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Efficient Resource Allocation and Scheduling Approach to Enhance the Performance Of Cloud Computing

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ABSTRACT

Cloud storage offering number of services where you can upload, document, data, images, videos and other files to a website to share with other. These files can access from any location or any type of device (laptop, mobile phone, tablet etc). Cloud computing distributes the computational tasks on the resource pool which consists of massive computers so that the service consumer can gain maximum computation strength, more storage space and software services for its application according to its need. Today's number of user in cloud are increase day by day they used cloud services But as the demand for cloud services increases, the ensuing increases in cost and complexity for the cloud provider may become unbearable means a huge amount of data moves from user to host and hosts to user in the cloud environment. In some cases two or multiple user request for the same resource. Based on the above these considerations, how to select appropriate host for accessing resources and creating a virtual machine (VM) to execute applications so that execution becomes more efficient and access cost becomes low are the challenging tasks. To solve this problem and increase the performance of cloud computing environment scheduling of task performed in order to gain maximum profit. This project gives a strategy for job scheduling. In this paper, an attempt has been made to propose a host selection model based on minimum execution time to minimize cost. Our analysis also attempts to schedule the jobs such a way that cloud provider can gain maximum benefit for his service and Quality of Service (QoS) requirement user's job. This strategy enhances the performance of cloud service

Keywords

Cloud Computing; Resource Allocation , Scheduling, Virtual Machine

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1. INTRODUCTION

The limitless measure of information they need to manage consistently has made customary database results restrictively exorbitant in view of legacy machines, supplies, and systems administration have been a trouble for organizations to keep up and oversee, and one of the more troublesome issues is to address the venture. Cloud computing reduces the load on corporate IT associations and offers versatility by letting firms outsource their figuring needs and concentrate on their customer requirement. Contingent upon the need, there are various levels of cloud computing service that organizations can take advantage of at the framework level, all hardware resource, for example compute, networking, power, and cooling are dealt with by the cloud vendor. Iaas (infrastructure as a service) customers are in full control over the virtual machines, storage, and everything else above in the stack. Paas (platform as a service) is a category of cloud computing that provides a platform and environment to allow developers to build applications and services over the internet. PaaS services are hosted in the cloud and accessed by users simply only need to be concerned with all of the hardware and mid-level services, for example, web and database servers are dealt with by the platform. At long last, Saas (software as service) provisions live universally in the cloud, permitting their customer access from desktops, laptops, or cell phones. Today a developing number of organizations need to process tremendous measures of information in an expense proficient way making their customer application.

Cloud computing is the use of delivering hosted services over the internet. Information is provided to the computers involved on demand. With cloud computing you're accessing services and different resources to perform jobs with changing and dynamic needs. An application can access the cloud for a service instead of standing and non-dynamic resource typically provided. Cloud computing can be described as a kind of distributed framework and parallel framework comprising of a collection of interconnected and virtualized machines that are progressively provisioned and present as one or more computing resource based on service level

agreement understandings made through arrangement between the service provider and consumer. It might be characterized as machine ideal model that gives dynamic computing environment to end user that is customized and reliable and also guarantees quality of service. Cloud computing is a way of correspondence around the different framework in the system with the assistance of internet. Cloud computing is a processing ideal model, where a huge pool of frameworks are joined in private or open systems, to provide dynamically scalable infrastructure for application, data and file storage. With the appearance of this innovation, the expense of computation, application hosting, content storage and delivery is reduced significantly. Cloud computing is a promoting term for advances that provide computation, software, file access, and capacity benefits that do not need of end user knowledge of the physical location and design of the framework that conveys the service. cloud computing is "on demand resource provisioning" which intends to give the accessible resource dependent upon the necessity of the resource. cloud computing is a "membership based". Cloud computing is the conveyance of computing services over the web utilizing portable computer, versatile, tablet from any area. Cloud administrations permit business Company and any person who need to use a software and hardware which is handle by outsiders (third party)which is present at remote area .cloud have numerous services for their customer according to customer service customer pay for this Cloud computing is a pay as per usage and reliable leads to an efficient network. cloud computing is a rising system and its exceptionally successful due to its characteristic that is quick, reliable, fault tolerance and efficient communication and so on around diverse system. Some cases of developing cloud computing foundation are Microsoft Azure, Amazon, Goggle application motor and Aneka. Cloud computing refers application and services provide through the Internet. These services are offered from server farms everywhere throughout the world, which collectivity referred as the "cloud." This metaphor represents, yet all inclusive nature of the Internet. A cloud service has three notable aspects that separate it from traditional hosting. It is sold on demand, regularly by the moment or the hour; it is versatile - a user can have as much or as little of a service as they want at any given time and the service are completely overseen/managed by the provider (the buyer needs only a PC and Internet access). Significant developments in virtualization and distributed computing, and in addition enhanced access to high speed Internet and a weak economy, have quickened interested toward cloud computing

To fully realize the potential of Cloud computing, Cloud service providers have to ensure that they can be flexible in their service delivery to meet various consumer requirements, while keeping the consumers isolated from the underlying infrastructure. Recently, high performance and cost efficient has been the sole concern in data center deployments, and this demand has been fulfilled paying much attention to resource allocation and scheduling. Large scale data processing is increasingly common in Cloud Computing systems. In this type of system, files are split into many small blocks these block are replicated over several server. Network bandwidth is a scarce resource in these systems that are why each job is divided into many tasks to process file efficiently and each task is allocated to a resource to deal with a file block. This process create a problem Problems like job are split into several independent subtasks, distributed among the available resources, and computed in parallel. For providing a Quality of service to consumer proper resource allocation and scheduling is required. There are number of task of any processing job which require a resource for fulfilling their requirements which is cost efficient and gives high performance.

Resource Allocation and Scheduling is done in various cloud environments. Job scheduling is responsible in the selection of the best suitable resource in a cloud. In this paper, apply an algorithm that follows the approach of the dynamic task allocation that reduces the cost of performance, which increases the efficiency of the system, which relate to the efficiency of the whole cloud computing facilities. The scheduling algorithms in distributed systems usually have the goals of spreading the load on processors and maximizing their utilization while minimizing the total task execution time. Task scheduling, one of the most famous combinatorial optimization problems, plays a key role to improve flexible and reliable systems. The main Purpose is to schedule tasks to the adaptable resources in accordance with adaptable time, which involves finding out a proper sequence in which tasks can be executed under transaction logic constraints

2. SCHEDULING IN CLOUD COMPUTING

Cloud Consumer A person or organization that maintains a business relationship with, and uses the service from a cloud provider. A cloud consumer requests the appropriate service, sets up service contracts which is SLA can cover terms regarding the QoS, security etc with the cloud provider, and uses the service. The cloud consumer may be billed according to their used.

Cloud Provider A person, organization, or entity responsible for making a service available to interested parties. cloud provider conducts its activities in the areas of service deployment, service orchestration, cloud service management, security and privacy. Request cognition component should be fully aware of the special needs for different businesses, which may include the computing, storage and communication requirements for computing, arrival law and concurrent conditions, security and privacy requirements, QoS of the service and so on;

Cloud Broker An entity that manages the use, performance and delivery of cloud services, and negotiates relationships between Cloud Providers

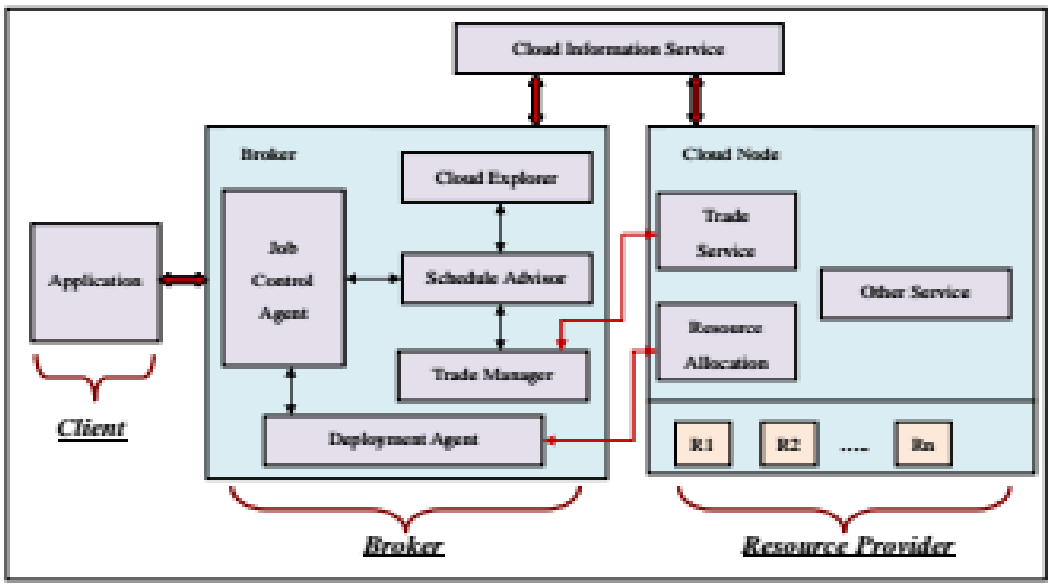


Figure 1 : scheduling Model of cloud computing

and Cloud Consumers. In general, a cloud broker can provide services in three categories .

Scheduling process in cloud can be generalized into three stages namely–

Resource discovering and filtering- Datacenter broker discovers the resources present in the network system and collects status information related to them.

Resource selection- Target resource is selected based on certain parameters of task and resource. This is a deciding stage.

Task submission- Task is submitted

3.RELATED WORK

Cloud computing is a latest new computing paradigm where applications, data and IT services are provided across dynamic and geographically dispersed organization. How to improve the global throughput and utilize Cloud computing resources proficiently and gain the maximum profits with job scheduling system is one of the Cloud computing service providers' ultimate objectives. The motivation of this paper is to establish a scheduling mechanism In the last years, the job scheduling problem in the cloud computing has been studied in few research activities because of the novelty of this research discipline however; we can mention the following approaches. As related work.
Resources allocation and scheduling approaches for business process applications in Cloud contexts[1]This paper deals with the allocation and scheduling workflow tasks in Cloud contexts. More precisely, as the problem is computational hard they have proposed three approaches based respectively on the overall execution time, on the cost incurred using a set of resources (i.e. virtual machines and human resources) and on the both criterion. Exploiting Dynamic Resource Allocation for Efficient Parallel Data Processing in the Cloud[2]In this paper they have discussed the challenges and opportunities for efficient parallel data processing in cloud environments and presented Nephele, the first data processing framework to exploit the dynamic resource provisioning offered by today's IaaS clouds for both, task scheduling and execution .They have described Nephele's basic architecture and presented a performance comparison to the well-established data processing framework Hadoop. The performance evaluation gives a first impression on how the ability to assign specific virtual machine types to specific tasks of a processing job, as well as the possibility to automatically allocate/deallocate virtual machines in the course of a job execution, can help to improve the overall resource utilization and, consequently, reduce the processing cost. With a framework like Nephele at hand, there are a variety of issues. Nephele's do not adapt resource overload or underutilization during the job execution automatically.
Virtual Machine Provisioning Based on Analytical Performance and QoS in Cloud Computing Environments[3] this paper presented an adaptive provisioning mechanism for delivery of resources to SaaS applications. The mechanism uses analytical performance (queuing system model) and workload information to drive decisions of an application

provisioned. The proposed approach is able to model the infrastructure using only information that IaaS providers make available to customers and monitoring data from running VMs. The goal of the model is to meet QoS targets related to service time and rejection rate of requests and utilization of available resources. SLA-Oriented Resource Provisioning for Cloud Computing: Challenges, Architecture, and Solutions [4].This paper presents vision, challenges, and architectural elements of SLA-oriented resource management. The proposed architecture supports integration of market based provisioning policies and virtualization technologies for flexible allocation of resources to applications. In this paper, they pointed out many challenges in addressing the problem of enabling SLA-oriented resource allocation in data centers to satisfy competing applications demand for computing services. In particular, the user applications are becoming more complex and need multiple services to execute instead of a single service. These complex user applications often require collaboration among multiple organizations or businesses and thus require their specific services to function successfully.

4. COMPREHENSIVE SCHEDULING APPROACH OF CLOUD

Cloud provisioning is the allocation of a cloud provider's resources to a customer. When a cloud provider accepts a request from a customer, it must create the appropriate number of virtual machines (VMs) and allocate resources to support them. The process is conducted in several different ways: advance provisioning, dynamic provisioning and user self-provisioning. In this context, the term provisioning simply means " to provide." With advance provisioning, the customer contracts with the provider for services and the provider prepares the appropriate resources in advance of start of service. The customer is charged a flat fee or is billed on a monthly basis.

Cloud Provisioning is the procedure of organization and administration of provisions on Cloud bases. It comprises of three key steps: (i) Virtual Machine Provisioning. Virtual machine provisioning, or virtual server provisioning, is a systems management process that creates a new virtual machine (VM) on a physical host server and allocates computing resources to support the VM. These computing resources typically include CPU cycles (or entire cores) and memory space, but can also involve I/O cycles and storage. It is a strategy for efficiently managing space in a storage area network (SAN) by allocating physical storage on an "as needed" basis.VM provisioning includes instantiation of one or more Virtual Machines (Vms) that match the particular fittings aspects and programming prerequisites of a provision. Most Cloud suppliers offer a set of broadly useful VM classes with nonexclusive programming furthermore asset setups. IT can reduce power and cooling costs by cutting down on the amount of idle storage devices in the array. The caveat for virtual provisioning is that it requires administrators to carefully monitor the usage of virtually provisioned resources to ensure that no virtual disks become full, resulting in storage errors for mission-critical applications.(ii) Resource Provisioning, which is the mapping and planning of Vms onto physical Cloud servers inside a cloud. Presently, most Iaas suppliers don't give any control over asset provisioning to requisition suppliers. At the end of the day, mapping of Vms to physical servers is totally avoided provision suppliers; and (iii) Application Provisioning, which is the arrangement of particular provisions, (for example, ERP framework, BLAST trials, and web servers) inside Vms what's more mapping of end-client's solicitations to requisition occurrences. The objective of Application Provisioning is guaranteeing a productive use of virtualized IT assets, which might be attained through the utilization of methods for example, burden adjusting and proficient mapping of appeals, while the objective of VM Provisioning is to give requisitions with sufficient computational force, memory, stockpiling, and I/O execution to meet the level of Qos needed by end-clients. The recent is attained either by expanding/diminishing limit of conveyed virtual machines or by expanding/diminishing the number of provision and VM occasion

The resource demands for different jobs fluctuate over time. Task execution time cannot be predicted in cloud computing. Scheduling is used to allocate particular resources for a certain tasks in particular time . Job scheduling system, which efficiently allocates resources to required tasks according of the Service Level Agreements (SLAs), is a core and challenging issue in achieving high performance in cloud computing and of great significance for improving resource load balance, security, reliability and reducing energy consumption of the whole system. However, it is a big challenging problem for efficient scheduling algorithm design and implementation in cloud computing environment. Hence the scheduler must be dynamic. The purpose of scheduling is to increase the utilization of resources .

There are following Challenges and Problem in resource allocation and scheduling

a) Resource contention situation arises when two applications try to access the same resource at the same time.

b) Scarcity of resources arises when there are limited resources.

c) Resource fragmentation situation arises when the resources are isolated. (There will be enough resources but not able to allocate to the needed application)

d) Over-provisioning of resources arises when the application gets surplus resources than the demanded one.

Cloud resources consist of physical and virtual resources. The physical resources are shared across multiple compute requests through virtualization and provisioning .The request for virtualized resources is described through a set of parameters detailing the processing, memory and disk needs. Provisioning satisfies the request by mapping virtualized resources to physical ones. The hardware and software resources are allocated to the cloud applications on-demand basis. For scalable computing, Virtual Machines are rented. The complexity of finding an optimum resource allocation is exponential in huge systems like big clusters, data centers or Grids. Since resource demand and supply can be dynamic and uncertain, various strategies for resource allocation are proposed. This paper puts forth various resource allocation strategies deployed in cloud environments.

5.PROPOSED ALGORITHM

Resource allocation and Job Scheduling aims at assigning jobs to data centers in the cloud so that the execution time of the overall tasks of jobs is minimized. The whole performance of cloud and efficiency are increase. Proper utilization of resources and virtual machine under the SLA the processing power of cloud is decrease thus the whole cost of to execute the task is also decrease. To deal with optimization of cost and execution time we purpose an approach .

That section provides the study of the ABC algorithm and the working, for resource scheduling task. The ABC algorithm in pseudo-code is given using table 3.1. Where each bee represents a position in the search space. If the project has n activities, the bees will fly in the search space with n dimensions. A position is a candidate for a priority list where each of its elements fixedly represents an activity and its corresponding value shows the priority of that activity. Hence, the position vector $\mathbf{x_i}$ of each bee i is used to represent the priority values of a schedule i with n activities. Each element d of the position vector $\mathbf{x_i}$ is located between 0 and 1 (i. e. $0 \leq x_{id} \leq 1$). Hence, each element with values larger than 1 or smaller than 0 is set to 1 or 0, respectively [15].

Table: pseudo code for ABC algorithm

Input: Population size, Scouts, Max_Trial
Output: best schedule

Initialization
Define FoodNumber = Population size/2
For i = 1 to FoodNumber
Initialize food source i randomly
$Trial_i = 0$
End For
Repeat
For i = 1 to FoodNumber
Evaluate food source i using serial-SGS
End For
(Send Employed Bees)
For i = 1 to FoodNumber
Select a parameter d randomly
Select Neighbor k randomly
Calculate $v_{id} = x_{id} + \omega_1 r_{id}(x_{id} - x_{kd})$
Evaluate new food source using serial-SGS
If the new food source presents a schedule with smaller makespan
Update the position
If the food source has not been improved
Increment its Trial by 1
End For
(Send Onlooker Bees)
Calculate probabilities for each food source using equation (3)
For i = 1 to FoodNumber
Select a parameter d randomly
Select Neighbor k from food sources based on equation (3)
Calculate
$V_{id} = X_{id} + \omega_2 r_{id}(x_{id} - x_{kd})$
Evaluate new food source using serial-SGS
If the new food source presents a schedule with smaller makespan
Update the position
If the food source has not been improved
Increment its Trial by 1

End For

(Send Scout Bees)

Define i as the food source with the maximum Trial

Initialize food source i randomly

$Trial_i$ = 0 Until termination condition is met

Return best schedule

Figure 2 : Comparision Of Time shared And New Shared(ABC Algorithm)

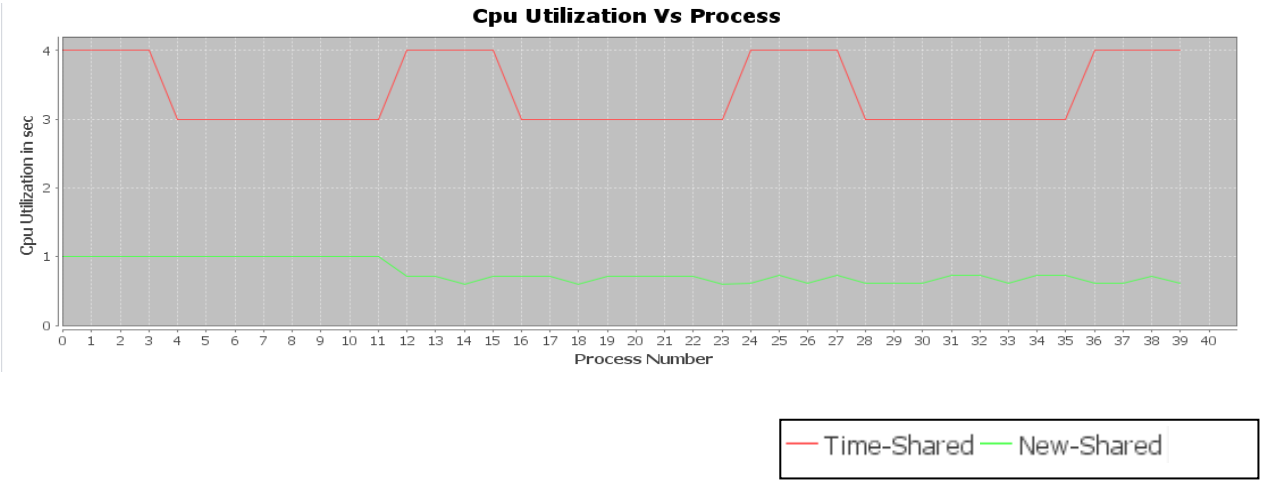
The ABC employs a population of different types of bees to find the schedule with minimum makespan. The type of a bee is defined based on the behavior she uses to find the food sources. A bee waiting for the dance area for making the decision to choose a food source is called onlooker bee; the bee which goes to the food source already visited by herself just before is named as employed bee, and the bee which flies spontaneously in the search space is called scout bee

6.1 Comparison with Time Shared Policy

In time shared policy resource are allocated under the time of each task. In this policy resource are allocated to task for particular time of period. Graph plot shows comparison between our algorithm and time shared policy. In time shared number of resource increasing execution time is increase but in our policy This policy minimizes the cost .further there is a problem occurred when the task is not complete in assigned time then the task will be again wait for his turn. That it will be gone in waiting list. But in our algorithm find the best resource according to task requirement like cost. Fig shows the comparison between this both algorithms as the number of task are increase in time shared execution time is also increase.

6.2 Comparison with Space shared Policy

In space shred policy are same as previous policy the difference is that in space shared for execution of an task it assign an space according the requirement of task .This policy is better than the previous policy. cloud is vast technology number of consumer is very large. To provide an each task a space for the duration of completing the task to perform without migration. Load is not balanced. Waiting list of task is increases they are waiting for resource until the resource are not free from other task. but in our algorithm this problem is not occur because in our algorithm load balancing is perform by virtual machine migration . fig shows the comparison between our algorithm and space shared policy.



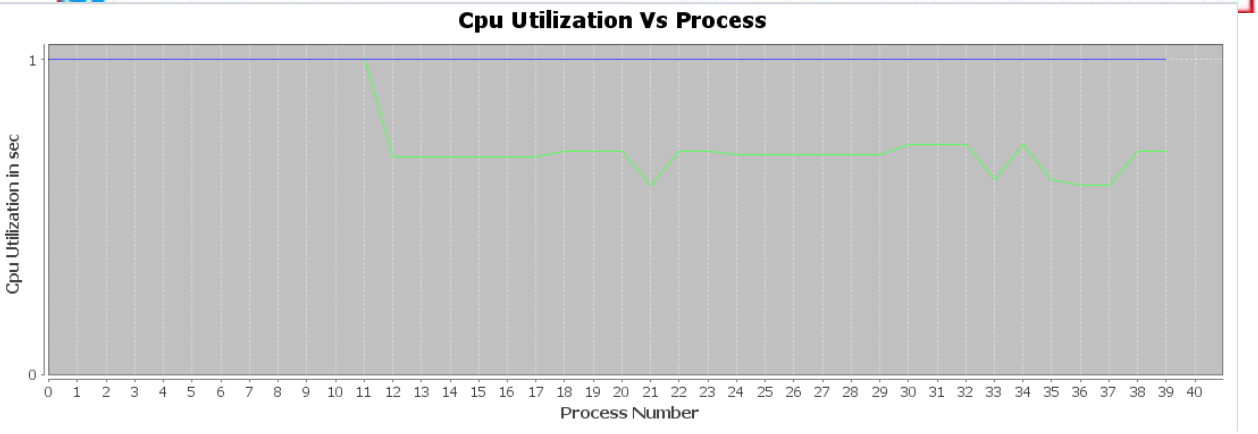


Figure 3 : Comparison Of Space shared And New shared(ABC Algorithm)

7. Conclusion and Future work

Scheduling is one of the most important task in cloud computing environment. In this paper, we have established a scheduling model for cloud computing based on ABC algorithm to minimize energy consumption and maximize the profit of service provides under the constraint .With the advancement of Cloud technologies rapidly, there is a new need for tools to study and analyze the benefits of the technology and how best to apply the technology to large-scaled applications. Efficient task scheduling mechanism can meet users' requirements, and improve the resource utilization, thereby enhancing the overall performance of the cloud computing environment. But the task scheduling in grid computing is often about the static task requirements, and the resources utilization rate is also low. According to the new features of cloud computing, such as flexibility, virtualization and etc, this paper discusses task scheduling mechanism based on load balancing in cloud computing. This task scheduling mechanism can not only meet user's requirements, but also get high resource utilization. It is observed that the proposed algorithm improves cost and completion time of tasks as compared to time and space shared policy. The turnaround time and cost of each job is minimized individually to minimize the average turnaround time and cost of all submitted tasks . But it need more improvement as this whole algorithm is based on the accuracy of the predicted execution time of each task. The proposed algorithm can be further improved by considering following suggestions In this algorithm population are generated randomly that means resource are selected randomly in future develop an approach who select the the best fit node. In general, we think our work represents an important contribution to the growing field of Cloud computing services and points out exciting new opportunities in the field of resource allocation and scheduling

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