



To be very precise,



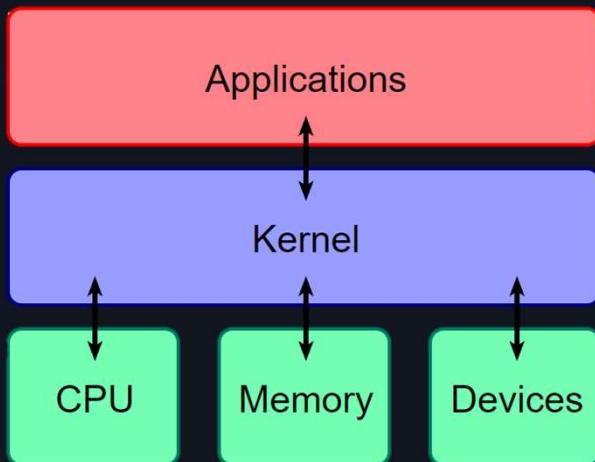
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**LINUX IS A KERNEL**



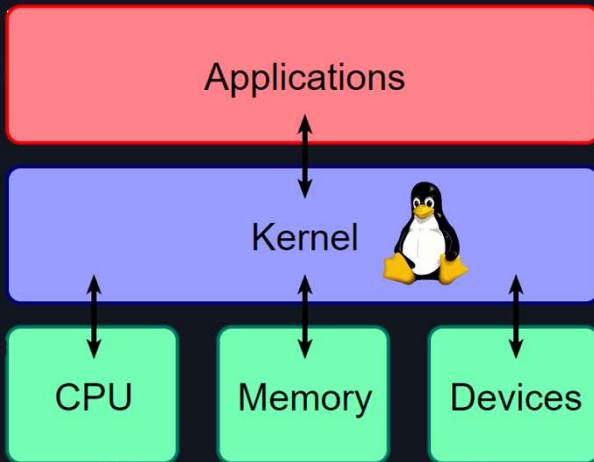
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# KERNEL

the of an operating system

**It is the code that makes it possible for applications and hardware to interact**



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**But broadly speaking,**



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# LINUX

operating system which uses the Linux kernel



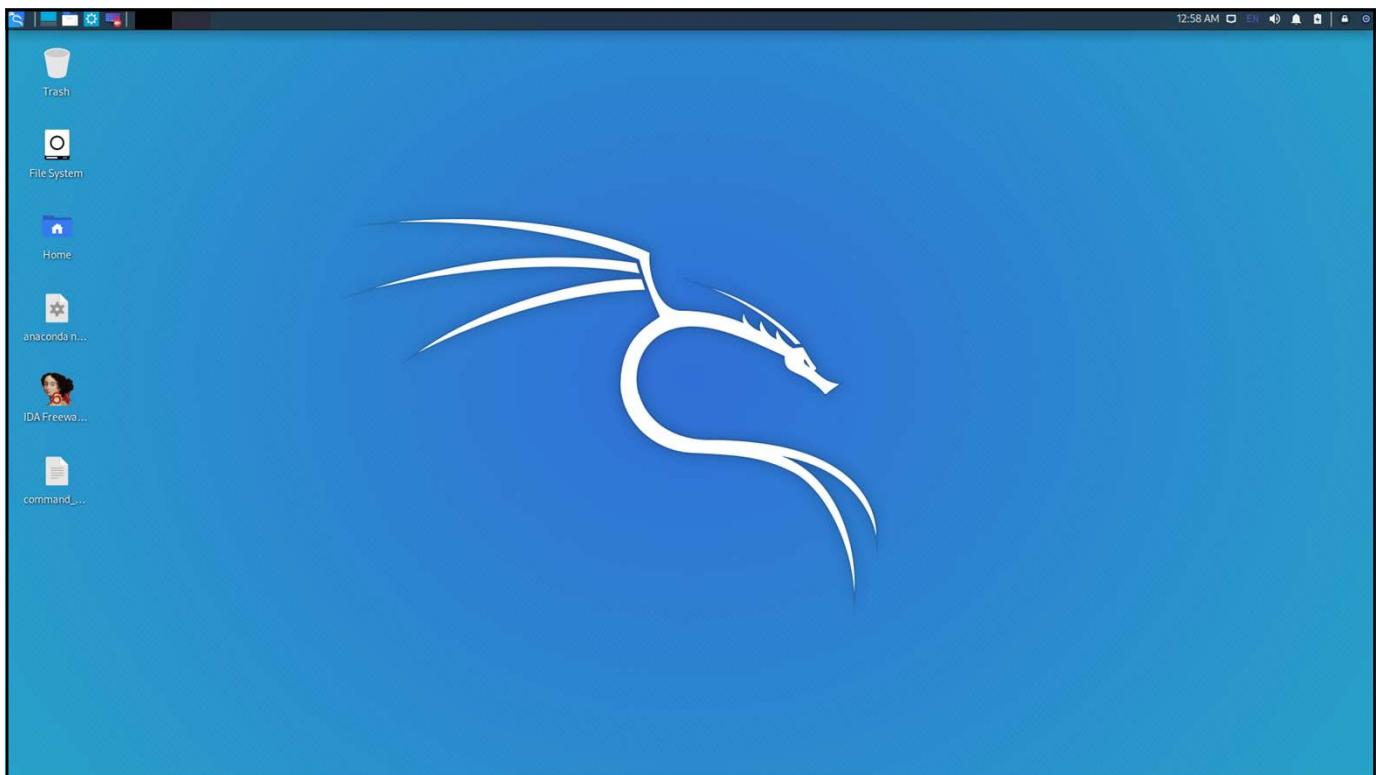
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# There are many different Linux Distributions (distros)



debian



gentoo linux™



archlinux



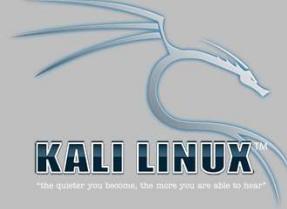
fedora



OPEN SUSE™

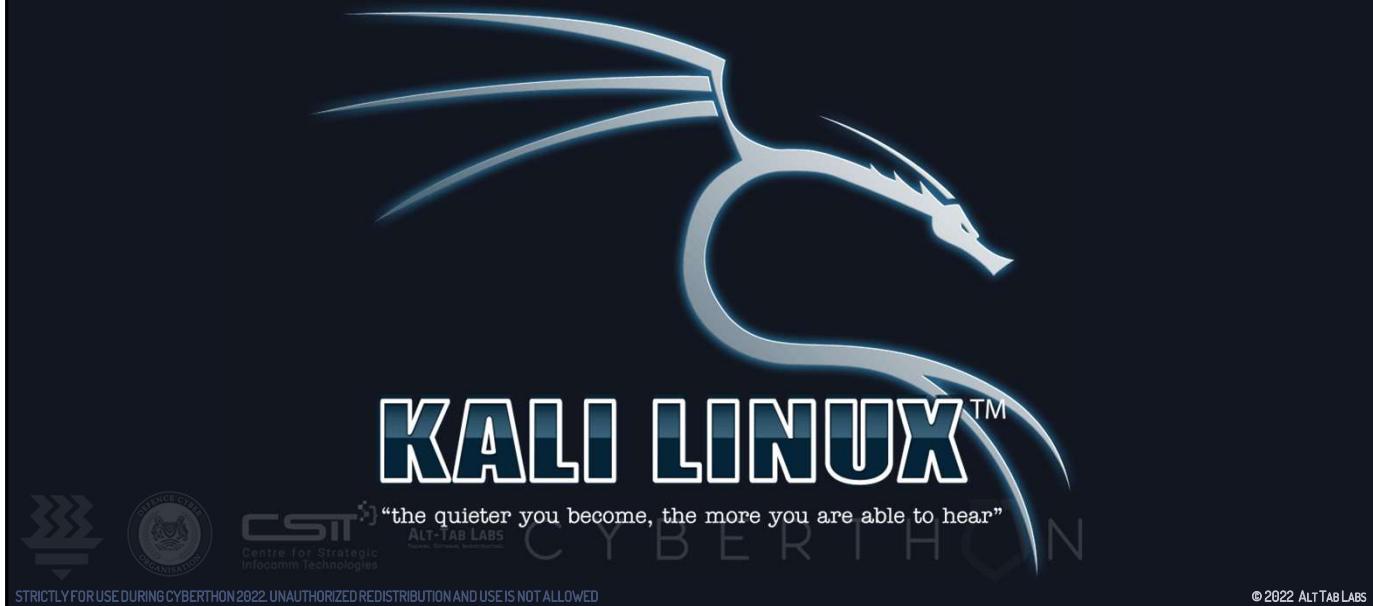
and many more...

## Some distros are based on others



KALI LINUX™  
"the quieter you become, the more you are able to hear"

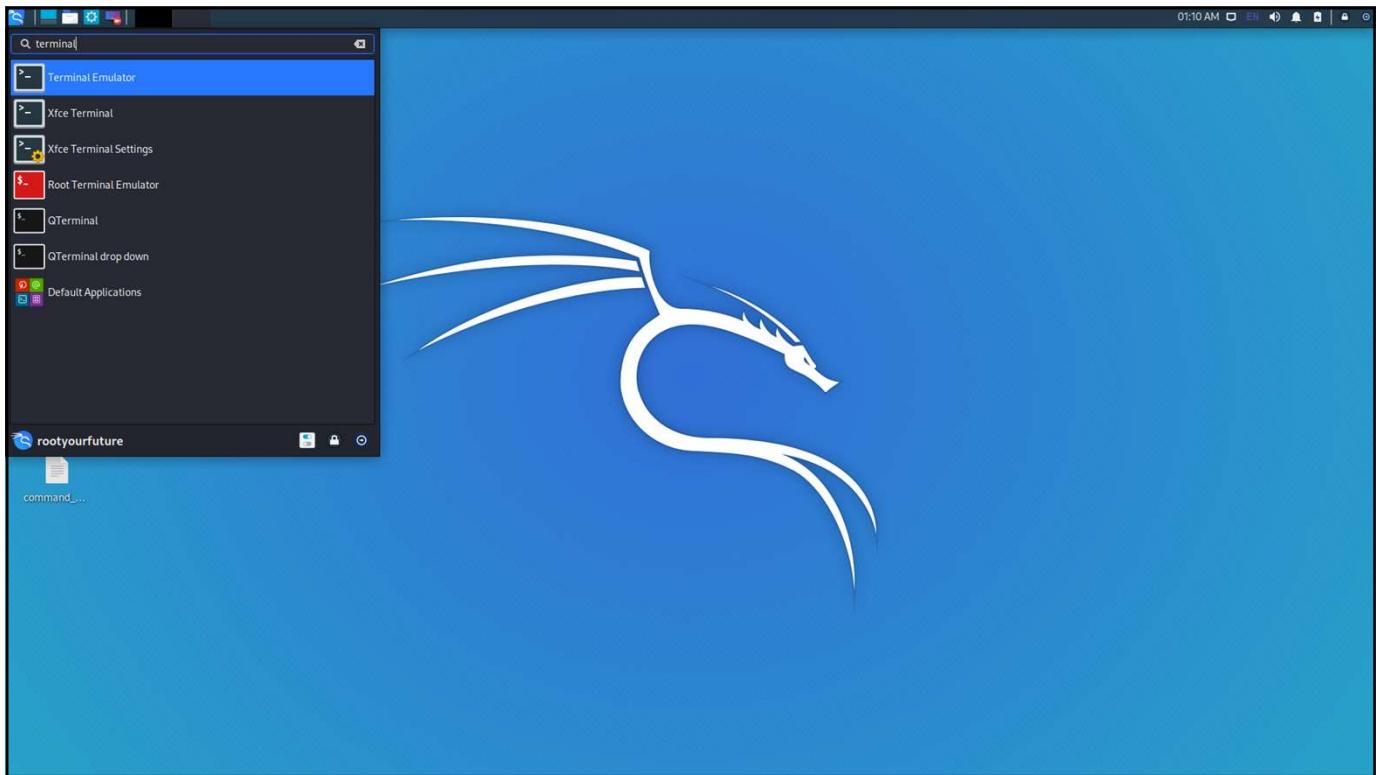
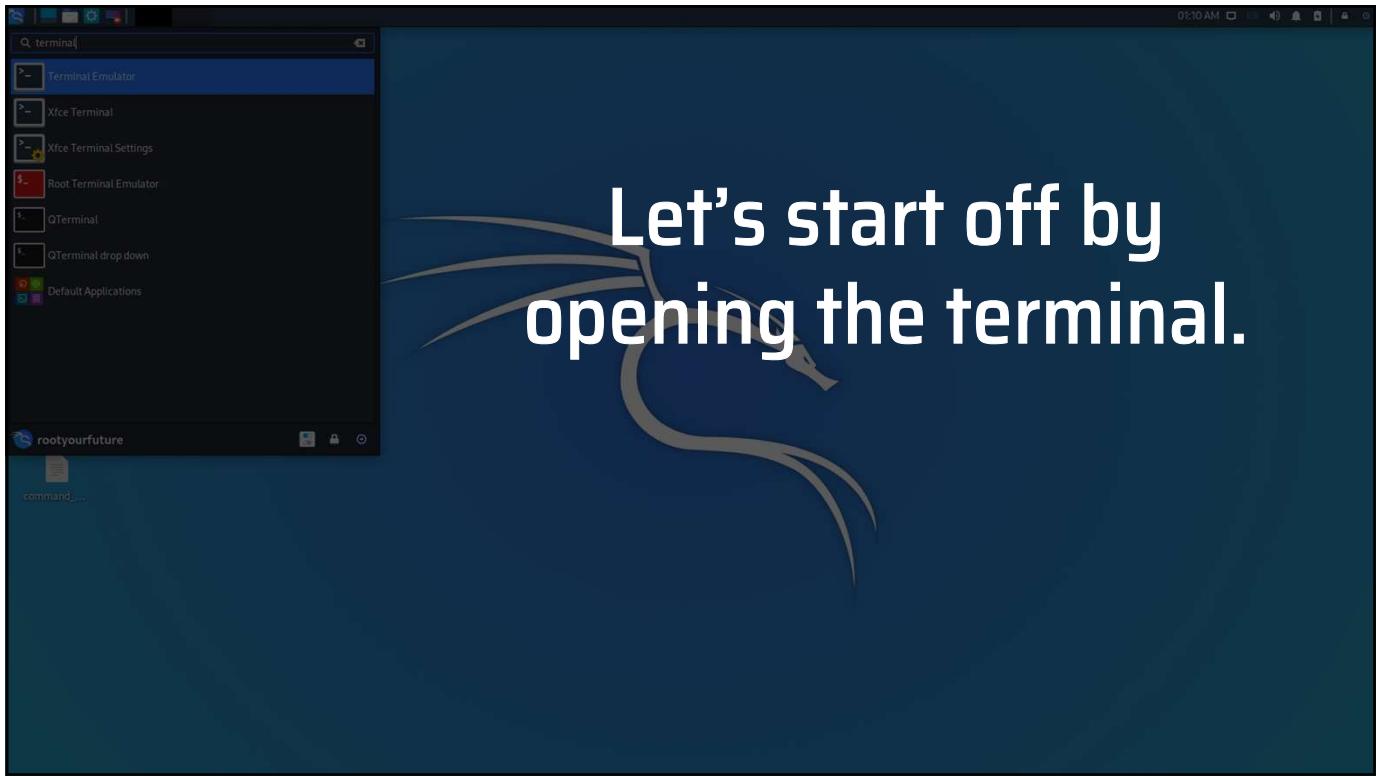
We will be using a Debian-based distro called



The image shows the Kali Linux desktop environment with a focus on the application menu. The menu is open, displaying a list of pre-installed security-related tools. The tools listed are:

- Favorites
- Recently Used
- All Applications
- Settings
- Usual Applications
- 01 - Information Gathering
- 02 - Vulnerability Analysis
- 03 - Web Application Analysis
- 04 - Database Assessment
- 05 - Password Attacks
- 06 - Wireless Attacks
- 07 - Reverse Engineering
- 08 - Exploitation Tools
- 09 - Sniffing & Spoofing
- 10 - Post Exploitation
- 11 - Forensics
- 12 - Reporting Tools
- rootyourfuture

On the right side of the screen, there is a large text overlay that reads: "It comes with a whole lot of security related tools pre-installed". The bottom of the screen features a watermark "BERTHON" and a copyright notice "© 2022 ALT TAB LABS".



# Welcome to the shell!

```
(base) rootyourfuture@kali:~$ █
```

hostname  
username

## Display current directory

```
(base) rootyourfuture@kali:~$ pwd
/home/kali
```

current directory

“~” is an alias for the user’s home directory /home/kali



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## Listing directory contents

```
(base) rootyourfuture@kali:~$ ls -l
total 996
drwxr-xr-x 26 rootyourfuture kali 4096 Mar 28 2021 anaconda3
drwxr-xr-x  2 rootyourfuture kali 4096 Mar 31 00:31 Desktop
drwxr-xr-x  3 rootyourfuture kali 4096 Mar 13 2020 Documents
drwxr-xr-x  2 rootyourfuture kali 4096 Mar 11 2020 Downloads
drwxr-xr-x 12 rootyourfuture kali 4096 Mar 22 20:56 idafree-7.7
-rw-r--r--  1 rootyourfuture kali 969429 Mar 27 2021 intel-openmp-2020.2-254.tar.bz2
drwxr-xr-x  2 rootyourfuture kali 4096 Mar 11 2020 Music
drwxr-xr-x 12 rootyourfuture kali 4096 Mar 22 21:45 nltk_data
drwxr-xr-x  2 rootyourfuture kali 4096 Mar 11 2020 Pictures
drwxr-xr-x  2 rootyourfuture kali 4096 Mar 11 2020 Public
drwxr-xr-x 10 rootyourfuture kali 4096 Mar 22 22:41 pwndbg
drwxr-xr-x  2 rootyourfuture kali 4096 Mar 11 2020 Templates
drwxr-xr-x  2 rootyourfuture kali 4096 Mar 11 2020 Videos
```



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```
(base) rootyourfuture@kali:~$ man ls

LS(1)                               User Commands                         LS(1)

NAME
ls - list directory contents

SYNOPSIS
ls [OPTION] ... [FILE] ...

DESCRIPTION
List information about the FILEs (the current directory by default). Sort entries alphabetically if none of -cf-tuvSUX nor --sort is specified.

Mandatory arguments to long options are mandatory for short options too.

-a, --all
do not ignore entries starting with .

-A, --almost-all
do not list implied . and ..

--author
with -l, print the author of each file

-b, --escape
print C-style escapes for nongraphic characters

--block-size=SIZE
with -l, scale sizes by SIZE when printing them; e.g., '--block-size=M'; see SIZE format below

Manual page ls(1) line 1 (press h for help or q to quit).

```

85

## Creating a Folder

```
(base) rootyourfuture@kali:~$ mkdir learn
(base) rootyourfuture@kali:~$ ls -l
total 1000
drwxr-xr-x 26 rootroot  kali  4096 Mar 28  2021 anaconda3
drwxr-xr-x  2 rootroot  kali  4096 Mar 31 00:31 Desktop
drwxr-xr-x  3 rootroot  kali  4096 Mar 13  2020 Documents
drwxr-xr-x  2 rootroot  kali  4096 Mar 11  2020 Downloads
drwxr-xr-x 12 rootroot  kali  4096 Mar 22 20:56 idafree-7.7
-rw-r--r--  1 rootroot  kali  969429 Mar 27  2021 intel-openmp-2020.2-254.tar.bz2
drwxr-xr-x  2 rootroot  kali  4096 Mar 31 12:01 learn
drwxr-xr-x  2 rootroot  kali  4096 Mar 11  2020 Music
drwxr-xr-x 12 rootroot  kali  4096 Mar 22 21:45 nltk_data
drwxr-xr-x  2 rootroot  kali  4096 Mar 11  2020 Pictures
drwxr-xr-x  2 rootroot  kali  4096 Mar 11  2020 Public
drwxr-xr-x 10 rootroot  kali  4096 Mar 22 22:41 pwndbg
drwxr-xr-x  2 rootroot  kali  4096 Mar 11  2020 Templates
drwxr-xr-x  2 rootroot  kali  4096 Mar 11  2020 Videos
```



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## Changing Directory (cd)

```
(base) rootyourfuture@kali:~$ cd learn
(base) rootyourfuture@kali:~/learn$ ls -l
total 0
```

## Creating an empty file (touch)

```
(base) rootyourfuture@kali:~/learn$ touch 1.txt
(base) rootyourfuture@kali:~/learn$ ls -l
total 0
-rw-r--r-- 1 rootyourfuture kali 0 Mar 31 12:03 1.txt
```



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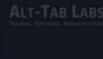
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## Write to a file using output redirection (>)

```
(base) rootyourfuture@kali:~/learn$ echo "Hello"
Hello
(base) rootyourfuture@kali:~/learn$ echo "Hello" > 2.txt
(base) rootyourfuture@kali:~/learn$ ls -l
total 4
-rw-r--r-- 1 rootyourfuture kali 0 Mar 31 12:03 1.txt
-rw-r--r-- 1 rootyourfuture kali 6 Mar 31 12:03 2.txt
```

## Display contents of a file (cat)

```
(base) rootyourfuture@kali:~/learn$ cat 2.txt
Hello
```



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## Redirecting with (>) overwrites

```
(base) rootyourfuture@kali:~/learn$ cat 2.txt
Hello
(base) rootyourfuture@kali:~/learn$ echo "first" > 2.txt
(base) rootyourfuture@kali:~/learn$ cat 2.txt
first
```

## Redirecting with (>>) appends

```
(base) rootyourfuture@kali:~/learn$ echo "second" >> 2.txt
(base) rootyourfuture@kali:~/learn$ cat 2.txt
first
second
```



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## Changing read permissions with chmod

```
(base) rootyourfuture@kali:~/learn$ chmod -r 2.txt
(base) rootyourfuture@kali:~/learn$ ls -l
total 8
-rw-r--r-- 1 rootyourfuture kali    0 Mar 31 12:03 1.txt
--w----- 1 rootyourfuture kali   13 Mar 31 12:06 2.txt
drwxr-xr-x 2 rootyourfuture kali 4096 Mar 31 12:07 3
(base) rootyourfuture@kali:~/learn$ cat 2.txt
cat: 2.txt: Permission denied
(base) rootyourfuture@kali:~/learn$ chmod +r 2.txt
(base) rootyourfuture@kali:~/learn$ ls -l
total 8
-rw-r--r-- 1 rootyourfuture kali    0 Mar 31 12:03 1.txt
-rw-r--r-- 1 rootyourfuture kali   13 Mar 31 12:06 2.txt
drwxr-xr-x 2 rootyourfuture kali 4096 Mar 31 12:07 3
(base) rootyourfuture@kali:~/learn$ cat 2.txt
first
second
```



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## Changing write permissions with chmod

```
(base) rootyourfuture@kali:~/learn$ ls -l
total 8
-rw-r--r-- 1 rootyourfuture kali 0 Mar 31 12:03 1.txt
-rw-r--r-- 1 rootyourfuture kali 13 Mar 31 12:06 2.txt
drwxr-xr-x 2 rootyourfuture kali 4096 Mar 31 12:07 3
(base) rootyourfuture@kali:~/learn$ echo "overwritten" > 1.txt
(base) rootyourfuture@kali:~/learn$ ls -l
total 12
-rw-r--r-- 1 rootyourfuture kali 12 Mar 31 12:11 1.txt
-rw-r--r-- 1 rootyourfuture kali 13 Mar 31 12:06 2.txt
drwxr-xr-x 2 rootyourfuture kali 4096 Mar 31 12:07 3
(base) rootyourfuture@kali:~/learn$ cat 1.txt
overwritten
(base) rootyourfuture@kali:~/learn$ chmod -w 1.txt
(base) rootyourfuture@kali:~/learn$ echo "overwritten again" > 1.txt
bash: 1.txt: Permission denied
(base) rootyourfuture@kali:~/learn$ ls -l
total 12
-r--r--r-- 1 rootyourfuture kali 12 Mar 31 12:11 1.txt
-rw-r--r-- 1 rootyourfuture kali 13 Mar 31 12:06 2.txt
drwxr-xr-x 2 rootyourfuture kali 4096 Mar 31 12:07 3
(base) rootyourfuture@kali:~/learn$ chmod +w 1.txt
(base) rootyourfuture@kali:~/learn$ echo "overwritten again" > 1.txt
(base) rootyourfuture@kali:~/learn$ cat 1.txt
overwritten again
```

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## What are “.” and “..” in folders?

```
(base) rootyourfuture@kali:~/learn$ cd 3
(base) rootyourfuture@kali:~/learn/3$ ls -la
total 8
drwxr-xr-x 2 rootyourfuture kali 4096 Mar 31 12:07 .
drwxr-xr-x 3 rootyourfuture kali 4096 Mar 31 12:07 ..
(base) rootyourfuture@kali:~/learn/3$ pwd
/home/kali/learn/3
(base) rootyourfuture@kali:~/learn/3$ cd .
(base) rootyourfuture@kali:~/learn/3$ pwd
/home/kali/learn/3
(base) rootyourfuture@kali:~/learn/3$ cd ..
(base) rootyourfuture@kali:~/learn$ pwd
/home/kali/learn
```

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## Moving a file with (mv)

```
(base) rootyourfuture@kali:~/learn$ ls -l
total 12
-rw-r--r-- 1 rootyourfuture kali 18 Mar 31 12:13 1.txt
-rw-r--r-- 1 rootyourfuture kali 13 Mar 31 12:06 2.txt
drwxr-xr-x 2 rootyourfuture kali 4096 Mar 31 12:07 3
(base) rootyourfuture@kali:~/learn$ mv 1.txt 3
(base) rootyourfuture@kali:~/learn$ cd 3
(base) rootyourfuture@kali:~/learn/3$ ls -l
total 4
-rw-r--r-- 1 rootyourfuture kali 18 Mar 31 12:13 1.txt
```



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## We can also use mv to rename files!

```
(base) rootyourfuture@kali:~/learn/3$ ls -l
total 4
-rw-r--r-- 1 rootyourfuture kali 18 Mar 31 12:13 1.txt
(base) rootyourfuture@kali:~/learn/3$ mv 1.txt new.txt
(base) rootyourfuture@kali:~/learn/3$ ls -l
total 4
-rw-r--r-- 1 rootyourfuture kali 18 Mar 31 12:13 new.txt
```



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## Creating a tar archive (think “zip” file)

```
(base) rootyourfuture@kali:~/learn$ ls
2.txt  3
(base) rootyourfuture@kali:~/learn$ ls 3
new.txt
(base) rootyourfuture@kali:~/learn$ tar czvf 3.tar.gz 3/
3/
3/new.txt
(base) rootyourfuture@kali:~/learn$ ls
2.txt  3  3.tar.gz
(base) rootyourfuture@kali:~/learn$ file 3.tar.gz
3.tar.gz: gzip compressed data, from Unix, original size modulo 2^32 10240
```



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## Deleting files and folders (rm)

```
(base) rootyourfuture@kali:~/learn$ ls
2.txt  3  3.tar.gz
(base) rootyourfuture@kali:~/learn$ rm 2.txt
(base) rootyourfuture@kali:~/learn$ ls
3  3.tar.gz
(base) rootyourfuture@kali:~/learn$ rm 3
rm: cannot remove '3': Is a directory
(base) rootyourfuture@kali:~/learn$ rm -r 3
(base) rootyourfuture@kali:~/learn$ ls
3.tar.gz
```



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## Extracting a tar archive (think “unzipping”)

```
(base) rootyourfuture@kali:~/learn$ ls
3.tar.gz
(base) rootyourfuture@kali:~/learn$ tar xvzf 3.tar.gz
3/
3/new.txt
(base) rootyourfuture@kali:~/learn$ ls
3 3.tar.gz
(base) rootyourfuture@kali:~/learn$ ls 3
new.txt
(base) rootyourfuture@kali:~/learn$ cat 3/new.txt
overwritten again
```



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## Attempting to install a package (and failing)

```
(base) rootyourfuture@kali:~/learn$ apt install toilet
E: Could not open lock file /var/lib/dpkg/lock-frontend - open (13: Permission denied)
E: Unable to acquire the dpkg frontend lock (/var/lib/dpkg/lock-frontend), are you root?
```

we lack the permissions to do so

## So how do we get permissions?



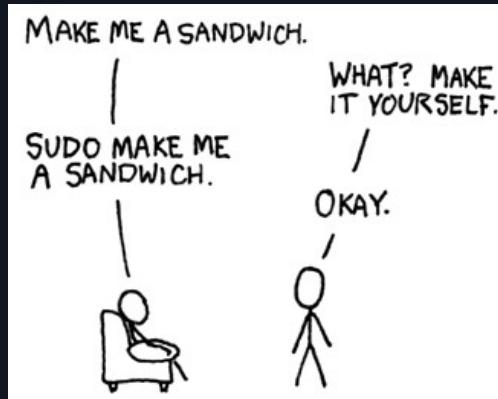
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## Simply say the magic word (sudo)



sudo is short for superuser do



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## Installing a package successfully

```
(base) root@yourfuture:kali:~/learn$ sudo apt install toilet
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  fastjar hddtemp jarwrapper libmpdec2 libpython3.7 libpython3.7-minimal libpython3.7-stdlib libusb-0.1-4 openjdk-8-jre
  python-pip-whl python3-edition python3-entries python3-jeepney python3-keyring python3-keyrings.alt
  python3-secretstorage
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  toilet
0 upgraded, 1 newly installed, 0 to remove and 520 not upgraded.
Need to get 22.6 kB of archives.
After this operation, 60.4 kB of additional disk space will be used.
Get:1 http://mirror.aktkn.sg/kali kali-rolling/main amd64 toilet amd64 0.3-1.4 [22.6 kB]
Fetched 22.6 kB in 1s (30.5 kB/s)
Selecting previously unselected package toilet.
(Reading database ... 317722 files and directories currently installed.)
Preparing to unpack .../toilet_0.3-1.4_amd64.deb ...
Unpacking toilet (0.3-1.4) ...
Setting up toilet (0.3-1.4) ...
Processing triggers for kali-menu (2021.4.2) ...
Processing triggers for man-db (2.9.1-1) ...
```



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## Playing with our new program

```
(base) rootyourfuture@kali:~/learn$ which toilet
/usr/bin/toilet
(base) rootyourfuture@kali:~/learn$ toilet HELLO

m      m  mmmmmm m      m      mmmmm
#      #  #        #      #      m"    "m
#mmmm# #mmmm m #      #      #      #
#      #  #        #      #      #      #
#      #  #mmmm m #mmmm m #mmmm m #mm#
```



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## Environment variables

```
(base) rootyourfuture@kali:~/learn$ env
SHELL=/bin/bash
SESSION_MANAGER=local/kali:@/tmp/.ICE-unix/1003,unix/kali:/tmp/.ICE-unix/1003
WINDOWID=0
QT_ACCESSIBILITY=1
COLORTERM=truecolor
XDG_CONFIG_DIRS=/etc/xdg
```

## Printing environment variables

```
(base) rootyourfuture@kali:~$ echo $USER
rootyourfuture
(base) rootyourfuture@kali:~$ echo $PWD
/home/kali
```



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## The “PATH” environment variable

```
(base) rootyourfuture@kali:~$ echo $PATH
/home/kali/.local/bin:/home/kali/anaconda3/bin:/home/kali/anaconda3/condabin:/usr/local/bin:/
usr/bin:/bin:/usr/local/games:/usr/games
(base) rootyourfuture@kali:~$ which ls
/usr/bin/ls
(base) rootyourfuture@kali:~$ which whoami
/usr/bin/whoami
(base) rootyourfuture@kali:~$ VAR="123"
(base) rootyourfuture@kali:~$ echo $VAR
123
(base) rootyourfuture@kali:~$ PATH=""
(base) rootyourfuture@kali:~$ echo $PATH

(base) rootyourfuture@kali:~$ ls
bash: ls: No such file or directory
(base) rootyourfuture@kali:~$ whoami
bash: whoami: No such file or directory
```

If it's not set correctly, we can't access our commands (programs)



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## Printing system information

```
(base) rootyourfuture@kali:~/learn$ whoami
rootyourfuture
(base) rootyourfuture@kali:~/learn$ uname -a
Linux kali 5.4.0-kali4-amd64 #1 SMP Debian 5.4.19-1kali1 (2020-02-17) x86_64 GNU/Linux
(base) rootyourfuture@kali:~/learn$ ip -c a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 00:0c:29:a1:60:1d brd ff:ff:ff:ff:ff:ff
    inet 192.168.19.129/24 brd 192.168.19.255 scope global dynamic noprefixroute eth0
        valid_lft 1135sec preferred_lft 1135sec
    inet6 fe80::20c:29ff:fea1:601d/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
```



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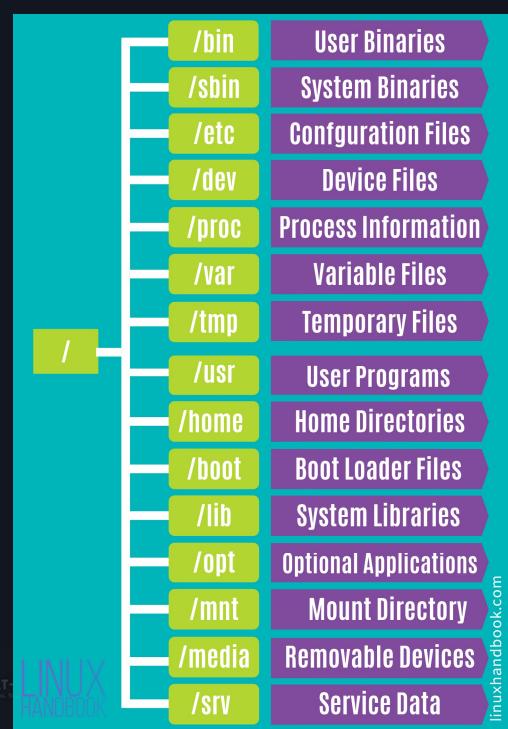
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# Peeking at the root (/) directory

```
(base) root@yourfuture:kali:~$ cd /
(base) root@yourfuture:kali:/$ ls -l
total 100
lrwxrwxrwx 1 root root 7 Mar 11 2020 bin → usr/bin
drwxr-xr-x 3 root root 4096 Mar 22 21:06 boot
drwxr-xr-x 18 root root 3220 Mar 31 01:20 dev
drwxr-xr-x 174 root root 12288 Mar 31 00:26 etc
drwxr-xr-x 3 root root 4096 Mar 11 2020 home
lrwxrwxrwx 1 root root 33 Mar 11 2020 initrd.img → boot/initrd.img-5.4.0-kali4-amd64
lrwxrwxrwx 1 root root 33 Mar 11 2020 initrd.img.old → boot/initrd.img-5.4.0-kali2-amd64
lrwxrwxrwx 1 root root 7 Mar 11 2020 lib → usr/lib
lrwxrwxrwx 1 root root 9 Mar 11 2020 lib64 → usr/lib64
lrwxrwxrwx 1 root root 10 Mar 11 2020 libx32 → usr/libx32
drwx—— 2 root root 16384 Mar 11 2020 lost+found
drwxr-xr-x 3 root root 4096 Mar 11 2020 media
drwxr-xr-x 3 root root 4096 Mar 11 2020 mnt
drwxr-xr-x 4 root root 4096 Mar 13 2020 opt
dr-xr-xr-x 258 root root 0 Mar 31 00:26 proc
drwx—— 19 root root 4096 Mar 22 21:10 root
drwxr-xr-x 35 root root 860 Mar 31 07:32 run
lrwxrwxrwx 1 root root 8 Mar 11 2020 sbin → usr/sbin
drwxr-xr-x 3 root root 4096 Mar 11 2020 srv
dr-xr-xr-x 13 root root 0 Mar 31 00:26 sys
drwxrwxrwt 17 root root 36864 Mar 31 13:43 tmp
drwxr-xr-x 13 root root 4096 Mar 27 2021 usr
drwxr-xr-x 12 root root 4096 Mar 11 2020 var
lrwxrwxrwx 1 root root 30 Mar 11 2020 vmlinuz → boot/vmlinuz-5.4.0-kali4-amd64
lrwxrwxrwx 1 root root 30 Mar 11 2020 vmlinuz.old → boot/vmlinuz-5.4.0-kali2-amd64
```

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# Let's take a look at some of the tools we've installed



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# Q & A



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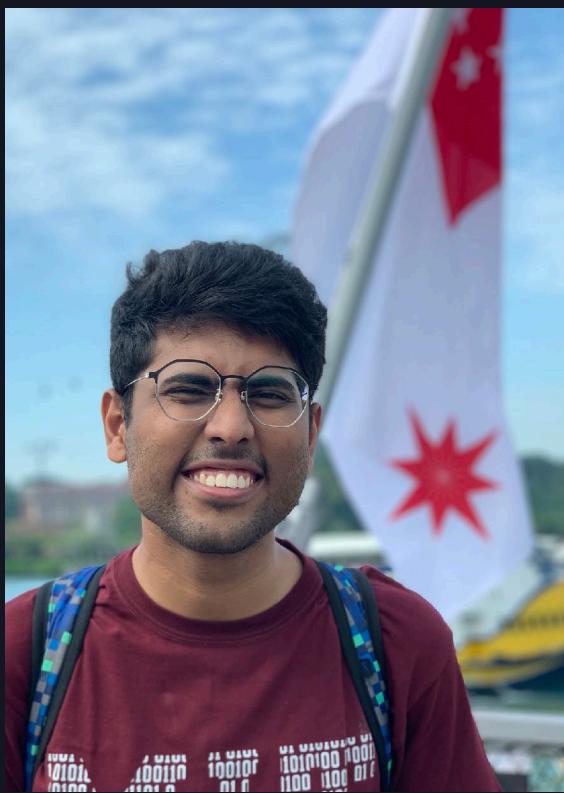
# C Y B E R T H O N



2022

1

whoami



@ragulbalaji

I play as:  
T0X1C V4P0R  
& CTF.SG

CTF-ing since 2015

Also do robotics  
and ML competitions



ALT-TAB LABS

Training Solutions, Infrastructure

C Y B E R T H O N

2

# Equipment Check

- ✓ A Computer
- ✓ Internet Connection
- ✓ Web Browser
- ✓ Google Account
- ✓ Linux VM\*
- ✓ Anaconda Navigator



3

## Tools you may like



Recommended for  
All Skill Levels



4



5

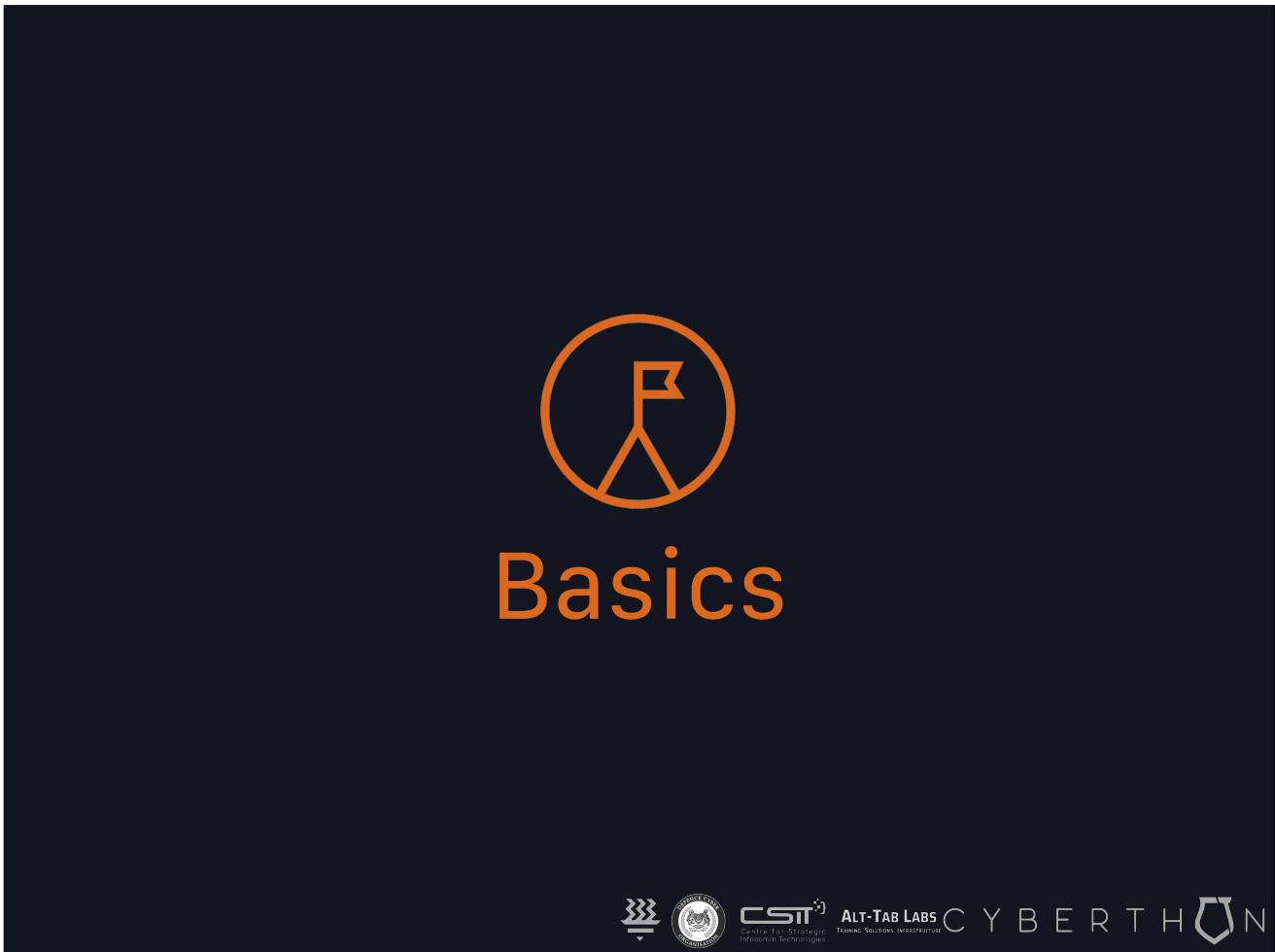
The screenshot shows the Anaconda website at <https://www.anaconda.com/products/individual>. The page title is 'Anaconda Installers'. It features three sections for Windows, macOS, and Linux, each with graphical and command-line installer links. A note at the bottom states: 'The archive has older versions of Anaconda Individual Edition installers. The'.

[\( You have to scroll down a little bit \)](https://www.anaconda.com/products/individual)

At the bottom of the page, there are several logos: 'CENTRE FOR STRATEGIC INFORMATION TECHNOLOGIES', 'C S I T', 'ALT-TAB LABS TRAINING SOLUTIONS, INFRASTRUCTURE', and 'CYBERTHON'.



7



8

# Learning Objectives

- 🎤 Python3 syntax
- 📁 Variables & File IO
- 🎛️ Functions & Control Flow
- 📚 Importing libraries
- 🔧 pip Package Manager
- ✍️ Gedit as editor
- 🏃 Run code in a shell
- ✍️ Jupyter Notebooks!



9

## 🐍 Activity Time!

### Files



py3.package.tar.xz  
xz compressed archive - 8 KB

### Task

Time to pick up a relatively easy but still powerful programming language!

Download this python3 notebook and lets learn some basic python



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# See you next week!



C Y B E R T H O N