

Intro to *nix and Shells

Level 0x00: The Shell

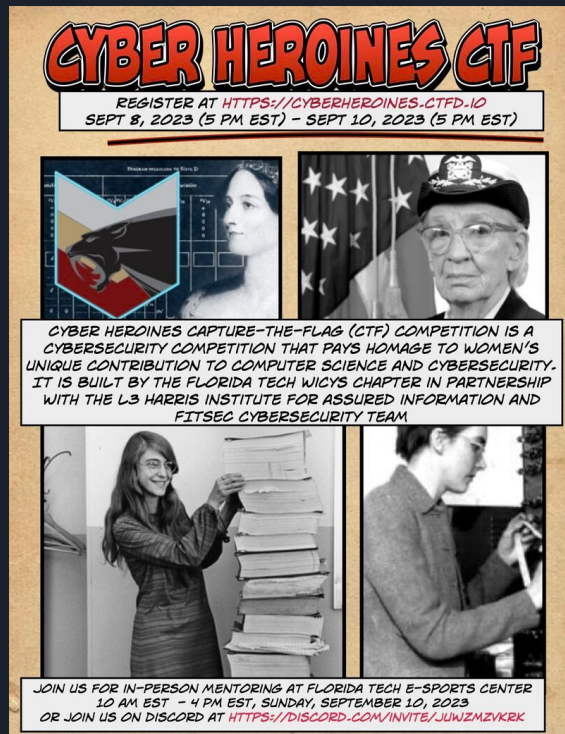


Quick Overview

- Upcoming Events
- Shell Commands
- Linux




Cyber Heroines CTF

- Online CTF
 - Florida Tech WiCys (Women in Cybersecurity) chapter
 - College and High School CTF
 - <https://cyberheroines.ctfd.io>
 - Starts: Friday Sept 8, 2023 5PM EST
 - Ends: Sunday Sept 10, 2023 5PM EST
- Mentoring Session
 - Sunday 10am - 4pm Sept 10
 - Florida Tech E-Sports Center
 - <https://discord.com/invite/JuWZMZvKrK>
- Sponsored by RII





CYBER HEROINES CTF

REGISTER AT [HTTPS://CYBERHEROINES-CTFD.IO](https://cyberheroines.ctfd.io)
SEPT 8, 2023 (5 PM EST) - SEPT 10, 2023 (5 PM EST)

CYBER HEROINES CAPTURE-THE-FLAG (CTF) COMPETITION IS A CYBERSECURITY COMPETITION THAT PAYS HOMAGE TO WOMEN'S UNIQUE CONTRIBUTION TO COMPUTER SCIENCE AND CYBERSECURITY. IT IS BUILT BY THE FLORIDA TECH WICYS CHAPTER IN PARTNERSHIP WITH THE L3 HARRIS INSTITUTE FOR ASSURED INFORMATION AND FITSEC CYBERSECURITY TEAM

JOIN US FOR IN-PERSON MENTORING AT FLORIDA TECH E-SPORTS CENTER
10 AM EST - 4 PM EST, SUNDAY, SEPTEMBER 10, 2023
OR JOIN US ON DISCORD AT [HTTPS://DISCORD.COM/INVITE/JUWZMZVKRK](https://discord.com/invite/JuWZMZvKrK)

Florida Tech Cyber Class

- Cyber Fundamentals Application
- 10 week free course
- Thursdays 4PM - 6PM
- Ruth Funk Center (E-Sports)
- [Registration Link](#)
- Must register - it may fill up!
- Chance to win 4 yr \$80,000 dollar scholarship award



BECOME A CYBER-SUPERSTAR IN 10 WEEKS USING HACKABLE TOYS

Sept. 14–Nov. 16 | Two hour weekly classes

Free course offered at Florida Tech



Florida Tech
Ruth Funk Center (Esports)
150 W. University Blvd., Melbourne, FL 32901

Each participant will:

- Have a chance to win a 4-year scholarship to Florida Tech, worth \$80,000 over 4 years.
- Receive a certificate of completion of cybersecurity training.
- Learn skills related to ethics in cybersecurity, web exploitation and cryptographic attacks.

Do you have what it takes to become the next generation cyber-superstar? Come join us for an exciting adventure and discover the secrets of the cyber world! In this 10-week course that meets once a week after school, you will learn and apply coding and problem-solving skills about how to hack and protect against cyberattacks on the web and smart devices, such as Alexa and ring doorbell cameras! Experience the thrill of using hackable toys like remote control cars, Game Boy emulators and Raspberry Pis to get you on a path to a potential cybersecurity career.



Participation Requirements: No prior coding/hacking knowledge or skills required, must be willing to attend two hours a week for 10 weeks, must be able to work in groups

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Filesystem

- Filesystem is usually a directory of files on your SSD / hard disk
 - Windows: C: D: (drive letters)
 - *nix: / /mnt /media/cdrom
- Each directory can have thousands of files and other directories

Linux Command	Windows/DOS Command	Explanation
<code>pwd</code>	<code>cwd</code>	<u>P</u>resent <u>w</u>orking <u>d</u>irectory (or <u>c</u>urrent <u>w</u>orking <u>d</u>irectory)
<code>ls</code>	<code>dir</code>	<u>L</u>ist contents of a directory



Directory Commands

Linux	Windows / DOS	Explanation
<code>mkdir DIRECTORY</code>	<code>mkdir</code>	<u>M</u>akes a new <u>dir</u>ectory
<code>cd DIRECTORY</code>	<code>cd</code>	<u>C</u>hanges <u>dir</u>ectory
<code>cd ..</code>	<code>cd ..</code>	Changes to the parent directory
<code>rmdir DIRECTORY</code>	<code>rmdir</code>	<u>R</u>emoves a <u>dir</u>ectory (must be empty)
<code>tree</code>	<code>dirtree</code>	Lists all files / subdirectories

Files

- Common contents of a file
 - Text
 - Executable Programs
 - Databases (SQL)
 - Compressed Archive
 - Images
 - Word document
 - Compressed Archive
 - Text
 - Images

```
Terminal - mwales@ubuntu: /usr/share/dict
File Edit View Terminal Tabs Help
british-english words
mwales@ubuntu:/usr/share/dict$ cat american-english | head
A
A's
AMD
AMD's
AOL
AOL's
AWS
AWS's
Aachen
Aachen'sn-english" [readonly] 102401 lines, 972398 characters
mwales@ubuntu:/usr/share/dict$ hexdump -C american-english | head
00000000  41 0a 41 27 73 0a 41 4d  44 0a 41 4d 44 27 73 0a  |A.A's.AMD.AMD's.|
00000010  41 4f 4c 0a 41 4f 4c 27  73 0a 41 57 53 0a 41 57  |AOL.AOL's.AWS.AW|
00000020  53 27 73 0a 41 61 63 68  65 6e 0a 41 61 63 68 65  |S's.Aachen.Aache|
00000030  6e 27 73 0a 41 61 6c 69  79 61 68 0a 41 61 6c 69  |n's.Aaliyah.Aali|
00000040  79 61 68 27 73 0a 41 61  72 6f 6e 0a 41 61 72 6f  |yah's.Aaron.Aaro|
00000050  6e 27 73 0a 41 62 62 61  73 0a 41 62 62 61 73 27  |n's.Abbas.Abbas'|
00000060  73 0a 41 62 62 61 73 69  64 0a 41 62 62 61 73 69  |s.Abbasid.Abbasi|
00000070  64 27 73 0a 41 62 62 6f  74 74 0a 41 62 62 6f 74  |d's.Abbott.Abbot|
00000080  74 27 73 0a 41 62 62 79  0a 41 62 62 79 27 73 0a  |t's.Abbey.Abbey's.|
00000090  41 62 64 75 6c 0a 41 62  64 75 6c 27 73 0a 41 62  |Abdul.Abdul's.Ab|
mwales@ubuntu:/usr/share/dict$
```

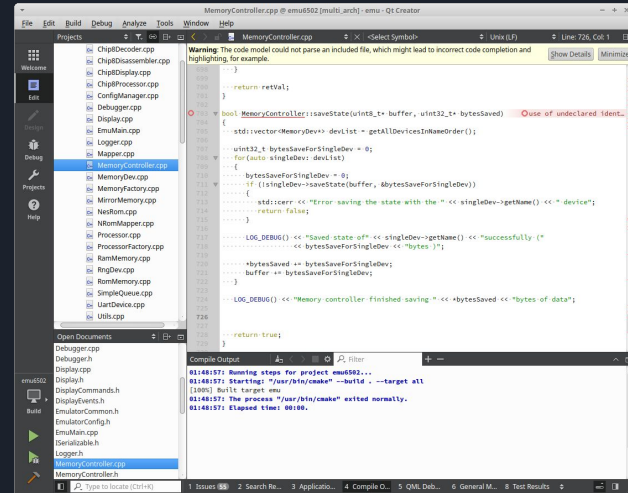


File Commands

Linux	Windows / DOS	Explanation
<code>touch FILE</code>	<code>copy con FILE</code>	Creates a blank file
<code>cat FILE</code>	<code>type FILE [FILE2 ...]</code>	Displays contents of a file, or <u>concatenates</u> files
<code>head FILE</code>		Displays beginning (the <u>head</u>) of a file
<code>tail FILE</code>		Displays ending of a file (the <u>tail</u>)
<code>hexdump -C FILE</code>		Displays contents of a binary in <u>hexadecimal</u>

Editors

- GUI
 - Simple: write text, save to a file
 - Gedit, Mousepad, Notepad
 - Coding: automatic coloring, auto-complete
 - Geany
 - Sublime (\$)
 - Atom
 - IDE: integrated development environment
 - Qt Creator
 - Visual Studio
 - CLion
- Command Line
 - nano, pico
 - vi / vim, emacs





File Commands

Command	Explanation
<code>strings FILE</code>	Prints out printable strings of a binary file
<code>sort [FILE]</code>	Prints lines in alphabetical order
<code>uniq [FILE]</code>	Removes redundant lines out output
<code>wc [FILE]</code>	W ord c ount. Counts number of words in a file
<code>dos2unix / unix2dos [FILE]</code>	Converts file line endings
<code>more / less [FILE]</code>	Shows output 1 page at a time
<code>grep needle [FILEs]</code>	Searches for a string



Standard Input / Output

- 3 file descriptors open by CLI application
 - 0 = stdin (standard input)
 - 1 = stdout (standard output)
 - 2 = stderr (standard error)
- Pipes (|) can be used to connect output from one application to input of another application

```
strings somefile | grep -i password
```

```
cat logfile | sort | uniq
```



I/O Redirection

- Using “`> file.txt`” after a command causes output from stdout to be redirected into a file
 - You won’t be able to see it on screen
 - stderr will still be displayed
- Using “`2> file.txt`” after a command causes stderr to be redirected into file
- `tee` will write standard output to a file and also write it to the screen
 - Ex: `./myprogram arg1 arg2 | tee logfile.txt`
- `>>` will append to existing file, `>` overwrites it

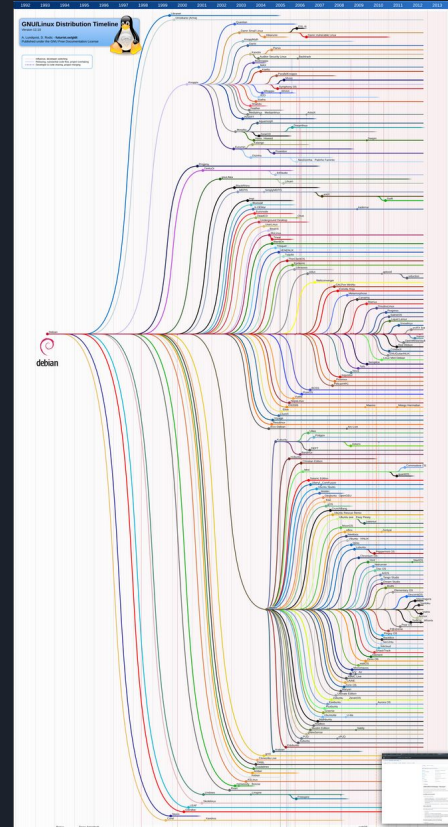
Linux Strengths

- Command Line First
 - Everything can be done via command line
 - Easy to automate
 - Remote access
- Live Versions
 - Knoppix / Tails / Kali
- Customization / Open Source
 - Kernel is fully transparent
 - Easy for anyone to add to kernel
 - User space is fully customizable (Steam Deck)
 - Can run on x86, ARM, RISC-V, MIPS, SPARC
- Package Managers
 - Easy / fast to add other open source tools / development packages



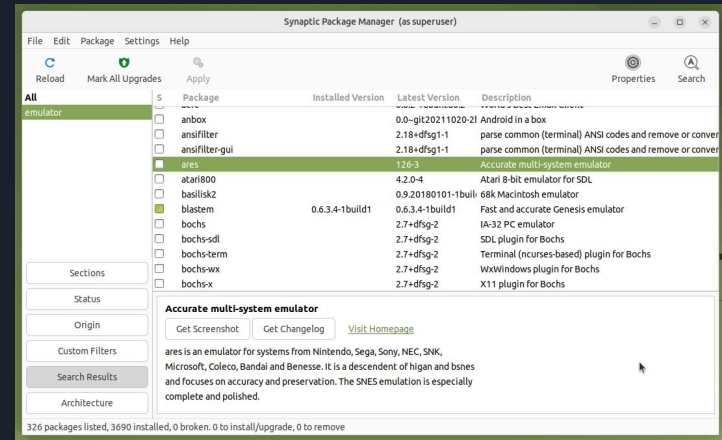
Ubuntu

- Child / Fork of Debian Linux
- Ubuntu provides:
 - Software repository with > 20,000 packages (apps, libraries)
 - Apt package manager
 - Installs new packages
 - Updates packages
 - Removes packages
- Ubuntu has many flavors
 - Which desktop manager used by default
 - Which applications used by default
 - Custom theming
- Releases every 6 months
 - LTS every 2 years. 22.04 is current LTS




Packages

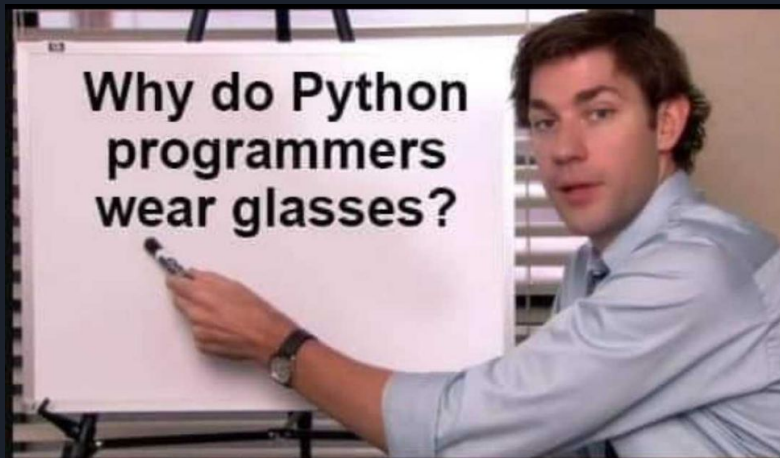
Easy to search for and add new software
(like Steam store, but everything is free)




<code>sudo apt update</code>	Update package lists / versions
<code>sudo apt upgrade</code>	Upgrade installed packages (takes a while)
<code>apt-cache search searchTerm</code>	Searches for packages that match search term
<code>sudo apt install packageName</code>	Installs a new package (and any packages required by that package)
Synaptic Package Manager	GUI for the package manager

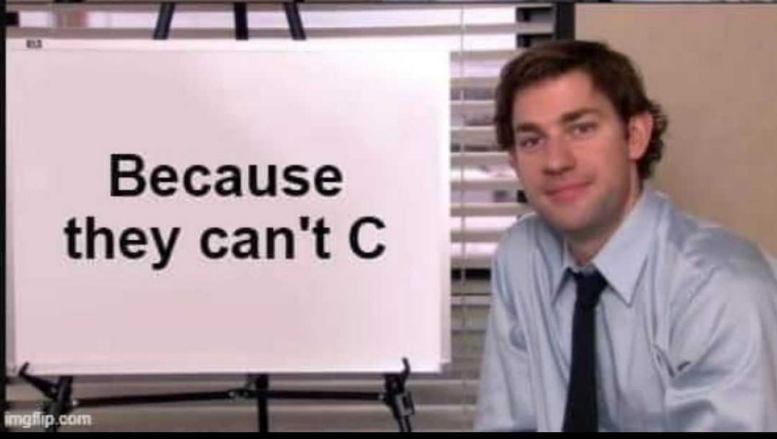


**Why do Python
programmers
wear glasses?**





Why do Python
programmers
wear glasses?



Because
they can't C

imgflip.com



Shell scripts

- A series of commands in a text file
 - Linux
 - Can start text file with `#!` (shebang) and make executable
 - Can call interpreter directly
 - Windows
 - .bat (batch) files
 - Windows Power Shell
- Can take arguments (`$1`, `$2`)
- Number of arguments (`$#`)
- Command Substitution (not just for scripts)
 - `echo "There are `ls *.txt | wc -l` files in this directory"`
 - `echo "There are $(ls *.txt | wc -l) files in this directory"`

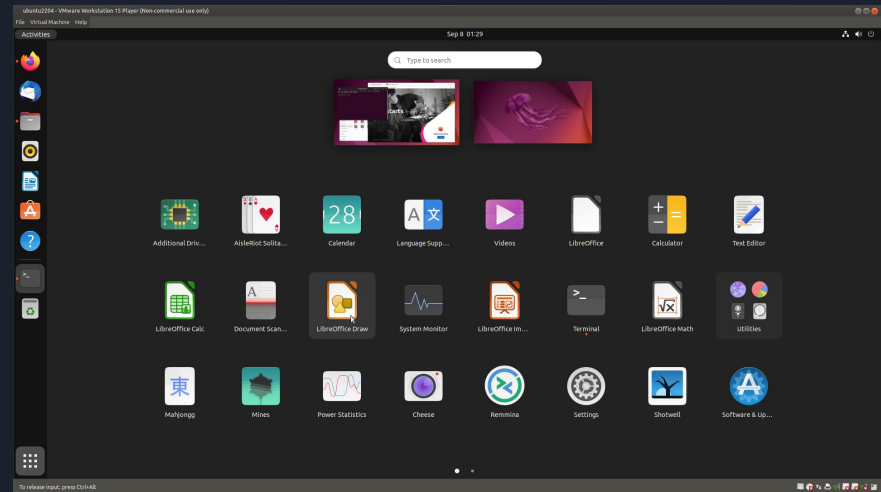
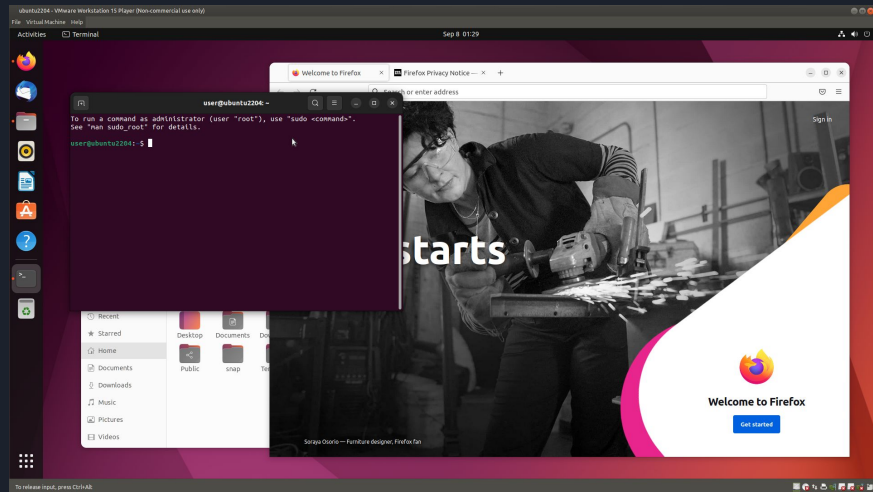


Executable Files

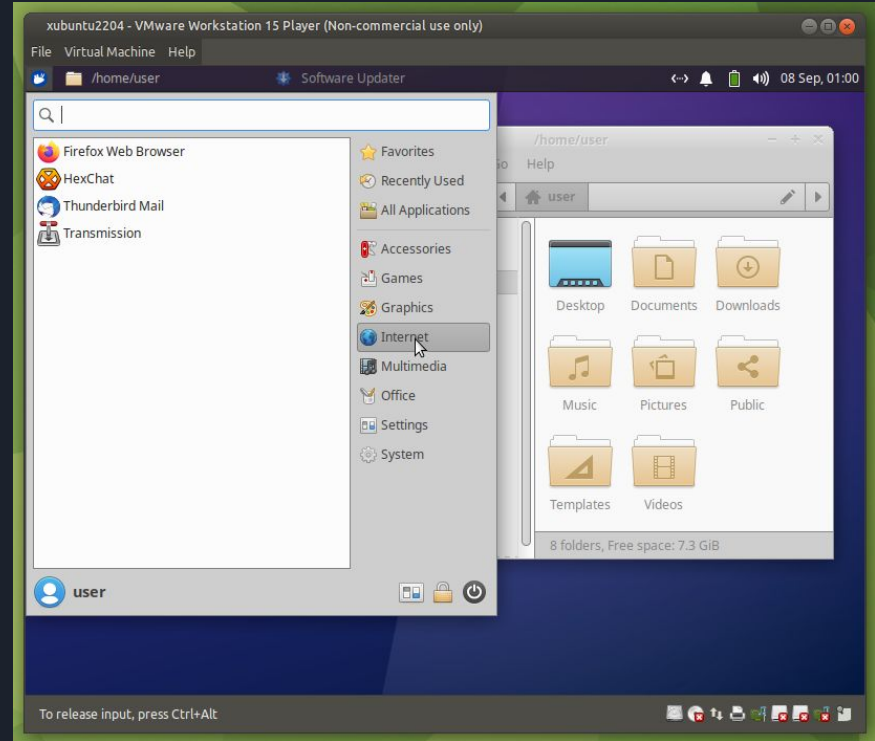
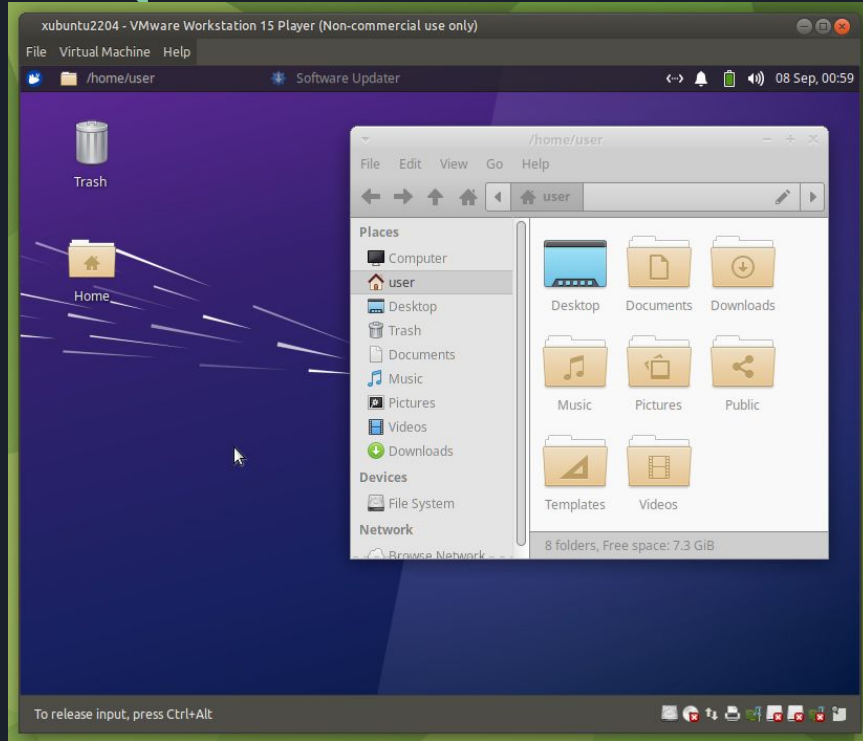
- Linux - permissions bits
 - Permission bits for user, then group, then others
 - r = read, w = write, x = executable
 - `$ ls -l`

```
-rwxrwxr-x 1 mwales mwales 16784 Feb 1 2023 a.out
-rw-rw-r-- 1 mwales mwales 26 Feb 1 2023 flag.txt
-rwxrwxr-x 1 mwales mwales 3969 Feb 3 2023 judge.py
-rw-rw-r-- 1 mwales mwales 330 Feb 2 2023 solution.c
```
 - `chmod` can change file permissions
- Windows - file extension
 - .bat (batch) and .cmd (command) script files
 - .exe and .com binary files
 - Many others

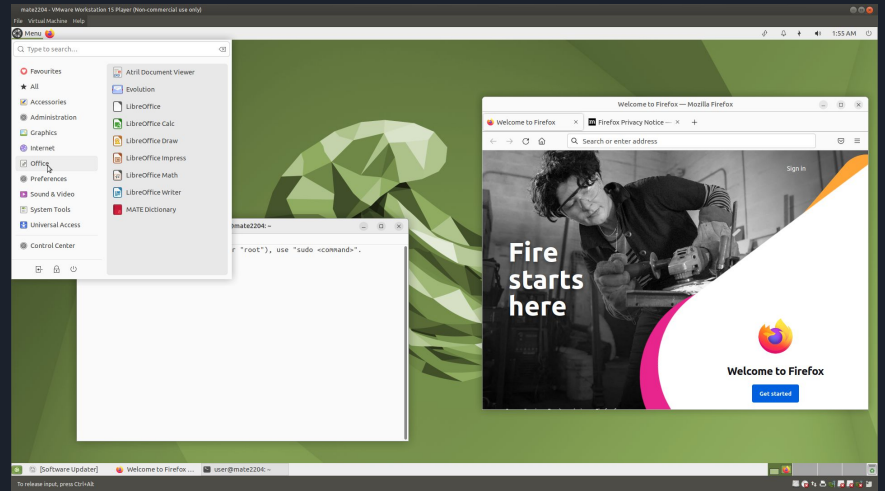
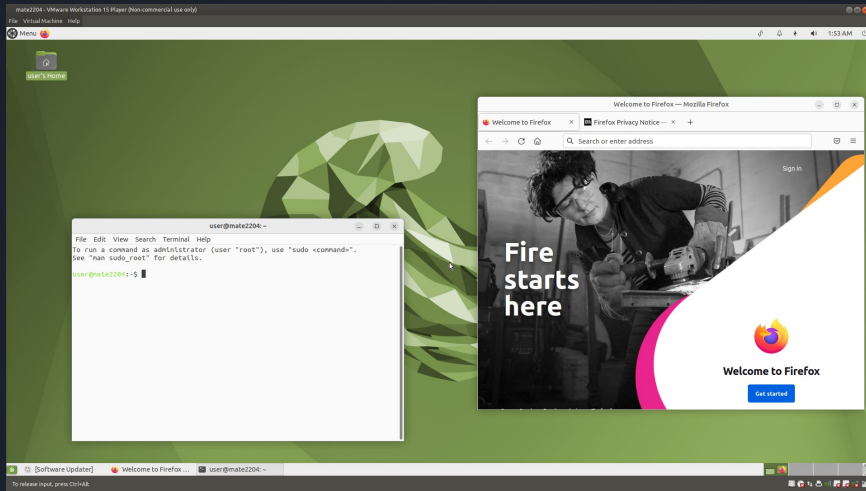
"Vanilla" Ubuntu



Xubuntu



Ubuntu MATE





Attributions

- Debian Family Tree: Andreas Lundqvist, Donjan Rodic from [wikimedia.org](https://www.wikimedia.org/)