Virtualization Technique

Network Modes

NREN

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How do virtual hosts access the network ?

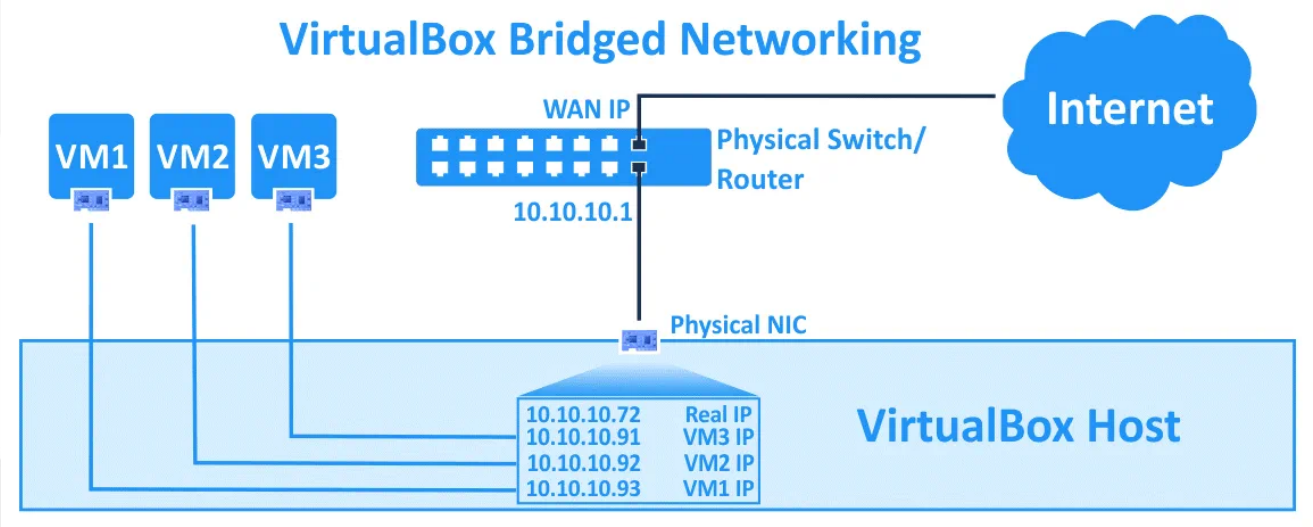
- Virtual Machines are connected to virtual network adapters, presented to the guest OS by the Hypervisor.
- But what is the virtual network adapter connected to on the host side ?
  - Several possibilities, Essentially:
    - Bridged mode
    - Other modes (host-only, NAT, internal)

Note: that the above terminology is usually associated with desktop virtualization software like VirtualBox and VMWare, although other products/solutions have reused the same terms

Bridged mode

- This is the most straightforward way to attach a Virtual Machine to the network.
  - The VM is “bridged”, or attached, to the same network that the host OS is physically connected to, using the Host’s interface
  - If DHCP is present on this network, then the VM will receive an IP from it.
  - To other hosts on the network, the VM will look like just any other machine, with its own MAC address and IP address.

Bridged mode (contd)



- Multiple VMs can be attached to the network in this fashion.
- Pros: VM participates in the network like any other machine
- Cons: VMs are visible to other machines (whether one wants to or not), and there has to be enough IPs available on the network

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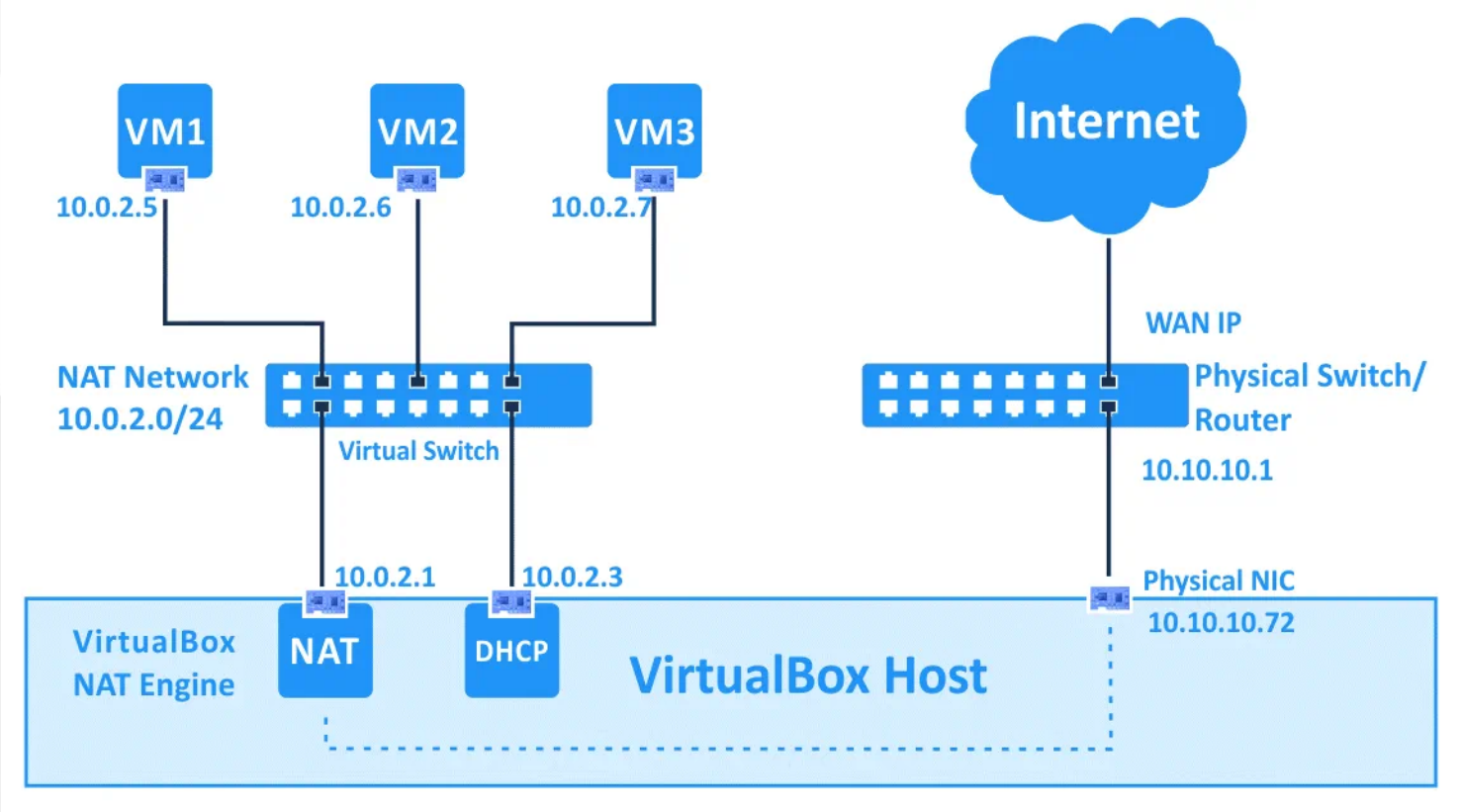
Note: that the host does not necessarily need to have an IP address on the network.

NAT mode

- This is the default way for VirtualBox and VMware Desktop editions to connect the VM.
- NAT (Network Address Translation) is used to allow the Guest VM to access the outside networks.
- NAT uses the IP address configured on the Host's physical interface, but the Host and Guest still cannot talk together.

NAAT mode (contd)



Other modes: host-only, internal

- These modes do not place the VM directly on the network where the Host is connected to the outside world.
- Instead, a private, internal network is created, and the VM is placed on it.
  - host-only:
    - the Host and the Guest VM can communicate together, but the VM cannot talk to the outside world - only with the Host For example, it's possible to SSH directly to the Guest from the Host (and vice-versa)
  - internal:
    - the Guest VM is isolated and cannot talk to the Host or the outside world, but can talk to other VMs, if they are connected to the same internal network

Accessing the Guest from the Host

- So what do we do if we want to access the Guest from the Host ? - 3 Possibilities
  - Use bridged mode
    - the VM is then a machine just like any other on your local network, and you can SSH to it using the IP address configured (statically or using DHCP)
  - Use Host-only mode
    - you can then connect to the VM, and vice-versa, but the VM cannot talk to hosts “outside”
  - Use Port Forwarding
    - which maps TCP/UDP ports on the Host to TCP/UDP ports on the VM. We will see this last solution now. *

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* VMware has a mode combining Host-only and NAT, which solves this problem. With VirtualBox, one can give the VM two network interfaces: one host-only, one NAT, or one can use Port Forwarding

Note

- A very good article explaining the different network modes in Virtual Box

https://blogs.oracle.com/scoter/post/oracle-vm-virtualbox-networking-options-and-how-to-manage-them