DATA CENTER PERFORMANCE ENHANCEMENT IN CLOUD COMPUTING

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Abstract: Cloud computing has wide area of services like storage, computation and resource allocation out of which virtualization supports a task to be executed in efficient way by consuming less resources but mapping of these tasks to suitable virtual machine (VM) is challenge and hence it is needed to develop some technique that allocate these task to suitable machine so that these tasks can take less resources to get executed and achieve the goal of total utilization of resources with optimized performance. In the present work, it is targeted to discuss the approach to map cloudlet to suitable VM to execute task in efficient way.

I. Introduction

Cloud computing is refer as services delivered over internet such services includes storage, processing and computation of data. Cloud computing has been playing tremendous role in order to reduce the cost of overall maintenance and processing the data [3]. 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:

1I. Cloud Service Model

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.

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 .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.

1II. 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.

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 .

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.

IV. 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.

V. 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.

VI. 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 [4]. 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 [9]. 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.

VII. Related Work

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 [6]. The QoS can be maintained by migrating the task from one virtual machine to another in case of host overloaded [7]. 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 [5].

VII. Proposed Work

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 € host $V_m$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 [10]. The belongs means that these tasks are executed on this virtual machine

2. V_m is migrated ← 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.utilHistory ← get $V_m$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.utilHistory

4. T← 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[17].

- Initiate pheromone T_{ij} do ///The initial population is define which the history of the machine which is stored in the Vm.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 ← host.is Migrated (w,i) /// Return the machine on which task need to be migrated on assigned machine
  Return is Migrated // Return the complete list of the machine.

The following diagram shows the structual represenration of simulation system how the cloudlet are assigned to the vm it is showing that n number of cloudlet can be assinged to the one vm and so on.Simillarly 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.

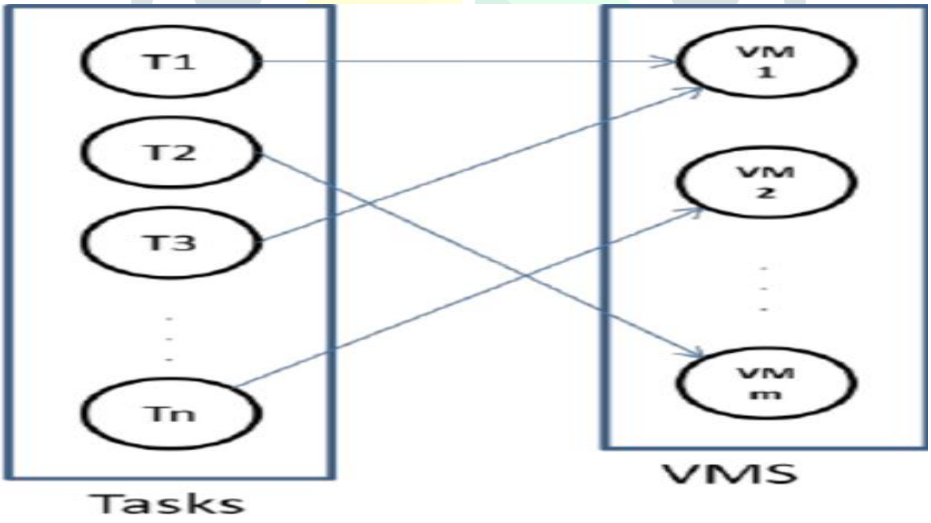

Figure 1.1 Task mapping to vm

The n number of task has been mapped to the various vm machine according to the feature and the ability [15] of the virtual machine to execute the task the task execution depends upon the finding the capacity of the virtual machine like the time to execute the task and time to finish [19] and the total length of the time for which they executed.

IX. Experimental Result

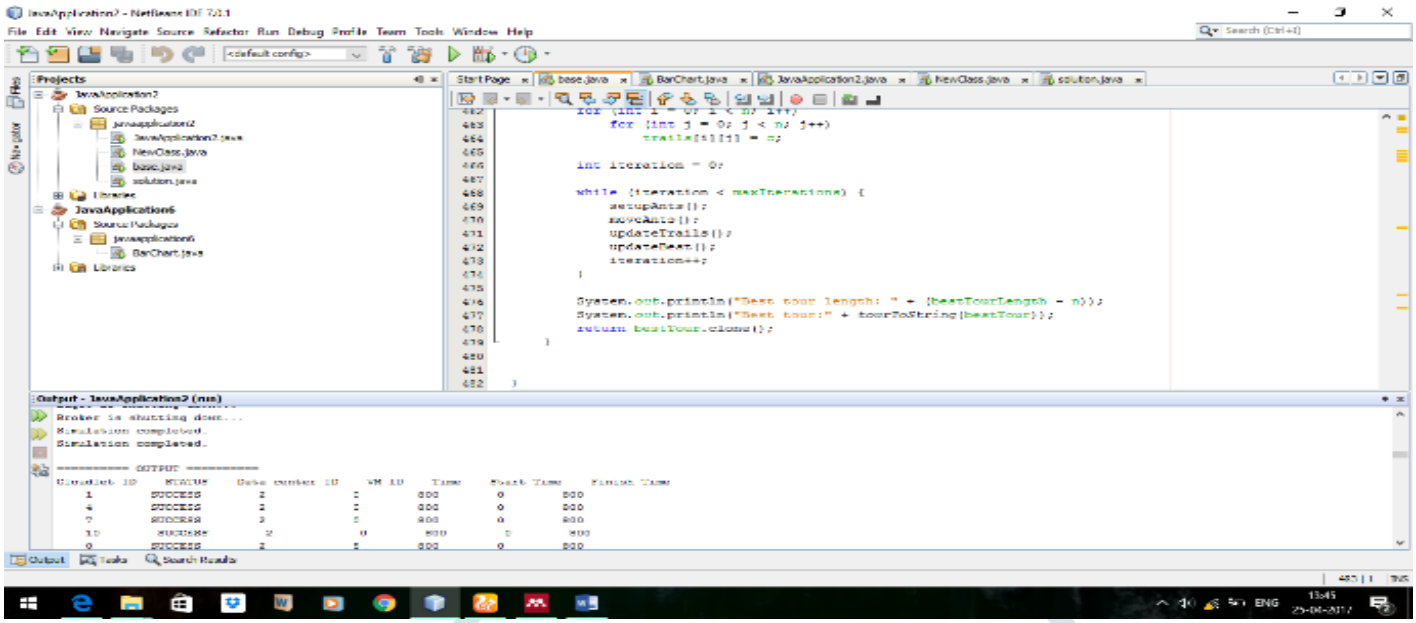

Figure 1.2 Demonstration of cloudlet assignment

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 virtual machine 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 milliseconds to complete the task in further results we see the improved and reduced time to execute.

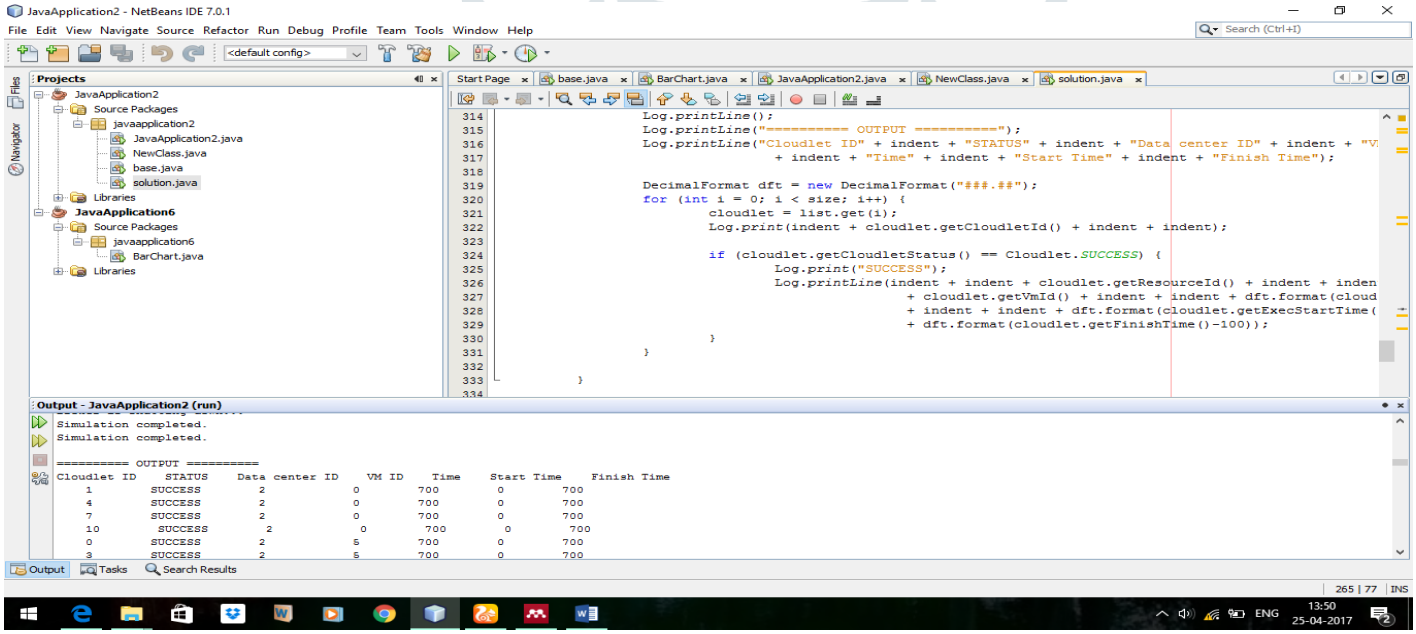

Figure 1.3 Improved result of data center

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.

X. Comparison with Existing Technique

As shown in the figure 1.3, 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.

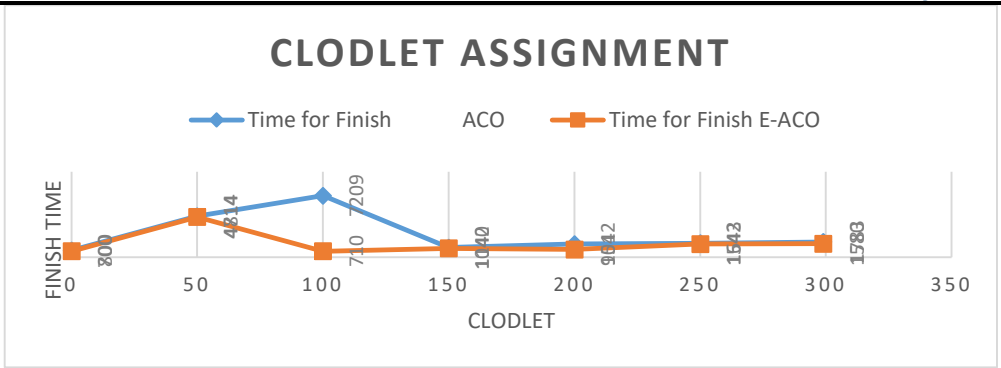

Figure 1.3 Comparison of technique

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.

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