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Differentiating Algorithms of Cloud Task Scheduling Based on various Parameters

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Abstract: *Cloud computing is a new design structure for large, distributed data centers. Cloud computing system promises to offer end user "pay as go" model. To meet the expected quality requirements of users, cloud computing need to offer differentiated services to users. QoS differentiation is very important to satisfy different users with different QoS requirements. In this paper, various QoS based scheduling algorithms, scheduling parameters and the future scope of discussed algorithms have been studied. This paper summarizes various cloud scheduling algorithms, findings of algorithms, scheduling factors, type of scheduling and parameters considered.*

Keywords- *Cloud Scheduling, algorithms, Quality of service (QoS), Qda scheduling algorithm, Improved Cost Based, PAPRIKA, ANT Colony, Cmultiqosschedule algorithm, SHEFT Workflow , Job scheduling algorithm based on berger model.*

I. Introduction

Cloud computing is the rising techNology that delivers infrastructure as a service [IaaS], software as a service[SAAS], platform as a service[PAAS] [1]. Cloud computing began to develop at end of 2007. It allows customers to use application without buying any software and hardware and access the files at any computer using internet. Cloud computing has become an interesting way of changing the whole computing through internet. Cloud computing is a model that combines various resources from data center into outside services. Scheduler for cloud computing checks the availability of processing resources on which task should be allotted. Service providers ensure that income is utilized to their fullest so that resource power is Not left unused. Scheduling is a critical problem in Cloud computing, because a cloud provider has to serve many users according to their different needs.

Scheduling in cloud computing is of various types: task scheduling, workflow scheduling, resource scheduling, job scheduling etc. Many researchers proposed various scheduling algorithms to achieve load balancing and fairness among users. Because of different QoS parameters like cost, waiting time, execution time, trust etc., scheduling in cloud computing is different from other scheduling environment like grid and distributed scheduling. The demand of resources changes dynamically and scheduling becomes very difficult. QoS is the collective effort of service performance, which determines the degree of user satisfaction for services [2]. The cloud computing environment provides a different platform by creating a virtual machine that assists users in accomplishing their jobs within a reasonable time and cost effectively without sacrificing the quality of the services [3]. The main task is to efficiently and reasonably allocate the user's needs to available resources according to the QoS from both cloud side and user side. The paper is organized as follows: section II gives a review on some scheduling techniques based on different. QoS parameters, section III shows the comparison of various algorithms by taking different parameters and future scope of discussed algorithms, section IV shows the metrics of various parameters and section V concludes the paper.

II. Related work

A. QDA scheduling algorithm

Luzhang et.al [4] proposed a QDA scheduling algorithm using cloud workflow as a background. Algorithm works on instance-intensive workflow scheduling optimization problem. By combining staggered sub-deadline allocation criteria and differentiate tasks based on QoS preferences of users, QDA algorithm is proposed. It takes many QoS parameters like time, cost, bandwidth, reliability, quantifies them with particular value and use them in QoS based sub-deadline allocation algorithm to meet complete QoS user satisfaction. QDA algorithm simulates on cloudsim new program function called BindcloudToVmByDeadline. By taking QoS utility function into account, QDA algorithm performs better in case of execution time, user satisfaction and load balancing.

B. Improved Cost Based Scheduling algorithm

In [5] paper author proposed the approach that is improved cost-based scheduling algorithm. It measured computation performance and resource cost. It also increased execution data transfer ratio by combining the tasks.

C. PAPRIKA

Hilda Lawrance and Dr. Salaja Silas[6] proposed a task based scheduling of resources called potentially all pair-wise rankings of all possible alternatives (PAPRIKA). By taking various QoS parameters into account, tasks and resources are arranged according to user satisfaction and PAPRIKA method. According to resources and tasks QoS parameter values, resources and Task matrix is created respectively. PAPRIKA method is based on overall ranking of all possible alternative values. Resource priority is calculated by allocating a threshold value to all QoS parameters, comparing all resources pair-wise with threshold value and finding priority of each resource. Task from task line is taken and allocate tasks to resources according to the user satisfaction. PAPRIKA method proves better result in case of task completion time and resource utility rate. Resource utility rate of PAPRIKA method is higher when compare with S-CSRSA[11] algorithm.

D. ANT Colony Algorithm

The author proposed a poised Ant colony algorithm [7] which uses a pseudo random proportional rule to poise the integral organization load while completing all the jobs at hand as soon as possible according to the environmental status. This algorithm balances the workload as well as minimizing the make span.

E. CMultiQoSSchedule algorithm

Due to restriction that most scheduling algorithm takes only time and cost as QoS parameters, Wenjuan Li et.al[8] proposed a new Novel based scheduling algorithm based on trust values. This approach used the trust parameter for workflow scheduling in cloud. Novel workflow scheduling is divided into two stages that is macro and micro. Trust value is calculated from both provider side and user side. On cloud provider side, trust agents manage the trust relationship by differentiating trust domains according to existing cloud platform. Cloud customers take help of intermediate institution to manage trust relationships. Using trust mechanism author proposed a single workflow scheduling algorithm under time and cost constraints. It also introduced fuzzy clustering method to classify workflow process. Cloudsim tool with extended features is used to simulate results. This approach achieve high execution success rate, less completion time and more user's satisfaction when compared with dynamic level scheduling(DLS), modified critical path(MCP) and berger model. It provides more success rate by eliminating dishonest providers. To use this model in actual cloud platform, its efficiency and effectiveness should test.

F. SHEFT Workflow Scheduling Algorithm

This paper [9] proposed the SHEFT (Scalable HEFT) scheduling algorithm that helps increasing and decreasing the number of resources at runtime. It provides facility to resources to scale at runtime, outperforms in optimizing workflow execution time. It scheduled a workflow in a cloud environment elastically. There was optimized execution time for the workflow.

G. Job scheduling algorithm based on berger model

Hongbo Yu [10], proposed a scheduling algorithm based on Berg Model that adapts to commercialization and virtualization features of cloud environment. People element analysis theory is applied to establish dual fairness constraints and efficiency. User's demand of resources is based on various QoS based parameters. Firstly, selection of resources is done on some expected constraints and then fair judgement constraints allocate resources to tasks. Proposed algorithm reflects better fairness of user tasks. In future, it should experimentally implement using Berg model.

III. Comparative table of various scheduling algorithms

Table II comparison of QoS-based task scheduling algorithms and future scope

Algorithm	Scheduling factor	QoS parameters	Algorithms compared	Scheduling type	Finding	Tool	Future scope
QDA scheduling algorithm[4]	User's preferences and QoS utility function	Cost, time, reliability, Bandwidth	CTC(comprised-time-cost)	Workflow instance intensive Scheduling	1.Performs better in term of cost and load balancing	Cloudsim with extended features	Average execution cost should compare with other algorithms too.
Improved cost based[5]	Priority, completion time	Makespan, latency	Berger model, Min-Min algorithm	Task scheduling	1. Makespan reduced with increase in VM. 2. It has lower total latency	Cloudsim 2.1	Load balancing and makespan should compare with more algorithms.
PAPRIKA[6]	User satisfaction, cost, time	Resource utility , completion time	S-CSRSA algorithm[11]	Resource scheduling	It takes less task allocation time. 2.Resource utility rate is more.	Cloudsim	Enhance algorithm with more number of parameters.
ANT Colony [7]	GA hint function	Cost ,execution time	Genetic algorithm, Mapping algorithm	Job scheduling	Proves better in case of cost and execution time	Cloudsim	Evaluate algorithm with more QOS parameters and in more realistic environment.
CMultiQoSSchedule algorithm[8]	Trust, time, cost	User satisfaction, Completion time, success rate	Dynamic level scheduling(DLS), Modified critical path(MCP) and berger model	Workflow scheduling	1It shorten the final completion time. 2.Provide more success rate by eliminating dishonest providers	Cloudsim with extended features	To use this model in actual cloud platform, its efficiency and effectiveness should test
SHEFT Workflow[9]	Trust	Cost	Reputation based trust model	Resource scheduling	Cost is efficiently improved.	Quemu and libvirt	This model should compare with other trust based model to improve cost and other QoS parameters.
Job scheduling algorithm based on berg model[10]	Fair constraints	Execution time	Optimal completion Time	Job scheduling	Efficiency is improved at some extent.	Cloudsim	As we kNow tasks can be classify on some more factors like cost, time, trust and experimentally implement them using berg model.

IV. Metrics for various scheduling algorithms

The Existing scheduling algorithms considers various parameters like time, cost, makespan, speed, scalability, trust, resource utilization, scheduling success rate, quality of service and so on. Table II gives the details about the different metrics considered for QoS-based task scheduling.

TABLE II Metrics considered by the Qos-based scheduling algorithms

Techniques	Cost	Time	Reliability	bandwidth	Makespan	Latency	Resource utility	Completion time	Execution time	Success rate	User satisfaction	Trust
T1	True	True	True	True	False	False	False	False	False	False	False	False
T2	False	False	False	False	True	True	False	False	False	False	False	False
T3	False	False	False	False	False	False	True	True	False	False	False	False
T4	True	False	False	False	False	False	False	False	True	False	False	False
T5	True	True	False	False	False	False	False	True	False	True	True	True
T6	True	False	False	False	False	False	False	False	False	False	False	True
T7	False	False	False	False	False	False	False	False	True	False	True	False

V. Conclusion

Scheduling is a major factor in cloud environment. As shown in paper scheduling depends upon various QoS parameters. This paper gives review on various QoS based task scheduling algorithms and the future work to be done on that algorithms. The existing scheduling algorithm considered as topic of research and can be used to introduce more efficient and improved performance of algorithms based on parameters like trust value, execution rate, cost of the communication, speed and success rate.

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