

# Task Scheduling in Cloud Computing

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## Abstract

Cloud computing is most popular technology now a days and has a lot of research potential in various areas like resource allocation, task scheduling, security and privacy etc. Scheduling is one of important issues for improving the efficiency of all cloud based services. In cloud computing Task scheduling is used to allocate the task to best suitable resource for execution. There are different types of task scheduling algorithms. Some issues like execution time, execution cost, complexity etc in task scheduling have been considered in this paper. In this paper, focus is on Task scheduling description and different algorithms proposed to resolve the issues of task scheduling have been reviewed.

**Keywords-** Cloud computing, Makespan, Task scheduling

## 1. Introduction

Cloud computing, also called as on demand computing. it is an internet based computing that provides resources on a pay per use basis. Due to the advantages of high computing power, low services cost, better performance, scalability, accessibility as well as availability it has become a utility. It is broken down into application, storage and connectivity segments. Each segment serves for various purposes and provides products for businesses and individuals around the world. Without installation and access their personal files at any computer, it allows consumers and businesses to use applications with internet access. Virtualization is a foundational element of cloud computing. It is software that separates physical infrastructures to create various resources. It is a fundamental technology that powers cloud computing. Multiple operating systems and multiple applications are run on the same server at same time by virtualization technology.

### 1.1 Cloud Computing Characteristics

Cloud computing is in news now a days. It is, also an application, that gives common resources and data to computers and other devices on demand. The essential characteristics can be elaborated as follows:

- **Broad access to network:** Cloud computing assets are available over the network, supporting dissimilar client platforms such as mobile devices and workstations.
- **On demand self service:** Users can have access to their required resources and software. They don't need to interact with cloud computing service providers. Mostly done through a web based self service portal.
- **Calculating service:** It is important features of cloud computing is use of services and resources. Only pay for what you actually used.
- **Rapid expansion ability:** Cloud is flexible and scalable to get your business needs. You can easily extend more resources, software etc. Resources are provided on demand.

### 1.2 Types of Cloud Computing

Cloud computing have four types i.e public, private, hybrid, community cloud which are shown in fig1.

- **Public Cloud:** This cloud is available for public use for a large industry group and is kept by an management selling cloud services. In fact, it is an open state for public access and protected through firewall and is entirely hosted and managed by the providing company. Therefore, it has low security. This cloud is ready for public use without much control over the infrastructure.
- **Private Cloud:** This cloud computing infrastructure is used with in a particular company and not shared by any other company. private cloud may be handled by particular company. In fact, private cloud is a infrastructure which is created by an organization for its substance usage. Private cloud grants more control over all implementation layers of cloud. The main advantage of private clouds is high security which results from the placement of equipment within the organization and inadequate communication with the outside world.
- **Hybrid Cloud:** This cloud is aggregation of public and private mode whereas public and private clouds keep their identities, In this model they act as a unit.
- **Community Cloud:** In the organization of same group this cloud share the computing infrastructure. This cloud is generated wherever several organizations have similar uses and explore benefits from cloud computing profit by sharing the infrastructure. Since the cost is split among fewer users than public clouds, this option is more costly than public cloud but it provides higher layers of privacy, security, and agreement with policies. In other words, it is a community cloud. In fact, this type of cloud is ready to serve

a public action and several organizations with nearly common needs share their resources and services and integrate a cluster cloud[1].

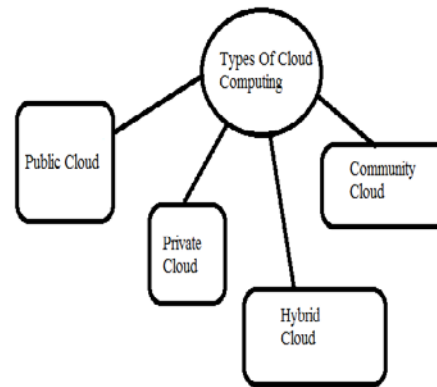


Figure1: Existing layers in cloud computing.

### 1.3 Cloud Computing Services

It gives different services which relates with platform, software and infrastructure. Cloud Computing have 3 basics service models. These are Software as a service, Platform as a service, and Infrastructure as a service.

- **Software as a service(SaaS):** This service is defined as software that is deployed over the internet. SaaS model provides application software and it is installed on cloud and accessed by users from cloud itself. Then it is not necessary to install and run application on user computer. SaaS is growing in market very quickly.
- **Platform as a service(PaaS):** This model provides platforms like development tools, database, web server. For develop high quality applications its mainly focus on effectiveness of cost and dynamic environment. It is a computing platform that allows the web applications creation

simply and instantly. There is no need to purchase and maintain the software.

- **Infrastructure as a service (IaaS):** In this, various hardware resources such as processing element, storage space or network are provided as services on need from a large resource pool [2].

The rest part of paper organized as follows. Section 2 represents task scheduling description. In section 3 Literature Review is presented. In Section 4 concluded the paper and describe some future work.

## 2. Task Scheduling

In cloud environment, task scheduling is very important issue. It is used to schedule tasks for better utilization of resources by allocating certain tasks to particular resources in particular time. The main aim of task scheduling algorithm is to improve the performance and quality of service and also maintaining the efficiency among the tasks and reduce the cost. In task scheduling available virtual resources are optimally used. By efficient resource scheduling high achievement of cloud computing. various parameters that are considered in scheduling algorithms are completion time, task completion cost Task scheduling is an NP-hard problem in cloud computing, that is evaluated using some heuristic approaches such as particle swarm optimization[3].

## 3. Literature Review

In the paper “Makespan Improvement of PSO based Dynamic Scheduling in cloud computing”, Optimized task scheduling was discussed by Azade Khalili et al[4]. The authors focused mainly on matter of mapping and scheduling. Tasks were assigned to resources in the manner that help to minimize execution time and maximize utilization. The particle swarm

optimization algorithm has been used that reduce the makespan.

In the paper “A Review of Metaheuristic Scheduling Techniques in Cloud computing”, Efficient performance in scheduling was discussed by Mala Kalra et al [5]. The objective of scheduling is to map tasks to convenient resources that optimize one or more targets. In cloud computing, scheduling belongs to NP-hard problems that take large space. It is preferable to find suboptimal solution. Meta-heuristic based techniques have been proved to achieve near best solutions within acceptable time for such problems. In this paper, a survey and comparative analysis of many scheduling algorithms for cloud and grid environments based on meta heuristic techniques such as: Activity based costing (ABC), ACO algorithm, Genetic Algorithm (GA) and PSO has been provided.

In the paper “Credit Based scheduling Algorithm in cloud computing Environment”, Task scheduling algorithm was discussed by Antony Thomas et al[6], which was based on priority of user and length of task. No any special importance given to high prioritized task when they arrive. Min-Min algorithm was used by considering the task length to reduce makespan of tasks. The proposed credit based scheduling algorithm considered all the factors like task length, makespan, resource utilization.

In the paper “Design of dependable Task scheduling Algorithm in cloud Environment” [7] the authors provided a new heuristic algorithm for dependable task scheduling, which was designed to decrease the time period of scheduling and compared the results with class of scheduling algorithms- Modified Critical Path (MCP), Earliest Time first algorithm (ETF) and Dynamic

Level Scheduling (DLS). The proposed heuristic algorithm reduced the execution time of task and high speed.

A paper on task scheduling has been presented by Dr. Amit Aggarwal et al[8]. The authors provided a priority algorithm for powerful completion time of task and compared with First come first serves and Round robin scheduling algorithm. The result gives better performance.

A paper on Dynamic task scheduling algorithm has been presented by Shital Patil et al[9]. The cloud service provider and users were affected in terms of cost and consequently in wastage of resources. Starvation, uneven distribution of hindrance on nodes etc. are the difficulties that traditional Scheduling algorithms suffer from and these result in increased turnaround time or waiting time of a task. The algorithm resulted in increase system functionality and resource utilization.

A paper on "Improved CHC algorithm" has been presented by Zhang L et al[10], which derived the benefits of standard genetic algorithm (SGA) and CHC algorithm. Complete consideration of the allotment of resources to tasks and the completion time of tasks is taken by improved CHC algorithm and the execution rate of the algorithm is also improved. This algorithm is highly efficient and the average completion time is comparatively lower.

#### 4. CONCLUSION

In this review paper, we have surveyed various task scheduling algorithm in cloud computing. the target of task scheduling approaches is the response time reduction, so that the completion of the tasks occur frequently. Various scheduling strategies are there which should take care of all

these things. From the literature reviewed, it is clear that lot of factors had already been covered in the area of task scheduling like execution time, cost, response time, flow time, throughput, and average resource utilization, etc. but still improvement required in some areas like make span, Time/space complexity & execution cost. So, Optimization based task scheduling may be further considered for achieving more effective task scheduling.

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