Linux for iron mans

Linux ?

operating system

Linus Torvalds launched the Linux kernel 1991

open source

Many roads

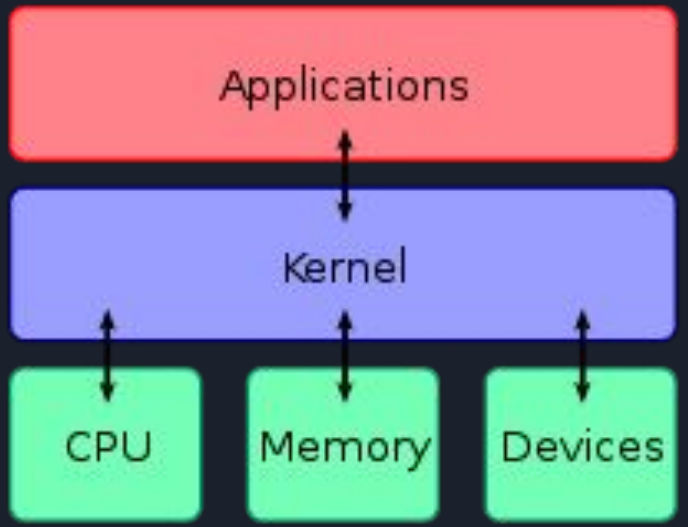
Tux -

OS

- GPOS: General Purpose OS
  - Dynamic memory mapping
  - Random execution time
  - Response time not Guaranteed
  - Examples: linux windows, IOS, Andorid
  - usage: PC, Tabled , iphone
-
- RTOS - Real Time OS
  - Deterministic: no random execution patttern
  - Predictable response time
  - Preemptive Kernel: A preemptive kernel is one that can be interrupted in the middle of executing code
  - Examples: FreeRTOS, Nuttx, ChebiOS
  - Useage:
    - Embedded computing: pixhawk

Kernels

- Resource management
  - cpu
  - memory
  - i/o



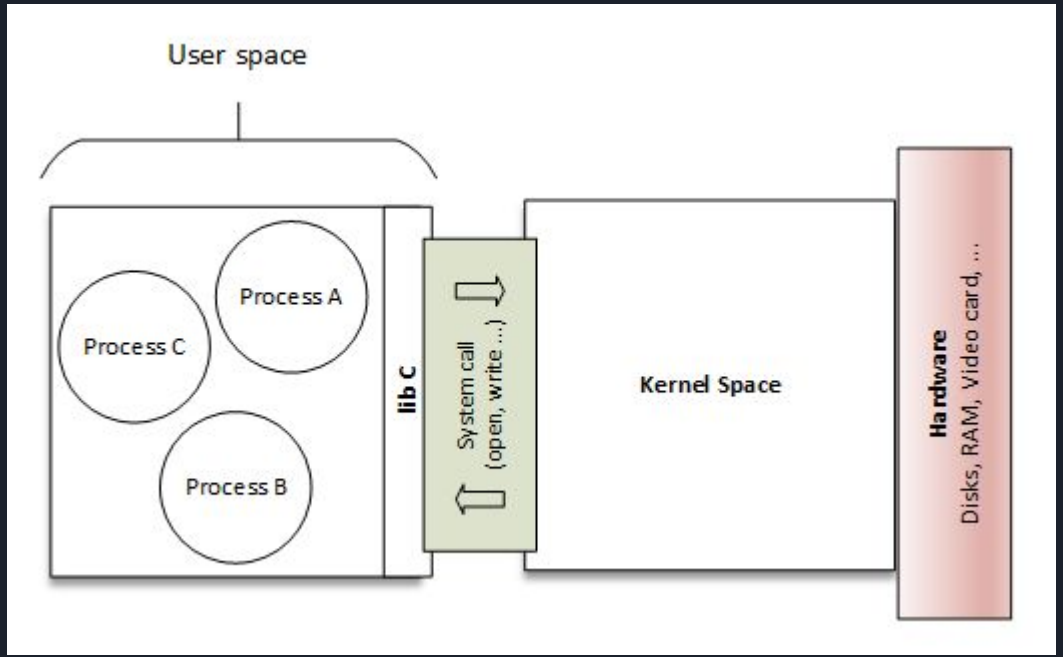
Linux Concepts

- Linux kernel
- Linux Distribution
- Server
- Desktop
- user space
- kernel space

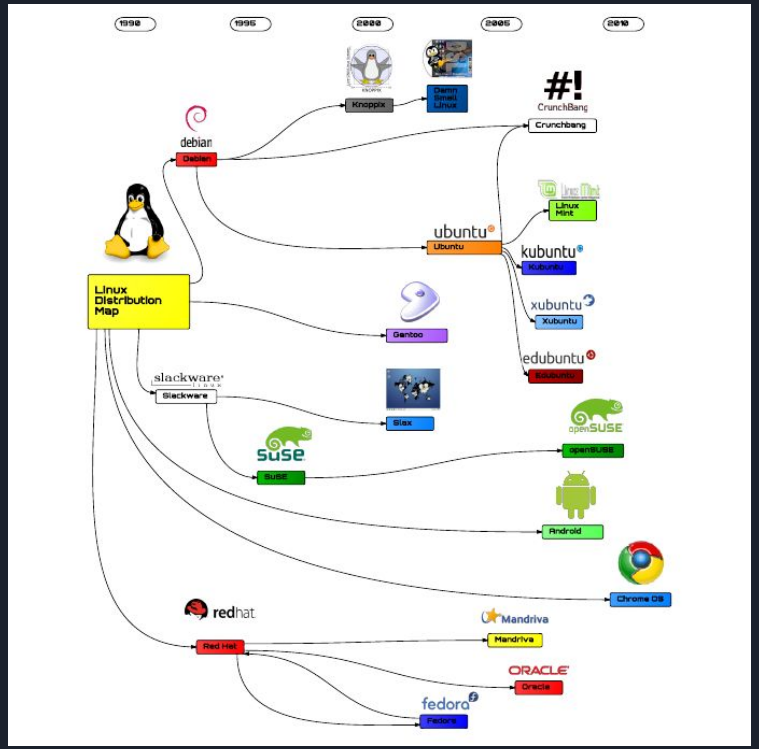
[dist graph view]

[kernel]

Kernel space / User space



Linux distribution Tree



Debian base

A
- Tails (operating system)
- Ångström distribution
- AntiX
- Astra Linux
- AV Linux

B
- BackBox
- Baltix
- Bharat Operating System Solutions

C
- Canaima (operating system)
- Commodore OS
- Corel Linux
- CrunchBang Linux

D
- Damn Small Linux
- Debian Pure Blend
- *Debian-Med*
- Deepin
- Devuan
- Dreamlinux
- Dyson (operating system)

E
- Elementary OS
- Emdebian Grip
- Emmabuntüs

F
- Finnix
- FreedomBox

G
- GLinux
- GNewSense
- GnuLinEx
- Google Cloud Shell
- Grml
- Guadalinex

H
- HandyLinux
- Huayra GNU/Linux

I
- Instant WebKiosk
- Iskolinux

K
- KaeilOS
- Kali Linux
- Kali Linux NetHunter Edition
- Kanotix
- Knoppix

L
- Libranet
- LiMux
- Linspire
- *Linux Mint Debian Edition*
- Loco Linux

M
- Maemo
- MEPIS
- Mklivecd
- Musix GNU+Linux
- MX Linux

O
- OpenZaurus

P
- Pardus (operating system)
- Parrot OS
- Parsix
- Pixart
- Progeny Linux Systems
- Proxmox Virtual Environment
- PureOS

R
- Reconstructor

S
- Sacix
- SalineOS
- Skolelinux
- SolydXK
- SparkyLinux
- SteamOS
- Stormix
- Sunwah Linux
- Symphony OS

T
- TurnKey Linux Virtual Appliance Library

U
- Ubuntu
- Univention Corporate Server
- UserLinux
- USU (operating system)

V
- Vyatta
- VyOS

W
- Webconverger
- Wienux

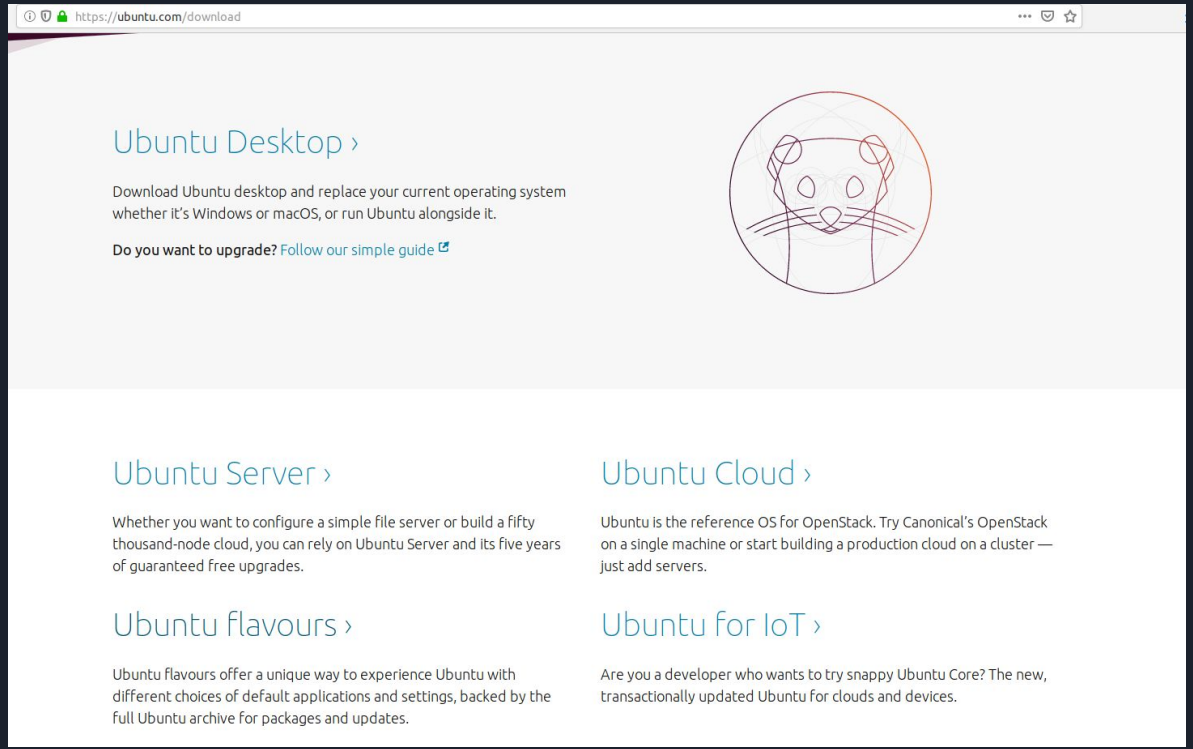
X
- Xandros

Y
- YunoHost

Ubuntu

1. Ubuntu is a free and open-source Linux distribution based on Debian
2. Ubuntu is officially released in three editions: Desktop, Server, and Core
3. Ubuntu is released every six months (19.10 , 20.04)
4. LTS every 2 years (18.04)
5. ubuntu naming: using an adjective and an animal with the same first letter (18.04 Bionic Beaver)

Desktop / server / core / ...



flavours

Ubuntu flavours

Ubuntu flavours offer a unique way to experience Ubuntu, each with their own choice of default applications and settings. Ubuntu flavours are backed by the full Ubuntu archive for packages and updates.

Kubuntu

Kubuntu offers the KDE Plasma Workspace experience, a good-looking system for home and office use.

Lubuntu

Lubuntu is a light, fast, and modern Ubuntu flavor using LXQt as its default desktop environment. Lubuntu used to use LXDE as its default desktop environment.

Ubuntu Budgie

Ubuntu Budgie provides the Budgie desktop environment which focuses on simplicity and elegance. It provides a traditional desktop metaphor based interface utilising a customisable panel based menu driven system.

Ubuntu Kylin

The Ubuntu Kylin project is tuned to the needs of Chinese users, providing a thoughtful and elegant Chinese experience out-of-the-box.

Ubuntu MATE

Ubuntu MATE expresses the simplicity of a classic desktop environment. Ubuntu MATE is the continuation of the GNOME 2 desktop which was Ubuntu's default desktop until October 2010.

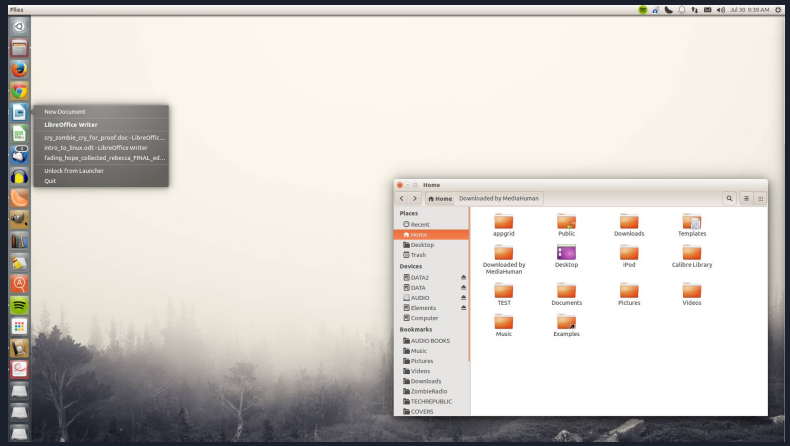
Ubuntu Studio

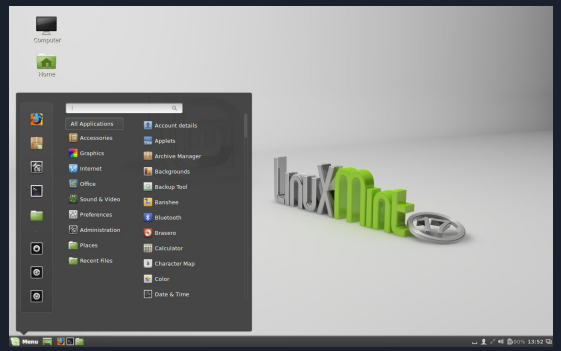
Ubuntu Studio is a multimedia content creation flavor of Ubuntu, aimed at the audio, video and graphic enthusiast or professional.

Xubuntu

Xubuntu is an elegant and easy to use operating system. Xubuntu comes with Xfce, which is a stable, light and configurable desktop environment.

Desktop



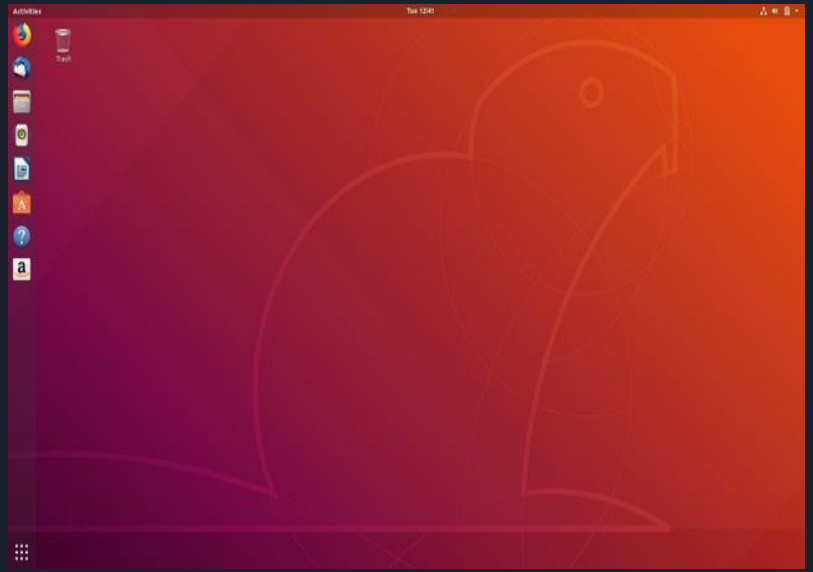


- GNOME
- UNITY
- mint cinnamon
- lxde
-
- more

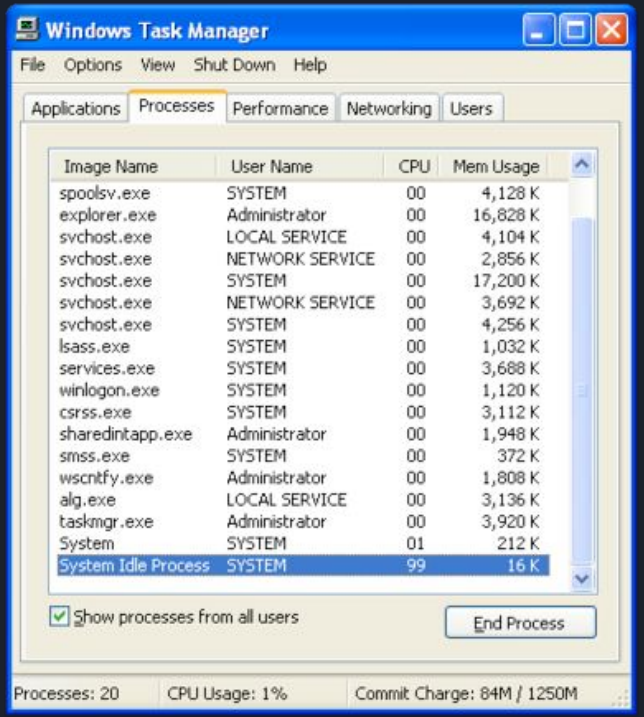
Demo

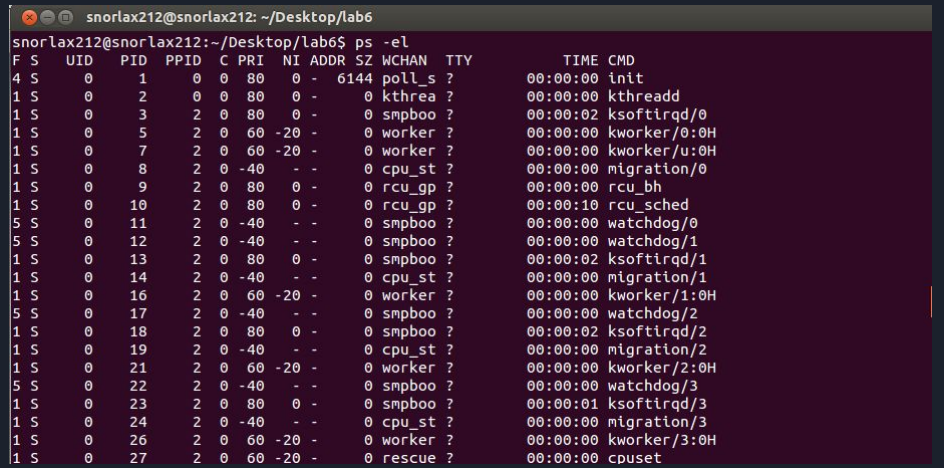
- Desktop
- Command lines
  - ls
  - cd
  - cat
  - ping
  - networking
- Edit file
- Install
  - tcpdump

Ubuntu 18.04 GNOME



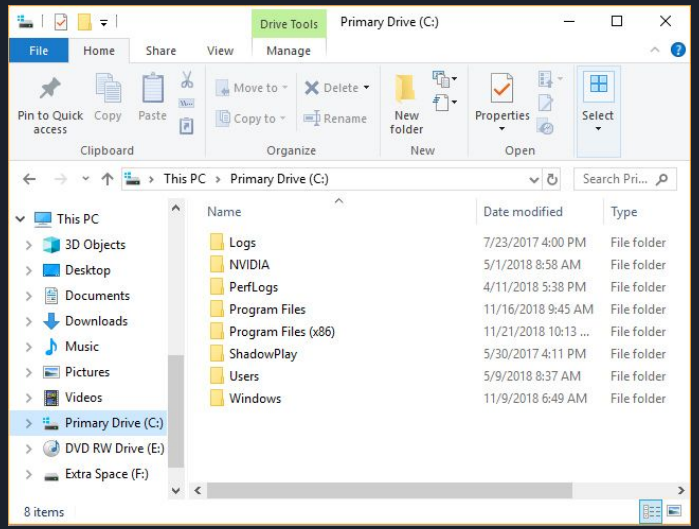
Process -> kill

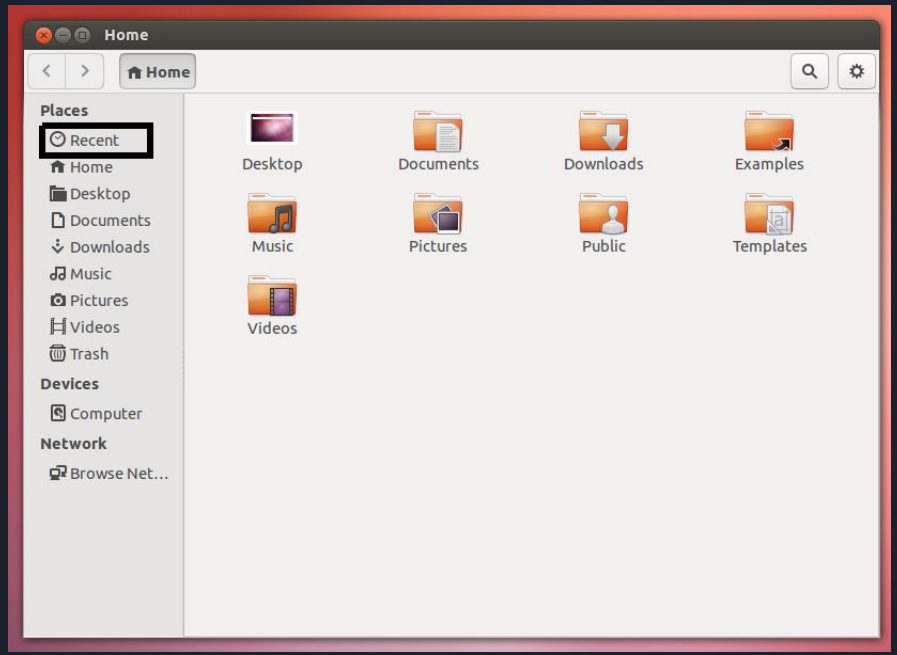




kill <pid>
kill -9 <pid>
killall <process name>

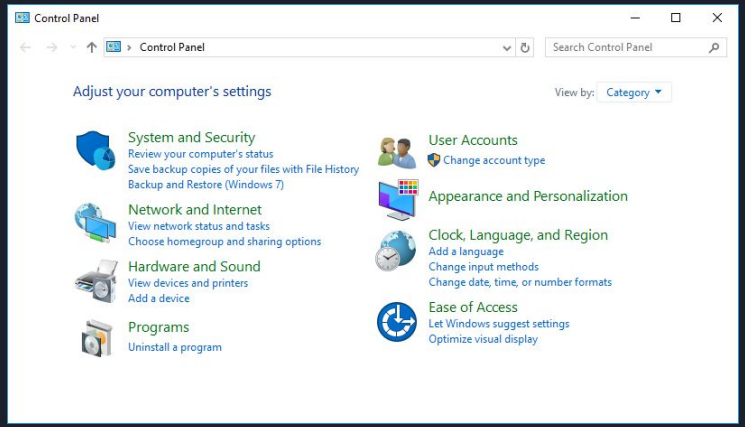
File Explorer

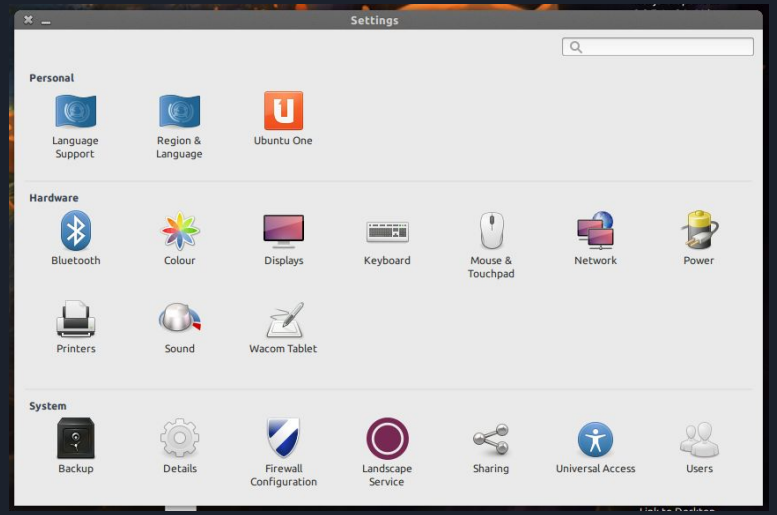




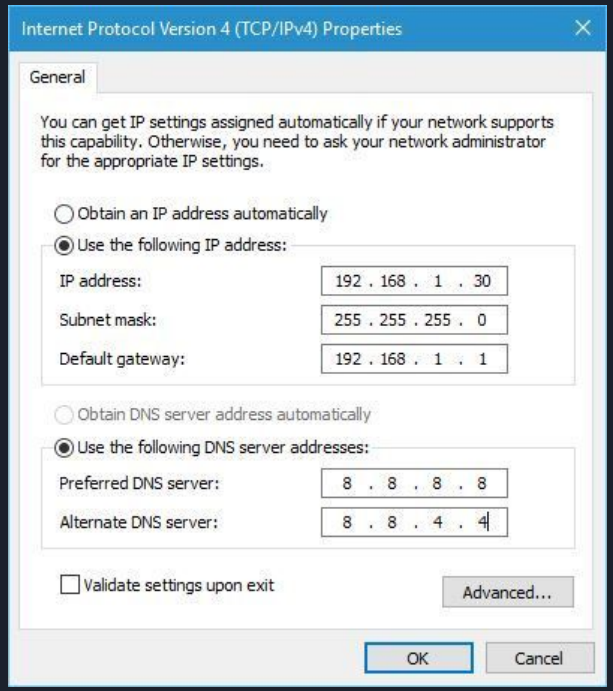
Linux always has More

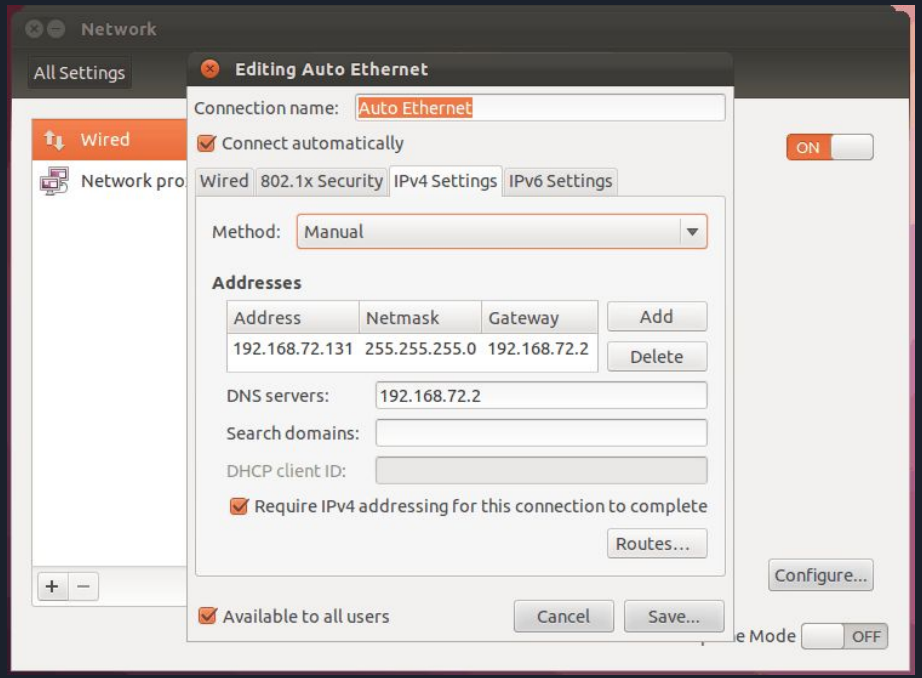
Control Panels / Settings



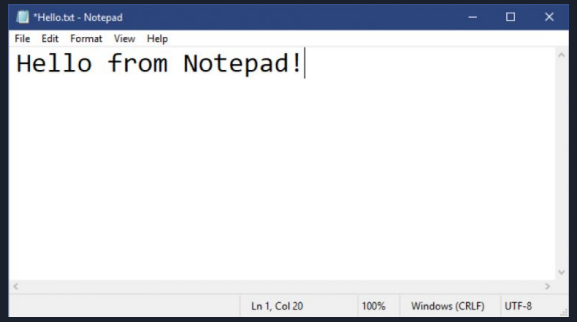


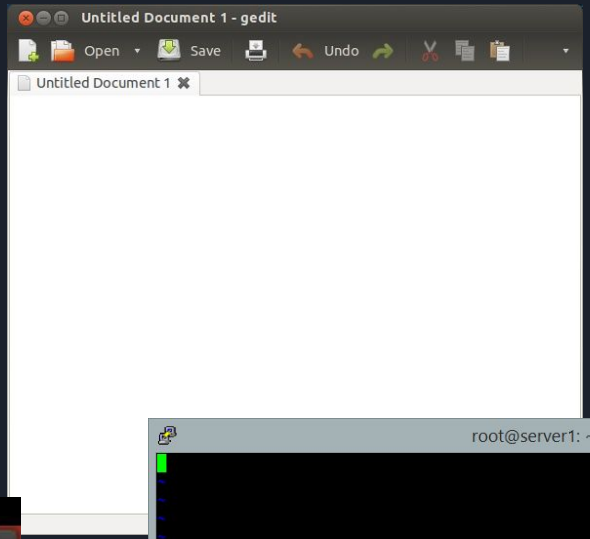
Network settings



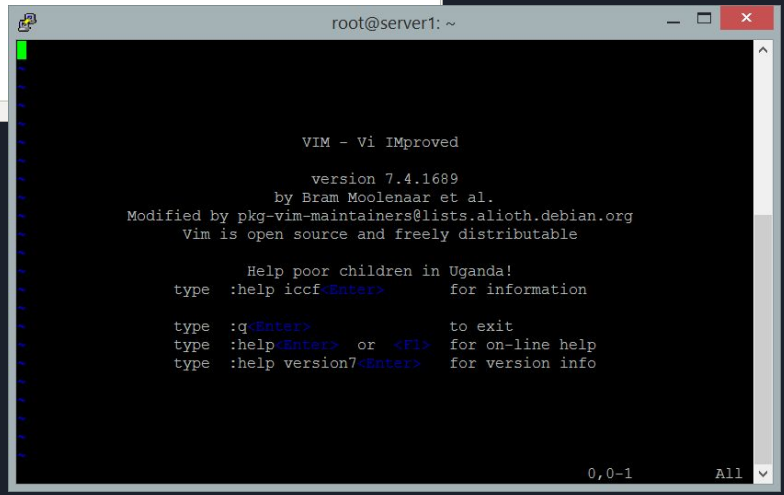


Editors

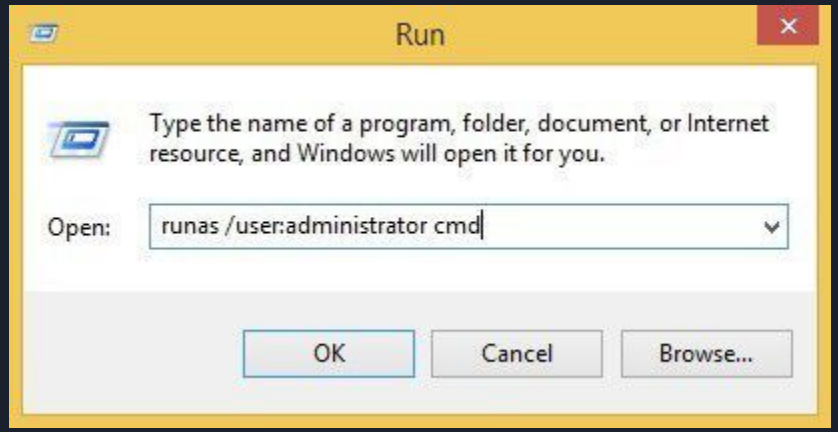

*Hello.txt - Notepad
File Edit Format View Help
Hello from Notepad!
Ln 1, Col 20
100%
Windows (CRLF)
UTF-8


Untitled Document 1 - gedit
Open
Save
Undo
Untitled Document 1

jlacroix@jlacroix-D630: ~/Documents
GNU nano 2.2.6
File: Test.txt
Modified
Testing
Testing
Testing
^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Text ^T To Spell


root@server1: ~
VIM - Vi IMproved
version 7.4.1689
by Bram Moolenaar et al.
Modified by pkg-vim-maintainers@lists.alioth.debian.org
Vim is open source and freely distributable
Help poor children in Uganda!
type :help iccf<Enter> for information
type :q<Enter> to exit
type :help<Enter> or <F1> for on-line help
type :help version7<Enter> for version info
0,0-1 All

Run as



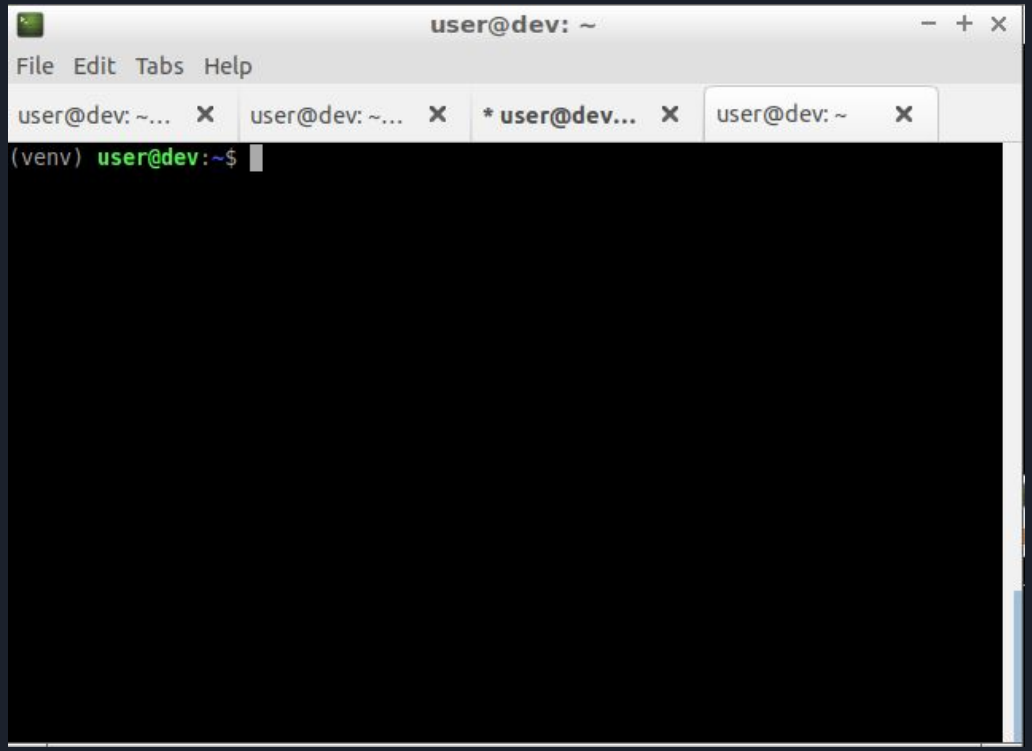
```
user@dev:~$ sudo su
root@dev:/home/user#
```

Troubleshoot

Terminal

- New terminal: ctrl-alt-t

  New tab in terminal : ctrl-shift-t



BASH

Ping

```
bob@suse1:~> ping 192.168.198.130
PING 192.168.198.130 (192.168.198.130) 56(84) bytes of data.
64 bytes from 192.168.198.130: icmp_seq=1 ttl=64 time=6.14 ms
64 bytes from 192.168.198.130: icmp_seq=2 ttl=64 time=0.778 ms
64 bytes from 192.168.198.130: icmp_seq=3 ttl=64 time=0.599 ms
64 bytes from 192.168.198.130: icmp_seq=4 ttl=64 time=0.558 ms
64 bytes from 192.168.198.130: icmp_seq=5 ttl=64 time=0.615 ms
64 bytes from 192.168.198.130: icmp_seq=6 ttl=64 time=0.608 ms
64 bytes from 192.168.198.130: icmp_seq=7 ttl=64 time=0.645 ms
64 bytes from 192.168.198.130: icmp_seq=8 ttl=64 time=0.619 ms
64 bytes from 192.168.198.130: icmp_seq=9 ttl=64 time=0.698 ms
^C
--- 192.168.198.130 ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8000ms
rtt min/avg/max/mdev = 0.558/1.252/6.149/1.732 ms
```

dmesg

dmesg prints the message buffer of the kernel. The output of this command typically contains the messages produced by the device drivers

sudo dmesg -C

dmesg | grep -i usb

dmesg | grep -i tty

dmesg | tail -20

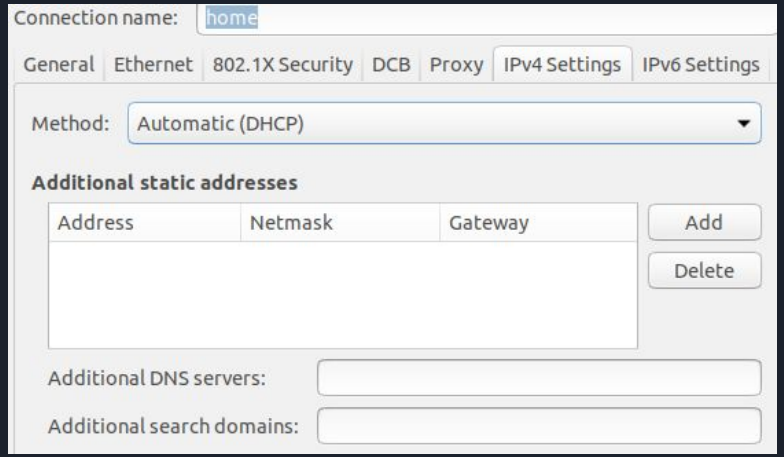
dmesg | less

```
user@dev:~$ dmesg | grep tty
[    0.000000] console [tty0] enabled
[    4.368335] usb 3-2: pl2303 converter now attached to ttyUSB0
```

DNS Resolve

cat /etc/resolv.conf

nslookup google.com

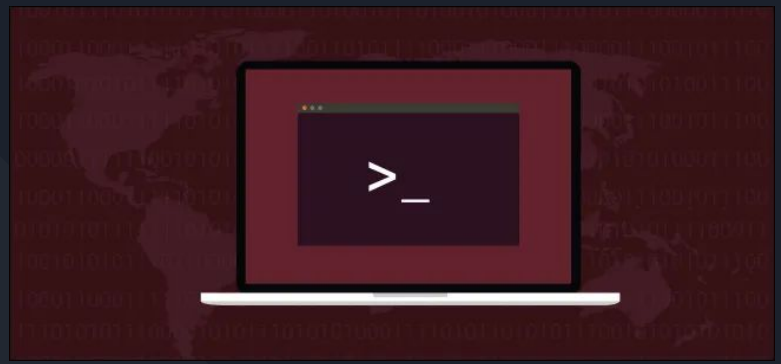



```
user@dev:~$ nslookup google.com
Server:         8.8.8.8
Address:        8.8.8.8#53

Non-authoritative answer:
Name:   google.com
Address: 216.58.211.110
Name:   google.com
Address: 2a00:1450:400e:809::200e
```

```
user@dev:~$ cat /etc/resolv.conf
nameserver 8.8.8.8
```

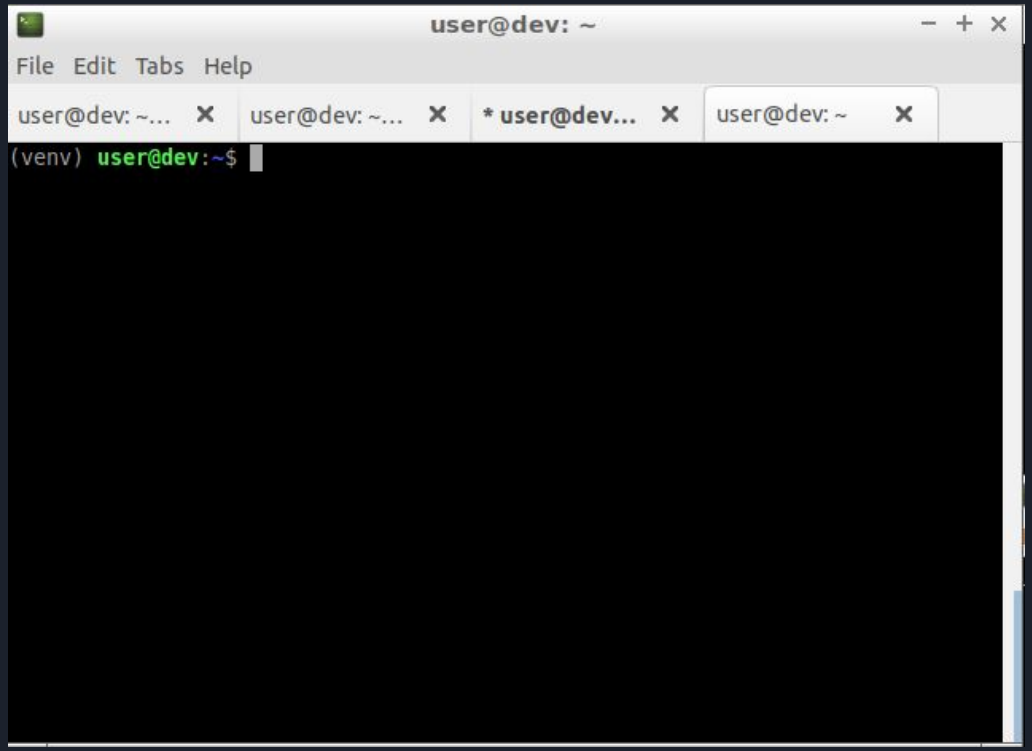
Linux Commands



Terminal

- New terminal: ctrl-alt-t

  New tab in terminal : ctrl-shift-t



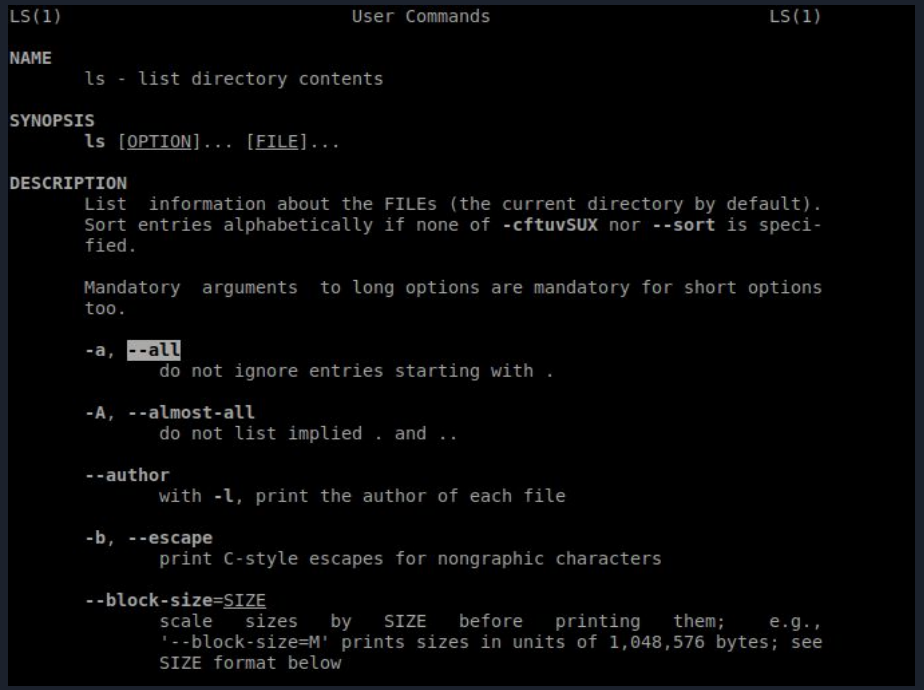
BASH

man, command manual

man ls

man -k

man ls



Everything is a file

“Everything is a File” and Types of Files in Linux

Normal	-	Normal file
Directories	d	Normal directory
Hard link	-	additional name for existing file
Symbolic link	l	Shortcut to a file or directory
Socket	s	Pass data between 2 process
Named pipe	p	like sockets, user can't work directly with it
Character device	c	Processes character hw communication
Block device	b	Major and minor numbers for controlling dev

Tecmint.com
Linux Howto's Guide

File System

/

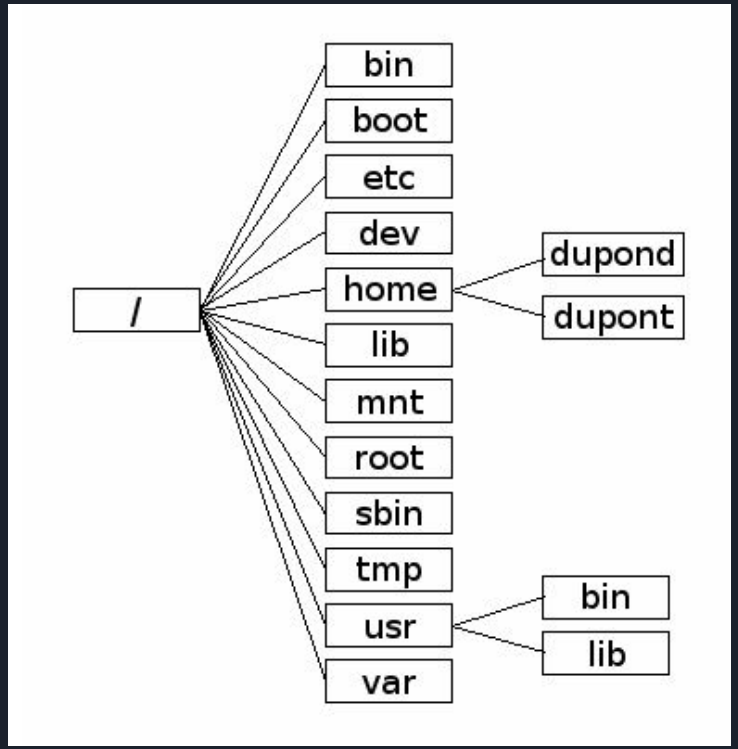
/home

/etc

/tmp

/mnt

/bin



TAB and Other shortcut

TAB

!!

./

cd ~

cd -

cd /

Files

pwd

cd, mkdir, rm

cat

cp

tree

Hand-on Time

ls
ls -la
ll
alias ll
man ls
ls -ltr

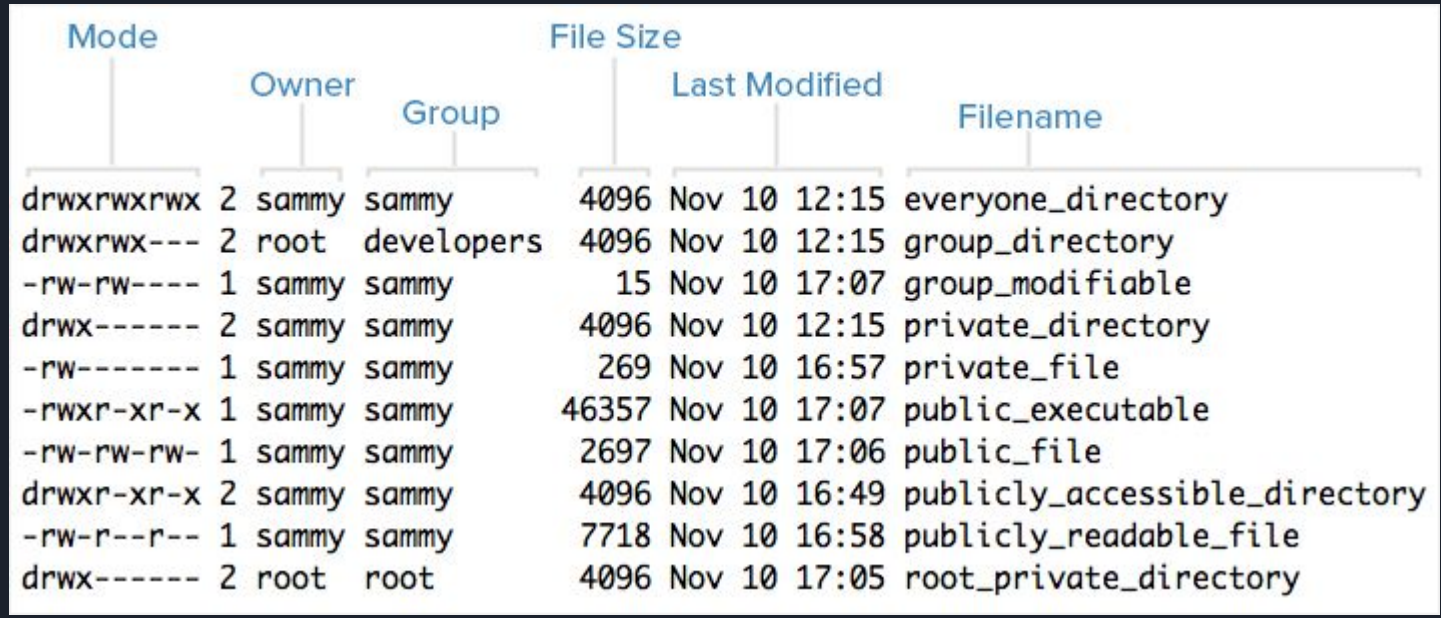
```
drwxrwxr-x   2 user user 4096 Jan  7 23:40 ./
drwxr-xr-x 112 user user 4096 Jan  7 23:40 ../
-rw-rw-r--   1 user user    0 Jan  7 23:40 1.txt
```

Files copy rename and delete

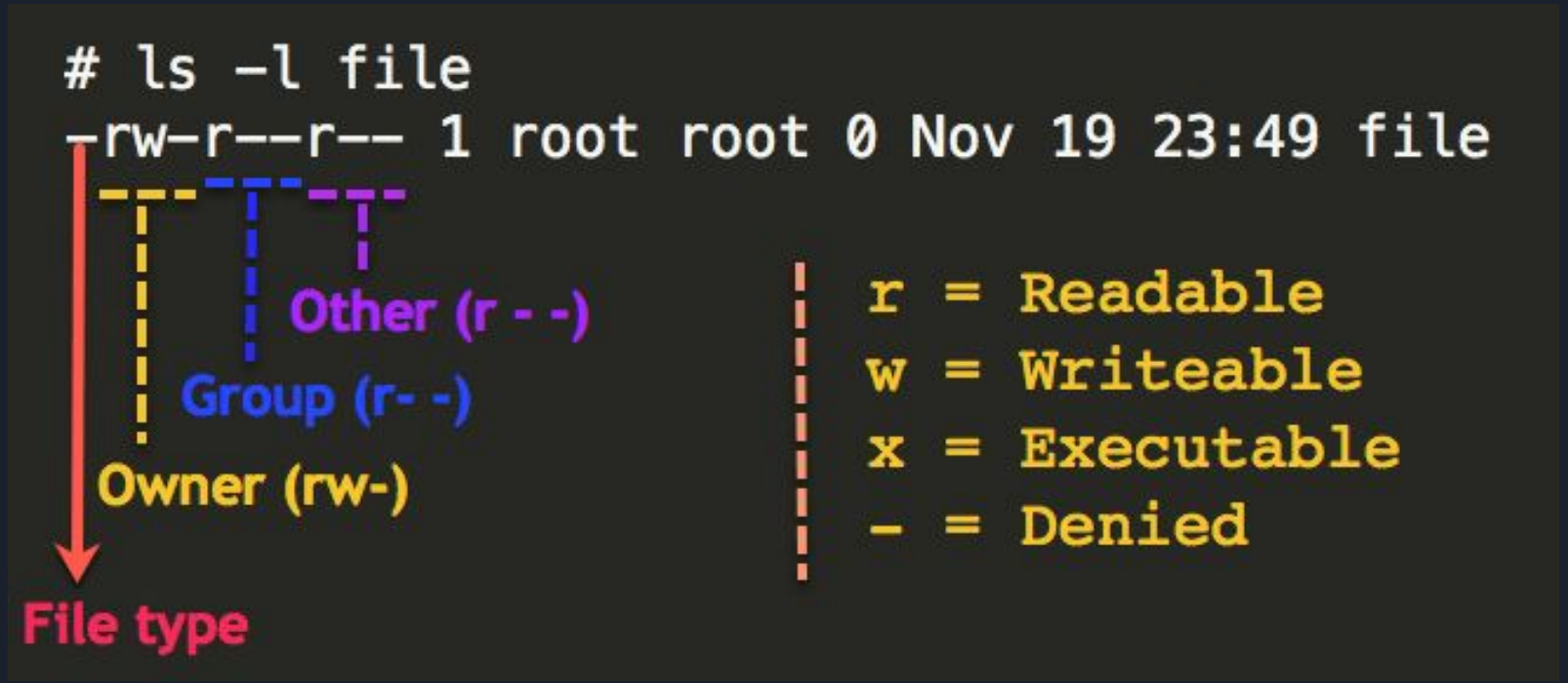
Hand-on Time

```
mkdir my_folder
cd my_folder
touch config.txt
cat config.txt
mv config.txt config.json
cp config.json ~/
rm config.json
```

Permission


Mode
Owner
Group
File Size
Last Modified
Filename
drwxrwxrwx 2 sammy sammy 4096 Nov 10 12:15 everyone_directory
drwxrwx--- 2 root developers 4096 Nov 10 12:15 group_directory
-rw-rw---- 1 sammy sammy 15 Nov 10 17:07 group_modifiable
drwx------ 2 sammy sammy 4096 Nov 10 12:15 private_directory
-rw------- 1 sammy sammy 269 Nov 10 16:57 private_file
-rwxr-xr-x 1 sammy sammy 46357 Nov 10 17:07 public_executable
-rw-rw-rw- 1 sammy sammy 2697 Nov 10 17:06 public_file
drwxr-xr-x 2 sammy sammy 4096 Nov 10 16:49 publicly_accessible_directory
-rw-r--r-- 1 sammy sammy 7718 Nov 10 16:58 publicly_readable_file
drwx------ 2 root root 4096 Nov 10 17:05 root_private_directory

Linux Permission



chown chmod commands

Change ownership

chown [-R] user *files*

chgrp [-R] group *files*...

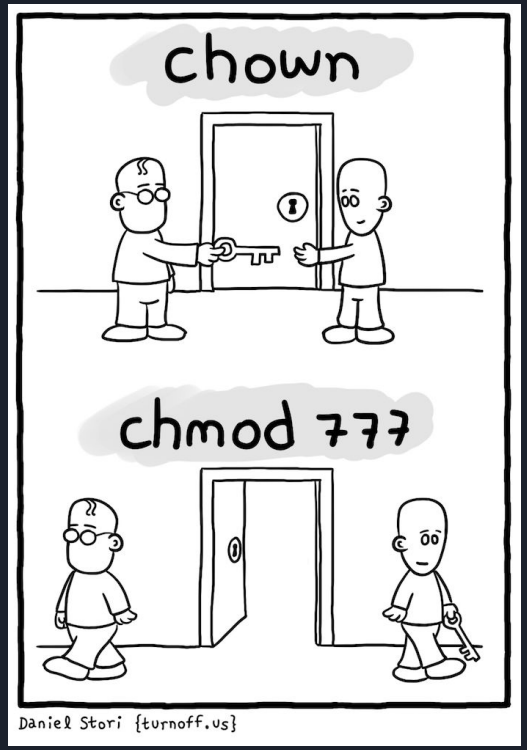
Change permission

chmod [-R][perms *files*

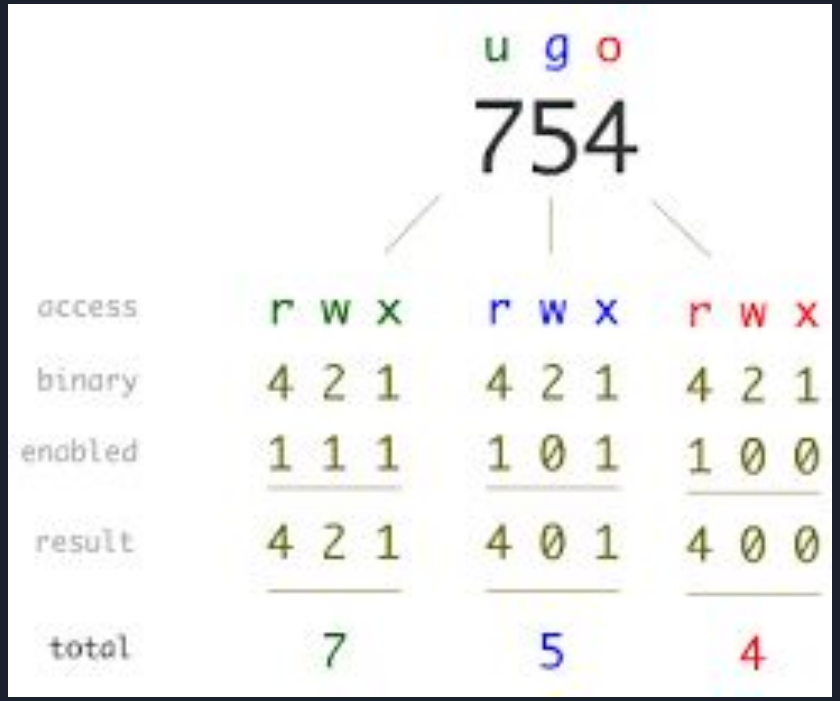
chmod +x my_script.sh

chmod u+x my_script.sh

chmod -x my_script.sh



Old style


u g o
754
access
r w x r w x r w x
binary
4 2 1 4 2 1 4 2 1
enabled
1 1 1 1 0 1 1 0 0
result
4 2 1 4 0 1 4 0 0
total
7 5 4

user$, root# and sudo - super user do

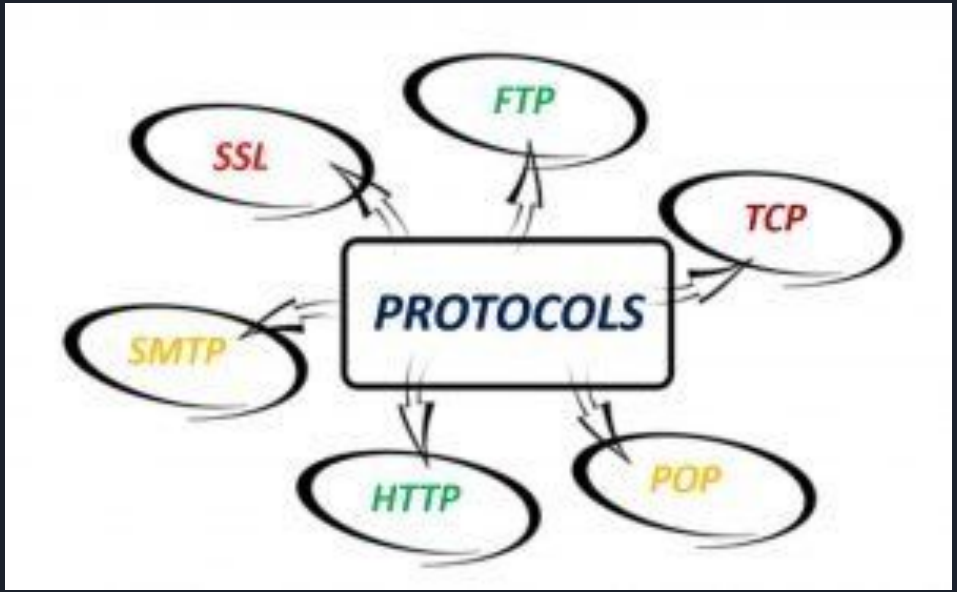
- /home
- /root

sudo

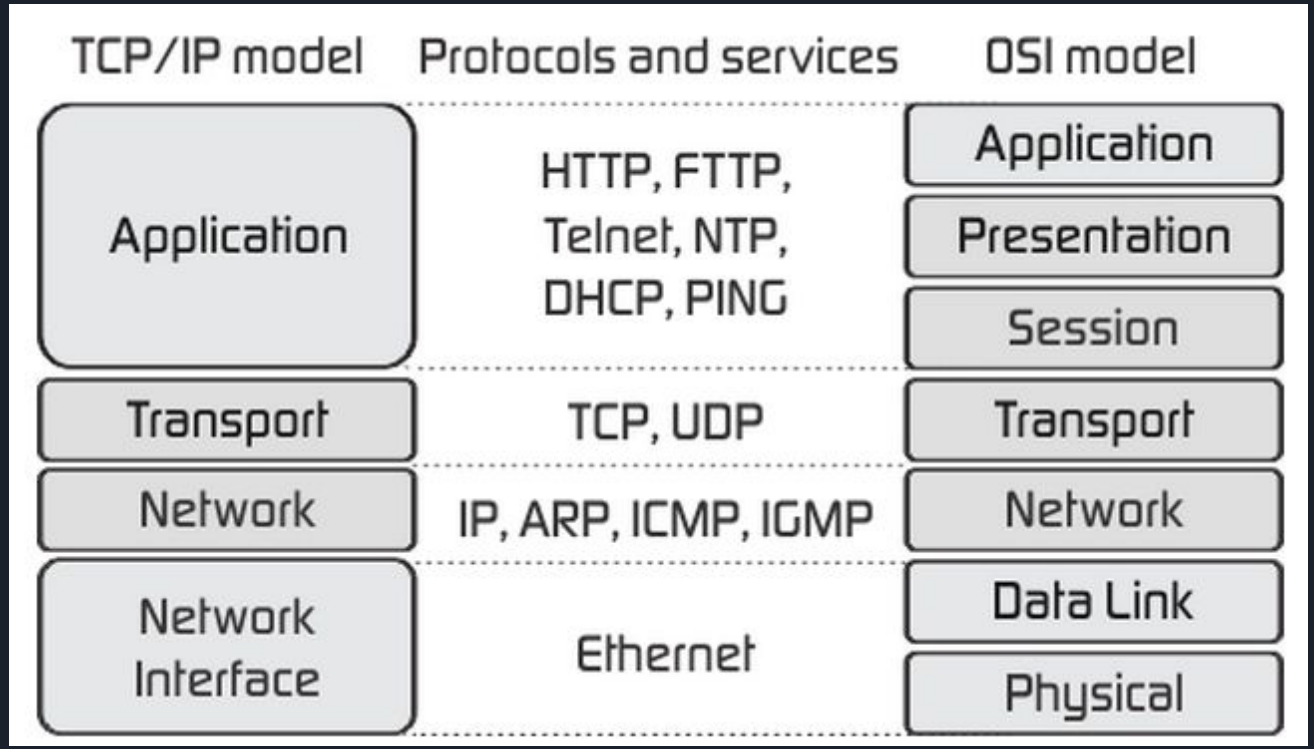
sudo is a command that lets you run other command as root temporarily

Networking
valid_lft forever preferred_l
inet6 ::1/128 scope host
valid_lft forever preferred_l
enp0s3: <BROADCAST,MULTICAST,UP,
link/ether 08:00:27:c6:43:bc
inet 192.168.1.10/24 brd 192.
valid_lft forever prefer
inet6 fe80::a00:27ff:fec6:4
valid_lft forever preferred

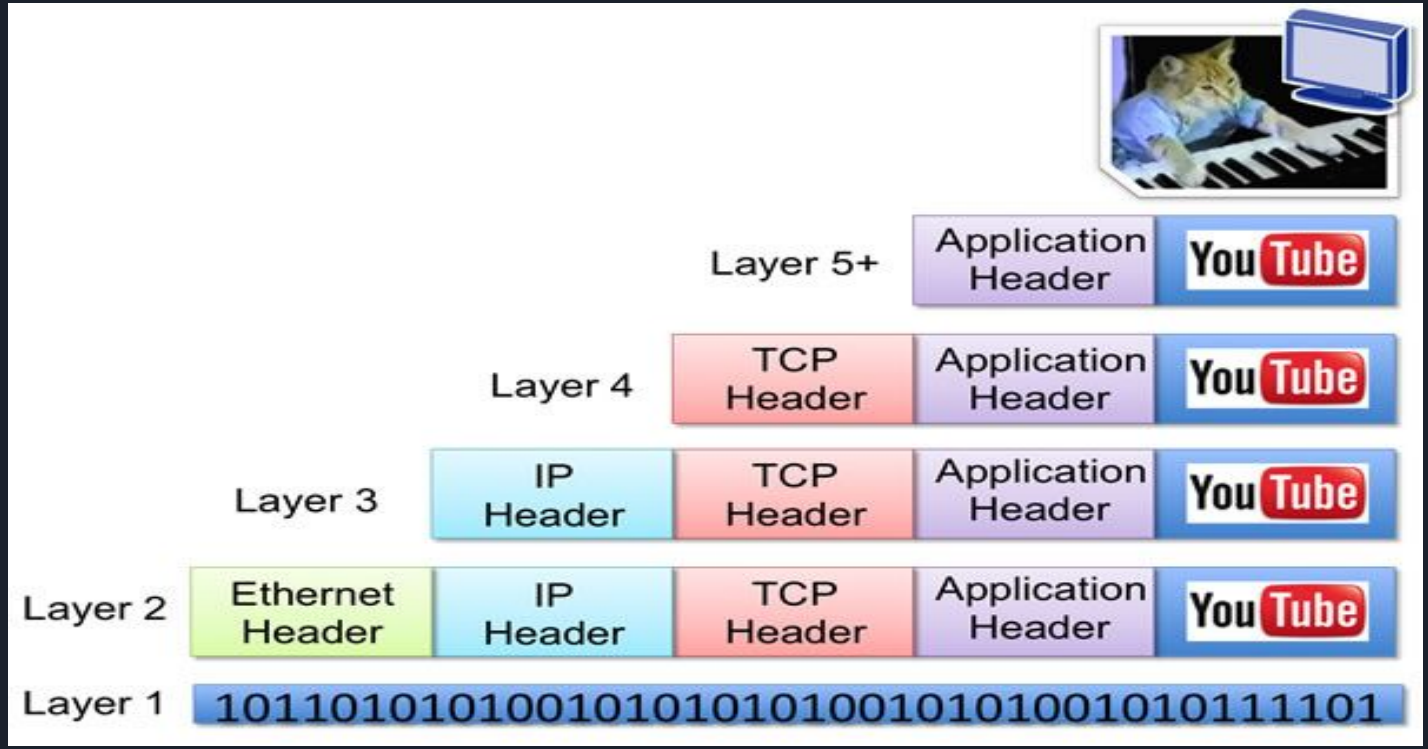
protocols



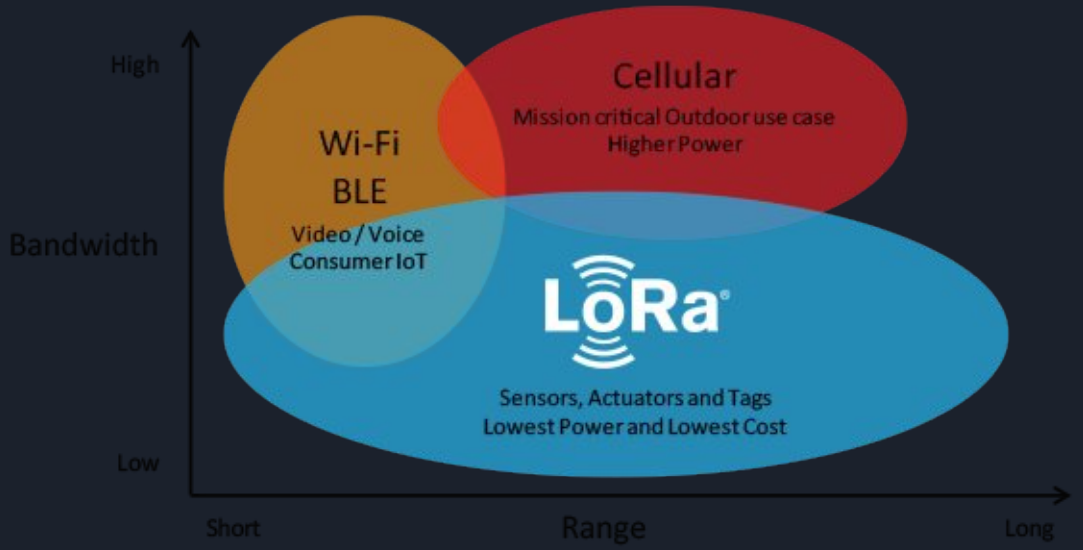
Network

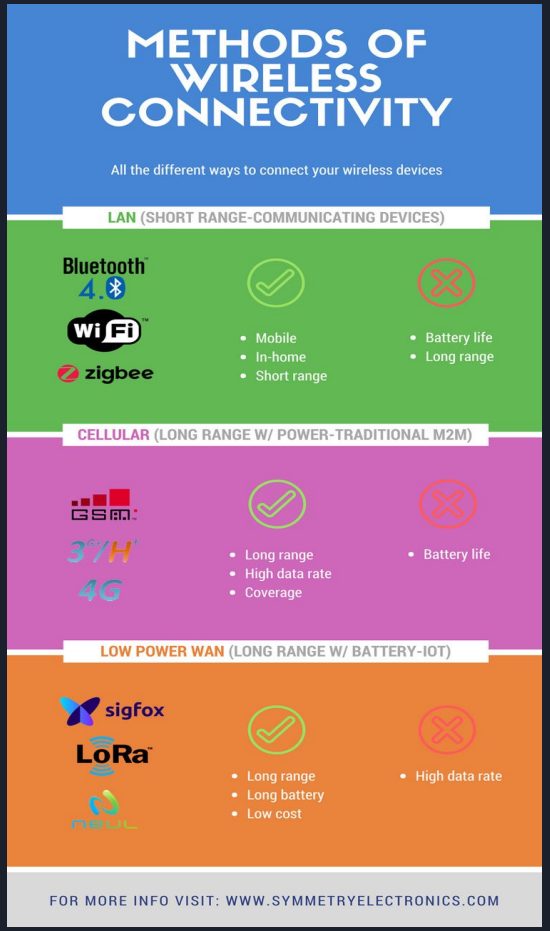

TCP/IP model
Protocols and services
OSI model
Application
HTTP, FTTP, Telnet, NTP, DHCP, PING
Application
Presentation
Session
Transport
TCP, UDP
Transport
Network
IP, ARP, ICMP, IGMP
Network
Network Interface
Ethernet
Data Link
Physical

Encapsulation

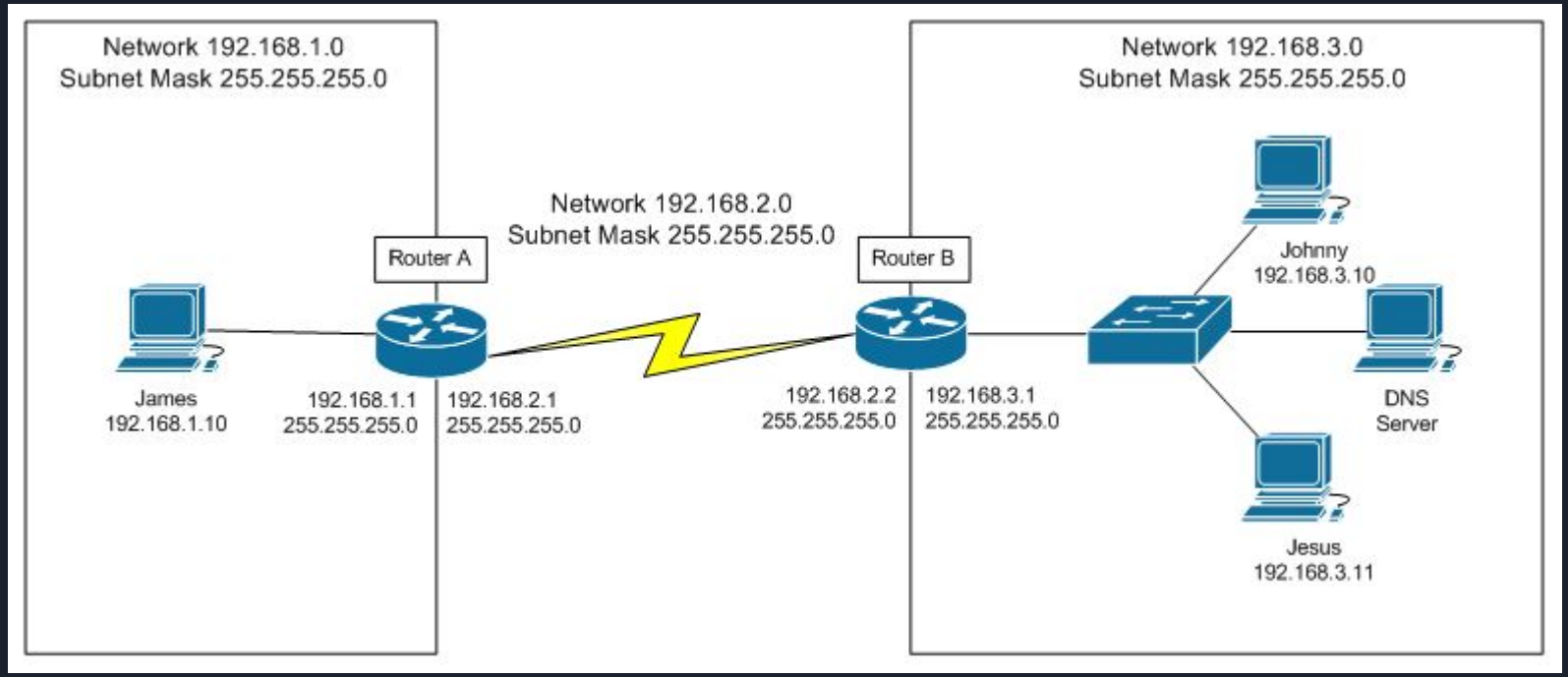


Physical layer

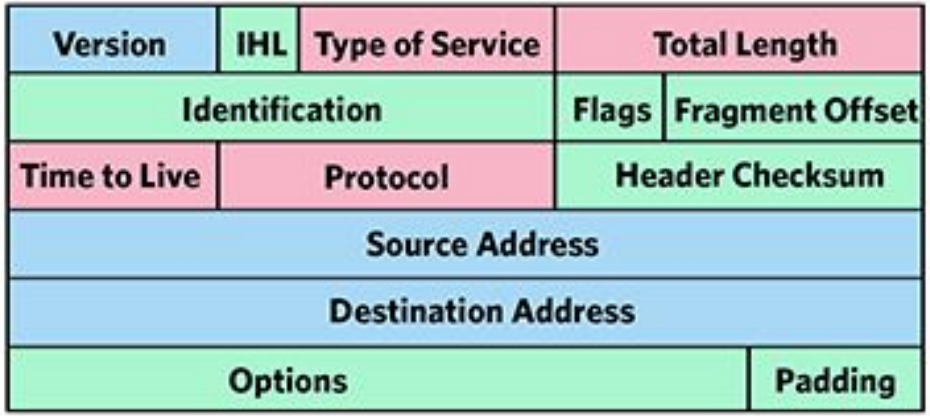




IP Internet Protocol



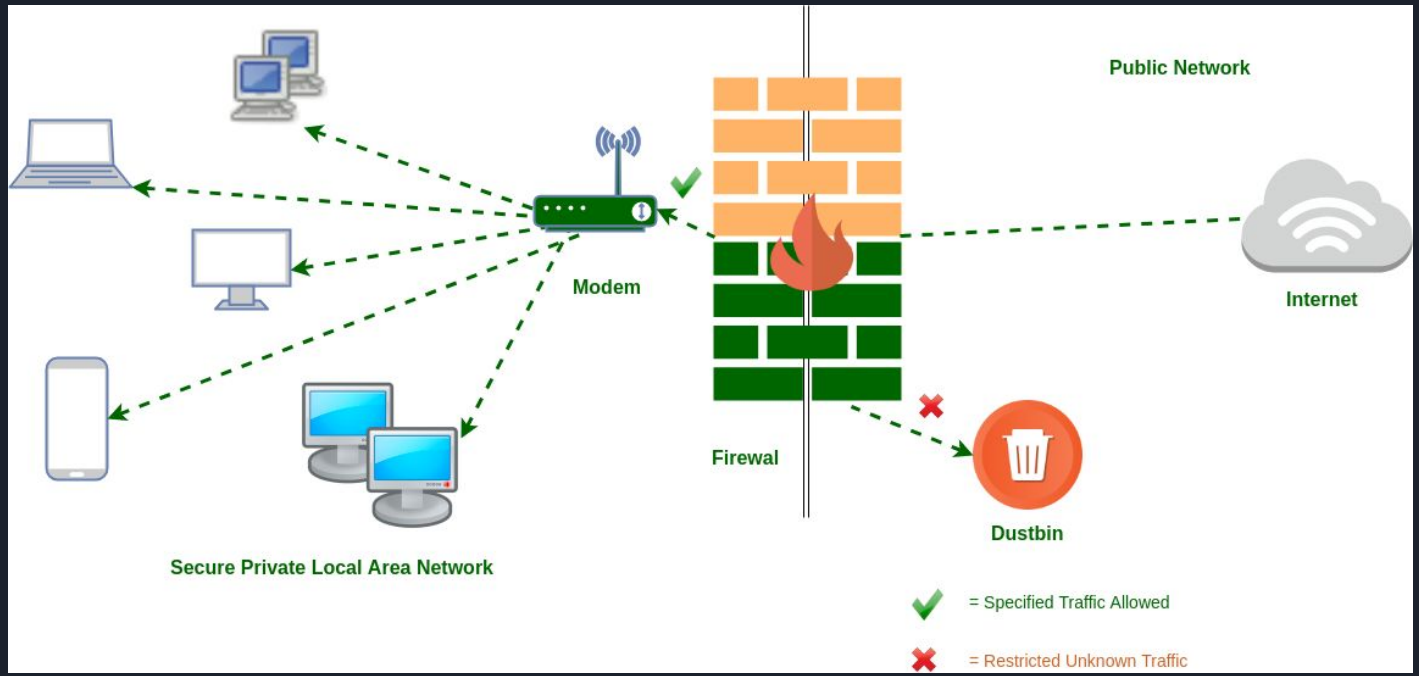
IP Header


Version
IHL
Type of Service
Total Length
Identification
Flags
Fragment Offset
Time to Live
Protocol
Header Checksum
Source Address
Destination Address
Options
Padding

TCP/UDP

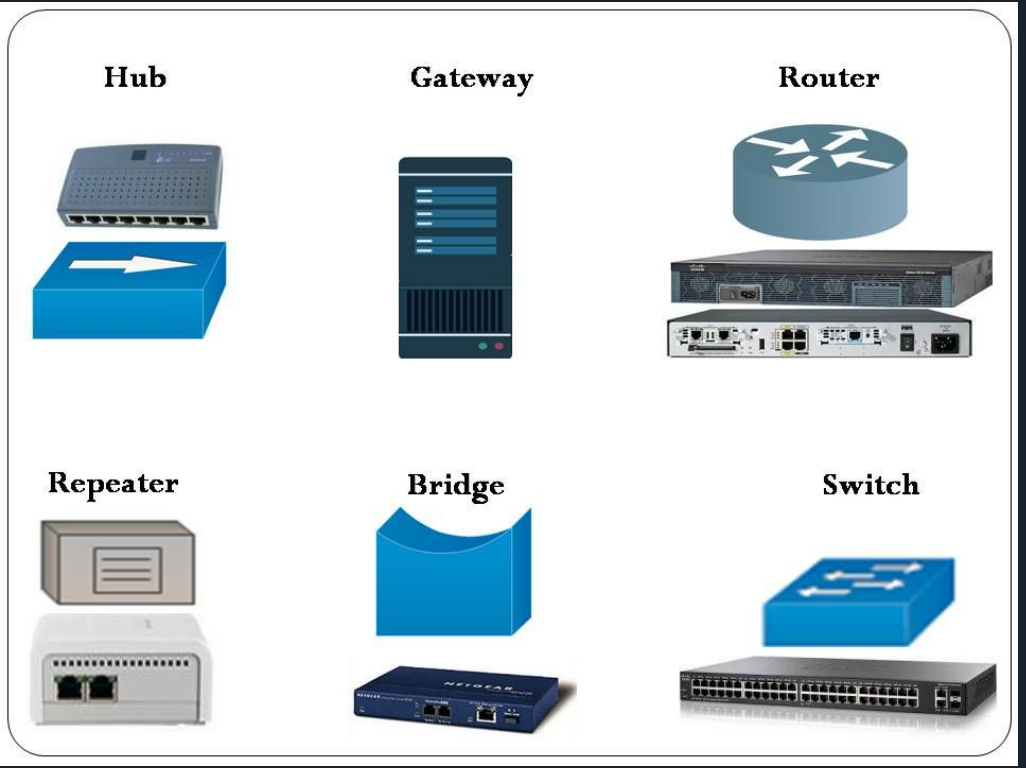
Services

Firewall


Public Network
Modem
Internet
Firewal
Dustbin
Secure Private Local Area Network
= Specified Traffic Allowed
= Restricted Unknown Traffic

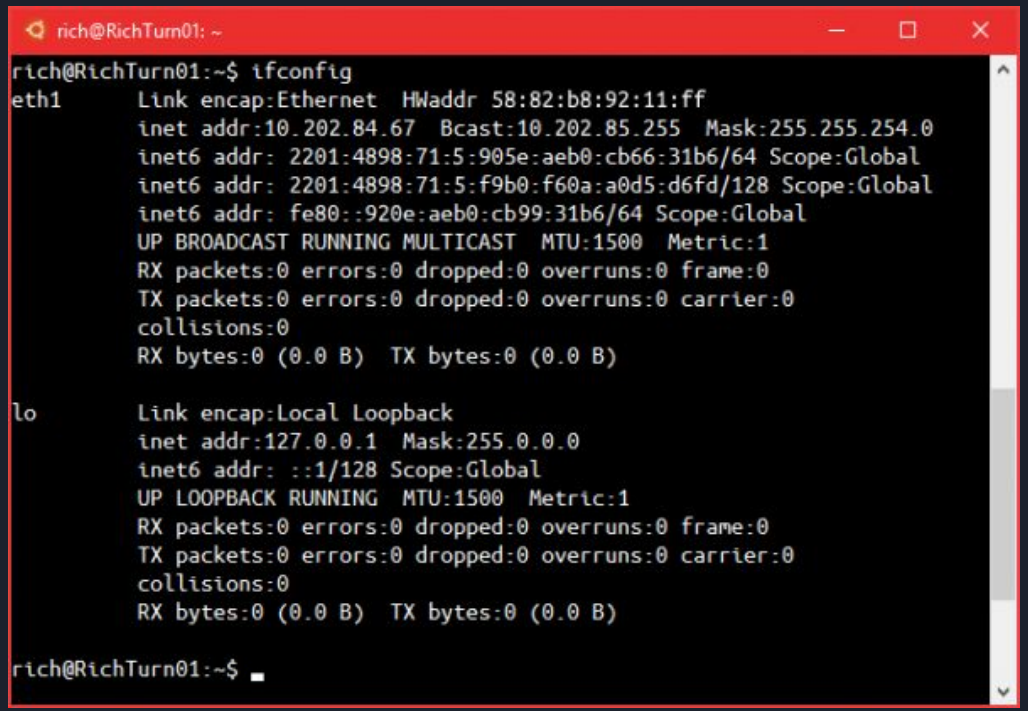
Network hardware

- Switch
- Router
- Modem
- Repeater



Linux network command and configuration

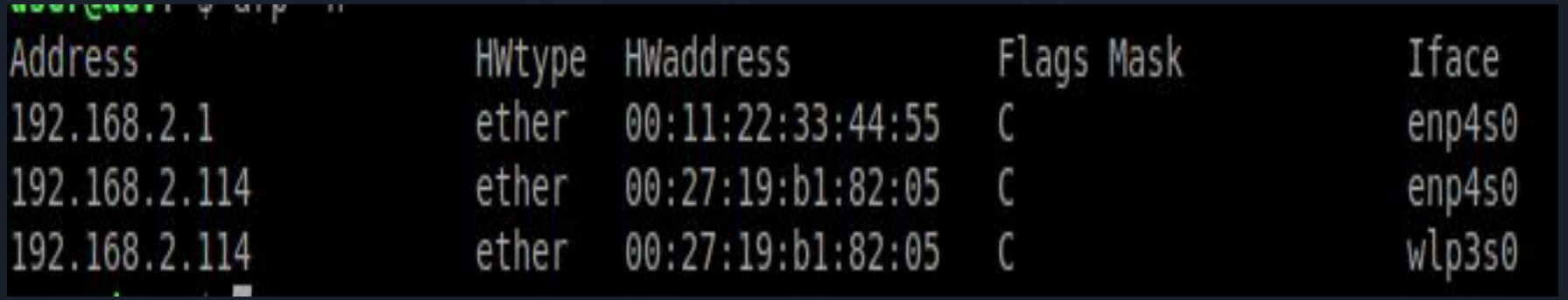
ifconfig



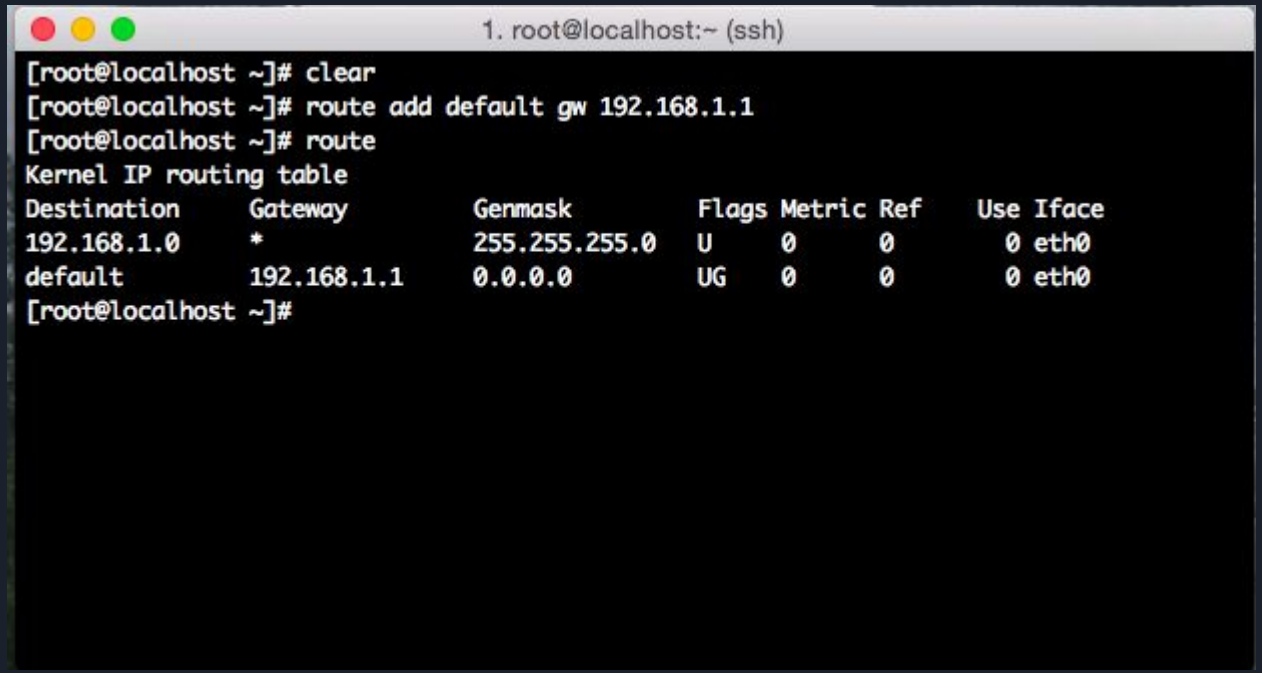
ifconfig utility has been deprecated and completely removed in Ubuntu 18.04

sudo apt install net-tools

ARP


Address HWtype HWaddress Flags Mask Iface
192.168.2.1 ether 00:11:22:33:44:55 C enp4s0
192.168.2.114 ether 00:27:19:b1:82:05 C enp4s0
192.168.2.114 ether 00:27:19:b1:82:05 C wlp3s0

Route

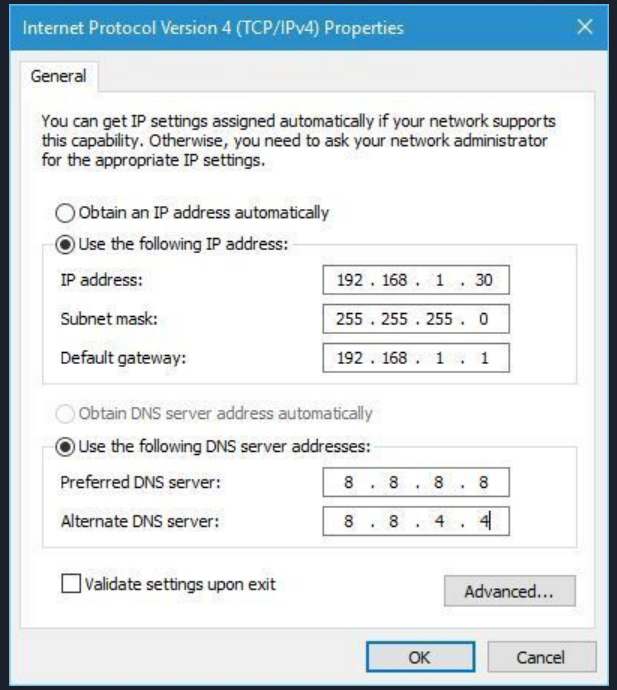

1. root@localhost:~ (ssh)
[root@localhost ~]# clear
[root@localhost ~]# route add default gw 192.168.1.1
[root@localhost ~]# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
192.168.1.0 * 255.255.255.0 U 0 0 0 eth0
default 192.168.1.1 0.0.0.0 UG 0 0 0 eth0
[root@localhost ~]#

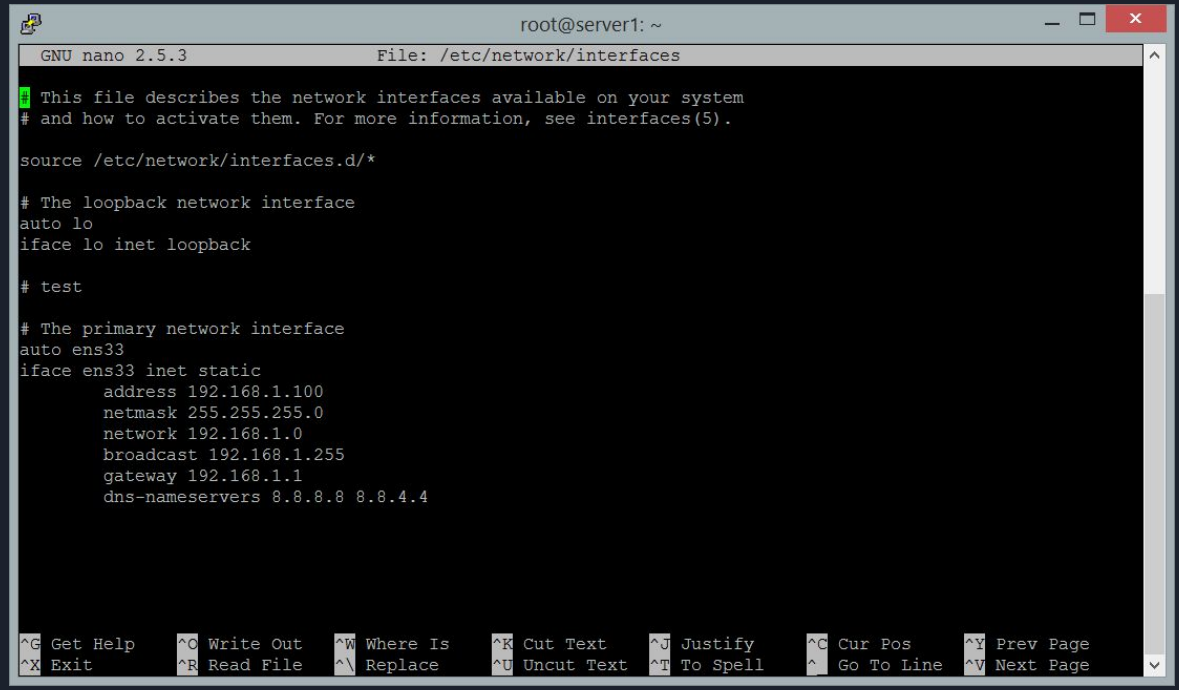
Netstat

```
user@dev:~$ sudo netstat -natp
[sudo] password for user:
Sorry, try again.
[sudo] password for user:
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 0.0.0.0:902             0.0.0.0:*               LISTEN      2664/vmware-authdla
tcp        0      0 127.0.0.1:8307          0.0.0.0:*               LISTEN      2687/vmware-hostd
tcp        0      0 127.0.0.53:53           0.0.0.0:*               LISTEN      813/systemd-resolve
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      1433/sshd
tcp        0      0 127.0.0.1:631           0.0.0.0:*               LISTEN      7182/cupsd
tcp        0      0 0.0.0.0:443             0.0.0.0:*               LISTEN      2687/vmware-hostd
tcp        0      0 0.0.0.0:1883            0.0.0.0:*               LISTEN      1203/mosquitto
tcp        0      0 0.0.0.0:17500           0.0.0.0:*               LISTEN      3098/dropbox
tcp        0      0 127.0.0.1:17600         0.0.0.0:*               LISTEN      3098/dropbox
tcp        0      0 127.0.0.1:17603         0.0.0.0:*               LISTEN      3098/dropbox
tcp        0      0 192.168.2.253:39816     216.58.204.225:443      TIME_WAIT   -
tcp        0      0 192.168.2.253:46280     172.217.20.65:443       TIME_WAIT   -
```

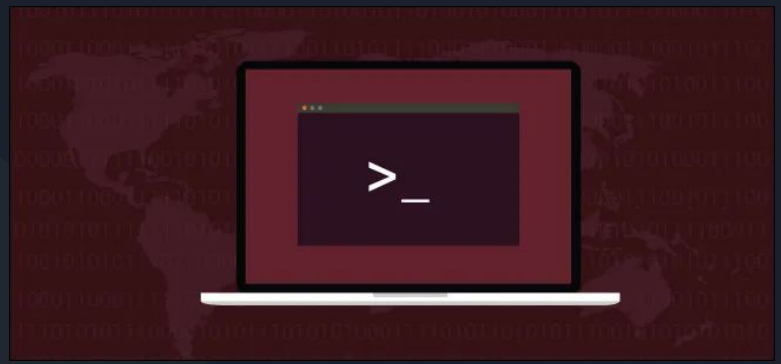
Linux network configuration

ip settings


Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 1 . 30
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 1 . 1
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server: 8 . 8 . 8 . 8
Alternate DNS server: 8 . 8 . 4 . 4
Validate settings upon exit
Advanced...
OK
Cancel


root@server1: ~
GNU nano 2.5.3 File: /etc/network/interfaces
This file describes the network interfaces available on your system
and how to activate them. For more information, see interfaces(5).
source /etc/network/interfaces.d/*
The loopback network interface
auto lo
iface lo inet loopback
test
The primary network interface
auto ens33
iface ens33 inet static
address 192.168.1.100
netmask 255.255.255.0
network 192.168.1.0
broadcast 192.168.1.255
gateway 192.168.1.1
dns-nameservers 8.8.8.8 8.8.4.4
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos ^Y Prev Page
^X Exit ^R Read File ^\ Replace ^U Uncut Text ^T To Spell ^_ Go To Line ^V Next Page

Linux Commands part II



History

Command shell

Common commands

Redirect

Pipeing

Install new application

GUI Way

Repository

apt

- update
- install
- Remove

Text editor

GUI way

VIM

nano

Play at home

Virtual machine

Download and install ubuntu