

WORKING WITH THE DATA CENTER OF CLOUD TO ENHANCE PERFORMANCE

Dissertation submitted in fulfilment of the requirements for the Degree of

MASTER OF TECHNOLOGY In COMPUTER SCIENCE AND ENGINEERING

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Abstract

Cloud computing is widely known for its various field of services such as software application infrastructure and various other web based application distribute over the network its services are worldwide and it has contribution to process store manipulate the data cloud computing has been devoting its contribution across various field along with it working if we consider its backend part than to complete such huge demand fast and securely cloud needs to store its tons of data that is cloud data center where all the data has been stored and processed according to user demand to storing such amount of data large amount of energy required which in turn is the source of increasing operational, electrical and processing cost and minimizes the profit .On the other hand these data center is the wide source to produce the carbon footprint and co2 gas that is harmful for the environment to solve these problem we attempt to effectively distribute the energy across the various component of data center along with the principle go green and . Most of the company such as google IBM amazon uses cloud as most prior mode to provide the services to their customer's service delivered are fast efficient and remote that increase the overall productivity and hence lead to overall achieving the goal of profit by minimizing the cost and using less number of resources of organization.

DECLARATION STATEMENT

I hereby declare that the research work reported in the dissertation entitled "WORKING WITH DATA CENTER TO ENHANCE PERFORMANCE" in partial fulfilment of the requirement for the award of Degree for Master of Technology in Computer Science and Engineering at Lovely Professional University, Phagwara, Punjab is an authentic work carried out under supervision of my research supervisor Mr. Gagandeep Singh. I have not submitted this work elsewhere for any degree or diploma.

I understand that the work presented herewith is in direct compliance with Lovely Professional University's Policy on plagiarism, intellectual property rights, and highest standards of moral and ethical conduct. Therefore, to the best of my knowledge, the content of this dissertation represents authentic and honest research effort conducted, in its entirety, by me. I am fully responsible for the contents of my dissertation work.

Signature of Candidate

Name of the Candidate

R.No.....

SUPERVISOR'S CERTIFICATE

This is to certify that the work reported in the M.Tech Dissertation entitled **“WORKING WITH DATA CENTER TO ENHANCE PERFORMANCE”** submitted by **Aditi Joshi** at **Lovely Professional University, Phagwara, India** is a bonafide record of his / her original work carried out under my supervision. This work has not been submitted elsewhere for any other degree.

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Acknowledgement

Gratitude cannot be seen or expressed. It can only be felt in heart and is beyond description. Often, words are inadequate to serve as a model of expression of one's feeling, specially the sense of indebtedness and gratitude to all those who help us in our duty. It is of immense pleasure and profound privilege to express our gratitude and indebtedness along with sincere thanks to our mentor **Mr. Gagandeep Singh** for providing us the guidance to work for the capstone project on “**working with cloud data center to enhance performance**”. I want to formally acknowledge our sincere gratitude to all those who assisted and guided me in completing this project report.

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CHAPTER 1

INTRODUCTION.

1.1 Cloud Computing

Cloud computing is refer as services delivered over internet such services includes storage, processing, computation of data. Cloud computing has been playing tremendous role in order to reduce the cost of overall maintain and processing the data. The best thing about cloud computing is pay as you use scheme that means we have to pay according to our uses that saves the cost of organization or individual. Cloud provides huge amount of services over internet that is performing revolutionary changes in terms of saving cost of labor processing storage and resources of any organization. We are not bother about hardware resources to access any information it can be accessed anywhere that means no geographical limitations that limit the task of any organization [1]. Most of the company such as google IBM amazon uses cloud as most prior mode to provide the services to their customer's service delivered are fast efficient and remote that increase the overall productivity and hence lead to overall achieving the goal of profit by minimizing the cost and using less number of resources of organization .Cloud proposes following model as its services that are explained below:

1.1.1 Cloud Service Model

- **Infrastructure-as-a-Service (IaaS)**
- **Platform-as-a-Service (PaaS)**
- **Software-as-a-Service (SaaS)**

SaaS (Services as Model)

This model of cloud provide various computing and processing services via internet such services includes online software's online compilers and many other application for end users. Example mail CRM social media services.



Figure 1.1 SaaS service model

Platform-as-a-Service (PaaS)

This provides platform to build the application and modify it according to user requirements online compiler are types of such development interface. It provides all the specification and environment for development of programmer [2]. Example Google app Engine and amazon web



Figure 1.2 PaaS service model

Services also uses as platform environment so it is the solution for all programming platform management.

Infrastructure-as-a-Service (IaaS)

IaaS model provides many services that include networks, firewalls, virtual machines load balancers, storage and many other services that includes. Amazon Web Services is the major example of IaaS services that provides the online accessories to store and process the data that reduces the overall cost of device maintenance and purchasing to process the data provided.



Figure 1.3 IaaS service model

1.1.2 Cloud Deployment Model

Cloud deployment models contains public private and hybrid provides these it services within one or more organization depends upon type and requirements.

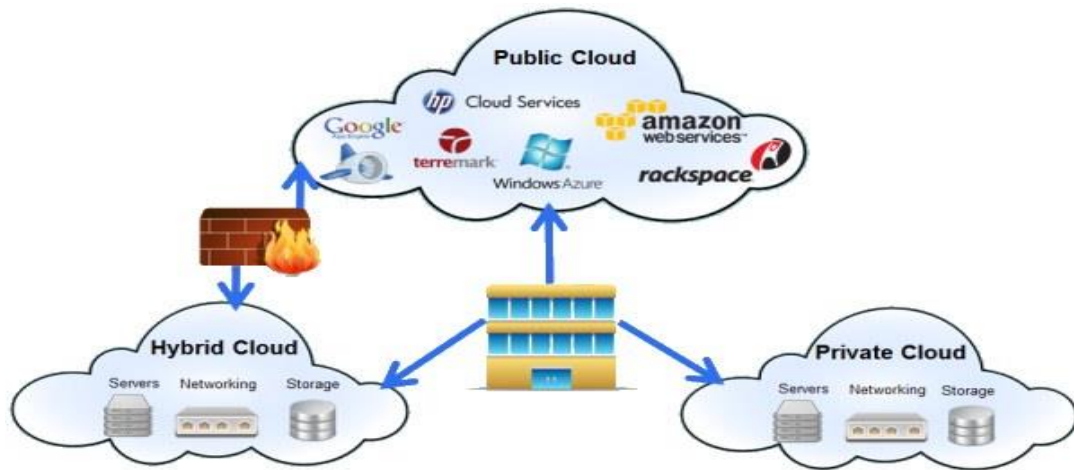


Figure 1.4 Cloud Deployment model

Private Cloud

Provides services within one organization hence more secure to store and process the data. VMware and open stack are example of such cloud services.

Public Cloud

This cloud resources provided by any of other organization that is third party means other than same organization its example are Microsoft azure ,google App engine Amazon web services [3].

Hybrid Cloud

It is the combination of services provided by both public as well as private cloud. Community cloud has a feature to share its resources across multiple organization.

1.1.3 Cloud Characteristics

- **Open-Source Software**

Services provided by cloud in the form of open source software Linux is the example of such open source operating system.

- **Pay-As-You-Grow**

You have to pay according to your uses no extra charges imparted on the uses this reduces overall cost for any organization.

- **Ubiquitous**

No geographical limitations for cloud and its service to reach over the end users it could be accessed from anywhere through any devices.

- **Elasticity**

It is the ability of cloud to increase its services according to requirements horizontal and vertical scaling are two types for such scaling processes.

- **Virtualization**

Instead of increasing number of machine or server this terms let you to increase the capacity and performance of single machine to enhance the performance and reduce the cost for maintain number of machines.

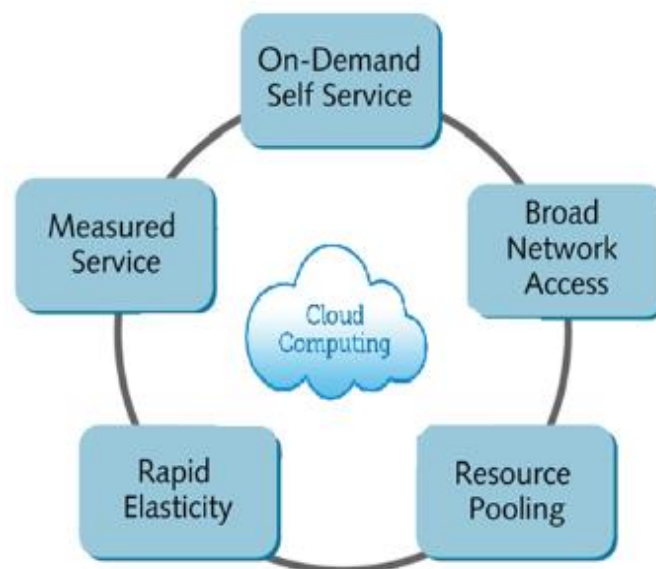


Figure 1.5 Characteristics of cloud

1.1.4 Examples Of cloud

Some common example of cloud computing includes that relates to our life that are in frequent use are following:

- **Dropbox**

That not only store your files but also update it by the method of synchronization means you can access you files anywhere and anytime.

- **Amazon Cloud Drive**

That store basically the music files that you buy from amazon it maintains the playlist of all your selected music files it also stores the image files that you store in your physical machine it stores the book that you purchase from kindely.

- **Apple iCloud**

It synchronizes the necessary information like contacts date and times calendar store in any of your operating system like windows android iOS it maintains the backup of these data and store and process it_

- **YouTube**

Allows you to watch online videos download it and upload it any time can be assessed anywhere through devices

- **Picasa**

let you edit your photo with availability of variety of feature included with it also store your saved photo that will be directly saved to cloud and can be accessed by any time with end user from any devices also it makes you safe to loss your favorites memory because it maintains the backup too.

- **Google Drive Google**

It provides plenty of services in terms of cloud computing such example includes Gmail google map YouTube and many other software to use online .drive plays very important role in order to store process the data it stores the data provided by the end users and also provide the feature to edit and maintain the data such as google sheets google slide google docs[4].



Figure 1.6 Example of Cloud

1.1.5 Green cloud computing

Cloud plays tremendous role while reducing the cost and increasing the accessing speed and remote ability and minimizing the cost to store the data on physical machine and it also provide the backup of the data as the result overall cost is reduce but the impact on environment is hazardous by emission of co2 gas[5].It includes the new capabilities of strategies that uses minimal number of resources and uses the substitutional method to achieve the goal of maximum efficiency and minimum cost by using the methodology such as:

- Using the concept of recyclable and reusable component in place of using new one.
- Achieve the goal of using natural energy to reduce cost such as solar and wind also other natural resources.

- The prime goal is to minimize the level of carbon footprints and c02 emission by reducing the e waste.
- Minimizes the resources needed to cool process and store the huge data store in cloud by using environmental friendly resources



Figure 1.7 Green cloud practices

1.2 Bio-Inspired Techniques

There are studies that relate the areas such as connectionism, social behavior as well as emergence, which can be used for research purposes. Biologically inspired computing is one such field. It is very similar to machine learning and thus can be related in that manner to the artificial intelligence. The areas of biology, computer science as well as mathematics are however, very much involved in these techniques. The natural computation methods are a broader view for the biologically inspired computing techniques [6]. It has different definitions according to various viewpoints. Used to study biology from different perspectives. Various genetic algorithms as well as evolutionary algorithms are proposed in today's research for studying the IT oriented paradigm of cell computation or information processing. Basically, bio-computing is a very powerful as well as potential tool.

Evolutionary computation and algorithms have been proposed along with the mathematical optimizers for validating the theories of biological evolutions and natural inspirations. These techniques are on small level not very efficient and cannot

work on larger projects. However, a proper study on them can help in developing them in a manner to handle such large technologies along with their theories [7]. The prominent genotype-phenotype idea of the evolutionary algorithm is missing which is a huge disadvantage.

1.2.1 Neural Network

The different processing units are combined together to work and adopt the behavior of the environments and learn the adaptive technologies the learn the behavior from the environment's and then provide the output the output provided by them is feeded back to the system to improve the performance the learn to behave from outside the system the neurons flow to the system and the process into multiple piece of units [8].

1.2.2 Genetic Algorithm

The initial population is generated and replicated and the population having the best fit characteristics is adapted as feeding for further input the process will carry on so far that the first initial population has been generated then the replication of the population has been produced then they will be evaluated based on the character there are having such as ability to survive recovery and various other parameters and the population that best suits the requirements has been selected best fit function is used to full fill the requirements the concepts is similar to the concept of chromosomes [9] the way chromosome replicate and decide their best fit shows the behavior of genetic algorithm this is bio specific algorithm to show the organization around.

1.2.3 Ant Colony Optimization

This algorithm is based on np problem like travelling salesmen problem which find the best path by travelling the shortest distance. The idea behind the algorithm is indicate that the behavior of ant to travel on shortest path by following the path founded by the ant in colony rest of the ant will follow the same path the substance known as pheromone is generated by the ant [7] if they get the shortest path to find their food. In our approach we started with storing the unique identification of each virtual machine and host the host task has to be executed on the virtual machine. The performance of each virtual machine has been stored in the the variable is stored in the variable the performance parameter includes execution time and failure rate of

each of the machine the efficiency of the machine has been decided by these parameters only.

CHAPTER 2

REVIEW OF LITERATURE

Sawathi. R, Manasa.V CIT (1998) et al.

This paper reflect the cloud center co2 emission problem taking example of real time scenario of Australia data center that is taking too much cost to maintain its data center and become a huge source for co2 emission.so the paper main part of interest is to reduce the energy consumption of data center of cloud and also provide a competitive environment to cloud resources so that they can work effectively and affect the environment at very low level it is also refers to increase the performance and availability of resources. The researcher validated its proposal and discussion by using the tool [10] CloudSim and demonstrate the idea to reduce cost. The another of this paper has objective to effectively distribute the energy to the end user and simulate the scenario by taking the example of cloud architecture framework on cloudsims simulator in which three layer is there first in which user is reside second in which green allocator is there third in which vm reside on the physical machine is there energy is loaded on each vm according to the request conducted by the user and has been allocated on the basis on modified bin algorithm.

Lianjie Zhou, Nengcheng Chen, Chenjie Xing (2011) et al.

In this paper the writer has proposed the vision of iot (internet of things) with the combination of cloud computing by focusing on cloud centric model frame work combined by public and private cloud in the field of cloud computing dedicated its contribution to storage processing and manipulating the data and the integration of sensing nodes with cloud server will sense the data from the user side the senses that will be father moved to cloud server in the form of instruction to be processed and completed and goes to allocated server the processes and corresponding computation will be takes place on the corresponding server and the result will be sent to the end user in the form of output [19]. These days iot has get collaboration with the cloud computing in order to process and integrate the data. In this paper a scaled version of

cloud has been used to provide its various field of services to the cloud computing with the integration of various sensing nodes.

Baskar Prasad, Enumi Choi (1998) et al.

In this topic of research has been conducted on the topic of improving the energy efficiency and the method to do is green scheduling algorithm to provide the method to maintain the distribution of energy level in each nodes .This algorithm has been combined with neural network based predicator to tell which node has to be on or which node has to be off to reduce the number of running machine and their loads. The simulation has been taken on two traces the pp20 mode is able to save 46.3% of consumption rate and the other loaded traces show 46.7% of consumption rate [4]. The paper has presented the future demand on the basis of historical demand and focus on the problem energy consume by data center it tries to highlight the server nodes which are not frequently used by the server by providing the green scheduling algorithm different mode of server has been take as the input data to perform evaluate and implement the performance of server.

Sachin .D Khirade, A.B Patil (2011) et al.

The cloud provide its various capabilities in order to provide various set of it services such services provide infrastructure software application and platform to develop such services communicate data on various field in the form of private public and hybrid cloud such service are the package of solution of all the problem of any end user [14] or an organization such services are fast to deliver as well as secure to be exchanged by many secure algorithm such as RSA DES the services are spread to various filed such as using in the business in the form of public and private cloud to communicate [11] and process the data on the basis of pay as you go model in the field of education to provide various software and application such as uml modelling software google docs google sheets drop box to store and access the data and may more in the field of medical, online entertainment marketing and promotional company, online storage media also in development filed and to forecast weather and various other research related work through is ubiquties services all across the area.

Deepak J. Dange (2015) et al.

The paper has presented the reallocation energy algorithm and vm migration and server consolidation concept in order to minimize the energy consumption rate of cloud iaas data center. The approach has used cloud power model with optimized reallocation algorithm and vm migration terms. The Search has been used in concept of heuristic migration that reflect that old server are less efficient than that of new one the old server or machine consume more energy and provide less processing terms whereas the new server takes less energy consumption instead provide [16] the high rate of output so we need to shift the higher work load to the new server and turn off to the old server as much as possible. The algorithm can enhance the performance even if the large number of old server has been working in the data center and loaded by the heavy weight of working and the new one is light weight loaded. The consolidation and efficient migration of vm lead to energy efficient resource re allocation of the resources.

Marveen B, Viswesh M (2010) et al.

The paper has proposed the dynamic energy management technique in both hardware as well as software level as the data center required large amount of operational and processing energy in the form of maintenance and execution investigator approach is related to dynamic provision of energy in term of vm placement vm migration and hardware and software level. Hardware level management consist of network storage and processor level management of energy and the other software level vm placement and vm migration so this paer has become the solution for efficient allocation of energy to various level to provision the services of cloud and distribute it effectively [20].

Haohao Zhou (2011) et.al

The paper presented the energy consumption by the model of software as service, processing as services ,storage as services and all future model expected from come from these provided the comprehensive energy consumption level of transporting the file over the network energy to store the data to server. Cloud has to provide large verity of service over the internet accordingly provision its resources for computation.

It is observed that public cloud is more energy consuming than that of private cloud because public cloud has large number of end user connected to it. The analysis of energy is based upon processing to storing and transportation cost also calculated while the time of delivering it to the user the transportation cost is depends upon the number of file downloaded per hour. The exploration like network equipment replaced such that energy consumption level will be maintained to a very low level cost as much as possible [21]. The model of network that is connecting to the user and cloud data center has been taking as the simulation of the research method that simulate the energy flow all over the environment

Huangke Chen, et.al

This Paper presented the various challenge that is coming in the performance of cloud services as cloud is providing the various. Such as internet is the main mode to deliver cloud services the question upon what will be the performance and method delivering various set of services without internet connection also various set of important and credential information is processed in cloud such as banking transaction such information enquired integrity authentication and secure method to exchange all over the internet. data challenge are in various field like cloud data management vm, migration encryption method of data, SLA, interoperability energy resource management, multi tenancy, reliability of specific services and their assessment managing the cloud platform and specify [18] the standard protocol of computing method also the number and the way to perform server consolidation and virtualization to enhance the capabilities and how to maintain the standard format of services.

Doulamis ND, et.al

Approach discussed here is focused on on maintain the reliability and energy efficiency of highly complex and structure cloud framework. The paper has discussed the research gap underlying in between the reliability and energy efficiency of cloud environment. Reliability is the term that is reflecting the need of cloud services continuous providing its services to the end user without encountering the failure or crashes in by provision the energy and enhancement of cloud availability [12].The point of discussion further explored by the point continuous combination of reliability

needs with already provided energy effectiveness but the gap between these two leads the inefficient way of delivering the services by the cloud without considering the end user requirements. Applicable as well as an efficient and optimized solution has been developed for effective energy provisioning.

Young Choon Lee, et.al

Paper discussed that how cloud has been affecting the environment due to it uses various resources and due to its complex data storage energy consumption investigator has entitled some of the alternative solution to replace with the component that is degrading the environmental condition the sustainability of cloud should be executed with maintain the minimum level of environmental affect the energy resource has been replaced by natural resources like solar and wind solar energy not only decrease the overall cost but lead the better execution of machine also we need to store and convert the energy to many other forms the wind energy will be used to cooling purpose to the n number of machine present in the data center for execution of performance of such server such element should be uses that are able to recycle also some organization has isolate their data center to dessert to affecting the environment at minimum level also they are using the hydroelectricity [20] that has approximately 50% reduces the energy consumption rate from the previous rate that was recorded also such source of energy has minimum adverse effect on the enviornment.PUE is the standard ratio the is uses to calculate the energy overhead such as maintenance or cooling to the actual energy given to the machine to power up in practice such ratio has become 0.7 is to 0.3 in a unit of energy distribution to server that means 70% energy has wasted as overhead[30]. The solution of author provide a sustainable procedure to make balance of such energy and impact environment at the ease level.

Kanwarpreet Kaur (2015) et al.

The another of this paper has objective to effectively distribute the energy to the end user and simulate the scenario by taking the example of cloud architecture framework on cloudsim simulator in which three layer is there first in which user is reside second

in which green allocator is there third in which vm reside on the physical machine is there energy is loaded on each vm according to the request conducted by the user and has been allocated on the basis on modified bin algorithm [6].

Medhat Tawfeek, Ashraf El-Sisi (2009) et al.

Cloud plays tremendous role while reducing the cost and increasing the accessing speed and remote ability and minimizing the cost to store the data on physical machine and it also provide the backup of the data as the result overall cost is reduce but the impact on environment is hazardous by emission of co2 gas includes the new capabilities of strategies that uses minimal number of resources and uses the substitutional method to archive the goal of maximum efficiency [13].

Fawzy Torkey (2011) et al.

Evolutionary computation and algorithms have been proposed along with the mathematical optimizers for validating the theories of biological evolutions and natural inspirations. These techniques are on small level not very efficient and cannot work on larger projects. However, a proper study on them can help in developing them in a manner to handle such large technologies along with their theories [14] The prominent genotype-phenotype idea of the evolutionary algorithm is missing which is a huge disadvantage.

Giuseppe Portaluri (2015) et al.

In this paper another task allocator is displayed for Cloud Data Center (DC). The implementation depends on two distinct heuristics multi-objective Genetic Algorithm that allocator reduces in the meantime both task completion time and server and switches power consumption, avoiding network link congestion. The evaluation results demonstrate [15] that the developed approach can perform the static allocation of countless tasks on homogeneous single-center servers with a quadratic time complexity for MOGA and a linear time complexity for SA. In this paper a task allocator is introduced for DC in light of MOGA and SA. The dealt problem is a variant of the multi-objective constrained bin packing which is np-Hard. The proposed allocator finds solutions minimizing makespan and power consumption of the server and switches. Future work will concentrate on model adjustment to manage

dynamic task allocation, live migration, interior communications (East-West traffic), electricity cost.

Dan Wang (2015) et al.

It is concluded that cloud computing is the architecture in which virtual machine, cloud servers and hosts are involved in the communication. The technique in this work has been proposed for the virtual machine migration. The proposed technique is based on the weight based algorithm in which weight of each virtual machine is calculated on the basis of fault detection rate and execution time. The simulation is performed in cloudsim and it is analyzed that the proposed technique performs well in terms of execution time [16]. The future improvement in the scope can be introduced by migrating the task of mobile user across various hosts by matching the best suitable algorithm that calculates the previous execution.

Guangyu Zhao (2016) et al.

Cloud should be executed with maintain the minimum level of environmental affect. The energy resource has been replaced by natural resources like solar and wind. Solar energy not only decreases the overall cost but leads to the better execution of machines. Also, we need to store and convert the energy to many other forms. The wind energy will be used for cooling purposes. The number of machines present in the data center for execution of performance of such servers. Such elements should be used that are able to recycle.

Shengjun Xue (2015) et al.

The natural computation methods are a broader view for the biologically inspired computing techniques. It has different definitions according to various viewpoints. Used to study biology from different perspectives. Various genetic algorithms as well as evolutionary algorithms are proposed in today's research for studying the IT oriented paradigm of [27] cell computation or information processing. Basically, bio-computing is a very powerful as well as potential tool.

Mengying Li, Xiaolong Xu (2014) et al.

Studying the IT oriented paradigm of cell computation or information processing. Basically, bio-computing is a very powerful as well as potential tool. Evolutionary computation and algorithms have been proposed along with the mathematical optimizers for validating the theories of biological evolutions and natural inspirations. These techniques are on small level not very efficient and cannot work on larger projects. However, a proper study on them can help in developing them in a manner to handle such large technologies along with their theories.

Arabi Keshk and Fawzy Torkey (2010) et al.

the standard protocol of computing method also the number and the way to perform server consolidation and virtualization to enhance the capabilities and how to maintain the standard format of services DES the services are spread to various filed such as using in the business in the form of public and private cloud [16] to communicate and process the data on the basis of pay as you go model in the field of education to provide various software and application such as uml modelling software google docs google sheets drop box to store and access the data and may more in the field of medical, online entertainment marketing and promotional company, online storage media also in development filed and to forecast weather and various other research related work through is ubiquities services all across the area.

Rajkumar Buyya, Srikumar Venugop (2015) et al.

It is the best practice done by cloud to make it energy efficient in terms of decrease the cost of total energy consumption virtualization of resources means a single server or machine can run multiple operating system at same time with effectively delivering the services to the end users if the no of machine is decreases since we are using a single server that is handling the work of many physical machines the cost of maintain such equipment and needed electricity for them also tends to decrease this leads the effective practice of energy saving and fast delivery of resources to be computed since the no of machine decreases in number so emission of carbon also reduce and leads to a green practice of cloud [30]. The concept of consolidation of server increase the energy utilization pattern and performance enhancement of physical machine and

hence reduces the carbon footprint and its degraded effect from the environment the term consolidation means less no of machine hence it reduces the cost of maintain such machine also to cool it and space required to put such machine hence deduction is introduced in overall cost consumption and beneficent to environment by reducing toxic elements by machines.

Hlvona Brandic (2015) et al.

the effective management of energy paradigm reduces the energy consumption typical data centers of cloud used the traditional method to gain energy like fossil and coal these resources of energy are very expensive as well produces the carbon footprint in environment that degrade the environment too also [20] resources of energy are limited in stock they are not recyclable at all these are the reason that these resources are expensive in the nature in this proposal of our research we have explored many area that can replace these expensive method of gaining energy with cost friendly and eco-friendly these sources can be understood as natural resources like solar and wind that are the major element that reduces the overall cost.

Mengying (2015) et al.

Server performance totally depends upon it memory configuration and management to increase the memory we have two ways either increase the number of machine or increase or improve the existing when the term server consolidation is the term in which instance of multiple server contained in one single server this concept directly leads to decrease in cost not only [17] the cost to buying such machine decrease but in additional to cost for maintain such server in terms of cooling maintenance and hence the profit margin is increases also the effort labor time any many other resources also saves so it is best practices to implement in terms cost effectiveness and overall all enhancement of profit by reducing cost by many method such as memory configuration server consolidation server virtualization replacing of traditional resources with the means of cost effective methods.

Munir E., Anwar W (2012) et al.

Elasticity and scalability of cloud is the main reason for its fastest delivery to end user if the resource allocation has been done to each server properly user can access to

information or computing services from anytime and anywhere the delivery of information also depends upon the bandwidth and internet connection by which user will be connected to access the services a prioritization of traffic and request handling should be pre maintained in each server what is the way that each request by the user is going to be handled by each server or what is the rate of demanding request is coming from user side a backup to provide huge amount of services is maintained either adding more machines or increasing the capacity of existing one if the rate at which user is trying to access such information is increased such server complete the request on time and handle the traffic congestion if coming with the large rate [18]. The main reason of user to prefer cloud as services because of its fastest delivery.

John Wiley and Sons, Hoboken, USA (2007) et al.

Performance can be enhanced by increasing the number of server in data center but make it efficient means we constraint the resource such as machine time cost labor is the big challenge for cloud computing our exploration of topic based upon such research only how to make distribution of services such as delivery of infrastructure software applications and many more easy over the internet the distribution algorithm of energy distribution let us know how to be provide the effective solution bounded by constraint data center are huge in amount millions of people access data from there and handling and processing such huge amount of data is not so easy to handle our research explore [16] the area of effectively explore and process such data motivation explored by the saving energy in many terms such as replacing the hardware that are less frequently use and also explore many other term which helps to distribute the energy all over.

P. Barham, B. Dragovic (2015) et al.

Cloud computing is widely known for its various field of services such as software ,application infrastructure and various other web based application distribute over the network its services are worldwide and it has contribution to process store manipulate the data cloud computing has been devoting its contribution across various field along with it working if we consider its backend part than to complete such huge demand fast and securely cloud needs to store its tons of data that is cloud data center where all the data has been stored and processed according to user demand to storing such

amount of data large amount of energy required which in turn is the source of increasing operational ,electrical and processing cost and minimizes the profit [36]. On the other hand these data center is the wide source to produce the carbon footprint and co2 gas that is harmful for the environment to solve these problem we attempt to effectively distribute the energy across the various component of data center along with the principle go green where we are trying to replace many of our traditional equipment with recyclable and eco-friendly and free from harmful toxic emission also we applied the concept of renewable energy in order to power up our data center such source of energy are solar, wind and hydro.

Zhu K., Song H. Liu L (2012) et al.

It is the best practice done by cloud to make it energy efficient in terms of decrease the cost of total energy consumption virtualization of resources means a single server or machine can run multiple operating system at same time with effectively delivering the services to the [32] end users if the no of machine is decreases since we are using a single server that is handling the work of many physical machines the cost of maintain such equipment and needed electricity for them also tends to decrease this leads the effective practice of energy saving and fast delivery of resources to be computed since the no of machine decreases in number so emission of carbon also reduce and leads to a green practice of cloud. If the server has information that is required by many other organization than such resource of information can be shared by these organization a term known multitenancy also multi-tenant for same resources and hence cost efficient because the money and resource us saving by not to maintain different server that contains the same information hence no cooling requirement no maintenance formulation saving of effort money and many other resource.

Arabi Keshk and Fawzy Torkey (2014) et al.

Elasticity and scalability of cloud is the main reason for its fastest delivery to end user if the resource allocation has been done to each server properly user can access to information or computing services from anytime and anywhere the deliver of information also depends upon the bandwidth and internet connection by which user will be connected to access the services a prioritization of traffic and request handling should be pre maintained in each server [12] what is the way that each request by the

user is going to be handled by each server or what is the rate of demanding request is coming from user side a backup to provide huge amount of services is maintained either adding more machines or increasing the capacity of existing one if they rate at which user is trying to access such information is increased such server complete the request on time and handle the traffic congestion if coming with the large rate. The main reason of user to prefer cloud as services because of its fastest delivery.

Jemal Abawajy (2010) et al.

These are issue point concern with data center of cloud we will consider the two approaches and try to providing the solution for this problem first consideration we are taking as concept of green cloud computing it is the term of processing, storing and executing the data in such a way that uses the minimum number of resources Google has made it data center to desert in order to use natural energy resources such as hydroelectricity and minimizing the impact on environment if we sum up over point than we have reached the conclusion that such billion amount of data on data center needs to be processed and needs processing elements such as electricity, hardware ,cooling maintenance secondly the effect of these elements on environment is also adverse we need to maintain the government policies by achieving [29].the goal of emitting minimum quantity of carbon footprint and also reducing the number of toxic element and degrading element that harm the environment.

Zhelsls & johan (2016) et al.

The power usage effectiveness(PUE) is the standard ratio that calculates that what is the energy deviation from the energy that goes to side steps such as cooling maintain phase to the energy that provide actually running the machine to perform the task with the standard of such ratio we calculate the deviation recorded [19].The high value of pue reflect the insignificant energy distribution and effectiveness and if the value of pue is low it reflect the appropriateness of system towards energy distribution as most of its energy is goes to running the server instead of maintain for maintain the system we suggest to use natural power resources like wind ,solar and hydro. Virtualization and observe the effect based on various set of data. We will try to integrate on more approach that can make energy efficient system that as migration of vm we will

migrate the vm to most loaded host or the most of the load will be transferred to new server.

Putnam & Makson (2016) et al.

The overall performance of server is increased by providing it proper way of maintenance such as cooling method resource allocation to each instance of server its memory configuration and monetization of running environment [13]. We need to understand the task and process distribution technique for each server make the prioritized task list to allocate the such task to corresponding server and accordingly configure and maintain the memory level for each of the server existing to make the work simple and easy or enhance the performance a pattern for energy distribution should be maintained we can enhance the utilization of server machine according to its demand to deliver services the vertical scaling is the method to increase the capacity of such server in which we increase the capacity of such server by either increasing the ram or correspond process related elements. The method of working approaches of each server in data Centre is design such that the will produce the minimum number of toxic element that can degrade the environments. The working condition of each of these server is design in implementation of keeping the view of go green concept .When we search something from google say typing cloud for example it will lead the emission of carbon and co2 gas each and every step should by maintain the sustainability with environmental and eco condition our procedure to maintain the each server are following the rule that will take the consideration of environment the approach to sustain the element such element that is able to recycle and do not produce the harmful gases has been used to our term of implication. Google data center for cloud is the best example that validate our approach that minimizes the 50 percent of harmful gas emission by cooling method of wind energy.

Sandep Vishwanatham (2014) et al.

Processing, storing and executing the data in such a way that uses the minimum number of resources and does not degrade the environment and enhance the profit. The concept of green cloud computing tell us to use alternative to minimizes the cost such as use of renewable energy such as sola ,hydroelectricity and wind energy solar energy can be used to provide the electricity whereas w wind energy can be uses to

cooling the data center[20].The PUE is the standard ratio to measure the usage of energy i.e. overhead energy to actual energy to power up the machine such overhead energy can be considered as energy to cooling an maintain the data as the percentage in overhead energy increases efficiency in overall all energy distribution decreases a study shows that in a unit 0.7 of energy goes to overhead such as cooling and maintain.[20]The second concept is to provide the proper resource allocation and utilization pattern of energy distribution and effectiveness by applying energy efficient distribution algorithms to each machine particular architecture of cloud frame work and simulate how to allocate each host to each Vm in order to better performance and energy efficient algorithm to allocate host to vm we are considering bin algorithm and do some modification to improve the efficiency of related utilization pattern. The tool that has been used to simulate the observation pattern is cloudsim and green cloud simulator

Wahid Hussain (2016) et al.

Resource allocation is most testing task in cloud computing where the service providers looks to locate an effective and efficient resource allocation that takes care of all demands of users and in addition sustain the quality of service. This paper has proposed an agent based architecture for resource allocation in dynamic environment by characterizing the roles at every level [33]. Proposed architecture has the various strategies identified with resource allocation such reliability, performance, scalability and in addition security related issues in distributed environment. This paper additionally depicts the various proposed architecture by researcher and their limitations. Proposed architecture beat the all constraint already proposed by researchers. Proposed architecture comprise consumer agent, broker agent, service providers, expert agent, monitoring agents and network administrator. Monitoring agents additionally comprise of RHA, AA, RAA, EBA, CAA and GLAA agents. Role of every agent is briefly explained in system architecture. In the proposed system reliability, proficiency, content analysis, scalability has additionally been thought about. The network administrator gets alerts by fluctuating the conduct of every agent on dashboard. The architecture likewise concentrates all problems in resource management as compared to other researcher's architecture for resource allocation.

3.1 Problem Formulation

The rapid growth of cloud architecture, it is required to increase scalability and reliability of the cloud architecture. To maintain Quality of Service in the network the data centers need to be increased as per host requirement. When the number of data centers increase, energy consumption of the network will be increased at the steady rate. This ensures quality of service at satisfactory level. In the recent times, various techniques have been proposed which maintain QoS and reduce energy consumption with the increase of number of data centers in the cloud architecture. When the number of hosts increases in the network, there are chances of overloading due to which QoS may be compromised. In the base paper, fuzzy logic technique is been proposed which detects overloaded host and migrates the tasks to the less loaded host. The task migration strategy depends upon the mean, median and standard deviation of the virtual machine resource utilization. The fuzzy logic technique handles the uncertainty on the basis of decision making greedy technique. The uncertainty is calculated on the basis of resource consumption, migration time and CPU utilization. In this work, no parameter is been considered which calculates number of check points are stored on the previous machine and number of bytes required for the task migration which affects energy consumption of the data center.

3.2 Objectives of the Study

- a. To study and analyze various energy efficient QoS techniques for cloud architecture.
- b. To propose improvement in fuzzy logic technique for task allocation in cloud computing.
- c. The proposed improvement is based on bio-inspired greedy algorithm for task migration.

d. To implement proposed technique and compare with existing algorithm in terms of energy consumption, resources used and execution time.

3.3 Research Methodology

The various techniques have been proposed in the recent times to reduce energy consumption of the data centers which also maintain QoS in cloud architecture. The QoS can be maintained by migrating the task from one virtual machine to another in case of host overloaded. The fuzzy logic technique calculates the mean, median and standard deviation of the virtual machine utilization, and assign task on the basis of greedy technique. In this work, new parameters of check points and number of bytes transmitted will be considered for the calculation of best virtual machine for the task migration.

Ant Colony Optimization

This algorithm is based on np problem like travelling salesmen problem which find the best path by travelling the shortest distance. The idea behind the algorithm is indicate that the behavior of ant to travel on shortest path by following the path founded by the ant in colony rest of the ant will follow the same path the substance known as pheromone is generated by the ant if they get the shortest path to find their food. In our approach we started with storing the unique identification of each virtual machine and host the host task has to be executed on the virtual machine. The performance of each virtual machine has been stored in the the variable is stored in the variable the performance parameter includes execution time and failure rate of each of the machine the efficiency of the machine has been decided by these parameters only. The transition matrix has been defined which migrate the task on the most suitable machine the pheromone store the history of machine the pheromone has been updated by comparing it with the previous results.

Algorithm

Input: Host, Virtual Machines, Virtual Servers

Output: Migration Decision

1. For each $V_m \in \text{host } V_m\text{list}$ do

In the first line of the code the for loop is executed which will access the identification of each virtual machine and the hosts whose task need to be executed on the virtual machine. The belongs means that these tasks are executed on this virtual machine

2. V_m is migrated \leftarrow False

In the second line of the code the condition get checked that weather any virtual machine is migrated or not. If the virtual machine get migrated then the condition get true

3. $V_m.\text{utilHistory} \leftarrow \text{get } V_m\text{utilization}$

The history of each virtual machine get stored and it means the resource utilization, the execution time and failure rate is stored in the variable $V_m.\text{utilHistory}$

4. $T \leftarrow \text{built Transitionmatrix}$

In this step the transaction matrix is define which can store the machines which need to be migrated for the efficient task execution

5. while Machine Migrated() do// The while loop is executed until the machines are get which need to be migrated and these machines which need to be migrated construct the transaction matrix

- Initiate pheromone T_{ij} do ///The initial population is define which the history of the machine which is stored in the $V_m.\text{utilHistory}$
- Repeat for all ants i ; Construct Transition Matrix(i) // The transactions matrix start constructing that at each iteration to search best virtual machine for the task migration

- For all ant i : global pheromone updates (i) // The best virtual machine is calculating by comparing the current iteration with the previous iteration
- $T_{(i-j)+1} = (1 - p)T_{(i-j)}$ /// the formula is define in which comparison of current and last iteration is compared. In this formulation the T is the transaction value, I, j are the machine numbers. The p is the efficiency of machine in the last iteration.
- While not yet a Transition matrix ()
- $\frac{T_{(pk-j)}}{\sum_{pi-j} x_{pi-j}}$ /// The best value is calculated which return the machine on which task need to migrated
End while
 - End for
- $is_migrated \leftarrow host.is_Migrated(w,i)$ /// Return the machine on which task need to be migrated on assigned machine
Return isMigrated // Return the complete list of the machine

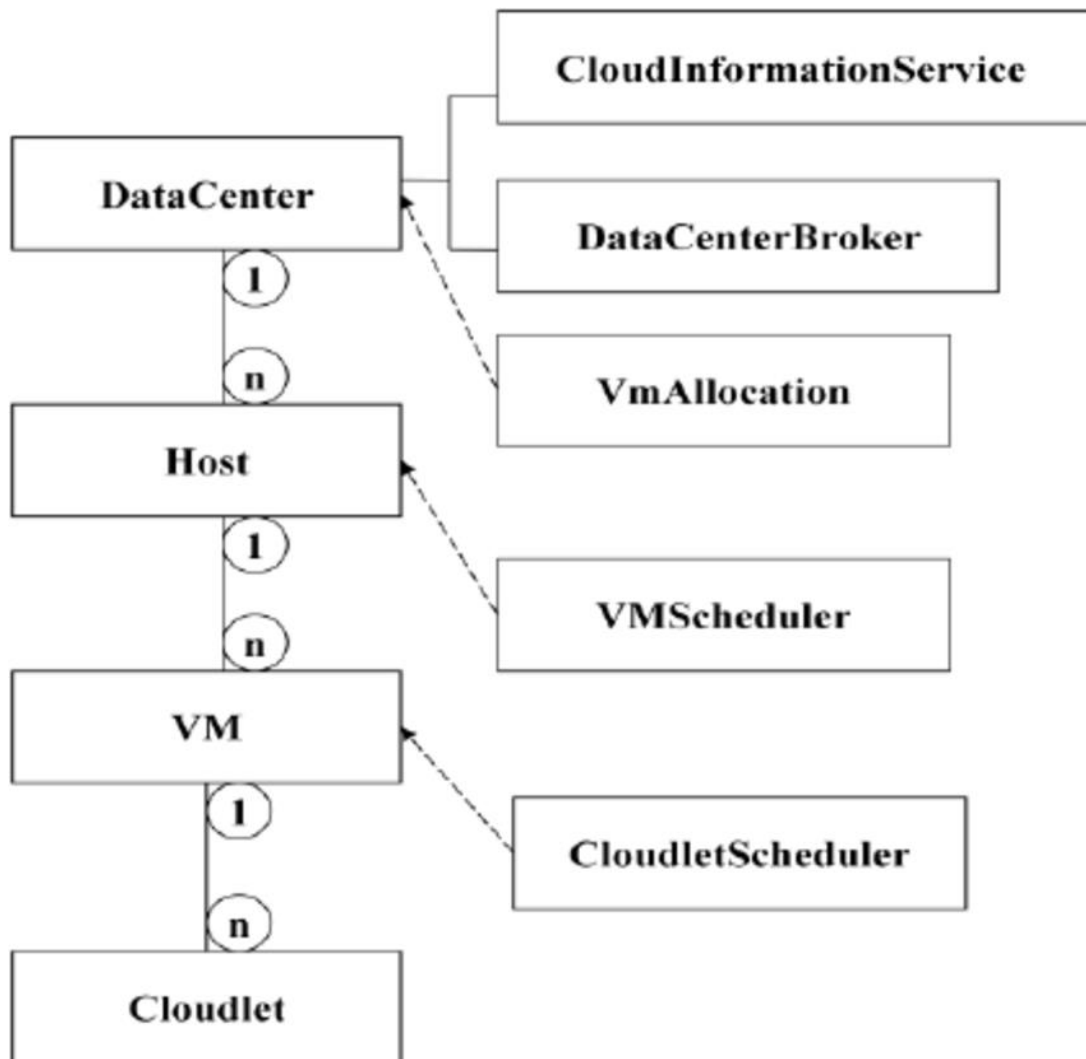


Figure 3.1 Data centred cloudlet structure and scheduling

The following diagram shows the structural representation of simulation system how the cloudlet are assigned to the vm it is showing that n number of cloudlet can be assigned to the one vm and so on. Similarly n number of vm can be assigned to host to execute the task and the whole scenario has been performed to the data center where the vm has been assigned on the basis on allocation and the mapping of corresponding vm is done.

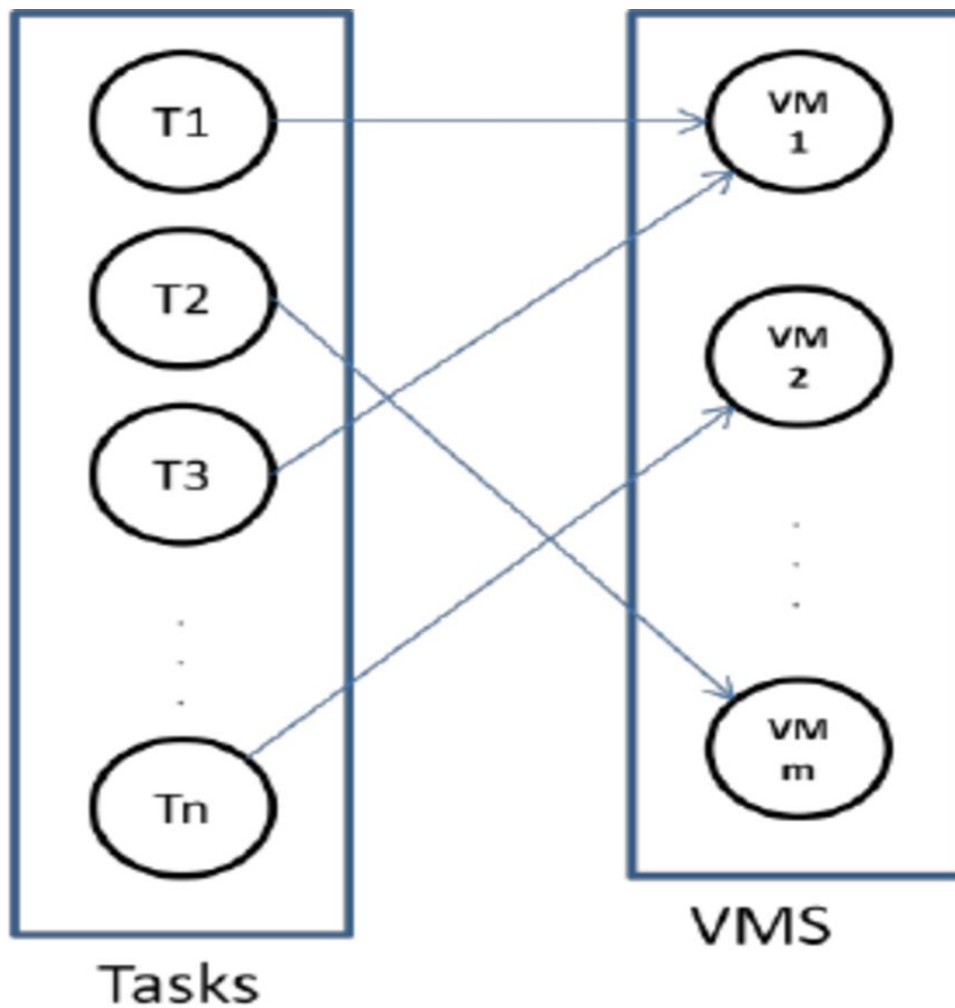


Figure 3.2 Task mapping to VM

The n number of task has been mapped to the various vm machine according to the feature and the ability of the vm to execute the task the task execution depends upon the finding the capacity of the vm like the time to execute the task and time to finish and the total length of the time for which they executed.

CHAPTER 4

RESULT AND DISCUSSION

4.1 Experimental Result

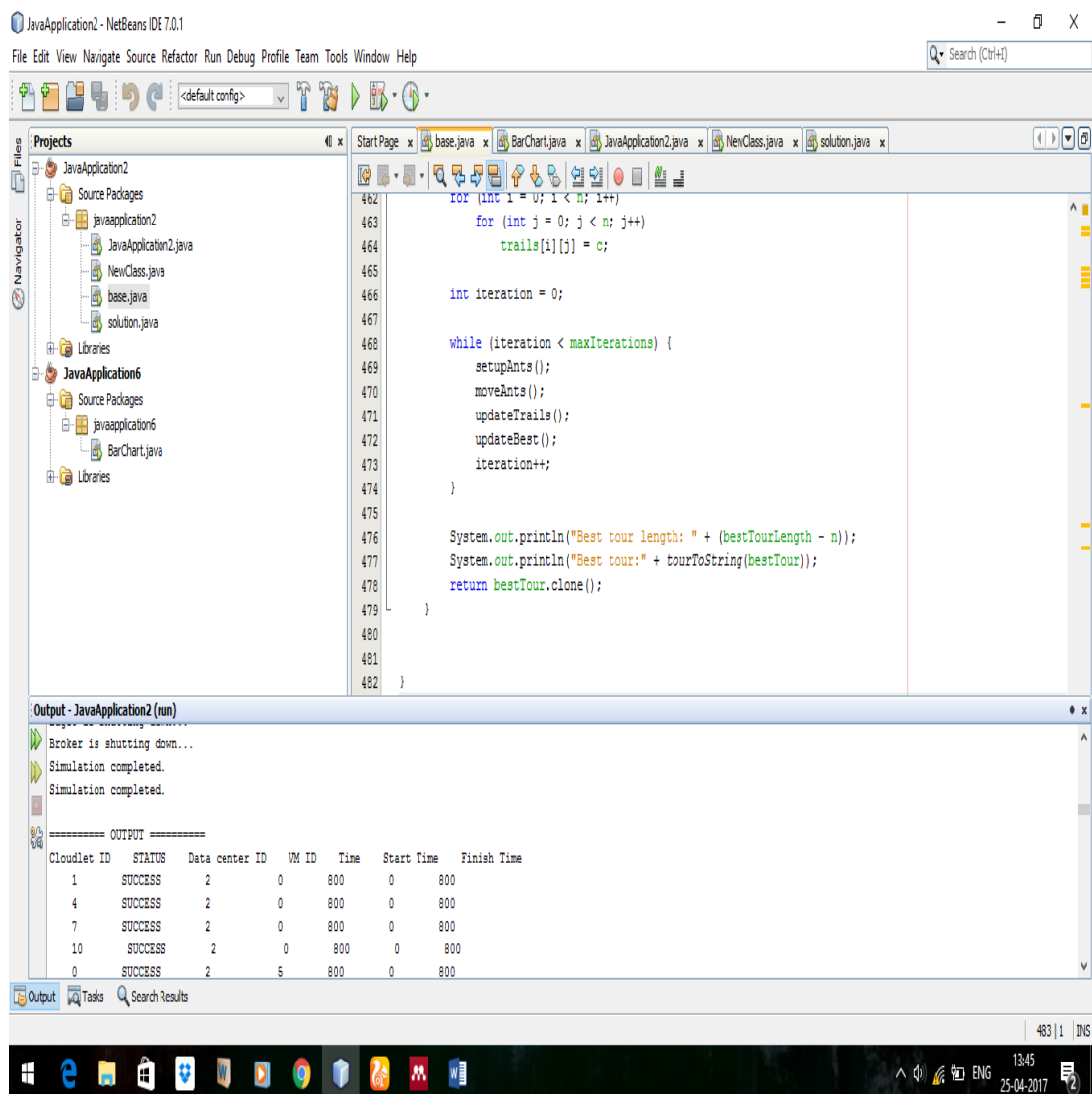


Figure 4.1 Demonstration of cloudlet assignment

The simulation result showing the various parameters like the cloudlet id that is unique and the length of the task the completion status and the corresponding data center and vm id to which task has been mapped and the start and finish time along

with the time to complete the process as we can see say cloudlet id 4 takes 800 ms to complete the task in further results we see the improved and reduced time to execute.

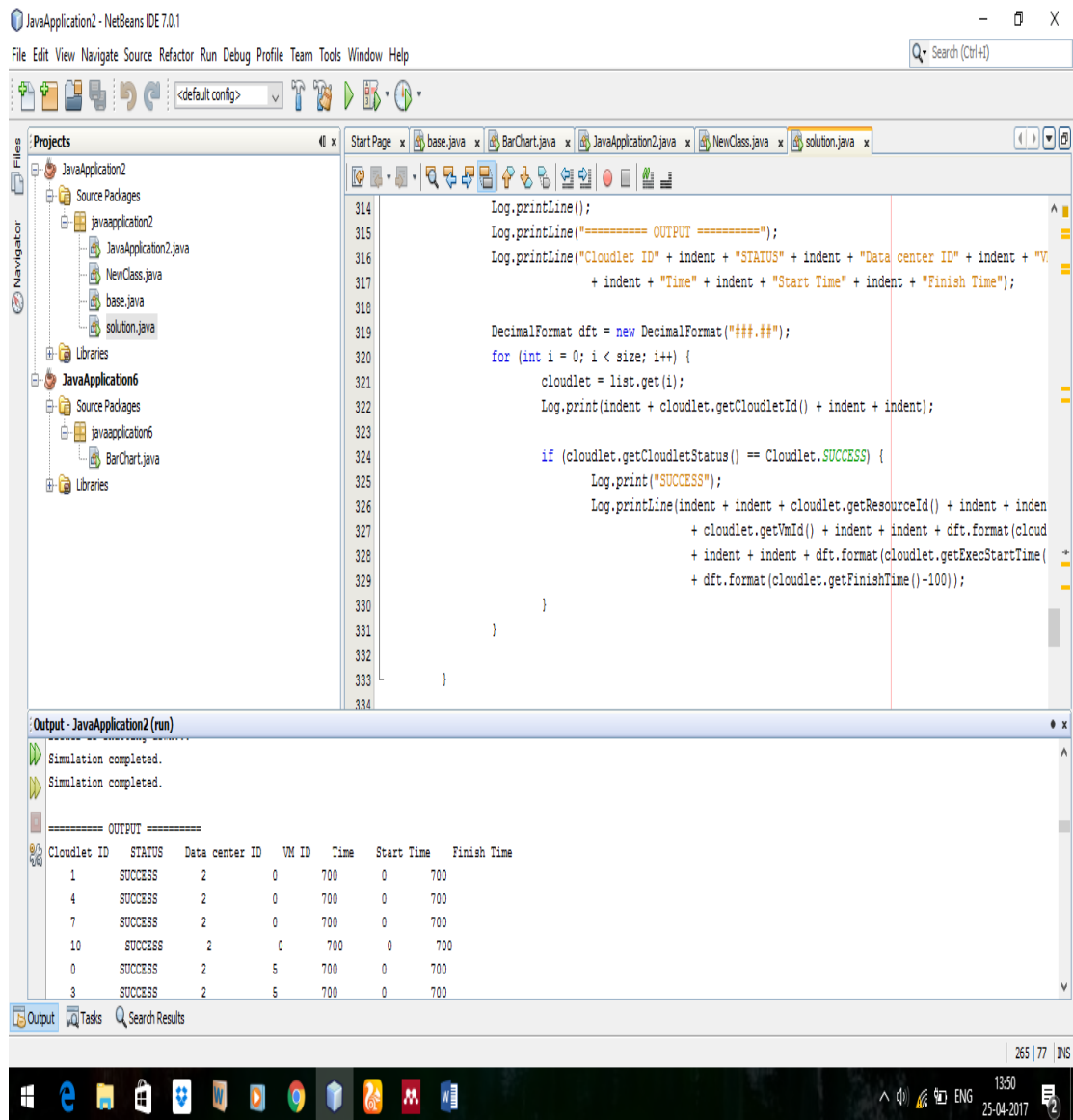


Figure 4.2 Improved result of data centre

As we mentioned before that enhancement in performance has been done by reducing the completion time the cloudlet id 4 that is taking the time to complete the task 800 is now taking the 700 ms so the performance has been improved.

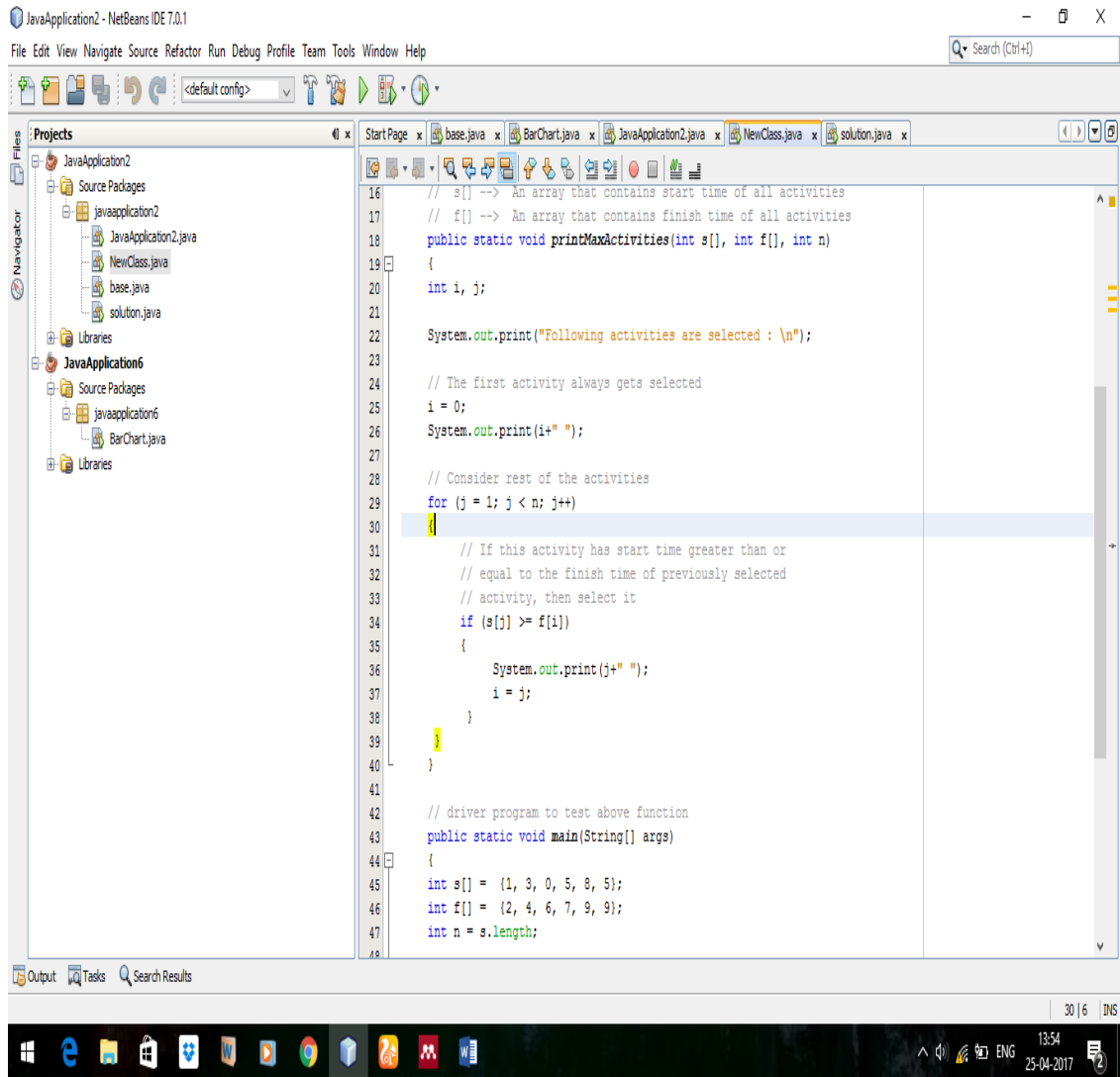


Figure 4.3 Allocation based on iteration

The activity to select the task has been done in this code that we have added for improvements we select the activity of allocation if the process start time has greater or equal to the finish time of the previously finished process and then we migrate the task according to the performance parameter of the vm.

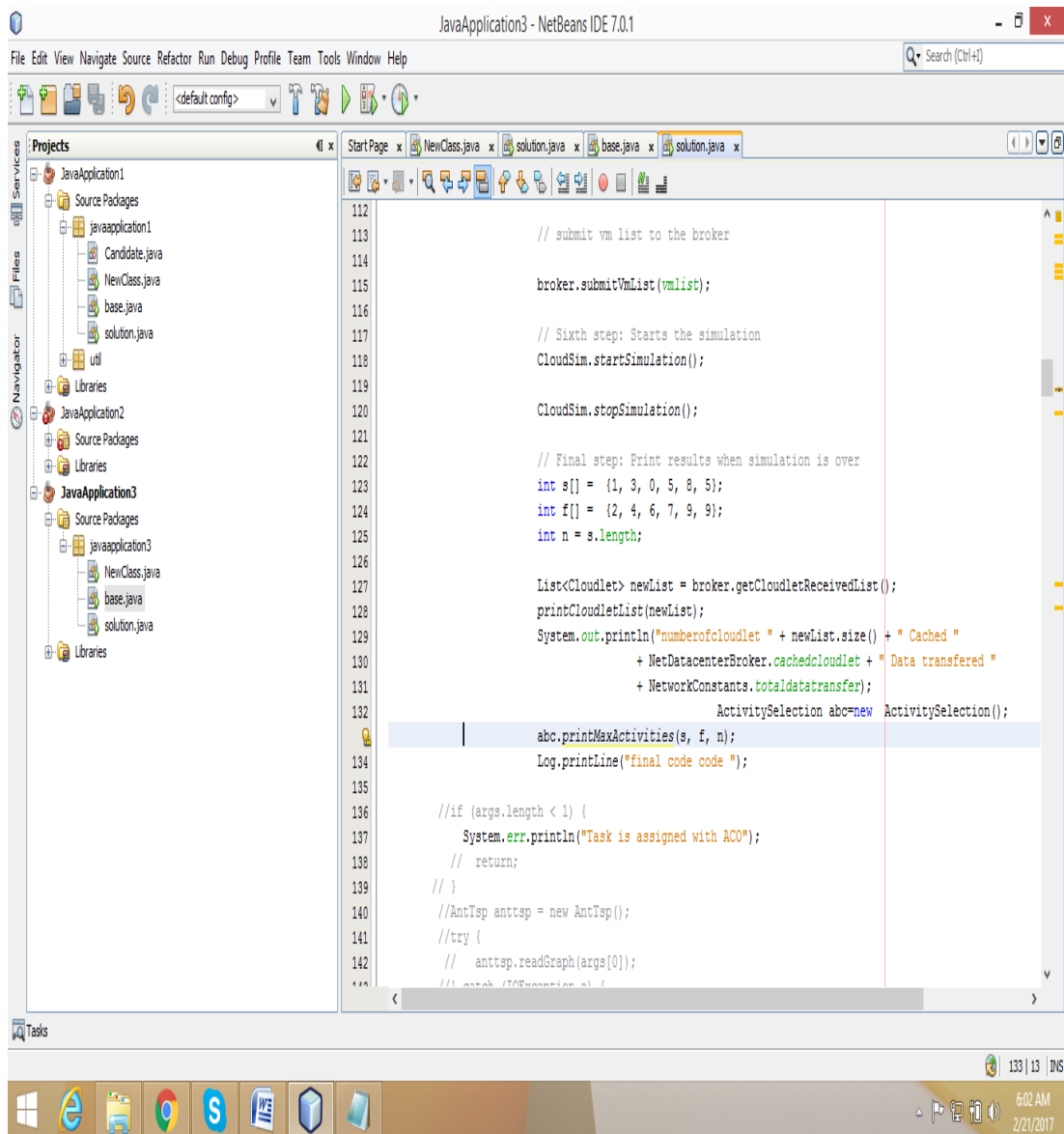


Figure 4.4 Execution of cloudlet

As shown in the figure 4.4, the network is deployed with the finite number of hosts, virtual machines and virtual servers. The cloudlets are executed on the virtual machine which are assigned by the broker.

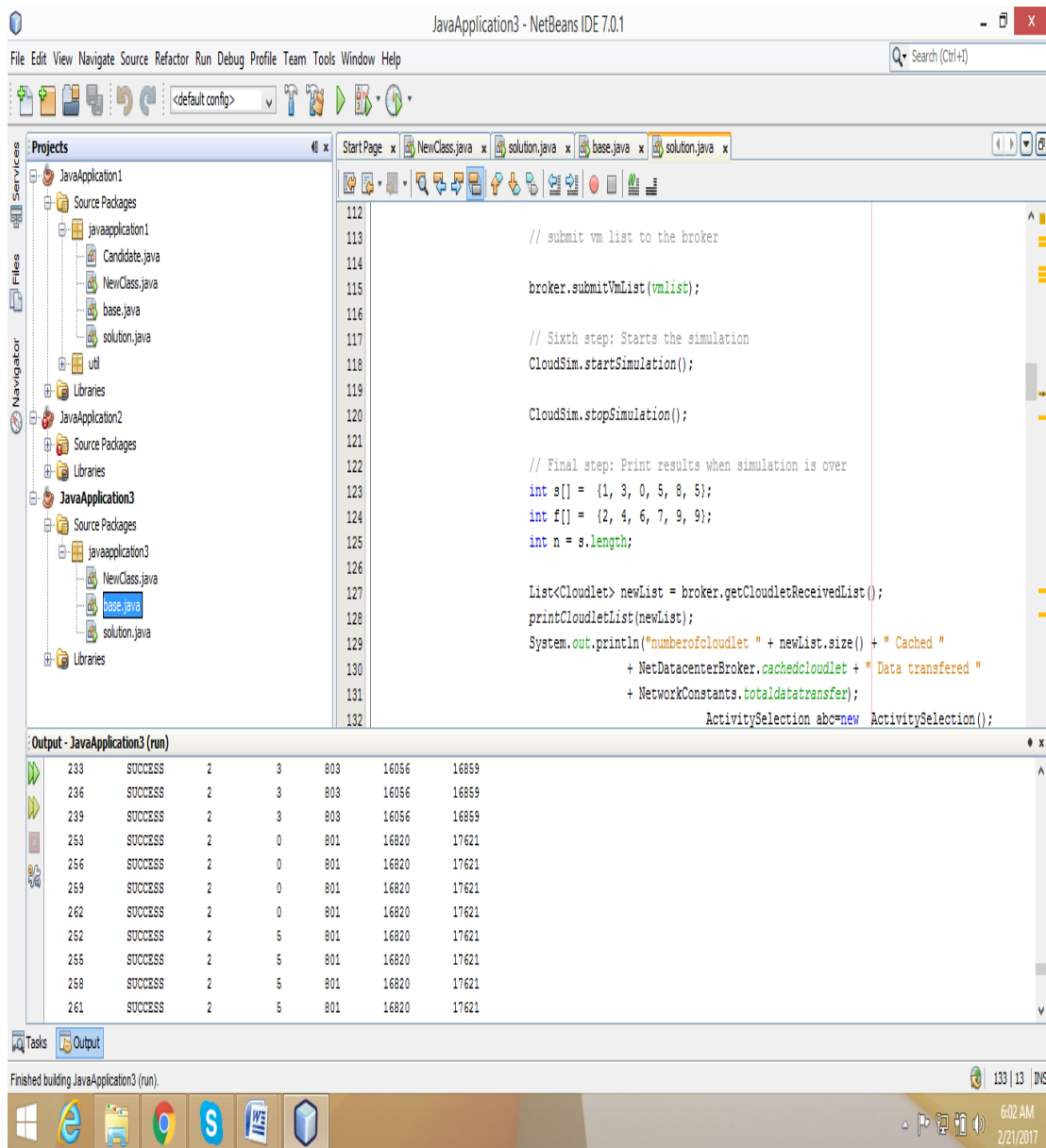


Figure 4.5 ACO applied for appropriate vm

As shown in figure 4.5, the technique of ACO is been applied which will get the most appropriate virtual machine for the task execution. The most appropriate virtual machine will be extracted on the basis of initial population.

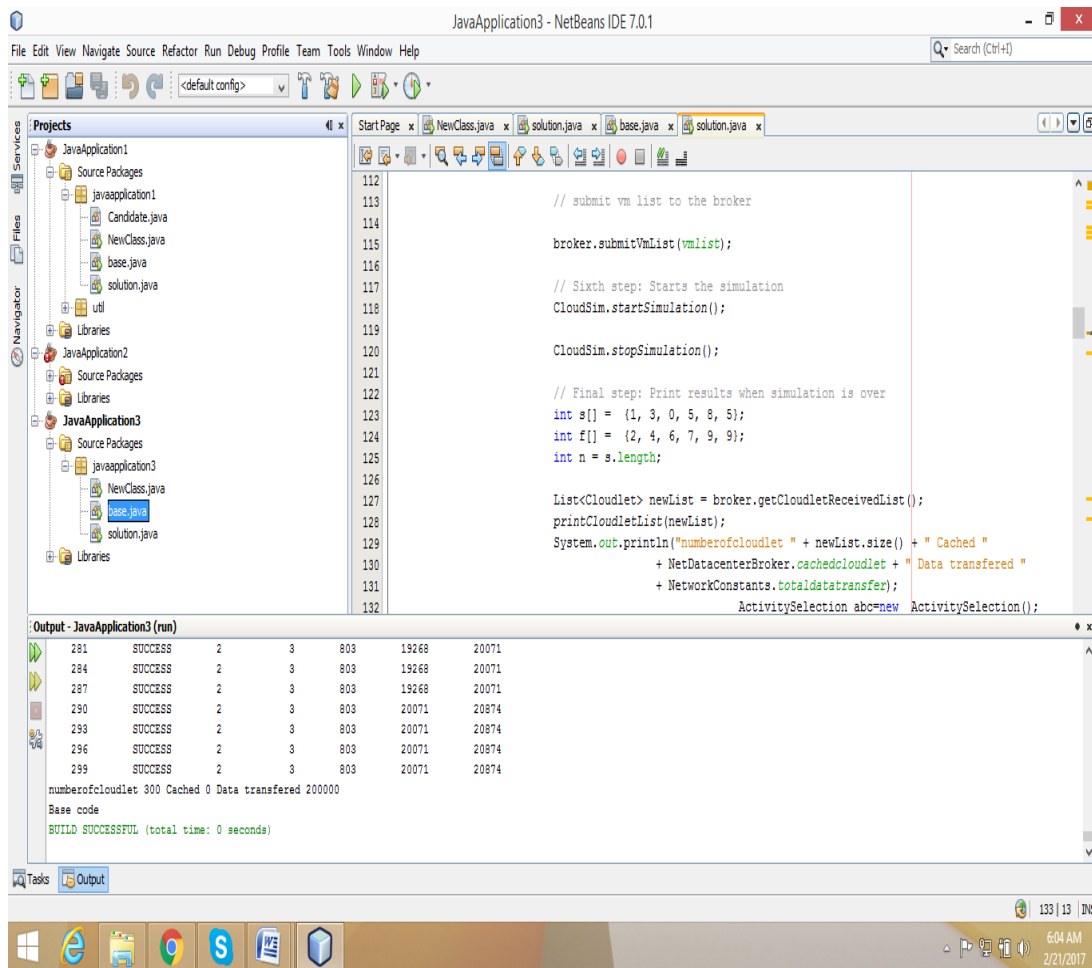


Figure 4.6 Increased energy level of network

As illustrated in the figure4.6, the ant colony optimization is applied which assign the task to most appropriate virtual machine. This leads to increase execution time and increase energy consumption of the network the improvement in the existing ACO algorithm is been done for the efficient task execution from the virtual machine. The broker selects the most appropriate virtual machine for the cloudlet execution. the Improvement in the ACO algorithm is done and this proposed improvement is based on the greedy algorithm which assign task to the virtual machine for the cloudlet execution the cloudlets are assigned to the virtual machines for the execution and the virtual machines which get overloaded the tasks are the migrated to the machines which are under loaded, this process is shown in the.

4.2 Comparison with Existing Technique

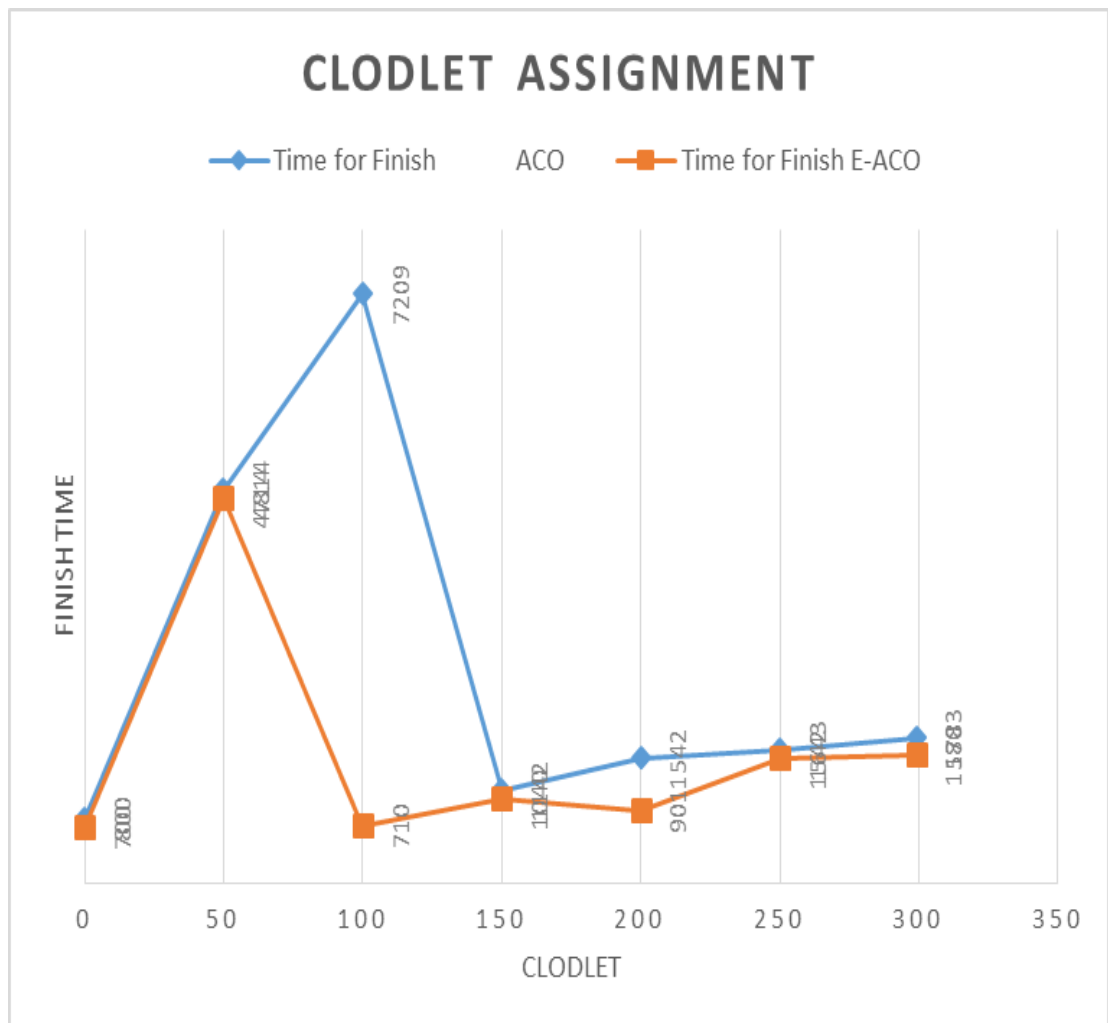


Figure 4.7 Comparison of technique

As shown in the figure 4.7, the execution time of the proposed and existing algorithm is compared and it is been analyzed that due to fault recovery in the network , the execution time is reduced in the proposed technique

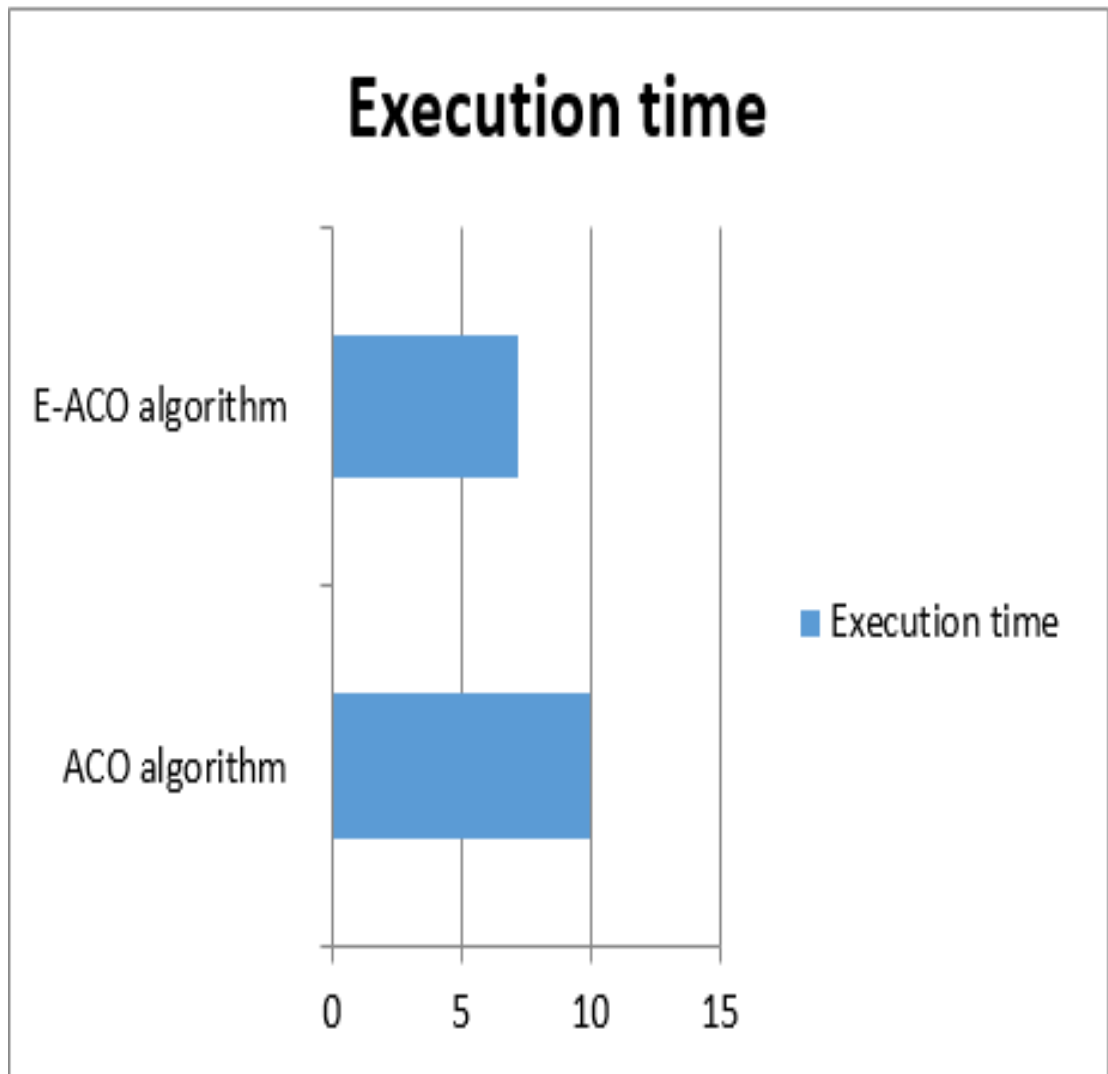


Figure 4.8 Comparison of technique in with respect to time

The comparison between the executions has been done between both of the approaches that has followed. And that totally leads to enhancement in overall performance and speed up the time to perform any task it is mandatory change to increase the efficiency.

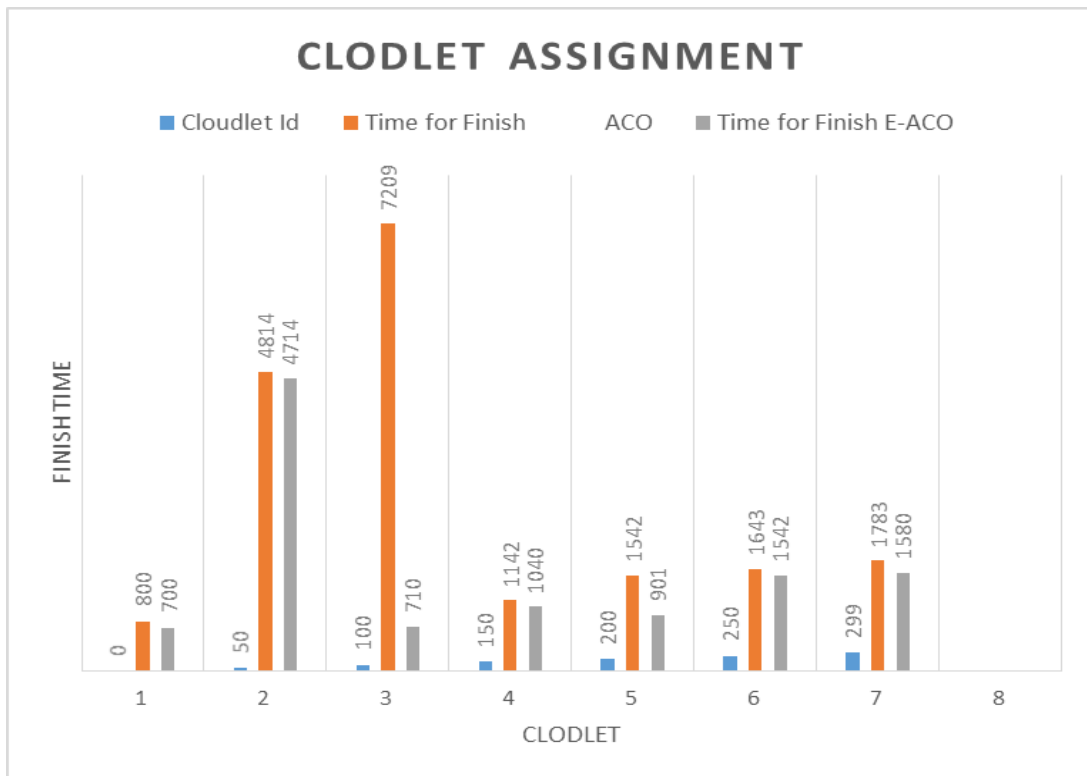


Figure 4.9 Comparison of technique by id

As shown in the figure 4.9, the proposed and existing algorithms are compared in terms of space utilization and it is been analyzed that when the fault is recovery in the network, space utilization reduced and network efficiency is increased.

CONCLUSION AND FUTURE SCOPE

5.1 CONCLUSION

Cloud provides huge amount of services over internet that is performing revolutionary changes in terms of saving cost of labor processing storage and resources of any organization. We are not bother about hardware resources to access any information it can be accessed anywhere that means no geographical limitations that limit the task of any organization. Most of the company such as google IBM amazon uses cloud as most prior mode to provide the services to their customer's service delivered are fast efficient and remote that increase the overall productivity and hence lead to overall achieving the goal of profit by minimizing the cost and using less number of resources of organization .Cloud proposes following model as its services that are explained below It is concluded that cloud computing is the architecture in which virtual machine, cloud servers and hosts are involved in the communication. The technique is this work has been proposed for the virtual machine migration. The proposed technique is based on the weight based algorithm in which weight of each virtual machine is calculated on the basis fault detection rate and execution time. The simulation is been performed in cloudsim and it is been analyzed that proposed technique performs well in terms of execution time. As defined in the table the execution time of the proposed algorithm is reduced to 10 percent as compared to existing algorithm.

5.2 FUTURE SCOPE

The future improvement in the scope can be introduced by migrating the task of mobile user across various host by matching the best suitable algorithm that calculate the precious execution time of each node and accordingly allocate the task. The transition matrix calculation can be provided by other quality aspects parameter.

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