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Load Balancing Model using Elastic Technique in Cloud Computing

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Abstract: ***A structural design in which virtual machines are implicated and connect to the cloud service provider is called cloud computing. On the behalf of the users, the virtual machines connect to the cloud service provider. The uncertainties overload the virtual machines. The genetic algorithm is implemented for the migration of virtual machine in the earlier study. The genetic algorithm is low depicts latency within the network is high at the time of virtual machine migration. The genetic algorithm is implemented for virtual machine migration in this study. The proposed algorithm is applied in MATLAB in this work. The obtained results are compared with the results of earlier algorithm. Various parameters like latency, bandwidth consumption, and space utilization are used to analyze the achieved results.***

Keywords: MATLAB, virtual machine migration.

I. INTRODUCTION

The cloud computing can be described as an on-demand service pool which connects various servers to each other for providing services to aiming clients. The cloud providers may contain direct access to these services. Therefore, the resources can be used according to the requirement. The user can extract and modifies the data stored in the clouds. The different services to the user are provided on demand using a feature called "cloud service provider". This trait makes certain that the amount of services being utilized for any number of times can be employed for calculating the expense of the user to access that service. The cloud computing system provides extremely complicated applications in different environments. In addition, some skilled concentrated services are provided in each environment. In cloud computing, common group of resources is provided to the users. Using cloud computing, the users can utilize these resources according to their need everywhere. The main objective of this technology is to maintain the minimum cost to access the services. It is analyzed that the software and hardware assets obtained using internet remain present in the virtual system and supports to provide the services. The user accesses a common group of resources using cloud computing on the basis of demand. The virtualization allows user to subscribe and use the services for a certain time period by getting access of the common group of resources using cloud computing.

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The cloud computing reduces application cost reduced and allows the user to access more hardware parts [1].The information regarding physical place or the design of the system is not required in this technology. Some of the significant aspects of cloud computing are identified as the geographic allocation-based service orientation, homogeneity,

Fig. 1.1 Cloud Computing Environment

virtualization, current security and inexpensive software. In cloud computing, the user can use applications without installing. The user can also manage and get the access of the private files at any location just using internet. In cloud computing, the centralized storage aspect provides competent bandwidth, memory, computing and resource distribution. The Fig. 1.1 drawn below gives a general idea of cloud computing environment.

Some fundamental requirements of framework, hardware and software are needed for the designing of a cloud. Some fundamental steps followed during the designing of the cloud are described below:

- Grid Computing: The grid computing uses parallel computing to solve the big scale issues.
- Utility computing: The clients should be charged on the basis of the amount of services accessed and the time period for which these services are accessed. The utility computing includes resources utilized for these services.
- SAAS: The SaaS is identified as a part of service in cloud computing system. This system provides network-based subscription for the applications.
- Cloud Computing: The cloud computing system involves all services provided by the above-mentioned systems. This implies that the resources can be accessed by the user at any time from any place [2].

II. RESEARCH METHODOLOGY

For handling the problems related to node failure in cloud networks, an algorithm named BFO is used in this research. Several nodes are included in a proposed algorithm.

Depending upon the failure rate and minimal execution time, a participant node is chosen among all these nodes. In this scenario, the threshold value is fixed using the master node. There are two parameters included in this threshold value. The master node chooses nodes having equivalent or less failure rate with least execution time as the participant nodes. In comparison to threshold value, the value of node N1 is less. Thus, the selection of this node is carried out as a candidate or participant node. There is a less and a higher parameter included in node N2. Therefore, it is not possible to select this node as candidate node. A node N3 is elected as candidate node since it includes the value equivalent to threshold. It is not possible to choose another node N4 as participant node because its value is higher as compared to that of the threshold level. After it is selected, the candidate node starts its functioning. In this scenario, various tasks are initiated. One node switch to other location once the task is completed. Thus, task failure occurs as a result. For remove the issue of failure arising because of node mobility, a new methodology is proposed. In the new algorithmic approach, a novel parametric quality known as master node time is included. The ultimate time connecting the end clients is known as master node time which helps in performing node cooperation.

Code of proposed system

```
Begin
Input: Virtual machine
Output: Task migration
Define Number of Tasks as Tk
Threshold value of failure rate as FR
Threshold value of execution time as ER
Repeat while virtual machine is selected for the Task (Tk)
        If (FR of machine i> FR of machine i+1)
          If (ER of machine i> ER of machine i+1)
                    Select i+1 as best machine
           End if
                    End if
End of while
If (virtual i get overloaded=true)
          Calculate weight ()
                    If (weigh of i>weight of i+1)
                    Select machine i for migration
          Else
                    Select execute weight algorithm
          End if
```

III. EXPERIMENTAL RESULTS

This work uses MATLAB as a simulation tool for implementing the new algorithm since in real time scenarios, its complexity is high. Based on power usage and execution time, the comparison among the performance of proposed and existing algorithms is evaluated. Table 1 shows the simulation parameters used in this research.

Table 3.1: Simulation Parameters

Number of VM	10
Number of cloudlets	60
Host Memory	2 GB
Processor	Xenon
Number of Data centers	5

On which task will be migrated for the execution.

3.2 Comparison graph of Response Time

Fig. 3.2 depicts the response time-based comparison between improved GA and new enhanced improved GA so that the performance of both of these algorithms can be analysed. The new algorithm is superior as its response time is lesser to its counterpart.

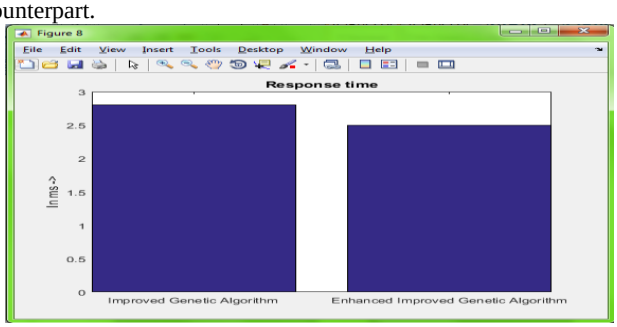

Fig.3.2 Comparison graph of Response Time

3.3 Comparison graph of Finish Time

Fig. 3.3 depicts the finish time-based comparison between improved GA and new enhanced improved GA so that the performance of both of these algorithms can be analyzed. The new algorithm is superior as its finish time is lesser to its counterpart.

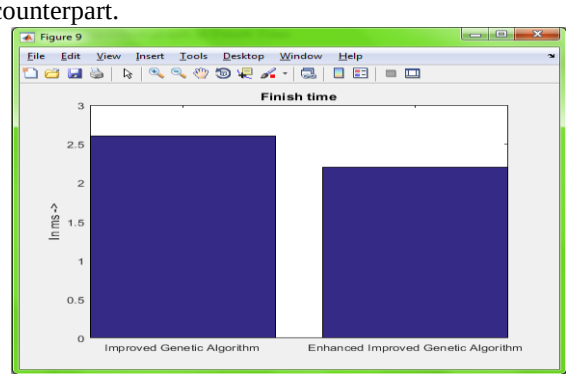

Fig.3.3 Comparison graph of Finish Time

3.4 Comparison graph of Energy Consumption

Fig. 3.4 compares improved GA and new enhanced improved GA on the basis of energy consumed by them. The new algorithm is superior as it consumes lesser energy than its counterpart.

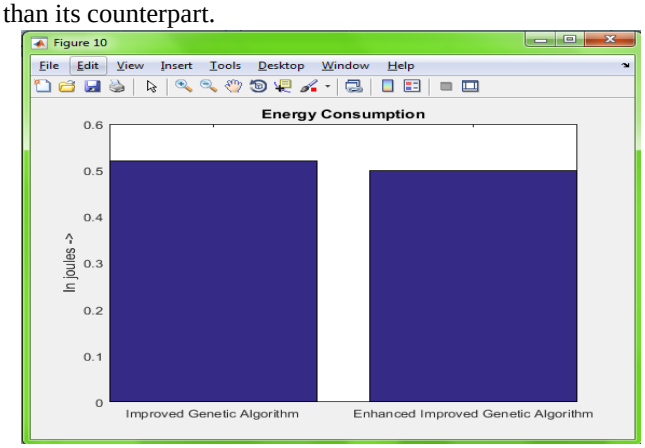

Fig.3.4 Comparison graph of Energy Consumption

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3.5 Comparison graph of Cost

Fig. 3.5 depicts the cost-based comparison between improved GA and new enhanced improved GA so that the performance of both of these algorithms can be analysed. The new algorithm is superior as its cost is lesser to its counterpart.

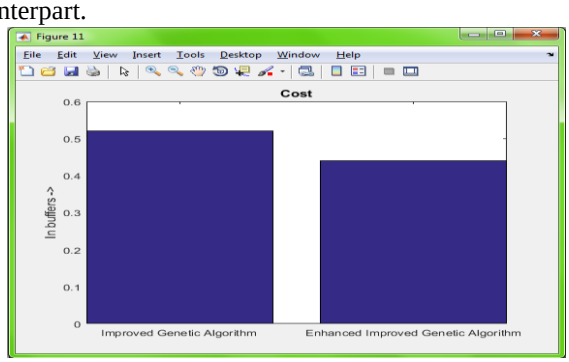

Fig.3.5 Comparison graph of Cost

3.6 Comparison graph of Number of Migrations

Fig. 3.6 compares improved GA and new enhanced improved GA on the basis of no. of migrations. The new algorithm is superior to its counterpart with lesser number of migrations.

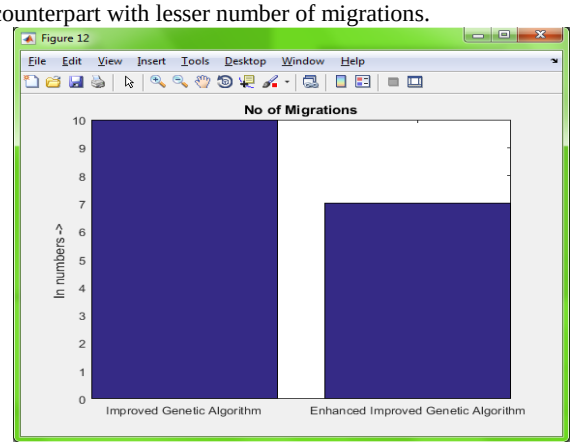

Fig.3.6 Comparison graph of Number of Migrations

3.7 Overall comparison

a) Qualitative Comparison of Improved GA and Presented Enhanced Improved GA –

Table 3.7 shows the qualitative comparison of improved GA and presented enhanced improved GA to measure the performance of both of these algorithms. The newly devised GA is fast, reliable, has less chances of fault in the network and is less complex for cloudlet assignment.

Table 3.7 Qualitative comparison of the algorithms

Parameters	Improved Genetic Algorithm	Proposed Enhanced Improved Genetic Algorithm
Cloud Assignment	Complex procedure for the cloudlet assignment.	Less complex procedure for the cloudlet assignment.
Strength	The algorithm is slow as compared to enhanced improved genetic algorithm.	The algorithm is fast for the virtual machine migration than the improved genetic algorithm.
Chances of fault	High chances of fault	Less chances of fault
Cost	Load Balancing is expensive	Load Balancing is cheaper

b) Quantitative Comparison of Improved GA and Proposed Enhanced Improved GA –

Table 3.8 depicts the improved genetic and proposed enhanced improved genetic algorithm comparison on the basis of some metrics including response time, finish time, energy consumption, cost and no of migrations. After analyzing the table, it appears that the presented algorithm outperforms the old algorithm in regard to all considered metrics.

Table 3.8 Quantitative comparison of the parameters

Parameter	Improved Genetic Algorithm	Proposed Enhanced Improved Genetic Algorithm
Response Time	2.8 seconds	2.5 seconds
Finish Time	2.9 seconds	2.2 seconds
Energy Consumption	0.57 joules	0.5 joules
Cost	0.56 buffers	0.45 buffers
No of migration	10	7

IV. CONCLUSION

There are two broader categories of load balancing algorithms known as dynamic and static. The decision related to load shifting is not based on the existing status of scheme in the static type of algorithms. Awareness related to the resources and applications of system are required here. It is possible to determine the efficiency of VMs once the task is assigned. Based on their functioning, the master node assigns tasks to other slave nodes. Therefore, the assigned work is processed by the slave processors and the master process delivers the achieved outcomes. To make decisions related to load balancing the current system status is used by dynamic algorithms. Thus, load shifting occurs as per the existing system status. For a faster implementation, the procedures are allowed to shift from an overused method to an underused method in an animated manner. This research resolves the load balancing issue being faced in the cloud architectures. In the systems, latency can be increased due to load balancing. For performing VM migration, the work carried out in the past has applied GA. It is seen through this research that the complexity of genetic algorithm is high. Thus, the time of virtual machine migration is increased. This research work aims to perform virtual machine migration by applying improved Genetic technique. MATLAB is employed for implementing the newly devised algorithm and several parametric values are calculated for analysing the efficiency of this algorithmic approach. The outcomes show that in comparison to existing algorithmic approach, the new algorithm is better.

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