

Cloud Computing and Virtualization In Redhat

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Abstract :

IT organizations today face unprecedented challenges. Internal business customers continue to demand rapid delivery of innovative services to respond to outside threats and opportunities. In this tense environment IT options have been few: delay innovation that fuels the business or continue or allow business users to procure services without IT oversight that ensures reliability, security, compliance and governance standards are met for the business. Cloud computing empowers IT through flexible, automated infrastructures, new on-demand service models and new levels of IT efficiency. All this allows IT to shift resources from maintaining existing systems to invest in building innovative services that drive new revenue, improve operations and advance business goals..

1. Introduction

What is Virtualization ?

Virtualization is a framework or methodology of dividing the resources of a computer into multiple execution environments.

By using this techniques it's possible to share the resources of a computer to multiple operating systems all running at once.

For our purposes - One physical machine to support multiple virtual machines that run in parallel.

A physical computer in the classical sense is clearly a complete and actual machine, both subjectively (from the user's point of view) and objectively (from the hardware system administrator's point of view), a virtual machine is subjectively a complete machine (or very close), but objectively merely a set of files and running programs on an actual, physical machine (which the user need not necessarily be aware of).

At its simplest level, virtualization allows a single computer to do the job of many computers.

The term often used is "metacomputer".

Why is this important? Virtualization technology can save money and simplify IT operations.

Virtualization also represents a technology

operations. Virtualization also represents a technology framework by which all IT infrastructures will run in the future.

2. Problem Assessment – Why Virtualization? :

- Too many servers for too little work.
- Aging hardware reaching end of usable life.
- High infrastructure requirements.
- Limited flexibility in shared environments.
- Low utilization metrics in servers across the organization.
- High costs and infrastructure needs

After Research into Virtualization :

- Reduce the number of physical machines
 - Isolate environments but share hardware
 - Make better use of existing capacity
 - Virtualize Network and SAN interfaces to reduce infrastructure needs
 - Ultimately save on maintenance and leases
- More options available today than ever before...

3. What is Cloud Computing?:

Cloud computing meant a program that run on a desktop or laptop computer on your desk, or a server in your lab. Or, using the internet, you could use a program that was running on a server somewhere else in the world. But it was always a specific piece of hardware in a specific location that was running the program.

Some service provider is providing you with virtual computers, or virtual disks, or virtual file-systems, or virtual databases, or even higher level constructs (to be described later), and guaranteeing that they will take care of everything related to the virtual hardware that you got - you just need to upload your program and run it.

Cloud computing largely depends upon virtualization technology. Virtualization refers to the technique in which all the capabilities of a piece of hardware are faithfully reproduced in a software program. So, for example, a virtual machine has a virtual CPU, virtual memory and a virtual disk. The virtual CPU might emulate, for example, an Intel x86 chip, and then it is able to take an executable file consisting of x86

instructions and execute them all. This virtual machine thus behaves just like a real machine - you can install an Operating System on it, you can boot into the OS, and then install other programs into the OS that you just installed. You can reboot the machine, power it off, and power it on again, just like real machines.

Types of Cloud Computing - IaaS, PaaS and SaaS

Depending upon what is being virtualized, we get three types of Cloud Computing:

- **IaaS or Infrastructure as a Service:** these are various services where the hardware is being virtualized. Virtual machines (*i.e.* CPU + Memory), virtual disks (*e.g.* Amazon EBS), virtual file-systems (*e.g.* Amazon S3), virtual databases (*e.g.* Google BigTable, Amazon SimpleDB, SQL Azure) are all examples of infrastructure. Basically, these are services that are looking to replace all the hardware infrastructure that sits in your server rooms and labs.
- **PaaS or Platform as a Service:** these are various services where the software development platform (*i.e.* programming language, runtime environment, *etc.*) is being virtualized. Google AppEngine (Java/Python), Microsoft Azure (.NET/Visual Studio).
- **SaaS or Software as a Service:** these are various services that have decided to skip the hardware and software engineers altogether and directly approach the end-user with software that s/he wants to use. In IaaS you can install your own OS and software and use it. In PaaS you can write programs in that platform and run them. In SaaS you need to do nothing. There is ready-made software that you can directly start using. Like Salesforce - software used by sales agents.

4. Project Scenario:

- In our project scenario we are using a base machine with high configuration on that various virtual machine will be installed
- 50 virtual machines would be installed on one physical base machine that would include different kind of operating system like windows XP, Red Hat, Ubuntu, Fedora, Windows 7, and OpenSuSe.
- In various virtual machines, different types of application will be installed.
Eg: Windows XP will provide C/C++ compiler and Windows 7 will provide .net, VB.net, Java.

Some other Windows machine will provide applications like AutoCAD.

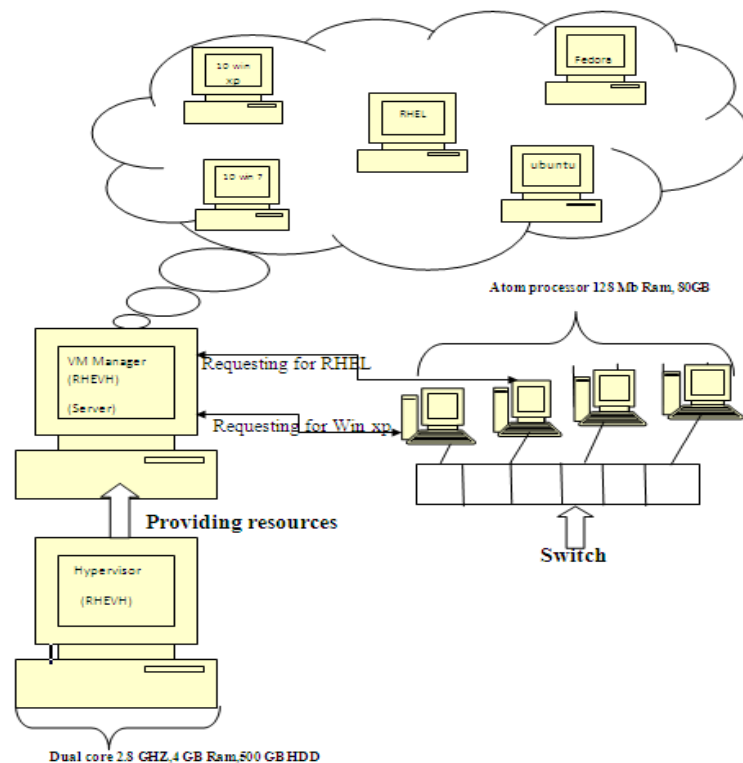
It is very useful for completion of machine drawing works.

(for Mechanical Students & Civil Students).

Another Windows machine will provide application like MATLAB

(for Electronics Students) for completing the circuitry works.

- In RHEL (Red Hat Enterprise Linux), a lot of services can exist like the DNS, apache, ftp, nfs ,nis etc.
- This virtual machine can be easily accessed by the client according to their respective requirement. It can be accessed by the client from anywhere in the network.
- Client machine can have low configuration but it doesn't matter because the virtual machine get the resources from main server not from the client base machine.
- The client who will access the virtual machine can have a limited privileges like access to VMs and read only privileges. He/she will get same limited storage also.
- Username and password will be provided to each and every client by which he/she will get a login.



5. Requirements:

Hardware requirements

- Larger Intel/AMD machines with more CPU and memory
- 16, 32, 64-way Intel machines now available with up to 1 TB RAM
- X86 Hardware Virtualization
 - Intel VT
 - AMD Pacifica

Software requirements

- Red Hat Enterprise Linux 5.0 (KVM kernel)
- RHEVH
- RHEVM

6. Advantages :

There are a number of advantages Cloud Computing has over the old way of doing things:

1. Convenience: Cloud Computing is easy. Not having to deal with real machines, and disk failures, and electricity failures, *etc* is a huge benefit.
2. Cost: There are two different cost advantages to cloud computing. Sometimes it is cheaper than the physical alternative. At other times, the advantage comes from the fact that you have to pay small installments every month instead of a large chunk of money when you're buying the infrastructure.
3. Easy scalability: If you're a growing company, and the demand for computing suddenly increases (for example, if your website is mentioned in TechCrunch and you suddenly get 10,000 new customers), it is very difficult to suddenly scale up your physical infrastructure. That would involve buying new servers, migrating programs, files, and databases. And a whole bunch of other setup. By contrast, IaaS providers provide these services at the click of a button. PaaS and SaaS providers take care of scaling completely, in a manner transparent to you, and you don't even need to think about it.
4. Location Independence: A cloud computing service can be used from where-ever you are, whereas most physical infrastructure ties you down to one place.

7. Conclusion :

- Notion of cloud is possible without virtualization, but it is insufficient and inflexible.
- Virtualization is an attempt to manage OS.
- There are many level any many ways to implement Virtualization.

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