



# Network in KVM Env

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July 8, 2011

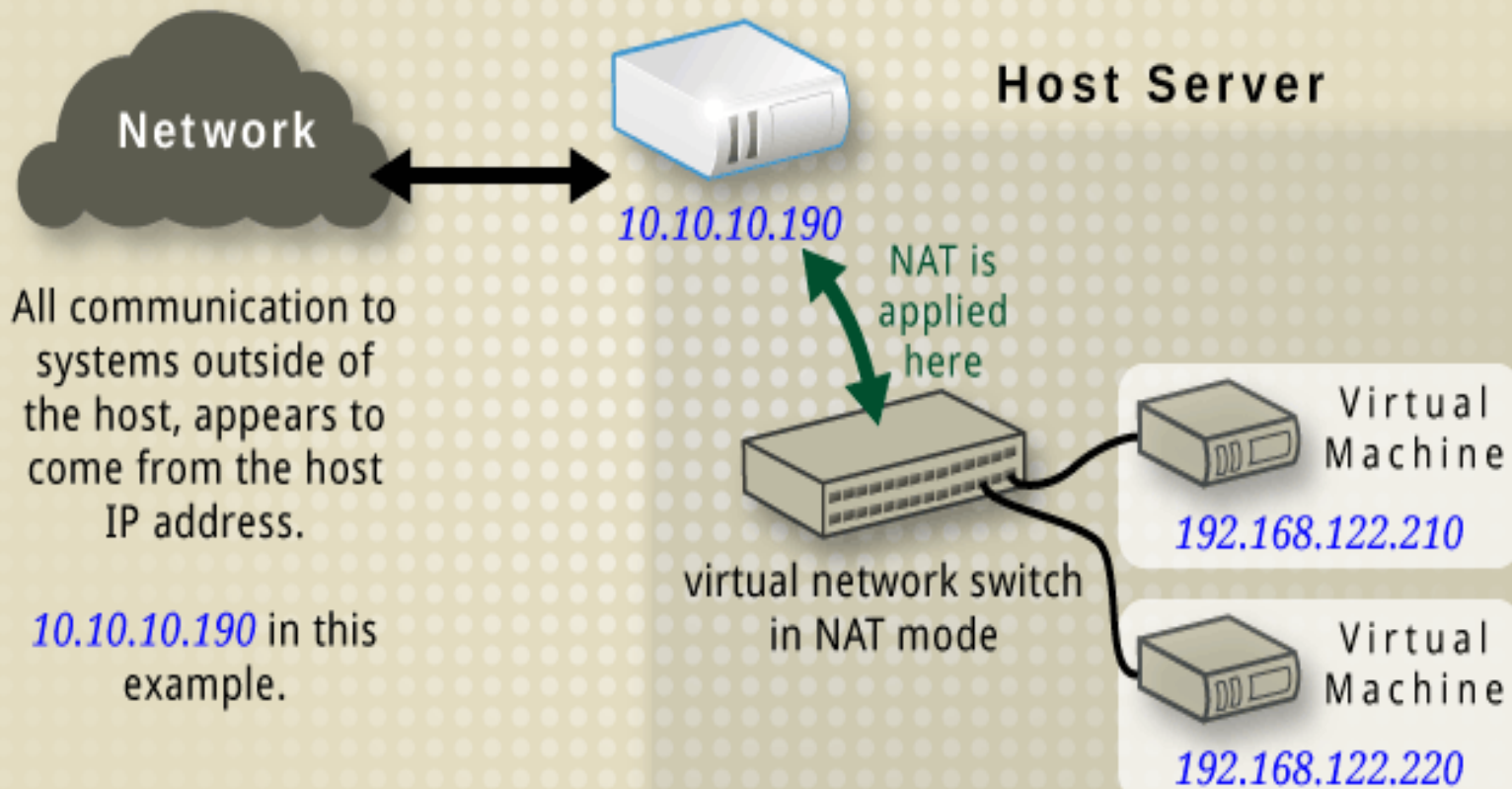
# Network in KVM Env

- Userspace net (NAT)
- Bridge+tap
- Main features
- Utility tools
- Q&A

# Userspace net(NAT)

- Virt nic is connected to a virtual network
- Network address translation
- Guest Port(80) <-> host port(1234)
- Doesn't request a host interface
- Routing or IP masquerading to connect with external network
- Qemu option: **-net user**

## Virtual switch: NAT mode



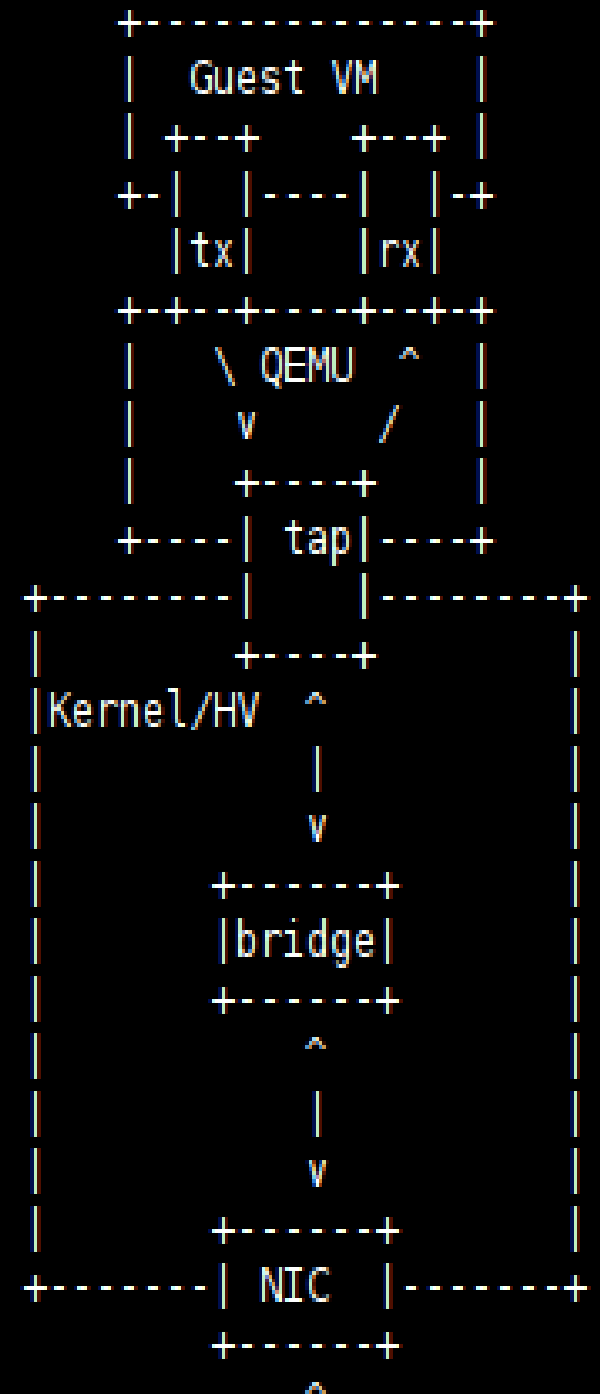
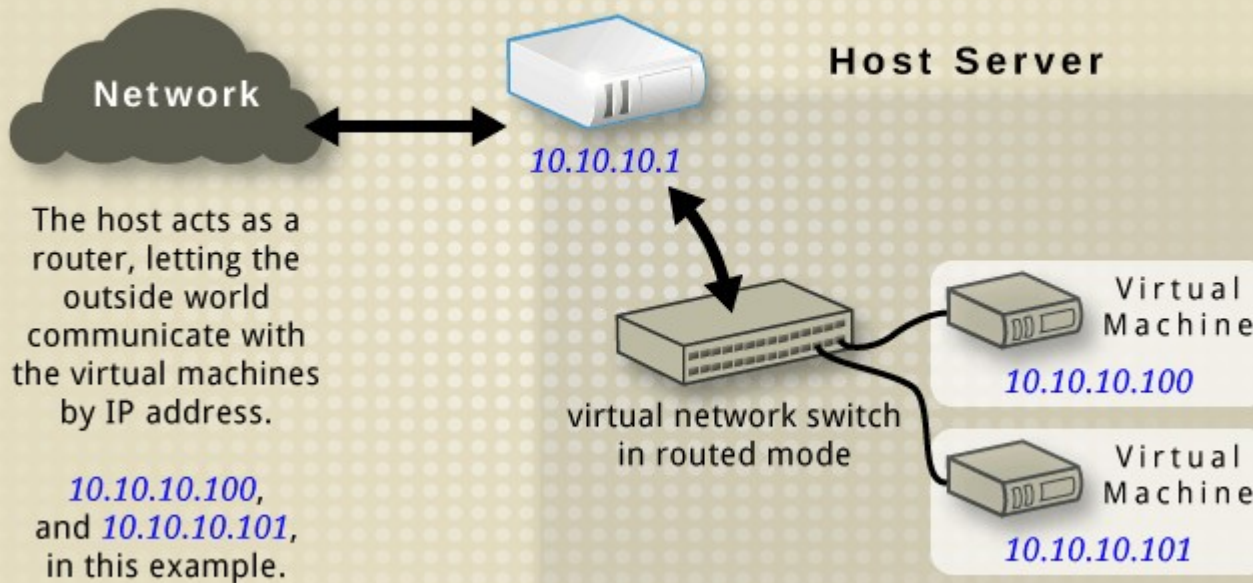
# Tun/tap

- Virtual network kernel devices
- Use `ioctl()` to access `/dev/tun`
- Tun → switch, tap → switch port
- Repeaters(bit), Bridges(frame), and Routers(packets)
- Qemu option: `-device virtio-net-pci,netdev=nid -netdev tap,id=nid`

# bridge(public) 1/2

- Virt nic is bridged to the same physical network as a physical NIC
- Using unique MAC address
- Physical NIC in promiscuous mode

## Virtual switch: Routed mode



# bridge(public) 2/2

```
[root@t network-scripts]# cat ifcfg-br0
```

```
DEVICE=switch
```

```
BOOTPROTO=dhcp
```

```
ONBOOT=yes
```

```
TYPE=Bridge
```

```
[root@t network-scripts]# cat ifcfg-eth0
```

```
DEVICE=eth0
```

```
BOOTPROTO=none
```

```
ONBOOT=yes
```

```
BRIDGE=switch
```

```
IPV6_INIT=no
```



# bridge(private) 1/2

- Libvirt use this by default
- It's convenient and independent
- Dnsmasq provides dhcp service
- Iptable forwards packets to external host

# bridge(private) 2/2

```
/usr/sbin/brctl addbr vbr0
```

```
echo 1 > /proc/sys/net/ipv6/conf/vbr0/disable_ipv6
```

```
echo 1 > /proc/sys/net/ipv4/ip_forward
```

```
/usr/sbin/brctl stp vbr0 on
```

```
/usr/sbin/brctl setfd vbr0 0
```

```
ifconfig $brname 192.168.58.1 up
```

```
iptables -t nat -A POSTROUTING -s 192.168.58.254/24 ! -d  
192.168.58.254/24 -j MASQUERADE
```

```
dnsmasq --strict-order --bind-interfaces --listen-address  
192.168.58.1 --dhcp-range 192.168.58.1,192.168.58.254
```

# Main features

- Vlan
- Bonding
- Multicast
- Fragment offload
- Jumbo

# Utility tools

- `tcpdump -vv -i tap0 icmp and src ...`  
(eth0 of guest, tap0, switch, eth0 of external host)
- `wireshark` (good analysis)
- `brctl` (bridge)
- `ethtool` (ethernet card)
- `ifconfig/ip/arp`
- `netperf/ping/scp/wget/nfs/ftp`

# Q&A

## Reference:

- understanding linux network internals Part IV: Bridging
- <http://www.linux-kvm.org/page/Networking>
- <http://wiki.libvirt.org/page/VirtualNetworking>