multimedia data transmission, it should be priority bandwidth requirements and provide high bandwidth.

(2) Service completion time: for real-time demand higher users, need within the shortest possible time to finish tasks and respond to user with submitted homework.

(3) <u>System reliability</u>: To run a number of complex tasks users, need cloud computing center to provide a stable and reliable performance support, such as mass data storage service.

(4) <u>Costs</u>: Cloud computing according to the needs to pay, cost is the user' attention focus, for the cheap service to users, cost is a standard.

Therefore, for different user needs, set up different QoS parameters, according to these parameters to measure the user's satisfaction, so as to establish the quantitative evaluation of different standards.

1.2 Map Reduce Level Scheduling

The key technology of Cloud computing Map Reduce is step-by-step type processing technology. Map Reduce scheduling is the core of the cloud computing resources
Scheduling and is the realization of the logical step calculation realize, all the task scheduling will be realized through this model. In Map Reduce programming mode, concurrent processing, fault tolerant processing, load balance problems are abstracted for a function library. Through the Map Reduce interface, user can put the large scale computing to be automatic concurrent and distribution implementation.
Map Reduce programming model calculation of the implementation process can be abstracted as three role: Master, Worker and User.

Master is a central controller system, responsible for task allocation, load balance, fault tolerant processing,

Worker is responsible for receiving task from Master, carries on the data processing and calculation, and responsible for data transmission communication,

User is client, input task to realize the Map and Reduce Function, control the whole calculation Process [2].

IV. GANG SCHEDULING

The main purpose of describing Gang Scheduling is to evaluate the performance and cost in the cloud computing system. Our model applies two of the most commonly gang scheduling algorithms. Both AFCFS and LJFS have been studied in the area of Cluster Computing.

2.1 **Adaptive First Come First Serve:** AFCFS tries to schedule jobs whose tasks are in front of their respective queues every time, VMs become idle following a departure. If no such job exists, AFCFS tries to schedule jobs that are further down their queues. Because of this way of scheduling AFCFS tends to favor smaller jobs that are easier to schedule and often increases the waiting times of larger jobs.

2.2. **Largest job first served**: LJFS on the other hand, gives priority to larger jobs. In every scheduling cycle, LJFS tries to schedule the largest job whose tasks are allocated to VMs. This method improves the response time for larger jobs significantly by giving them priority. Also, Since larger jobs often leave large enough numbers of VMs free when scheduled, smaller jobs suffer a smaller increase in waiting times in comparison to larger jobs under AFCFS.

By using these two AFCFS and LJFS, one can evaluate the performance and cost in terms of Response Time, Total number of migrations, Bounded Slow down [3].

V. RESOURCE SCHEDULING

Resource scheduling is a crucial question of distribution and in cluster calculation, it gives the user task execution efficiency, the resources of the system numbers and the performance. From scheduling, heuristic scheduling algorithm in Grid Task Scheduling is used in most applications, the most effective, common heuristic scheduling algorithms are: simulated annealing, genetic algorithm, the ant colony algorithm. Cloud Computing is the use of computing resources (hardware and software) that are delivered as a service over a network. Cloud computing entrusts remote services with a user's data, software and computation.
In the business model, using software as a service, users are provided access to application software and databases. The cloud providers manage the infrastructure and platforms on which the applications run. SaaS is sometimes referred to as "on-demand software" and is usually priced on a pay-per-use basis [4].

FACTORS AFFECTING SCHEDULING MECHANISMS OF CLOUD COMPUTING ARE:
Some Factors affected Scheduling Mechanisms of Cloud Computing which are going to discuss below:
1)   Efficiency aspects (from a cloud provider's angle)
Cloud providers have an interest to maximize the efficiency of their underlying resources so they can serve more customers with lower infrastructure investment. Their scheduler will look at application characteristics as well as their infrastructure capacity and their SLA commitment.
2)   Fairness aspects (from a federated pool of resources contributed by co-operative parties) My perception of SUN Grid Engine is based on this model. The main goal of the scheduler is to maintain a prioritized share of resource based on who is the contributor . Such schedule focus a lot on how to "reserve" resource for the resource owner and provide sharing when the job of the resource owner is not busy.

3) **Cost aspects** (from a cloud consumer's angle)
Cloud providers offers different SLA and charge model, Cloud consumers have an interest to run its application in the most cost effective way. This scheduler is "cost-sensitive" and will adjust the allocation based on workload pattern changes.

4) **Communication Pattern Aspects** –
If the processing itself can be expressed in a pattern of communications ,then the scheduling algorithm can be based on these communication patterns to minimize the amount of data moved around. The scheduler will be very specific to the algorithm in the processing.
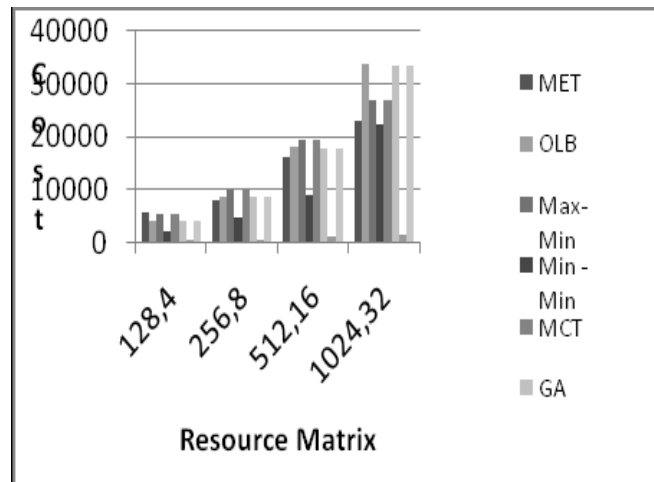

Fig 1: Comparison of scheduling algorithms using consistent <u>resources and cost</u> for low heterogeneity tasks and low heterogeneity resources [2].
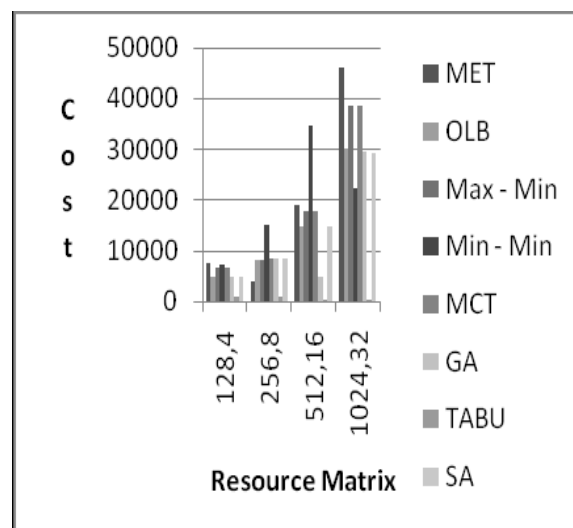

Fig 2 : Comparison of scheduling algorithms using consistent <u>resources and cost</u> for low heterogeneity tasks and high heterogeneity resources[2].
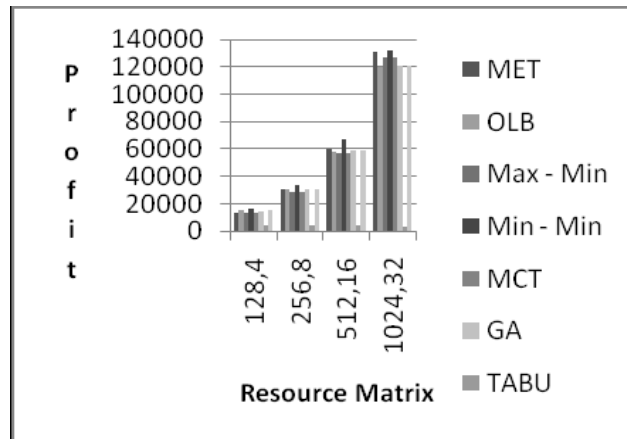
Fig 3: Comparison of scheduling algorithms using consistent <u>resources and profit</u> for low heterogeneity tasks and low heterogeneity resources [2].
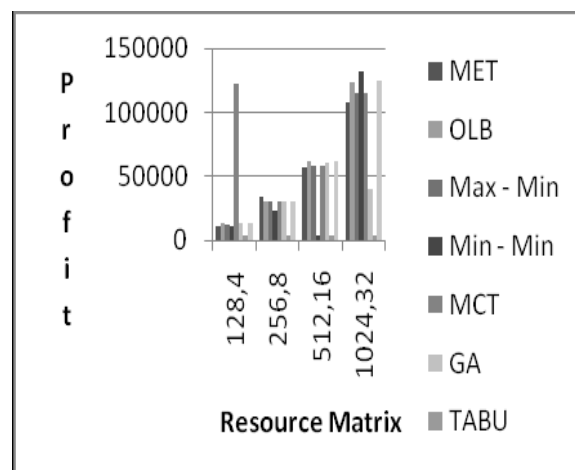

Fig 4: Comparison of scheduling algorithms using consistent <u>resources and profit</u> for low heterogeneity tasks and high heterogeneity resources [2].

VI.   CONCLUSION

This paper makes elaboration on the realization of scheduling mechanisms of Cloud Computing. Different scheduling mechanisms are evaluating i.e. Task Scheduling in terms of Quality of services and Map Reducing, Gang Scheduling in terms of Adaptive first come first serve and largest job first served for evaluating performance and cost, Resource Scheduling in terms of Hardware and Software.

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