### Intro to Linux

#### Linux 101 Lab



#### Linux 101 Materials

- This is an introduction to the Linux command line
- Materials needed
  - Linux Machine
- Software Tools used
  - Linux Terminal





#### Linux 101 Lab Overview

- 1. Linux Overview
- 2. Explore the Filesystem
- 3. Directories/Text Files
- 4. Reading Files
- 5. Move/Copy Files





#### Linux Introduction

- Unix-like operating system distributed free of charge under the GNU License
- Available in several "distributions" to serve different purposes. (bundles of included software)
- Originally written by Linus Torvalds.
- Now almost 10,000 developers including major technology companies like Intel and IBM.







#### Where is Linux used?

- Majority of internet servers run Linux
- 67% of the world's web-servers run Linux (2016)
- Used in Research/High-Performance Computing
- Google, Amazon, NSA, 100% of TOP500 Super-computers
- Mobile devices
- Android phones
- Amazon Kindle
- IoT devices
- Smart TV, Roku box, etc





### Why Linux?

- Numerous Cybersecurity tools for Linux
  - Majority of tools are free!
- Linux allows you complete control of the system
  - Puts user in driver's seat, trusts you know what you want
- Linux can be made more secure
  - Open-Source code means it is free to explore, review, modify, secure, copy/reuse
  - Linux is entirely customizable
     You can shut down processes that might be a security risk
  - Windows and Mac have processes you cannot disable





#### Linux Command Line

- Interface to the underlying operating system
  - Built-in commands
  - Environment variables
  - Programming control structures
- Linux supports different shells (interfaces)
  - Most common is *bash*
  - Also sh, zsh, csh, ksh, etc.

			kali@kal	i:∼	-
File Actions Edit View	Help	[]			
_s ls	13.32.132)-	[~]			
CourseFiles	Documents	Music	Public	Videos	juice-shop
Desktop	Downloads	Pictures	Templates	cron.log	
11.71.000					
	15.52.152)-	[~]			
total 44					
drwxr-xr-x	5 kali kali	4096 May	5 18:47 Co	ourseFiles	
drwxr-xr-x	2 kali kali	4096 May	5 19:12 De	esktop	
drwxr-xr-x	2 kali kali	4096 Aug	17 2021 DC	ocuments	
drwxr-xr-x	2 kali kali	4096 Jun 4096 Aug	17 2021 M	usic	
drwxr-xr-x	2 kali kali	4096 Aug	17 2021 Pi	ctures	
drwxr-xr-x	2 kali kali	4096 Aug	17 2021 Pt	ıblic	
drwxr-xr-x	2 kali kali	4096 Aug	17 2021 Te	emplates	
	2 Kali Kali 1 kali kali	4096 Aug	5 13·42 C	con log	
drwxr-xr-x 2	25 kali kali	4096 Sep	21 2022 it	ice-shop	
(kali@10.	15.52.152)-	[~]			





#### Linux: The Filesystem

- The structure resembles an upside-down tree
- Directories (a.k.a. folders) are collections of files and other directories.
- Every directory has a parent except for the root directory.
- Many directories have subdirectories.







#### Linux: The Filesystem Diagram







#### Linux Command Line Prompt







#### Linux Commands & Arguments

username@hostname:~\$ command -option argument

- Command program that does one thing
- Argument provides the input/output the command uses
  - Please Note: Not every command needs an option or an argument







- Use the pwd (print working directory) command to see what the current directory is pwd
- Use the Is (list) command to see the directories inside the home directory
   ls
- Use cd (change directory) to move into a new directory
   cd Desktop
- Use the pwd command to print the working directory



pwd





- Create a folder on the desktop
- Right click, then "Create Folder"
- Show the folder/directory in the Terminal

#### ls

- Change directory into the folder cd Folder\_Name
- Navigate back to the Desktop
   cd . .



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- Navigate to the root directory • cd /
- Navigate into the etc directory • cd etc
- Navigate into the default directory • cd default
- Go back to the root folder

cd ...

- cd ...
- Navigate through two folders



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cd /etc/default

- Absolute versus Relative Path
  - Relative = the path of a file or directory from the current directory
  - Absolute = the path of a file or directory from the / directory
- Examples:
  - Relative: cd bin/share
  - Absolute: cd /usr/bin/share
  - Relative: cd ~/Desktop
  - Absolute: cd /home/student/Desktop





- Navigate back to the home directory cd
- Navigate straight to a folder using the absolute path

cd /etc/default







# Explore the Filesystem (Together)

- Navigate back to the home directory
- Print the working directory
- Navigate to the root directory
- Navigate to the Desktop







## Explore the Filesystem (Together)

- Navigate to the root directory
- List all the contents of the directory
- Navigate into the opt directory
- List all the contents of the directory
- Go back up a directory







#### Explore the Filesystem (On Your Own)

- Navigate back to the Desktop
- List all the files in the tmp directory located in the var directory
- List all the files in the following location: /usr/share/doc
- Navigate back to your home directory
- Navigate to the Desktop





#### Who am I?

 Sometimes when you access a Linux system, you aren't sure what user is logged in. To determine your username, use the command

whoami

Warning: This command could cause philosophical introspection or a deep existential crisis!







#### Directories/Text Files (Watch)

- Navigate to the Desktop
- Make a directory using the mkdir command mkdir DirectoryName
- Make more than 1 directory mkdir Name1 Name2
- Remove the directories rmdir DirectoryName rmdir Name1 Name2







#### Directories/Text Files (Watch)

- Create a text document
   touch DocumentName
- Edit the document (nano editor) nano DocumentName CTRL+X to exit
- Display the contents of the document (concatenate)

cat DocumentName

• Remove the document rm DocumentName



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#### Directories/Text Files (Together)

- Create a directory on the Desktop
- Navigate into the directory
- Create a text file in the directory
- Edit the text file
- Display the text file in the Terminal
- Remove the text file
- Navigate back to the Desktop
- Remove the directory





#### Directories/Text Files (On Your Own)

- Create a Text File on the Desktop
- Edit the text file
- Create a folder on the desktop
- Create another folder inside of that folder
- Create a file inside the new folder
- Edit the file
- Read the file in the Terminal
- Navigate back to the Desktop and delete all the files/directories







#### Dirty screen?

• If you have too much text on your screen, use the **clear** command to clear all text from the screen.

clear

#### [319 kB] Fetched 490 kB in 0s (2357 kB/s) Selecting previously unselected package install-info. (Reading database ... 274816 files and directories currently installed.) Preparing to unpack .../install-info 6.8-6+b1 amd64.deb ... Unpacking install-info (6.8-6+b1) ... Setting up install-info (6.8-6+b1) ... Selecting previously unselected package info. (Reading database ... 274831 files and directories currently installed.) Preparing to unpack .../info\_6.8-6+b1\_amd64.deb ... Unpacking info (6.8-6+b1) ... Setting up info (6.8-6+b1) ... update-alternatives: using /usr/bin/info to provide /usr/bin/infobrowser (in fobrowser) in auto mode Processing triggers for desktop-file-utils (0.26-1) ... Processing triggers for man-db (2.9.4-2) ... Processing triggers for install-info 🔏.8-6+b1) ... Processing triggers for mailcap (3.70) ... Processing triggers for kali-menu (2021.3.3) ... clear



Using the clear command will erase all the previous commands from the Terminal



#### **Reading Files**

- Navigate back to the CourseFiles Folder
   cd ~/CourseFiles
- Navigate into the documents folder cd Cybersecurity/documents









#### Reading Files (Watch)

- List all the files
  - ls
- The **cat** command can be used to read an entire file
  - cat gatsby.txt



Most of the big shore places were closed now and there were hardly any light s except the shadowy, moving glow of a ferryboat across the Sound. And as th e moon rose higher the inessential houses began to melt away until gradually I became aware of the old island here that flowered once for Dutch sailors' eyes--a fresh, green breast of the new world. Its vanished trees, the trees that had made way for Gatsby's house, had once pandered in whispers to the last and greatest of all human dreams; for a transitory enchanted moment man must have held his breath in the presence of this continent, compelled into an aesthetic contemplation he neither understood nor desired, face to face for the last time in history with something commensurate to his capacity for wonder.

And as I sat there brooding on the old, unknown world, I thought of Gatsby's wonder when he first picked out the green light at the end of Daisy's dock. He had come a long way to this blue lawn and his dream must have seemed so close that he could hardly fail to grasp it. He did not know that it was alr eady behind him, somewhere back in that vast obscurity beyond the city, wher e the dark fields of the republic rolled on under the night.

Gatsby believed in the green light, the orgastic future that year by year re cede before us. It eluded us then, but that's no matter--tomorrow we will r faster, stretch out our arms farther. . . . And one fine morning----

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Notice the cat command will list the contents of the entire file

#### Reading Files (Watch)

Use head to list just the first 10 lines of the file

head gatsby.txt

• Use tail to list the last 10 lines of the file

tail gatsby.txt

The Great Gatsby by F. Scott Fitzgerald

Chapter 1

In my younger and more vulnerable years my father gave me some advice that I 've been turning over in my mind ever since.

"Whenever you feel like criticizing any one," he told me, "just remember tha t all the people in this world haven't had the advantages that you've had." On the last night, with my trunk packed and my car sold to the grocer, I wen t over and looked at that huge incoherent failure of a house once more. On t he white steps an obscene word, scrawled by some boy with a piece of brick, stood out clearly in the moonlight and I erased it, drawing my shoe raspingl y along the stone. Then I wandered down to the beach and sprawled out on the sand.

Most of the big shore places were closed now and there were hardly any light s except the shadowy, moving glow of a ferryboat across the Sound. And as th e moon rose higher the inessential houses began to melt away until gradually I became aware of the old island here that flowered once for Dutch sailors' eyes--a fresh, green breast of the new world. Its vanished trees, the trees that had made way for Gatsby's house, had once pandered in whispers to the last and greatest of all human dreams; for a transitory enchanted moment man must have held his breath in the presence of this continent, compelled into an aesthetic contemplation he neither understood nor desired, face to face for the last time in history with something commensurate to his capacity for wonder.

And as I sat there brooding on the old, unknown world, I thought of Gatsby's wonder when he first picked out the green light at the end of Daisy's dock. He had come a long way to this blue lawn and his dream must have seemed so





#### Reading Files (Watch)

 Use the wc (word count) command to count the total number of words in a file wc constitution.txt wc constitution.txt declaration.txt anthem.txt



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#### Reading Files (Together)

- List the last ten lines of declaration.txt
- List the first 10 lines of treasureisland.txt and sherlock.txt

Count the number of words in artwar.txt, anthem.txt, and constitution.txt





#### Reading Files (On Your Own)

- List the first ten lines of frost.txt
- Count the number of words in meditations.txt
- List the last ten lines of yankee.txt
- Count the number of words in yankee.txt and twocities.txt





#### Former Commands?

 If you want to see all the previous commands that you have typed, use the history command



cd tree

130





#### Move/Copy Files (Watch)

- Navigate to the home directory cd
- Create two text files touch File1 File2
- Edit the files nano File1 nano File2

(kali@10.15.52.152)-[~]

 Check to make sure the files are there ls





#### Move/Copy Files (Watch)

 Use the mv (move) command to move a file to the Desktop

mv FileLocation/Name Location/Name

 Use the cp (copy) command to copy a file to the Desktop

cp FileLocation/Name Location/Name

 List the files in the home directory to see that one file has been moved, the other copied ls







#### Move/Copy Files (Watch)

- The move command is also the command to rename a file
- Use the **mv** command to rename a file

mv FileLocation/FileName FileLocation/FileName

—(kali@10.15.52.152)-[~]
-\$ mv Desktop/File10 Desktop/FileNewName

 Would you need to have the file location if you were already on the Desktop?





File10

FileNewName

### Move/Copy Files (Together)

- Navigate to the home directory
- Create a folder and a text file in that directory
- Copy the text file into the directory
- Verify the file is inside of the directory ls
- Move the folder (with file) to the Desktop
- Rename the folder





### Move/Copy Files (On Your Own)

- · Create two folders and two text files on the desktop
- Move one folder into the other folder
- Rename the folder inside of the other folder to "InsideFolder"
- Copy one file to the InsideFolder
- Move the other file into the folder on the desktop
- Move the InsideFolder (with the file) back to the desktop





#### What is the Date/Time?

- One tool for the date/time is date
  - This will show the day *and* time in the Universal Time Zone
  - Eastern Time Zone: TZ= 'America/NewYork' date
  - Central Time Zone: TZ= `America/Chicago' date
  - Mountain Time Zone: TZ= `America/Denver' date
  - Pacific Time Zone: TZ= `America/Los\_Angeles' date





