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An Review of Scheduling Algorithms In Cloud Computing

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Abstract

At present scenario Cloud computing is an ultimate model and it is remarkable in software and hardware environments. In cloud efforts are minimized and also provide service interaction to user. The above approach users has a beneficial that pay for what they use. Scheduling is one of the most important criteria in cloud environment. Many algorithms are proposed for explaining the various scheduling tasks. Since cloud computing deals with large users' appropriate decisions are required for all scheduling tasks. This paper provides elaborate studies on many algorithms are explained to overcome the common problems identified in different scheduling tasks. This study also focuses on relative on the basis of Quality of service (QOS) to project clear ideas on scheduling algorithms.

Keywords: Cloud computing; scheduling algorithm;

Introduction

Cloud computing has been emerging in technical fields since its applications are vast and also promotes multiple approaches for users. Many organisations offer the users with pay and use concept. The customers accept the concept because it is cost effective and time saving. More specifically cloud performs execution of code and manages the task more efficiently. Cloud computing is derived from parallel computing, distributed computing and grid computing. Some of the main characteristics of cloud computing are virtualization, distribution and dynamic extendibility. Compared to distributive and grid computing cloud computing provides cheap and easy access.

The three important types of cloud models are given as software as a service (SaaS), platform as a service (PaaS) and Infrastructure as a service (IaaS). Nimbus, Eucalyptus, open nebula and hadoop are some of the tools available for cloud computing. Since cloud computing environment researches are going on many areas such as scheduling and allocation, security issues scalability and so on.

In cloud computing scheduling is important concepts to be executed. Among various types of scheduling static scheduling and dynamic scheduling are the common types. Static scheduling job are arrived simultaneously and available resource should be fixed. Dynamic scheduling task and machine location and resource allocation should be based on request of jobs Job scheduling has a high priority because of its performance and throughput

Existing Scheduling Algorithm

Following are some of the scheduling algorithms that are important for cloud environment and their Behaviors are explained below

An approach to optimize workflow scheduling for cloud computing environment

Kumar et al (2013) proposed Artificial Bee Colony algorithm (ABC) [1] for workflow scheduling in cloud environment.ABC is an optimization algorithm that is based on the intelligent behaviour of honey bee swarm and has not been used for job scheduling in cloud. ABC also provides solution to complex problems. The proposed system aims at optimization of server utilization and computation time for efficient scheduling of tasks and services. An ABC algorithm extends its future work for criteria such as priority for scheduling jobs, inter-dependency and balance the load.

An ACO-LB Algorithm for Task Scheduling in the Cloud Environment

Xue et al (2014) proposed ACO-LB (Ant Colony optimization-Load Balancing) algorithm. ACO-LB Algorithm solves the problem of load unbalancing of virtual machines in task scheduling. The proposed algorithm aims at overcoming the limitations of ACO.ACO-LB algorithm [2] will not only shorten the makespan of task scheduling, but also maintain the load balance of virtual machines by users in the process of task scheduling. This paper limits with only one workflow model and also it considers only the minimizing of execution time and the cost problem is ignored.

Minimizing the makespan using Hybrid Algorithm for cloud computing

Raja et al (2013) proposed An efficient job scheduling algorithm called Hybrid algorithm for reducing the completion time. This algorithm collaborate the advantages of ACO and Cuckoo search [3] the hybrid algorithm compares its performance with Ant Colony Optimization and the energy consumption is also analyzed .this algorithm does not fulfill the utilization of more tasks.

Cost-Based Multi-QoS Job Scheduling using Divisible Load Theory in Cloud Computing

Abdullah et al (2013) to minimize the overall processing time in job scheduling environments defined as Divisible Load Theory (DLT) is proposed [4]. Quality of service (QoS) requirement for job scheduling parameter is also satisfied. The DLT is of main importance due to its flexibility, tractability, data parallelism; computational difficulties. The distribution strategy developed by DLT paradigm minimized the overall total cost other issues such as dynamic workload, real-time job allocation restriction like machine failure is not described.

Honey bee behaviour inspired load balancing of tasks in cloud computing environments

Venkata et al (2013) proposed an algorithm named honey bee behaviour inspired load balancing (HBB-LB) to achieve optimal machine utilization for load balancing [5]. (HBB-LB) also aims at achieving well balanced load across virtual machines for maximizing the throughput. The proposed algorithm is effective when compared with existing load balancing and scheduling algorithms and also minimizes the waiting time of tasks. The QoS parameters other than time reduction are not considered.

A parallel bi-objective hybrid metaheuristic for energy-aware scheduling for cloud computing systems

Mezmaz et al (2011) A new algorithm called parallel bi-objective hybrid genetic algorithm [6] proposed for minimizing the makespan. It mainly focuses on problems of parallel applications on heterogeneous computing systems (HCS). Other than makespan it also minimizes energy consumption by Dynamic Voltage Scaling (DVS).the major drawback is application of several execution time.

An Efficient Tri Queue Job Scheduling using Dynamic Quantum Time for Cloud Environment

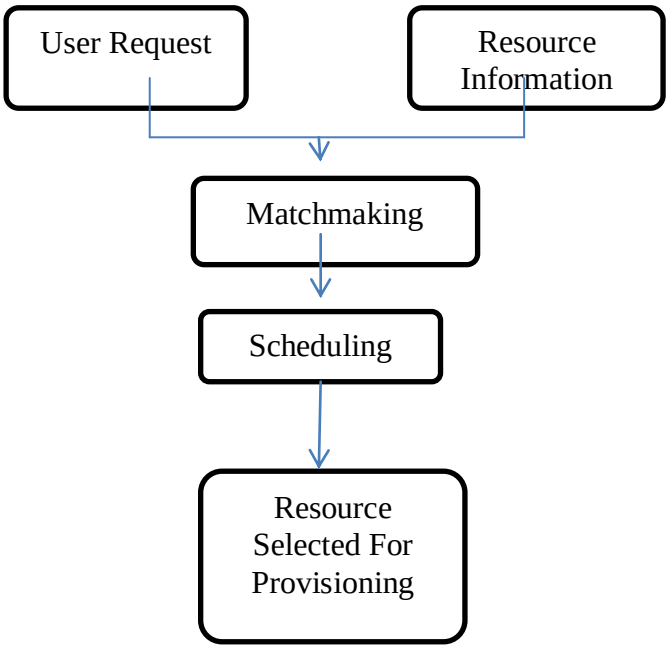
Karthick et al (2013) proposed an algorithm called tri-queue scheduling (TQS) is defined in this paper [7]. This algorithm solves two important constraints such as time and space complexity. The other most notable criteria is avoidance of fragmentation processes also explained. It abruptly allocates all resource uses and optimization of resources within systems. The main drawback is that scheduling of reservation category is not considered.

An approach to optimized resource scheduling algorithm for open-source cloud systems

An optimized scheduling algorithm is proposed to achieve better scheduling problems in cloud by optimization or sub-optimization solutions. An algorithm called Improve genetic algorithm (IGA) has been automated [8]. Zhong et al (2010) investigate the maximum usage of physical resources by the possibility of Virtual Machines (VMs) . When compared to traditional Genetic Algorithm the speed of IGA is faster and utilization is higher than IaaS cloud systems.

A revised discrete particle swarm optimization for cloud workflow scheduling
Wu et al (2010) facilitates the data transfer problems by an algorithm called Revised Discrete Particle Swarm Optimization (RDPSO) [9]. The proposed algorithm takes into account both the data transmission cost and computation cost. This paper also compares cost optimization and make span ratio with the help of standard Particle Swarm optimization (PSO) and Best Resource Selection (BRS). The comparison thus resulted in a large cost saving and better performance in make span and cost optimization.

Efficient task scheduling algorithms for cloud computing environment
Sindhu et al (2011) proposed two algorithms for efficient task scheduling in cloud computing defined as longest cloudlet Fastest Processing Element (LCFP) and Shortest cloudlet Fastest Processing Element (SCFP)[10]. The main aim of these algorithms is reducing turnaround time and also improves resource utilization. The proposed algorithms also take into account the computational complexity and computing capacity of processing elements. The algorithms also results in better performance under heavy loads.



Scheduling Diagram

Paper	Execution Time	Scalability	Reliability	Resource Utilization	Energy Consumption	Load Balancing	Fairness	cost
An approach to optimize workflow scheduling for cloud computing environment [1]	✓	*	*	✓	*	*	*	*
An ACO-LB Algorithm for Task Scheduling in the Cloud Environment[2]	✓	*	*	*	*	✓	*	*
Minimizing the makespan using Hybrid algorithm for cloud computing[3]	*	*	*	*	✓	*	*	*
Cost-based multi-QoS job scheduling using divisible load theory in cloud computing[4]	*	*	*	*	*	*	*	✓
Honey bee behaviour inspired load balancing of tasks in cloud computing environments[5]	*	*	*	*	*	✓	*	*
A parallel bi-objective hybrid metaheuristic for energy-aware scheduling for cloud computing systems[6]	✓	*	*	*	✓	*	*	*
An efficient Tri Queue job Scheduling using dynamic quantum time for cloud environment[7]	*	*	*	✓	*	*	*	*
An approach to optimized resource scheduling algorithm for open-source cloud systems[8]	*	*	*	✓	*	*	*	*
A revised discrete particle swarm optimization for cloud workflow scheduling[9]	✓	*	*	*	*	*	*	✓
Efficient task scheduling algorithms for cloud computing environment[10]	*	*	*	✓	*	*	*	*

Conclusion

Cloud computing is an internet based parallel oriented task scheduling infrastructure supporting large scale applications. Work flow systems or workflow models are complex information in cloud computing. In order to tackle the complex tasks, algorithms are proposed for managing the independent tasks. The algorithms also require suitable tools for analysing the tasks. This study provides an overview of some of the existing algorithms in cloud computing. It also gives a comparison of these algorithms based on quality of service (QoS).

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