

# A Review on Task Scheduling in Cloud Computing

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**Abstract**— Cloud computing, uprising in information technology (IT) industry suitable due to its growing performance, openness, low cost services compared to existing online computing and storage process. Cloud computing provides a massive storage for data and quick computing services over the internet. Cloud computing is a type of distributed computing where services being provided by outlying vendors through internet providing high performance gain to the users and also providing benefits to the Cloud Service Provider (CSP). To achieve this goal many problems have to be faced. Task Scheduling is one of them which are concerned with searching for optimal (or near-optimal) real-time and predictive schedules subject to a number of constraints". This survey is done on various task scheduling categories of various task of scheduling algorithms.

**Key words:** Cloud Computing, Task Scheduling, PSO, Cloudsim, scheduling parameters

## I. INTRODUCTION

### A. Cloud Computing

Cloud computing model focuses on sharing the information and working out over a scalable network of nodes. Cloud is a symbol for internet and is a concept for the composite infrastructure. Certain examples are like nodes comprise end user computers and web services, data centers and such a network of nodes as a cloud. The main proposal is to use the accessible infrastructure in order to bring all possible services to the cloud and make it feasible to access those services regardless of time and location.

Cloud computing is defined by the National Institute of Standards and Technology (NIST) as "a replica for enabling suitable, on-demand network access to a mutual pool of configurable computing resources. The main potential of the cloud comes from capability to provide everything as service "XaaS". "XaaS" means one or more of these services such that Software as a Service (SaaS), Infrastructure as a Service (IaaS), and Platform as a Service (PaaS).

### B. Cloud Scheduling

Cloud scheduling algorithm intends to minimize and reduce the time and cost for the processing of scheduled tasks. As a result, in cloud computing environment computing potential varies from resources to the cost of usage. Therefore, it is important to ensure the cost. A scheduling algorithm aims in scheduling tasks with expected gain and profit and execution of the tasks in the flow.

### C. Services Models Of Cloud Computing

- Cloud software As a Service (SaaS)
- Cloud Platform As a Service (PaaS)
- Infrastructure As a Service (IaaS)

SaaS:- Exploiting users applications executing on a cloud infrastructure and available from client devices with the help of a thin client interface such as web browser.

Paas:- Instalng the cloud infrastructure user – created applications using programming languages and tools supported by the supplier.

Iaas:-To provision processing, storage, networks and other fundamental computing resources where the consumer is able to install and run random software.

### D. Characteristics Of Cloud Computing

- 1) On demand self-service:- Ensuring protected cloud-hosting services with the help of a cloud host provider which could be any software seller. Providing access to services and giving the authority to change cloud services using a online control group or directly with the provider.
- 2) Broad network Access:- The group is given access to business management solutions by their tablets, laptops, and office computers. These devices can be used wherever they are located with a simple online access point.
- 3) Resource pooling:- A striking feature for multiple business offices and field service or sales teams that are frequently external to the office.
- 4) Rapid elasticity:- Cloud is elastic and scalable to suit instant business needs. Adding and removing users is quick and easy.

### E. Performance Parameters of Cloud Scheduling

- Makespan: (completion time of a schedule): The time variation between the beginning and end of a sequence schedule.
- Resource cost: It can be calculated from resource capacity and time taken. Powerful resource led to a higher cost.
- Scalability: Capability to handle and execute with increased workload and has ability to add resources effectively.
- Reliability: In case of failure, the system shows capability to perform.
- Resource utilization: It shows the efficient use of resources.

## II. RELATED WORK

Shivani Wadhwa, et.al [1] proposed that cloud computing is a technology that provide access to the services anywhere, anytime and paying it for which were being used. This allows the clients to use the feature of cloud computing anywhere with the access of internet. Better quality of services has to be provided in a well maintained manner to all clients. Two scheduling algorithms namely first come first serve and Round Robin have been executed. In comparison this has been proved that FCFS shows less average waiting time than round robin. In this paper,

experiments have been done to schedule services of fixed length as well as variable length two algorithms have been implemented. For future scope, this work can be extended by using parameters like throughput, response time and preemptive jobs. Moreover more clouds can be added to distribute load work.

CT cin [2] proposed that the aim of cloud computing is to provide sufficient access to remote and geographically distributed resources. There are various type of scheduling algorithm in cloud computing environment and these are implemented at different levels with different parameters like cost, performance, time, priority, bandwidth etc. In this paper different types of scheduling algorithm that provide cloud services have been analyzed and surveyed. These algorithms determines which is best for cloud environment for providing efficient services. Scheduling algorithms policies should consider resources, prices, deadline and time while some are based on cost factor. Different scheduling algorithms have been used by different providers for scheduling at different levels in cloud computing environment for generating better results and optimize resource utilization.

O.M.Elzeki, et.al [3] proposed that cloud computing are widely common available distributed environment. There are many tasks require to be executed by resource to carry best performance, less time for completion, shortest response time etc. Thus because of these different intentions and high performance we need to design, develop a scheduling algorithm. In this paper, we present a package of reviews based on different factors which effects scheduling process such as cost and time. This study is concerned with numbers of available scheduling algorithms in distributed system and there basis criteria for task allocation.

Raja manish singh, et.al [4] proposed that task schedule plays a vital role in cloud computing but under a lot of rule and regulations which term as a agreement between users and providers of cloud. This agreement means here the quality of services that users want from providers whereas at the same time there are large number of tasks running at the provider side. Task scheduling problem can be viewed as finding optimal mapping of different tasks so that desired goal is achieved.

Liang. huang, et.al [5] proposed that cloud computing task scheduling is a multi – objective decision depends upon the performance of a variety of task, performing simultaneously reasonable sort is essential. This paper construct a population of convergence non- dominating sorting method. This article consists of a method which is based on non dominated sorting method, by the use of distribution estimation method is improved by four steps to complete the task order scheduling. Finally, the distributed estimation method carried out in depths study. The two ways together constructed a population convergence of non dominated sorting method. The method is obtained by taking geometric center point set task, a target space from the geometric center point of the calculated distance of variance and standard deviation, excessive population interaction criterion scheduling four steps. Experimental results show that this method has good convergence and distribution.

R. Ramesh Kannan, et.al [6] proposed that cloud computing latest technology gives the excellent possibilities to solve a systematic difficulties and many queries that is used to finish the work economically. In present invention the work get neglected due to users quality of services and it combine with elasticity and heterogeneity as various principles in computing assets. In this paper, the resource provisioning and scheduling strategy for systematic workflows on infrastructure as a service (IAAS) cloud were presented. In this strategy, wise use two algorithms namely meta – heuristic optimization technique and particle swarm optimization (PSO), which aims to reduce overall execution cost and fulfilling the consumer defined deadline. Thus it advances better than the current state – of – the – art algorithms.

Monir Abdullah, et.al [7] proposed that cloud computing is a recent trend of technology which is the development of parallel and grid computing. One of the issues related to development is task scheduling. Task scheduling is an NP-hard optimization problem and many meta- heuristic algorithms have been introduced to solve it. A good scheduler should adapt all changes occur in cloud environment. A genetic algorithm for job scheduling has been proposed and provide better result. But there is a time consuming problem in genetic algorithm. In this paper, the improved genetic algorithm has been introduced. This not only guarantees the quality of services requirement of customer but also provide best profit of cloud providers. Thus improved genetic algorithm with better solution was introduced to reduce the genetic execution time.

Sonal Y. Sangale, et.al [8] proposed that problems of scheduling raised in several areas like industry, health care and private sectors. There are various optimization methods to solve the scheduling problems like GA, PSO and ABC.

PSO is one of the latest optimization scheduling algorithms, which give rise to social behavior of nature. This paper gives you overall method for solving scheduling problem using PSO algorithm. PSO optimization gives you better result in terms of time, efficiency and balanced workload etc. By comparing with other optimization algorithms, it is clear that PSO method is very simple and can be easily complete its scheduling tasks. Thus PSO gives better results that other evolutionary approach in terms of time efficiency.

Abdul Raouf Khan [9] proposed that various attributes based on access control scheme suitable for cloud computing environment. It will lead to a design of attribute that based on access scheme for cloud computing. Thus, for a large cloud system access decision needs to be more flexible and scalable. This paper presents various access control techniques used in cloud computing and highlights its features for cloud computing.

Amid khatibi Bardsiri, et.al [10] proposed that cloud computing environment ease applications by using virtualized resources that can be supplied easily. Cloud computing is a new model of service providing in distributed system that encourages researchers to investigate its pros and corns in executing scientific applications such as workflow. There are various types of resources of scheduling in cloud environment some of them are job scheduling and bout workflow. The cloud workflow system

is type of platform service which facilitates the automation of distributed applications based on the cloud infrastructure. Its scheduling is typically done under IT staff. In this paper, we studied various types of workflows scheduling algorithms. The main goal of this work done is to review various problems, issues and types of scheduling algorithm for cloud workflow.

Haibo yang, et.al [11] proposed that schemes used for cloud computing. The articles are differentiate according to a scheme which carries out four categories i.e. technological issues, business issues, domains and applications, conceptualizing cloud computing. In this paper, the result comes to review that current research is still changed the position towards technological issues, but a new research regarding social and organizational implications are emerging. This article gives a reference source and scheme for IS researchers interested in cloud computing and indicate them researched areas as well as future directions. This review will also contribute to understand the research into business applications of new technologies develops.

Arabi E. keshk [12] proposed that cloud computing seek a lot of attention to be used as a computing model for a variety of application domains. In cloud computing environment, task scheduling is an optimization problem. For better cloud environment a good task algorithm is assigned. Cloud tasks can be divided into two categories namely online mode service and batch mode service. In this paper, online cloud task scheduling based on virtual machine and load balancing algorithm is proposed. The main contribution is that load balancing factor is added and system tolerates the faults by tracking the decision on basis of reliability. The cloud sim tool kit package strategy was proposed in this review. The proposed scheme is good option to be used as a fault tolerance and balance the load of cloud computing virtual machine. The result concludes that proposed algorithm increases the performance in terms of reduction on total execution time and degree of imbalance.

Abdulrahman Almutairi, et.al [13] proposed that a risk in cloud virtual resources assignment for big data centers and proposed two heuristics algorithms PBH partition based heuristic and SBH based heuristic for scheduling to solve the given problem. In this paper, it develop a risk aware virtual resources assignment mechanism for cloud multitenant environment.

Gaurang Patel [14] proposed that the cloud computing is a most demanding services, which performs certain tasks required to be executed by resources for best performance, shortest response time and utilization of resources. To implement these factors there is a need to design a new task scheduling algorithm. In this paper, a optimized review of task scheduling algorithm is presented. These algorithms have different perspectives and working principles. This survey concludes that all the existing techniques focus on reducing service response time, minimum completion time, maximum utilization of resources and improving performance. There are many aspects to be considered to introduce more accurate and improved algorithms rather than cost of task execution, arriving rate of task etc.

S. J. Mohana, et.al [15] proposed that swarm intelligence is a property which shows collective behavior of decentralized and self – organized systems. For complex

algorithms swarm intelligence is one of successful paradigms. In this paper, main aim is to analyze and compare most successful optimization techniques inspired by swarm intelligence: ant colony and PSO optimization. In cloud computing scheduling can be more effective by achieving low makespan time. Compared with other optimizations PSO occupies bigger optimization ability and it can be completed easily. PSO can be easily implemented and has proven both very effective and quick. PSO algorithm outperforms ACO in terms of makespan, deadline and cost. Thus, PSO algorithm in cloud scheduling is better option when compared to ACO.

Kavita bhatt [16] proposed to know that the processing of PSO in workflow scheduling with cloud model. In this paper, the analytical review is presented based on PSO. PSO has multiple features like good convergence rate, less expensive, easy to apply in different scenario and simple to implement. Thus workflow scheduling can also performed with the help of PSO. There are various versions of PSO which exists and can be implemented in application area. In this review paper, a new version of PSO with cloud model is introduced for future scope of work and which can be used for workflow scheduling.

Kavita bhatt [17] this paper gives an concept of execution of PSO algorithm over cloudsim toolkit and propose a new method of searching of cloudlet in future. The use of real infrastructure such as Amazon EC2, limits the experiments to the infrastructure. The main reasons over the internet based environment are beyond control of developers of resource allocation scheduling algorithm. That's why we preferred cloudsim. The toolkit can also be helpful when there are more than two datacenters exists or mapping of virtual machine are required. This paper has three parts in which first part covers cloudsim, second part covers PSO and literature survey done in that area and third part covers implementation. We can propose variants of PSO to be executed in cloudsim and in near future. We can also assume to perform the search on cloudlets rather than doing the search in particles using particle simulation algorithm.

Navdeep kaur [18] proposed the designing approached in cloud computing environment. In present work it is implied that an exhaustive and systematic research on two types of cloud based scheduling algorithm in correct context of state of art technology used in cloud contains the work under taken highlights in different comparison both in text and tabular form. One of the most challenging problems in cloud computing is the scheduling the problem of satisfying the quality of service of users as well as minimize the cost of execution and scheduling of algorithm.

### III. CONCLUSION AND FUTURE WORKS

Scheduling is the major issue in the management of tasks execution in cloud computing. In this paper, we have surveyed the various existing task scheduling algorithm and tabulated their parameters such as time complexity, make span, speed and method.

The experimental analysis shows that as the number of tasks is increased, the time taken for the creation of tasks and result retrieval is also increased in PSO. Thus by doing the comparison in future we plan to apply the cuckoo algorithm for task scheduling in scientific and high

power computing to minimize the completion time and resource consumed.

In comparison with other algorithms, cuckoo search performs well for almost all these test problems. This superiority can be attributed to the fact that cuckoo search uses a combination of vector zed mutation, crossover by permutation and Levy flights and selective elitism among the best solutions. To implement the proposed techniques and compare it with existing techniques.

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