A Review Work On Task Scheduling In Cloud Computing Using Genetic Algorithm

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Abstract: Cloud computing is one of the upcoming latest new computing paradigm where applications and data services are provided over the Internet. Today's most of the business organizations and educational institutions use cloud environment. The Task management is the key role in cloud computing systems task scheduling problems are main which relate to the efficiency of the whole cloud computing facilities. Scheduling in cloud means selection of best suitable resources for task execution. A task scheduler in Cloud computing has to satisfy cloud users with the agreed QoS and improve profits of cloud providers. There are a mass of researches on the issue of scheduling in cloud computing most of them, however are about workflow and job scheduling. The scheduling entails the selection of the services and the appropriate start time for each workflow. In this paper we mainly focus on different types of workflow scheduling algorithms. The main focus is to study various problems, issues and types of scheduling based on the genetic algorithm for cloud workflows.

Index Terms: Task Scheduling, Genetic Algorithm(GA), Virtual Machine(VM), CloudSim, CloudLet, Simulate Experiment. Job Scheduling

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1 INTRODUCTION
Cloud computing is service-focused to provide high quality and low-cost information services by pay-per-use model in which guarantees are offered by the cloud service providers through customized SLA [1,2].Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network i.e. Internet[3]. The cloud makes it possible for you to access your information from anywhere at any time. Whereas traditional computer setup requires you to be in the same location. The cloud removes the need for you to be in the same physical location as the hardware that stores your data [4]. Your cloud provider can both own and house the hardware and software necessary to run yours home or business applications. Cloud can generally provide three levels of services: IaaS (Infrastructure as a Service), PaaS (Platform as a Service), and SaaS (Software as a Service). As described in [5], a cloud workflow system can be regarded as a type of platform service which facilitates the automation of distributed large-scale e-business and e-science applications in the cloud [6, 7]. As a cloud service itself, a cloud workflow system belongs to a specific service provider and under the management of its cloud resource managers. With the increasing demand for process automation in the cloud , especially for large scale collaborative and distributed e-business and e-science applications [6, 8, 9], the investigation on cloud workflow scheduling strategies is becoming a significant issue not only in the area of cloud workflow systems but also general cloud computing. There are many papers that address the problem of scheduling in traditional distributed systems like Grids, there are only a few works on this problem in clouds. The scheduling problem in clouds makes it difficult to solve, especially in the case of large complex jobs like workflows. The paper focuses on various workflow scheduling based on the genetic

2 ALGORITHMS AND METRICS
The Following workflow scheduling are based on the genetic algorithms are currently prevalent in clouds and these algorithms have been summarized in Table. The existing workflow scheduling algorithms consider various parameters like time, cost, makespan, speed, scalability, throughput, resource utilization, scheduling success rate and so on.

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Algorithm	Description	Parameter	Tool
Independent Task Scheduling in Cloud Computing by Improved Genetic Algorithm[10]	In the normal Genetic Algorithm the initial population is generated randomly, so the different schedules are not so much fit, so when these schedules are further mutated with each other, there are very much less chances that they will produce better child than themselves .In an improved genetic algorithm, the idea for generating initial population by using the Min-Min and Max-Min techniques for Genetic Algorithms.	VMs & cloudlets	CloudSim
The Study of Genetic Algorithm-based Task Scheduling for Cloud Computing[11]	In the proposed model, the task scheduler calls the Genetic Algorithm scheduling function for every task scheduling cycle. This function creates a set of task schedules and evaluates the quality of each task schedule with user satisfaction and virtual machine availability. The function iterates genetic operations to make an optimal	Throughput, Simulation Time, Average VM Utilization, Average Response Time, Average Processing Cost & No of Tasks	GA-based Task Scheduling Model
Dynamic scheduling of data using genetic algorithm in cloud computing[12]	In dynamic scheduling task arrival is uncertain at run time and allocating resources are tedious as all task arrive at the same time. To avoid this genetic algorithm is used. Genetic algorithm is a heuristic method that deals with the natural selection of solution from all possible solutions. Using genetic algorithm the tasks are scheduled according to the computation and memory usage. This way tasks are scheduled dynamically. The execution time is also reduced by parallel processing.	Time utilization and resource utilization	Ubuntu Enterprise Cloud
Tasks Scheduling optimization for the Cloud Computing Systems[13]	Describes and evaluates fuzzy sets to model imprecise scheduling parameters and also to represent satisfaction grades of each objective. Genetic algorithms with different components are developed on the based technique for task level scheduling in Hadoop MapReduce.	Flexibility, virtualization	Not implemented
Impatient Task Mapping in Elastic Cloud using Genetic Algorithm[14]	The algorithm proposes that can find a fast mapping using genetic algorithms with "exist if satisfy" condition to speed up the mapping process and ensures the respecting of all task deadlines.	Number of jobs, time	CloudSim
A Genetic Algorithm for Workload Scheduling In Cloud Based e-Learning[15]	The paper presents the characteristics of a private cloud used for e-Learning purposes along with a genetic algorithm that optimizes the scheduling of the e-Learning workloads according to a set of conditions that are imposed by the underlying virtualization technology such as memory over-commitment and IOPS rate.	Load distribution for Windows, CPU intensive, IO intensive	IBM Cloudburst System
A New Resource Scheduling Strategy Based on Genetic Algorithm in Cloud Computing Environment[16]	The paper considers the VM resources scheduling in cloud computing environment and with the advantage of genetic algorithm, this paper presents a balanced scheduling strategy of VM resources based on genetic algorithm.	Virtual Machine, CPU Utility	Simulate Experiment
A Method of Cloud Resource Load Balancing Scheduling Based on Improved Adaptive Genetic Algorithm[17]	The paper takes real-time load parameters from the server cluster nodes as decision variables of resources scheduling model, and uses the improved adaptive genetic algorithm to search the optimal solution, in order to realize the load balancing scheduling of cloud resource, and make the each index change smoothly.	CPU occupancy rate, memory occupancy rate, network bandwidth, the process occupancy rate, service response time	Simulate Experiment

Advanced Task Scheduling for Cloud Service Provider Using Genetic Algorithm[18]	The paper includes mainly three parts- GA Module Queue Sequencer, Job Scheduler (JS) and Resource Pool (RP). All service requests which are coming from Cloud Users domain are stored in RQ which is in GAQS. Now the requested processes must communicate with GAQS processor (GAP) and the processor finds out the appropriate sequence of tasks which reduce the waiting time of the tasks. GAQS processor then communicate directly with JS which schedules the tasks using Round Robin scheduling algorithm and communicate with RP and tries to assign each of these jobs as per their requirement to the resources.	Processor, Burst Time & Calculation of waiting time	Manual Calculation
An Efficient Approach to Genetic Algorithm for TaskScheduling in Cloud Computing Environment[19]	The paper focuses on algorithms that are Genetic Algorithm (GA) in a private cloud environment. With the combination of SCFP (Shortest Cloudlet to Fastest Processor), LCFP (Longest Cloudlet to Fastest Processor) and a meta-heuristic GA as an optimization method, This propose to developed a new approach Modified Genetic Algorithm (MGA) for task scheduling. MGA is developed by modifying the initial population with LCFP, SCFP and by controlling the stochastic operators of standard genetic algorithm which lead to achieve a very good results and better efficiency of the algorithm than the standard genetic algorithm.	Cloudlet, Makespan & Cost	CloudSim
Job Scheduling Model for Cloud Computing Based on Multi-Objective Genetic Algorithm[20]	The paper first establishes a macroscopic scheduling model with cognition and decision components for the cloud computing, which considers both the requirements of different jobs and the circumstances of computing infrastructure, then propose a job scheduling algorithm based on Multi-Objective Genetic Algorithm (MO-GA), taking into account of the energy consumption and the profits of the service providers, and providing a dynamic selection mechanism of the most suitable scheduling scheme for users according to the real-time requirements.	Power, Frequency, Memory & Amount	CloudSim
A Cloud Computing Resource Scheduling Policy Based on Genetic Algorithm with Multiple Fitness[21]	The paper mainly aiming at solving the problem of resource optimization within a cloud. So they proposes a Hybrid Genetic Algorithm (HGA for short in the following), which acts as an independent module in the cloud manager. This scheduling policy module is executed regularly and the result contains a set of reasonable virtual machines' migration schemes. The result can be used as the administrator's reference, or it can be directly used to migrate the virtual machines automatically. The base of this algorithm is that the three load dimensions: CPU load, network throughput and disk I/O load of all the virtual machines carried on one specific physical machine, can be matched and calculated to get the optimal migration advice. The algorithm is based on genetic algorithm with multiple fitness. In the design of this algorithm, three sub fitness functions are adopted. Sub fitness	Physical Machine Ratio, Variance Ratio & Migration Ratio	Simulator

	function 1 represents the virtual machines' load complementation. Sub fitness function 2 represents that the amount of physical machines is minimum after migration. Sub fitness function 3 represents that the amount of virtual machines that need to be migrated .	

3 CONCLUSION

With the emerging of cloud computing, cloud workflow systems are designed to facilitate the cloud infrastructure to support large scale distributed collaborative e-business and e-science applications. The management and scheduling of resources in Cloud environment is complex, and therefore demands sophisticated tools for analysis the algorithm before applying them to the real system. In this paper, we have surveyed the various existing workflow scheduling based on genetics algorithms in cloud computing and tabulated their various parameters along with tools and so on.

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