Review on Optimization Techniques Used In Cloud Scheduling

Dolly
Department Of Computer Science and Engineering
Galaxy Global Group Of Institution , Dinarpur, Ambala, India

Assistant Professor Er.Suchitra
Department Of Computer Science and Engineering.
Galaxy Global Group Of Institution , Dinarpur,Ambala,India

ABSTRACT: Cloud computing make possible to access application and data from anywhere so this has become new technology. cloud computing is a model that enable On-Demand access and charges under the basis of amount of resources consumed. Scheduling play a key role in cloud. Present study involve surveying of various task scheduling algorithm and resource allocation algorithm for cloud. **B**y making comparison among various algorithm, we conclude that scheduling algorithm depends on type of task to be scheduled.

IndexTerms: Cloud Computing, Genetic Algorithm, ACO Algorithm, PSO Algorithm

1. Introduction

Cloud computing can be defined as distributed system. there are a number of inter-connected computer in cloud. Cloud computing is a new technology which provide on-demand access of services to userd. On the basis of subscription cloud delivers the services to users. These services can be infrastructure as a services(Iaas),software as a servives (Saas) and platform as a services(Paas).
Cloud computing enable on-demand access of resources and charger under the basis of amount of resources consumed. Cloud enable the user to access the data anywhere at any location all over the world.insead of keeping all the in own drive or updating application for your own needs, you can use a service over the internet.
Cloud computing allow the servives to individuals and to businesses to use of software and hardwere. These services are manged by the third parties. Cloud services include online file storage,web mail, online business applications. Primary cloud services mode of cloud are known as SPI models i.s softwere, platform, infrastructure as a services.

A) Types Of Clouds. Various type of clouds are private cloud, public cloud and hybrid cloud.

Private cloud: this cloud can be available for a single organization only. Infrastructure is managed for one organization. Private cloud consistent level of security and privacy. Concur technology is example of private cloud.

Public cloud: public cloud computing resources are dynamically available for all the users over the internet via web applications. These are run by the third parties. These cloud can be used by general public. This type of cloud owned by Google or Amazon, Microsoft.

Hybrid cloud: a cloud the is combination of two or more cloud is known as hybrid cloud. It can also be defined as multiple clouds thart are merged together in a way that allow data to be moved easily from one deployment system to another.

B) Characteristics of Cloud

1.Pay per use
2. elasticity
3.On-demand services
4. location independent resource pooling

2.Scheduling

In computing, **scheduling** is the method by which work specified by some means is assigned to resources that complete the work. The work may be virtual computation elements such as threads, processes or data flows, which are in turn scheduled onto hardware resources such as processors, network links or expansion cards.
A **scheduler** is what carries out the scheduling activity. Schedulers are often implemented so they keep all computer resources busy (as in load balancing), allow multiple users to share system resources effectively, or to achieve a target quality of service. Scheduling is fundamental to computation itself, and an intrinsic part of the execution model of a computer system; the concept of scheduling makes it possible to have computer multitasking with a single central processing unit (CPU).

A scheduler may aim at one of many goals, for example, maximizing throughput (the total amount of work

completed per time unit), minimizing response time (time from work becoming enabled until the first point it begins execution on resources), or minimizing latency (the time between work becoming enabled and its subsequent completion), maximizing fairness (equal CPU time to each process, or more generally appropriate times according to the priority and workload of each process).

Scheduling In Cloud

There are so many algorithms for scheduling in cloud computing. The main advantage of scheduling algorithm is to obtain a high performance. The main examples of scheduling algorithms are FCFS, Round -Robin, Min-Min algorithm, Max-Min algorithm and meta-heuristic algorithms (ACO, GA, Simulated annealing, PSO, Tabu search and many more).

3. Literature Survey

S. Pandey, L. Wu, S. Mayura Guru, R. Buyya [1] focus on particle swarm optimization (pso) heuristic based algorithm based on scheduling. by scheduling applications are scheduled to the cloud resources that are used for computation of cost and transmission cost of data in cloud. by using PSO total cost of execution is minimized.

G. n. Gan, T. l. Huang and S. Gao [2] used an optimized algorithm for scheduling the task based on genetic annealing algorithm. This algorithm considering the QOS requirement of diff type of task in cloud, this result efficiently allocation of resources in cloud.

L. Guo, G. Shao and S. Zhao [3] *is focus on* Multi-objective Task Assignment in Cloud Computing by using Particle Swarm Optimization (PSO) algorithm. In this both cost and time are optimized. The author work for increasing the efficiency of cloud and decreasing the total cost of the cloud by using PSO algorithm.

Dervis Karaboga , Beyza Gorkemli , Celal Ozturk , and Nurhan Karaboga [4] The section involves the introduction of Swarm Intelligence (SI) algorithm by the authors. Swarm Intelligence is briefly described as the collective behavior of decentralized & self-organized swarms. The well known examples are bird flocks, fish schools, ants, termites & bees. Although, the features required by SI are strongly seen in honey bee colonies. Several algorithms have been developed. Among these, Artificial Bee Colony (ABC) has been most widely accepted and used by researchers. Due to its great potential, different heuristic algorithm components are integrated into ABC. With the advance study on ABC,

research has found out that it can be applied for optimization in dynamic & uncertain environment.

Lizheng Guo1,2, Guojin Shao1 and Shuguang Zhao2., [5] The cost 7 time of processing and transferring are critical in cloud computing. Most of the existing optimization algorithm only focus on one aspect. In this , Particle Swarm Optimization is formulated for the multi-objective task. As a result, PSO algorithm is proved efficient & effective as it not only optimizes cost but also the time, in both the processing & transferring aspects.

Linan Zhu1, Qingshui Li2 and Lingna He3.[6] The new business calculation mode cloud computing has been proposed, in order to replace the traditional internet software usage patterns. This paper makes research & elaboration on cloud computing techniques. Resource scheduling strategy is the key technology in cloud computing. Results have shown that the use of ant colony algorithm in resource scheduling .

Sanjeev Dhawan1and Nitin Kaushik [7] The authors draw their attention, in this section, towards the distribution of tasks. Cloud computing involves the task distribution to the resources with the help of computers in bulk. This is done to provide the service consumers with more storage space, improved efficiency & software services according to its need. A huge amount of data flows from user to the host & vice versa. So, by considering the above said points, the selection of appropriate host for accessing resources & creating virtual machine (VM) to execute application, in order to achieve efficiency & reduced execution time is challenging task.

Wei Ming, ZhangChunYan and QiuFeng, CuiYu, SuiQiangQain, DingWanBing [8] A new polymorphic Ant Colony optimization algorithm has been used. It is done to improve the resource allocation & resource utilization. ACO algorithm improves the quality of cloud service as well as change the list containing nodes information dynamically. When the task is submitted by the user, it will be transferred to the Cloud Control Queen by master, by the algorithm. After this, according to the function the ant colony will be divided into:

- Test ant colony
- Reconnaissance ant colony
- Cleared ant colony
- Workers ant colony

This verifies the experiment of the computing allocation framework based on ant colony algorithm. By doing this, the superiority of the method is proved. However, the efficiency of Ant Colony & its stability is still needed to be improved.

Chun-Yan LIU, and Cheng-Ming ZOU,Pei WU[9] are focus on Genetic Ant-Colony Algorithm. The algorithm makes use of Global Search to solve optimal solution. This algorithm is efficient in task scheduling because the aim of task scheduling in cloud is to solve the problem in slow convergence.

GA-ACO (the integration of both the algorithm) uses strong Global search to get better solution and then convert it into pheromone of ACO for getting the optimal solution for scheduling the task in cloud with positive feedback of ACO.

Solmaz Abdi, Seyyed Ahmad Motamedi, and Saeed Sharifian [10]

In this section the emphasis is given by the authors mainly on task scheduling. Task scheduling problem is one of the important steps in cloud computing. The experiment results showed that having an optimal solution is impossible but having sub-optimal solution is possible. PSO & Genetic algorithms are most famous algorithms for scheduling tasks. For improving the performance of standard PSO algorithm, it is merged with SJFP algorithm to be a modified PSO algorithm. This will result in generating initial population in order to minimize make span.. This algorithm now can effectively be used for efficient scheduling of tasks & minimize the completion time for tasks.

Medhat Tawfeek, Ashraf El-Sisi, Arabi Keshk and Fawzy Torkey [11]

The attention is drawn by the authors on Cloud Task Scheduling. Cloud Task Scheduling is an NP-hard optimization problem in task scheduling. Many algorithms have been proposed to solve it. In this, cloud task scheduling policy based on ACO algorithm, is compared with different scheduling algorithms such as FCFS & Round Robin. ACO is random optimization search approach. This algorithm is used to allocate the incoming jobs to the Virtual Machines. In this process, firstly the best parameters for ACO algorithm is determined experimentally.

Trilce Estrada , Michael Wyatt and Michela Taufer [12]

The consideration is given by the authors on higher costs & expensive resources and when to effectively use them. Higher costs do not always result in better turnaround time in working with large applications in the cloud environment. So, some resource allocation policies are needed to determine when to use expensive and faster resources and when not. Such heuristics prove to be time consuming if done manually. So the author focuses on presenting an automatic method using a genetic programming approach. This method finds set of policies that uses resources efficiently. The results show that genetic designed policies perform better than greedy & other human designed policies do. This method allocates

resources efficiently, is very adaptive and also optimizes time & cost.

Nadia Abd-Alsabour, Hesham Hefny, and Atef Moneim [13] authors' consideration in this section is about the use of heuristic information which is considered most crucial for the better performance of ACO algorithm. In this, 3 different heuristics have been added to ACO algorithm. Soto look forward to solve the feature selection problem in case of classification problem. In this, the consideration of no. of features in ant's decision & enhancing the accuracy of classifier is done.

Suraj Pandey1, LinlinWu1, Siddeswara Mayura Guru and Rajkumar Buyya1 [14]

The authors' focus in this section is on computation and communication cost. To take into account both computation and communication cost, the Particle Swarm optimization based heuristic is presented to cloud resources. PSO & Best Resource Selection algorithm are compared to evaluate cost savings. Comparison results show that PSO algorithm can achieve as much as 3 times cost savings and good distribution of work load. The heuristics proposed can be used for any no. of tasks by increasing dimension of particles.

N.C.Brintha , J.T.Winowlin Jappes and Shajulin Benedict [15]

According to the author, resource scheduling & management is an important problem in cloud manufacturing. Due to the heterogeneous users in cloud environment, the optimization of job scheduling is considered important. In this, a modified Ant Colony based optimization technique is used. ACO uses one among different alternative rules to determine the processing order of each resource. This approach reduces the search space and gives better solution by reducing delay in allocating resources through the use of adaptive and global search technique. This algorithm takes into account the minimum execution time and effective resource allocation.

Warangkhana Kimpan, and Boonhatai Kruekaew [16]

The matter to be brought up in thus section is load balancing. Task scheduling is also an important matter for virtual machine (VM) to balance load of each machine and efficiently using the resources. This based on the Heuristic Task scheduling with Artificial Bee Colony for VM in heterogeneous cloud computing called HABC. HABC is a new load balancing & task scheduling algorithm. It results in improved efficiency, when large jobs were considered first (HABC_LJF) in VM scheduling. Even if the tasks are increased in no., it minimizes the make span.

Dr. R. Joshua Samuel Raj and Dr. S. V. Muruga Prasad [17] authors takes into account the scheduling &

optimization techniques. Scheduling is a vital issue in cloud computing in order to facilitate optimized usage of resources. Heuristic based algorithms are used in optimization techniques as they are inspired from meta-heuristic which solves hard problems. The cloud scheduling optimization problem is addressed as a population of candidate solution. Heuristic algorithms can be applied for benefitting the fittest candidates. The study & survey conducted presents the variants of heuristic algorithms for efficiently allocating tasks to resources. The survey stated that no unique heuristic is needed, but a little bit of intelligence can be added to the heuristic to enable a better exploration of the search space & exploitation of better assignments.

Ms. Bini Mariam Varghese and Dr. R. Joshua Samuel Raj [18]
The author takes into account the use of genetic algorithms in this section. Scheduling is a vital issue in cloud computing in order to facilitate optimized usage of resources. Genetic algorithms are used in optimization techniques as they are inspired from evolutionary ideas of natural evolution. The cloud scheduling optimization problem is modeled as a population of candidate solution. Genetic algorithms can be applied for benefitting the fittest candidates. The study refers to variants of genetic algorithm for efficiently allocating tasks to resources. It is concluded that Multiple Priority Queues Genetic algorithm is an efficient method for scheduling tasks. It offers minimum make span and minimum overall costs.

Mohit Agarwal and Dr. Gur Mauj Saran Srivastava [19] the author tries to figure out the performance of genetic algorithm. The Genetic algorithm based task scheduling mechanism clearly outperforms the performance of other 2 algorithms. Genetic algorithm allocates the task in such a way so that the maximum required time is minimal. This technique distributes load effectively among the virtual machines, results in optimizing the overall response time.

Deepika Saxena and Dr. R.K. Chauhan [20]
The authors particularly focus on the scheduling strategies. The scheduling strategies to be applied should be adapted in dynamic ways i.e. dynamically. It should be done only by a good task scheduler. The scheduling strategy should be chosen dynamically as well as according to the changing environment & the type of tasks aiming to the model structure of cloud computing, Ant colony optimization algorithm is introduced in this article which is in combination with Optimized Task Scheduling algorithm which is adaptive according to the available resources and is also dynamic. In this ACO algorithm used, the group of tasks are represented in the way so that they can be optimized to their best.ACO reduced the total processing time and also

communication overhead. It takes into load balancing consideration and hence results in high significance.

4. Conclusion

Cloud computing is a computing service paradigm that charges under the basis of the amount of resources consumed i.e. pay per use constraint. Primary advantage in cloud environment is that IaaS controls the user and manages the systems in terms of bandwidth, response time resource expenses, and network connectivity, but do not concentrate on infrastructure. This paper discuss about the various types of resources allocation and task scheduling algorithm. Although, there are various algorithms and methods were existing to solve the problem of resource allocation but none of these algorithms could be extended. Efficiency of cloud depends on the type scheduling algorithm used in environment. All above discussed algorithm used for resource allocation completely depends on types of task to be scheduled. Time driven based resource allocation gives better response time and increase resource utilization. Depending on surveying the various algorithm it can be concluded that, make span can be reduced by grouping the task. Since cloud computing systems have a high degree of unpredictability with respect to resource availability. In future as the cloud size increases, there is a need for better task scheduling algorithm.

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