

Linux

DAY 3 – VIRTUAL MACHINES, NETWORKING & LINUX INTERNALS

1. Understanding Hypervisors & Virtual Machines

- A **hypervisor** (like VirtualBox) sits between your physical hardware and the virtual machine.
 - It allocates virtual CPU, RAM, storage, and network resources.
 - The guest OS inside the VM runs its **own kernel, libraries, and applications** independently from the host.
 - This isolation allows multiple operating systems to run safely on one machine.
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2. How Virtualization Works

- The virtualization layer abstracts real hardware.
 - Each VM believes it is running on dedicated hardware.
 - Virtualization provides:
 - isolated memory
 - isolated storage
 - isolated processes
 - separate kernel and system environment
 - This ensures stability and prevents conflicts between VMs.
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3. Virtual Network Interface Card (NIC)

- A VM contains a **virtual NIC**, which works like a physical NIC.
 - It is managed by the hypervisor and is responsible for network packet transmission.
 - Common NIC names in VirtualBox: **enp0s3**, **enp0s8**, **eth0**.
 - This NIC allows the VM to receive its own IP address and communicate on a network.
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4. Checking Network Interface Details

- Use the `ifconfig` command to view a NIC's configuration:

```
ifconfig enp0s3
```

This displays:

- IP address
 - MAC address
 - RX/TX packets
 - Interface status
 - Assigned network details
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5. Managing Network Interfaces

- Turn the interface **OFF**:

```
ip link set enp0s3 down
```

- Turn the interface **ON**:

```
ip link set enp0s3 up
```

These commands are helpful for troubleshooting and understanding how Linux handles network devices.

6. Important Interview Questions (With Answers)

Q1. What is a hypervisor and how does it manage virtual machines?

A hypervisor is software that creates and runs virtual machines by providing **virtual hardware** (CPU, RAM, storage, NIC).

It isolates each VM so they run their own operating system independently without affecting the host or other VMs.

Q2. What is a virtual NIC and how can it be managed in Linux?

- A virtual NIC is a software-based network interface inside a VM.
You can view its details using `ifconfig enp0s3` and enable/disable it using:

```
ip link set enp0s3 down # disable
```

```
ip link set enp0s3 up # enable
```