ISSN: 2348 - 2117

International Journal of Engineering Technology and Computer Research (IJETCR)
Available Online at www.ijetcr.org
Volume 3; Issue 3; May-June 2015; Page No. 72-75

Design & Evolution of Performance of Various Virtual Machines in Hybrid Cloud Environment using KVM

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Abstract:
The Virtualization refers that where the actual machine is not available to the user but it work as actual resources. Thus the virtualization play good role in the resource provisioning for the cloud controller. Cloud computing provides the facility to access shared resources and common infrastructure, offering services on demand over the network to perform operations that meet changing business needs.The virtualization is very important for the IT organization allows the association and sharing of IT resources so that they can be shared over various applications. In this paper we proposed a process of analysis of performance in the CPU Time, Memory usage, percent CPU for the different virtual machines of Ubuntu and WinXP's using the KVM hypervisor in hybrid visualization environment. Our objective is how the performance affects the different virtual machines on single host and takes a proper decision for the selection of best virtual machine for the cloud user.

Keywords: Cloud computing, Virtualization, KVM.

1 Introduction

Cloud computing is a computing area, where a large pool of system is connected in a private or public network to provide dynamically scalable infrastructure for application, data and storage [1]. Cloud computing is a lucrative technology, which is used to cost of computation, application hosting, content storage. The hybrid Cloud which is combination of private Cloud and public Cloud is becoming an important part of the commercial Cloud computing model [5]. In a hybrid Cloud private Cloud can be treated as secure Cloud [2].

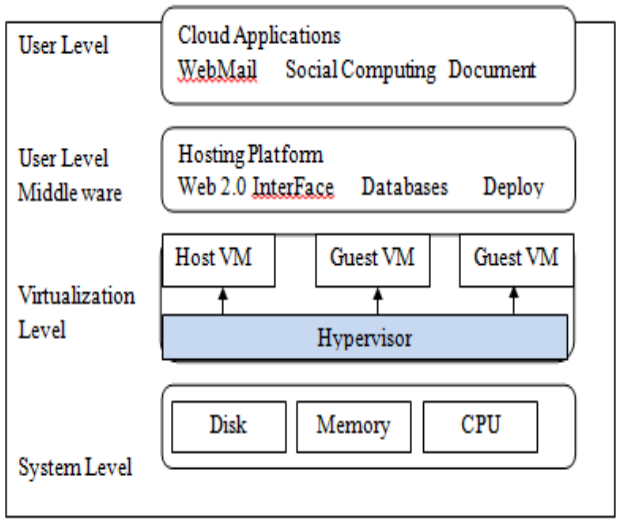

Figure 1: General View of Cloud System

1.1 Deployment Model of Cloud Computing

A Cloud can be deployed with various types of models which are as follow

- **Public Cloud:** This Cloud system is known as pay-as-you-go model. This virtual infrastructure update the all the information through a portal. Customer can be request to a provider according to his need. It gives all the security assurance and managed all the resource. Amazon Web Service EC2 (Elastic Compute Cloud) is the first public Cloud that manages the public Cloud. Public Cloud gives a user scalability and flexibility of his data. Users do not worry about data backup and other storage issue. The main issues of Public Cloud is when any client subscribing to a Public Cloud it have little control over the Public Cloud architecture, performance with compare to other Cloud environments.
- **Private Cloud:** A Private Cloud is known as internal Cloud. Private Cloud is set up within an organization's internal project datacenter. It is obvious that this way has a more secure background than the traditional public Clouds. However the Cloud broker is worried about the authentication of Cloud data. Example of private Cloud is ebay. ebay is provide secure connation and service for trading purpose.
- **Hybrid Cloud:** The hybrid Cloud is a mixture of both a private and public Cloud. This can involve work load being processed by an enterprise data center while other

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activities are provided by the public Cloud. Hybrid Cloud gives user to data flexibility and security of data also.

1.2 Virtualization in Cloud: Virtualization is a widely used term basically; it refers to the abstraction of physical and other resources. Virtualization offers standard interfaces for applications and Operating Systems and removes their dependency on the underlying hardware or software layer. Hardware resources can be multiplexed between several Operating Systems and made to look like something else using virtualization. It is possible to virtualized complete machines or just parts of the machine. VMM (Virtual Machine Monitor) is the abstraction layer that hides the hardware below and provides a generic interface for the Virtual Machines. The Applications and operating systems run as they were run on the physical hardware. VMs are isolated from each other by VMM so that they cannot affect to each other. A key component of Hybrid Cloud Computing is virtual infrastructure management, which provides some virtualized resource in virtualization platform such as Xen, kernel base virtual machine, VMware by the management of Virtual Machine provide storage requirement and user policies.

2 Problems and techniques for securing the Hybrid Cloud Computing

The area of hybrid Cloud is very large so it can suffer from various problems. Hybrid Cloud can suffer from problems like – Authentication of hybrid Cloud data, Authentication of Public Cloud in Hybrid Cloud Model, developing the eco-efficient Cloud data center, a cost saving of hybrid Cloud. Hybrid Cloudalso faces some challenges like- Data protection, Data recovery and availability, Disaster recovery, Capacity and performance management, Regulatory and Compliance Restrictions [11] [9][14][11][12].

2.1 Components of Virtualization

Hypervisor: It is software layer between hardware and Virtual Machine (VM) which allows virtualization. It is use to providing the virtual environment of the various operating systems on a single host. It managed the user systems and make sure that the resources are allocated to the guests requirements. There are two types of Hypervisor. The hypervisor is known as native or bare metal hypervisor. It is the lowest level of hypervisor. This hypervisor is directly run on the host machine. All the allocation of memory, disk, CPU etc are done by this hypervisor. These hypervisors have very limited drivers so limited hardware can be installed by these hypervisor. This hypervisor is generally used in server virtualization the hypervisor run on full host operating system to operate. This means that is working on the top of the host operating system. It requires fewer driver/hardware to interface with the host operating system. So that is has less issue to operate it. This hypervisor is used in Java Virtual Machine (JVM) to used application portability.

3 Proposed Work

In the experimentation work we will use the Kernal based Virtual Machine (KVM) hypervisor.

3.1 Kernel-based Virtual Machine:

Kernel-based virtual machine (KVM) is a Virtualization tool for the Linux kernel on the x86 hardware platforms. It used the Intel VT-x and AMD-V technology, to allow for virtualization. KVM is an open source-project that is a kernel module which is supplied with each major community and enterprise level Linux distributions. KVM offers an interface, /dev/kvm, which a user-space program, such as Qemu uses to communicate with the hypervisor. Early version of Red Hat working with Xen hypervisor but in latest version Red hat version 6 is using KVM.

First of all the Kernal Virtual Machine hypervisor setup which is already discussed in previous section after that a software requires for the performance analysis of virtualization . Once the comparison of different-2 virtual machine is completed than the benchmarking tool is used.

3.2 Libvirt

The Libvirt is a software package which interacts with the virtualization capabilities of Linux and other Operating Systems. The main objective of Libvirt is to provide a homogenous layer sufficient to securely manage domains on a node with the Libvirt node it can be managed in remotely connection. Libvirt consist a rich set of APIs needed to manage such as: provision, create, modify, monitor, control, migrate and stop the domains - within the limits of the support of the hypervisor for those operations.Libvirt is also providing the monitoring management of the Virtual machines and Libvirt's API deploysthe manage the policies, checking the domain positions, resource utilizationof node. Libvirt is also providing the TLS encryption and x509 certificates and authentication with Kerberos and SASL. The category of Libvirt command are Node commands, Domain commands, Interface commands, Network commands, Storage commands, Security commands.

3.3 Algorithm for the performance comparison of the various virtual machines:

Step 1: Create a Virtual Machine(s) software layer in Ubuntu14 14.04 platform.

Step 2: Run a Virtual Machine(s) software layer in Ubuntu14 14.04 platforms.

Step 3: Input the Ubuntu linuxcommands using the libvert directory software tool

Step 4: Libvert virtual shell performing in the operating system analysis for the system resources.

Step 5: Output of the various consumed resources in the current Virtual machine.

Step 6: Comparison of these resources with the other Virtual machines resources

The algorithmic implementation is designed according to take the iterative results from the different Virtual Machines. The objective is design to run the virtual machine in the host machine then take the system performance according to current utilization of resources like- CPU uses, RAM and memory etc.

The comparative result of different Virtual machines run in Kernel-based virtual machine (KVM) hypervisor in Ubuntu14.04 LTS. Description of System is that first system creates a virtual machine(s) in the Ubuntu14.04 after that when the virtual machine(s) is in the running state then Libvirt directory commands are performing to the current system. Thus the various virtual machines can run on the Ubuntu14.04. Every time the hypervisor is same and result is evaluated by the libvirt commands. At the last system current resources performance evaluated as how much it consumed by the system. Thus the project take various virtual machine consumption data and result generated by them are compare with the other system.

3.4 Performance parameters Use for the analysis: The performance of the various running virtual machine(s) such as CPU, RAM, Memory, Buffer, and Cache are combined for analysis. The results are evaluated in both system Host (Node) and Domain (Virtual machine).

- **User time -** It is an amount of time the CPU was busy in processing to the user program's instruction.
- **System time -** Itis the amount of time the CPU was busy executing code in kernel space. If this value is reported for a thread or process, then it represents the amount of time the kernel was doing work on behalf of the executing context, for example, after a thread issued a system call.
- **Idle time** –It is the amount of time the CPU was not busy, or, otherwise, the amount of time it executed the system idle process. Idle time actually measures unused CPU capacity.
- **Random Access Memory (RAM):** This is physical memory where the programs are run their instruction. If a Virtual machine used lots of resources then it use lots of RAM of the system. After destroy the VM from the system then RAM is free for handle to other instruction.
- **Secondary Memory**: Secondary memory is the memory which accepts the data load of virtual machine(s).
- **Buffer:** A buffer holds the data that is stored for very short amount of time, typically in the computer's memory (RAM). Sometime buffer is called the temporary storage of RAM. The purpose of a buffer memory is to hold data right before it is used. Buffer memory is used to improve several computer performances.
- **Cache Memory:** This memory is used where the computer's microprocessor can access more quickly than RAM. As the microprocessor processes data, it looks first in the cache memory and if it finds the data there (from a previous reading of data), it does not have to do the more time-consuming reading of data from larger memory.
- **Processes:** list of processes running on the host, and their loads against system.

4 Discussion & Conclusion

From the starting our objectives are taken the Implementation of different Virtual Machine with KVM hypervisors on a single Host, but due to lack of time only virtual machines are implemented only in KVM , because the KVM is good in sever virtualization. However the project full fills implementation of Virtual Machine with KVM in Ubuntu14.04 and performance of Virtual Machine are evaluating and checking the benchmarking with sysbench tool kit. After the review processed it is found that the performance measurement of Virtual machine in a Hybrid Cloud as issue of my interest. Hence, undertook a much detailed study of virtualization in computer system with hypervisor KVM, which helped me to understand the challenges faced in the design and implementation of virtual Machines in the hybrid Cloud model.

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