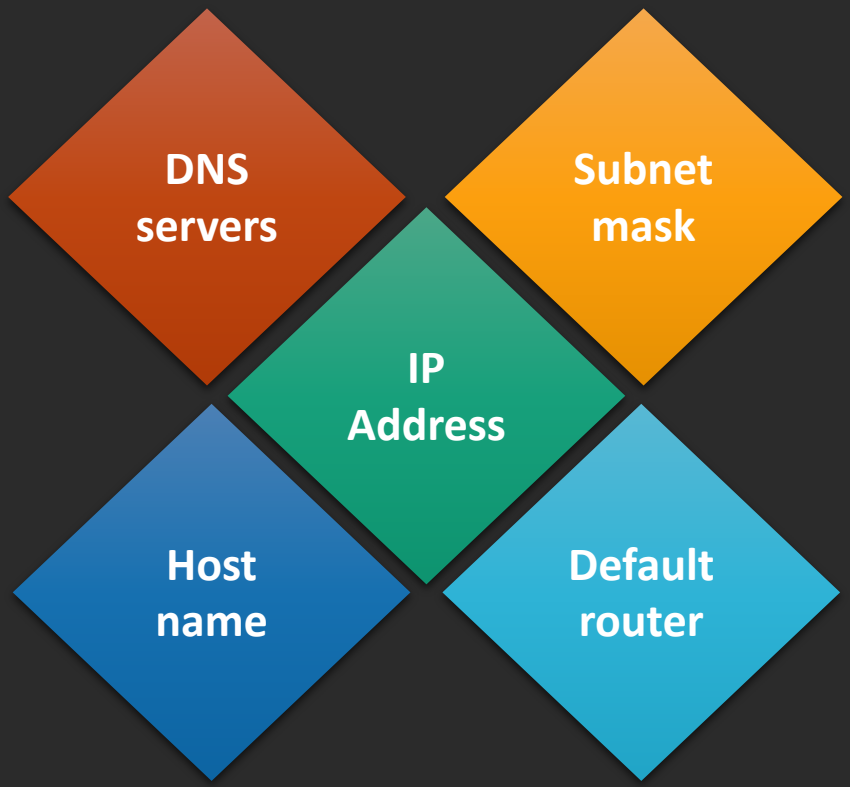
Lesson 9: Configuring Basic Networking

Objectives covered

- 109.1 Fundamentals of internet protocols (weight: 4)
- 109.2 Persistent network configuration (weight: 4)
- 109.4 Configure client side DNS (weight: 2)
- 109.3 Basic network troubleshooting (weight: 4)

Persistent network configuration and Configure client side DNS

What we need to configure



Network Configuration Files

Distribution	Network configuration location
Debian-based	/etc/network/interfaces file
Red Hat–based	/etc/sysconfig/network-scripts directory
OpenSUSE	/etc/sysconfig/network file

```
auto eth0
iface eth0 inet static
   address 192.168.1.77
   netmask 255.255.255.0
   gateway 192.168.1.254
iface eth0 inet6 static
   address 2003:aef0::23d1::0a10:00a1
   netmask 64
   gateway 2003:aef0::23d1::0a10:0001
```

Debian based

```
DEVICE=enp1s0
BOOTPROTO=none
ONBOOT=yes
PREFIX=24
IPADDR=192.168.1.27
```

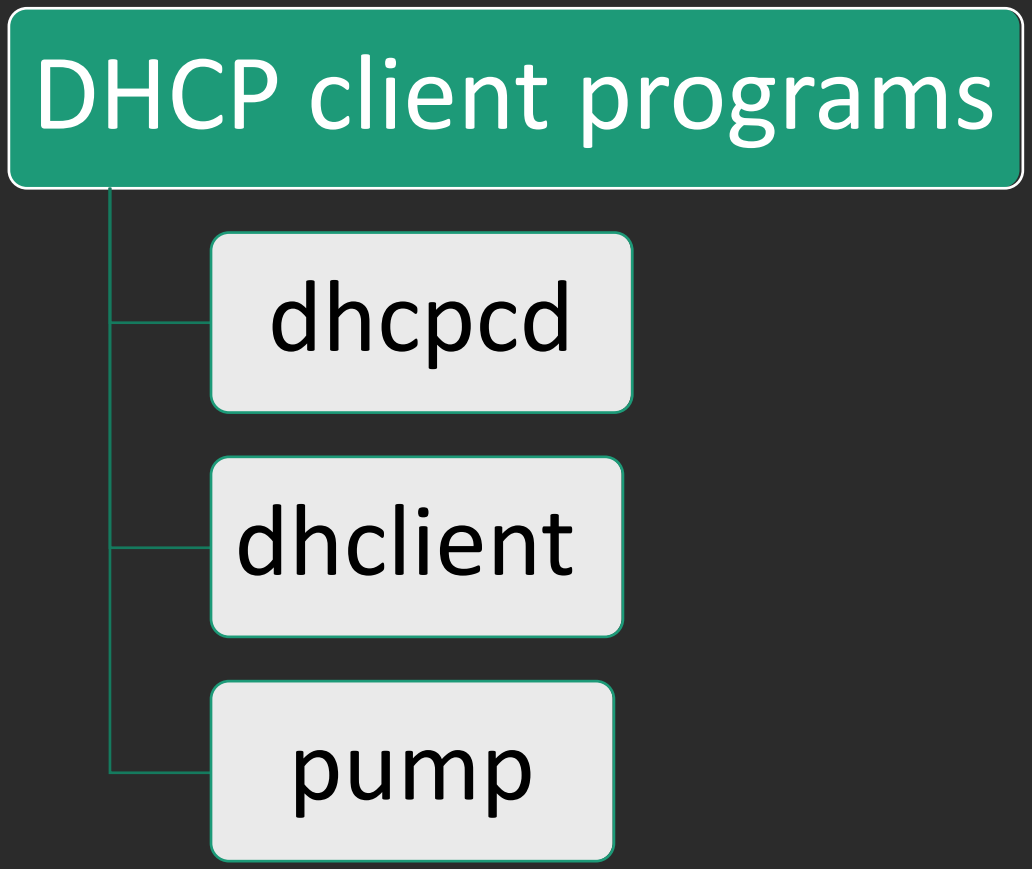
ifcfg file

```
NETWORKING=yes
HOSTNAME=mysystem
GATEWAY=192.168.1.254
```

Network file

Red Hat based

Auto configure IP address



Debian based

```
auto eth0
iface eth0 inet dhcp
iface eth0 inet6 dhcp
```

Red Hat based

```
TYPE=Ethernet
PROXY_METHOD=none
BROWSER_ONLY=no
BOOTPROTO=dhcp
DEFROUTE=yes
IPV6INIT=yes
IPV6_AUTOCONF=yes
IPV6_DEFROUTE=yes
NAME=enp0s3
DEVICE=enp0s3
ONBOOT=yes
```

DNS configuration files

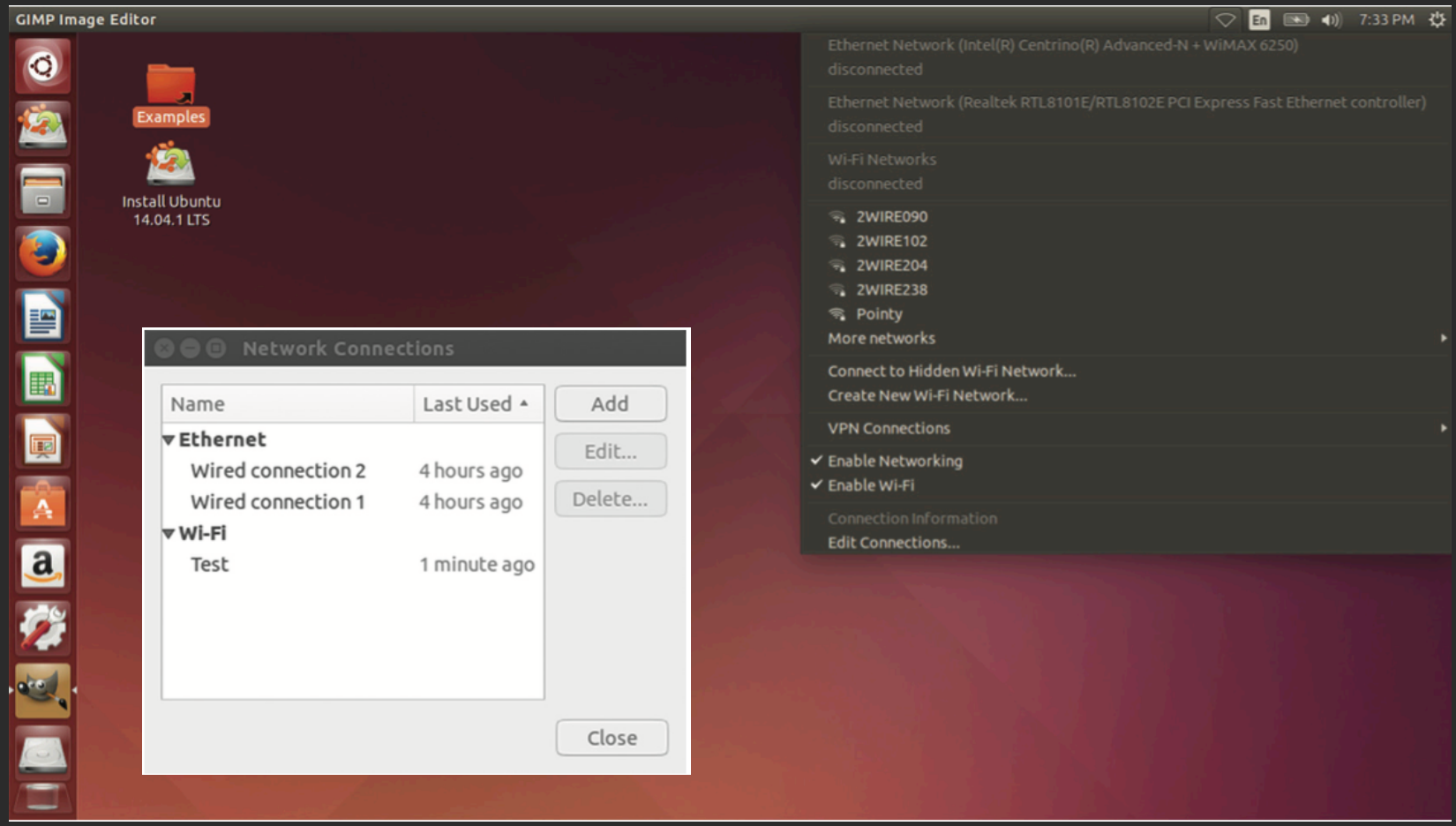
/etc/nsswitch.conf

hosts: files dns

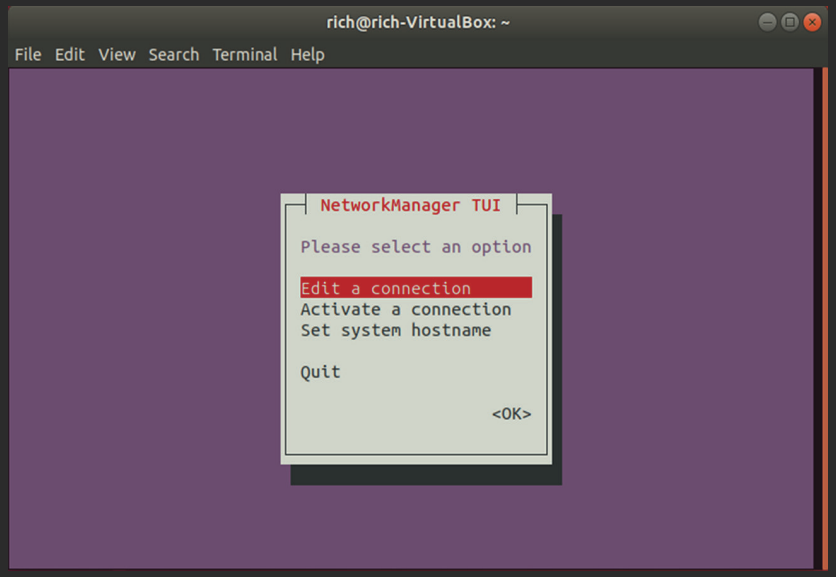
/etc/resolv.conf

domain mydomain.com search mytest.com nameserver 192.168.1.1

Network Manager Graphical tool



Network Manager Command line tool



nmtui

```
$ nmcli
enp0s3: connected to Wired connection 1
        "Intel 82540EM Gigabit Ethernet Controller (PRO/1000 MT Desktop Adapter)
        ethernet (e1000), 08:00:27:2C:35:D2, hw, mtu 1500
        ip4 default, ip6 default
        inet4 192.168.1.77/24
        route4 0.0.0.0/0
        inet6 2600:1702:1ce0:eeb0::6d0/128
        inet6 fe80::16d2:b8f:7f78:f3ed/64
        route6 2600:1702:1ce0:eeb0::/60
        route6 2600:1702:1ce0:eeb0::/64
        route6 ::/0
        route6 ff00::/8
        route6 fe80::/64
        route6 fe80::/64
        ...
```

```
# nmcli con add type ethernet con-name eth1 ifname enp0s3 ip4
10.0.2.10/24 gw4 192.168.1.254
```

nmcli

Legacy tool

- `ethtool`: Displays Ethernet settings for a network interface
- `ifconfig`: Displays or sets the IP address and netmask values for a network interface
- `iwconfig`: Sets the SSID and encryption key for a wireless interface
- `route`: Sets the default router address

```
$ ethtool enp0s3
Settings for enp0s3:
        Supported ports: [ TP ]
        Supported link modes:   10baseT/Half 10baseT/Full
                                100baseT/Half 100baseT/Full
                                1000baseT/Full
        Supported pause frame use: No
        Supports auto-negotiation: Yes
        Supported FEC modes: Not reported
        Advertised link modes:  10baseT/Half 10baseT/Full
                                100baseT/Half 100baseT/Full
                                1000baseT/Full
        Advertised pause frame use: No
        Advertised auto-negotiation: Yes
        Advertised FEC modes: Not reported
        Speed: 1000Mb/s
        Duplex: Full
        Port: Twisted Pair
        PHYAD: 0
        Transceiver: internal
        Auto-negotiation: on
        MDI-X: off (auto)
Cannot get wake-on-lan settings: Operation not permitted
        Current message level: 0x00000007 (7)
                               drv probe link
        Link detected: yes
```

```
$ sudo ifconfig enp0s3 down 10.0.2.10 netmask 255.255.255.0
$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.1.77  netmask 255.255.255.0  broadcast 192.168.1.255
        inet6 2600:1702:1ce0:eeb0:66dc:cedc:10ff:9ee6  prefixlen 64  scopeid 0x0<global>
        inet6 fe80::16d2:b8f:7f78:f3ed  prefixlen 64  scopeid 0x20<link>
        inet6 2600:1702:1ce0:eeb0:48e3:1865:5544:8200  prefixlen 64  scopeid 0x0<global>
        ether 08:00:27:2c:35:d2  txqueuelen 1000  (Ethernet)
        RX packets 293593  bytes 431675620 (431.6 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 119754  bytes 9135701 (9.1 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 1206  bytes 125586 (125.5 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1206  bytes 125586 (125.5 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

```
# route add default gw 192.168.1.254
$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         192.168.1.254   0.0.0.0         UG    0      0        0 enp0s3
192.168.1.0     *               255.255.255.0   U     1      0        0 enp0s3
```

```
# iwconfig wlan0 essid "MyNetwork" key s:mypassword
$ iwlist wlan0 scan
```

Iproute2 package – ip utility

```
$ ip address show
rich@rich-VirtualBox:~$ ip address show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:2c:35:d2 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.77/24 brd 192.168.1.255 scope global dynamic noprefixroute enp0s3
       valid_lft 84487sec preferred_lft 84487sec
    inet6 2600:1702:1ce0:eeb0::6d0/128 scope global dynamic noprefixroute
       valid_lft 5606sec preferred_lft 5306sec
    inet6 2600:1702:1ce0:eeb0:48e3:1865:5544:8200/64 scope global temporary dynamic
       valid_lft 3305sec preferred_lft 3305sec
    inet6 2600:1702:1ce0:eeb0:66dc:cedc:10ff:9ee6/64 scope global dynamic mngtmpaddr noprefixroute
       valid_lft 3305sec preferred_lft 3305sec
    inet6 fe80::16d2:b8f:7f78:f3ed/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
```

```
# ip address add 192.168.1.77/24 dev enp0s3
```

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

```
# ip route add default via 192.168.1.254 dev enp0s3
```

Iproute2 package – ip utility

Parameter	Description
address	Display or set the IPv4 or IPv6 address on the device
addrlabel	Define configuration labels
l2tp	Tunnel Ethernet over IP
link	Define a network device
maddress	Define a multicast address for the system to listen to
monitor	Watch for netlink messages
mroute	Define an entry in the multicast routing cache
mrule	Define a rule in the multicast routing policy database
neighbor	Manage ARP or NDISC cache entries
netns	Manage network namespaces
ntable	Manage the neighbor cache operation
route	Manage the routing table
rule	Manage entries in the routing policy database
tcpmetrics	Manage TCP metrics on the interface
token	Manage tokenized interface identifiers
tunnel	Tunnel over IP
tuntap	Manage TUN/TAP devices
xfrm	Manage IPSec policies for secure connections

Bonding Network cards

Mode	Name	Description
0	balance-rr	Provides load balancing and fault tolerance using interfaces in a round-robin approach
1	active-backup	Provides fault tolerance using one interface as the primary and the other as a backup
2	balance-xor	Provides load balancing and fault tolerance by transmitting on one interface and receiving on the second
3	broadcast	Transmits all packets on all interfaces
4	802.3ad	Aggregates the interfaces to create one connection combining the interface bandwidths
5	balance-tlb	Provides load balancing and fault tolerance based on the current transmit load on each interface
6	balance-alb	Provides load balancing and fault tolerance based on the current receive load on each interface

```
$ sudo modprobe bonding
```

```
$ sudo ip link add bond0 type bond mode 4
```

```
$ sudo ip link set eth0 master bond0
$ sudo ip link set eth1 master bond0
```

Question...