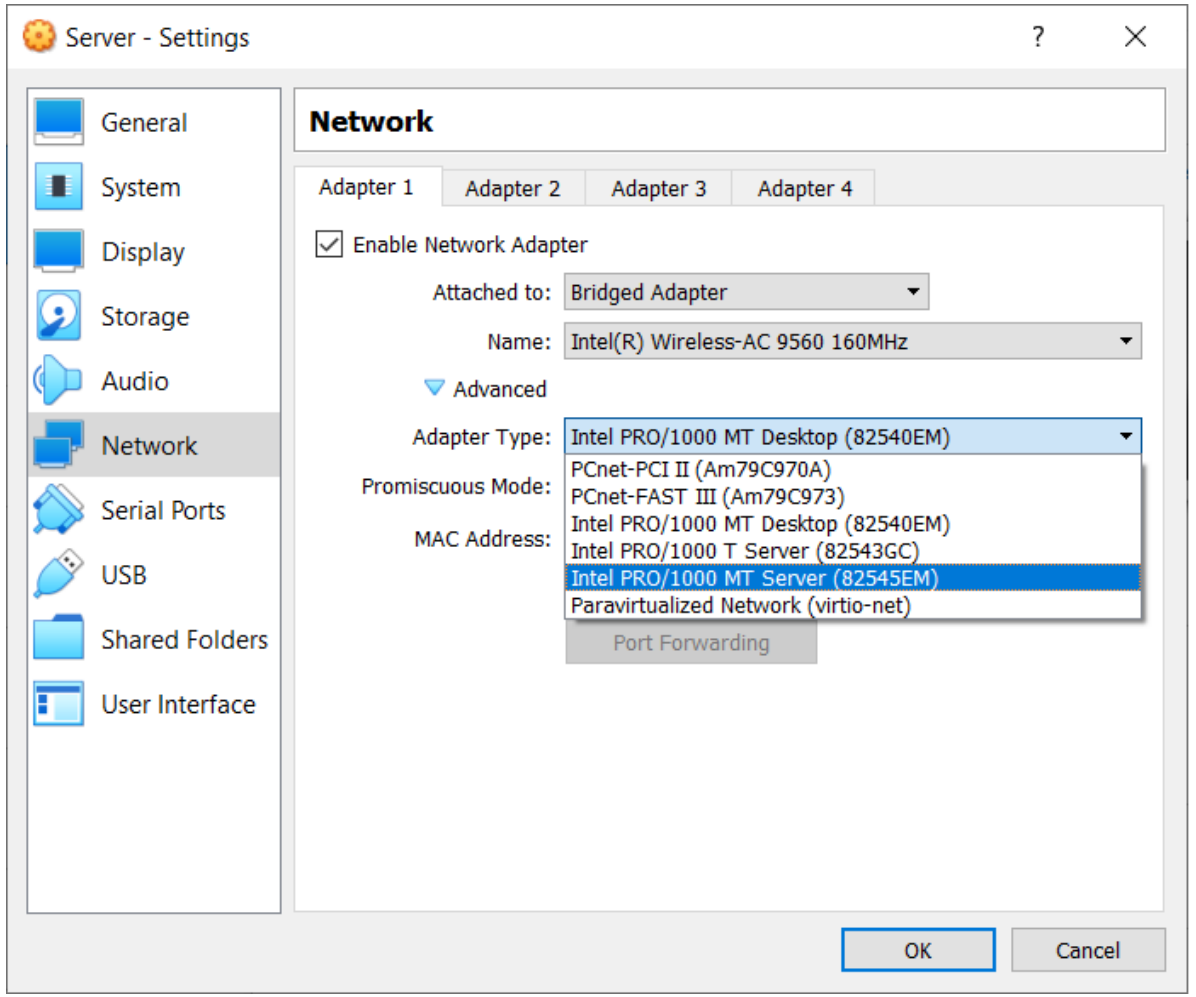
VirtualBox Networking

Linux Networking

Serhii Zakharchenko

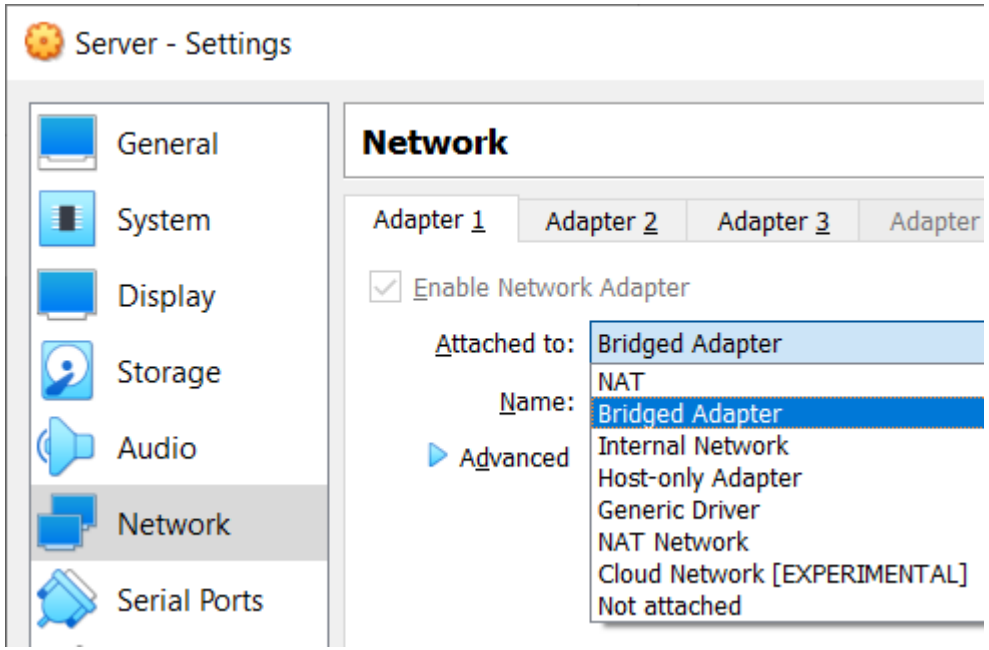
Virtual Networking

- Oracle VM VirtualBox provides up to **eight** virtual Network adapters for each virtual machine. For each such card, you can individually select the following:
  - The hardware that will be virtualized.
  - The virtualization mode that the virtual card operates in, with respect to your physical networking hardware on the host.
- **Four** of the network cards can be configured in the Network section of the Settings dialog in the graphical user interface of Oracle VM VirtualBox.
- You can configure all eight network cards on the command line using *VBoxManage modifyvm*.



Introduction to Networking Modes

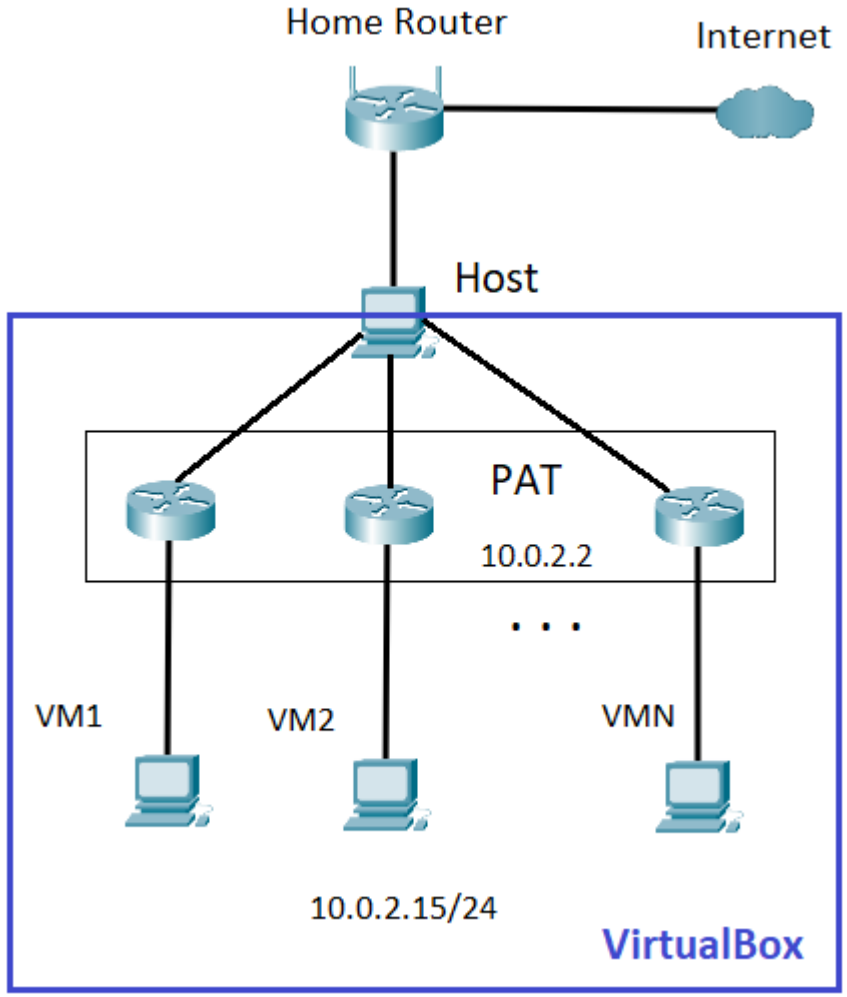
- Network Address Translation (NAT)
- Bridged networking
- Internal networking
- Host-only networking
- Generic networking
- NAT Network
- Not attached



Mode	VM→Host	VM←Host	VM1↔VM2	VM→Net/LAN	VM←Net/LAN
Host-only	+	+	+	–	–
Internal	–	–	+	–	–
Bridged	+	+	+	+	+
NAT	+	Port forward	–	+	Port forward
NATservice	+	Port forward	+	+	Port forward

Network Address Translation (NAT)

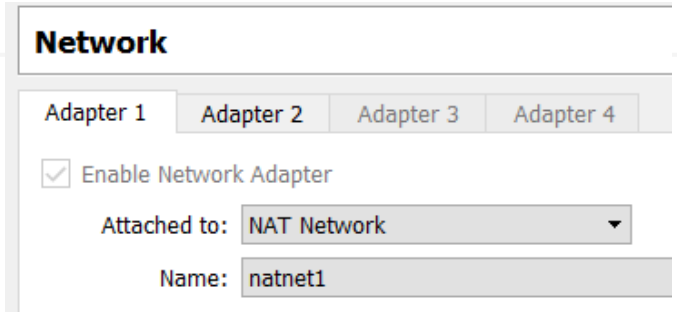
- Network Address Translation (NAT) is the simplest way of accessing an external network from a virtual machine. Usually, it **does not require any configuration** on the host network and guest system. It is the default networking mode in Oracle VM VirtualBox.
- A virtual machine with NAT enabled acts much like a real computer that connects to the Internet through a router. **The router, in this case, is the Oracle VM VirtualBox networking engine**, which maps traffic from and to the virtual machine transparently.
- In Oracle VM VirtualBox this **router is placed between each virtual machine and the host**. This separation maximizes security since by default virtual machines cannot talk to each other.

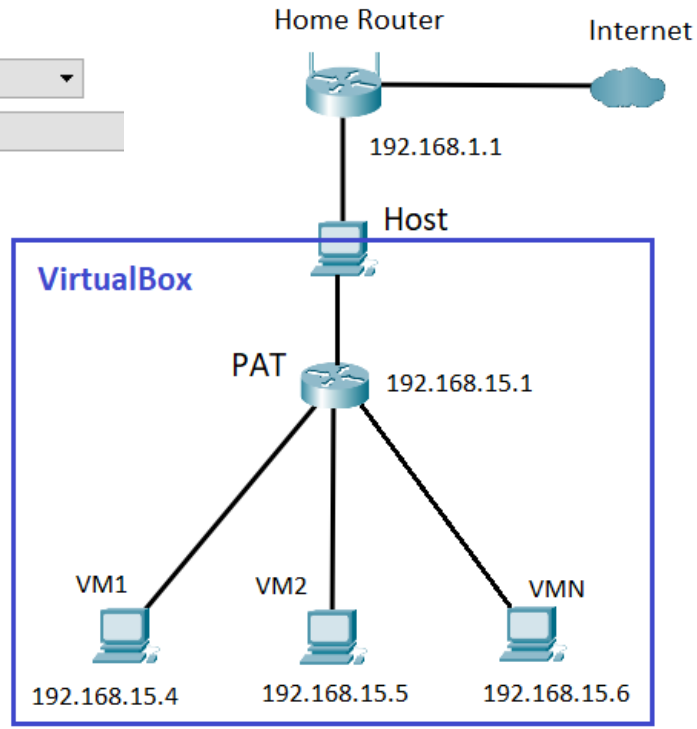


Mode	VM→Host	VM←Host	VM1↔VM2	VM→Net/LAN	VM←Net/LAN
Host-only	+	+	+	–	–
Internal	–	–	+	–	–
Bridged	+	+	+	+	+
NAT	+	Port forward	–	+	Port forward
NATservice	+	Port forward	+	+	Port forward

NAT Network

- The Network Address Translation (NAT) service works in a similar way to a **home router**, grouping the systems using it into a network and preventing systems outside of this network from directly accessing systems inside it, but letting systems inside **communicate with each other** and with systems outside.
- A NAT service is attached to an internal network. Virtual machines which are to make use of it should be attached to that internal network.
- The name of internal network is chosen when the NAT service is created, and the internal network will be created if it does not already exist.
- The following is an example command to create a NAT network: ***VBoxManage natnetwork add --netname natnet1 --network "192.168.15.0/24" --enable***

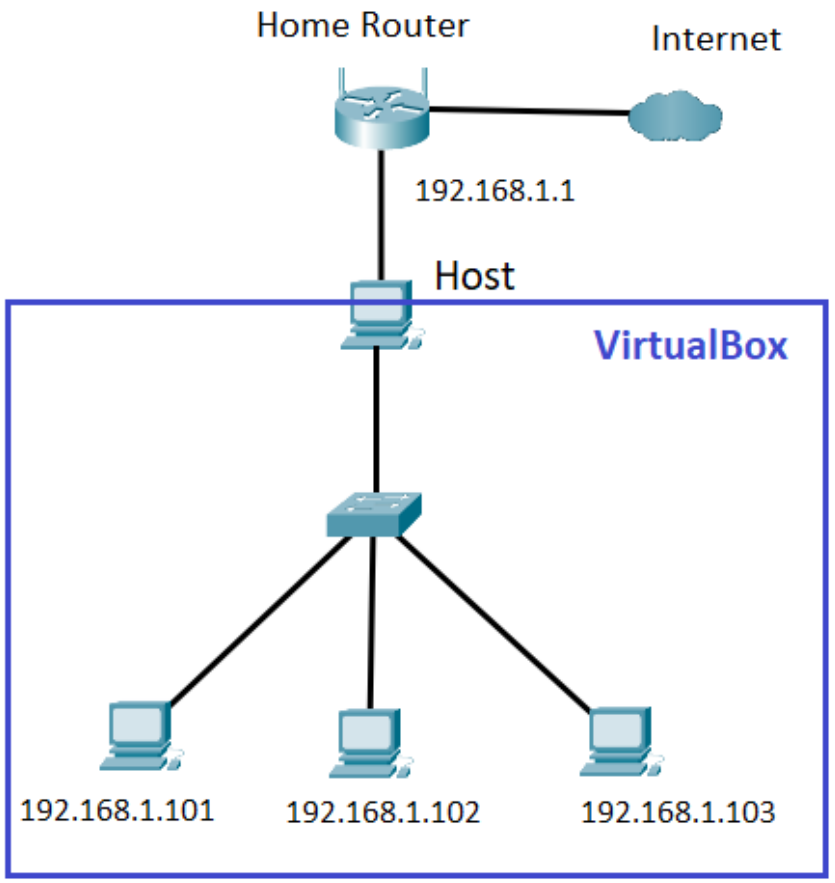




Mode	VM→Host	VM←Host	VM1↔VM2	VM→Net/LAN	VM←Net/LAN
Host-only	+	+	+	–	–
Internal	–	–	+	–	–
Bridged	+	+	+	+	+
NAT	+	Port forward	–	+	Port forward
NATservice	+	Port forward	+	+	Port forward

Bridged networking

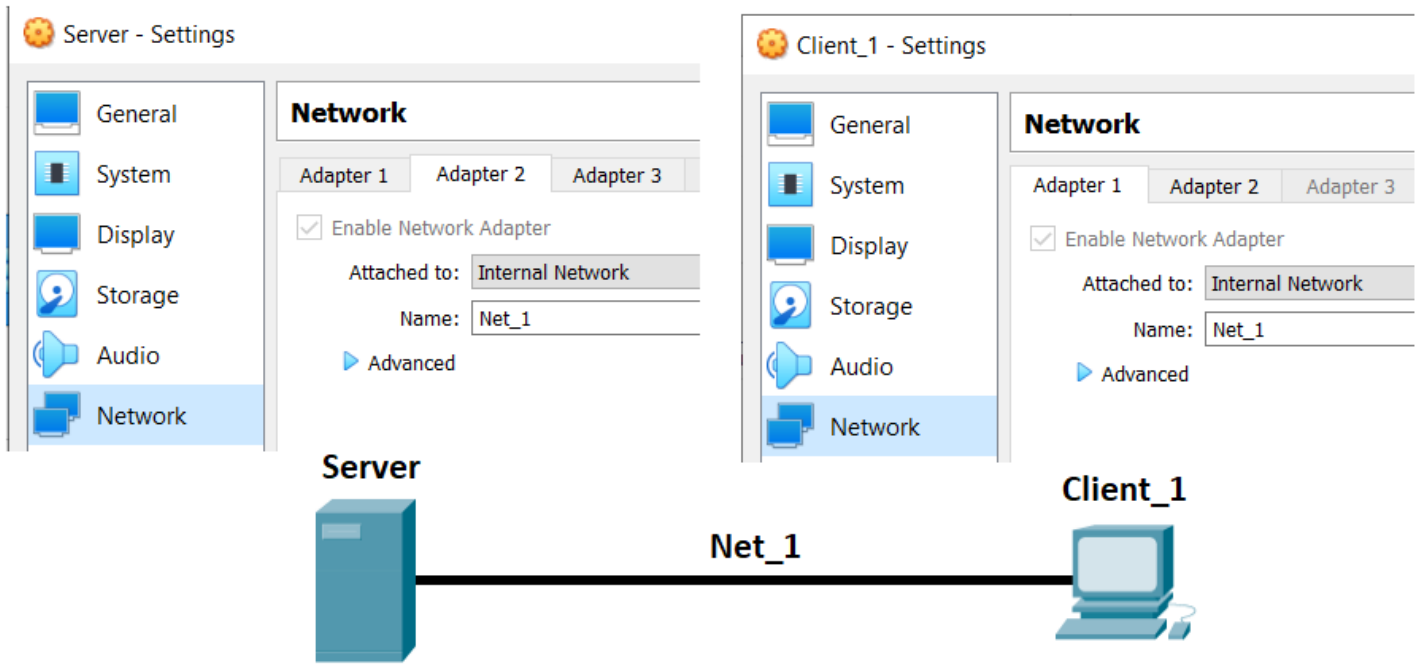
- With bridged networking, Oracle VM VirtualBox uses a device driver on your host system that filters data from your physical network adapter.
- This driver is therefore called a **net filter driver.** This enables Oracle VM VirtualBox to intercept data from the physical network and inject data into it, effectively creating a new network interface in software.
- When a guest is using such a new software interface, it looks to the host system as though the guest were **physically connected to the interface using a network cable**.
- The host can send data to the guest through that interface and receive data from it.



Mode	VM→Host	VM←Host	VM1↔VM2	VM→Net/LAN	VM←Net/LAN
Host-only	+	+	+	–	–
Internal	–	–	+	–	–
Bridged	+	+	+	+	+
NAT	+	Port forward	–	+	Port forward
NATservice	+	Port forward	+	+	Port forward

Internal networking

- Internal Networking is similar to bridged networking in that the VM can directly communicate with the outside world. However, the **outside world is limited to other VMs** on the same host which connect to the same internal network.
- Every internal network is identified simply **by its name**.
- Once there is more than one active virtual network card with the same internal network ID, the Oracle VM VirtualBox support driver will automatically wire the cards and act as a **network switch**.
- The Oracle VM VirtualBox support driver implements a complete Ethernet switch and supports both broadcast/multicast frames and promiscuous mode.



Mode	VM→Host	VM←Host	VM1↔VM2	VM→Net/LAN	VM←Net/LAN
Host-only	+	+	+	–	–
Internal	–	–	+	–	–
Bridged	+	+	+	+	+
NAT	+	Port forward	–	+	Port forward
NATservice	+	Port forward	+	+	Port forward


Thank you!