VIRTUALIZATION

what is a virtual machine?

Well inside your computer there is a virtual computer that you create. You can create one, two, three, multiple virtual computers inside your computer.

Install OS on them, connect them together and you can start your practice or set up your lab.

What is virtualization ?

One computer does the job of multiple computers. No, I'm not talking about multitasking. I am talking about multi os.

One computer can run multiple OS at the same time. parallelly.

Now before virtualization came. That was not the case before virtualization.

Also, we had software, services, apps running and to run an app or a service like Tomcat or apache https apache httpd or mysql databases to run such services, we need servers.

In that time, the only option was physical computers. Like the one you would be using right now.

We have much more bigger computers in data centers.

And always the idea is one service, one server.Or should I say one main service = one serverAnd this is for isolation.

So if your database server is running, you don't want to run a web server in the same machine or a web service in the same computer.

If you run multiple main service in one server. It's like "Putting all our eggs in one basket." Which can lead to catastrophe. So this is called as isolation.

And servers are always over provisioned. That means if we need 8 GB of RAM, we will go for 12 gb of RAM. IT team will always over-provision servers.

But server resources are mostly underutilized.

You will say if it's under-utilized, then why is it over-provisioned?

Well, the team will always go for extra just in case. So they don't run out of resources.

But all this results in **huge capital expenditure and operational expenditure.**

I'm talking about physical servers over here.

We have to procure it, stack it, rack it, install operating system and maintain it.

So if you have a ten services in a project, you need ten servers minimum and for high availability minimum, you need 20.

And definitely more than that. So it was kind of a big deal.

To run an I.T. project. Then came VMware. With the concept of virtualization.

VMware brought in tools or created tools which could allow one computer to run multiple operating systems.

And that's how we can isolate, right?

So instead of running multiple main Services in one computer, we can run multiple operating system in the computer and run all services on top of that. So they will be isolated.

And if you're thinking again, isn't it the problem of one basket having multiple eggs or multiple eggs in one basket?

So let me tell you here, these physical computers can be clustered together so you can distribute your virtual machines.

So virtualization partitions your physical resource into virtual resource. So to set up and run an operating system, you need a physical computer.

But with virtualization, you can create a virtual computer in the physical machine and you can create multiple virtual computers in a physical machine.

Think of them as baby computers living in the physical machine.

And these virtual machines are isolated from each other because they have their own operating systems.

And I'm talking about server virtualization, virtual machines. But there's other kind of virtualization as well. You have network virtualization, storage virtualization.

So that is how it may look.
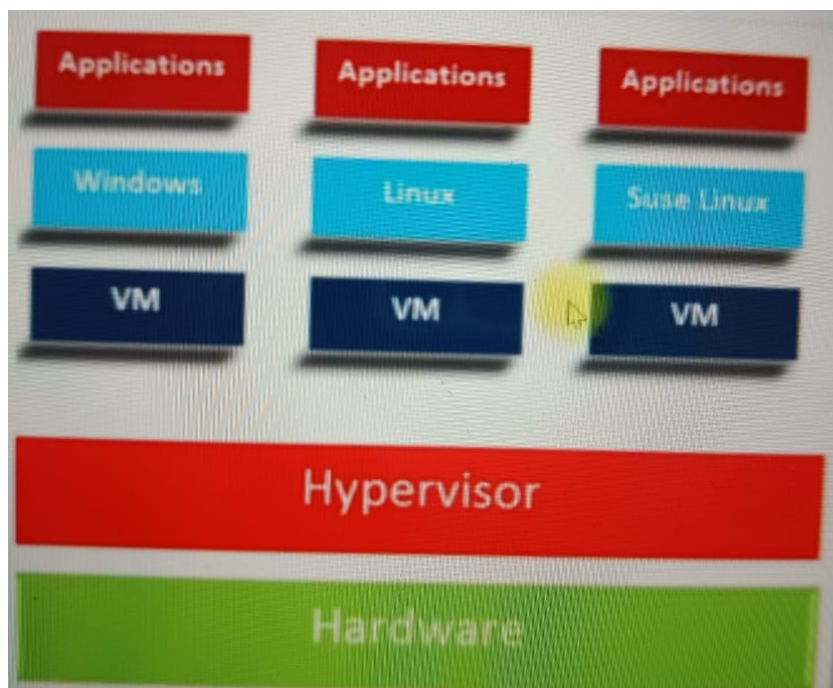
You have the hardware, the computer, physical computer.

On top of that, you will have a tool called a hypervisor, the software, and on that you can create virtual machines, each virtual machine having its own operating system. And you can run your main service, your application in this OS. So they are isolated from each other.

Host OS :This is the operating system of the physical machine a

Physical computer.

So currently, if you're using laptop or a desktop the operating system of your laptop is the host operating system.

Guest operating system : is the operating system of the virtual machine.

Virtual machines are also sometimes referred as guest machine.

VM are the short form of virtual machines

Snapshot: Is a way of taking backup of the virtual machine.

Hypervisor is the tool or the software that let us do or create virtual machines.

Hypervisor enables virtualization.

There are two types of hypervisor.

You have type one, which is also called as bare metal operating a bare metal hypervisor.

It runs directly on the physical computer, like an operating system like here installing Windows 10 or you have Mac OS, like that you will have hypervisor installed on the physical computer.

Now this is only for production and it won't let you use this computer for other purposes.

For example, VMware ESXi or Zen Hypervisor.

The other type of hypervisor is type 2

It runs as a software which you can install on any computer.

This is just for learning and testing purpose, because obviously you're not going to run production

machines on your laptop.

Some example, Oracle VM VirtualBox, which we will be using in this course and VMware server and there are many other.

So that First diagram is the type 1 hypervisor.

You have the computer on top of that, your hypervisor, and then you create your virtual machine, install your operating system and run your app.

This is for production, and this also can be clustered. Type one hypervisors can be clustered together so you can distribute your virtual machines on the cluster of hypervisors.
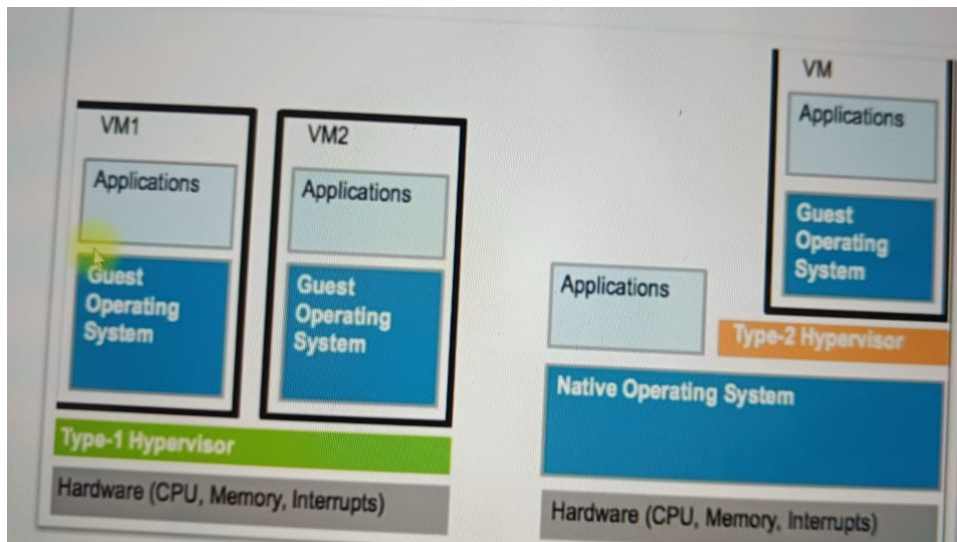
So if one of the hypervisor goes down, the other can take or run your virtual machines.

Type two hypervisor, which just runs like a software on your computer.

This is for learning and testing purpose, so you will have your computer.

On top of that, you will have an operating system like Windows 10, Mac OS or even Linux.

And like you install softwares, you're going to install a Type two hypervisor on that.

You can create virtual machines and install your operating system.

Now there is a hypervisor called Hyper-V from Microsoft, and that can be easily confused as a Type two hypervisor.But it is a type one hypervisor.

To install vagrant and to get a vm visit the file name vm manual and automate m1 m2m3 chip

Below command is based on the folder you save

```
 $cd documents/vms/ubuntu
 $ ls                    ————- (vagrant file)
 $vagrant up
 $vagrant ssh
 $vagrant halt
 $vagrant destroy
$cd documents/vms/centos
 $ ls                    ————- (vagrant file)
 $vagrant up
 $vagrant ssh
 $vagrant halt
 $vagrant destroy
```