Linux - Introduction

What is Linux?

Unix

Unix was/ is a proprietary operating system that was used for industrial and corporate operations.

GNU

GNU was a project to develop Unix like tools for a free and open ecosystem

Linux Kernel

Linux Kernel allows software to interact with hardware

GNU Linux

GNU Linux is combining the Linux Kernel with the GNU tools to create the OS you think of as "Linux".

Forks and Distros

Linux is opensource and anyone can modify it as they see fit.

Forks are major deviations in core components. The major forks are Debian and Red Hat. Even the most basic tasks may default to different tools. Such as apt vs yum.

Distros are small changes to a fork. This may be a difference in shells, standard package of installed software.

Shells

Shells are the interactive environment you use to control the computer. GUI Shells include GNOME, KDE, XFCE

Server vs Desktop

Desktop Distros have a GUI environment installed by default. Server Distros simply give you the CLI. GUI's can be added to servers, and removed from Desktops.

For new users Desktop Distros are generally better because it is easier to interact with services such as WiFI.

Administering a Linux Server

Installing Linux

Use a Live Flash Drive. Follow instructions from Ubuntu.

You'll need a utility to burn an ISO onto the Flash Drive and make it bootable. Don't just copy the .iso onto the drive.

If you want a GUI download the Desktop version, and if you just want the CLI download the Server version.

Current version of the OS probably does not matter for systems that will do basic tasks. If you plan to work with AI, or cutting edge (or legacy) technology you may need a specific version.

Linux should run on almost any computer.

Some drivers such as webcam may not work or may require extra work.

You'll need to be able to boot off of the USB drive.

https://ubuntu.com/tutorials/install-ubuntu-desktop#1-overview

Note: Select "Install Third Party Software..." this will make sure device drivers are installed for WiFi and such.

Desktop Demo

-- Demonstration of the Desktop Environment --

Learn by playing

You can run command line utilities from the Terminal

SSH

SSH allows for remote administration of a server using another computers terminal. SSH client is built into the terminal of MacOS, Linux and Windows.

SSH uses TCP port 22.

```
ssh username@server_ip
```

sudo

sudo command allows you to escalate your privileges to run administrative tasks.

Installing Apps

Update Catalogue

```
sudo apt update
```

Install Updates

```
sudo apt upgrade
```

Install an App

```
sudo apt install apache2
```

Uninstall App

```
sudo apt remove apache2
```

Uninstall App and Remove Configuration Files

```
sudo apt purge apache2
```

Nano

Nano is a simple text editor.

```
sudo nano /var/www/test.html
```

Services

```
sudo systemctl status apache2
```

```
sudo systemctl start apache2
```

```
sudo systemctl stop apache2
```

```
sudo systemctl restart apache2
```

```
sudo systemctl enable apache2
```

Security - Users and Groups

Permissions are assigned based on "everyone", users and groups.

All resources are objects in Linux. So to give permission to the webcam you would add your user to the group that owns the video object.

Certain resources reset their permissions at reboot such as video. You have to add your user to the group that owns it instead of simply making yourself owner.

See Settings for All Users on System
```
sudo cat /etc/passwd
```

Create User
```
sudo adduser USERNAME
```

Create Group
```
sudo groupadd GROUPNAME
```

Show Groups
```
sudo cat /etc/group
```

Change Owner of File or Folder
```
sudo chown newowner FILE/FOLDER
```

Change Owner and Group Owner of File or Folder
```
sudo chown newowner:newgroup FILE/FOLDER
```

Change Ownership of Folder and All Contents
```
sudo chown -R newowner FOLDER
```

Add User to Group (-a is used to append new group to user)
```
sudo usermod -aG GROUP USER
```

Change Permissions on File or Folder
```
sudo chmod 777 FILE/FOLDER
```

Change Permissions on Folder and All Contents
```
sudo chmod -R 777 FOLDER
```

1 - execute
2 - write
4 - read

Directory Structure

Show Current Directory
```
pwd
```

List Directory Contents in List
```
ls -l
```

Show Hidden Files
```
ls -a
```

Change Directory
```
cd FOLDER
```

Change Directory, Go Up a Level
```
cd ../
```

```
mkdir NEWFOLDER
```

Move or Rename File
```
mv OLDFILE NEWFILE
```

Copy File
```
cp OLDFILE NEWFILE
```

Delete File
```
rm FILE
```

Delete Empty Folder
```
rmdir FOLDER
```

Delete Folder with Contents
```
rm -r FOLDER
```

Find

Use sudo so you have permission to loon in folders
Use -iname for case insenstivity
```
sudo find PATHSTART -iname QUERY
```

grep

Grep will show only lines returned from a command that match a query.

```
command | grep QUERY
```

```
ping -c 1 cnn.com | grep loss
```

top

top is the "task manager" for Linux.

```
top
```

UFW

UFW is the built in Software Firewall. If your web app or other service cannot be accessed by clients it might be because of UFW.

Check Status of UFW

```
sudo ufw status
```