About This Course

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About this Course

- We will do all hands-on work in the AWS cloud
- You can complete most of this course without installing Linux
- We start with Linux basics and key commands
- At the end of class we will install Linux on a computer and explore the GUI

Introduction to Linux

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Benefits of Linux

- Cost
  - Many free options
  - Paid options include support
- Open Source
- Reduced attack surface
  - Windows: Swiss Army Knife
  - Linux: Hammer
- Use older computers

Distributions

- Too many distributions to name here…
- Different distros for different purposes
  - *https://distrowatch.com/*
- Linux is a Unix-like operating environment
- Regardless of the distro, there is always:
  - Linux Kernel (Core, talks to hardware)
  - Default GNU software (Command utilities)
  - General utilities (text editors, etc.)
- We will start with Ubuntu, but you can apply what you learn to other distributions

Mint

MX Linux

Kali

Ubuntu

- Extremely popular
- 3 Editions:
  - Desktop: GUI desktop environment
  - Server: Command line only server
  - Core: For IoT, Raspberry Pi, etc..

Launching Ubuntu Server on AWS

Running Ubuntu on AWS

- Included in the Free Tier
- Clean up when you are done
- Commands used:
  - sudo apt update
  - sudo apt full-upgrade

The Linux Terminal

Terminal

- Understanding the command line is essential
- Allows you to input text commands
- The Linux shell interprets your commands and pushes them into the kernel for execution
- Remember the terminal is Case-Sensitive!
- The terminal is available in server and desktop Linux distros
- We are using Ubuntu server, which only provides console access
- Use the tab key to auto-complete commands

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man

man

```
man ls
```

To navigate and search:

```
    ctrl-f
    ctrl-b
    g
    G
    /string
```

To display help:

```
    h
```

To quit:

```
    q
```

man -k

```
man -k ifconfig
```

Search all man files for ifconfig

```
man -k “copy files”
```

Search all man files for the sting in quotes

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Useful Shortcuts

Shortcuts

- Ctrl-L clears the screen
- Up arrow shows previous commands
- `history` will show the history of commands you have run
- Ctrl-A moves the cursor to the beginning of the line
- Ctrl-E moves the cursor to the end of the line

Using tab

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tab

Try using the tab key to auto-complete commands

```
cd /
```

Go to the root directory

```
ls
```

Show all files and directories

```
cd e <tab>
```

Auto-complete the cd command

```
cat /e <tab>
```
(displays the etc directory)

Search all man files for ifconfig

```
cat /etc/p <tab> <tab>
```
(lists files that you can cat)

Search all man files for ifconfig

The root User

Root

- There is always a root user on any Linux system
- There is only one root user
- The root user has absolute power over the system
- Don’t use root for day to day tasks because you have the ability to cause serious harm to the system

Commands

`sudo su`

Allows a user to run commands as root

The user must have permissions to do this

The password required is the password for this user

`id`

Show the user you are logged in as and the groups you are part of

`exit`

Exit out of sudo

Navigating Files and Directories

The File System

- Logically organizes the files into directories (think folders)
- The root directory is at the base of the file systems
- Key directories:
  - bit.ly/3yWVs3N

pwd *and* cd

pwd

Print working directory

cd

Change directory

ls

`ls`

Lists files in the current directory

`ls --all`

`ls -a`

Shows all files including hidden files

`ls -l -all /var/`

-l lists files in long form,

`ls -la /var/`

Includes both arguments in a shorter command

mkdir / tree

`mkdir test`

Make directory

Notice that the command does not return any output. This means it ran successfully.

`mkdir -p test2/test2`

Make directory and subdirectory in a single command

`tree test2/`

List all files and subfolders and files within subfolders

mkdir / rmdir

`mkdir test3 test 4`

Make multiple directories

`rmdir test test3 test 4`

Remove directories

df -h

`df -h`

Report free disk space

-h makes the output human readable

Working with Files

cat

```
cat /var/log/auth.log
```

View the contents of a text file

touch

```
touch text.txt
```

Creates a new file called text.txt

```
touch Text.txt
```

Creates a new file because Linux is case sensitive

cp

```
cp text.txt text2.txt
```

Copies text.txt to a new file called text2.txt

```
cp text.txt text2.txt
```

Overwrites the existing text2.txt with a copy of text.txt

mv

```
mkdir test
```

Make a new directory called test

```
mv text.txt test/
```

Moves text.txt to a different directory

```
mv *.txt test/
```

Moves all txt files to a different directory

rm

```
rm test/text.txt
```

Use tab key for completion!

Remove test.txt

Bear in mind, there is no trash folder / recycle bin in Linux!

locate / find

locate

- Locate a file, just like the search command in Windows

```
apt install plocate
```

Installs the package for locate

```
locate cloud-init.log
```

Displays directory containing cloud-init.log

```
locate -i CLOUD-init.log
```

Locate regardless of case

find

- Similar to locate, but can be focused on a specific directory

```
find /var -name *.log
```

Searches within /var and subdirectories

grep

grep

- Search a text file or the output of a command
- Prints out lines that contain the pattern you searched for

```
grep user /etc/ssh/ssh_config
```

Displays any lines that include user

```
grep -i “COMMAND LINE” /etc/ssh/ssh_config
```

Use quotes if the string has spaces

-i option: Ignore upper/lower case

grep

```
grep -R 127.0.0.1 /etc/
```

Search all files in the etc directory

```
grep user /etc/ssh/ssh_config > sample.txt
```

Sends search results to a text file

```
ls | grep crontab
```

Search the output of a command for a string

grep

```
man grep
```

Many options for the grep command

https://en.wikibooks.org/wiki/Grep

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head

head

- View the first few lines of any text file

```
cd /var/log/

head cloud-init.log
```

Displays the first 10 lines of the file

```
head -n 5 cloud-init.log
```

Displays the first 5 lines of the file

tail

- View the last few lines of any text file

```
tail -n 5 cloud-init.log
```

Displays the last 5 lines of the file

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nano

nano

- Allows you to edit a text file

```
cd /
```

Moves to the root directory

```
Touch diff.txt diff2.txt
```

Creates two new text files

```
nano diff.txt
```

Allows you to edit the text file

diff

diff

- Compares the contents of two files

```
diff diff.txt diff2.txt
```

echo

echo

```
echo trainertests.com >> diff.txt
```

Add text to a file

ping

ping

```
ping 8.8.8.8
   crtl-c to stop

ping -c 3 8.8.8.8
   or
ping 3 8.8.8.8 -c
```

Shortcuts

- Ctrl-C stops the current in progress command

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ifconfig

ifconfig

Install the net-tools package:

```
sudo apt install net-tools
```

Display network interface configurations:

```
ifconfig
```

netstat

netstat

Display the route table:

```
netstat -r
```

Display open connections for a specific port:

```
netstat -np | grep "80“
```

https://en.wikipedia.org/wiki/Netstat

hostname

Installing Ubuntu Desktop

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AWS Cleanup

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Linux Command Quick Reference

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