An Enhanced Resource Optimization using Swarm Intelligence in Cloud Computing Environment

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ABSTRACT

Cloud computing is widely used in many companies and enterprises. However, there are some challenges in using Cloud computing. The main challenge is resource management, where Cloud computing provides IT resources based on virtualization concept and pay-as-you-go principle. A good task scheduler should adapt its scheduling strategy to the different environment and the types of tasks. In this paper a cloud task scheduling policy is performed based on four optimization methods such Genetic algorithm,Particle swarm optimization ,Ant colony optimization algorithm and Cost optimization methods is integrated to fuzzy theory. These results are compared with different scheduling algorithms like Round Robin and First Come First Serve. The main goal of these algorithms is minimizing the makespan of a given tasks set. These optimization methods are random optimization search approach that will be used for allocating the incoming jobs to the virtual machines. The aim of this proposed algorithm is to reduce the completion time and cost of tasks, and maximize resource utilization. Algorithms have been simulated using cloudsim toolkit package.

Keyword*s : Cloud Computing,fuzzy tool,scheduling, genetic algorithm ,particle swarm optimisation.*

I.INTRODUCTION

Cloud computing is a concept used to describe a variety of computing conceptsthat involve a large number of computers connected through a real-time communication network . In science, cloud computing is a distributed computing which is connected over a different network.Such virtual server does not exist physically and moved around and scaled up and down on fly without affecting the end users rather like a cloud.Each provider servers a specific function giving users more or less control over their cloud depending on the type. When we choose a provider, compare our needs to the cloud services available. cloud needs will vary based on the space and resources associated with the cloud. Cloud can be used based on our usage which is pay-as-you go.There are three types of service that the cloud can provide like Softwre as a service,Platform as a service ,Infrastructure as a Service.

II RELATED WORKS

SCHEDULING

Genetic Algorithm (GA), Particle Swarm Optimization , clone selection algorithm, Shuffled Frog Leaping (SFL) algorithm are the solution to cloud computing scheduling.Due to high efficiency of newly proposed algorithms which is integrated Genetic algorithm in to scheduling model, and the original fitness function was improved through QoS, but the result easily trapped in a local optimum. Yang et al proposed a novel heuristic optimizing algorithm which is Bat Algorithm and a variety of improved versions were devised to deal with the resource scheduling of cloud computing

A)OptimizedResourcescheduling algorithm

To accomplish the optimization for cloud scheduling trouble, an optimized resource scheduling algorithm is proposed based on the profound systematic investigation on Infrastructure-as-a-Service (IaaS) cloud systems. The possible ways to distribute the Virtual Machines (VMs) in a flexible way to maximize the usage of corporeal resources is investigated here. An Improved Genetic Algorithm (IGA) for the computerized development policy is used here. The minimal genes are used by the IGA andit will be introduce the scheme of Dividend Policy in Economics to choose a finest allocation for the VMs demand is proposed to solve resource allocation problem.

B)Resource allocation strategy based on market (RAS-M)

A resource allocation strategy based on market here, consecutively to advance resource consumption of large data centers while providing services with higher QoS to Cloud consumers. According to the different resource constraints ,the structural design and the market replica of RAS-M are constructed. The resource allocation method can be described and it supplies resource portions according to diverse resource necessities. By using resource consumption in advanced while improving profits of both service suppliers and resource clients at the same time.

III EXISTING SYSTEM

First-in-first-out (FIFO) scheduling algorithm, greedy algorithm, fair scheduling algorithm these are the traditional cloud computing algorithms. However, these algorithms belong to the static type, thus there is no adaptive and dynamic adaption mechanism. Unfortunately, the cloud computing resources are dynamically allocated and released, therefore, scheduling algorithms cannot satisfy the experimental requirements of the cloud computing resource scheduling, and the resources are not used. The great deal of research that shows that resource scheduling is not only a multi-constrained multi-objective optimizing issue , but also a NP problem.

DISADVANTAGES

1)Traditional algorithms cannot satisfy the practical requirements of the cloud computing resource scheduling, and the resources are wasted seriously.

2)There is a great deal of research that shows that resource scheduling is not only a constraint in optimizing issue, but also a NP problem.

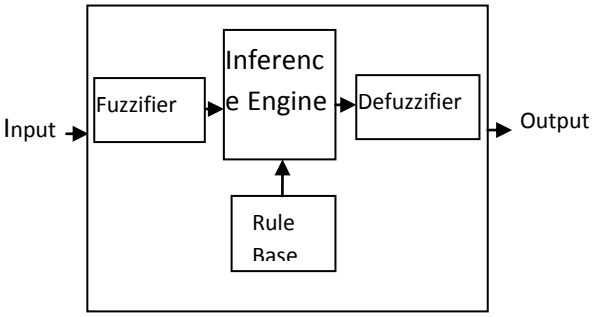
IV PROPOSED SYSTEM

A good task scheduler should adapt its scheduling strategy to the different environment and the types of tasks. In this research paper a cloud task scheduling policy is performed based on four optimization methods such as Genetic Algorithm (GA), Particle Swarm Optimization (PSO) , Ant Colony Optimization (ACO) algorithm and cost optimization (CO) methods is integrated to fuzzy theory. These methods results were compared with different scheduling algorithms like First Come First Served and Round-Robin has been presented. The main goal of these algorithms is minimizing the makespan of a given tasks set. These optimization methods are random optimization search approach that will be used for allocating the incoming jobs to the virtual machines. The aim of this proposed algorithm is to reducethe completion time and cost of tasks, and maximize resource utilization. Algorithms have been simulated using cloudsim toolkit package

Fuzzy Logic

The proposed Fuzzy Controller uses Fuzzy Logic(FL) [1,2,3,4], introduced by Zadehin 1965. FL does not follow any strict mechanism for assignment of sets like that of binary logic. Instead, every element is assigned with some degree of membership to a set. The degree of membership is represented by a value set between 0 to 1. To apply this, FL system is needed to be built based on the following three stages . This is can be applied to any set of problems. The examples include scheduling of resources among the virtual machines or small cloudlets.

- Falsification: In this stage, the degree of membership of the input values is assigned to Fuzzy sets. The degree of membership is given by $\mu: X \rightarrow [0, 1]$, where X is the set of input values. So every input value is mapped to a value between zero and one.
- Inference Engine: This system is a rule based system which is mapping input spaces to output spaces based on rule sets.
- De-Fuzzification: In this stage, a numerical output value is generated from the output set.



Fuzzy Control System

Uncertainties are part of any system. The cloud system is not exception to it. In such situation, Fuzzy Set Theory (FST) gives an opportunity to represent the uncertainties. It means that FL is best way of treating random uncertainties when the events prediction in the real-time world is found to be

difficult. To handle this situation a Fuzzy Control System (FCS) is used as it is a rule based system, which helps to make decision based on the dynamic causes that come in the system so that right decision can be taken for optimal usage of the available resources in the online system. The ultimate role of the FCS is to replace a human by a rule based fuzzy rule based control system.

For this, at the first stage, some input variables and control variables are defined. Then the Fuzzy based rules are designed to take decisions if certain conditions are satisfied with the rules set defined by the developer. The rules are based on the IF-ELSE conditions. So that the input variables are quantified and assigned a membership function. Based on these variables and rules output is generated according to the rules of the Interface Engine.

ADVANTAGES

The simulations of the algorithms are conducted on the CloudSim platform, and the experimental results demonstrate that the proposed algorithm can effectively improve their performance.

It satisfies the quality of service parameters of the cloud environment, the profits of the cloud service providers and the resource utilization rate of VM during scheduling task.

V *RESOURCE OPTIMIZATION*

The cloud computing resource especially the VM resource performance during task scheduling is an important index in the cloud computing service, which could measure the service probability and the level of serviceability of the cloud service providers. Usually, VM resource performance evaluation during task scheduling is mainly based on the information of the VM resource available during task scheduling. The description of the current used and avail-able VM resources can be realized by the evaluation of VM resource availability during task scheduling, which is beneficial for resource scheduling, distribution and transferring.

A)GA ALGORITHM

The proposed task scheduling algorithm in the Cloud circumstances is based on the default GA with some changes. According to these modifications, the parents will be considered in each population the produced child after the crossover process. Also, the Tournament Selection is used to select the best chromosomes to overcome the restriction of the population size. Therefore, the proposed algorithm is called Genetic Algorithm (GA).

B)PSO ALGORITHM

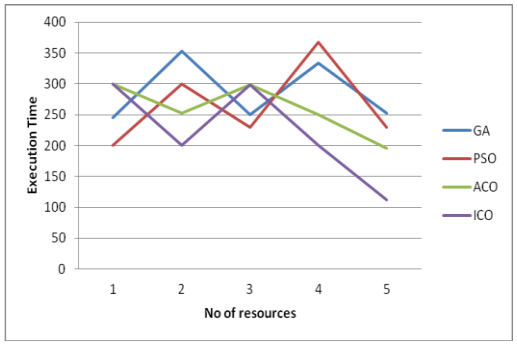
Particle Swarm Optimisation (PSO) is a swarm-based intelligence algorithm influenced by the social behavior of animals such as a flock of birds selecting a food source or a school of fish protecting themselves from a predator. A particle in PSO is analogous to a bird or fish flying through problem space. The movement of each particle is co-ordinated by a velocity with both magnitude and direction.Each particle position at any instance of time is influenced by its best place and its position is considered as a best particle in a problem space. The performance of a particle is calculated by a fitness value, which is problem specific. The PSO algorithm is similar to other computing algorithms. In PSO, number of particles considered as population in a problem space. Particles are initialized randomly. Each particle will have a fitness value, and it will be evaluated by a fitness function to be optimized in each generation.

EXPERIMENTAL RESULTS AND COMPARISION

PERFORMANCE EVALUATION

By using CloudSim toolkit, the proposed GA and PSO is implemented, and a comparative study has been made among three algorithms; Round-Robin (RR), the default GA, and the improved optimizations algorithms. Five parameters are considered to evaluate the performance. These parameters are the completion time, cost, resource utilization, speedup, and efficiency.

Comparison of four scheduling Algorithms



No of Resources	Execution Time			
	GA	PSO	ACO	ICO
1	246	211	321	321
2	353	321	252	231
3	256	231	299	298
4	333	367	259	200
5	253	231	196	112

VI CONCLUSION

This paper proposes a new swarm intelligent based optimization methods for task scheduling problem in the Cloud computing environment. The proposed algorithm targets to minimize completion time and cost, and maximize resource utilization. In this paper a cloud task scheduling policy is performed based on two optimization methods such as Genetic Algorithm (GA), Particle Swarm Optimization (PSO) methods is integrated to fuzzy theory.. Firstly, the best values of parameters for all algorithms are determined, before that the parameters value of VM is converted into fuzzy value which is experimentally evaluated and analyzed. Then, these algorithms have been applied to cloud applications with the number of tasks varying from 100 to 1000 evaluated. Simulation results demonstrate that proposed algorithm outperforms than the conventional task scheduling algorithms.

FUTURE WORK

Modern cloud platforms increased the techniques to allocate resources in a more efficient way. However, several scheduling strategies have been developed for dynamic and optimized resource allocation. For future work, the proposed algorithm can be extended to add possibility real time characteristic of VMs through run GA. Moreover, more parameters can be added based on the users' requirements. In future, further two algorithms are used and find the best algorithm for optimizing performance.

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