

Virtualization: Technology Helping Environment

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Introduction

Virtualization, name itself saying virtual, means doesn't exist in real. It is a mechanism through which we can virtualize the IT resources like storage, memory, CPU etc. It is a technology which utilizes the hardware completely by virtualizing the one operating system on another. Means the hardware is one and operating system is more than one. Currently every institution, industries is using their own high-end machines/computers called servers for their different-different purposes and they consume a lot of power. Power consumption by servers is just one aspect, on the other-side servers need Air-Conditioners to balance the heat produced by servers. So in total a single server is consuming a lot of power. In study, it was seen that load on all server is not same. In such scenario where one

server is using a lot and other is using for some-time but both are consuming same power, so it is really an inefficient way of computing. Virtualization, means of creating things which actually doesn't exist. This technology has changed means of computing.

Now the concern of space and environment is taking its place in industry, forces us to think more to save space and speed-up the processes.

Based on various definitions we can say Cloud Computing is a new revolution which gives you the power to access and use all the resources of computers as a service from anywhere at anytime and from any device just by having an internet connection and you pay (optional) as much as you use.

Virtualization is the basic need of cloud computing. Virtualization means imaginary i.e. "not real". In Computer Science concept of "virtual memory" is not new. It provides an illusion of large memory to all users though actual physical size is less.

Virtualization provides an emulation of hardware (computer resources) to different virtual machines. A virtual machine is an

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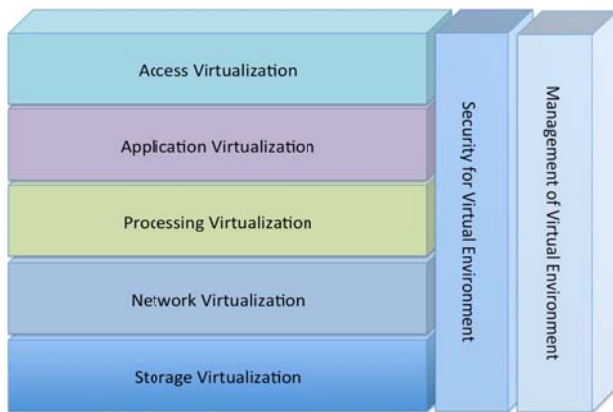
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illusion of existing machine, which uses the resources of underlying machine & works as actual machine. Broadly speaking virtualization is to run different operation system on a machine, giving an illusion that each is running on different machines.

Need of Virtualization

Cloud computing promises to give you as much as you desire. It is a fully scalable and elastic model. But to fulfill the real time demands a lot of infrastructure is required, which would require a lot of cost and energy consumption too. The solution to it is Virtualization. As with virtualization the same resource can be made available to many user concurrently. Therefore virtualization is the basic need of cloud computing.

Layers of Virtualization



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Access Virtualization

The virtualized image of any operating system can be accessed from any remote user. The remote user can never differentiate between virtualized image of operating system and host

operating system.

Application Virtualization

Application Level Virtualization allows application to be run on run time environment, which natively do not support all the features required by such application. It allows running application on one operating system, which actually does not support that application. It allows executing a program, compiled for different network. This is done at operating system level by emulation, using a thin log on program or operating system components eg. Cross over provides facility to run windows application on Mac operating system.

Processing Virtualization

This type of virtualization provides an illusion of having dedicated processor for the client. Many resources (hardware) over one machine (hardware). Same processor is emulated (reproduced) to many users. This is processing virtualization.

Network Virtualization

It can be grouped in two categories. Internal and External. In External Network Virtualization a virtual LAN (VLAN) is created, it gives capability of real network. It is a combination of Hardware appliances and some soft-wares for network virtualization. The groups of hosts make a VLAN that communicate with each other as if they are in real LAN. In Internal Network Virtualization, network facility is provided by Operating System.

Storage Virtualization

In this type of virtualization basic focus is on storage of the data. User can have access to

unlimited amount of storage without even worrying about their actual location. Data is accessed by logical address or path. Google drive, Drop-box are examples of this category.

Goals of Virtualization

1. Reliability

Increase in reliability is one of the major advantage of virtualization. Virtual machine is not a physical machine, so hardware crashing can't affect it. While virtualizing the operating system, it stores all the software including operating system in just one file, so backing up the virtual machine is easy and in case if the underlying physical hardware crash occur, backed up file can again restart with some other physical machine, thus reducing the time and overhead of installing the complete machine again.

2. Scalability

It is another major advantage, the time you need more power to your business it does the perfect job. On requirement we can start two, three or more instances of the same virtual machine and can boost the availability, without having the need of shutting down the services.

3. Complete utilization of Resource

Generally it has been seen over time that processor is equipped with great power and utilizing the complete power is almost impossible. But with virtualization we can start more than one virtual machine, on one hardware and can provide services or can compile tasks. This helps in complete utilization of the underlying physical

hardware.

4. Performance Enhancement

5. Green Environment

Another most important thing is, it is environment friendly. As an average power consumption of a server is near about 450W. Instead of 5 servers if the work can be completed with one server it's a huge saving on energy and cost both. This way virtualization is highly environment friendly and helping in greener environment.

Impact of virtualization on Environment

E-waste talk, Number of servers/ computers resources are reduced.....

How can we achieve it?

Virtualization can be done in various ways depends on the purpose. A hypervisor, required to create and run virtual machines. Currently VMware ESX and ESXi, KVM, Parallel Desktop, VMware workstation, VMware Fusion (MAC), VMware Player, XEN, are running to fulfill needs of their specified customer needs. KVM is the in-built virtual machine monitor in Linux based operating system.

Step of Deployment

Here are step to deploy PaaS (platform as a service).Considering operating system is CentOS 6.5. To use KVM Intel VT should be activated from BIOS.

1. Install KVM

KVM is a virtual machine monitor or a hypervisor.

“yum install kvm”

2. Install libvirt

```
“yum install libvirt”
```

3. Install bridge utility

Bridge is required to create the path for guest operating system. Using bridge we can use guest operating system on the same LAN.

```
“yum install bridge-utils”
```

4. Configure bridge networking using KVM virtual machine manager.

a. mv /etc/sysconfig/network-scripts/ifcfg-eth0 /etc/sysconfig/network-scripts/ifcfg-br0

b. Now edit “ifcfg-br0” and change DEVICE=br0
TYPE=Bridge

And change the ip address in case of static IP allocation in the host machine.

c. Edit “ifcfg-eth0”
Add one new line.

```
Bridge=br0
```

d. Now restarting services

```
# service network restart
```

e. Now check complete configuration by using command.

```
# ifconfig
```

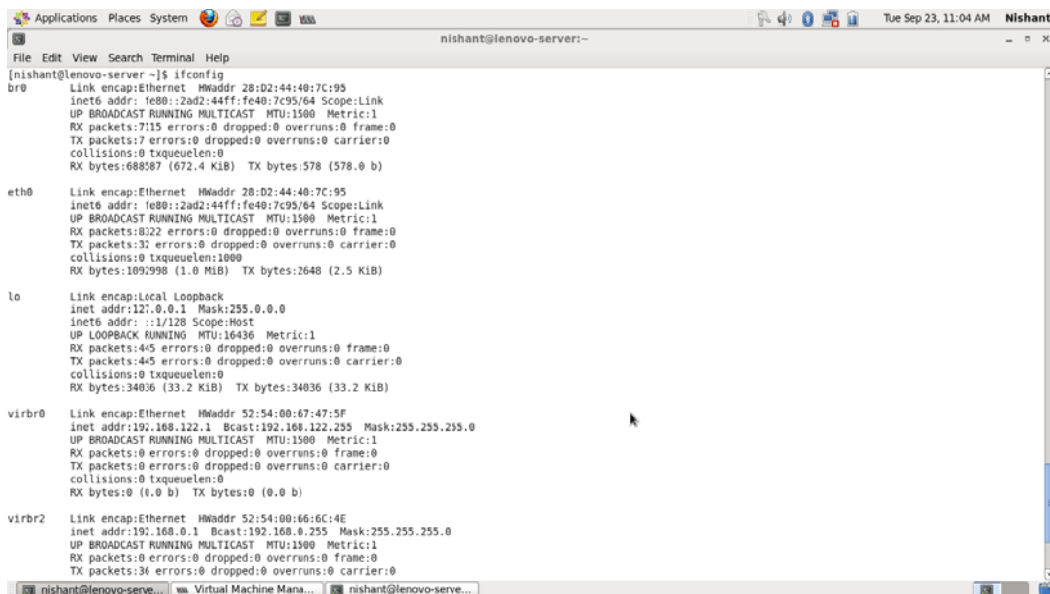
5. Start “virt-manager” from Application->System

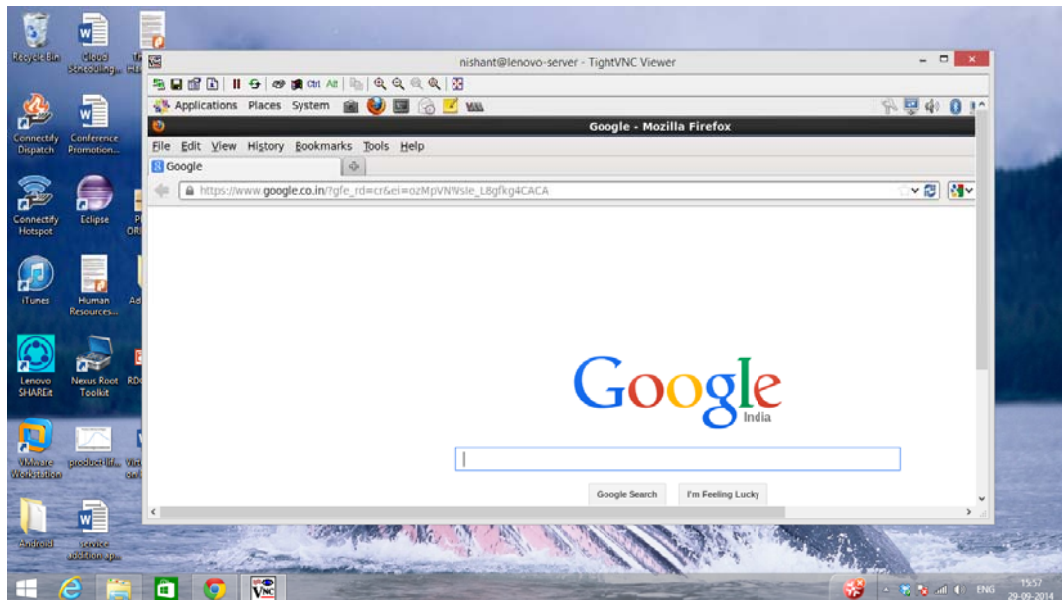
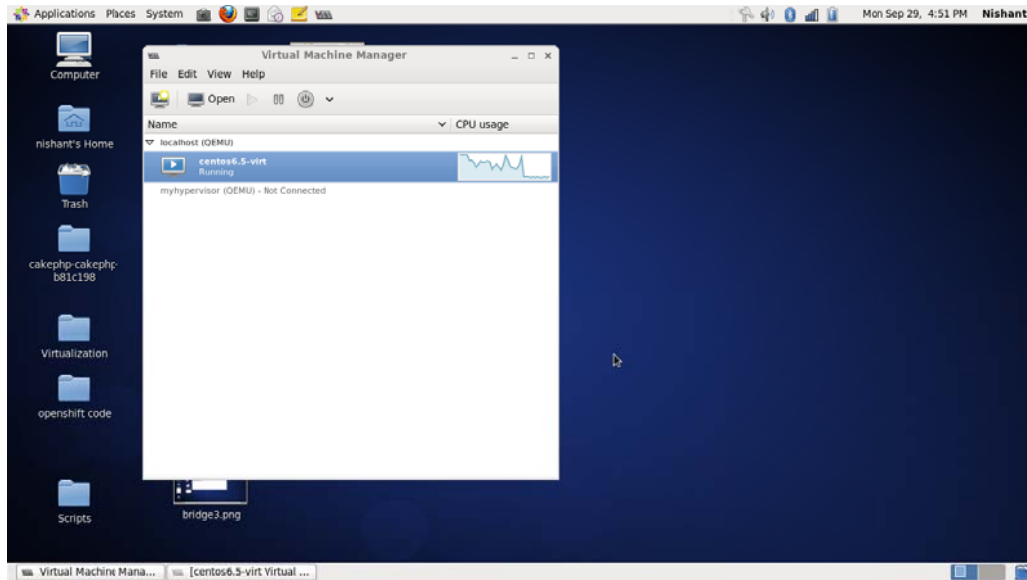
6. Create new virtual machine of any operating system. After creation check information related to virtual machine using “i” tab.

7. Initially hypervisor is setup to use virtual machine on local machine. To make it work on remote machine configure it.

a. Change “vnc_listen” in “/etc/libvirt/qemu.conf” parameter from 127.0.0.1 to current IP of the machine.

8. At client side install VNC viewer. If client is running windows operating system then tiger, real VNC viewer are the application can be used. If client is running linux operating system then in-built tiger vnc-viewer can be used.





9. Connect your VNC viewer with server using Server IP address and default port 5900.
10. Now the operating system installed as guest can be used via VNC viewer.

Result: This technology can not only save energy it will also help in utilizing the capability of one server or high-end machines completely.

Conclusion: Virtualization is changing world into different direction. Cloud, the most popular technology in the market nowadays has its feet's in virtualization. Cloud is a concept and virtualization is implementation scenario.