

CCGC 5001 - Virtualization

# Module 2: Virtualization Software



# Module objectives

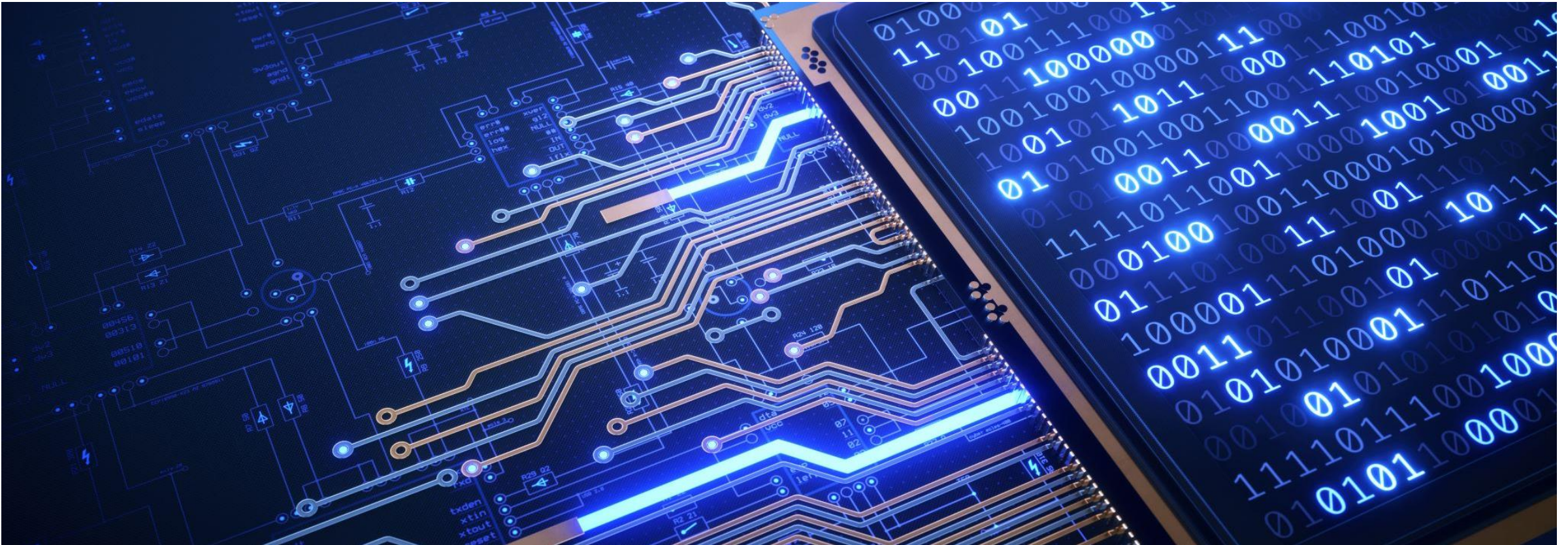


At the end of this module, you should be able to:

- Define hypervisor
- Explain how hypervisor works with VMs
- Explain ESXi architecture
- Create and implement VMs in ESXi environment
- Construct virtual networks in ESXi

# Hypervisor

A piece of computer software, firmware, or hardware that creates and runs virtual machines



# Hypervisor



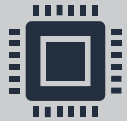
Host – physical server running  
hypervisor software



Guest – virtual machine hosted by  
hypervisor

# Hypervisor

## Types of hypervisors



Type-1 – run directly on the hardware without the need of a host OS



Type-2 – require a host OS and are often used to run other OS environments

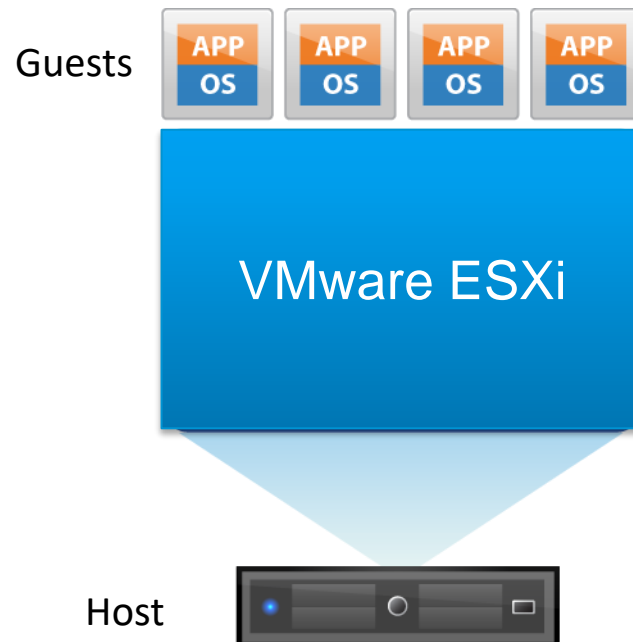


# Hypervisor

## Type 1 Hypervisor: “Bare-Metal”

Installed as the operating system

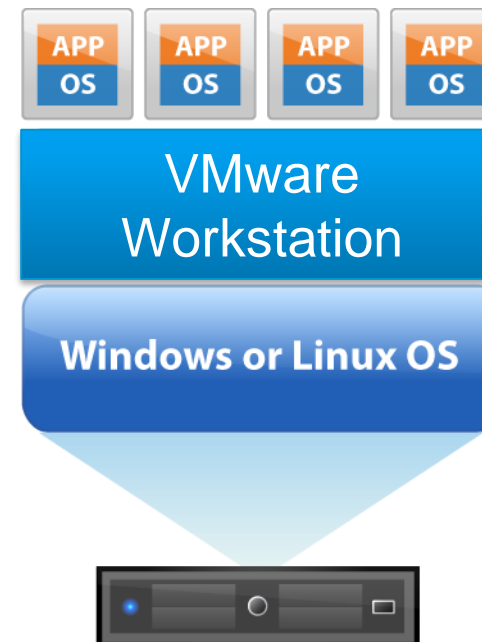
Example: VMware ESXi, MS Hyper-V



## Type 2 Hypervisor: “Hosted”

Installed as an application

Example: VMware Workstation, Oracle Virtualbox



# How hypervisor works with VMs



The hypervisor must provide hardware resources dynamically to each VM.

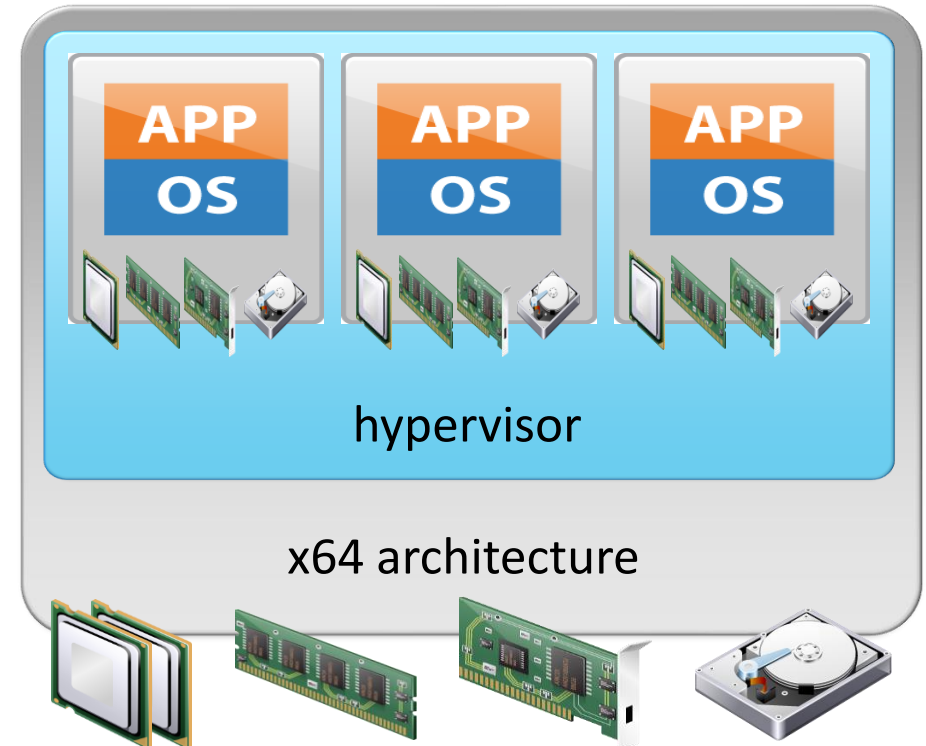


Each VM shares the server's hardware resources:

CPU  
Memory  
Disk  
Network

# How hypervisor works with VMs

- Hypervisor intercepts and processes requests coming from the guest OS
  - Return results back to the VM
- Each VM has two main files:
  - Configuration file
    - Contains settings for virtual hardware
  - Virtual disk file
    - Contains a boot loader along with OS files and user data





# ESXi overview



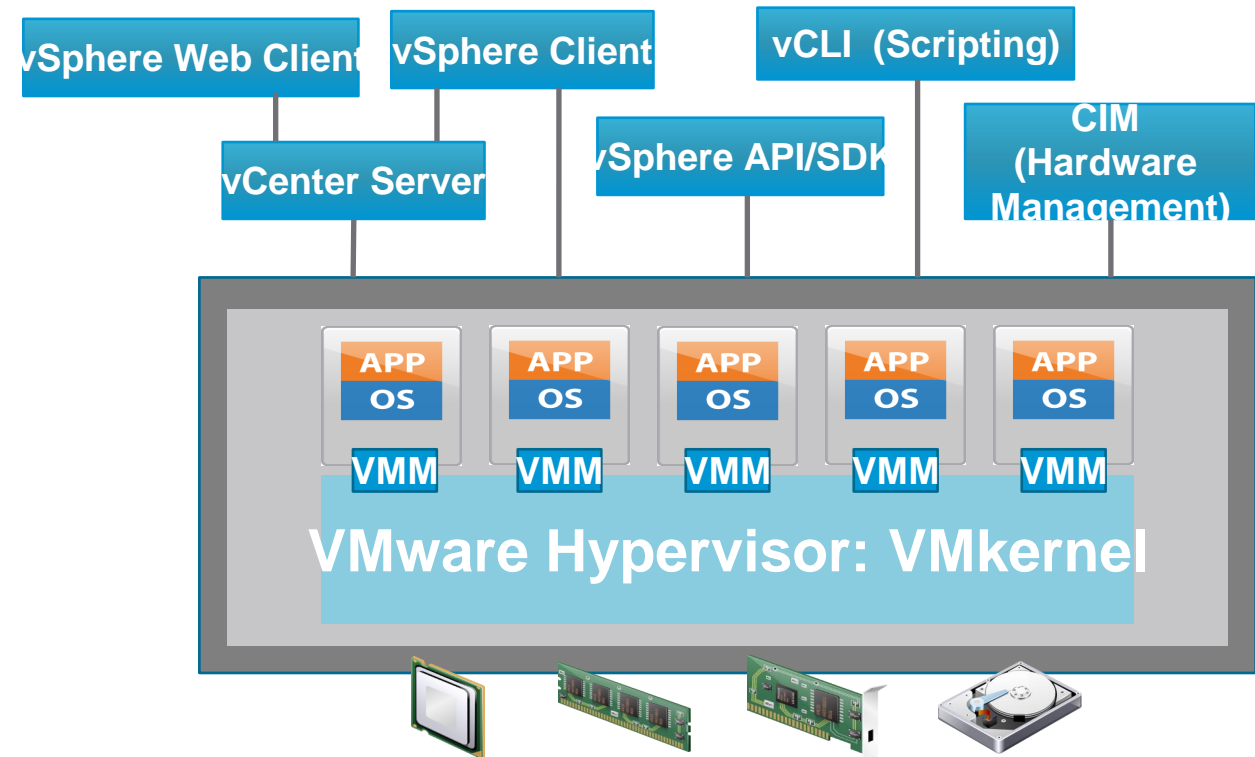
ESXi is a purpose-built bare-metal hypervisor that installs directly onto a physical server.



With direct access to and control of underlying resources, ESXi is more efficient than hosted architectures and can effectively partition hardware to increase consolidation ratios.

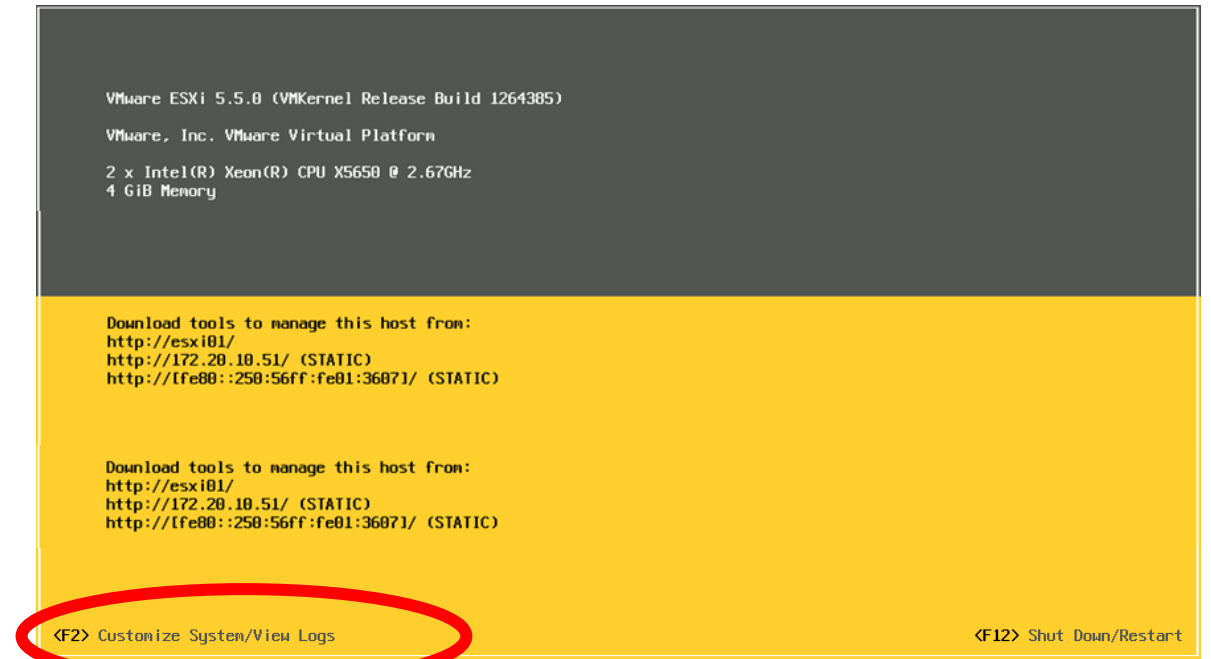
# ESXi architecture

- ESXi hypervisor abstracts the processor, memory, storage, and networking resources of the physical host and allocates them to multiple VMs.
- In the ESXi architecture, applications running in virtual machines access CPU, memory, disk, and network interfaces without direct access to the underlying hardware.
- ESXi hypervisor is called the VMkernel.
- The VMkernel receives requests from virtual machines for resources from the virtual machine monitor (VMM) and presents the requests to the physical hardware.
- VMM per virtual machine has the job of presenting virtual hardware to the virtual machine and receiving requests.



# Configuring ESXi

- The direct console user interface (DCUI) is similar to the BIOS of a computer with a keyboard-only user interface.
- The DCUI is a low-level configuration and management interface, accessible through the console of the server, used primarily for initial basic configuration.
- You press F2 to start customizing system settings.



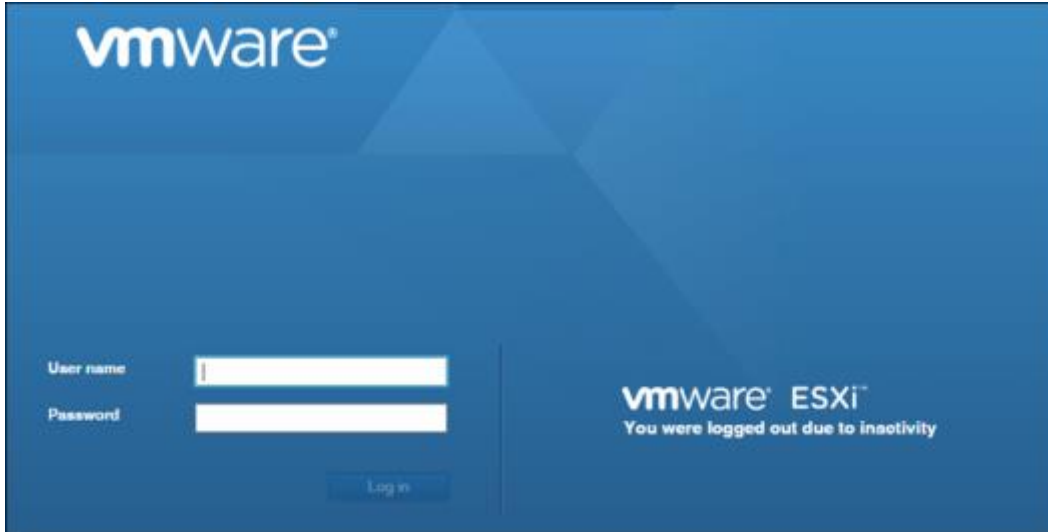
# Configuring ESXi



The DCUI allows you to modify network settings:

- Host name
- IP configuration (IP address, subnet mask, default gateway)
- DNS servers
- VLAN

# Accessing ESXi



An ESXi host can be managed using a number of tools:

- vSphere Web Client
- SSH
- vSphere Command-line Interface (vCLI)
- vSphere Management Assistant (vMA)
- vSphere PowerCLI

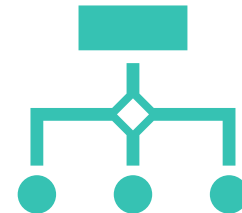
# Virtual Networking



Virtual switches are core connectivity components in a virtual network.



Without virtual switch there would be no network connectivity.



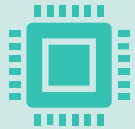
To communicate with one another the VM should have access to a properly configured network switch.



# Virtual switch



A software construct implemented in the VMKernel of the ESXi hypervisor



## Two major types of virtual switches

Standard switches (available on all version)

- Limited to accessing only VMs running on the same host that the switch is on

Distributed switches (available only on licensed)

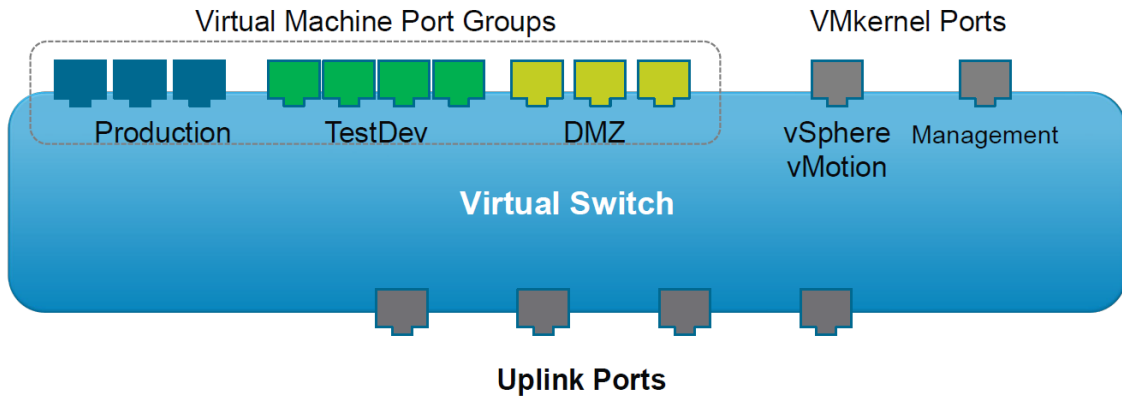
- Can be accessed from VMs running on any host



To connect the virtual switch to the physical network

One or more NICs must be assigned to each switch using the uplink ports

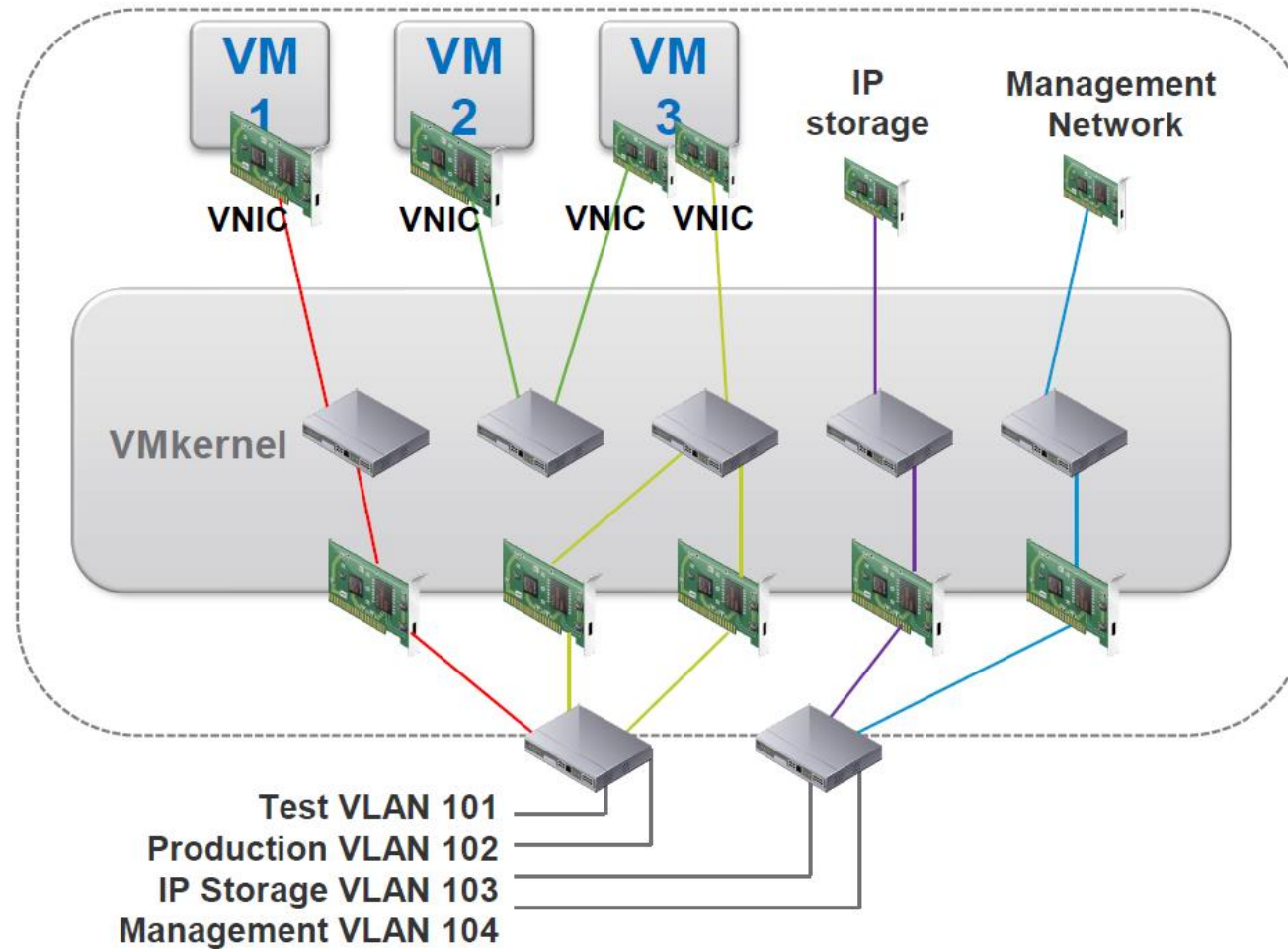
# Virtual switch connections



A virtual switch has specific connection types:

- Virtual machine port groups
- VMkernel port:
  - For IP storage, High Availability, vMotion migration, Fault Tolerance
  - For the ESXi management network

# An example...



# Module summary

In summary, in this module, you learned:

- Differences between type1 and type2 hypervisors
- ESXi architecture and configuration
- Virtual networking in ESXi environment

The background is a solid teal color with a pattern of overlapping, semi-transparent geometric shapes in various shades of blue and teal. These shapes include pentagons, hexagons, and irregular polygons, creating a layered, crystalline effect.

Thank you