Monitoring and Live Migration of Virtual Machines using Open Source for Efficient Resource Utilization

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Abstract— **Virtualization technology is technique where we can serve IT users requirement with minimum available hardware resources. Live migration and Resource utilization by virtualization become more valuable in cloud computing environments. In this paper, we propose a method to monitor the virtual machines created by KVM (Kernel based Virtual Machine) for each user and perform the live migration for the efficient utilization of resources. Monitoring of each virtual machine is performed by using "virt-top" tool and then representing the result through graph using "grafana" monitoring tool. live migration of virtual machines can be used to implement virtualization. Dynamic scheduling mechanism that allocates resources based on the availability of virtual machines on Infrastructure as a service, it focuses on the live migration strategy with different resource utilization in multiple virtual machines.**

Keywords— *Component Virtualization; Kernel Based Virtual Machine; Live Migration;*

I. INTRODUCTION

Cloud computing is a technology that uses internet services to deal with the data and its applications. It allows many businesses persons and customers to apply the statistics and alertness and it could be retrieved to any computer machine which having a web connection[1]. Cloud enables IT industry to meet ever increasing business demands by managing efficient resource utilization. Cloud service is respectively called as Infrastructure as a Service (IaaS), Platform as a Service (PaaS) or Software as a Service (SaaS)[2]. Infrastructure as a Service (IaaS), it is a form of cloud computing facility that offers used to provide virtualized computing resources over the Internet. It sanctions users to access the all kind of resources, such as applications and data, from the cloud machine, from anyplace and anytime on customer demand. Virtualization in which an operating system (OS) can run the program without an installation [3]. Virtualization and migration are combined to increase the manageability[4]. The performance monitoring tool of KVM based virtualized systems can measures the CPU overhead acquired by the hypervisor on behalf of the virtual machine along-with the usage of CPU and usage of memory of the virtualized system itself [13]. The concept of live migration is introduced to satisfy the common resource requirements of the user through virtualization and to efficiently manage the resource utilization. To get effective utilization of Computer Resources, Integration of live migration on KVM can be done for sharing the work among available Resources[7][8].

II. RELATED WORK

A light weight desktop, a web browser and mobile application can be used to access Cloud based applications. Cloud computing environment allows applications to run faster, with improved manageability and less maintenance. In this technology data center of internet used to store user data to provide virtualization. In [6] authors have introduced a hypervisor or virtual machine monitor (VMM) in between operating system and hardware. Virtualization is the one of the technique used to provide efficient resource utilization by abstracting the resources like CPU and memory through generating virtual machines (VM). A virtual machine runs all process or application like a single program with a single process. It runs application like normal program how it runs in other system. The creation of the virtual machine is initiated when user is requested and destroyed when the process exits or dies. A system virtual machine gives a complete virtual hardware supported platform for execution of a complete operating system (OS)[9]. Migration can be done by shifting one applications from one machine to another for efficient and faster computation power, to gain larger memory, high speed communication skill, or reserving energy for future. In each round of pre-copy, the host machine in which required migration will copies the memory data of the VM and sends the information to destination machine [10]. It allows all the instances operating systems on host physical machine operate parallel and allow every instance of machines to share the resources available on the host machine with respect to the requirements. The resources can be the memory, cache, CPU, network, etc. It need to utilized efficiently meet the requirements of users [7]. In migration process memory migration is time consuming, for performing the live migration of virtual machines post copy method is used [9] in earlier paper but, its time consuming and it is increasing downtime [12] also. To overcome from this pre copy algorithm [10] proposed here for the resource utilization.
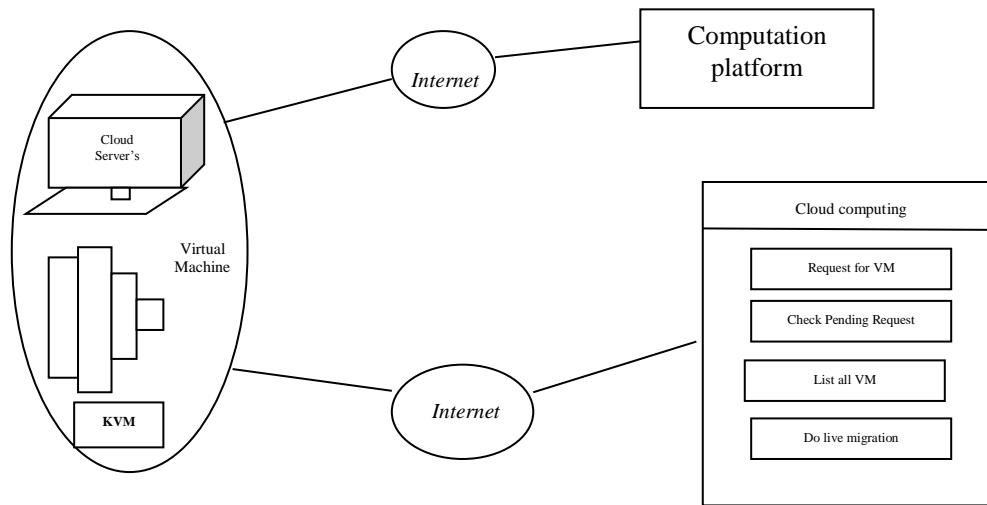
III.   PROPOSED METHOD

Fig 1. Architecture

A. Architecture

Cloud computing is the delivery of services that are provided to the client over internet. Hypervisor called KVM virtualizes platform's operating system. Linux kernel provides a virtualization technology that resides inside of it. Linux kernel can be modified with small module called KVM for virtualization. To create virtual machines on Linux kernel loading of KVM is very much required and essential one.

Strong feature are power and ease of its implementation, and constant support of Linux. Live Migration and Memory Management also strengthened by KVM. qemu-kvm, virt-manager, virt-viewer, python-virtinst are the packeges required to fully utilize the KVM support. Hypervisor manages OS's as a machine enabling the multi OS's to share a same physical hardware. People interested to use different applications must register and then login .After login to the server user can request for the VM, can check from the menu all the pending request waiting for the approval and also can list all the VM's.

B. Creation of Virtual Mechines

- Use a zero before decimal points: "0.25," not ".25." Use "cm3," not "cc." (*bullet list*)

- First step is to install KVM in system.

    sudo apt-get install qumu-kvm libvirt-bin ubuntu-vm-builder bridge-utils

- Install vim
        sudo apt-get install vim

- Create qcow2 file
        sudo qemu-img create -f qcow2 /home/ storage/jaan2.qcow2 8192

- Generate MAC address
        python macgen.py
- Create VM

sudo virt-install -r 1024 --accelerate -n jaan --vcpus=1 --os-type=Linux--file=/home/ storage/jaan2.qcow2\,\bus=virtio/cdrom/home/isosourc e/filename.iso --network bridge=virbro,model=virtio,mac=54:56:00:00:07:02 -- graphics vnc,port=6608,listen=0.0.0.0 -- noautoconsole --description --autostart --force -s 20

C. Live Migration Of Virtual Machines

Live migration can be implemented using different network type such as local area network (LAN) and wide area network (WAN) environment. Performing a KVM migration requires the same kind of CPU on the hosts, the same kernel version and shared storage among the migrating VMs. pre copy approach is used to copy pages from the memory of one machine to memory of another machine, all without interrupting the execution of the virtual machine being migrated.

IV.   IMPLIMENTATION

Steps involved in creation of live migration

Step1: If the user is new member then he has to register first and then login.

Step2: If the user is already registered then user can directly login to the website to get the services from server.

Step3: User details will be stored in the database.

Step4:   After that user can request for VM by specifying name of VM, RAM, Hard Disk, Period of usage, Purpose of VM, Operating System .

Step5: It will be sent to the server and it forwards message to Admin, who enquiries the resource availability. According to that, server creates the VM based on the specification and provides services to user.

Step6 : The server monitors the VM by using "virt-top" and "grafana"(graphical representation) tool for CPU and RAM usage. In case, request arrives for virtual

machines in another server Admin performs the live migration through server.

V. RESULTS

Figure 3 shows the CPU and Memory usage of virtual machines which are present in the server according to services provided for virtual machines. The monitoring process is performed by carbon-graphite monitoring tool. X-axis representing time allotted for VMs and Y-axis representing memory usage of VMs. Figure 4 and Figure 5, shows virtual machines which are present in the Host1 and Host2. "Virsh list --all" command can be used for this. Vm2, UBU1.4, VM1, WIN1 these are the virtual machines running in host1 and vm2 is in running stage.

Figure 6 show live migration of VM1 from Host1 to Host2. To perform live migration, VM1 should be in the running state in Host 1. The Live Migration can then be performed by specifying the particular virtual machine which needs to be migrated and IP address of Host 2 without disturbing the active network connections.
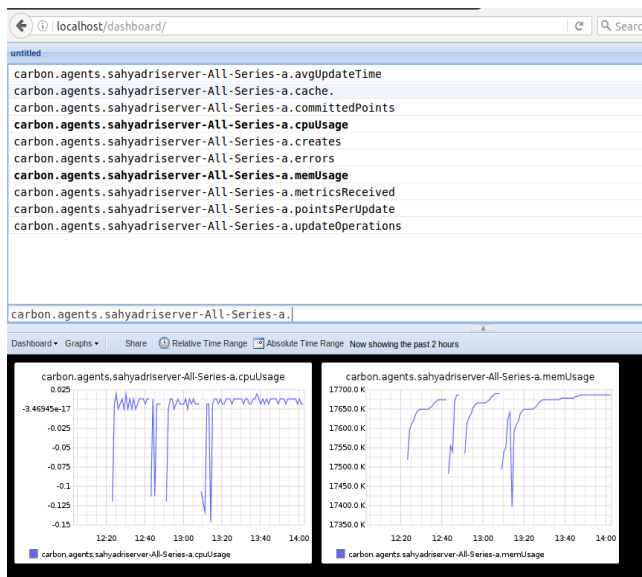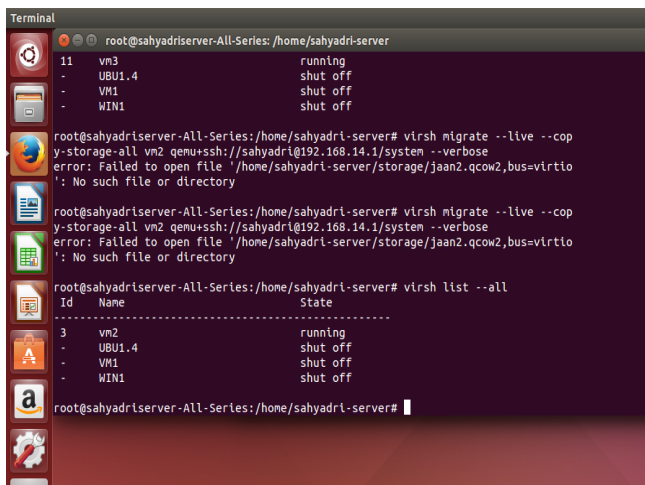

Fig .3 RAM AND CPU usage
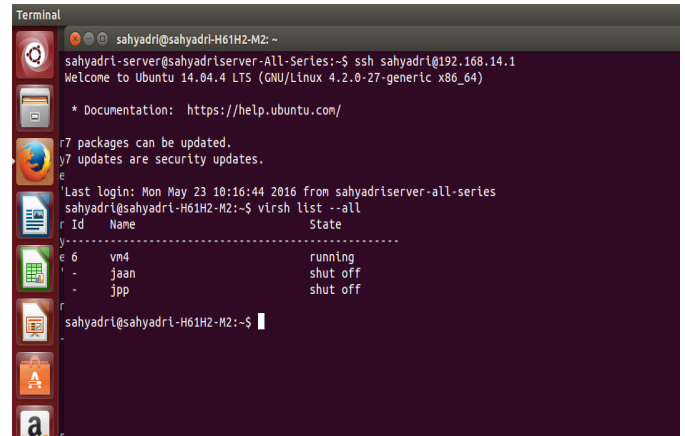

Fig .4 VMs are present in Host1
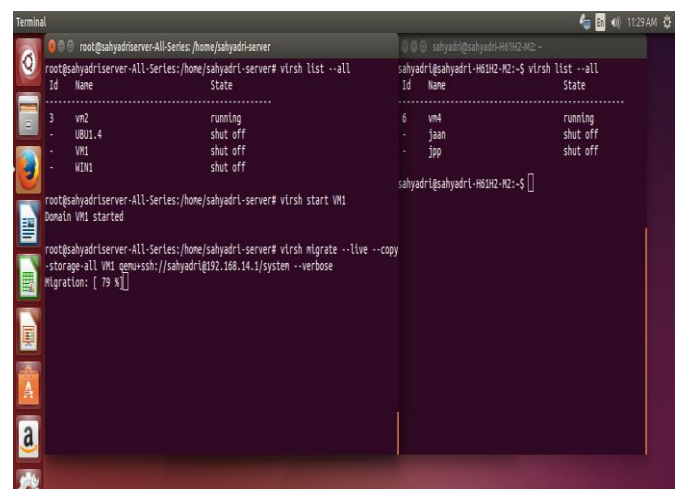

Fig .5 VMs are present in Host2

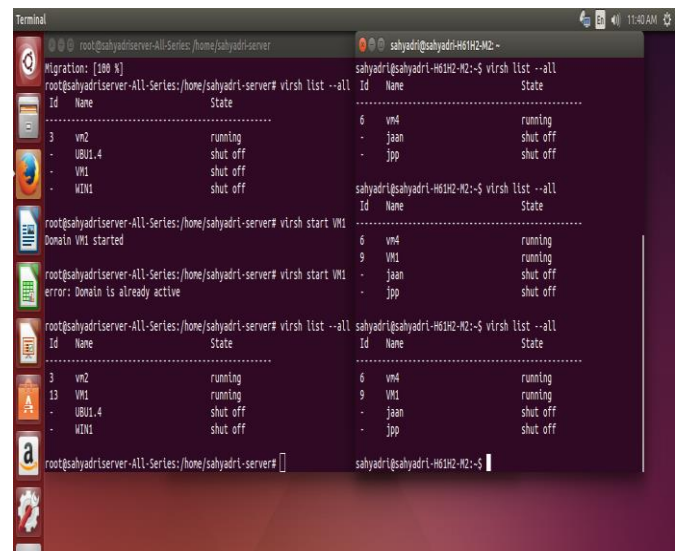Fig .6 Live Migration from Host 1 to Host2

Fig .7 After Live Migration VM1 is running in Host1 and Host2

Figure 7 shows the state of VM1 in Host 1 and Host 2 which is migrated i.e. VM1 is in running state in both.

VI. CONCLUSION

By Integrating live migration on KVM Virtual machine can be shared among different system in order to optimize computer resources. Providing virtual machines and usage of operating system without installation as specified by the user and performs live migration to satisfy the common user requirements.

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