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Improvement in Overall Response Time in Closest data center allocation in cloud computing using CloudAnalyst tool

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Abstract *— Cloud computing is a latest new computing paradigm where applications, data and IT services are provided over the Internet. Cloud computing serves different types of the resources in virtualized form which can be utilized dynamically. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centers. Organizations use the Cloud in a variety of different service models (SaaS, PaaS, and IaaS) and deployment models (Private, Public, Hybrid, and Community). Cloud Analyst is a tool developed at the University of Melbourne whose goal is to support evaluation of social networks tools according to geographic distribution of users and data centers. In this tool, communities of users and data centers supporting the social networks are characterized and, based on their location; parameters such as user experience while using the social network application and load on the data center are obtained/logged.*

Keywords: Cloud Computing, Security, SaaS, PaaS, IaaS, CloudAnalyst, Closest Data Center

I. INTRODUCTION

The cloud computing is a large group of interconnected computers and cloud symbol represents a group of systems or complicated networks. Cloud computing is one way of communication among the various system in the network with the help of internet. Cloud computing is a computing paradigm, where a large pool of systems are connected in private or public networks, to provide dynamically scalable infrastructure for application, data and file storage. With the advent of this technology, the cost of computation, application hosting, content storage and delivery is reduced significantly. Cloud computing is a marketing term for technologies that provide computation, software, data access, and storage services that do not require end-user knowledge of the physical location and configuration of the system that delivers the services.[1]

Cloud Services

Cloud computing can be thought as different layers or models which provide different services.
Cloud contains three types of services as follows.

1. Infrastructure-as-a-Service (IaaS)- This type of cloud computing distributes a full computer infrastructure via the Internet. Most popular IaaS provider like Amazon Web Services offers virtual server instances with unique IP addresses and block of storage on demand. Here customers usually use the service provider's application program interface to start, stop, access, modify and configure their virtual servers and storage as is needed. In the enterprise, cloud computing allocates services to a company to pay for only as much facility as is required, and bring more flexible tools online as soon as required. [4]

2. Platform-as-a-Service(PaaS)- This type of cloud computing offers a product development tool or environment that users can access and utilize online, even in collaboration with others and hosted on the provider's infrastructure. In PaaS, developers create applications on the service provider's platform over the Internet. PaaS service providers may use Application Program Interfaces (APIs), gateway software or website portals installed on the customer's premises. [4]

3. Software-as-a-Service (SaaS) -This type of cloud computing model offers users the hardware infrastructure, the software product and interrelates with the users through a front-end gateway or portal. Here a provider authorizes an application to clients either as a service on demand in a "pay-as-you-go" model or at no charge by a subscription. [4]

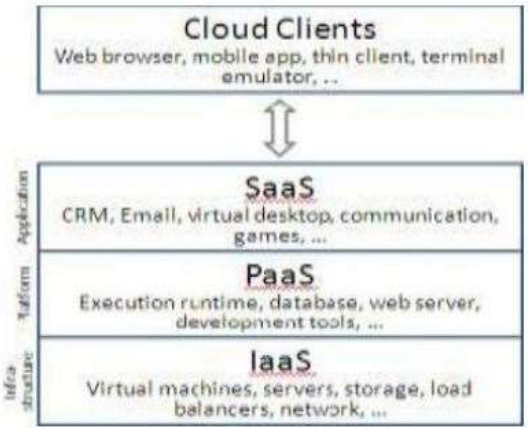

Figure 1. Cloud Services [4]

Deployment Models of Cloud

Cloud Computing technology and services can be implemented in different ways according to their purpose and characteristics. These different types of deployment of Cloud are categorized in four ways as follows [3].

1. Private Cloud:
In this Cloud, Infrastructure is deployed and operated by an Organization where all the resources can be owned, maintained and controlled by it only. It can be managed internally or by Third-party. It is also hosted internally or externally. [3]

2. Community Cloud:
In this Cloud, Infrastructure of Cloud is deployed and operated by several organizations in sharing that supports a specific community with common approaches. [3]

3. Public Cloud:
In this Cloud, Infrastructure of Cloud is available to the general public or large group of different kinds of organization. Client can access services without any control and at specific rent. Client's services and data can be co-located with other users. [3]

4. Hybrid Cloud:
In this Cloud, Infrastructure of Cloud can be combination of Private, Community and Public Cloud Infrastructure. This combination of two or more clouds is with unique characteristics, entities and benefits to the users. Multiple kinds of Cloud are connected in such a way that programs and data can be transferred from one system to another deployment Cloud system. [3]

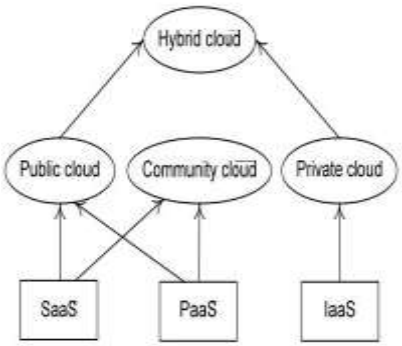

Figure 2. Types of Cloud [3]

II. CLOUD ANALYST TOOL

Cloud Analyst is a tool developed at the University of Melbourne whose goal is to support evaluation of social networks tools according to geographic distribution of users and data centers. In this tool, communities of users and data centers supporting the social networks are characterized and, based on their location; parameters such as user experience while using the social network application and load on the data center are obtained/logged.[5] Even though Clouds make deployment of large scale applications easier and cheaper, it also creates new issues for developers. Because Cloud infrastructures are distributed, applications can be deployed in different geographic locations, and the chosen distribution of the application impacts its performance for users there are far from the data center.

Because Internet applications are accessed by users around the world, and because popularity of applications varies along the world, experience in the use of application will also vary. Quantifying impact of number of simultaneous users, geographic location of relevant components, and network in applications is hard to achieve in real testbeds, because of the presence of elements that cannot be predicted nor controlled by developers. To allow control and repeatability of experiments, simulators such as CloudSim can be used. Simulation experiments apply models of both applications and infrastructures. So, simulation requires some effort from application developers to model both the target infrastructure and the software in a language that is interpreted by the simulator. Even though simulators offer support to model such scenarios, they are conceived to be applied in general experiments, and so modeling of specific scenarios may be time demanding. One of the main objectives of CloudAnalyst is to separate the simulation experimentation exercise from a programming exercise, so a modeler can focus on the simulation complexities without spending too much time on the technicalities of programming using a simulation Toolkit. The CloudAnalyst also enables a modeler to repeatedly execute simulations and to conduct a series of simulation experiments with slight parameters variations in a quick and easy manner. [2]

The main important feature of this tool is:-

1. User friendly GUI
2. Ability to simulate data with flexibility
3. Gives graphical output
4. Repeated Data can also be simulated

Here is the GUI of Cloud Analyst

Figure 3. Cloud Analyst

III. CLOUD RESOURCE ALLOCATION

A cloud computing service providers deliver their resources based on virtualization to satisfy the demands of users. In cloud computing, the amount of resources required can vary per user request. Therefore, the providers have to offer different amounts of virtualized resources per request. For Infrastructure-as-a-Service (IaaS), the providers offer their resources in different sized virtual machines (VM) that fulfill the user request. The provider's resources are usually hosted by a data center that consists of a set of interconnected physical machines to allocate the VMs [3]. To provide worldwide service, a provider may have data centers that are geographically distributed throughout the world. Likewise, the user locations vary in geographic location. Since cloud computing services are delivered over the Internet, there may be undesirable response latency between the users and the data centers. For example, if a user requested VM is allocated to a physical machine in a data center that is significantly far away from the user's location, the user may have high network latency. In addition, if the VM is allocated in a data center that has a high workload, eventually, the user has to wait longer than when the VM is allocated in a data center with a light workload. Hence, for the best service, the provider needs to find a data center and physical machine that has a light workload and is geographically close to the user.[6]

Cloud uses Virtual Machine to allocate data centers to user base. In computing, a virtual machine (VM) is an emulation of a particular computer system. Virtual machines operate based on the computer architecture and functions of a real or hypothetical computer and their implementations may involve specialized hardware, software, or a combination of both. [7].

IV. CURRENT SYSTEM

Here the algorithm used is Best response time for data center allocation [8]
Initially traffic is routed to the {@link DatacenterController} closest to the requests originating {@link UserBase} in terms of network latency. Then if the response time acheived by the closest Data Center starts deteriorating, this service broker searches for the service broker with the best resonse time at the time and shares the load between the closest and the fastest data centers.

Step1. Initially VM index table will be 0 as all the VMs are in available state.

Step2. DataCenterController receives a new request.

Step3. DataCenterController queries new LoadBalancer for next allocation

Step4. DataCenterController parses the VM list to get next available VM:
If found: LoadBalancer returns the VM id to DataCenterController Step2 continues
If not found: Using round robin fashion VM index is reinitialised to 0 and in increment manner VMs are checked to find VM in available state

Step5. When the VM finishes the processing the request, and the DataCenterCOntroller recieves the cloulet response, it notices the load balancer of the VM de-allocation

Step6. The Load Balancer updates the status of VM in allocation table to available.

Step7. Continue from Stp2
The purpose of the algorithm is to find the expected Response Time of each Virtual Machine , which is calculated as:

Response Time = Fint - Arrt + TDelay

Lets take a look at the result of present system with closest datacenter in Cloud Analyst tool With the provided data center and user base

Figure 4. Simulation of Cloud Analyst

The results generated for the simulation are as follows:

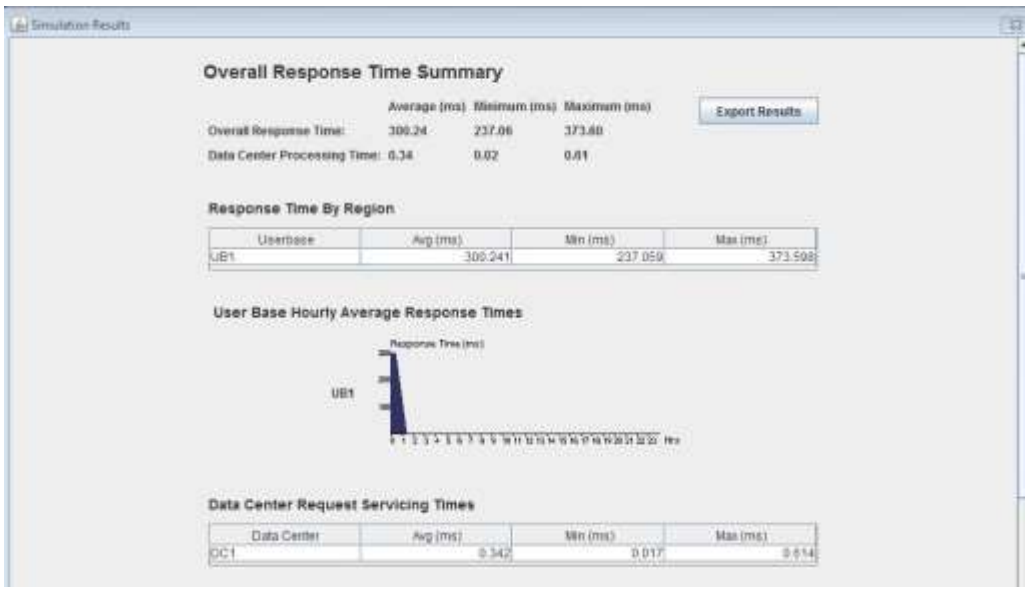

Figure 5. Result of Simulation in Cloud Analyst

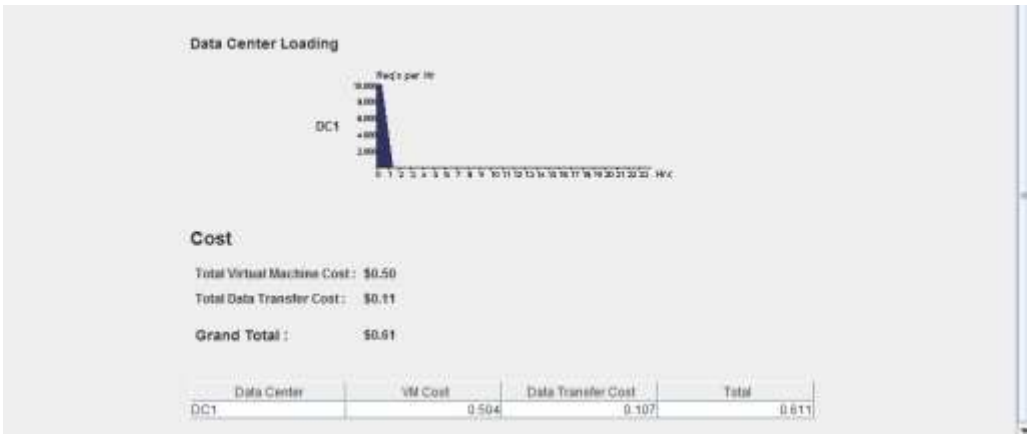

Figure 6. Result of Simulation in Cloud Analyst

V. PROPOSED SYSTEM

The proposed algorithm is as follows:-

Step1. Initially VM index table will be 0 as all the VMs are in available state.

Step2. DataCenterController receives a new request.

Step3. DataCenterController queries new BestResponseTimeServiceBroker for next allocation

Step4. DataCenterController parses the VM list to get next available VM:
If found: BestResponseTimeServiceBroker returns the VM id to DataCenterController Step2 continues
If not found: Using closest data center VM index is reinitialised to 0 and in increment manner VMs are checked to find VM in available state

Step5. When the VM finishes the processing the request, and the DataCenterCOntroller recieves the cloulet response, it notices the load balancer of the VM de-allocation

Step6. The BestResponseTimeServiceBroker updates the status of VM in allocation table to available.

Step7. Continue from Stp2

The purpose of the algorithm is to find the expected Over all Response Time of each Virtual Machine

Lets take a look at the result of proposed system with closest datacenter in Cloud Analyst tool With the provided data center and user base

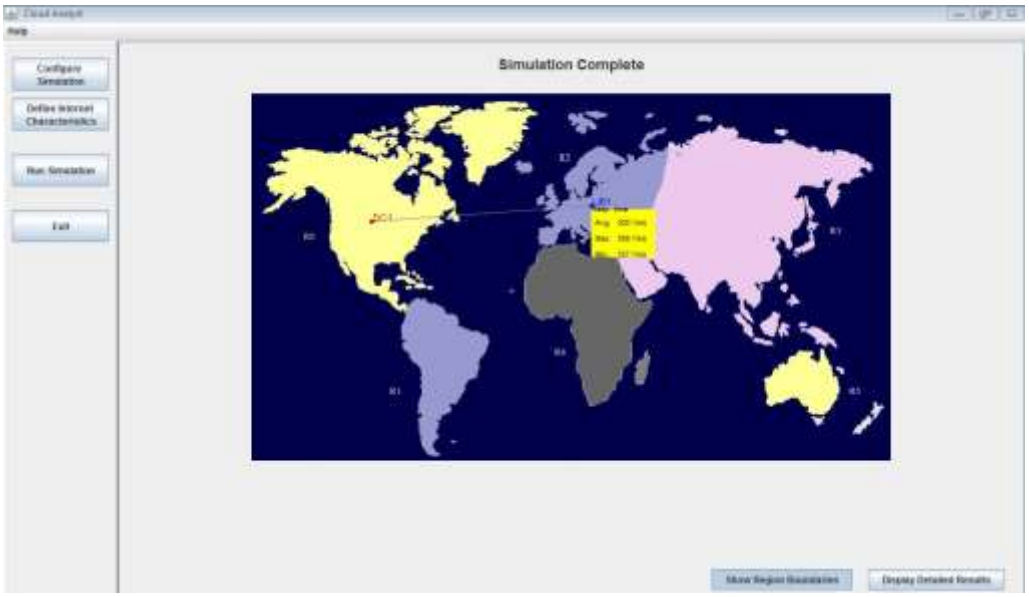

Figure 7. Simulation of Cloud Analyst

The results generated for the simulation are as follows:

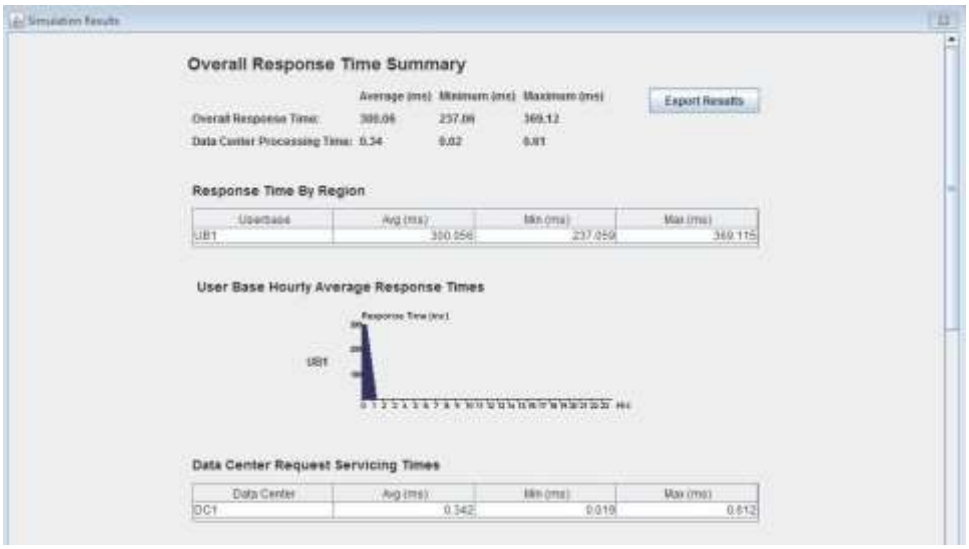

Figure 8. Result of Simulation in Cloud Analyst

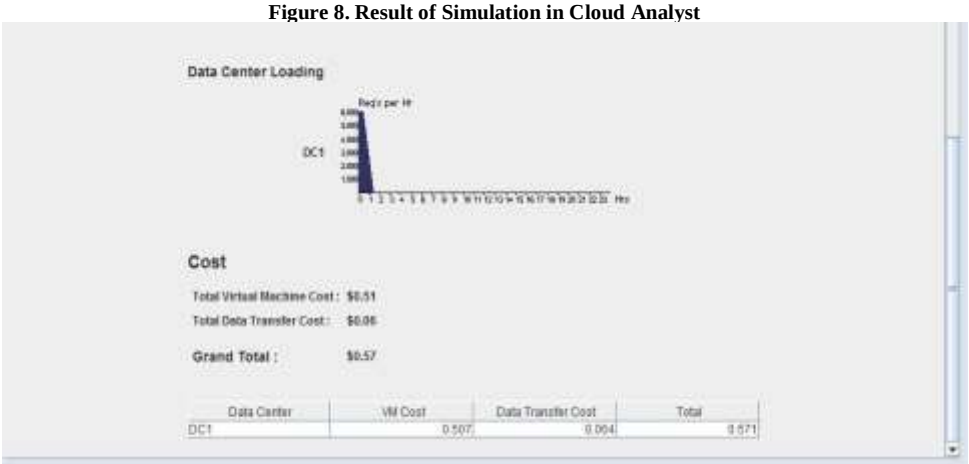

Figure 9. Result of Simulation in Cloud Analyst

VI. CONCLUSION

With Cloud computing emerging as a new in thing in technology industry, public and private enterprise and corporate organizations are either using the Cloud services or in process of moving there but face security, privacy and data theft issues. Cloud BestResponseTimeServiceBroker algorithms are designed to support large scale applications and to support cloud infrastructure. Here, the proposed algorithm shows the enhancement in response time for various cloudlets. The simulation tool used is CloudReports.

VII. REFERENCES

1. MS. Pooja P Vasani, MR. Nishant S Sanghani "Literature Review: Various Priority Based Task Scheduling Algorithms In Cloud Computing" Journal of Information, Knowledge and Research in Computer Engineering, Vol– 02, Issue 2, November 12 to October 13, pp 298-302
2. Bhathiya Wickremasinghe, Rodrigo N. Calheiros, and Rajkumar Buyya "CloudAnalyst: A CloudSim-based Visual Modeller for Analysing Cloud Computing Environments and Applications "
3. MR Nishant S Sanghani, MR. R J Khimani, Asst. Prof. K K Sutaria, MS. Pooja P Vasani "Pre-Emptable Shortest Job Next Scheduling In Private Cloud Computing" Journal of Information, Knowledge and Research in Computer Engineering, Vol 2, Issue 2, November 12 to October 13, pp 385-388
4. MS. Pooja P Vasani, MR. Nishant S Sanghani "Resource Utilization & Execution Time Enhancement by Priority Based Pre-emptable Shortest Job Next Scheduling In Private Cloud Computing " International Journal of Engineering Research & Technology (IJERT), Vol. 2, Issue 9, September – 2013, pp 1649-1654
5. http://www.cloudbus.org/cloudsim/
6. https://sites.google.com/site/gistcloudresearchgroup/introduction-to-location-aware-resource-allocation-model
7. https://en.wikipedia.org/wiki/Virtual_machine
8. Tejinder Sharma, Vijay Kumar Banga "Efficient and Enhanced Algorithm in Cloud Computing" International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-3, Issue-1, March 2013