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# A New Era to improve the QOS on Cloud using hybrid approach

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***Abstract*-Cloud computing is an inevitable progression in the future computing development of technology. Its critical significancelies in its ability to provide all users with tremendous performance and reliable calculation. With the evolution of system virtualization and Internet technologies, Cloud computing has emerged as a new computing platform. Cloud computing is to contribute virtualized IT resources as cloud services by using the Internet technology. In Cloud computing, a cloud user carry out an agreement called Service Level Agreement (SLA) with a cloud provider. The cloud user makes use of IT resources like storage and server as a service and pays for the service. In cloud computing environment, there are inevitably numerous service providers to provide services with similar functionalities and different QoS. These services can incorporate tens of thousands composite services with similar functions and different QoS. That is, there are many distinct combination plans. Therefore, in a service composition process, we need to choose service components from enormous services with similar functions and different QoS based on user's QoS requirements. In the research work, we used populations with different sizes, with adopted for different composition scales, the efficiency of algorithm has been greatly improved. Therefore, the research work concentrated on examining the dynamic adaptive approach of population size. The other next step is to apply the proposed hybrid algorithm into a number of functional large-scale services of computing environments, in order to enhance the efficient and reliable operations of the hybrid GA further. To analyzed the behavior of the proposed method using various research parameters such as Input number of tasks, Populations size( different), Average number of candidate services for each task, Compute average fitness value of simple genetic**.

***Keywords:*** **QoS, Genetic, Population size**, S**implex, Hybrid**.

## 1. Introduction

Cloud computing is a type of internet based computing the provides resources on request, served over the Internet from shared data centers. Rather than purchasing a cluster of computers, finding space in our local lab, hiring an administrator, and then allowing the facility remain idle when not needed, we can outsource our computing to remote facilities in the cloud, and pay only for what we use. Cloud computing is a recently proposed and evolving paradigm that provides computing as a service that can be purchased on demand by different types of clients following a pay-per-use model [2]. Differently from Grid [3] and clusters users, cloud users benefit from the concept of elasticity, as they can easily scale resources up and down according to their processing demand, in a virtually unlimited form [1]. Clouds are strongly based on the concept of virtualization in which Virtual Machines (VM) play a fundamental role. This allocation of resources, on demand, provides a new dimension for High Performance Computing (HPC). Although, at a first analysis, clouds were considered not suitable for HPC applications.

### 1.1 Cloud computing architecture

We know that cloud computing is the transfer of computing to a host of hardware infrastructure that is shared in the cloud. The commodity hardware infrastructure contains various low cost data servers that are connected to the system and give their storage and processing and other computing resources to the application. Cloud computing associates running applications on virtual servers that are allocated on this distributed hardware infrastructure accessible in the cloud. These virtual servers are formed in such a way that the different service level agreements and reliability issues are met. There may be multiple occurrence of the same virtual server accessing the distinct parts of the hardware infrastructure available. This is to make sure that there are multiple copies of the applications which are ready to take over on another one's failure. The virtual server shares the processing between the infrastructure and the computing is done and the result returned.

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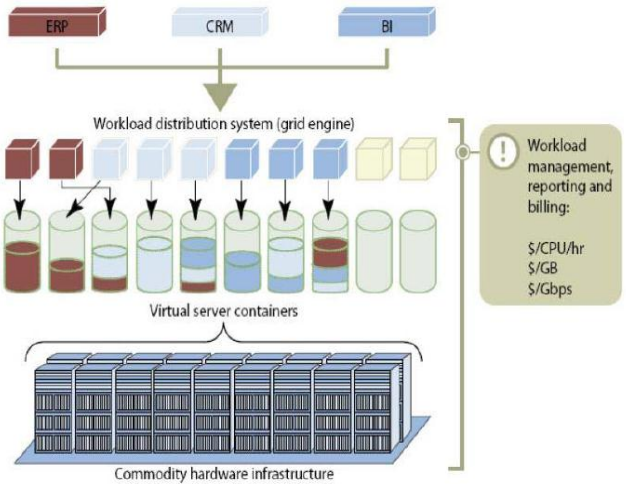



**Figure 1** Cloud Computing Architecture

In cloud computing a workload distribution management system, also known as the grid engine, handles the demands coming to the virtual servers. This engine will manage the creation of many copies and also the safety of integrity of the data that is stored in the hardware infrastructure. This will also regulate itself such that even on heavier load, the processing is completed as per the demands. The different workload management systems are not visible to the users. For the user, the requests are processed and the result is obtained. There is no query of where it was done and how it was done. The users pay based on the usage of the system - as said before - the commodity is now cycles and bytes. The billing is on the basis of usage per CPU per hour or GB data transfer per hour.

## 2. Qos based cloud computing

In cloud computing [1-4] environment, there are inevitably many service providers to provide services with same functionalities and different QoS. These services can combine tens of thousands composite services with same functions and different QoS. That is, there are many different combination plans. Therefore, in a service composition process, we need to choose service components from massive services with same functions and different QoS based on user's QoS requirements. How to select the most suitable composite service among many available candidate services for consumers is an interesting practical issue [24, 25]. The service selection with global QoS constraints possesses a considerably big proportion in the problem of QoS-based cloud service selection. QoS-based cloud service selection plays an important role in the combination of cloud services.QoS-based cloud service selection problem is one of the hot research areas. The calculation algorithms based on QoS properties is a kind of QoS-based service selection algorithm. Exhaustive methods and approximate algorithms are two kinds of QoS properties calculation methods. To meet the global constraints and to find the optimal combination are under the scope of combinatorial optimization, and QoSbased service selection is NP-hard problem [11], therefore, approximate algorithm is more suitable to solve optimization combinatorial problems. Genetic Algorithm is a kind of approximate algorithm. It is a good method to solve optimization combinatorial problems [12-13]. But, Genetic Algorithm is not advantageous for the local convergence. To compensate for local search capability of Genetic Algorithm itself, the combination of Genetic Algorithm and some kind of local search algorithms is needed to enhance the local search capabilities of Genetic Algorithm.

### 2.1 Related work

The main use of moving to Clouds is application scalability. Unlike Grids, scalability of Cloud resources grants real-time provisioning of resources to meet application demands. Cloud services like compute, storage and bandwidth resources are accessible to cloud users at substantially lower costs. Usually tasks are scheduled by user demands. There are different studies associated to the quality-based cloud service selection.

## 3.Research problem formulation

In the paper, we proposed a hybrid algorithm with Simplex Method and GA in order to solve quality-driven selection, mainly including the method of a tree traversal sequence encoding scheme and some Simplex Method operations. In this approach, we will use a tree traversal sequence encoding scheme. The encoding is based on a tree combination template of services combination. Simplex Method (SM) is a common approach to solve mathematical programming problem. Genetic Algorithm and Simplex Method also have their own advantages. Genetic Algorithm has global optimization capability, and it can search simultaneously multiple regions of solution space. Simplex Method has local space search ability, fast convergence speed. It can change search direction according to the trend of fitness values and the use of local information.A hybrid algorithm is designed with the combination of Genetic Algorithm and Simplex method that combines the global optimization algorithm and the local optimization algorithm. Genetic Algorithm ensures that the hybrid algorithm has the global search capacity and can find the global optimal point. Simplex Method can add a number of parallel searches in several local regions and it can use local search methods to direct the search. It can not only increase the speed of process of global optimization, but also work out the "premature" problem of Genetic Algorithm to a certain degree. Better convergence speed and search capability can be obtained at the similar time. In the paper, we will use populations with different sizes, will be selected for distinct composition scales, the efficiency of algorithm will be greatly improved. Therefore, the research work will focus on examining the dynamic adaptive mechanism of population size. The other next action is to execute the proposed hybrid algorithm into a numerous of practical large-scale services computing environments, in order to enhance the efficient and reliable operations of the hybrid GA further.

### 3.1 Research objectives

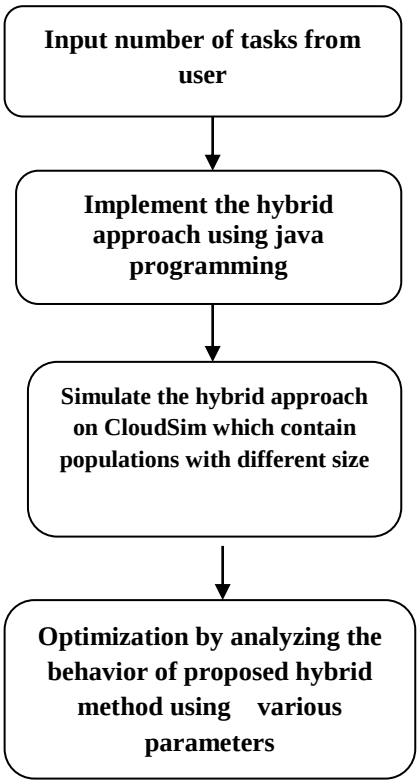
The objective of research work is to use populations with different sizes, will be adopted for different composition scales, he performance of algorithm will be greatly enhanced. Therefore, the research work will focus on

examining the dynamic adaptive mechanism of population size. The Objectives of the research work are:

1) To optimize the performance of cloud architecture.
2) To study the CloudSim toolkit for simulaions.
3) To integrate Simplex method with Genetic algorithm, and implement the hybrid approach using java programming.
4) To simulate the hybrid approach using CloudSim toolkit.
5) To analyse the behavior of the proposed method using various parametters:
   - Input number of tasks
   - Populations size( different)
   - Average number of candidate services for each task
   - Compute average fitness value of simple genetic
   - Average fitness value of hybrid genetic

### 3.2 Steps to Perform for the Methodology

Input: - Required parameters for cloudlets and vm's are taken from user.
Output: - Improves Quality of Services at cloud with better Computation Time, data processing time and throughput.




## 4. Results and discussions

A hybrid algorithm is designed with the combination of Genetic Algorithm and Simplex method that combines the global optimization algorithm and the local optimization algorithm. Genetic Algorithm ensures that the hybrid algorithm has the global search capacity and can find the global optimal point. Simplex Method can add a number of parallel searches in several local regions and it can use local search methods to direct the search. It can not only increase the speed of process of global optimization, but also work out the "premature" problem of Genetic Algorithm to a certain degree. Better convergence speed and search capability can be obtained at the similar time.

### 4.1 Simulation Steps and Results

First we have to configure the server for QOS on Cloud
Step 1: Configure the server using TOMCAT-BASE\webapps\QOS \WEB-INFserver_config.XML

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- ip is mendatory and need to be unique -->
<servers>
 - <server>
      <id>1</id>
      <hostname>hostname A</hostname>
      <ip>127.0.0.1</ip>
      <active>false</active>
      <loadfactor>15</loadfactor>
      <architecture>X86</architecture>
      <os>Linux</os>
      <cpu>Xen</cpu>
      <numberofcpu>2</numberofcpu>
      <speed>1000</speed>
      <ram>1024</ram>
      <storage>10000</storage>
   </server>
```

Step 2:Start the server and use url http:\\ localhost:8080/QOS/

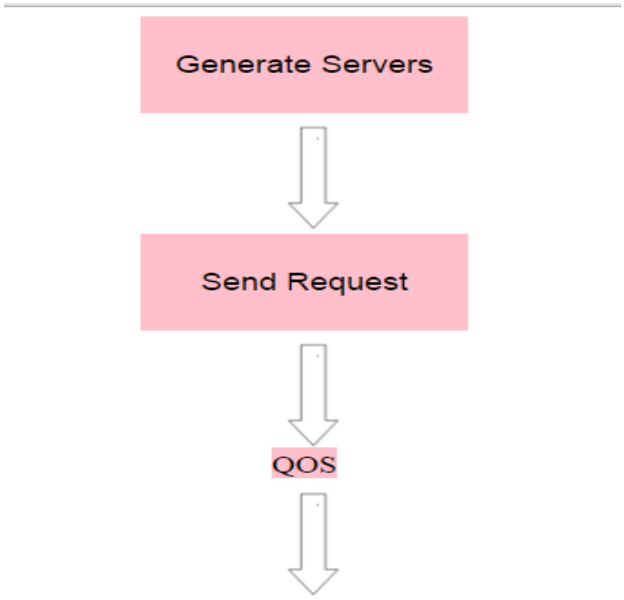



**Figure 2**.Shows the result of local server startup process for QOS

In the above figure, when click on generate servers button it will generate servers. On clicking send request button, then simulation will get start. After that, it will return the results of the genetic algorithm and hybrid genetic algorithm (hybrid with simplex) to achieve quality of service for cloud computing environment.

Step3: Initializing Server list with populations size 10.

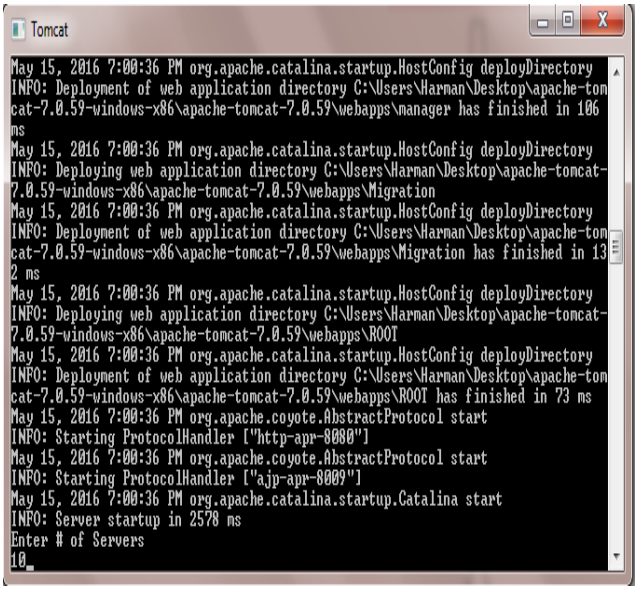



**Figure 3**. Shows the initializing server with the population size 10

Step4: Initialized server list with population size 10.

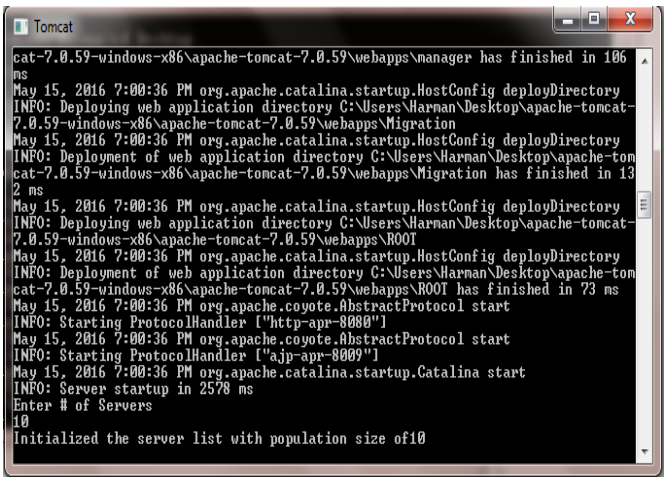



**Figure 4.**Initialized serverlist with the population size 10

Step5:list of 10 servers.

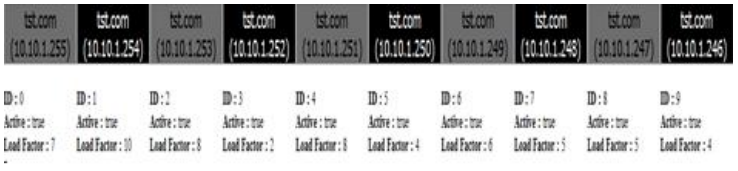



**Figure 5**: list of servers

Step 6:Results of genetic algorithm when the size of the populations are 10.

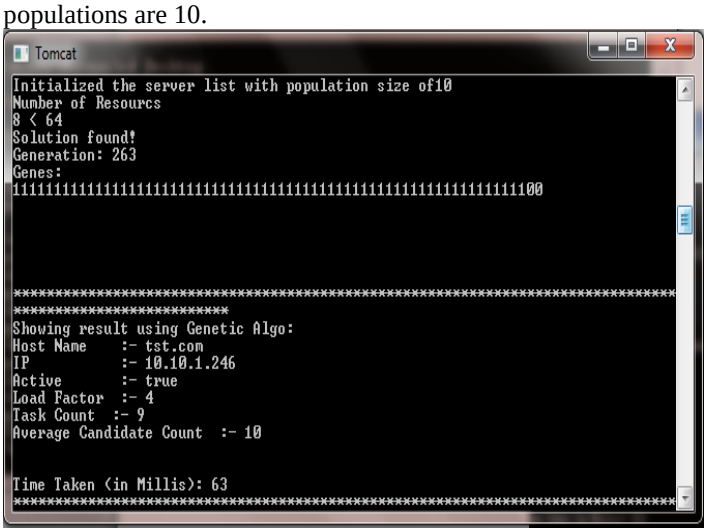



**Figure 6**.Shows the results of genetic algorithm.

In the above diagram, the results of genetic algorithm shown that the load factor of the server, total number of task count, average candidate count and total time taken to complete the entire task with different populations.

Step 7: Final generation of simplex.

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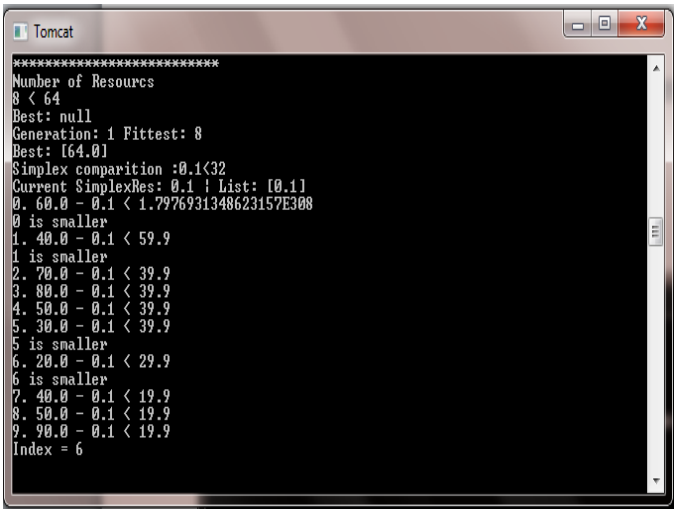


**Figure.7** shows the total number of resources and final generations of simplex

Step8: Results of hybrid genetic algorithm

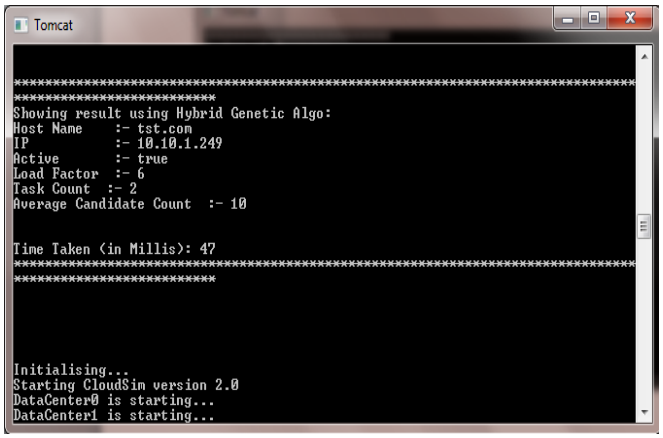


**Figure 8.** Shows final the result of hybrid genetic algorithm In the above figure, clearly shows that the total task count And total time taken for final generations in quality of service in cloud computing is less than the simple hybrid algorithm the hybrid genetic shows the better result than the simple genetic method in cloud computing environment for quality of service

Step 9:Simulation Result

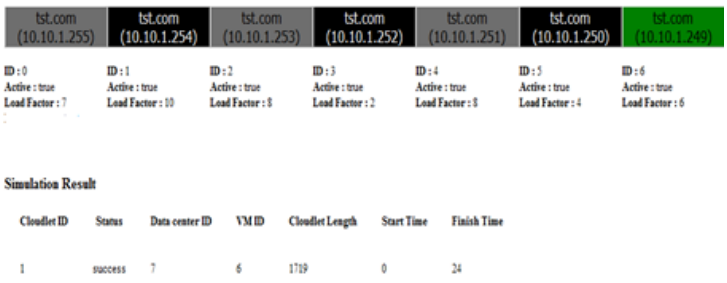


**Figure 9**: Shows server which provides quality of service using hybrid genetic algorithm in less time than simple genetic algorithm

### 4.2 Result analysis

In the result analysis, we have different output tables and graphical charts to compare the proposed method with other techniques.

#### 4.2.1. Output Table

The comparison table clearly shows that the result of hybrid algorithm are better than the simple genetic algorithm, although the load factor in hybrid algorithm is more than the simple genetic algorithm, but still it takes less time to compute all the candidate task and produce better results than the simple genetic, initially the populations start from the size 10 and populations range up to 235 possible generations.. The table 5.3.1 shows the comparison results:

**TABLE 1**

**Different algorithms are compared for number of jobs.**

| *Parameters* / *Algorithms* | *Load Factor* | *Task Count* | *Average candidate count* | *Total Completion Time* |
|---|---|---|---|---|
| *Genetic Algorithm* | *4* | *9* | *10* | *63* |
| *Hybrid Algorithm* | *6* | *2* | *10* | *47* |

#### 4.2.2 GRAPHICAL ANALYSIS

The graphical charts shows that the results of hybrid algorithm are better than the simple genetic algorithm when the populations are vary. The graphical results are showing below:

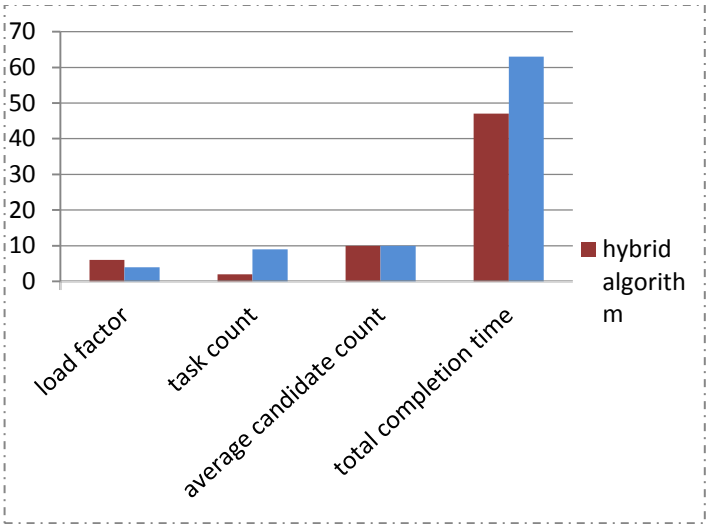

**Figure 10** . Bar chart shows the graphical results of comparison between the hybrid and simple genetic

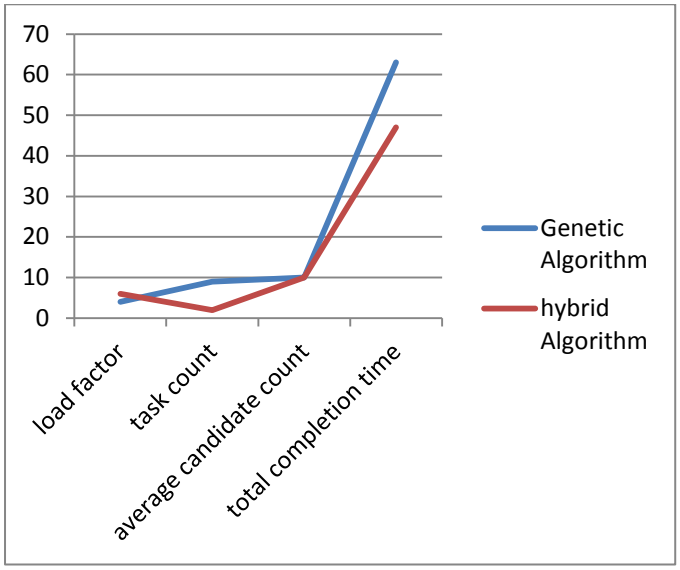


**Figure 11.** Line chart shows the comparison between the hybrid and simple genetic

## 5. Conclusion

With the progressive development of cloud services technology and application, it is inevitable for a task to appear a numerous of candidate services with the similar function properties and different non-functional attributes (mainly referring to QoS attributes). It has become an urgent problem that how to fast and flexibly select a high-availability, high reliability, high performance and the best services to meet user' needs from massive candidate services. Namely, it is QoS-based service selection problem. In the research work we have proposed and implemented a Hybrid genetic algorithm with different population size on cloud environment using CloudSim Toolkit and compared it with the simple genetic algorithm to improve the quality of service on cloud environment. The results show that proposed technique is much better than the simple genetic algorithm in terms of population size, task count, average number of candidate task count, and the total completion time.

## 6 Future work

Cloud Computing is a vast concept and QOS plays a very important role in case of Clouds. There is a huge scope of improvement in this area. We have implemented only two techniques to improve the quality of service. But there are still other approaches that can be applied to QOS in cloud computing. The performance of the given algorithms can also be increased by varying different parameters. We can also move ourresearch work on any Private Cloud for the Security and further enhancements.

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## REFERENCES

[1] SaeedJavanmardi , Mohammad Shojafar, DaniloAmendola, Nicola Cordeschi "Hybrid Job scheduling Algorithm for Cloud computing Environment" published in SpringerVerlag Berlin Heidelberg 2014.

[2] Tom Guérout, Samir Medjiah, Georges Da Costa, Thierry Monteil(2014),"*Quality of service modeling for green scheduling in Clouds*", In Elsevier.

[3] Bernardetta Addis, DaniloArdagna, Antonio Capone ,GiulianaCarello (2014)," Energy-aware joint management of networks and Cloud infrastructures", In Elsevier Computer Networks, pp.75–95.

[4] Patrick Raycroft, Ryan Jansen, Mateusz Jarus, Paul R. Brenner (2014)," *Performance bounded energy efficient virtual machine allocation in the global cloud*", Elsevier ,Sustainable Computing: Informatics and Systems, pp. 1–9.

[5] Nader Mohamed, JameelaAl-Jaroodi, AbdullaEid (2013)," *A dual-direction technique for fast file downloads with dynamic load balancing in the Cloud*", In Elsevier Journal of Network and Computer Applications, pp. 1116–1130.

[6] Chengwen Zhan, JianKuang, Zhitao Dai, Bo Cheng , and Lei Zhang "An Approach for QoS-aware Cloud Service Selection Based on Genetic Algorithm and Simplex Method" published in Int'l Conf. Grid & Cloud Computing and Applications, GCA, 2013.

[7] YumingXu, KenliLi ,, Ligang He "A DAG scheduling scheme on heterogeneous computing systems using double molecular structure-based chemical reaction optimization" published in Elsevier, 2013.

[8] Hong Sun, Shi-ping Chen "Research and Simulation of Task Scheduling Algorithm in Cloud Computing" published in TELKOMNIKA, Vol.11, November 2013.

[9] TarunGoyal, AakankshaAgrawal "Host Scheduling Algorithm Using Genetic Algorithm In Cloud Computing Environment" published in International Journal of Research in Engineering & Technology (IJRET) Vol. 1, Issue 1, June 2013.

[10] Hwa Min Lee, Young-SikJeong, Haeng Jin Jang (2013), "*Performance analysis based resource allocation for green cloud computing*",In Springer.

[11] Mohamed Abu Sharkh, ManarJammal, AbdallahShami, and AbdelkaderOuda (2013)," *Resource Allocation in a Network-Based Cloud Computing Environment: Design Challenges*", IEEE Communications Magazine.

[12] Sourav Banerjee, MainakAdhikari, UtpalBiswas "Advanced Task Scheduling for Cloud Service Provider Using Genetic Algorithm" published in IOSR Journal of Engineering Volume 2, Issue 7, july 2012.

[13] Sung Ho Jang, Tae Young Kim "The Study of Genetic Algorithm-based Task Scheduling for Cloud Computing" published in International Journal of Control and Automation Vol. 5, No. 4, December, 2012.

[14] Liang Luo, Wenjun Wu "A Resource Scheduling Algorithm of Cloud Computing based on Energy Efficient Optimization Methods" published in IEEE2012.

[15] N. Xiong,W. Han, A. Vandenberg," *Green cloud computing schemes based on networks: a survey*",In The Institution of Engineering and Technology 2012, Vol. 6, Iss. 18, pp. 3294–3300.

[16] Bo Yang, XiaofeiXu, Feng Tan "An Utility-Based Job Scheduling Algorithm for Cloud Computing Considering Reliability Factor" published in International Conference on Cloud and Service Computing, 2011.

[17] KyongHoon Kim1, Anton Beloglazov2, and RajkumarBuyya" Power-Aware Provisioning of Virtual Machines for Real-Time Cloud Services" inCONCURRENCY AND COMPUTATION: PRACTICE AND EXPERIENCE *Concurrency Computat.: Pract. Exper*. 2011; 00:1–7 *Prepared using* cpeauth.cls*[Version: 2002/09/19 v2.02]*

[18] R. N. Calheiros, R. Ranjan, A. Beloglazov, C. A. F. D. Rose, and R. Buyya, CloudSim: a toolkit for modeling and simulation of cloud computing environments and evaluation of resource provisioning algorithms, Software: Practice and Experience, Wiley Press, New York, USA, 2010.

[19] Anton Beloglazov, RajkumarBuyya, "Energy Efficient Resource Management in Virtualized Cloud Data Centres," in *2010 10th IEEE/ACM International Conference on Cluster, Cloud and Grid Computing*, 2010, pp. 826-831.

[20] A. Berl, E. Gelenbe, M. di Girolamo, G. Giuliani, H. de Meer, M.-Q. Dang, and K. Pentikousis. Energy Efficient Cloud Computing. The Computer Journal,53(7), September2010

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