Resource Allocation Methodology Using Virtual Machines for Hybrid Cloud Computing Environment

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Abstract:

In this paper we demonstrate the potential utility of resource allocation management systems that use virtual machine technology to achieve Overload Avoidance. The capacity of a PM should be sufficient to satisfy the resource needs of all VMs running on it. Otherwise, the PM is overloaded and can lead to degraded performance of its VMs. This proposed system consists of number of servers, predictor, for hybrid cloud computing environment. Predictor is used to execute periodically to evaluate the resource allocation status based on the predicted future demands of virtual machines. The design, implementation, and evaluation of a resource management system are presented for cloud computing services. User can easily identify the load on server from the graph and thus avoid overload on server. This reduces the average decision time regarding resource allocation decisions.

I.   INTRODUCTION:

Cloud computing refers to a set of software products that are sold as a service, managed by a third party provider, and delivered over a cloud based network. Cloud computing enables companies to consume compute resources as a utility. Cloud computing promises several attractive benefits for businesses and end users. Computing resources are measured at a granular level, allowing users to pay only for the resources and workloads they use. Private cloud services are delivered from a business data center to internal users. This model offers versatility and convenience, while preserving management, control and security. In the public cloud model, a third-party provider delivers the cloud service over the Internet. Public cloud services are sold on-demand, typically by the minute or the hour. Resource management includes resource discovery, resource scheduling, resource allocation and resource monitoring. Resource discovery identifies the suitable physical resources in which the virtual machines are to be created matching the user's request. Resource scheduling selects the best resource from the matched physical resources. It actually identifies the physical resource where the Virtual machines are to be created to provision the resources from cloud infrastructure. Resource allocation allocates the selected resource to the job or task of user's request. Resource allocation is to determine the type and amount of resources needed to fulfill a user's request. On the other hand, scheduling is usually used to denote how the sub-tasks of the user's request isassigned to particular resources.

II.   VIRTUAL MACHINE:

In computing, a virtual machine (VM) is an emulation of a particular computer system. Virtual machines allow you to run an operating system in a window on your desktop. Use them to run software made for other operating systems, experiment with different operating systems, and sandbox software. 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. A virtual machine program is a computer program that creates a virtual computer system, complete with virtual hardware devices. This virtual computer "machine" runs as a process in a window on your current operating system. You can boot an operating system installer disc inside the virtual machine, and the operating system will be "tricked" into thinking it's running on a real computer.

It will install and run just as it would on a real, physical machine. Whenever you want to use the operating system, you can open the virtual machine program and use it in a window on your current desktop.Virtual machines have a number of serious uses. They allow you to experiment with another operating system without leaving your current operating system. They're a good way to play with Linux, or at least a new Linux distribution, without actually installing that Linux distribution on your current hardware or even just booting to a live CD or USB drive. When you're done with an operating system, you can just delete the virtual machine.

A virtual machine is also a great way to test out a new version of Windows. With the Windows 10you can avoid potential system instability by installing it in a virtual machine to play with it rather than installing it as your sole operating system. The sandboxing also allows you to run insecure operating systems more safely. If you still use an application that absolutely requires Windows XP, you could run it in a Windows XP virtual machine. Sure, it'd be ideal to leave Windows XP behind completely — but it'd be better to confine Windows XP to a virtual machine than to run it as a computer's normal operating system.

III.   RELATED WORK

VM live migration is a widely used technique for dynamic resource allocation in a virtualized environment. Our work also belongs to this category. Sandpiper combines multi-dimensional load information into a single Volume metric. It sorts the list of PMs based on their volumes and the VMs in each PM in their volume-to-size ratio (VSR).In the proposed architecture, using feedback control theory, for adaptive management of virtualized resources, which is based on VM. In this VM-based architecture all hardware resources are pooled into common shared space in cloud computing infrastructure so that hosted application can access the required resources as per there need to meet Service Level Objective (SLOs) of application. The adaptive manager use in this architecture is multi-input multi-output (MIMO) resource manager, which includes 3 controllers:

Dynamic Resource Allocation using Virtual Machines for Cloud Computing Environment 219 Published By: Blue Eyes Intelligence Engineering & Sciences Publication Pvt. Ltd. CPU controller, memory controller and I/O controller, its goal is regulate multiple virtualized resources utilization to achieve SLOs of application by using control inputs per-VM CPU, memory and I/O allocation. The seminal work of Walsh et al., proposed a general two-layer architecture that uses utility functions, adopted in the context of dynamic and autonomous resource allocation, which consists of local agents and global arbiter.

The responsibility of local agents is to calculate utilities, for given current or forecasted workload and range of resources, for each AE and results are transfer to global arbiter. Where, global arbiter computes near-optimal configuration of resources based on the results provided by the local agents. In this, author proposes an adaptive resource allocation algorithm for the cloud system with preempt able tasks in which algorithms adjust the resource allocation adaptively based on the updated of the actual task executions. Adaptive list scheduling (ALS) and adaptive min-min scheduling (AMMS) algorithms are use for task scheduling which includes static task scheduling, for static resource allocation, is generated offline.

The online adaptive procedure is use for re-evaluating the remaining static resource allocation repeatedly with predefined frequency. The dynamic resource allocation based on distributed multiple criteria decisions in computing cloud. In it author contribution is tow-fold, first distributed architecture is adopted, in which resource management is divided into independent tasks, each of which is performed by Autonomous Node Agents (NA) in ac cycle of three activities:

(1) VM Placement, in it suitable physical machine (PM) is found which is capable of running given VM and then assigned VM to that PM,
(2) Monitoring, in its total resources use by hosted VM are monitored by NA,

(3) In VM selection, if local accommodation is not possible, a VM need to migrate at another PM and process loops back to into placement and second, using PROMETHEE method, NA carry out configuration in parallel through multiple criteria decision analysis. This approach is potentially more feasible in large data centers than centralized approaches.

IV. PROPOSED SYSTEM

This proposed system consists of number of servers, predictor, for hybrid cloud computing environment. The Set of servers used for running different applications. Predictor is used to execute periodically to evaluate the resource allocation status based on the predicted future demands of virtual machines.

Goals to Achieve

• Overload Avoidance The capacity of a PM should be sufficient to satisfy the resource needs of all VMs running on it. Otherwise, the PM is overloaded and can lead to degraded performance of its VMs.
• Green Computing the number of PMs used should be minimized as long as they can still satisfy the needs of all VMs. Idle PMs can be turned off to save energy.

V. RESULTS AND DISCUSSION

The design, implementation, and evaluation of a resource management system are presented for cloud computing services. User can easily identify the load on server from the graph and thus avoid overload on server. Thus reduce the average decision time regarding resource allocation decisions

Setting Up a Virtual Machine:

Cloud services rely on virtualization they offer virtual machines where customers can run software without setting up physical machines but containers still make sense when running atop virtual machines. You can still increase efficiency if not quite as much. The cloud computing environment you may have to setup network between virtual machines which are running on VMware workstation and Virtual Box. These separate virtual machines can be on same host or different host.

Setting up network on same desktop virtualization software is very easy once you understand the available network type. To configure a VM, you need to be using a running version of ESX, or you can download and use VMware Server from the VMware Web site. (www.vmware.com). VMware while not extremely difficult to use, can be very confusing to those first learning it. If you are new to VMware, it is highly recommended that you visit the links section and connect to the VMware Web site documentation and download a version that you can work with on your desktop. For those running production systems and/or ESX server, to prepare for a VM install, you need to follow most of the same steps you would when installing an operating system on a physical system – you need to check the host operating systems minimum hardware requirements as an example.

There are a few general items that you need to be aware of when configuring a new VM with VMware. First, when considering a new VM, you need to be aware of your total resources. VMware works off of resource pools and the theory of using slicing. When you create a new VM, resource must be taken for it therefore you must know how much you need and how much you have. For example, in this article we will create a new Windows XP Professional VM. Hypothetically speaking, if we needed this new VM for software testing and the minimum hardware requirements are now maximized, you may run out of resources very quickly.
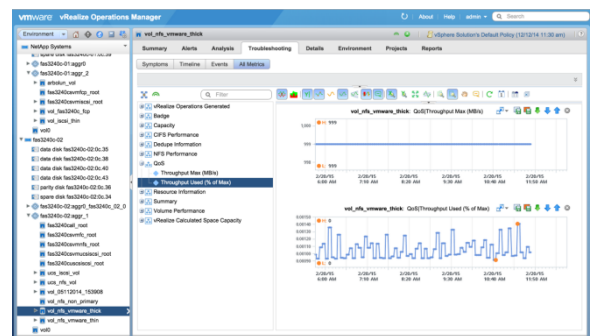
Secondly, you must consider how you will install the host operating system. Since you still need installation media such as CDs, DVDs or an ISO file, it needs to be accessible to the VMware infrastructure and you need to configure it within your new VM. Lastly, you should have a connection to the Internet via your VMware infrastructure to run Windows (or Microsoft) update to patch and repair your guest operating system. Now that you know a few general guidelines, let's set up prepare to create a VM.
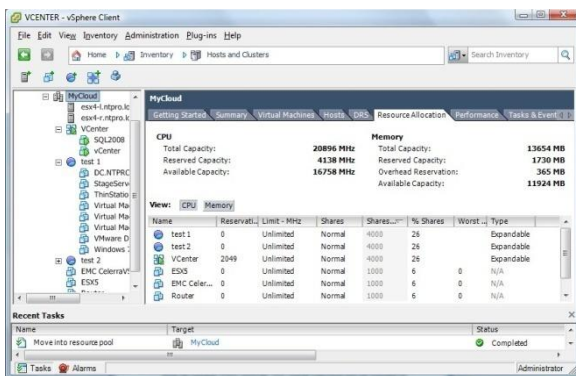
Now that your installation files (and needed drivers) are uploaded then nexttask is to create a VM to install Windows XP into. To create a VM, you first need to create the container that the host system will sit in. Since VMware is essentially the sharing of resources, you will have to configure each one of those resources in order for your install to take place. For example, you will need to configure a way for the VM to find the ISO file on the LUN. To do this, you must fist create a VM. Then, once the VM is created, you will need to map the VM to the LUN to find the ISO file to run the install from. The easiest way to do this is with the Virtual Machine Wizard.

Once you have selected all of the resources you need and have configured your VM with the appropriate settings, now it's time to click Finish. You can also edit the VM after it's created but since we selected to edit the VM settings before the VM finishes creating.
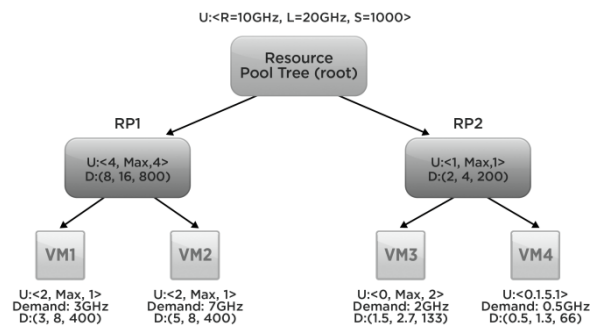
Setting Up a Virtual Machine

Resource pools allow you to delegate control over resources of a host (or a cluster), but the benefits are evident when you use resource pools to compartmentalize all resources in a cluster. Create multiple resource pools as direct children of the host or cluster and configure them. You can then delegate control over the resource pools to other individuals or organizations.


A VMware administrator can choose how much of each physical resource to allocate to each new VM and allocate portions of these logical resource groups to various users, add and remove compute resources, or reorganize pools as required.

The VMware resource pool manages and optimizes these physical resources for virtual systems within a VMware Distributed Resource Scheduler (DRS) cluster. With memory over commit, more resources can be allocated to VMs than are physically available. Changes that occur in one resource pool will not affect other, unrelated resource pools VMware administrators create.
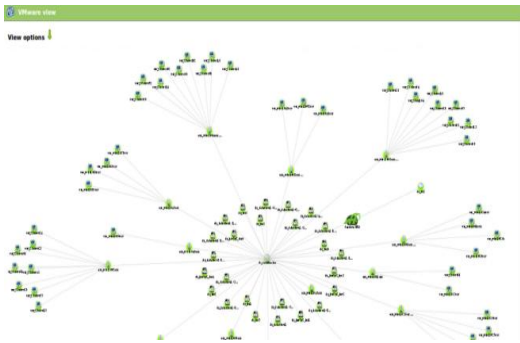
VI.   CONCLUSION

We have presented the design, implementation, and evaluation of a resource management system for hybrid cloud computing Environment. The VMware provides us with a high flexible platform that helps the cloud service provider to manage, upgrade and visualize the hybrid cloud resource usage. By creating "N" number of VM's it is easy to understand the working of load balancing methodology without compromising the client data while restricting the cloud service provider to access the client data.

The results are clear and having good contribution:
1) Allocation of resource is done dynamically.
2) Saves the energy using the green computing concept
3) Proper utilization of servers and memory utilization is taken care using skewness.
4) Minimize the total cost of both the cloud computing infrastructure and running application.

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