

⑤ Introduction to virtualization and virtual machines (lesson 5)

* Overview.

- What is virtualization and what virtual machine is.
- Why virtualization is useful
- main concepts of how virtualization works.

Demo: Setup Linux virtual machine.
-(virtual box) open source software

* What is Virtual Machine?

windows computer →

applications

windows os

Hardware - cpu, ram, storage

But now we want to use Linux.

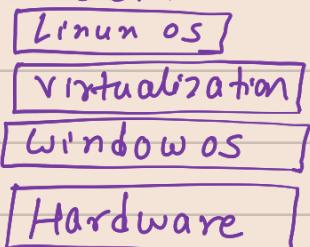
separate computer with hardware resources
and Linux OS on top of that.

With virtualization

- no separate hardware needed to install new OS.
- we can install Linux OS on top of Windows OS or vice versa.

Windows on Linux, Windows and Linux on Mac OS
any combination.

We can achieve this using 'Hypervisor'.



Hypervisor - is a technology that allows hosting multiple virtual computer on a physical computer (Host OS)

popular hypervisor - 'Virtual Box' from 'Oracle'

→ open source

→ works on all O.S.

→ Virtual Box lets you create a virtual computer on your windows computer by telling windows OS.

→ VirtualBox takes hardware resources from Host OS.

→ Creates virtual CPU, virtual RAM, virtual storage for each virtual machine

→ you can only give the resources you actually have.

8 GB RAM - 4 GB used for windows → 4 GB for Linux

now no ram left for other VM

→ Hardware resources are shared.

→ Virtual machines are completely isolated

→ if something breaks inside VM, it doesn't affect the host machine.

* Benefits of using a virtual machine.

① Learn and experiment.

→ you don't need to buy a new computer for that.

→ you don't endanger your main OS.

② Test your app on different OS.

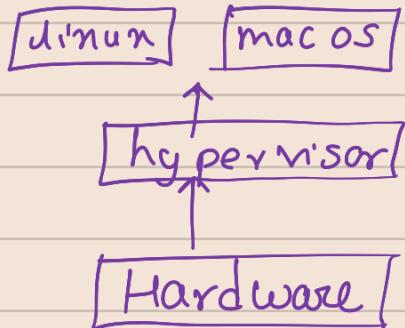
Developing on macOS laptop → check on Linux machine or Firefox browser.

→ check on windows on

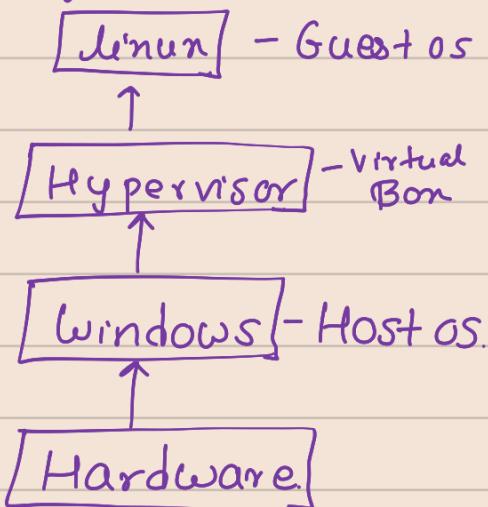
* Type 1 vs Type 2 hypervisor.

Type 1

Hypervisor installed directly on hardware.



Type 2



- Bare metal hypervisor - Guest os borrows the hardware from host os.
eg - hypervisor -

- ① VMware esxi - personal computers.
- ② Microsoft hyper-v.

used for big server.

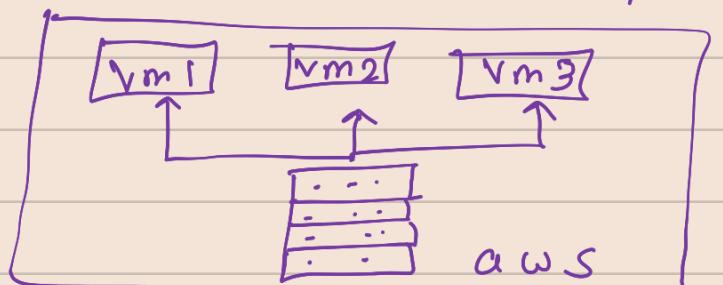
Type 1 hypervisor use cases.

- ① Big cloud platform use them to create Big companies

and run their own infrastructure

- ② When you create a server instance on cloud platform like AWS, we create a 'VM' on a physical server.

and other user when create a server instance may get a vm on exact same physical server, But 'Vm' are completely isolated from each other. (Independent)



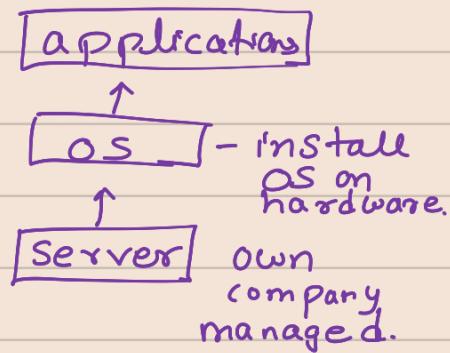
What are the benefits for companies using virtualization?

①. efficient usage of hardware resources.

- users can choose any resource combinations. (size of instance)

②. Abstracting of the OS from the hardware.

without virtualization

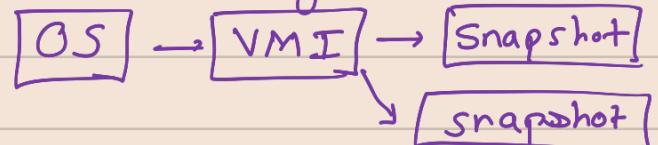


- OS is tightly coupled to the hardware.
- hardware fail → whole os and apps gone.
- High risk of losing all the services.

with virtualization

- OS is a portable file which can be moved around.
- Virtual machine image.
- includes OS, apps etc, configurations pictures.

→ you can have many backups of your OS.



- Secure very easily
- Portable
- not dependent on physical server.