

Migration of Virtual Machines for Better Performance in Cloud Computing Environment

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ABSTRACT: Cloud computing allows business customers to scale up and down their resource usage based on needs. Many of the touted gains in the cloud model come from resource multiplexing through virtualization technology. In this paper, we present a system that uses virtualization technology to allocate data center resources dynamically based on application demands and support green computing by optimizing the number of servers in use. We introduce the concept of “skewness” to measure the unevenness in the multidimensional resource utilization of a server. By minimizing skewness, we can combine different types of workloads nicely and improve the overall utilization of server resources. We develop a set of heuristics that prevent overload in the system effectively while saving energy used. Trace driven simulation and experiment results demonstrate that our algorithm achieves good performance.

KEYWORDS: virtualization, types of cloud, migration, Usher framework, skewness algorithm

I.INTRODUCTION

Cloud computing become a popular technology and it is used to refer to different technologies, services, and concepts. It is also associated with virtualized infrastructure or hardware on demand, IT outsourcing, platform and software as a service are the focus of the IT industry. A main thing about the cloud computing is able to deliver on demand IT services, which are quite diverse from each other. This variety creates a different perception of what cloud computing is among users. Despite this, it is possible to classify cloud computing services into three major categories:

1. Infrastructure as a service (IAAS)
2. Platform as a service (PAAS)
3. Software as a service (SAAS)

A. Virtualization

Virtualization is a large technology that means it provides an abstract environment whether this is virtual hardware or operating system for the run of applications. This term is often synonymous with hardware virtualization, which plays major role in efficiently delivering Infrastructure as service solutions for cloud computing. In fact, virtualization technologies have a long trail in the history of computer science and have come into many flavors by providing virtual environments at operating system level, programming language level and application level. Moreover, virtualization technologies not only provide a virtual environment for executing applications, but also for storage, memory, and networking.

Advantages of Virtualization

- Managed execution and isolation are the most important advantages of virtualization.
- Portability is another advantage of virtualization, mostly for executing virtualization techniques

B. Types of clouds

1. *Public clouds:* the cloud is open to the public premises

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2. *Private clouds*: the cloud is implemented within the private premises of an institution and generally made accessible to the members of the institution.

3. *Hybrid or Heterogeneous clouds*: The Hybrid cloud is a combination of the two previous solutions and most likely identifies a private cloud that augmented with resources or services hosted in a public cloud

4. *Community clouds*: the cloud is characterized by a multi-administrative domain, involving different deployment models (public, private and hybrid) and it is specifically designed to address the needs of a specific industry.

C. Migration

Virtual machine migration takes a running virtual machine and moves it from one physical machine to the other physical machine. This migration should be transparent to the guest operating system, and remote clients of the virtual machine. It must be appear to all parties involved that the virtual machine did not change its location.

II. EXISTING SYSTEM

In our algorithm we have to achieve goals mention below:

- Overload avoidance: the capacity of a PM must be sufficient to satisfy the resource needs of all VMs running on it. If it is not sufficient, the PMs are overloaded and it can lead to degraded performance of its VMs.
- Green computing: the number of PMs used might be minimized as long as they can still satisfy the needs of all VMs. Idle PMs can be turned off to save energy.

There is an inherent trade-off between the two goals in the face of changing resource needs of VMs. For overload avoidance, we should keep the utilization of PMs Low to reduce the overload in case the resource needs of VMs increase later. For green computing, we should keep the utilization of PMs reasonably high to make efficient use of their energy. Here we present the design and implementation of an automated resource management system that achieves two goals. We make the following contributions:

- We adopt a resource allocation system that might be avoiding overload in the system effectively while minimizing the number of servers used.
- Here we adopt the concept of “skewness” to measure the uneven utilization of a server. By minimizing skewness, we will improve the overall utilization of servers.
- We adopt the concept of a load prediction algorithm that can capture the future resource usages of applications accurately without looking inside the VMs.

A running Usher system consists of three main components: local node managers (LNMs), a centralized controller, and clients. A client consists of an application that utilizes the Usher client library to send virtual machine management requests to the controller. We have written a few applications that import the Usher client library for managing virtual machines with more under development.

A. Local Node Managers

The local node managers (LNMs) operate closest to the hardware. As shown in Figure 2, LNMs run as servers on each physical node in the Usher system. The LNMs have three major duties: i) to provide a remote API to the controller for managing local VMs, ii) to collect and periodically upload local resource usage data to the controller, and iii) to report local events to the controller.

B. Usher Controller

The controller is the center of the Usher system. It can either be bootstrapped into a VM running in the System, or run on a separate server.

The architecture of the system is represented in Figure 1. Each PM runs the Xen hypervisor (VMM) [1] which have privileged domain 0 and one or more domain U [2]. Each Virtual Machine in domain U have one or more applications those are Web server, remote desktop, Domain Naming System, Mail, Map/Reduce etc. We assume that all PMs Share backend storage. The multiplexing of VMs to PMs is controlled by using the concept of Usher framework [3]. This project is implemented by a set of plug-ins to usher. Each node have an Usher local node manager (LNM) on

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domain 0, it should collect the usage statistics of resources for each VM on that node. The CPU and network usage managed by scheduling events in Xen. The memory usage within a VM is not possible to control the hypervisor. The Best way is to infer memory shortage of a VM by observing its swap activities. The guests OS have to install a separate swap partition. It might be too late to adjust the memory allocation at the time swapping occurs. Instead we implemented a working set prober (WS Prober) on each hypervisor to calculate the working set sizes of VMs running on it.

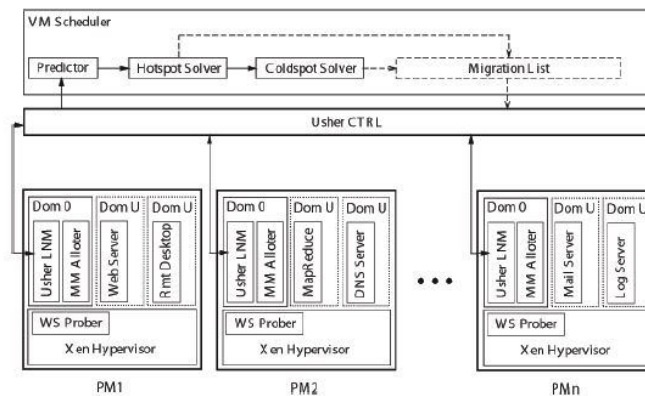


Figure 1: Architecture of Existing System.

We have to use the random page sampling technique as in the VMware ESX Server [4]. The statistics are collected at each PM are forwarded to the Usher central controller (Usher CTRL) where our VM scheduler runs. The VM Scheduler is accessed periodically and receives from the LNM the resource demand history of VMs, the capacity and the load history of PMs, and the current layout of VMs on PMs. The scheduler has several components. The predictor should predict the future resource demands of VMs and the future load of PMs depend on past statistics. We compute the load of a PM by aggregating the resource usage of its VMs. The LNM at each node first attempts to satisfy the new demands locally by adjusting the resource allocation of VMs sharing the same VMM. Xen can change the CPU allocation among the VMs by adjusting their weights in its CPU scheduler. The MM Alloter on domain 0 of each node is responsible for adjusting the local memory allocation. The hot spot solver in our VM Scheduler detects if the resource utilization of any PM is above the *hot threshold* (i.e., a hot spot). If so, some VMs running on them will be migrated away to reduce their load. The cold spot solver checks if the average utilization of actively used PMs (APMs) is below the *green computing threshold*. If so, some of those PMs could potentially be turned off to save energy.

Drawbacks:

1. Virtual Machines are migrated by the Physical Machines temperature
2. Calculating the temperature is may not be accurate due to the fluctuations.

IV. PROPOSED SYSTEM

A. Project Flow

In Figure 2 have the flow of execution of project. By using the skewness algorithm we find out the PM which has the higher overload. After find out PM we should sort the VMs in particular PM then migrate the some VMs which have the highest memory allocation

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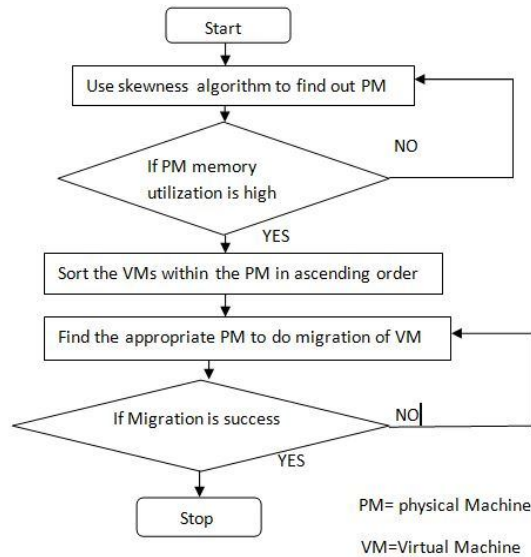


Figure 2: Project Flow of Execution

B. The Skewness Algorithm

We introduce the concept of skewness to quantify the unevenness in utilization of multiple resources on a server. Let assume that n is the number of resources and r_i is the utilization of the i -th resource. We Calculate resource skewness of a server P as

$$skewness(p) = \sqrt{\sum_{i=1}^n \left(\frac{r_i}{\bar{r}} - 1\right)^2}$$

Here \bar{r} is the average utilization of all resources for server p . By minimizing the *skewness*, we have to combine different types of workloads nicely and improve the overall utilization of server resources.

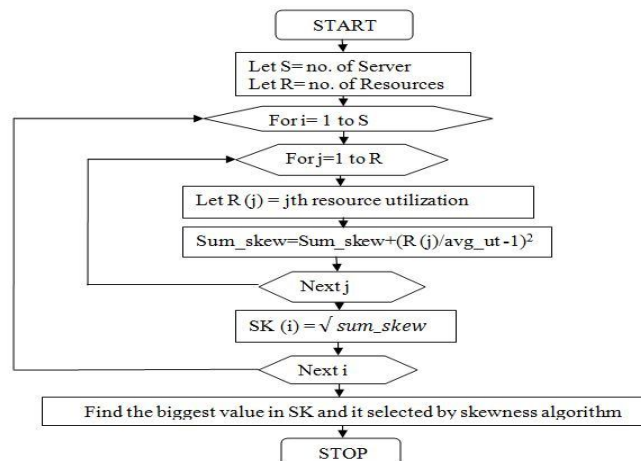


Figure 3: Skewness Algorithm Working Process

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C. Working process of algorithm

Here we consider S is the no. of servers and R is the no. of resources in datacenter. If the resource utilization is more than the threshold value then it migrate some virtual machines from one Physical machine to the other machines.

V. CONCLUSION

Better Performance can achieve by migrating the virtual machines with high memory utilization from overloaded servers obtained by using skewness algorithm. The proposed system will ensure overload avoidance.

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BIOGRAPHY



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