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An Cost Effective Approach for Provisioning In a Cloud

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ABSTRACT:Cloud computing is becoming popular Buzzword today. Cloud computing provides opportunity to dynamically scale the computing resources for applications, which is shared among customers using virtualization technology. Infrastructure as a Service (IaaS) allows the cloud provider freely locate the infrastructure over the internet in cost-effective manner by migrating in the form of virtual machine. A resource monitoring system, monitors utilization of resources of host machine can be used as a base criteria for determining idle machine. Utilizing this types of idle machines results in effective utilization of machine, energy saving etc. Hence, proposed system uses collection of Virtual Machines (VMs) running on unused computers at the edge and allocate them dynamically, based on user demands. Proposed system is Designed and implemented as an inventory management system in which server manages heterogeneous system, handles end-user request and serve them effective virtual machine. There are three main issues discussed in this paper (I) "Resource monitoring and connection establishment" (II) "Inventory management system" i.e. finding efficient virtual machine and allocating them. (III) "Reallocation of the Virtual Machines", re-configuring the VM if required Machines configuration is not available on cloud side. This paper analyses problem from the perspective of an end-users like small and middle organization. Which uses cloud Services in order to achieve scalable provisioning with respect to Qos constraints.

KEYWORDS: Resource monitoring, Connection establishing, Load balancing, IaaS, Allocation of resources.

I. INTRODUCTION

Cloud computing is a fast growing area, known as service-driven business model as it providing ultimate solution in business times. Business required hardware and platform level services, fulfilled on-demand basis allowing business customers to scale their resource usage based on their requirements. It is a technology, which enables one to accomplish aforementioned objective, leading towards improved business performance. Infrastructure as a Service is a cloud computing model which provides infrastructure to different organizations according to their needs [1]. It comprises of users requesting for the services of diverse applications from various distributed virtual servers. The cloud should provide resources on demand to its clients with high availability, scalability and reduced cost [2]. To enhance performance of service provider in distribute network load balancing is one of the essential factors. Cloud computing has given the new face to the distributed field.

The success of IT organizations lies in acquiring the resources on demand. Cloud computing is a promising technology to provide on demand services according to the clients requirements within a stipulated time. For dynamically sharing of resources cloud computing provides break through using virtualization technology. In [4] author explained how to creating virtual platform inside other operating system along with its detailed installation process of hypervisor and virtual machines [5]. Handling of resources effectively is still an open challenge. Because of vast diversity in hardware platform, different usage pattern, large number of resources, etc. testing these on real scenario is quite lengthy process. Further, despite of high diversity in service platform cloud computing environment provides shared pool of resources for end-users. Supervision of resources, dynamic handling of real time user request and providing it instantaneously on user demand is becoming complex job. Cloud is a pay-go model where on every instance utilization there is separate charge, dictates requirements of available resources requested on demand.

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In this paper, we concentrate attention on IaaS, as main aim is to build an application which acts as an interface between clouds and locally connected several idle client machines. To achieve the above mentioned objective, we are implementing an inventory management system that supports virtual machine migration. In the cloud computing environment the load refers to the number of requests that has to be serviced by VMs that are available in cloud. There are three prime issues discussed (I) "Resource monitoring and connection establishment" (II) "Inventory management system", i.e. the process of finding efficient virtual machine and allocating them. (III) "Reallocation of the Virtual Machines", re-configuring the VM if required Machines configuration is not available on cloud side. This paper focus on how machines can be utilized cost effectively.

This paper is aligned as follows. Related work is given in section 2. The problem definition with system architecture is describe in section 3. Module implementation and its result is explained in Section 4 and finally conclusion is in section 5.

II. RELATED WORK

Cloud computing is a vast concept. The interesting part is to consider, while migrating the VM and as per the second issue, for allocating efficient VMs, large numbers of the algorithms were available for the load balancing but we are more concern about different modules available for the migration of Virtual Machines from one source machine to the other target machine [7] [15]. In this system, for transparent migration of virtual infrastructures between client and server, involve many challenges such as IP address sharing, bandwidth sharing and isolation from local home network traffic etc. [18][25]. They overcome the problem and provide variety of solutions on managing a personal Cloud. They implement an optimal solution to the resource management problem, allowing peers to share VMs across their individual Personal Clouds by specifying their resource offers, requests and verify its performance via detailed simulations.

The main objective of the system is to use underutilized resources of idle client machines by making them available for use for the cloud computing system, so machine are utilized. By this we can save energy and also give advantage of dynamic resource allocation to the cloud users. Proposed system is designed and implemented as an inventory management system in which server manages heterogeneous system having different configurations and used for allocation of efficient virtual machine to the end-user. Our proposed method handle request, which arrives for the requirement of VMs. And also suggest efficient and suitable VMs with their required configuration. There are numerous algorithms, models and architectures has been proposed in order to adapt and handle bulk of cloud [11][15][16]. But very few of them have succeed in their architectural perspective [14].

In cloud computing environment live immigration of VMs is a major issue [7][15]. When physical host's machines are loaded, some or all virtual machines moved to less loaded host in order to balance performance working of host machine. This may imposes surplus challenges since these machine uses local persistent storage. Since whole disk state get transferred to the destination host while the virtual machines are running. In [15] author propose several different methods for synchronizing local storage during live migration. Cloud infrastructures enable users to migrate resources, swap space, etc. In [14], author analyses the problem from the perspective of an application service provider, resulting in good trade-off between the ASP control over the autonomic loop and scalability level guaranteed by a public IaaS provider.

III. PROBLEM DEFINITION

As the main aim of cloud computing is to provide resources as a service on demand to the user. In this research paper we are going to deal with three main problems.

1. Identifying unused (idle) machines.
2. Allocation of virtual machines.
3. Reallocation of virtual machines.

A. Identifying unused (idle) machines

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In this phase, status of currently running machines of particular group or organization connected in network is being monitored. Based on percentage of utilization of resources it is declared as idle (available) and automatically connected to the server. While connection is establishment with the server, it pass details of its own machine configuration, number of VM (if it has) along with its VMs configuration. Based on requirement request like RAM size, Hard Disk size of end user, server will allocate access of best possible machine configuration. But if it is not present then server automatically re-size the existing machine configuration making them available to the end user. In this way efficient utilization of unused machines can be done.

B. Allocation of virtual machines

As per user requirement, Cloud provider should allocate an efficient virtual machine to the end user. When the user request arrives for the virtual machine and the cloud provider is available with the number of free virtual machines, then allocating an efficient virtual machine is the main goal of cloud provider.

Allocating efficient virtual machines is also one of the big challenge. For example if the request arrives at the cloud provider for the VM and if more than 1 virtual machines are available, then the load balancing algorithm will be used for finding an efficient VM for the allocation. Moreover if arrived request does not match with the configuration of the available virtual machine then reconfiguration will be done for the suitable virtual machines so they are able to fulfill end user needs.

C. Reallocation of virtual machines

The foremost goal of cloud computing is to provide better service as per requirement on demand to end-user. Now suppose if we are having two physical machines and both the machines are idle and already connected with server, each having one virtual machine with the processor of 1 GHz, 80 GB and 100 GB hard disk respectively. If the request arrives for the virtual machine having processor of 2 GHz and 80 GB, at that time the concept of reallocation of virtual machine take place. For such situation we dynamically reconfigure one of the virtual machine from one physical machine and then make it available with the configuration of 2GHz, 80 GB hard disk so providing a better service to the end user.

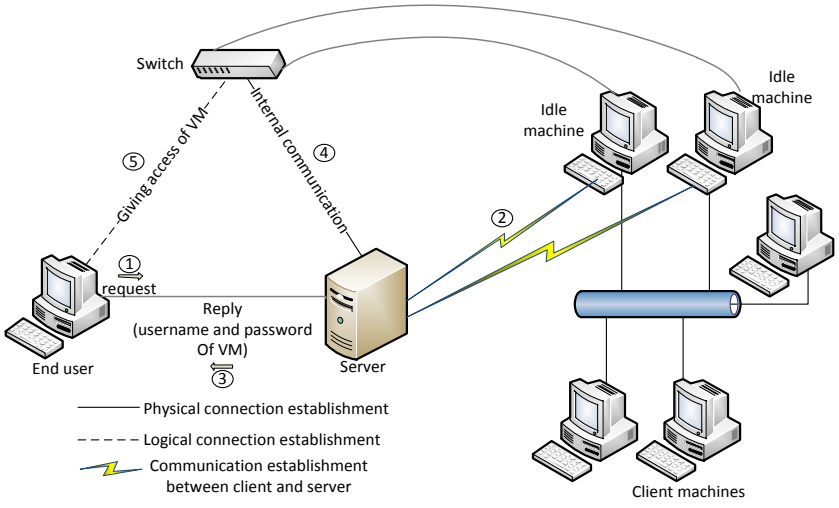

Fig. 1: System architecture for representing the working of system

The system architecture is shown in figure 1 representing working of inventory system overcoming the above stated problem. Whenever user send request to the inventory server systemfor a machine with specific configuration, inventory system identifies suitable and efficient Virtual machine from set of idle host machine. Since mapping table is maintained inside server database representing host connection and its equivalent available virtual machines.The matched VM is made available by runtime executing VM control command as shown in figure 2 and 3. That virtual

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machine access is provided as a response in returned with required parameters such as remote VM username and its password details as shown in figure 5. Switch is internally controlled by server for providing remote access.

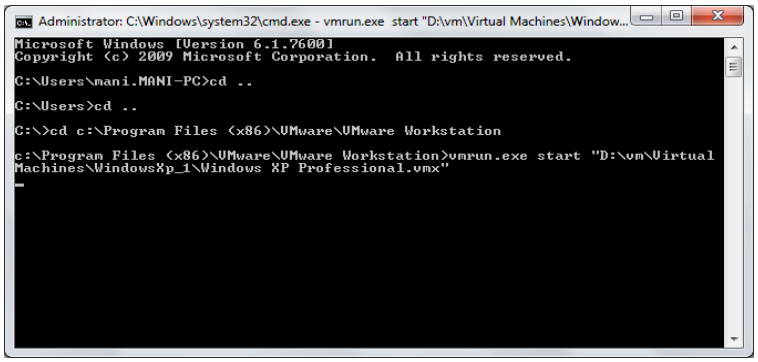

Fig. 2:Output screen showing VM commands for start of virtual machine

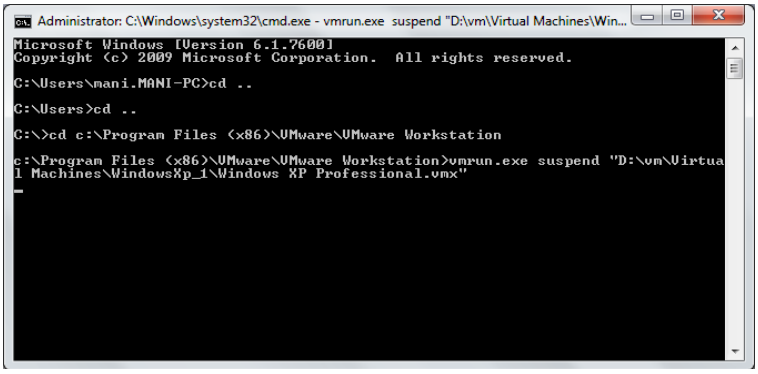

Fig. 3:Output screen showing VM commands for suspension of virtual machine.

III. MODULE IMPLEMENTATION AND RESULT

Resource Monitoring on client (Host) machines:

Using hardware API, system monitor the status of current running machine in network. Based on percentage of utilization of resources as shown in figure 4, system automatically establish the connection between host and server using socket programming concept, certain DOTNET packages.

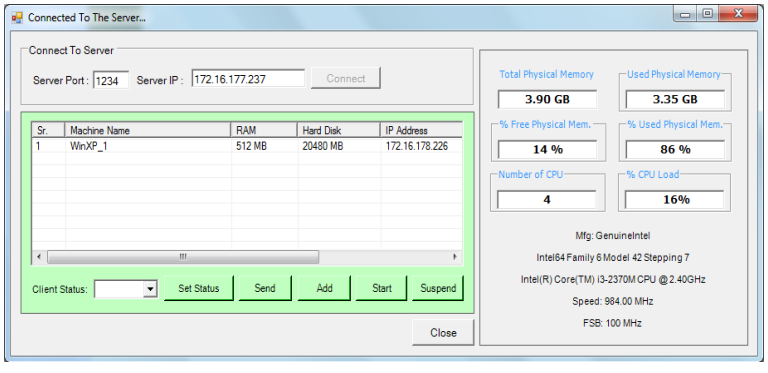

Fig. 4: Resources monitoring system on Host side having virtual machines reside inside host.

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Network Connectivity:
Server and client connected to each other using some logical link, as shown in figure 1. This logical link is called as "SOCKET". For socket programming Winsock 6.0 control is used which allow two different machines to communicate through the functions like Listen (), Connect (), Accept (), SendData () and GetData (). Figure 1 shows how connection is established between client and server.

End-user Application:
End-user first establish connection to the server and after connection is established user provides its input request for specific configuration of machine to master server which act as inventory manager as shown in figure 5. Master will analyze the request and finds efficient and suitable VM machine, provide access to the end-user by providing remote system information such as user-ID and its password.

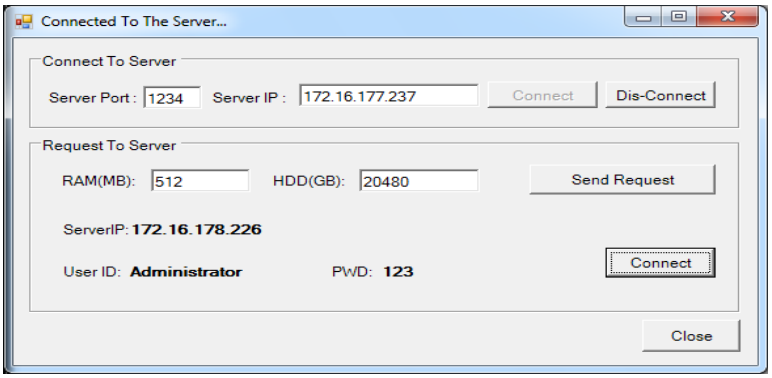

Fig. 5. End-user communicating with server and requesting for required machine, and in return server allocating user-ID, Password to the end-user if the requested machine is available.

Inventory management system:
Server manages record of connected idle client along with its own connected host machines as shown in figure 6. It allocates relevant and efficient VM to the requesting end-user if request is matched and machine available. Server allocates user-ID, password to the end-user as shown in figure 6. It also keep records of allocation of VM to end-user and also manages configuration and re-configuration of Virtual Machines. The general test case scenario of overall system is shown in Table I. Using Remote Desktop Protocol the connection is established between end user and its requested VM. RDP internally uses Microsoft Desktop terminal service allowing remote access of VM to the end-user.

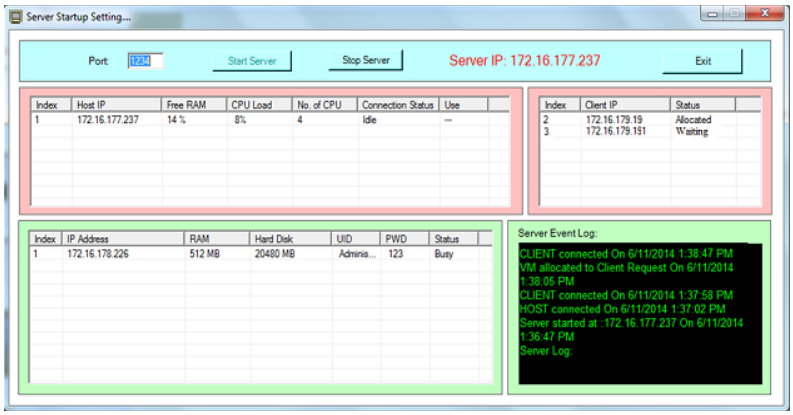

Fig. 6: Inventory management system keeping track for each connected clients such as either host or end-user and also allocates VM as a response to respective request of end-user.

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With Remote Desktop Connection, one machine running Windows can connect to another computer running Windows that's connected to the same network or to the Internet. For example, like we are using resources from our home computer.

For connection with the remote computer, computer must be turned on, Remote Desktop must be enabled, it must have network access to the remote computer (this could be through the Internet), and should have permission to connect. For permission to connect, machine must be on the list of users. Before starting a connection, it's a good idea to look up the name of the computer connecting to and to make sure Remote Desktop connections are allowed through its firewall.

There are different scenario identified while considering inventory management is as shown in table 1. The each column entry in table represent status of entities involved in provisioning of VM on demand.

Sr no	Server	Matching Status	VM status	End-user
1	Machine available	Found	VM Allocated	Connection established
2	No machine available	No match Found	Busy	Display message no machine available
3	Machines available but it doesn't match with either RAM or HardDisk	No match Found	Busy	Display Available machines
4	Machines available and matches with RAM	RAM matched	Configure HardDisk and made it allocated	Display waiting message, establish connection after configuring
5	Machines available and matches with HardDisk	HardDisk matched	Configure HardDisk and made it allocated	Display waiting message, establish connection after configuring

Table 1: Test scenarios with different situations.

V. CONCLUSION AND FUTURE WORK

This paper, discussed about cost effective scheme for effective utilization of VM by implementation of an inventory management system in which server manages heterogeneous system having different configurations which are used for allocation of efficient virtual machine to the end-user. This system handles dynamic request, for the requirement of VMs, suggest efficient and suitable VMs with their configuration, but if the required VM is not available then we are going to find machine with at least any one requirement matching i.e. either RAM or HardDisk while re-configuring other. And providing that machine access to the end-user with minimum time delay. If neither of this happen in that case user will be in waiting state.

The expected outcome of the system is to save unused energy and resources by making it available for use to the cloud computing system, so it get utilized. This is advantages to the small as well as large organizations such as for establishing their own infrastructure without investing too much of cost by simply donating their machine access. So that Institutions/ Enterprises can effectively utilize their resources by controlling the VM state i.e. on demand activation without investing large expenses. As CSP will include charges for only managing and transferring the resource instances, to required places within that organization itself. For the future use we will try for making highly configured virtual machine by utilizing resources of two or more activated virtual machine.

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BIOGRAPHY

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