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Dynamic Resource Allocation Using Virtual Machines for Cloud Computing Environment

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ABSTRACT

The main advantage of cloud computing is that it is capable of handling a huge amount of growing work in a predestined manner for the usage of the business customers. The main enabling technology for cloud computing is virtualization which generalize the physical infrastructure and makes it easy to use and manage.In this paper virtualization is used to allocate resources based on their needs and also supports green computing concept."Skewness" concept is introduced here in which the same is minimized to combine various workloads to improve the utilization of the server. Overload avoidance is maintained in this paper which leads to achieve good performance.

1 INTRODUCTION

This paper mainly concentrates on two main concepts overload avoidance and green computing. We also learn about how a cloud service provider is best multiplexing its virtual resources. Thus a cloud model is expected to have a scale up and down in order to manage the load variation. It also reduces the hardware cost and saves electricity. Sometimes the mapping of virtual machine to the physical machines a mechanism provided by the virtual machine monitors are hidden from the cloud users. its the responsibility of the cloud providers to make the resources meet their needs. The VM live migration technology makes the vm and pm mapping possible when the execution is running. The two main goals that we achieve here is

1. The capacity of PM should be able to satisfy the needs of the VM's running.
   Thus the we should maintain the utilization of PM's low as possible.
2. The number of PM's should be minimized.
   Thus in this case we have to maintain the utilization of Pm's high.

The three main contributions we have made in this paper are

- To avoid the overload we develop a resource allocation system is maintained thus by minimizing the total number of servers used.
- To measure the utilization of the server we introduce a concept "skewness" and by minimizing this we can find the utilization of the servers.
- We also design a load prediction algorithm to encounter the future resource usages.

Virtual machine monitors:

VMM or hypervisor is a host program that allows a computer to support multiple and identical execution environments. There are two types of hypervisors available

- Type 1 vm's run directly on the host's hardware which controls the same and manages the operating system.
- Type 2 hypervisors run within a operating-system environment.

Virtual machines:

Virtual machines are the software implementation of a computer in which an operating system can be installed and run.

Virtualization: Virtualization is creating a virtual version of a hardware platform, an operating system or a network resource. Here the cpu is shared among the operating systems. Memory is shared using more level of indirections. Virtualization architecture provides an illusion through a hypervisor.

2 SYSTEM ARCHITECTURE

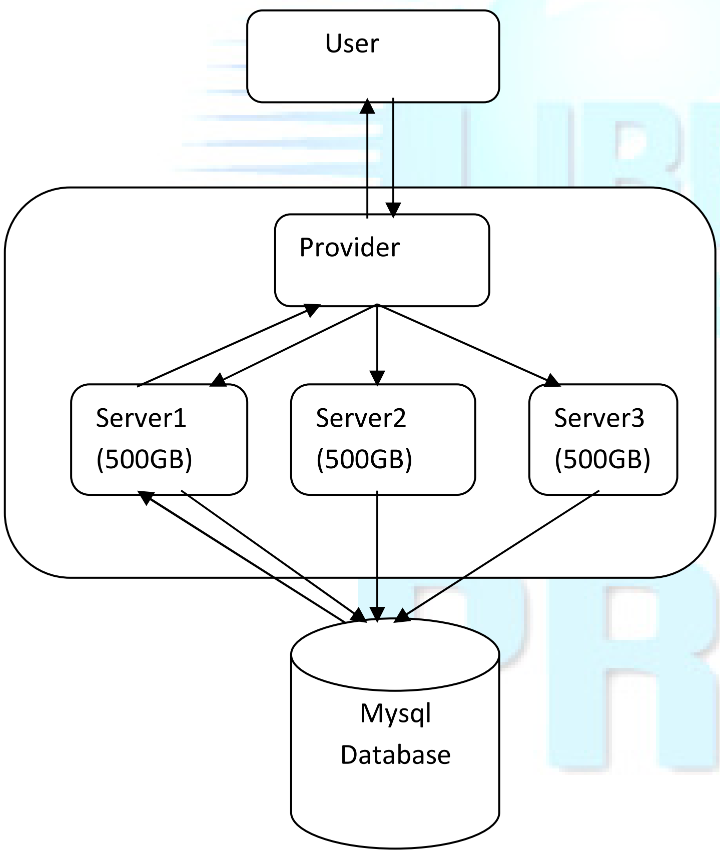

Fig. 1 System Architecture

The architecture of this system is to create a domain for a particular company. After creating a domain that has to be sent to the provider. The provider will check if some other domain exists with the same name or not. If not the provider will send the approval and if some other domain exists with the same name then an acknowledgement will be given by the provider. If the approval is given then the webpage will be hosted successfully.

Threshold is the intensity that must be exceeded for certain result or a particular condition.

Skewness is to define the extent to which a distribution differs.

The multiplexing of VM 's to PM's is thus managed by the above framework. The main logic is implemented as plug ins which runs on domain 0 and collects various information for each VM . The cpu and network usage can calculated and monitored. The statistics collected at each PM are sent to the controller where our VM is running. The predictor predicts the demands of VM and loads of the PM. Here two types of threshold are used one is the hot threshold and the other is the cold threshold.

The hotspot scheduler finds if the utilization of PM 's is above the hot spot threshold the VM 's running on them will be moved to minimize the load .The cold spot threshold finds if the usage is below the green computing threshold ,then some of the PM's will be turned off to save energy. It also identifies if the usage of the PM is below the limit then it tries to move all the VM's. It then finally sends to the controller for execution.

3 SKEWNESS ALGORITHM

We introduce a concept skewness which would be useful to measure the a variable utilization of the server. By minimizing skewness we can find the various utilization of the servers.

Hot spot is a small area in which there is relatively higher temperature than the surroundings.

Cold spot is the area in which there is a decrease in ambient temperature.

Here we use the hot spot and cold spot to just explain the way in which the green computing algorithm has been used .The threshold technology is thus maintained here to make it more clear.

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The overload avoidance and the green computing concept is being used to make the resource management precise.

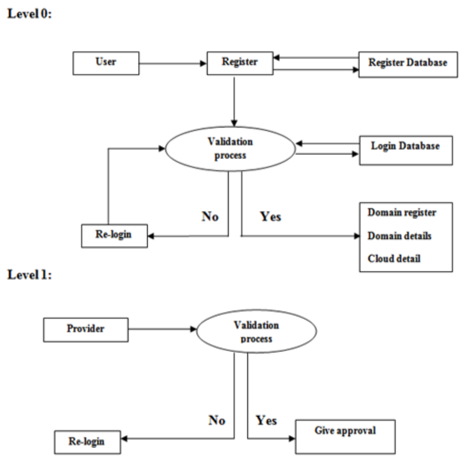

Fig. 2Hotspot and cold spot

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Our algorithm evaluates the allocation of resources based on the demands of VM.Here we define the server a hotspot and if the utilization exceeds the above the hot threshold then it symbolizes that the server is overloaded and Vm's are moved away. The temperature is zero when the server is not a hot spot. We define a cold spot when the utilization of the resources are below the clod threshold which indicates that the server is idle and it has to be turned of in order to save energy. This is done when mostly all servers are actively used below the green computing threshold else it is made inactive.

Hot spot mitigation

The sorted lists of hot spots are arranged in a order so that we can eliminate them else keep the temperature low. Our goal is to move away the VM's that can reduce the servers temperature. Among all we select the one which can reduce skewness.

Green computing

Green computing aims to attain economic viability and improve the way computing devices are used.It is the environmentally responsible and eco-friendly use of computers and their resources.

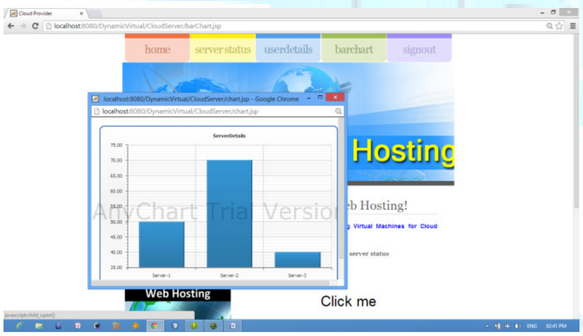
When the resources utilization of servers are low in such cases they are turned of wherein we use this greencomputing algorithm.The very important challenge here is to reduce the number of actively participating servers. Thus we have to avoid oscillation in the system.

Our algorithm is used when utilization of all active servers are below the green computing threshold.

Dynamic resource management has become an active area of research in the Cloud Computing paradigm. Cost of resource varies significantly depending on configuration for using them. Hence efficient management of resource is of prime interest to both Cloud Provider and Cloud Users. The success of any cloud management software critically depends on the flexibility; scale and efficiency with which it can utilize the underlying hardware resource while providing necessary performance isolation. Successful resource management solution for cloud environments needs to provide a rich set of resource controls for better isolation, while doing initial placement and load balancing for efficient utilization of underlying resource.

VM live migration is widely used technique for dynamic resource allocation in a virtualized environment. The process of running two or more logical computer system so on one set of physical hardware.

Screen shots



4 CONCLUSIONS

we have implemented the resource management concept in cloud computing in which we have reached the goal of achieving the overload avoidance and green computing concept successfully. We have also used the skewness concept to combine the VM's so that all the servers are utilized.

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