

# TO DEVELOP THE AGENDA FOR TASK SCHEDULING IN CLOUD COMPUTING

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**Abstract :** Cloud Computing is a means through which we can access the applications in the form of utilities over the internet. Cloud is something which is present at remote location, and it offers online data storage and infrastructure. It is the fastest emerging area, as it has got a reach among both the technical and non-technical users in the IT industry, which leads to the increased business achievements. Cloud computing provisions to increase capacity on the fly without investing in newer infrastructure or licensing new software. The cloud provides resources requirements on clients demands with great availability, scalability and with commercially viable (with low cost). Cloud computing makes available to the users a dynamically manageable environments for the computing resources. The management of these resources is becoming a big ground in cloud. So scheduling is of very vital concern in the cloud computing area. In this paper a dynamic scheduling scheme for cloud computing has been discussed, by taking into account the resource provisioning as the main issue to be addressed. Also the idea of Genetic Algorithm based scheduler is proposed, wherein the population is produced by enlarged Max Min by which make span can be reduced and load balancing of resources can be obtained

**Keywords—** Cloud Computing, Make span, Task Scheduling, Genetic Algorithm, Load Balancing.

## I. INTRODUCTION

Cloud computing is a new term related to internet based computing, and which is coined from the Utility Computing. It's a platform which has a group of integrated and network based hardware, Internet infrastructure and software, for providing communication and transport services through the use of internet. Through the use of GUI or APIs, these platforms overcome the complexity and details of the infrastructure (fundamental) from applications and users. In addition, cloud provides on demand services that are always on, anywhere, anytime and anyplace, as pay per use as needed. Both hardware & software services are available to general public, enterprises, corporations etc. Cloud computing, thus provides, shared pool of configurable computing resources. On-demand network access, which is provisioned by the Service Provider, as shown in the figure 1. Cloud is changing our lives by providing to users new kinds of services. It is high quality software, which has the ability to change the IT software industry.

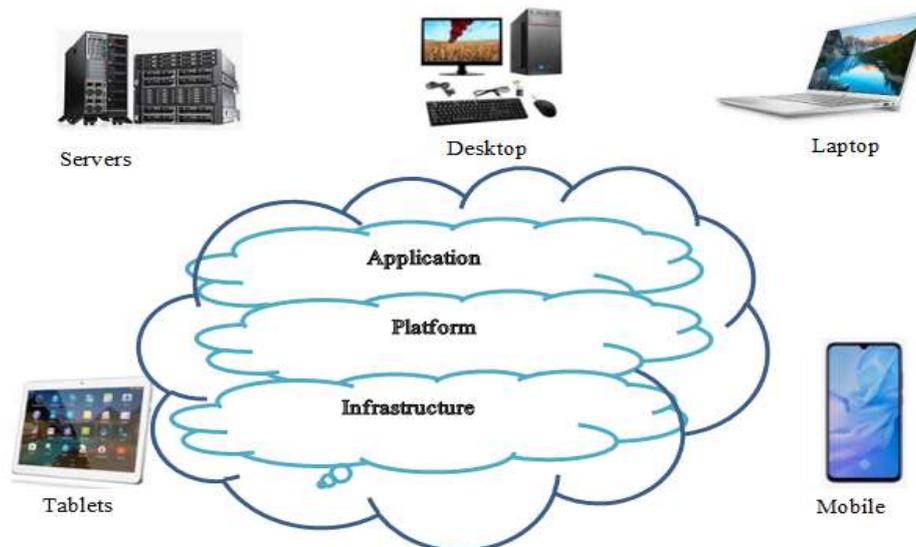


Figure 1: Cloud Computing

## Cloud Service Models

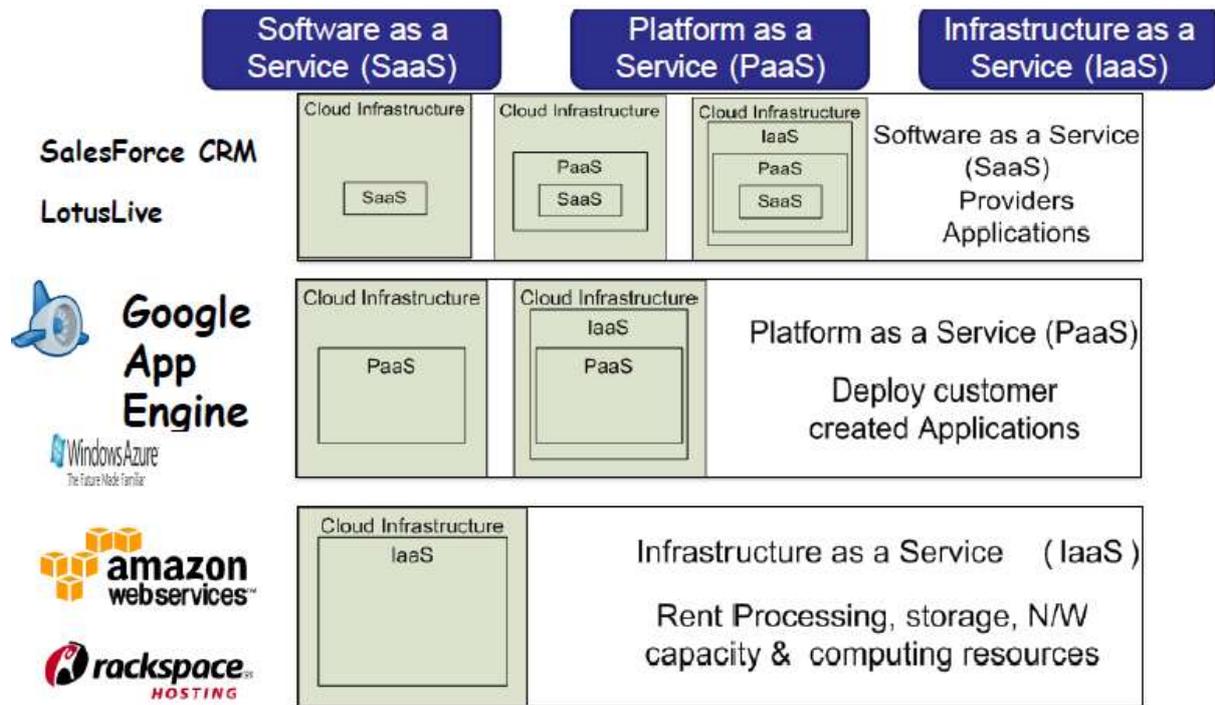


Figure 2: Cloud service model

There are mainly three different types of services which are provided by the cloud computing. Software as a Service (SaaS) features a complete application offered as a service on demand. One instance of the software executes or runs on the cloud and many users use these service. Platform as a Service (PaaS), which encapsulates a layer of software and provides it as a service that can be used to build higher-level services. Perspectives for PaaS are Producer & Consumer. Infrastructure as a Service (IaaS) delivers basic storage and computing capabilities as standardized services over the network.

## Cloud Deployment Models

- 1. Public Cloud:** Large-scale cloud infrastructure is made available for the general client or a large groups of industries and which is owned by an organization and which selling cloud services.
- 2. Private Cloud:** The cloud infrastructure is purely monitored and operated by an organization, which may exist ON premise or OFF premise.
- 3. Hybrid Cloud:** This cloud infrastructure is a combination of two or more clouds i.e. private or public, which remains as a unique systems but are certain to do together by standardized or proprietary technology which enables application and data portability.
- 4. Community Cloud:** A cloud service which is shared among different organizations with a common objective.

## Characteristics of Cloud Computing



Figure 3: Characteristics of Cloud Computing

## Elasticity and Scalability

- Impression of unlimited computing and physical resources, which is available on demand.
- Cloud infrastructure should be able to provide computing resources, when number of users or application load increases.

- The application should be fit to accommodate more users.
- Scalability refers to up and down when required.

#### **Measured Metering and Billing of Service**

- Users need not know the underlying architecture or the capabilities of setup.
- Metering should be categorized according to the types of their required services such as pre-processing resources, storage, hardware and system resources.
- Metering: Pay-Per-Use or Pay-as-you-go.

#### **Self-Service provisioning of resources**

- Consumers or subscribers require instant access.
- Cloud Service Providers must provide self-service facility for requesting services, storage, processing capabilities.
- Facilitates users to request, customize, pay-per-usage.

#### **Performance Measurement Services**

- The management system monitors the services, measures the performance, reduce the time delays, and optimize the services.

#### **Security**

- It improves security by centralization of data.
- Network level security concern
  - Sensitivity and integrity of the transmitting data to and from the cloud provider.
- Privacy concern
  - CSP have access to client's sensitive and private data.

#### **Security Issues**

##### **• Most security problems stem from:**

Loss of Control

##### **• Take back control**

Database and applications might be stored on to the cloud

Can it be managed & monitored by the consumer?

Lack of trust

##### **• Increase trust (mechanisms)**

Technology

Policy, regulation

Contracts (incentives): topic of a future talk

Multi-tenancy

## **TASK SCHEDULING ON RESOURCES**

Task scheduling and resources arrangements are the main problem areas in both Grid as well as in cloud computing. The scheduling of the cloud services to the consumers by service providers effect the cost benefit of these computing paradigms. The main aim of resource allocation to tasks is for unified services to accommodate their performance targets. In the cloud environment system Scheduling is an NP-complete problem. As the number of consumers increases, the tasks that need to be scheduled increase in proportion. Task scheduling is the hottest researches area in the cloud computing, many cloud experts and scholars published papers in journals to discuss the task scheduling problem. In addition, emerging disciplines of research's findings are applied to resolve the scheduling problem, such as genetic algorithms, neural networks, Artificial Intelligence. This regards to solving the task scheduling problem, Resource scheduling is a very crucial problem of distribution and in cluster calculation; it gives the user task execution efficiency, the resources of the system numbers and the performance. From heuristic scheduling algorithm in Task Scheduling is used in most applications, the most effectively. The most common heuristic scheduling algorithms are Genetic algorithm, and the Ant colony algorithm.

#### **Load Balancing**

Load balancing refers to a method which has a network of computers, which is used for distributing the workloads beyond many computing resources such as cluster of computers, networking links, CPUs or hard disk drives (HDDs). Load balancing plans to optimize uses of resource, minimize response time, maximize throughput, and escape overload of any one of the resources. By the use of multiple components with load balancing rather than a specific component may increase reliability over redundancy. Load balancing is one of the central problems in cloud computing. It is a tool that distributes the dynamic local workload evenly across all the nodes in the perfect cloud to avoid a situation where few nodes are heavily loaded while others are idle or doing some work. It helps to attain a high user's satisfaction and resource utilization ratio, consequently improving the global performance and resource utility of the system. The already available techniques of load balancing in cloud environments, takes into account different parameters like response time, performance, throughput, scalability, utilization of resources, fault tolerance, time to

migrate, and overall (combined) overhead. The emerging cloud computing model attempts to address the explosive growth of web-connected devices, and hold huge amounts of data and client demands, which in turn gives rise to the question whether our cloud model is capable enough to balance the constantly increasing load in an efficient manner or not.

## LITERATURE REVIEW

There are so many algorithms are provided by various researchers for task scheduling. A heuristic method to schedule bag-of-tasks (tasks with short execution time and no dependencies) in a cloud is presented, so that the number of virtual machines to execute all the tasks within allocated cost, is minimum and the same time speedup. In [2]2009, Dr. Sudha and Dr. Jayarani proposed the efficient Two-level scheduler (user centric meta-scheduler for collection of resources and system centric VM scheduler for dispatching jobs) in cloud computing technology is based on QoS. In[3] 2010, Yujia Ge and Guiyi Wei evolves and proposes a new scheduler in which the scheduling decision made by classifying the entire group of tasks into a job queue. A genetic algorithm is designed as the optimization method for a new scheduler who gives better makespan and better balanced load across all nodes than FIFO (First In First Out) and delay scheduling. In[4] 2011, Sandeep Tayal proposed an algorithm based on Fuzzy-GA optimization which classify the entire group of tasks in a job queue on basis of prediction of execution time of tasks authorize to convinced processors and prepare the scheduling decision. In [5]2011, Laiping Zhao, Yizhi Ren & Kouichi Sakurai , has recommended a DRR (Deadline, Reliability, Resource-aware) scheduling algorithm, wherein the tasks are scheduled in such a way that all the jobs can be completed or concluded much before the said deadline, which ensures the Reliability and minimizing of the resources. In [6]2011,S.Sindhu & Saraswati Mukherjee planned two algorithms for cloud computing environment and compared it with default policy of cloudsims toolkit , at the same time considering computational complexity of jobs.

In [7] 2012, Shaminder Kaur.et.al Cloud computing shows consumption, supplement and delivery model for internet services on pay as per usage basis. The scheduling of the cloud services to the users by service providers, effects the cost benefit of this computing service. In such a scenario, Tasks scheduling is efficiently work as the execution of cost and time could be reduced. In this paper, we proposed a meta-heuristic based scheduling, which reduces execution time and execution cost as well. A revised genetic algorithm is developed by merging two existing scheduling algorithms for scheduling tasks taking into review their computational complexity and computing capacity of processing items. Results of the experiment confirms that, under heavy loads, the proposed algorithm shows a better performance.

In [17]Saurabh Bilgaiyan.et.al(2015) Cloud computing is a popular computing paradigm that performs processing of huge volumes of data using extremely accessible geographically distributed resources that can be accessed by users which is based on Pay As per Use policy. In the latest computing scenario where the amount of data to be processed is increasing day to day, the costs engaged in the transmission and execution of such amount of data is increasing significantly. So the concern of appropriately scheduling the tasks, which in turn will help us for managing the costs escalations of data intensive applications. This paper analyses many evolutionary and swarm based task scheduling algorithms that address the above mentioned problem.

In [18]Mala Kalra.et.al(2015), Cloud computing has been a buzzword in the area of high performance distributed computing as it gives on-demand access to common pool of resources over Internet. Cloud computing is still in its infancy, so to obtain its full benefits, much research is required across a broad array of concepts. The important and mandatory research issues which requires focus due to its most valued performance is scheduling. To shape tasks to appropriate resources that optimize more than one objectives is the main goal of task scheduling. In Cloud computing scheduling is relating to a category of problems known as NP-hard problem due to large amount of solution space and thus it takes a long time to find a best solution. There is not a single algorithm to produce best solution within polynomial time to solve these problems. In cloud computing, it is preferable to find optimal solution. Metaheuristic based scheduling techniques have been proved to attain approximate optimal solutions within reasonable time for said problems. Here, in this paper, we have provided an expanded and elaborated survey which involves comparative analysis of multiple scheduling algorithms for grid and cloud computing environments, and which is based on three very trendy metaheuristics techniques: Ant Colony Optimization (ACO), Genetic Algorithm (GA) and Particle Swarm Optimization (PSO).

Table1: Comparison

Paper	Authors	Findings	Scheduling Parameters	Tools	Future Scope
Efficient approach to Genetic Algorithm for task scheduling in cloud computing environment[7]	Shaminder Kaur, Amandeep Verma (2012)	Two-point crossover method is used.	Initial population is generated by using SCFP and LCFP techniques in private cloud environment, Genetic Algorithm, Makespan, Task-Scheduling, cost	CloudSim	Enhance algorithm by supporting runtime scheduling, priority of jobs for multiple users.
Independent task scheduling in cloud computing by improved Genetic Algorithm[19]	Shekhar Singh, Mala Kalra (2014)	Fitness function is based on minimization of Make Span. Proportion selection method is used as selection operator	Make span, Resource Utilization	CloudSim	Execution cost can be taken as fitness criteria. Explore towards dependent and dynamic jobs.
Task Scheduling optimization for the cloud computing system [4]	S.Tayal (2011)	Use of Fuzzy GA optimization wherein in scheduling decision is evolved by evaluating the entire task group with in the job queue.	Fitness function is based on minimization of makespan	CloudSim	Improvement required on the accuracy of predicted completion time of job.

## CONCLUSION

This paper depicts a survey on optimizing Task Scheduling in cloud computing environment. It enables the use of Fuzzy GA optimization, which is used in decision of scheduling and Fitness function, which is based on minimizing makespan. Here, in this paper, we also learnt and studied about load balancing, which is a very important factor and shows how to balance the load, in cases when multiple systems are inter-connected. Techniques used for load balancing is reducing the migration time, reducing overhead, and improving performance etc., but the response to request ratio is rarely considered. In efficient research to GA in cloud computing environment, we have put forward a modified genetic algorithm for one user activity, wherein the fitness is evolved (developed) which encourages the solutions formation, and which helps in attaining the time reduction and the same can be relate to current heuristics.

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