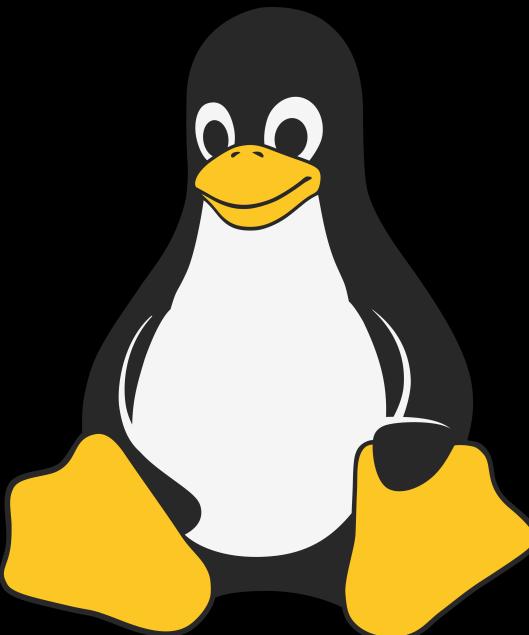


Introduction to Linux



```
whiterabbit@Wonderland: ~ $ neofetch
  _.-/+oossssoo+/-.
   `:+ssssssssssssssssssssst+:'
   .osssssssssssssssssssdMMMNyssss.
  /sssssssssshdmmNNmyNMMMHssssss/
 +ssssssssshmydMMMMMMMdddyssssss+
 /sssssssshhyyhNMMyhyyyyhmNMMNhssssss/
 .ssssssssdMMMNhssssssssshhNMMMdssssss.
 +sssshhhyNMMNyssssssssssyNMMMyssssss+
 ossyNMMMyMhsssssssssssshhmmhssssssso
 ossyNMMMyMhsssssssssssshhmmhssssssso
 +sssshhhyNMMNyssssssssssyNMMMyssssss+
 .ssssssssdMMMNhssssssssshhNMMMdssssss.
 /sssssssshhNMMMyhyyyyhdNMMNhssssss/
 +ssssssssdmydMMMMMMMdddyssssss+
 /sssssssssshdmmNNNmyNMMMHssssss/
 .osssssssssssssssssdMMMNyssss.
 +ssssssssssssssssssssyyssss+-+
 `:+ssssssssssssssssss+:
  .-/+oossssoo+/-.

whiterabbit@Wonderland: ~ $
```

OS: Ubuntu 20.04.5 LTS on Windows 10 x86_64
Kernel: 5.15.90.1-microsoft-standard-WSL2
Uptime: 33 mins
Packages: 683 (dpkg)
Shell: bash 5.0.17
Theme: Adwaita [GTK3]
Icons: Adwaita [GTK3]
Terminal: Relay(9)
CPU: 11th Gen Intel i7-11800H (16) @ 2.304GHz
GPU: 34e7:00:00.0 Microsoft Corporation Device 008
Memory: 379MiB / 7776MiB

Agenda

- **What is GNU/Linux**
- **GUI Vs. Terminal**
- **Navigation and Some Commands**

What is GNU/Linux?

- What do you think Linux is?
- What do you think GNU is?
- Wait... what?
- Which has the cooler mascot?



GNU

- GNU was launched by Richard Stallman (rms) in 1983, as an operating system which would be put together by people working together for the freedom of all software users to control their computing. rms remains the Chief GNUisance today.
- The primary and continuing goal of GNU is to offer a Unix-compatible system that would be 100% free software. Not 95% free, not 99.5%, but 100%. The name of the system, GNU, is a recursive acronym meaning GNU's Not Unix—a way of paying tribute to the technical ideas of Unix, while at the same time saying that GNU is something different. Technically, GNU is like Unix. But unlike Unix, GNU gives its users freedom.



Richard Stallman (rms)

GNU Philosophy

- Free software means that the software's users have freedom. (The issue is not about price.) We developed the GNU operating system so that users can have freedom in their computing.
- Specifically, free software means users have the four essential freedoms: (0) to run the program, (1) to study and change the program in source code form, (2) to redistribute exact copies, and (3) to distribute modified versions.
- Software differs from material objects—such as chairs, sandwiches, and gasoline—in that it can be copied and changed much more easily. These facilities are why software is useful; we believe a program's users should be free to take advantage of them, not solely its developer.

Linux

- Linux is a clone of the operating system Unix, written from scratch by Linus Torvalds with assistance from a loosely-knit team of hackers across the Net. It aims towards POSIX and Single UNIX Specification compliance.
- It has all the features you would expect in a modern fully-fledged Unix, including true multitasking, virtual memory, shared libraries, demand loading, shared copy-on-write executables, proper memory management, and multistack networking including IPv4 and IPv6.
- Although originally developed first for 32-bit x86-based PCs (386 or higher), today Linux also runs on a multitude of other processor architectures, in both 32- and 64-bit variants.



Linus Torvalds

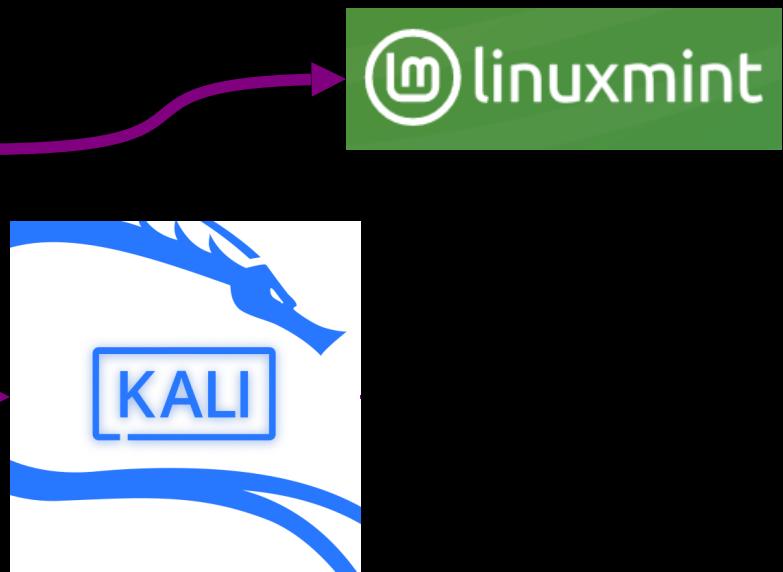
Wait... what?

- Isn't GNU and Linux both Operating Systems?
 - Eh, depends on who you ask
- GNU is an implementation of POSIX, but more importantly a Philosophy of how software should be developed and distributed
- Linux is a kernel. That is it's the core code of what makes an Operating System work
- GNU developed software gives that kernel a “user land” and allows us to actually use the dang thing

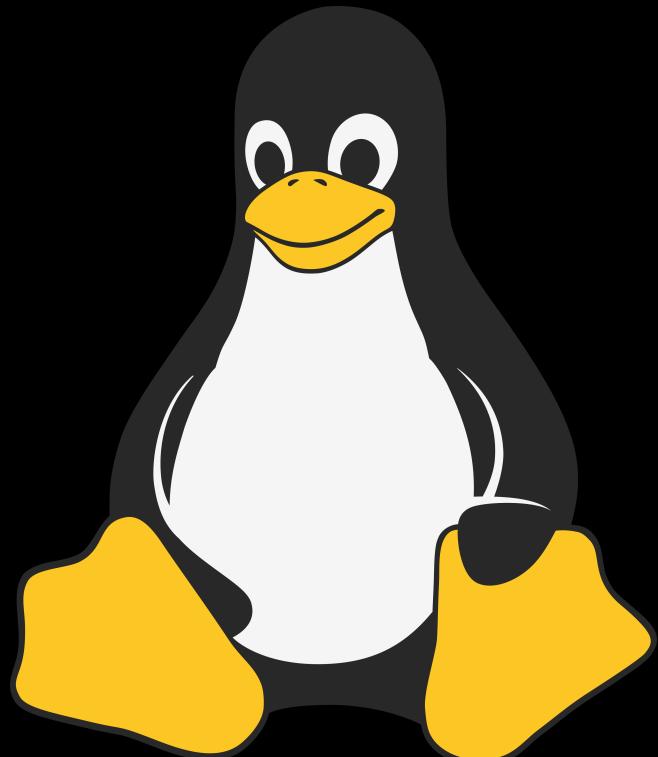


Linux Distributions

- These are packages of software distributed to make our lives easier. You can download and compile the Linux kernel yourself and add GNU software to it all day.



Mascot Battle!



YOU NEVER SAID WHAT UNIX IS

- A complete, commercial OS developed by Thompson and Dennis Ritchie at Bell Labs in 1969.



IT'S A UNIX SYSTEM!



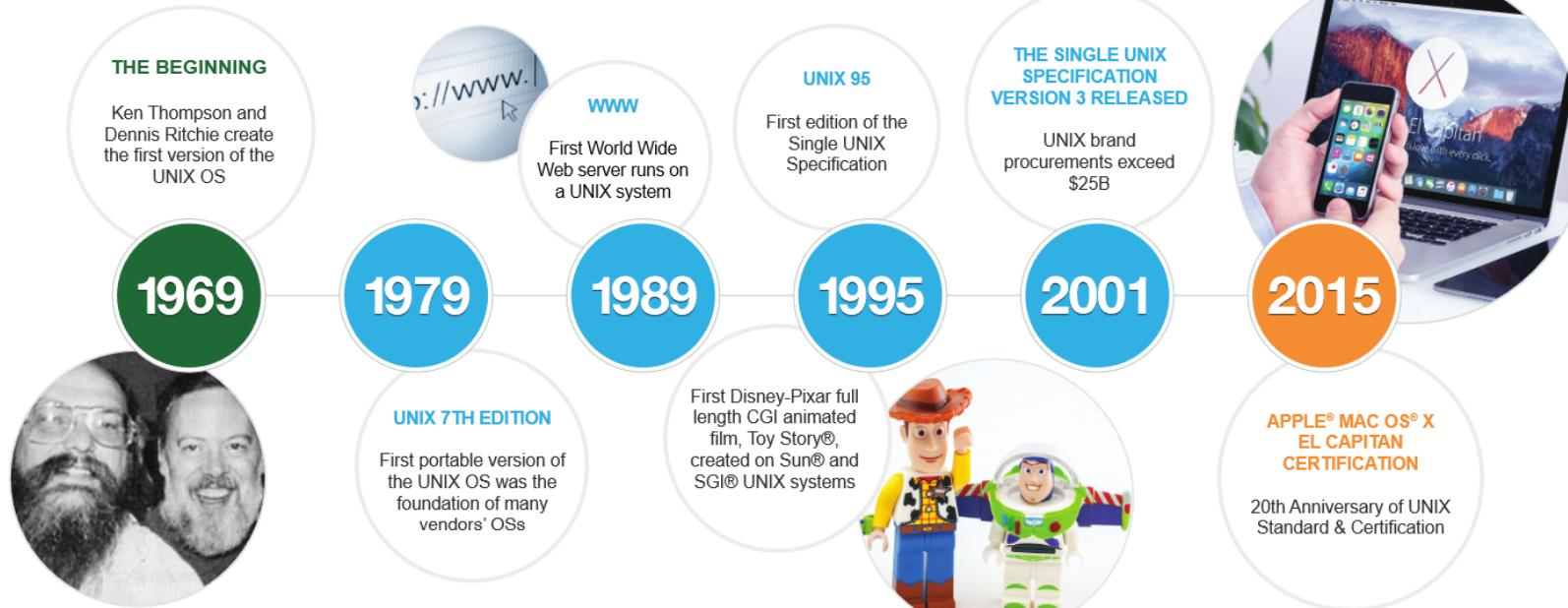
I KNOW THIS!

UNIX®

An Open Group Standard

“ The UNIX platform demonstrates the value of being open, since as a truly open standard it allows all to focus on driving innovation of the ecosystem around the platform rather than competing at the core OS level. The open standard makes portability easier for software developers, provides integrators with choice in the building blocks for solutions, and enables customers to focus on solving business problems rather than integration issues.

Steve Nunn, President and CEO, The Open Group ”



THE
Open
GROUP

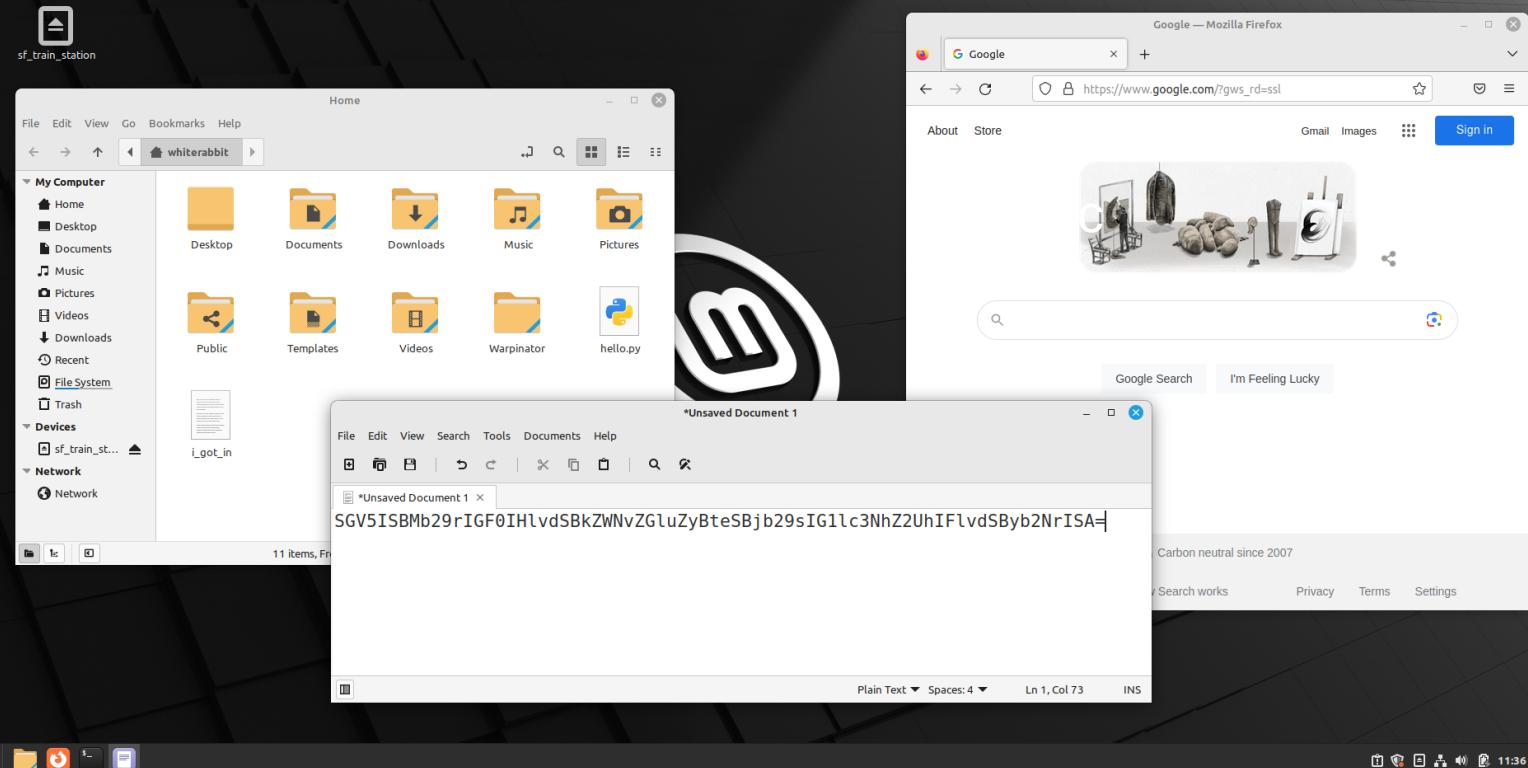
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UNIX®, a robust open standard managed by The Open Group, enables increased IT agility, scalability, and interoperability across diverse operating and computing environments driving business, technology, and innovation around the globe.

For more information visit: www.opengroup.org/UNIX

GUI

- Graphical User Interface.



Easy to use
(hopefully)

Visual

Charts, Graphs,
Graphics

Overall a good,
universal user
experience
(hopefully)

Terminal

Text based
Powerful
Scripting
A bit intimidating
Makes people think you're a hacker

```
whiterabbit@Wonderland: ~ + 
whiterabbit@Wonderland: $ whoami
whiterabbit
whiterabbit@Wonderland: $ ls -la
total 2164
drwxr-xr-x 12 whiterabbit whiterabbit 4096 Jun 20 09:31 .
drwxr-xr-x  4 root      root       4096 Mar 31 10:31 ..
-rw-----  1 whiterabbit whiterabbit 12025 Jun 20 09:43 .bash_history
-rw-r--r--  1 whiterabbit whiterabbit   220 Sep  1 2022 .bash_logout
-rw-r--r--  1 whiterabbit whiterabbit 3808 Apr  4 13:19 .bashrc
drwxr-xr-x  3 whiterabbit whiterabbit 4096 Jun 20 09:31 config
drwxr-xr-x  2 whiterabbit whiterabbit 4096 Sep  1 2022 landscape
-rw-----  1 whiterabbit whiterabbit 104 Apr  4 13:01 lessht
drwxr-xr-x  3 whiterabbit whiterabbit 4096 Mar 29 10:19 local
-rw-r--r--  1 whiterabbit whiterabbit   0 Jun 20 08:58 motd_shown
-rw-r--r--  1 whiterabbit whiterabbit  807 Sep  1 2022 profile
-rw-r--r--  1 whiterabbit whiterabbit  47 Apr 14 11:01 python_history
drwxr--r--  2 whiterabbit whiterabbit 4096 Jan 12 10:39 web
-rw-r--r--  1 whiterabbit whiterabbit   0 Sep  1 2022 sudo_as_admin_successful
-rw-----  1 whiterabbit whiterabbit 1921 Mar 30 12:37 viminfo
drwxr-xr-x  5 whiterabbit whiterabbit 4096 May  3 12:57 vscode-server
-rw-r--r--  1 whiterabbit whiterabbit 218 Apr 14 10:11 wget-hsts
drwxr-xr-x  2 whiterabbit whiterabbit 4096 Mar 28 10:38 Desktop
drwxr-xr-x  4 whiterabbit whiterabbit 4096 Apr 26 13:48 Pictures
-rw-r--r--  1 whiterabbit whiterabbit 1133 Apr 26 09:30 apache_log
-rw-r--r--  1 whiterabbit whiterabbit 1191 Apr 26 14:01 apache.log.save
-rw-r--r--  1 whiterabbit whiterabbit 1829 Mar 31 11:22 err.log
-rw-r--r--  1 whiterabbit whiterabbit 12936 Apr  3 2022 expanding-powers-3
-rw-r--r--  1 whiterabbit whiterabbit   0 Mar 31 10:54 file1
-rw-r--r--  1 whiterabbit whiterabbit   0 Mar 31 10:54 file2
-rw-r--r--  1 whiterabbit whiterabbit   0 Mar 31 10:54 file3
drwxr-xr-x  2 whiterabbit whiterabbit 4096 Mar 30 11:06 national_treasure
drwxr-xr-x  3 whiterabbit whiterabbit 4096 Apr  4 13:49 serve
drwxr-xr-x  4 whiterabbit whiterabbit 4096 Mar 30 13:11 text_editing
-rw-r--r--  1 whiterabbit whiterabbit 2092015 Aug  2 2019 tumblr_nvld321j8Q1r7rea2o1_1280.gif
whiterabbit@Wonderland: $
```

```
Windows PowerShell x + 
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\caffe> dir

Directory: C:\Users\caffe

Mode                LastWriteTime         Length Name
----                LastWriteTime         Length Name
d----              5/10/2023  2:39 PM          0 arduinoIDE
d----              2/1/2023   3:37 PM          0 dbus-keyrings
d----              5/11/2023  2:41 PM          0 expo
d----              2/14/2023  2:55 PM          0 icesoft
d----              2/13/2023 11:31 AM          0 splunk
d----              3/23/2023  2:48 PM          0 ssh
d----              6/28/2023  11:48 AM          0 VirtualBox
d----              9/30/2022  2:11 PM          0 vscode
d----              9/14/2023 11:07 AM          0 vscode-cli
d----              9/1/2022   1:42 PM          0 ansel
d----              10/8/2022  11:51 AM          0 Contacts
d----              9/1/2022   1:05 PM          0 Documents
d----              6/20/2023  10:50 AM          0 Downloads
d----              10/8/2022  11:51 AM          0 Favorites
d----              6/20/2023  8:42 AM          0 Links
d----              10/8/2022  11:51 AM          0 Music
d----              10/8/2022  12:03 AM          0 OneDrive
d----              10/8/2022  11:51 AM          0 Saved Games
d----              10/8/2022  11:51 AM          0 Searches
d----              4/26/2023  12:59 PM          0 Tracing
d----              6/28/2023  9:53 AM          0 Videos
d----              5/5/2023   5:06 PM          0 VirtualBox VMs
-a----- 5/1/2023   3:43 PM          0 bash_history
-a----- 6/2/2023   7:06 PM          0 git-for-windows-updater
-a----- 3/22/2023  2:57 PM          0 gitconfig

PS C:\Users\caffe>
```



A Closer Look at Terminals

```
whiterabbit@Wonderland: ~  +  -  X
Welcome to Ubuntu 20.04.5 LTS (GNU/Linux 5.15.90.1-microsoft-standard-WSL2 x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

System information as of Wed Jun 21 09:32:03 CDT 2023

System load: 0.0          Processes: 9
Usage of /: 0.2% of 1006.85GB  Users logged in: 0
Memory usage: 4%          IPv4 address for eth0: 172.23.198.66
Swap usage: 0%

147 updates can be applied immediately.
109 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

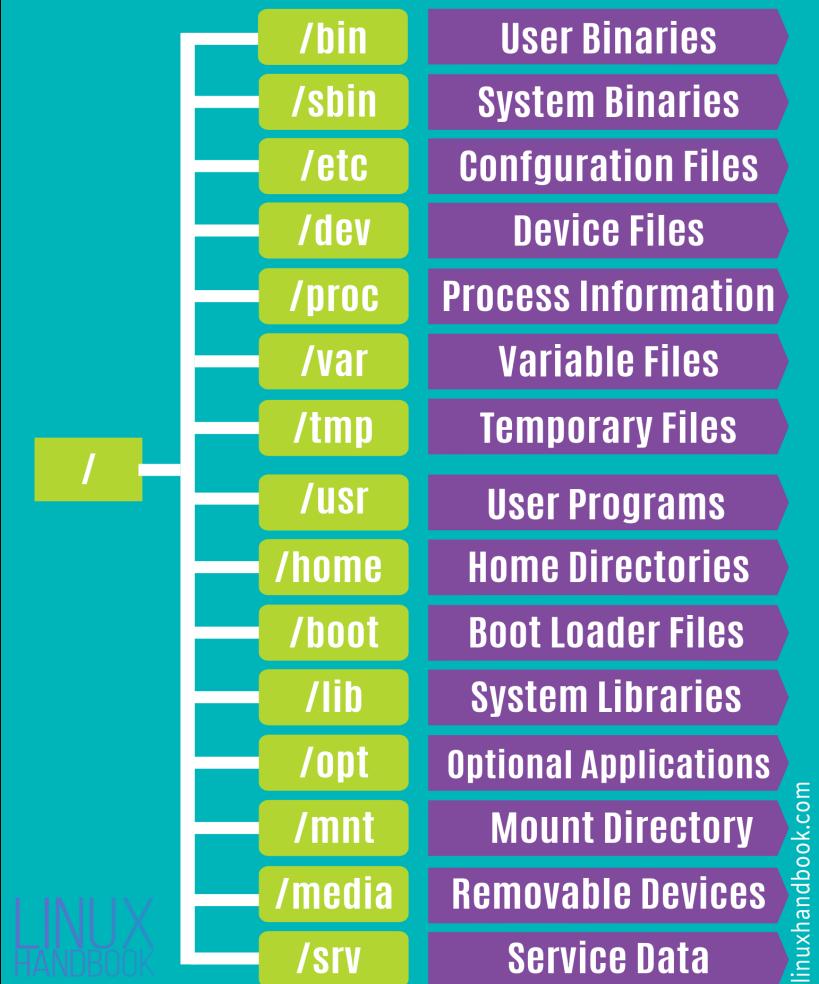
This message is shown once a day. To disable it please create the
/home/whiterabbit/.hushlogin file.
whiterabbit@Wonderland:~$ █
```

BASH

- Bash is the GNU Project's shell—the Bourne Again SHell. This is an sh-compatible shell that incorporates useful features from the Korn shell (ksh) and the C shell (csh). It is intended to conform to the IEEE POSIX P1003.2/ISO 9945.2 Shell and Tools standard. It offers functional improvements over sh for both programming and interactive use. In addition, most sh scripts can be run by Bash without modification.

Linux Structure

- “/” or is it “root”



Absolute Vs Relative Paths

- /home/whiterabbit Vs ~
- . Right here in the directory I currently am in
- .. One directory above where I currently am
- Remember the top directory in Linux is /

Commands

- ls and ls -l
- pwd
- cd
- touch
- mkdir
- file
- tree
- cp and cp -r
- mv
- rm and rm -r
- cat
- more
- less
- head
- tail
- man
- Sort

DO NOT ATTEMPT TO MEMORIZE ALL COMMANDS

Hands on Keyboards!

- Listening to lectures and watching videos has diminishing returns. The best way to learn is to try and maybe fail, but then regroup and keep on trying.

