Profit Based Swarm Intelligence Task Scheduling For Cloud Computing: Review

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Abstract

Cloud computing, The OnDemand computing is a internet based computing that provides s hared processing data and required resources to computers and other devices on demand. It is highly demanded service because of advan tages of high high performance, cheap cost of services, scalability, accessibility as well as availability. In cloud computing , there are various tasks needs to be executed on the existing resources to attain best performance, shortest response time, achieve, deadline etc. Scheduling in a cloud computing is a selection of best suitable resources for executing multiple tasks. A scheduler in Cloud computing has to satisfy cloud users with the agreed QoS and increase profit for cloud providers. Particle swarm optimisation basically a population based stochastic optimisation technique is for continuous optimisation problems. It is used to optimise tasks scheduling algorithm in cloud computing to achieve best performance and profit.

Keyword: - *Cloud computing, task scheduling, Scheduling Algorithm, Particle Swarm Intelligence.*

1. INTRODUCTION

Nowadays, with the increase demand of resources over the internet to reduce cost, proper management of resources , cloud computing is introduced. **Cloud computing**, also known as **on-demand computing**, it required internet that provides sharing of resources and data to computers and other devices on request. Basically, we can store the data somewhere insides company network and it could be access to over the network. There are many real time scenario where we use cloud computing concept such as Email Communication, hospitals, Software development, law firms etc. It provides three kind of services which are Infrastructure–as a service(IAAS) is the delivery of computer infrastructure, typically a platform virtualisation environment, as a service, Platform–as a service(PAAS) the delivery of a computing platform, and/or solution stack as a service, facilitates deployment of applications without the cost and complexity of buying and managing the underlying hardware and software layers, Software as a service(SAAS) is often eliminating the need to install and run the application on the customer's own computer, thus alleviating the burden of software maintenance, ongoing operation, and support. There are many advantages to use cloud computing like Flexibility, Disaster Recovery, Automatic software updates ,security etc.

1.1 SCHEDULING

The word Scheduling is one of the major role play in cloud computing environment. Basically, It is a process to distribute resources among varieties of possible tasks. The tasks might be virtual computation elements like threads, processes or data f lows which are scheduled onto hardware resources such as processors, network links or expansion cards. I t's aim to maximise throughput (the total amount of work completed per time unit), minimise response time (time from work becoming enabled until the first point it begins execution on resources), or minimise latency (the time between work becoming enabled and its subsequent completion), maximise fairness (equal CPU time to each process, or more generally appropriate times according to the priority and workload of each process).

2. RELATED WORK

There are various methods have been proposed for task scheduling in cloud computing. Here, we have some of the papers that use different techniques to schedule cloud computing tasks:

BU Yanping et al. [8] provided an improved particle swarm optimisation (PSO) algorithm kept all the advantages of the standard PSO, such as implementation simplicity, low computational burden, and few control parameters, etc. He also tested the improved PSO algorithm against the MaxMin heuristic and found that improved PSO outperforms MaxMin by the total make-span and other performance. A discrete PSO algorithm was presented to solve grid scheduling problem within reasonable time. In the grid environment, the scheduling problem was to schedule a stream

of tasks to a set of nodes. During the execution, there were some communications between nodes. The function of DPSO was to find the best tasks scheduling strategy and to obtain the optimal make-span.

Nuttapong Netjinda e t al. [1 2] proposed a new framework where number of purchased instance, instance type, purchasing options, and task scheduling were considered within an optimisation process. In order to identify a solution in a reasonable amount of time, they studied the use of Particle Swarm Optimisation (PSO) technique. The decoding scheme was also designed to convert real values in PSO's particles into an integer representing a solution. They worked on the Particle Swarm Optimisation (PSO) method for cloud provisioning cost optimisation. The mechanism of PSO was to allow generated particles (candidate solutions) to move around within the solution spaces. The positions of each particle would be updated at each iterating until the near optimal position is found. In PSO, the value associated with the position is a real value. They designed a decoding scheme to convert the particle with discrete coding rule for grid scheduling problem. The improved PSO algorithm can position from real values into a discrete solution (integers). Multiple objectives were also used in our optimisation framework in order to incorporate multiple independent variables related to cloud purchasing options. Using this decoding scheme, they could represent selections of number of instances to be purchased, instance type, purchasing type, and task assignment while PSO's particle was still consisted of real values. Another benefit was that the number of alternatives for task assignment could be changed as the number of purchased instances had changed.

Xingquan Zuo et al. [1 4] e stablished an integer programming model for the resources allocation problem of an IaaS cloud in a hybrid cloud environment. A self adaptive learning PSO (SLPSO)based scheduling approach for this problem was proposed. In SLPSO, each dimension of a particle represents a task and a particle as a whole represents all tasks' priorities. This approach was able to obtain a high quality scheduling solution by adaptively selecting velocity updating strategies to update each particle. Experimental results shown that the approach was effective and efficient for this problem. Its results were better than standard PSO, and those obtained by CPLEX for large problem size under a reasonable runtime. performs better compared to Max Min Scheduling and Minimum Execution time in case of schedule length and execution ratio in this study. When tasks increase, the average schedule length of hybrid PSO was reduced in a range of 4.6 to 4.8% than Max Min Scheduling and in a range of 2.4 to 3.4% than Minimum Execution Time. Average schedule length of the hybrid PSO improves in a range of 1.1 to 5.5% than Max Min Schedu ling and in a range of 1.1 to 3.3% than Minimum Execution Time.

Himani et al. [1 5] represented a soft real real time scheduling approach with deadline and cost constraints. It had been planned to take the concrete problems related to cloud computing. They determined that earlier approaches are not able to meet the deadline efficiently. They illustrate that a deadline-meeting methodology to schedule tasks over a cloud allows to reduce the number of missed deadline. They compare the CDB TaskScheduling Algorithm with space shared policy and shows that the given approaches was more effective in defined parameters as Task Profit, Task Penalty, ThroughPut, Provider profit and in User Loss. The research includes cost optimisation by prediction model to estimate the initial value of MaxUserPay based on the length of the task, number of processing elements required, and deadline.

Azadi Khalili et al. [1 5] proposed a hybrid Particle Swarm Optimisation (PSO) for scheduling in cloud. The hybrid PSO performs better compared to Max Min Scheduling and Minimum Execution time in case of schedule length and execution ratio in this study. When tasks increase, the average schedule length of hybrid PSO was reduced in a range of 4.6 to 4.8% than Max Min Scheduling and in a range of 2.4 to 3.4% than Minimum Execution Time. Average schedule length of the hybrid PSO improved in a range of 1.1 to 5.5% than Max Min Scheduling and in a range of 1.1 to 3.3% than Minimum Execution Time.

Dr. M.Sridhar et al. [1 5] proposed a hybrid Particle Swarm Optimisation (PSO) for scheduling in cloud. The hybrid PSO that an evaluation and comparative study of these approaches had been performed. Firstly the best values of parameters for each algorithm, experimentally determined. Then the algorithms in applications with the number of tasks varying from 100 to 1000 evaluated. Simulation results demonstrate that ABC, PSO and ACO algorithms achieves better resource utilisation and significantly outperforms FPLTF, random and FCFS algorithms on the basis of make-span and degree of imbalance. The experimental results proved that ABC algorithm is the superior and outperforms other algorithms. The PSO and ACO could be putted in second level and third level respectively.

ChienHung Chen et al. [1 5] Investigated the DeadlineConstrained MapReduce Scheduling (DCMRS) problem in heterogeneous cloud computing systems. Considering the slots in different nodes had different amount of computing resources, we first divide a job deadline into two sub deadlines: map and reduce deadlines. The sub-deadlines were used for finding appropriate slots to run the tasks of the job. Then, they transformed the DCMRS problem to a well-known Minimum Weighted Bipartite Matching (MWBM) problem. To solved this problem, they formulated an ILP model for obtaining the optimal solution. They also presented a heuristic algorithm involving the node group technique to decrease the computational time.

Lizheng Guo et al. [1 2] p resented the task scheduling optimising method in cloud computing, and they formulated a model for task scheduling to minimise the cost of the problem and solved it by a PSO algorithm. By comparing and analysing particle swarm algorithm with crossover, mutation and local search algorithm based on particle swarm, they proposed the particle swarm algorithm embed in SPV , which represents better performance. Experimental result manifests that the PSO algorithm both gains optimal solution and converges faster in large tasks than the other two.

Moreover, running time is shorter than the other two too. It was obvious that PSO was more suitable to cloud computing.

Table-1 Comparative study of recent Image Retrieval Techniques.

S.No.	Author's Name	Technique Used	Results
1	BU Yanping	PSO algorithm with discrete coding rule for grid scheduling problem	DPSO algorithm outperformed the MaxMin heuristic.
2	Nuttapong Netjinda	Particle Swarm Optimisation (PSO) method for cloud provisioning cost optimisation	When increase deadline of Inspirer and Sight, the percent differences were reduced because of giving more flexibility to the scheduling.
3	Xingquan Zuo	particle swarm optimisation (SLPSO)based scheduling.	Guarantee user-level QoS and improve IaaS providers' credibility and economic benefit
4	Himani	Cost Deadline based task Scheduling	Cost optimisation by a prediction model for MaxUserPay based on the deadline,length of the task and number of processing elements required.
5	Dr. M.Sridhar	Hybrid Particle Swarm Optimisation Scheduling	Average schedule length of the hybrid PSO improves in a range of 1.1 to 5.5% than Max Min Scheduling and in a range of 1.1 to 3.3% than Minimum Execution Time.
6	CheinHung C hen	MapReduce Scheduling.	At least 79% reduction in the total job elapsed time and 56% reduction in the deadline-over job ratio.
7	Azadi Khalili	Make-span improvement of PSO based Dynamic Scheduling	PSO algorithm with LDIW strategy has improved make-span with an average of 22.7% compared to FCFS model.
8	Lizheng Guo	Particle swarm optimisation (PSO)	PSO algorithm both gains optimal solution and converges faster in large tasks than the other two. Moreover, running time was shorter than the other two too.

3. CONCLUSION AND FUTURE SCOPE

Nowadays, Task scheduling has been an active research field and is used in cloud computing. In this paper, we have discussed various techniques that enable users to extract the relevant result for task scheduling and maximize profit. In future work, we will work on improving PSO algorithm to maximize profit in task scheduling for cloud computing.

4. REFERENCES

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