Introduction to Linux

Day2_Linux.md

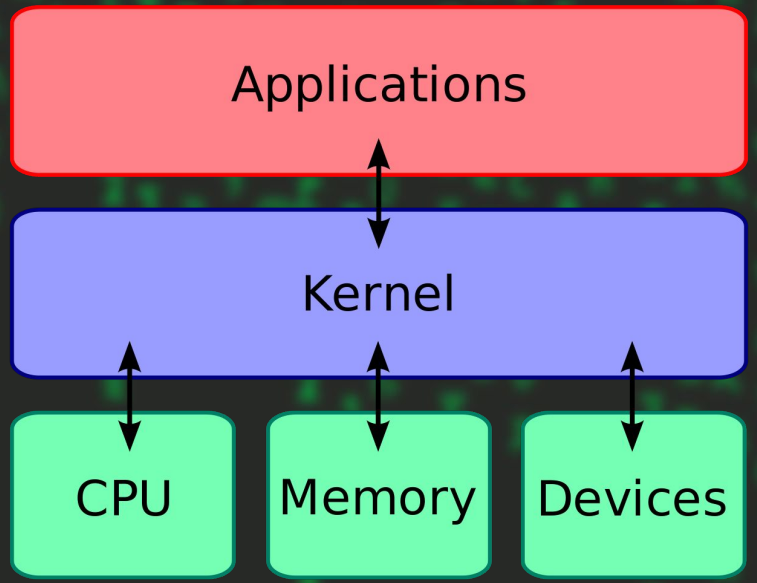
Recall

Last Class topics

- **Linux is a kernel.**

WHAT is kernel?

- Kernel is a code/program that used to meet your Software and Hardware. And allocate some resources.



History of Linux

- In **1969** a team led by computer scientists Ken Thompson and Dennis Ritchie created the first version of UNIX on a PDP-7 minicomputer,

- which was chosen mainly because of Thompson's familiarity with the system from his hobby work on it
- BUT IT WASN'T CHEAP AND OPEN-SOURCE
- Then Person called "LINUS TORVALDS" Created the Linux kernel. And posted it online to make it open-source.

Overview | Repositories 7 | Projects | Packages | Stars 2

Linus Torvalds

torvalds

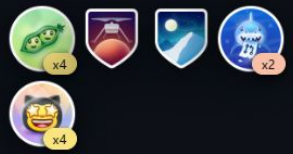
Follow

178k followers · 0 following

Linux Foundation

Portland, OR

Achievements



Beta Send feedback

Organizations

Block or Report

Popular repositories

linux — Public
Linux kernel source tree
C ☆ 148k ⑂ 47.1k

uemacs — Public
Random version of microemacs with my private modificatons
C ☆ 955 ⑂ 206

test-tlb — Public
Stupid memory latency and TLB tester
C ☆ 546 ⑂ 188

pesconvert — Public
Brother PES file converter
C ☆ 263 ⑂ 61

subsurface-for-dirk — Public
Forked from subsurface/subsurface
Do not use - the real upstream is Subsurface-divelog/subsurface
C++ ☆ 251 ⑂ 58

libdc-for-dirk — Public
Forked from subsurface/libdc
Only use for syncing with Dirk, don't use for anything else
C ☆ 185 ⑂ 49

2,634 contributions in the last year

Contribution activity

2023
2022
2021

March 2023

Created 82 commits in 1 repository

torvalds / linux Public

Watch 8.1k | Fork 47.1k | Star 148k

Code | Pull requests 310 | Actions | Projects | Security | Insights

master | 1 branch | 782 tags | Go to file | Add file | Code

torvalds sched_getaffinity: don't assume 'cpumask_size()' is fully initialized ... 6015b1a 13 hours ago 1,169,528 commits

Documentation	Merge tag 'docs-6.3-fixes' of git://git.lwn.net/linux	yesterday
LICENSES	LICENSES: Add the copyleft-next-0.3.1 license	4 months ago
arch	Merge tag 'trace-v6.3-rc1' of git://git.kernel.org/pub/scm/linux/kern...	15 hours ago
block	block, bfq: fix uaf for 'stable_merge_bfqq'	last week
certs	Merge tag 'kbuild-v6.3' of git://git.kernel.org/pub/scm/linux/kernel/...	2 weeks ago
crypto	Merge tag 'net-next-6.3' of git://git.kernel.org/pub/scm/linux/kernel...	3 weeks ago
drivers	Merge tag 'clk-fixes-for-linus' of git://git.kernel.org/pub/scm/linux...	16 hours ago
fs	Merge tag 'mm-hotfixes-stable-2023-03-14-16-51' of git://git.kernel.o...	15 hours ago
include	Merge tag 'trace-v6.3-rc1' of git://git.kernel.org/pub/scm/linux/kern...	15 hours ago
init	Merge tag 'kbuild-v6.3' of git://git.kernel.org/pub/scm/linux/kernel/...	2 weeks ago
io_uring	io_uring: silence variable 'prev' set but not used warning	last week
ipc	Merge branch 'work.namespace' of git://git.kernel.org/pub/scm/linux/k...	3 weeks ago
kernel	sched_getaffinity: don't assume 'cpumask_size()' is fully initialized	13 hours ago
lib	Merge tag 'zstd-linus-v6.3-rc3' of https://github.com/terrelln/linux	15 hours ago
mm	mm/damon/paddr: fix folio_nr_pages() after folio_put() in damon_pa_ma...	last week
net	wifi: cfg80211: Partial revert "wifi: cfg80211: Fix use after free fo...	2 days ago
rust	Merge tag 'rust-fixes-6.3-rc1' of https://github.com/Rust-for-Linux/l...	2 weeks ago
samples	Merge tag 'loongarch-6.3' of git://git.kernel.org/pub/scm/linux/kerne...	2 weeks ago

About

Linux kernel source tree

Readme
View license
148k stars
8.1k watching
47.1k forks

Releases

782 tags

Packages

No packages published

Contributors 5,000+

+ 14,003 contributors

Languages

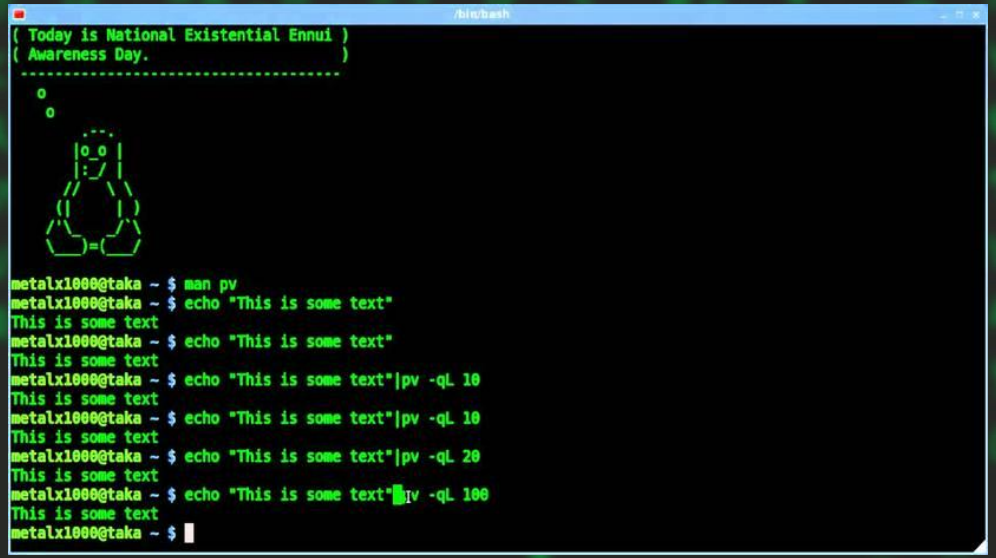
C 98.5% Assembly 0.8% Shell 0.3% Makefile 0.2%

Cont...

- **Richard Stallman** announced the GNU project in 1983 and cofounded the Free Software Foundation in 1985.
- GNU is a free software replacement to the UNIX OS, But it was just software replacement not full os {Examples: Bash,tar,emacs…} .
- So GNU + LINUX will give the GNU/Linux OS.
- The GNU Linux project was started to create a Unix-like operating system created with source code that could be copied, modified, and redistributed

What is Shell?

- Users communicate with the kernel by the **shell**.
- The Shell is a Command Line Interpreter. It translates commands entered by the user and converts them into a language that is understood by the Kernel.



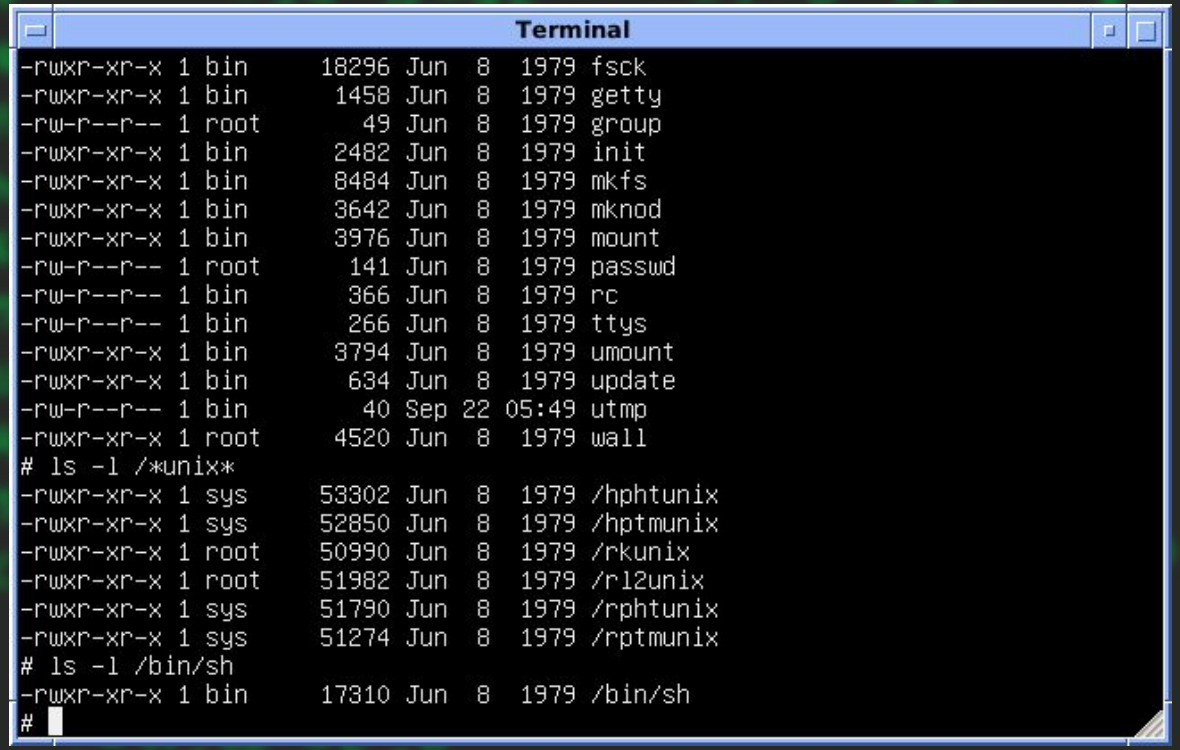
Types of shells

- Based on their features there are money shells.
  - SH
  - BASH
  - ZSH
  - FISH

> They differ in Colouring,Piping,command compilation, some kind of features.

- TO IDENTIFY YOUR SHELL “echo $SHELL”

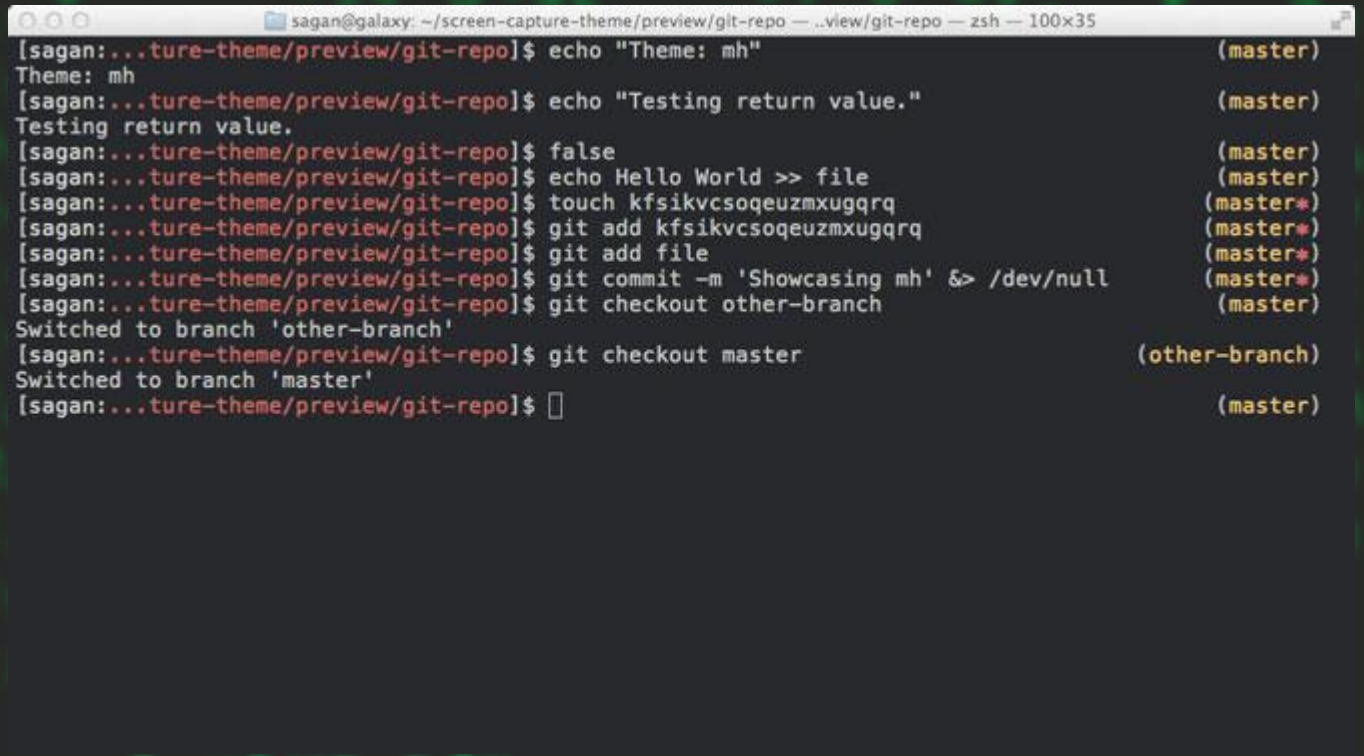
sh


Terminal
-rwxr-xr-x 1 bin 18296 Jun 8 1979 fsck
-rwxr-xr-x 1 bin 1458 Jun 8 1979 getty
-rw-r--r-- 1 root 49 Jun 8 1979 group
-rwxr-xr-x 1 bin 2482 Jun 8 1979 init
-rwxr-xr-x 1 bin 8484 Jun 8 1979 mkfs
-rwxr-xr-x 1 bin 3642 Jun 8 1979 mknod
-rwxr-xr-x 1 bin 3976 Jun 8 1979 mount
-rw-r--r-- 1 root 141 Jun 8 1979 passwd
-rw-r--r-- 1 bin 366 Jun 8 1979 rc
-rw-r--r-- 1 bin 266 Jun 8 1979 ttys
-rwxr-xr-x 1 bin 3794 Jun 8 1979 umount
-rwxr-xr-x 1 bin 634 Jun 8 1979 update
-rw-r--r-- 1 bin 40 Sep 22 05:49 utmp
-rwxr-xr-x 1 root 4520 Jun 8 1979 wall
ls -l /*unix*
-rwxr-xr-x 1 sys 53302 Jun 8 1979 /hphtunix
-rwxr-xr-x 1 sys 52850 Jun 8 1979 /hptmunix
-rwxr-xr-x 1 root 50990 Jun 8 1979 /rkunix
-rwxr-xr-x 1 root 51982 Jun 8 1979 /rl2unix
-rwxr-xr-x 1 sys 51790 Jun 8 1979 /rphtunix
-rwxr-xr-x 1 sys 51274 Jun 8 1979 /rptmunix
ls -l /bin/sh
-rwxr-xr-x 1 bin 17310 Jun 8 1979 /bin/sh
#

BASH

```
peterloshin@penguin:/$ ls
bin  boot  dev  etc  home  lib  lib64  media  mnt  opt  proc  root  run  sbin  srv  sys  tmp  usr  var
peterloshin@penguin:/$ ls -lash
total 0
0 drwxrwxrwx   1 root   root     132 Nov 30 11:08 .
0 drwxrwxrwx   1 root   root     132 Nov 30 11:08 ..
0 drwxr-xr-x   1 root   root    1.5K Aug 31 00:02 bin
0 drwxr-xr-x   1 root   root       0 Jun 13 06:30 boot
0 drwxr-xr-x  12 root   root     660 Nov 30 09:53 dev
0 drwxr-xr-x   1 root   root    2.2K Nov 30 09:58 etc
0 drwxr-xr-x   1 root   root      22 Nov 30 09:52 home
0 drwxr-xr-x   1 root   root     126 Aug 31 00:02 lib
0 drwxr-xr-x   1 root   root      40 Aug 30 14:52 lib64
0 drwxr-xr-x   1 root   root       0 Aug 30 14:52 media
0 drwxr-xr-x   1 root   root      32 Nov 30 09:52 mnt
0 drwxr-xr-x   1 root   root      12 Nov 30 09:52 opt
0 dr-xr-xr-x 187 nobody nogroup    0 Nov 30 09:52 proc
0 drwx------   1 root   root      30 Aug 30 14:52 root
0 drwxr-xr-x  13 root   root     400 Nov 30 11:19 run
0 drwxr-xr-x   1 root   root    1.7K Aug 31 00:02 sbin
0 drwxr-xr-x   1 root   root       0 Aug 30 14:52 srv
0 dr-xr-xr-x  12 nobody nogroup    0 Nov 30 09:52 sys
0 drwxrwxrwt   1 root   root      94 Nov 30 11:20 tmp
0 drwxr-xr-x   1 root   root      80 Aug 31 00:03 usr
0 drwxr-xr-x   1 root   root      90 Aug 30 14:52 var
peterloshin@penguin:/$ ls -lash /home
total 0
0 drwxr-xr-x 1 root        root        22 Nov 30 09:52 .
0 drwxrwxrwx 1 root        root       132 Nov 30 11:08 ..
0 drwxr-xr-x 1 peterloshin peterloshin 192 Nov 30 11:08 peterloshin
peterloshin@penguin:/$ ls -lashR /home | grep "filename.txt"
4.0K -rw-r--r-- 1 peterloshin peterloshin   15 Nov 30 11:07 filename.txt
peterloshin@penguin:/$
```

ZSH


sagan@galaxy: ~/screen-capture-theme/preview/git-repo — ..view/git-repo — zsh — 100×35
[sagan:...ture-theme/preview/git-repo]$ echo "Theme: mh" (master)
Theme: mh
[sagan:...ture-theme/preview/git-repo]$ echo "Testing return value." (master)
Testing return value.
[sagan:...ture-theme/preview/git-repo]$ false (master)
[sagan:...ture-theme/preview/git-repo]$ echo Hello World >> file (master)
[sagan:...ture-theme/preview/git-repo]$ touch kfsikvcsoqeuzmxugqrq (master*)
[sagan:...ture-theme/preview/git-repo]$ git add kfsikvcsoqeuzmxugqrq (master*)
[sagan:...ture-theme/preview/git-repo]$ git add file (master*)
[sagan:...ture-theme/preview/git-repo]$ git commit -m 'Showcasing mh' &> /dev/null (master*)
[sagan:...ture-theme/preview/git-repo]$ git checkout other-branch (master)
Switched to branch 'other-branch'
[sagan:...ture-theme/preview/git-repo]$ git checkout master (other-branch)
Switched to branch 'master'
[sagan:...ture-theme/preview/git-repo]$ (master)

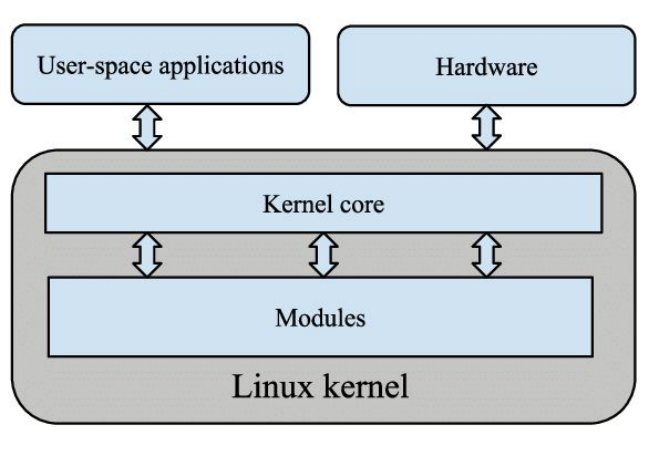
fish

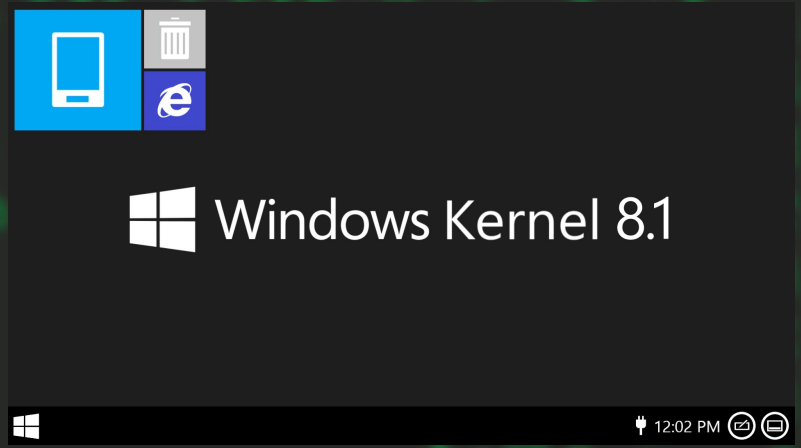
```
~/ar.al/site (git)  master 1 untracked
❯ exa -lh --git --all

Permissions Size User Date Modified Git Name
drwxrwxr-x     - aral 30 Dec  2020   -- .archive-1
drwxrwxr-x     - aral 30 Dec  2020   -- .dynamic
drwxr-xr-x     - aral 13 Dec  1901   -I .generated
drwxrwxr-x     - aral 25 Jun 16:01   -- .git
.rw-rw-r--    32 aral 30 Dec  2020   -- .gitignore
drwxrwxr-x     - aral  3 Apr 15:13   -N .hugo
.rw-rw-r--  5.0k aral 30 Dec  2020   -- chat.js
drwxrwxr-x     - aral 30 Dec  2020   -- in-progress
.rw-rw-r--   14k aral 30 Dec  2020   -- LICENSE
.rw-rw-r--   130 aral 30 Dec  2020   -- README.md

~/ar.al/site (git)  master 1 untracked
❯
```

What is OS- Operating system??

- We have said UNIX and GNU/Linux as OS but what is OS. OS is “operating system”, which means the main software part of computer that helps to work on.
- It contains:
  - Kernel
  - Softwares
  - Desktop environment
  - File extensions
  - Window manager

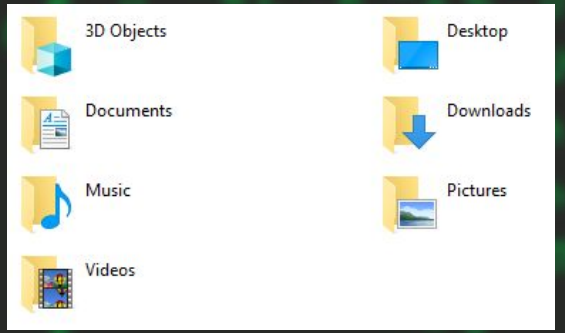
Kernel


User-space applications
Hardware
Kernel core
Modules
Linux kernel


Windows Kernel 8.1
12:02 PM

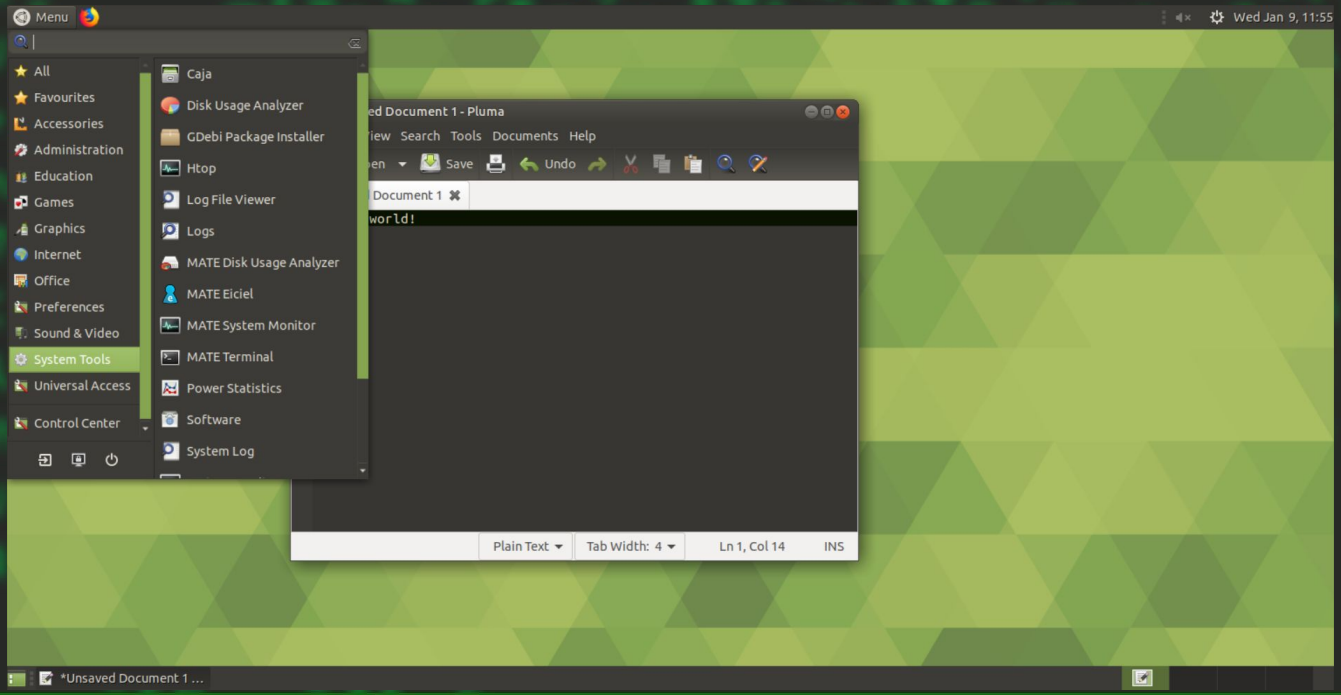
Software

Desktop Environment



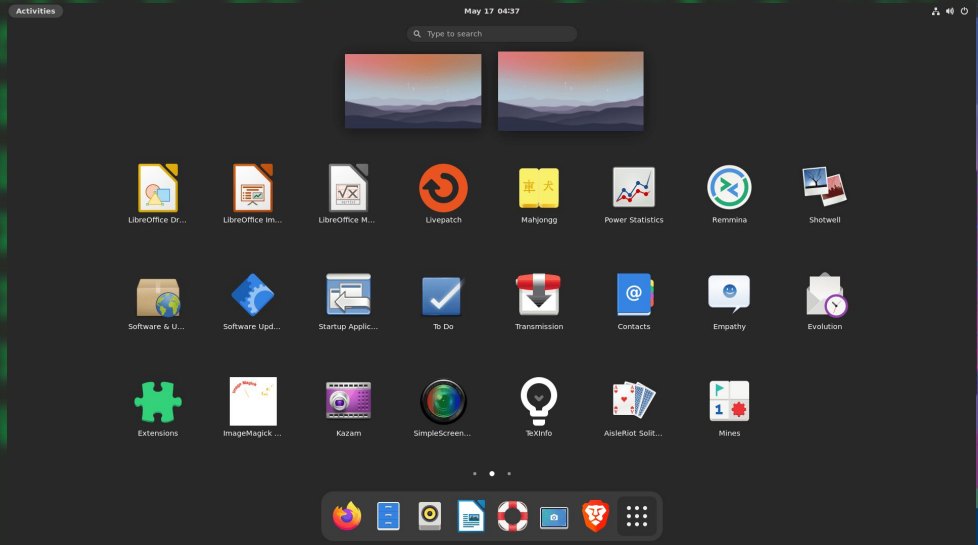
Types of desktop environment on linux

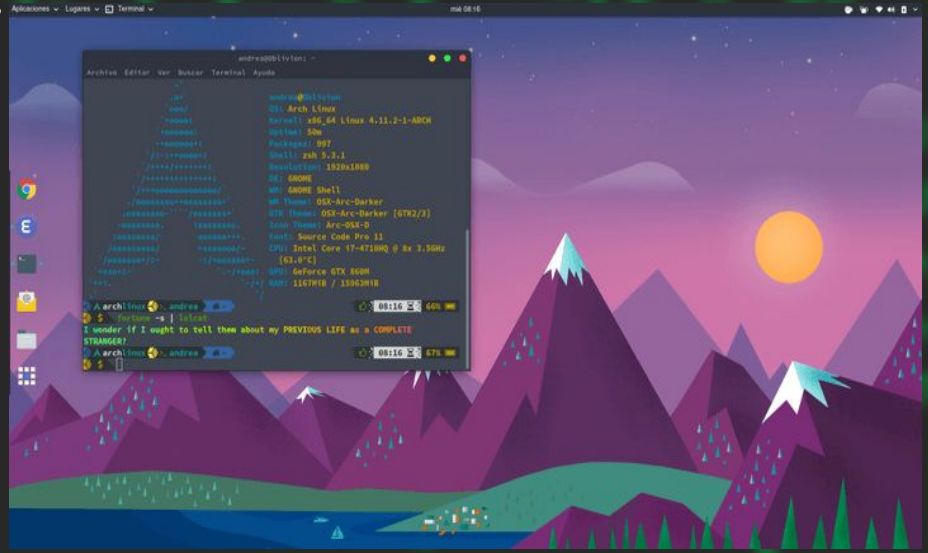
A) mate



Types of desktop environment on linux

B) gnome

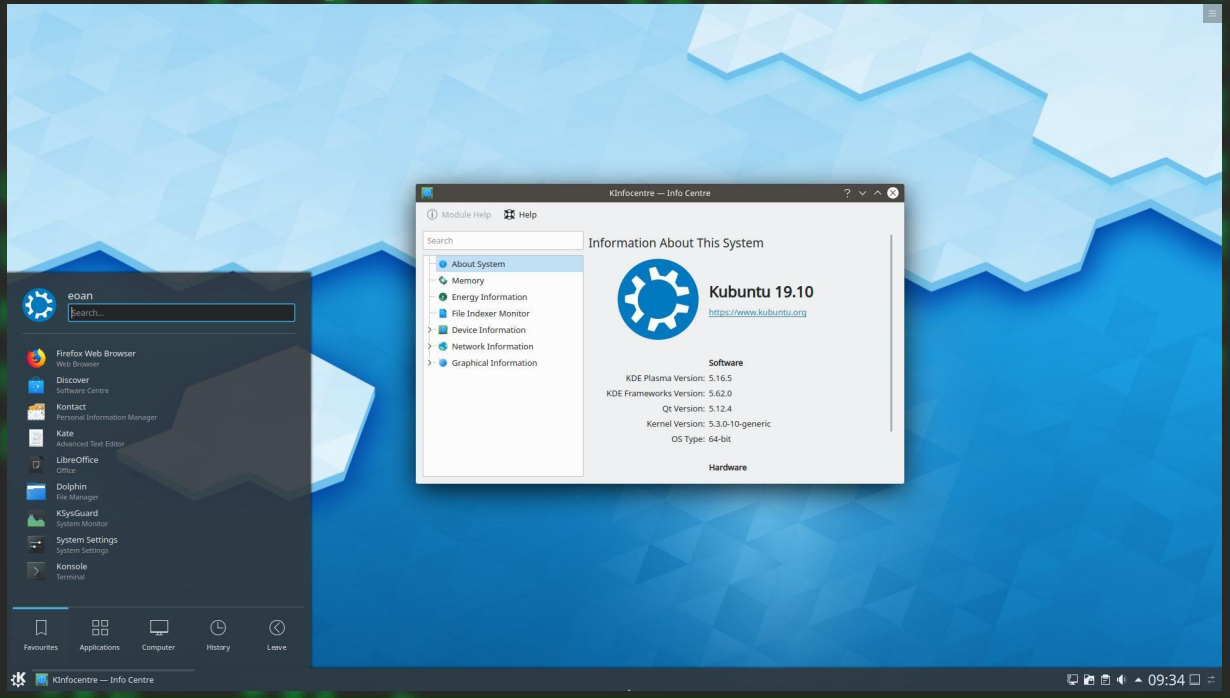




- Have beautiful animations, while opening,closing files

Types of desktop environment on linux

C) KDE plasma



Types of desktop environment on linux

D) XFCE

Which Desktop environment is best?

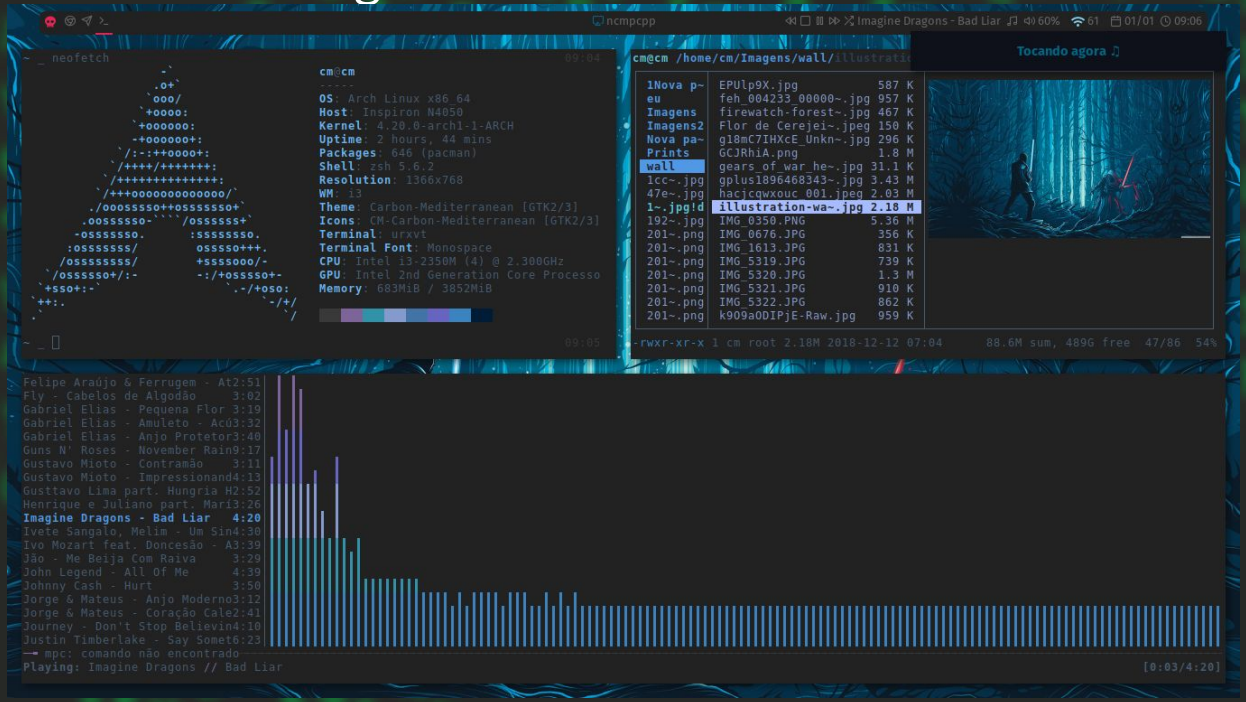
>> Speed depends on:

- Animations
- High Graphics
- Quality

>? Do You have slow pc…

Window manager

i3-window-manager



- Organize your notes
- Take a break(feta belu) and we will be back in 15 minutes.

Break time

Why Linux?

- FAST

No high spec computer/device needed

Why Linux?

• Most used

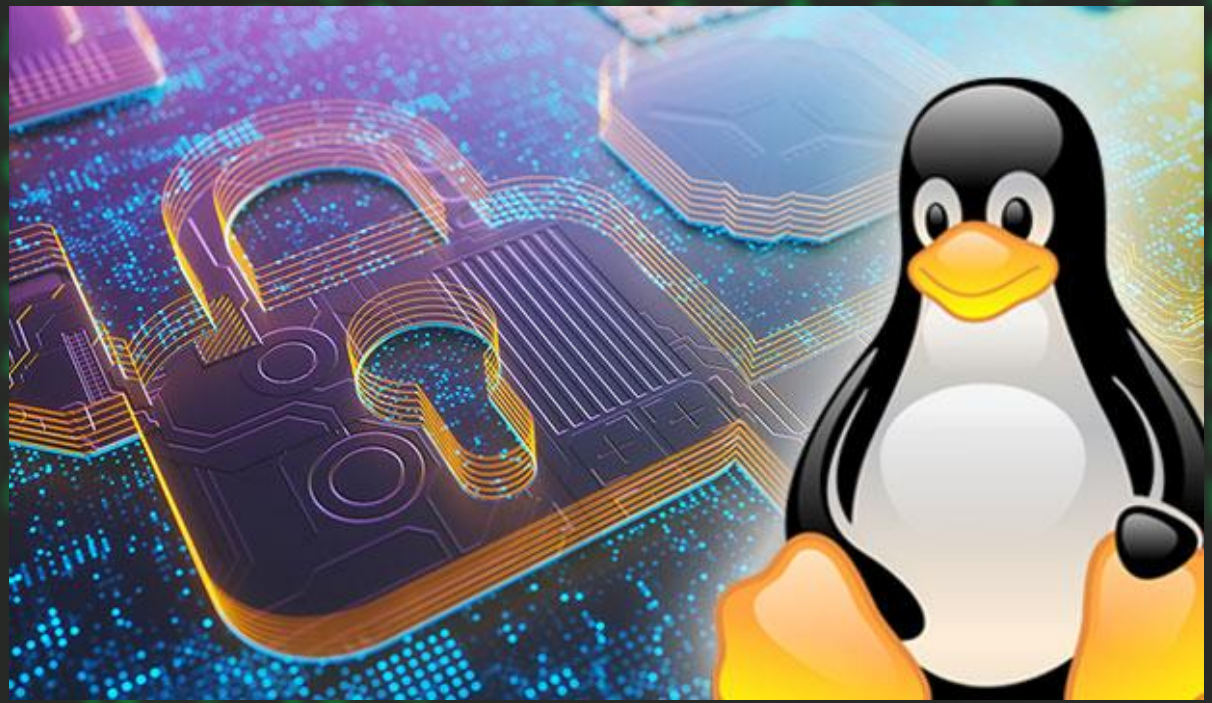
- 47% of professional developers use Linux-based operating systems.
- Linux powers 39.2% of websites whose operating system is known.
- Linux powers 85% of smartphones. (Hayden James)
- Linux, the third most popular desktop OS, has a market share of 2.09%.
- The Linux market size worldwide will reach $15.64 billion by 2027.
- The world's top 500 fastest supercomputers all run on Linux.
- 96.3% of the top one million web servers are running Linux.
- Today, there are over 600 active Linux distros

Why Linux?

- Most hacking tools

Why Linux?

- Most Secured!

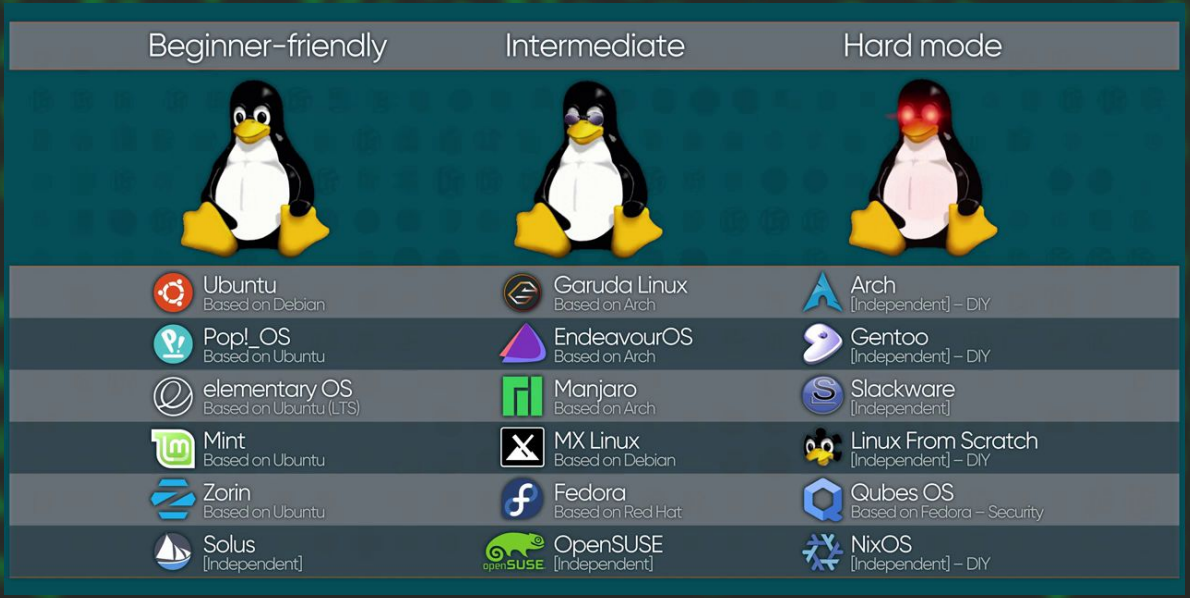


Linux distributions/distro

- Distro is Modified Linux Kernels,type of operating systems with different:

So many distros...

- Debian
  - Kali linux
  - Ubuntu
  - Parrot
- Arch
  - Black arch
  - Garuda
- Fedora
- Red Hat
- Gentoo
- Android



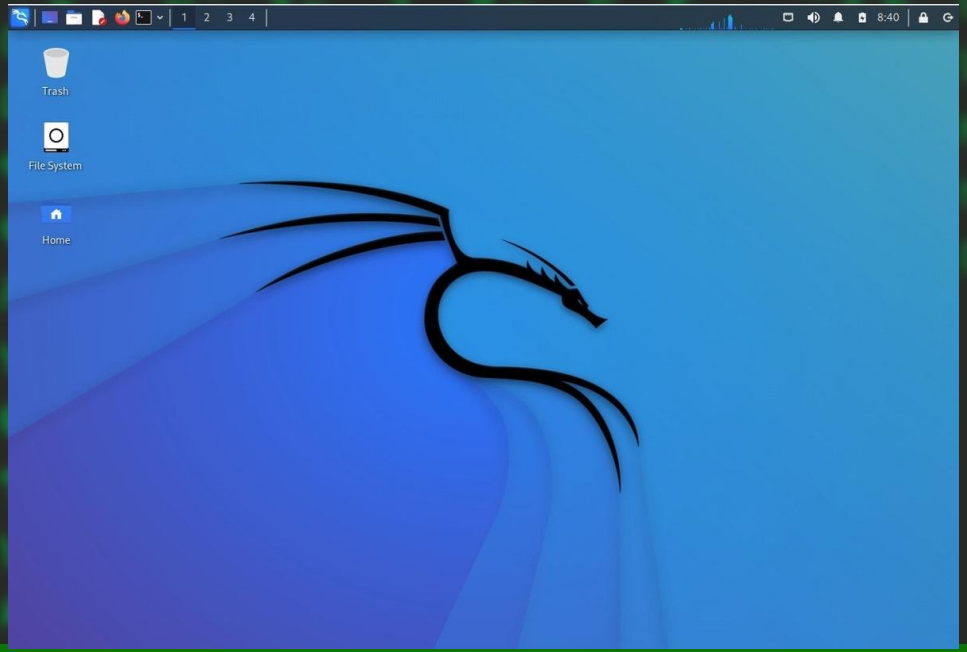
Which is best for hackers?

- Kali linux
- Parrot Os
- Garuda
- Black Arch
- ...

Kali linux

Kali Linux is a Debian-derived Linux distribution designed for digital forensics and penetration testing. It is maintained and funded by Offensive Security.

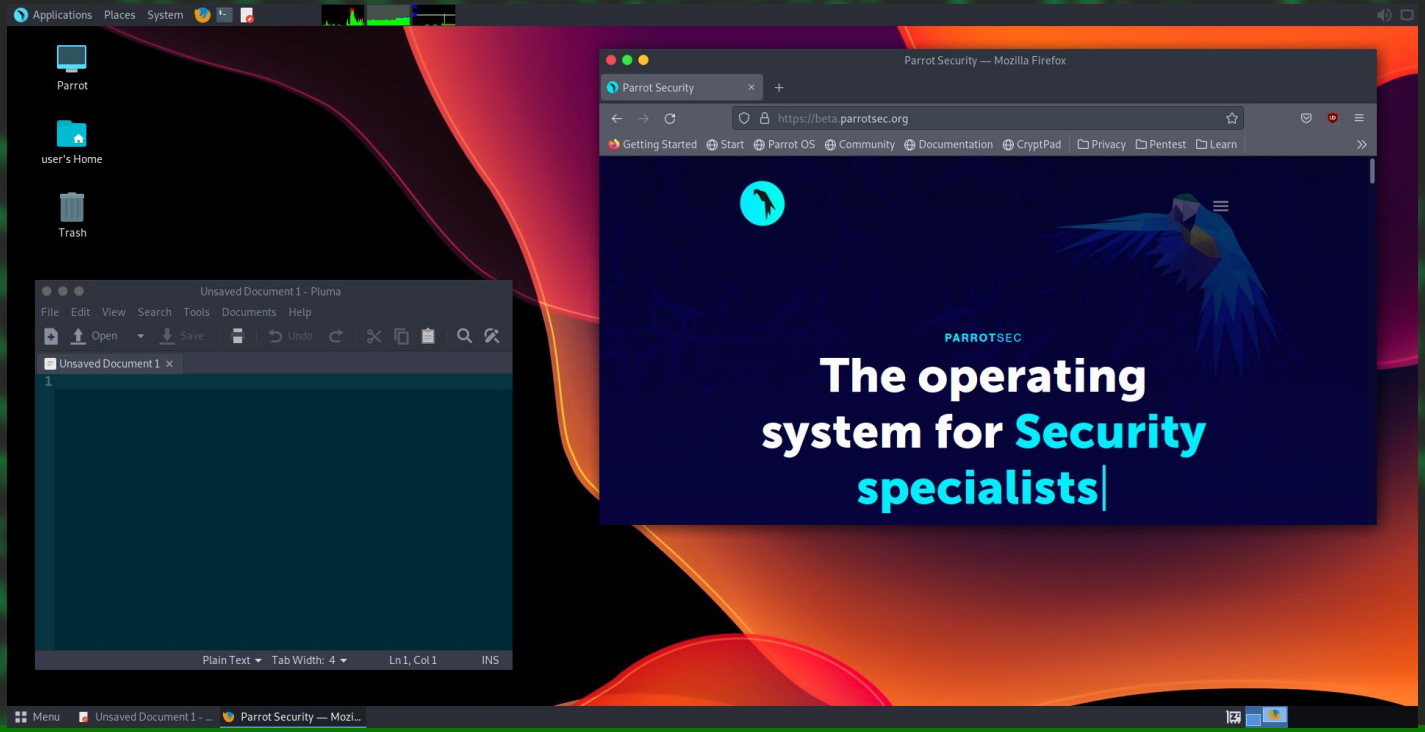
Desktop Env: xfce
Package manager: apt
Shell: zsh



Parrot Os

Parrot OS is a Linux distribution based on Debian with a focus on security, privacy, and development.

- Desktop Env: mate
- Package manager: apt
- shell: bash



Garuda

Garuda Linux is a Linux distribution based on the Arch Linux operating system.

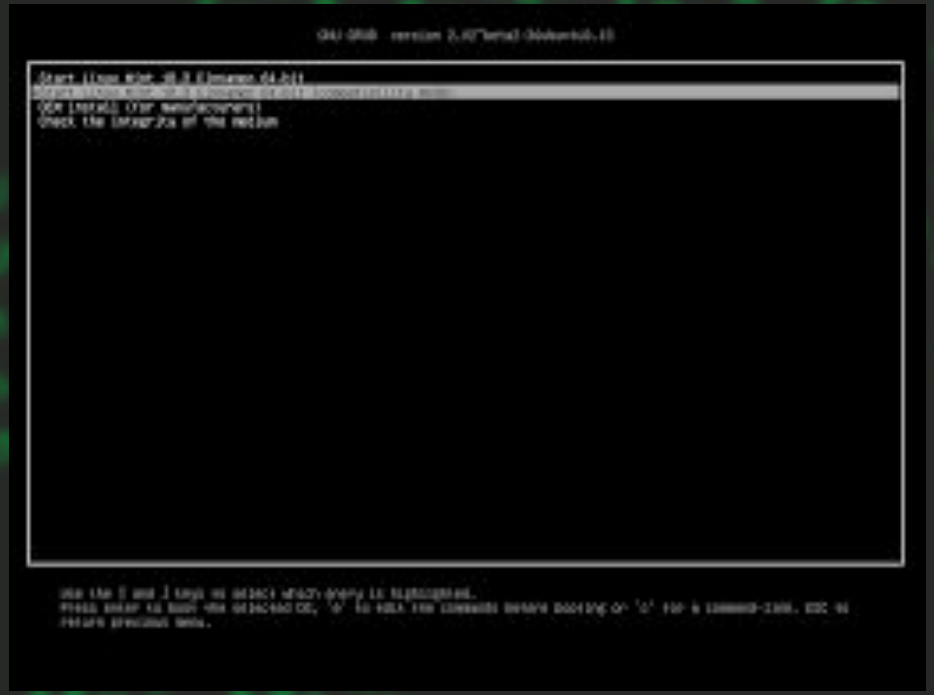
- Desktop Env: KDE plasma
- Package Manager: pacman
- shell: fish

Do windows have distros?

- Windows is not open-source so peoples won’t use / edit it, so there won’t be other kind.
- It just give updates and adds some feature on it.

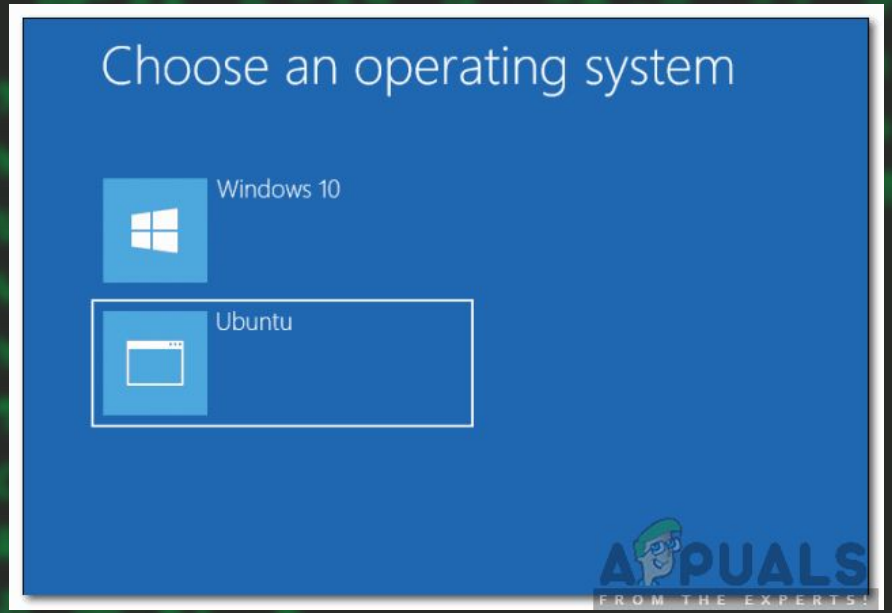
So... How can we use it?

A) Main OS/ Main-boot



So... How can we use it?

B) DualBoot / 2in1

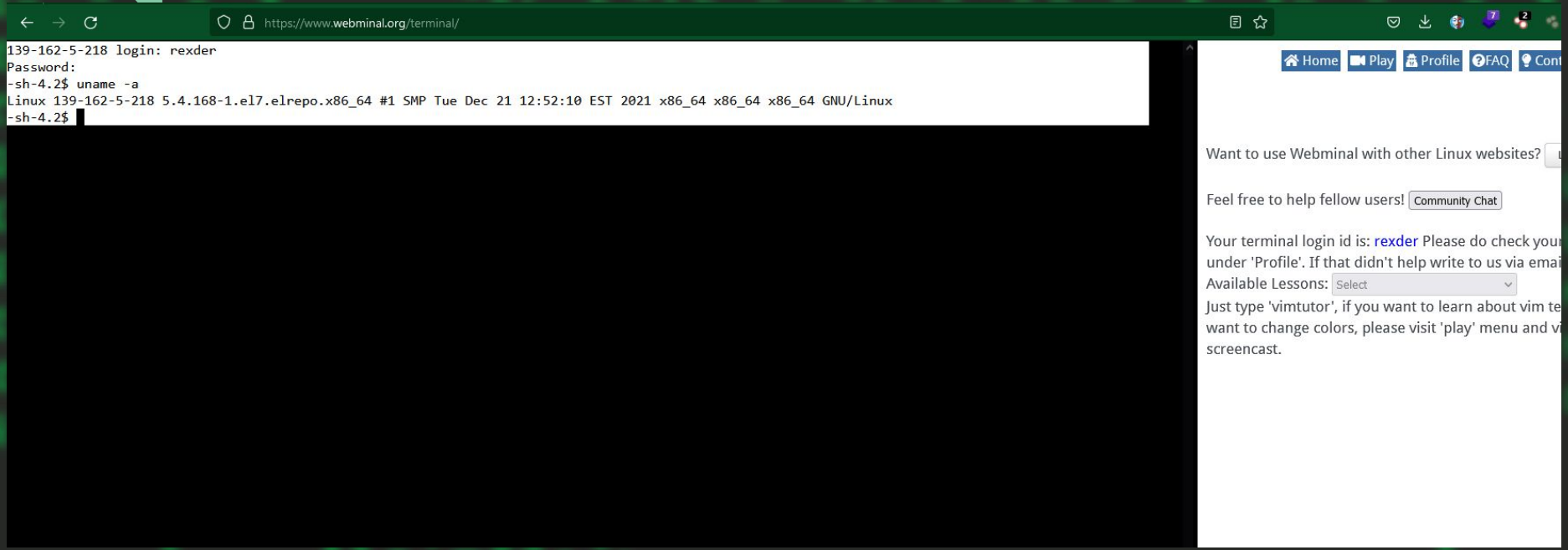


So... How can we use it?

C) Live boot

So... How can we use it?

D) Cloud terminals



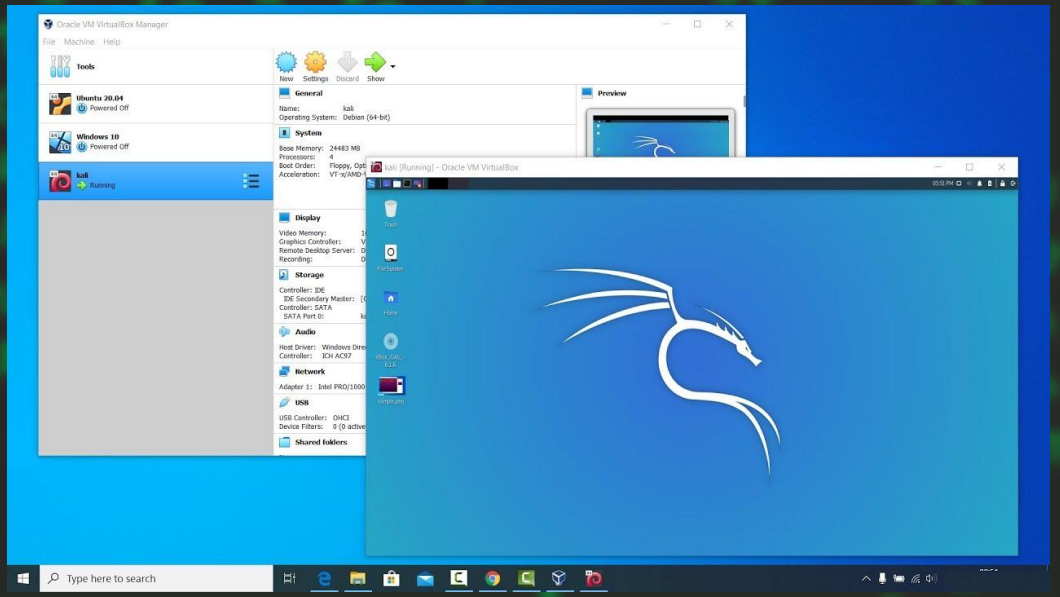
URL: https://www.webminal.org

So... How can we use it?

E) Virtual Machine

Cont...

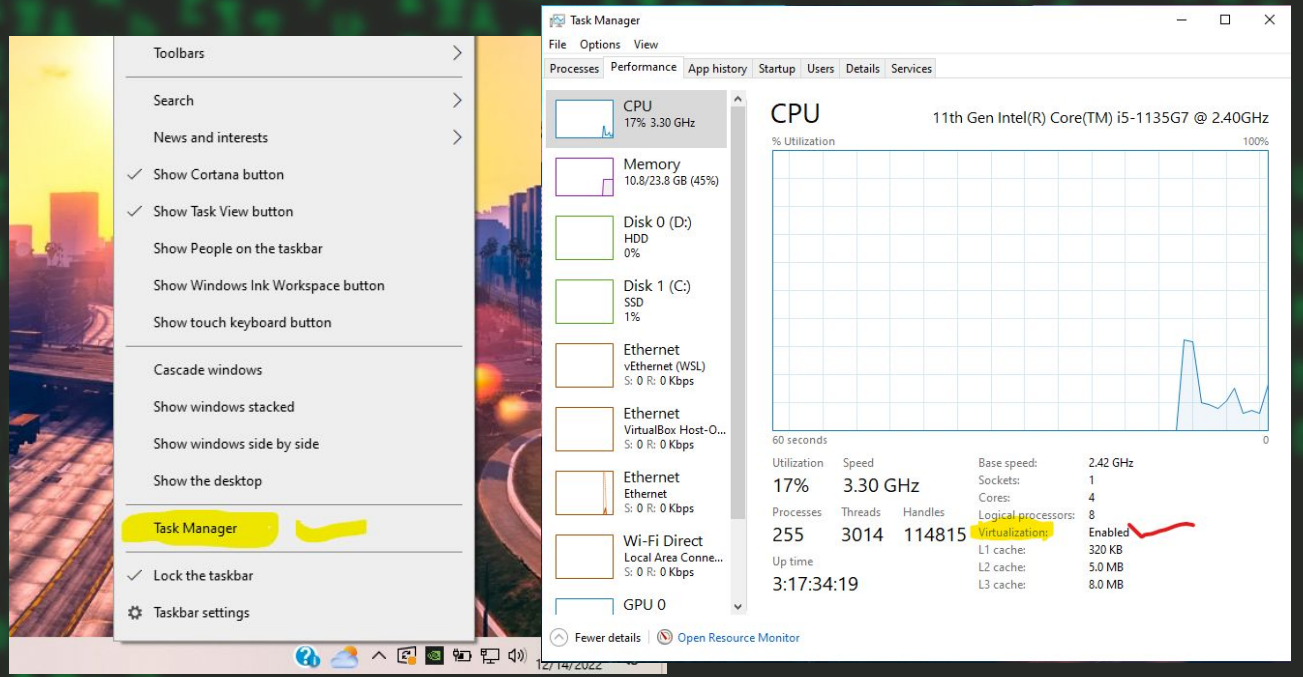
- Computers have a Technology called "**VIRTUALIZATION**". This is the method how it allocate our using memory to the virtual machines/ VM's
- This is a method to use windows and linux together.
- Softwares that gives you This ability:
  - HyberV
  - QEMU
  - Virtual Box - Oracle
  - VMware
  - ...



You have to check some systems

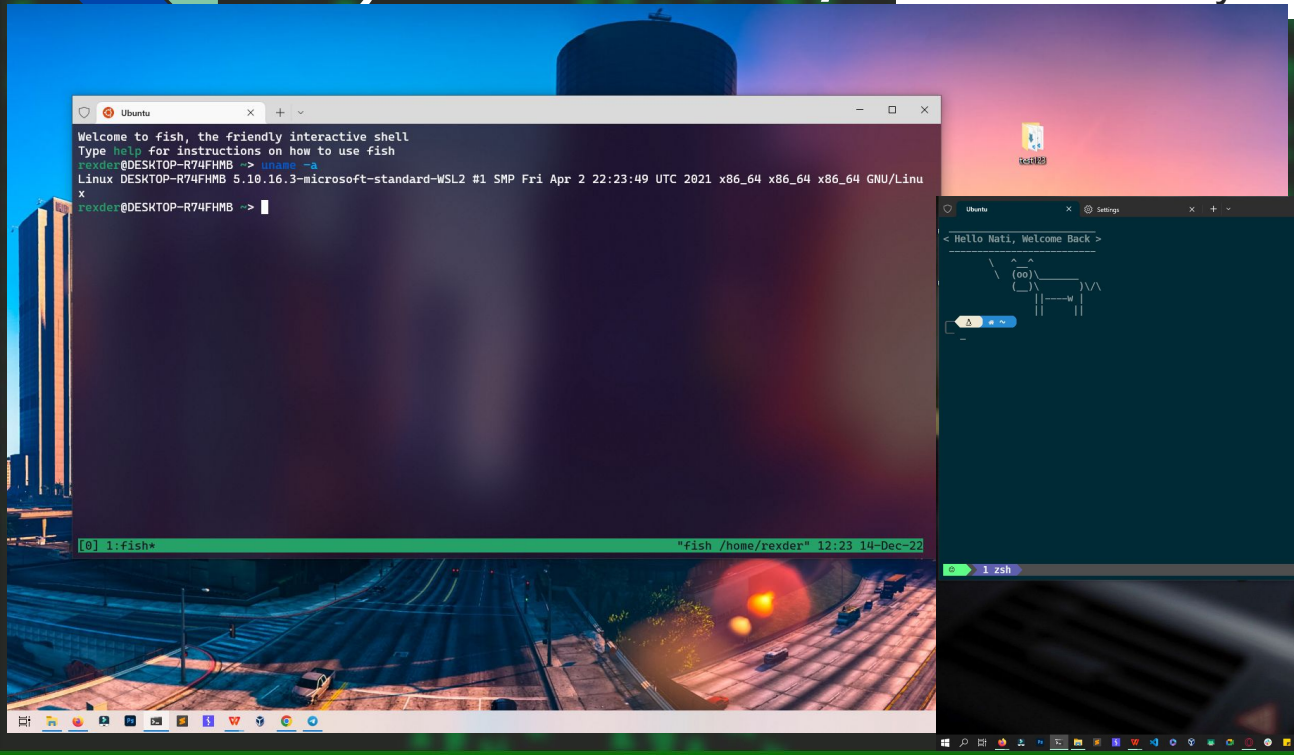
1. Open task manager
2. Goto performance
3. Open CPU

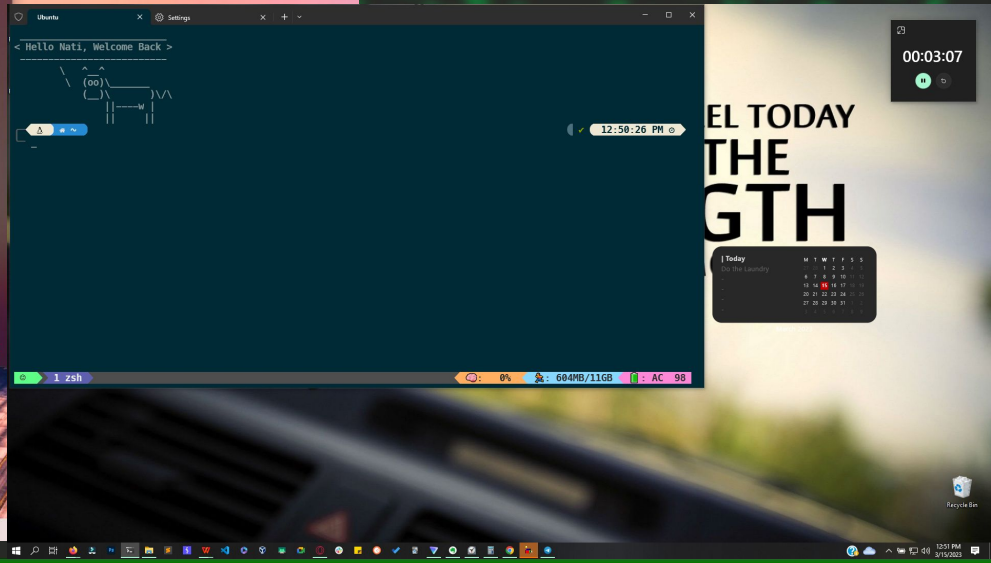
- If it is disables, you have to enable in BIOS settings(check youtube)
- If is is enabled we are good to go.

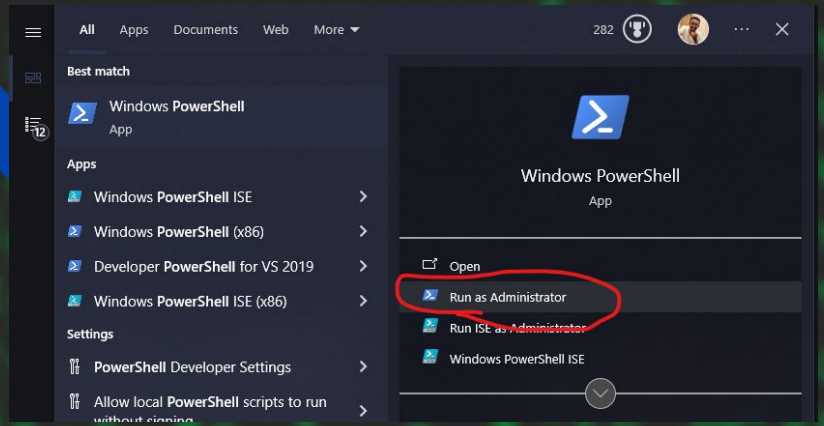


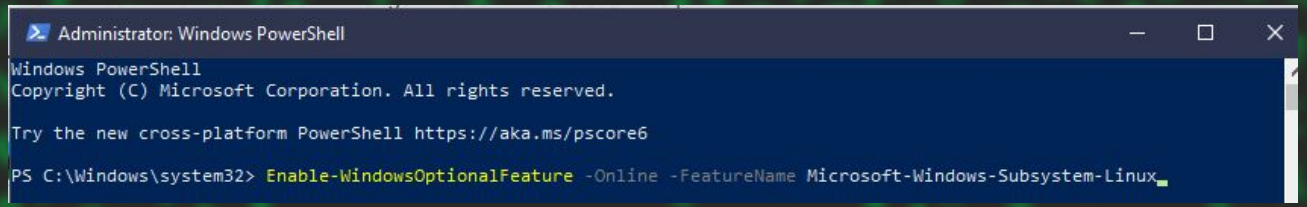
So... How can we use it?

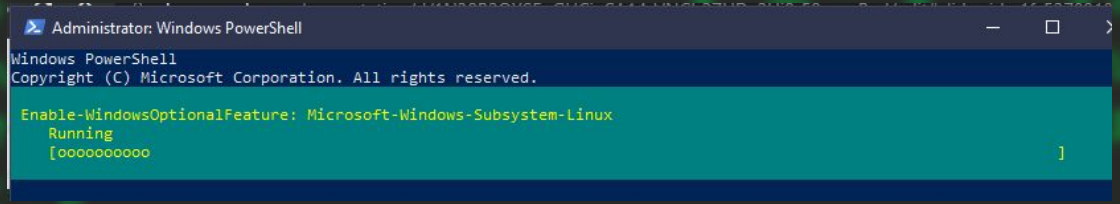
F) WSL v2 / Windows Subsystem for Linux





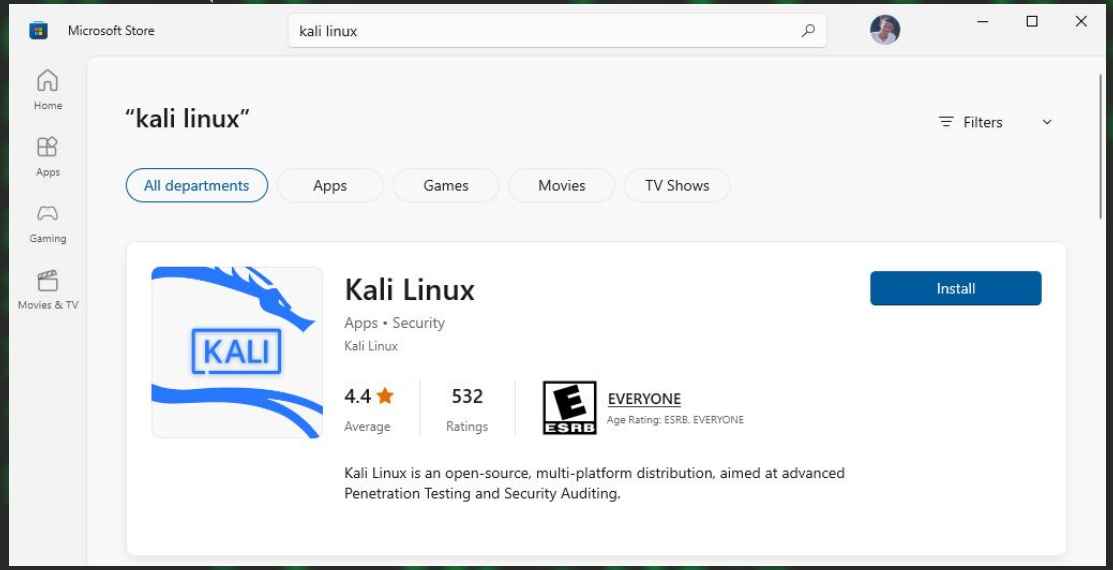

All
Apps
Documents
Web
More
282
Best match
Windows PowerShell
App
Apps
Windows PowerShell ISE
Windows PowerShell (x86)
Developer PowerShell for VS 2019
Windows PowerShell ISE (x86)
Settings
PowerShell Developer Settings
Allow local PowerShell scripts to run
Windows PowerShell
App
Open
Run as Administrator
Run ISE as Administrator
Windows PowerShell ISE

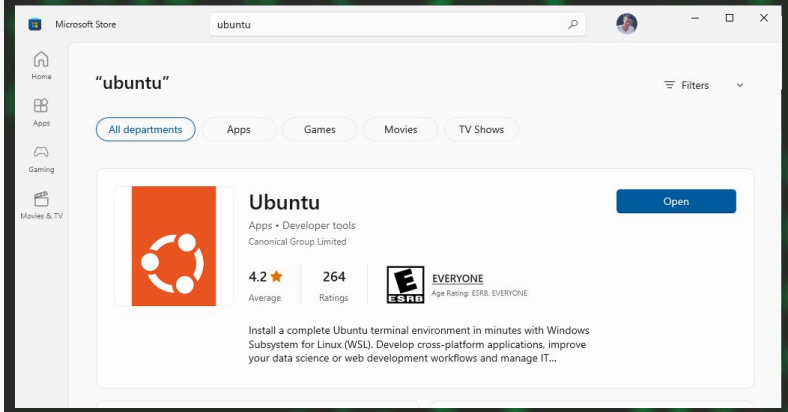

Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
Try the new cross-platform PowerShell https://aka.ms/pscore6
PS C:\Windows\system32> Enable-WindowsOptionalFeature -Online -FeatureName Microsoft-Windows-Subsystem-Linux

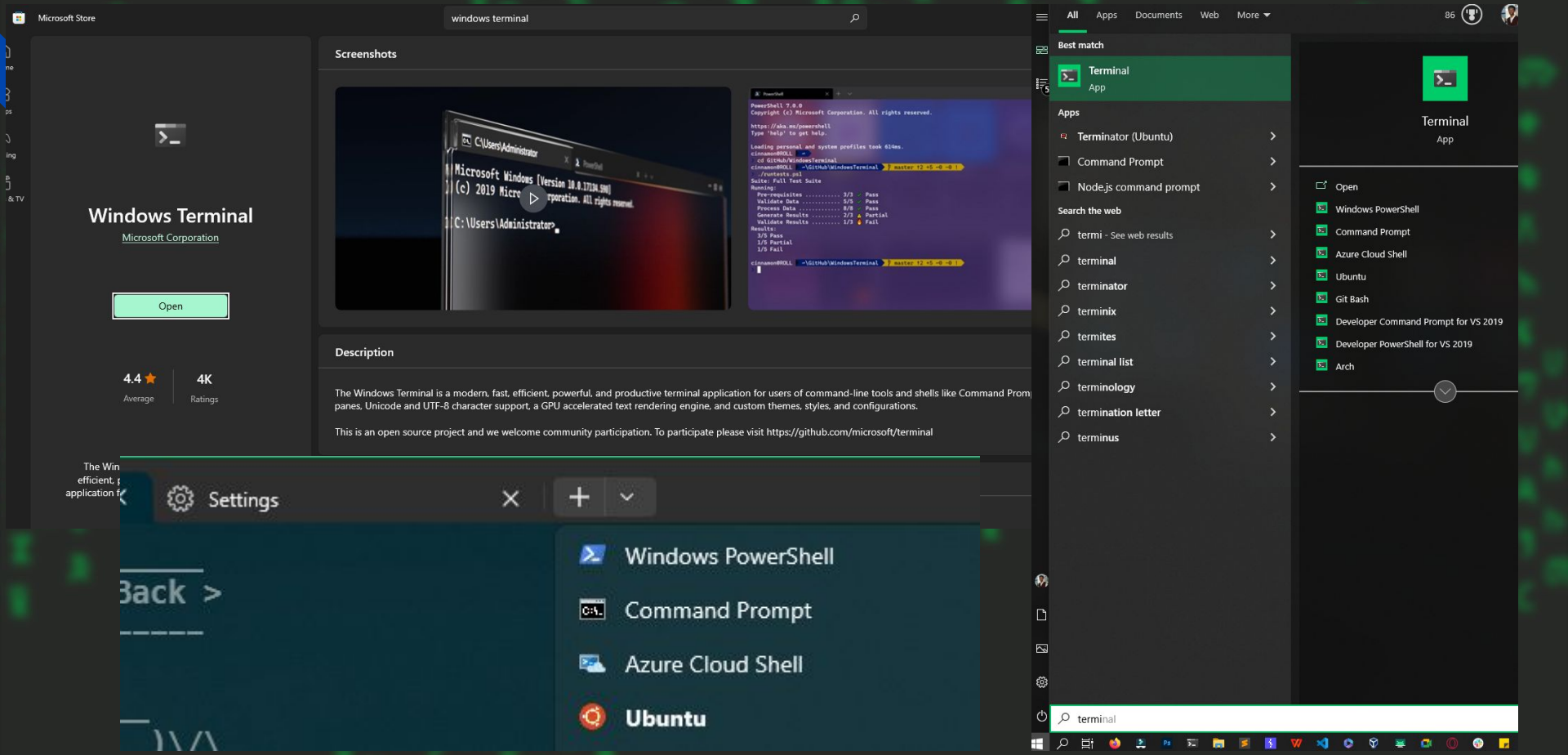

Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
Enable-WindowsOptionalFeature: Microsoft-Windows-Subsystem-Linux
Running
[ooooooooo
]

Cont...

You can simply install them from Microsoft Store





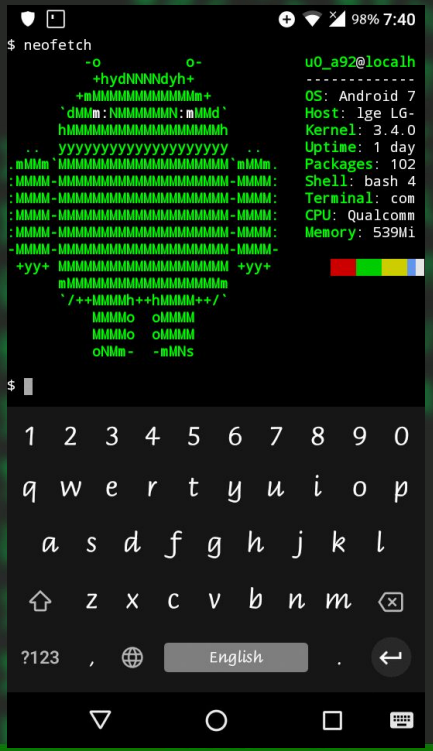


GTST - GeezTech Security Tester®

by Nathan Hailu

So... How can we use it?

G) Termux - Android



For running some codes
And doing simple things!

Assignment for next session

- Based on your computer Performance choose one method from the 6 methods (except termux) and setup it for next time.
- Resource: there are many youtube videos check them.

And just do this no need to do other thing

Class is Over

Question, Comment time