

# Ubuntu

# and basic Linux command part 1



# ubuntu

*Adapted and modified slides from Nguyen Quang Khai*

Nov 2, 2025

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HuyHa

# Contents

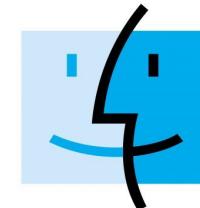
1. Introduction: Ubuntu, file systems, some terms.
2. Install tools, packages, apps on Ubuntu
3. Some alternative apps for Linux user: wps office, obs studio, chrome, discord...
4. Use Chat GPT in helping and learning code

# Contents

1. Introduction: Ubuntu, file systems, some terms.
2. Some basic Linux commands work with files and directories.
  - Change working directory.
  - List content.
  - Create.
  - Remove.
  - Copy.
  - Move.

# 1. Introduction

## Some popular **Operating Systems**



Mac<sup>TM</sup> OS



## Distributions of linux (OS)



**ubuntu**

Ubuntu OS has the most users



**Red Hat**



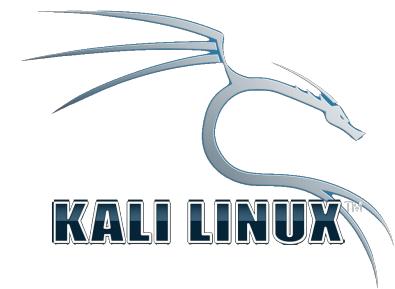
**archlinux™**



**fedora™**



**CentOS**

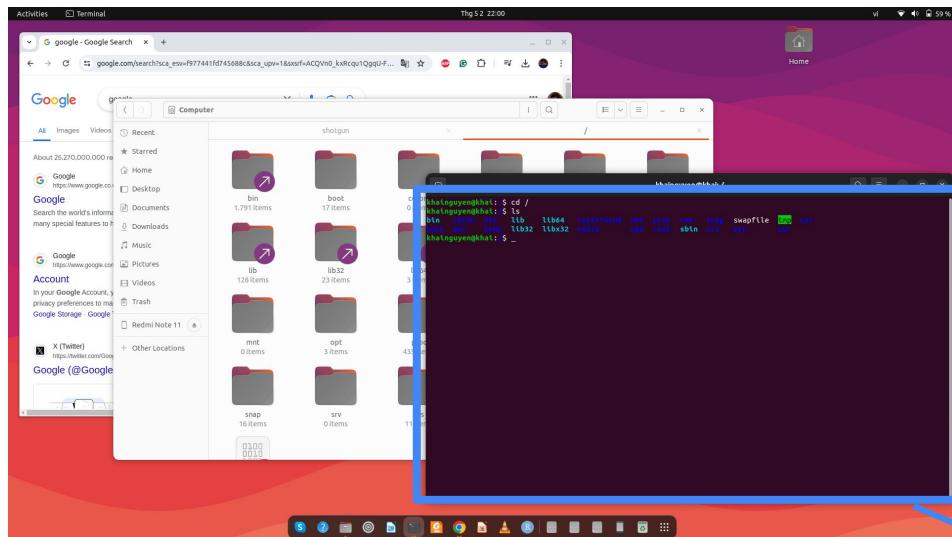


**KALI LINUX™**

# **Why linux in bioinformatics?**

1. Linux is an open-source operating system.
  - Allows users to customize their systems according to their specific needs.
  - It is free.
1. Linux is the most commonly used operating system in High-Performance Computing (HPC). HPC unlocks primary challenges in bioinformatics:
  - Data processing limits.
  - Slow analysis times.
  - Impact on research progress.
1. Most bioinformatics tools and applications are designed to be run on Linux-based operating systems.

# interact with the software/package



graphic user interface - GUI  
(mouse + keyboard)

```
Ubuntu 22.04 LTS savvyserver tty1

Password:
Welcome to Ubuntu 22.04 LTS (GNU/Linux 5.15.0-27-generic x86_64)

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

 System information as of Mon May  2 12:39:46 PM UTC 2022

 System load: 0.25195125  Processes:           116
 Usage of /: 4.3% of 153.42GB  Users logged in:      0
 Memory usage: 2%               IPv4 address for enp0s3: 10.0.2.15
 Swap usage:  0%

 4 updates can be applied immediately.
 To see these additional updates run: apt list --upgradable

 The programs included with the Ubuntu system are free software;
 the exact distribution terms for each program are described in the
 individual files in /usr/share/doc/<copyright>.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

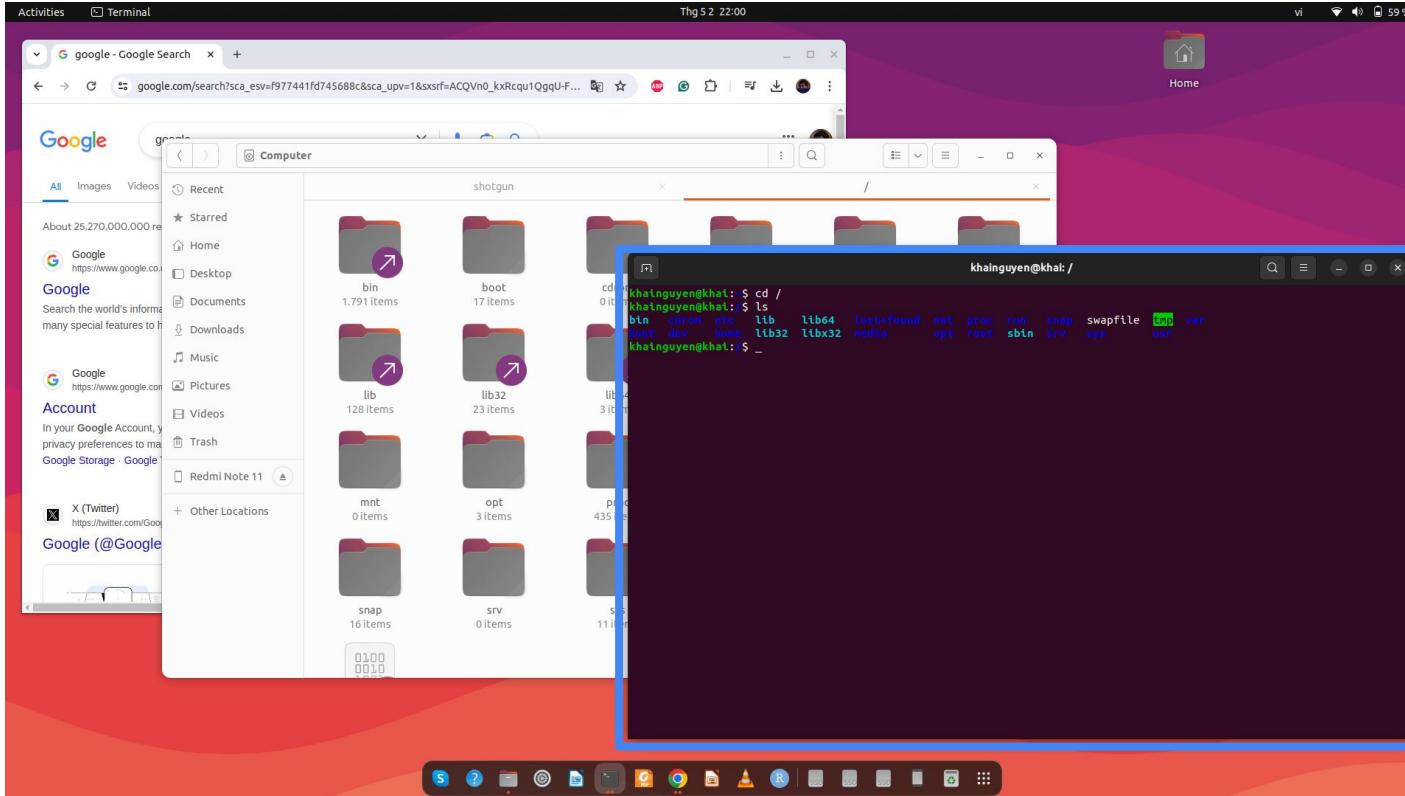
savvynik@savvyserver:"$ _
```

also called

command line interface - CLI  
(keyboard)

Ubuntu desktop: GUI + CLI  
Ubuntu server: only CLI

# Terminal



Ubuntu desktop

Terminal window  
is where you  
type commands

Open:  
Ctrl + Alt + T keys  
on the keyboard

HelloWorld.sh

Bash Hello World!

1 echo "Hello, World!"

+ AI NEW

BASH ▾

RUN ►

⋮

STDIN

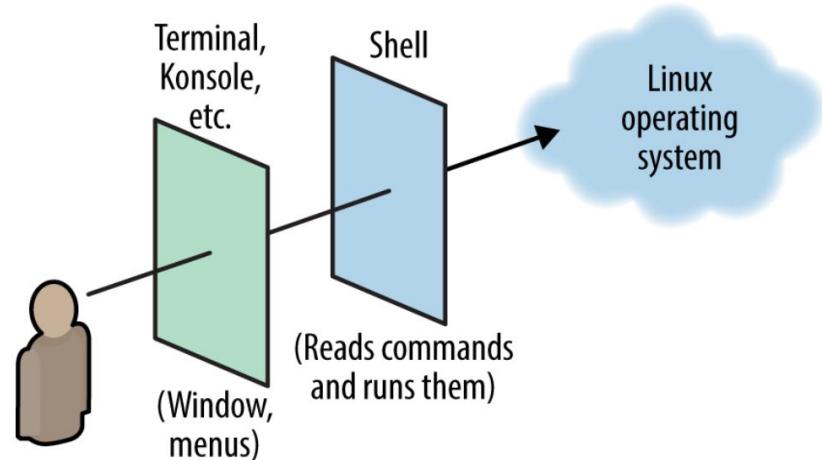
Input for the program ( Optional )

Output:

Click on RUN button to see the output

# What is Shell?

- A shell is a special user program that provides an interface for the user to use operating system services.
- Terminal is where we interact with the shell through commands.
- Several types of Shell:
  - + Bourne Shell (sh)
  - + C Shell (csh)
  - + **Bourne Again Shell (**bash**): most popular**
  - + Z Shell (zsh)



*(Daniel J. Barrett, Linux pocket guide)*

# Some ways to get the Terminal

easy to  
install

1.

macOS: How to open Terminal:

<https://support.apple.com/en-vn/guide/terminal/apd5265185d-f365-44cb-8b09-71a064a42125/mac>

Windows 10/11: Install Ubuntu on Windows Subsystem for Linux (WSL): Recommended for beginners

<https://canonical-ubuntu-wsl.readthedocs-hosted.com/en/latest/guides/install-ubuntu-wsl2/>

2. Install Ubuntu on virtual machine (VM):

Windows: Install Ubuntu on VirtualBox: <https://www.youtube.com/watch?v=ngJQPt-xEeo>

macOS: Install Ubuntu on VirtualBox: [https://www.youtube.com/watch?v=b\\_tOiaICsXE](https://www.youtube.com/watch?v=b_tOiaICsXE)

3. Install Ubuntu on physical computer: Best for long term use

Delete Windows & install Ubuntu: [https://www.youtube.com/watch?v=oZcvqfWf\\_ps&t=100s](https://www.youtube.com/watch?v=oZcvqfWf_ps&t=100s)

If you don't want to delete windows:

or a) Dual boot: Ubuntu and Windows on the same hard drive:

<https://www.youtube.com/watch?v=GXXtXBPKecQ&t=229s>

or b) Dual boot: Ubuntu and Windows on the separate hard drive:

(Ubuntu on hard drive 1, Windows on hard drive 2)

<https://www.youtube.com/watch?v=KX85vZ3ANVk>

Recommended method b) if you want dual-boot.

**Warning: backup your data before install!!**

More reference: [https://www.youtube.com/watch?v=oZcvqfWf\\_ps&t=100s](https://www.youtube.com/watch?v=oZcvqfWf_ps&t=100s)

a bit  
difficult  
to install



# **Step by step in install dual boot ubuntu**

- 1 Download Ubuntu
- 2 Flashing the Image to a USB
- 3 Shrinking Storage Space for Ubuntu
- 4 Booting into USB using BIOS
- 5 Changing Boot Order in BIOS
- 6 Starting the Ubuntu Installation
- 7 Customizing Partition Setup
- 8 Continuing Setup Process
- 9 Selecting Between Windows & Ubuntu
- 10 Checking out Ubuntu
- 11 Exploring the Desktop
- 12 Congrats on Ubuntu & Win Setup

## Ubuntu 24.04.3 LTS



The latest LTS version of Ubuntu, for desktop PCs and laptops. LTS stands for long-term support — which means five years of free security and maintenance updates, extended up to 12 years with [Ubuntu Pro](#).

[Intel or AMD 64-bit architecture](#)

[Download](#)

5.9GB

For other versions of Ubuntu Desktop including torrents, the network installer, a list of local mirrors and past releases [check out our alternative downloads](#).

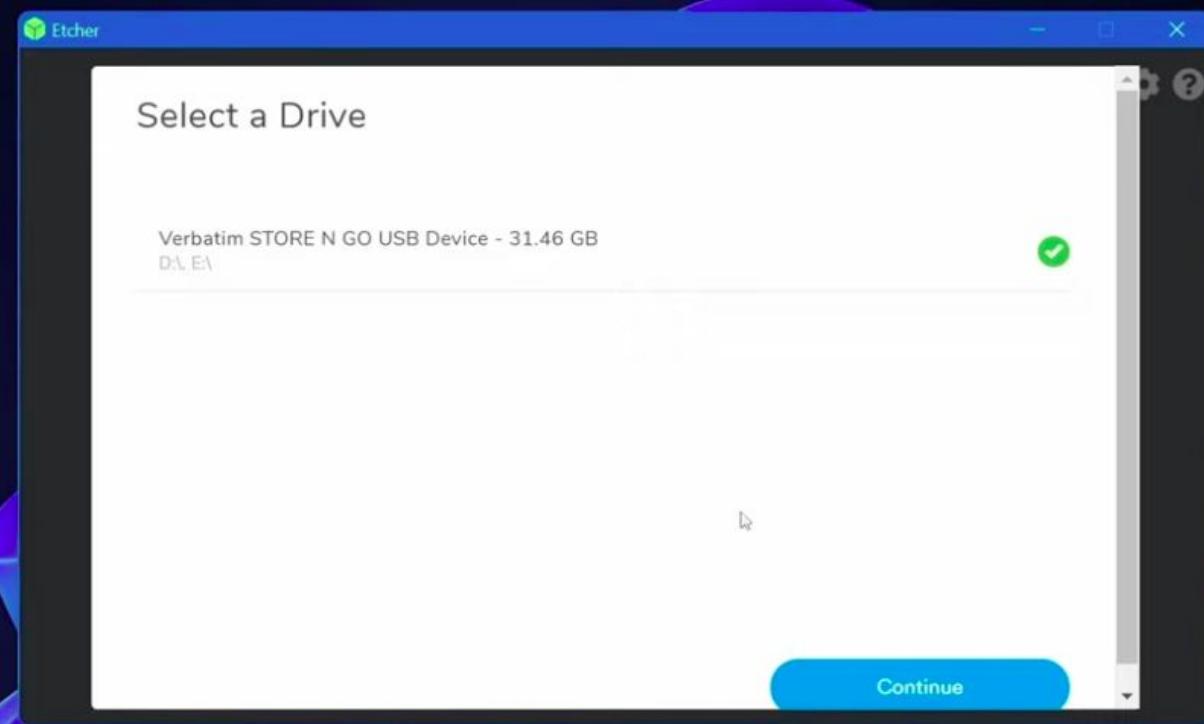
[What's new](#)

[System requirements](#)

[How to install](#)

- ✓ New Desktop installer with support for autoinstall
- ✓ New App Center and Firmware Updater applications
- ✓ GNOME 46 with support for quarter screen tiling
- ✓ Advanced Active Directory Group Policy Object support for Ubuntu Pro users
- ✓ Experimental support for TPM-backed Full Disc Encryption and ZFS encryption

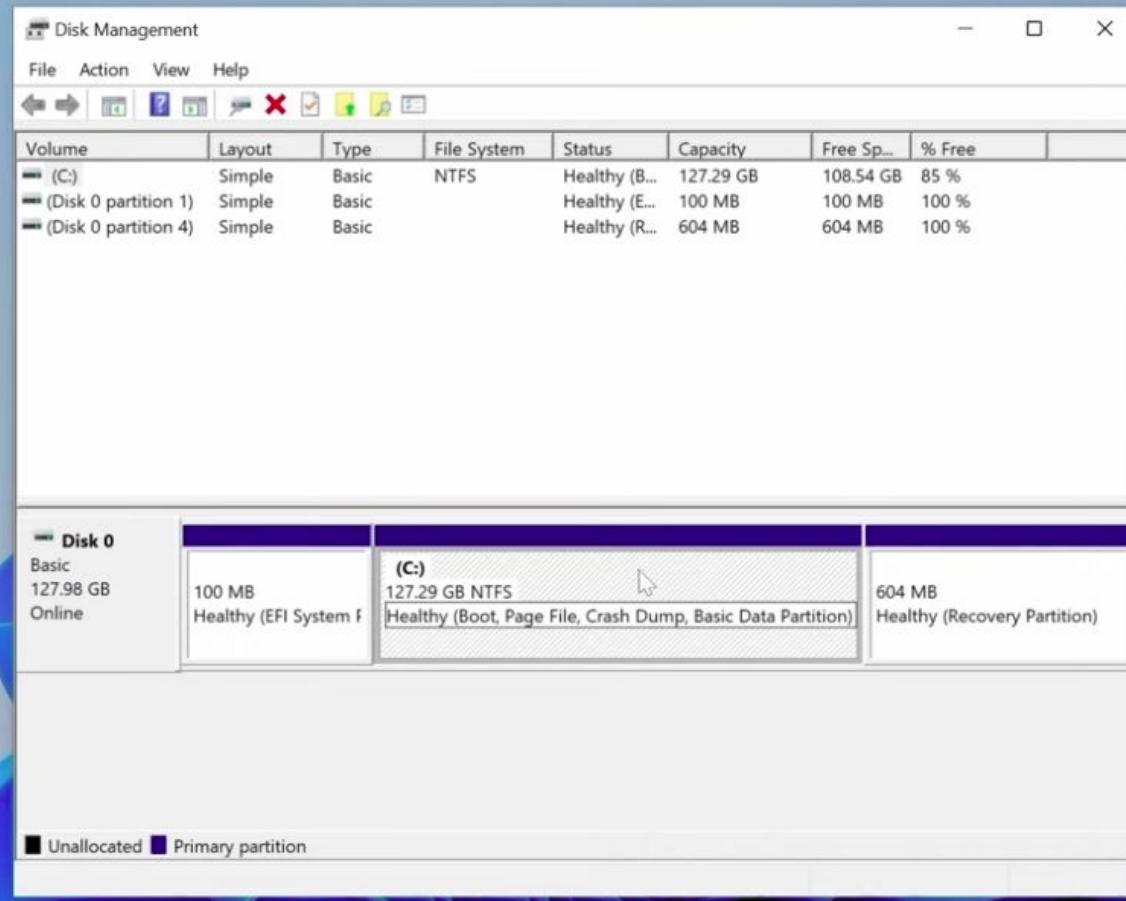
[Deep dive](#) › [Release notes](#) ›



View products X

PLAY  
SUBSCRIBE

### 3 Shrinking Storage Space for Ubuntu



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#### 4 Booting into USB using BIOS

#### UEFI BIOS Utility - Advanced Mode



01/22/2022 16:08

English

MyFavorite(F3)

Qfan Control(F6)

Search(F9)

AURA ON/OFF(F4)

#### 5 Changing Boot Order in BIOS

My Favorites

Main

Ai Tweaker

Advanced

Monitor

Boot

Tool

Exit

▶ Boot Configuration

▶ CSM (Compatibility Support Module)

▶ Secure Boot

#### Boot Option Priorities

Boot Option #1

Windows Boot Manager (M.2\_1):

Boot Option #2

GRUB (M.2\_2: PCIe SSD) (512.1C)

Boot Option #3

Arch (SATA6G\_2: SanDisk SD8SB)

Boot Option #4

UEFI OS (SATA6G\_2: SanDisk SDI)

Boot Option #5

UEFI: VerbatimSTORE N GO 110i

Boot Option #6

UEFI: VerbatimSTORE N GO 110i

Boot Option #7

ubuntu (M.2\_1: PCIe SSD) (1024.)

Sets the system boot order

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Hardware Monitor

#### CPU

Frequency	Temperature
3600 MHz	52°C

BCLK Freq	Core Voltage
100.0 MHz	1.464 V

#### Ratio

36x

#### Memory

Frequency	Capacity
3200 MHz	32768 MB

#### Voltage

+12V	+5V
12.076 V	5.060 V

+3.3V	
3.376 V	

Last Modified

EzMode(F7) ↗

Hot Keys ↗

Search on YouTube ↗



6:13 / 19:03

Changing Boot Order in BIOS &gt;

Version 2.20.1271. Copyright (C) 2019 American Megatrends, Inc.

17

Main Advanced Security Boot Exit

Intel(R) SpeedStep(TM) [Enabled]  
Virtualization [Enabled]  
USB Emulation [Enabled]  
USB Powershare [Enabled]  
USB Wake Support [Enabled]  
SATA Operation [AHCI]  
Adapter Warnings [Disabled]  
Function Key Behavior [Multimedia Key]  
Battery Health This battery is performing normally

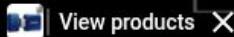
Intel(R) Smart Connect Technology [Enabled]

► Miscellaneous Devices

Battery Charge Configuration [Adaptive]

Advanced Battery Charge Mode [Disabled]

- Try or Install Ubuntu
- Ubuntu (safe graphics)
- OEM install (for manufacturers)
- Boot from next volume
- \*UEFI Firmware Settings



Use the **▲** and **▼** keys to select which entry is highlighted.

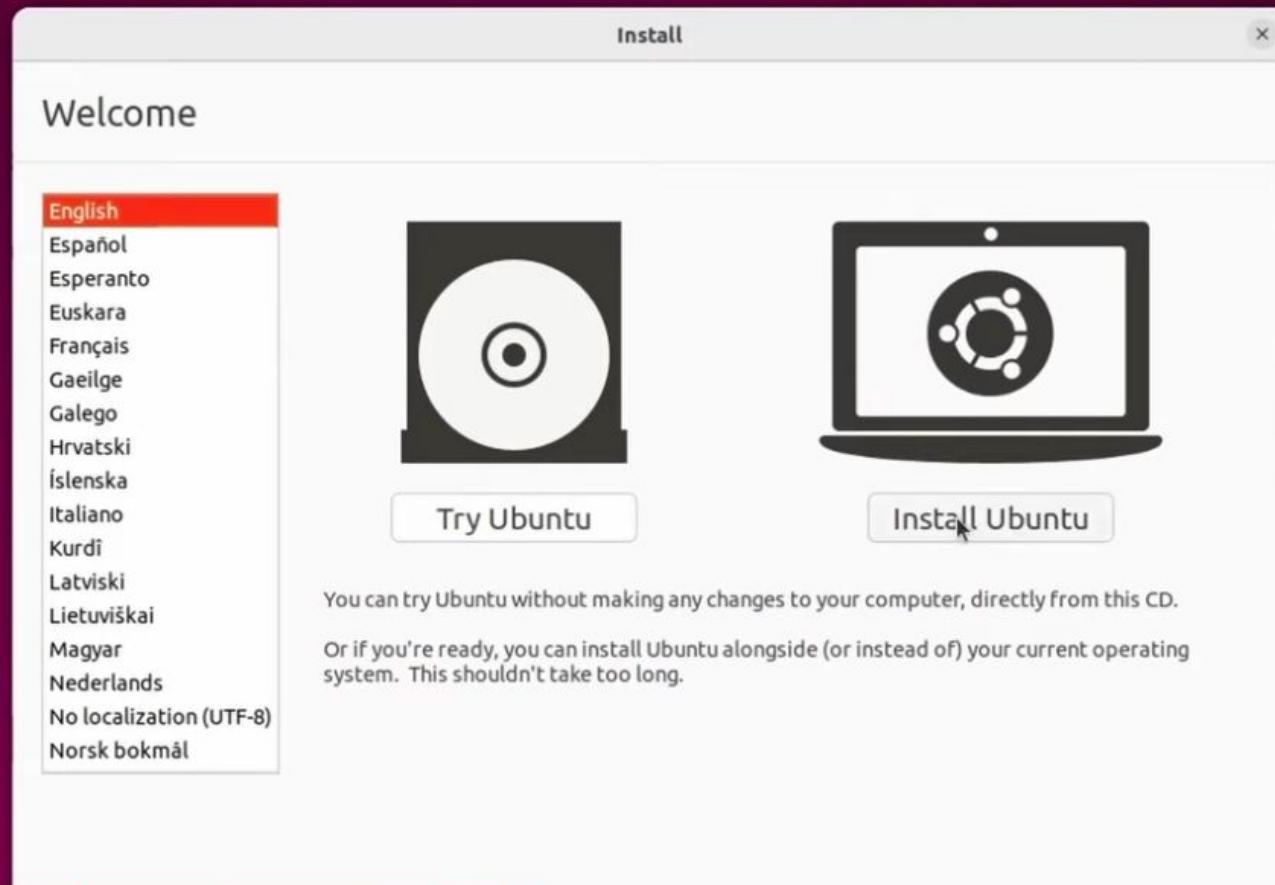
Press enter to boot the selected OS, **e** to edit the commands before booting or **c** for a command-line.



7:29 / 19:03

Starting the Ubuntu Installation &gt;





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PLAY  
SUBSCRIBE

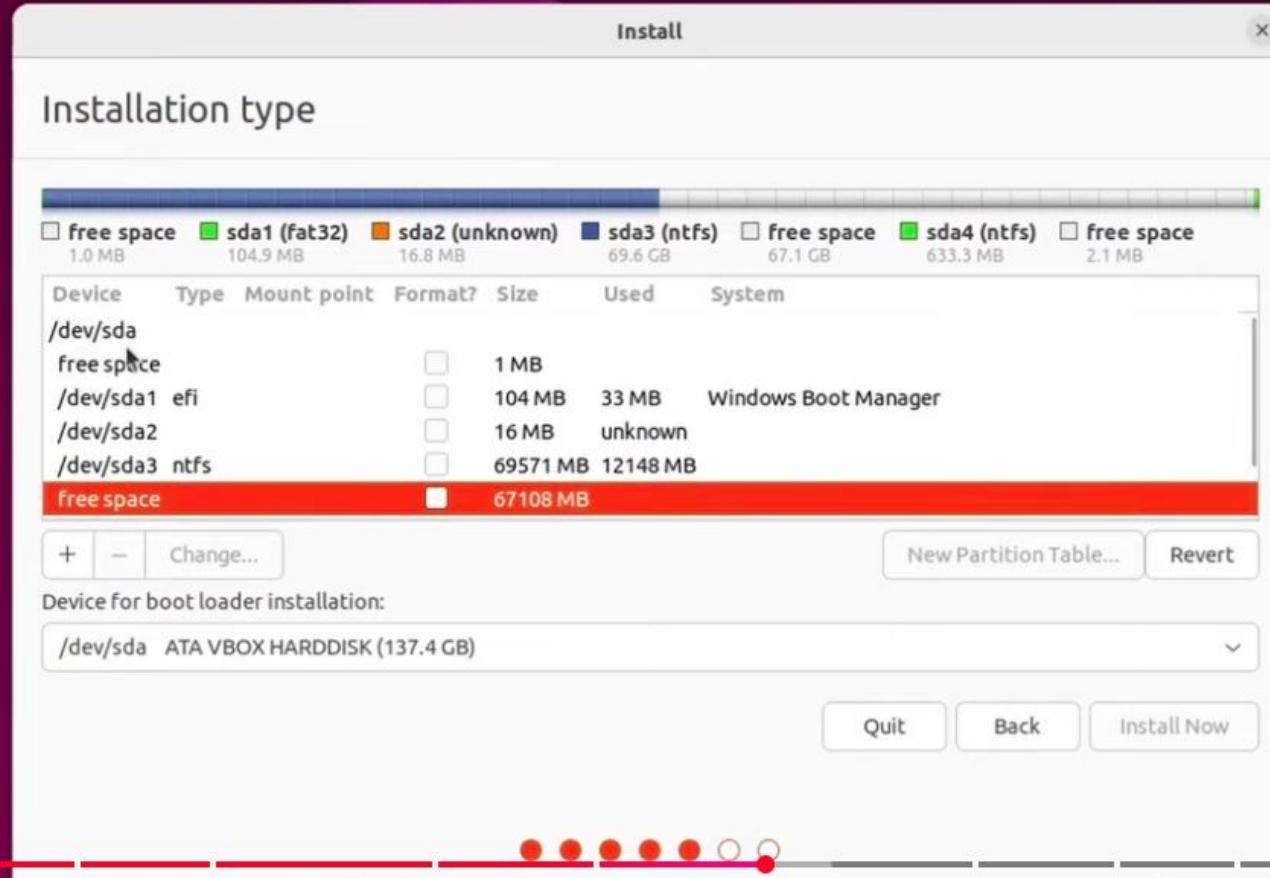


8:12 / 19:03

Starting the Ubuntu Installation &gt;



20



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10:42 / 19:03

Customizing Partition Setup >



21

Install X

## Who are you?

Your name:  ✓

Your computer's name:  ✓  
The name it uses when it talks to other computers.

Pick a username:  ✓

Choose a password:  ⓘ

Confirm your password:

Log in automatically  
 Require my password to log in  
 Use Active Directory

You'll enter domain and other details in the next step.

Back Continue

 View products X

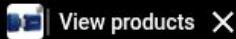
13:01 / 19:03

Continuing Setup Process &gt;





```
Ubuntu
Advanced options for Ubuntu
*Windows Boot Manager (on /dev/sda1)
UEFI Firmware Settings
```



Use the ↑ and ↓ keys to select which entry is highlighted.  
Press enter to boot the selected OS, 'e' to edit the commands before booting or 'c' for a command-line. ESC to return previous menu.



14:31 / 19:03

Selecting Between Windows &amp; Ubuntu &gt;





## Connect Your Online Accounts

Connect your accounts to easily access your online calendar, documents, photos and more.



Ubuntu Single Sign-On



Google



Nextcloud



Microsoft

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Accounts can be added and removed at any time from the Settings application.



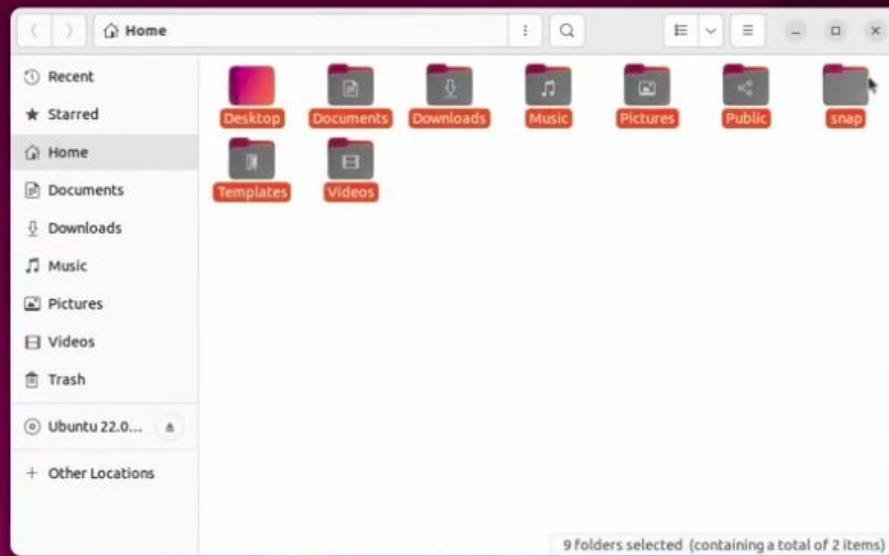
15:50 / 19:03

Checking out Ubuntu >



## 11 Exploring the Desktop

Apr 24 16:07



Home



View products X



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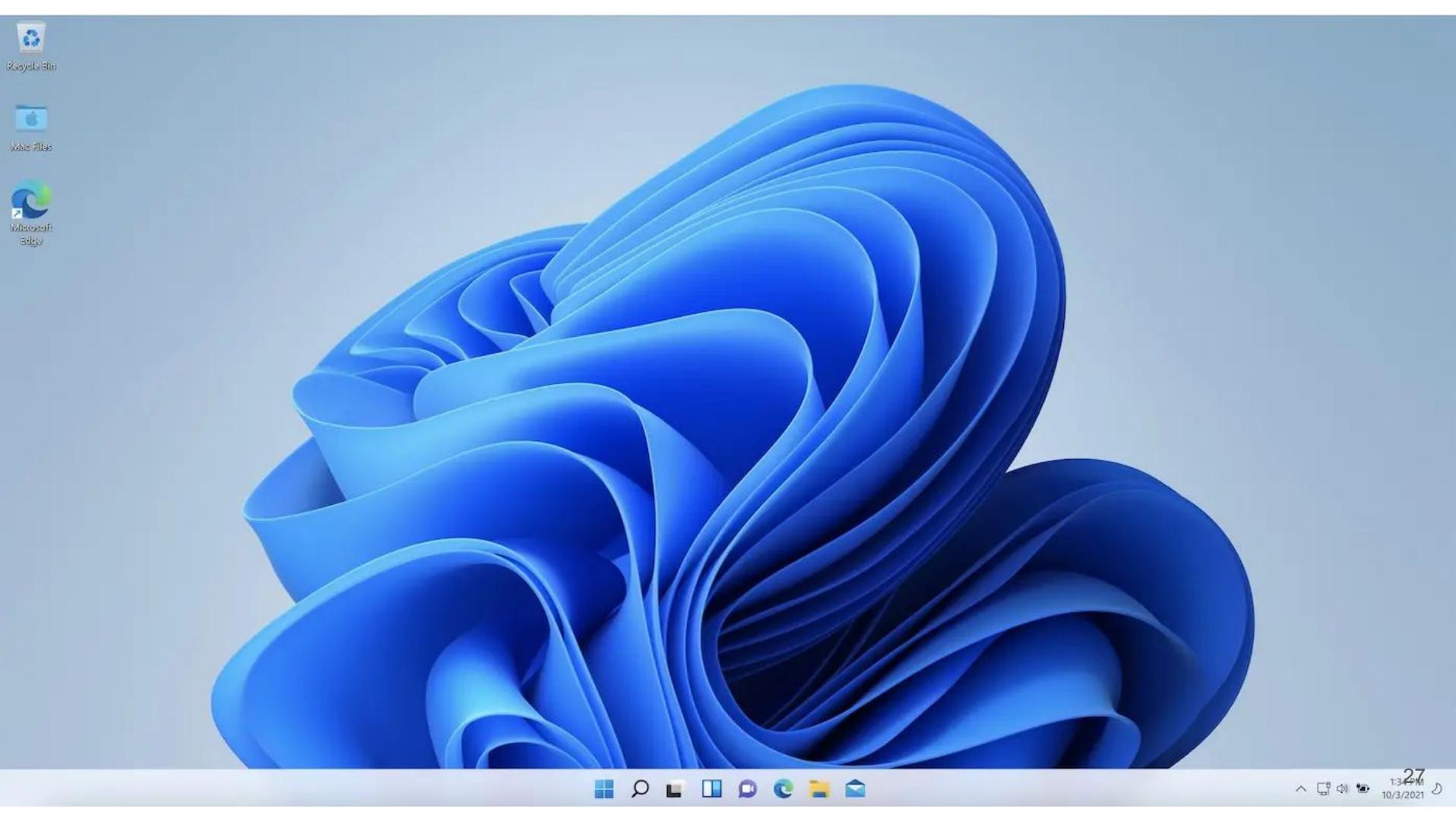
17:08 / 19:03

Exploring the Desktop >



25







# How to install tools?

 1. APT (Advanced Package Tool) — default Ubuntu method

 2. Micromamba / Conda — isolated environments

 3. Snap packages

 4. .deb packages (Debian installer files)

 5. Manual install from source (build yourself)

 6. Python tools via pip

 7. Docker or Singularity/Apptainer containers

 8. Install from PPA (Personal Package Archive)

The image displays the WPS Office suite of applications. On the left, a large red 'W' logo is overlaid on a white grid background, with the text "WPS Office" written below it in a large, bold, red font. To the right of the logo is a screenshot of the WPS Office spreadsheet application, showing a formula bar with '=SUMIF' and a cell containing '=SUM()'. The spreadsheet interface includes a header row with column letters A through Y and a row with numbers 1 through 32. The top menu bar shows 'Home', 'Insert', 'Page Layout', 'Formulas', 'Data', 'Review', and 'View'. Below the menu are various toolbar icons for file operations like Cut, Copy, Paste, and Format Painter, along with text and table styling tools. A large orange circular icon with a white stylized 'U' logo is positioned above the spreadsheet screenshot. To the right of the spreadsheet are three smaller icons representing different applications: a blue square with a white 'W' (Word), an orange square with a white 'P' (PowerPoint), and a green square with a white 'S' (Excel). Red arrows point from each of these smaller icons to their respective application logos: a blue Word document, an orange PowerPoint slide, and a green Excel spreadsheet.

## 12 Congrats on Ubuntu &amp; Win Setup

 appl

App Center



Startup Applica...



Remmina

Settings  
2 more

Apps Control various app permissions and settings



Appearance Change your background image or the UI colors



About View information about your system



Users Add or remove users and change your password



Search Control which apps show search results in the Activities Overview

 Explore Featured Productivity Development Games

## Snap packages

 WPS Office Multi-Language WPS Office 2016 - All lang, no internet WPS Office 2019 - Multi-Language

## Featured Snaps

[Discover more](#)[See all results for "wps"](#)

Mumble

Snapcrafters 

Open Source, Low Latency, High Quality Voice Chat

Good | 51 votes



kolourpaint

KDE 

Paint Program

Good | 421 votes



insomnia

Insomnia

Good | 163 votes



CLion

Jetbrains 

A cross-platform IDE for C and C++

Good | 174 votes



HEY Mail

Basecamp, LLC 

Email at its best, by Basecamp

Poor | 111 votes



Super Productivity – To-Do, Time Tracker

Johannesjo

Time tracker &amp; to-do app with Jira/GitHub sync, timeboxing, Pomodoro, and privacy-first desi...

 Manage 1 About

 Explore Featured Productivity Development Games

## WPS Office Multi-Language

HoLuLu

Productivity



Channel

latest/stable 10.1.0.67...

Installing

Cancel

106 votes

Neutral

Confinement

Strict

Download size

287.21 MB

License

Proprietary

Version

10.1.0.6757-multilang

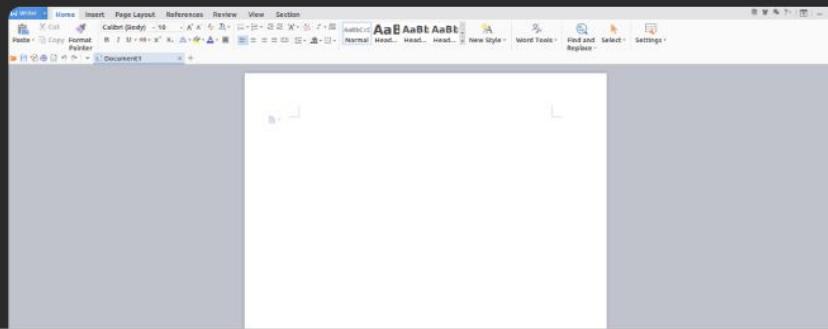
Published

Jan 25, 2019

Links

[Developer website](#)

## ▼ Gallery



⋮ Manage 1

? About

# App in desktop



RStudio



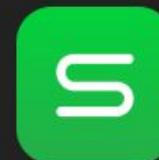
scrcpy



scrcpy (console)



WPS Presentation



WPS Spreadsheets



WPS Writer

# Install WPS Office with support of Chat GPT

Here's a step-by-step tutorial to install WPS Office on Ubuntu (any version) ↴

## 1. Update your system

Before installing any new software, make sure your system is up to date:

```
bash
```

 Copy code

```
sudo apt update && sudo apt upgrade -y
```

## 2. Download the WPS Office .deb package

Go to the official WPS Linux download page:

👉 <https://linux.wps.com/> ↗

Or use `wget` to download it directly:

```
bash
```

 Copy code

```
wget https://wdl1.pcfg.cache.wpscnd.com/wpsdl/wpsoffice/download/linux/11776/wps-office_1:
```

 You can check for the latest version on their website if this link becomes outdated.

### 3. Install the .deb package

• Upgrade to Go ×

Use `dpkg` to install:

bash

 Copy code

```
sudo dpkg -i wps-office_11.1.0.11776.XA_amd64.deb
```

If you see dependency errors, fix them with:

bash

 Copy code

```
sudo apt -f install -y
```

---

### 4. Launch WPS Office

After installation, you can start it by:

- Searching “WPS Office” in your app menu, or
- Running it from the terminal:

bash

 Copy code

```
wps
```

# Install Chrome with support of Chat GPT

Here's a step-by-step guide to **download and install Google Chrome on Ubuntu** (works for versions like 20.04, 22.04, and newer):

## 💡 Option 1: Using the Terminal (Recommended)

This is the easiest and most reliable way.

### 1. Update your package list:

```
bash
```

Copy code

```
sudo apt update
```

### 2. Install required dependencies:

```
bash
```

Copy code

```
sudo apt install wget -y
```

### 3. Download the latest Google Chrome .deb package:

```
bash
```

Copy code

```
wget https://dl.google.com/linux/direct/google-chrome-stable_current_amd64.deb
```



### 4. Install Chrome using apt :

Ask anything

Attach

Search

# Install Chrome with support of Chat GPT

## 4. Install Chrome using `apt`:

bash

 Copy code

```
sudo apt install ./google-chrome-stable_current_amd64.deb
```

Using `apt` instead of `dpkg` ensures dependencies are handled automatically.

## 5. Launch Google Chrome:

- From the terminal:

bash

 Copy code

```
google-chrome-stable
```

- Or search for "Google Chrome" in your application menu.

# Install R and Rstudio

Is  
es from Posit in our Fall 2025 Product Announcement

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RStudio on [Posit Cloud for free](#). If you're a professional data scientist looking to download RStudio and also need common enterprise features, don't hesitate to [book a call with us](#).

Want to learn about core or advanced workflows in RStudio?  
Explore the [RStudio User Guide](#) or the [Getting Started](#) section.

[Try Positron](#), the new code editor for data science from the creators of RStudio, built for the next generation of data science workflows with R and Python.

## 1: Install R

RStudio requires R 3.6.0+. Choose a version of R that matches your computer's operating system.

*R is not a Posit product. By clicking on the link below to download and install R, you are leaving the Posit website. Posit disclaims any obligations and all liability with respect to R and the R website.*

## 2: Install RStudio

Find your operating system in the table below.

# Install R

The Comprehensive R Archive Network

### Download and Install R

Precompiled binary distributions of the base system and contributed packages. **Windows and Mac** users most likely want one of these versions of R:

- [Download R for Linux \(Debian, Fedora/Redhat, Ubuntu\)](#)
- [Download R for macOS](#)
- [Download R for Windows](#)

R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

### Source Code for all Platforms

Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!

- The latest release (2025-10-31, [Not] Part in a Rumble) [R-4.5.2.tar.gz](#), read [what's new](#) in the latest version.
- The CRAN directory [src/base-prerelease](#) contains R alpha, beta, and rc releases as daily snapshots in time periods before a planned release.
- Between releases, the same directory [src/base-prerelease](#) contains snapshots of current patched and development versions. Please read about [new features and bug fixes](#) before filing corresponding feature requests or bug reports.
- Alternatively, daily snapshots are [available here](#).
- Source code of older versions of R is [available here](#).
- Contributed extension [packages](#).

### Questions About R

- If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email.

### Supporting CRAN

- CRAN operations, most importantly hosting, checking, distributing, and archiving of R add-on packages for various platforms, crucially rely on technical, emotional, and financial support by the R community.

Please consider making [financial contributions](#) to the R Foundation for Statistical Computing.

#### What are R and CRAN?

R is 'GNU S', a freely available language and environment for statistical computing and graphics which provides a wide variety of statistical and graphical techniques: linear and nonlinear modelling, statistical tests, time series analysis, classification, clustering, etc. Please consult the [R.project homepage](#) for further information.

CRAN is a network of ftn and web servers around the world that store identical, un-to-date, versions of code and documentation for R. Please use the CRAN [mirror](#) nearest to you to minimize network load.

posit.co/download/rstudio-desktop/

Smarter science, better tools  
Explore new product capabilities from Posit in our Fall 2025 Product Announcement

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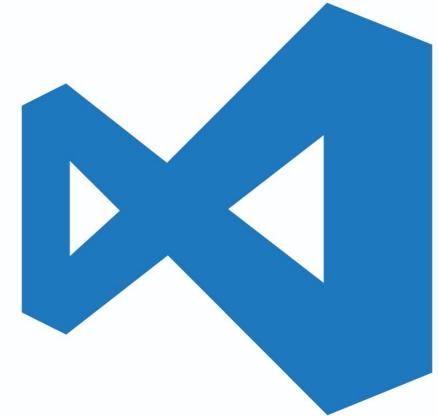
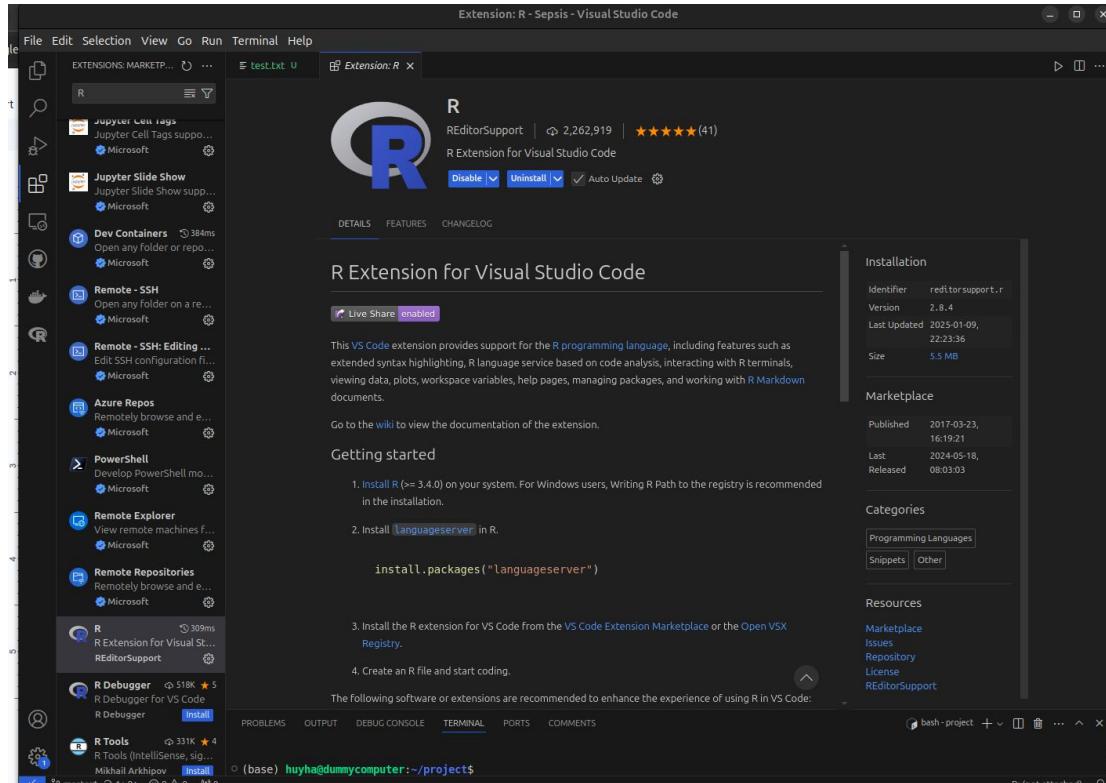
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ABOUT



OS	Download	Size	SHA-256
Windows 10/11	<a href="#">RSTUDIO-2025.09.2-418.EXE</a>	296.74 MB	<a href="#">439D3200</a>
macOS 13+	<a href="#">RSTUDIO-2025.09.2-418.DMG</a>	656.36 MB	<a href="#">9D1719CE</a>
Ubuntu 22/Debian 12	<a href="#">RSTUDIO-2025.09.2-418-AMD64.DEB</a>	226.04 MB	<a href="#">1ECA6CA3</a>
Ubuntu 24	<a href="#">RSTUDIO-2025.09.2-418-AMD64.DEB</a>	226.04 MB	<a href="#">1ECA6CA3</a>
Fedora 41	<a href="#">RSTUDIO-2025.09.2-418-X86_64.RPM</a>	242.18 MB	<a href="#">2CD4A1DC</a>
Red Hat 9	<a href="#">RSTUDIO-2025.09.2-418-X86_64.RPM</a>	242.18 MB	<a href="#">2CD4A1DC</a>

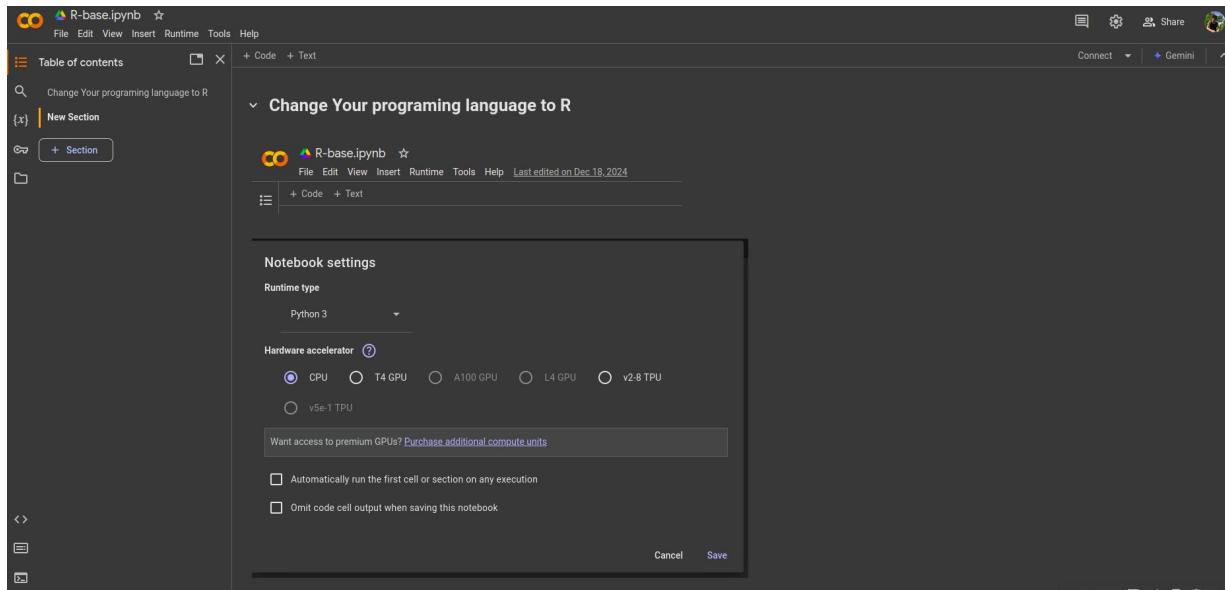
# Orthers platforms for R



Visual code

<https://code.visualstudio.com/download>

# Orthers platforms for R



Google colab

<https://colab.research.google.com>

# Python for windows

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Python » Downloads » Windows

## Python Releases for Windows

- [Latest Python install manager - Python install manager 25.0](#)
- [Latest Python 3 Release - Python 3.14.0](#)

### Stable Releases

- [Python 3.13.9 - Oct. 14, 2025](#)

Note that **Python 3.13.9** cannot be used on Windows 7 or earlier.

- [Download Windows installer \(64-bit\)](#)
- [Download Windows installer \(32-bit\)](#)
- [Download Windows installer \(ARM64\)](#)
- [Download Windows embeddable package \(64-bit\)](#)
- [Download Windows embeddable package \(32-bit\)](#)
- [Download Windows embeddable package \(ARM64\)](#)
- [Download Windows release manifest](#)
- [Python install manager 25.0 - Oct. 8, 2025](#)
- [Download Installer \(MSIX\)](#)

### Pre-releases

- [Python install manager 25.1 beta 1 - Oct. 27, 2025](#)
  - [Download Installer \(MSIX\)](#)
  - [Download MSI package](#)
- [Python 3.15.0a1 - Oct. 14, 2025](#)
  - [Download Windows installer \(64-bit\)](#)
  - [Download Windows installer \(32-bit\)](#)
  - [Download Windows installer \(ARM64\)](#)
  - [Download Windows embeddable package \(64-bit\)](#)
  - [Download Windows embeddable package \(32-bit\)](#)
  - [Download Windows embeddable package \(ARM64\)](#)
  - [Download Windows release manifest](#)

# Tools version

```
(base) huyha@dummycomputer:~$ python3
Python 3.7.12 | packaged by conda-forge | (default, Oct 26 2021, 06:08:21)
[GCC 9.4.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> □
```

s-andrews / **FastQC** Public

Code Issues 34 Pull requests 8 Actions Projects Security Insights

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129 Commits

.devcontainer .github .settings Configuration Help Templates lib net/sourceforge/iharder/base64 org/apache/commons/math3 test uk/ac/babraham/FastQC .classpath .gitignore .project INSTALL.md

About

A quality control analysis tool for high throughput sequencing data

Readme GPL-3.0, Apache-2.0 licenses found Activity 546 stars 10 watching 101 forks Report repository

Releases 6

v0.12.1 Latest Mar 1, 2023 + 5 releases

Packages

No packages published

Contributors 9

https://github.com/s-andrews/FastQC/branches

run\_fastqc.bat Make run\_fastqc.bat executable 2 months ago

README GPL-3.0 license Apache-2.0 license

## FastQC

A Quality Control application for FastQ files

FastQC is a program designed to spot potential problems in high throughput sequencing datasets. It runs a set of analyses on one or more raw sequence files in fastq or bam format and produces a report which summarises the results.

bad\_sequence.txt good\_sequence\_short.txt

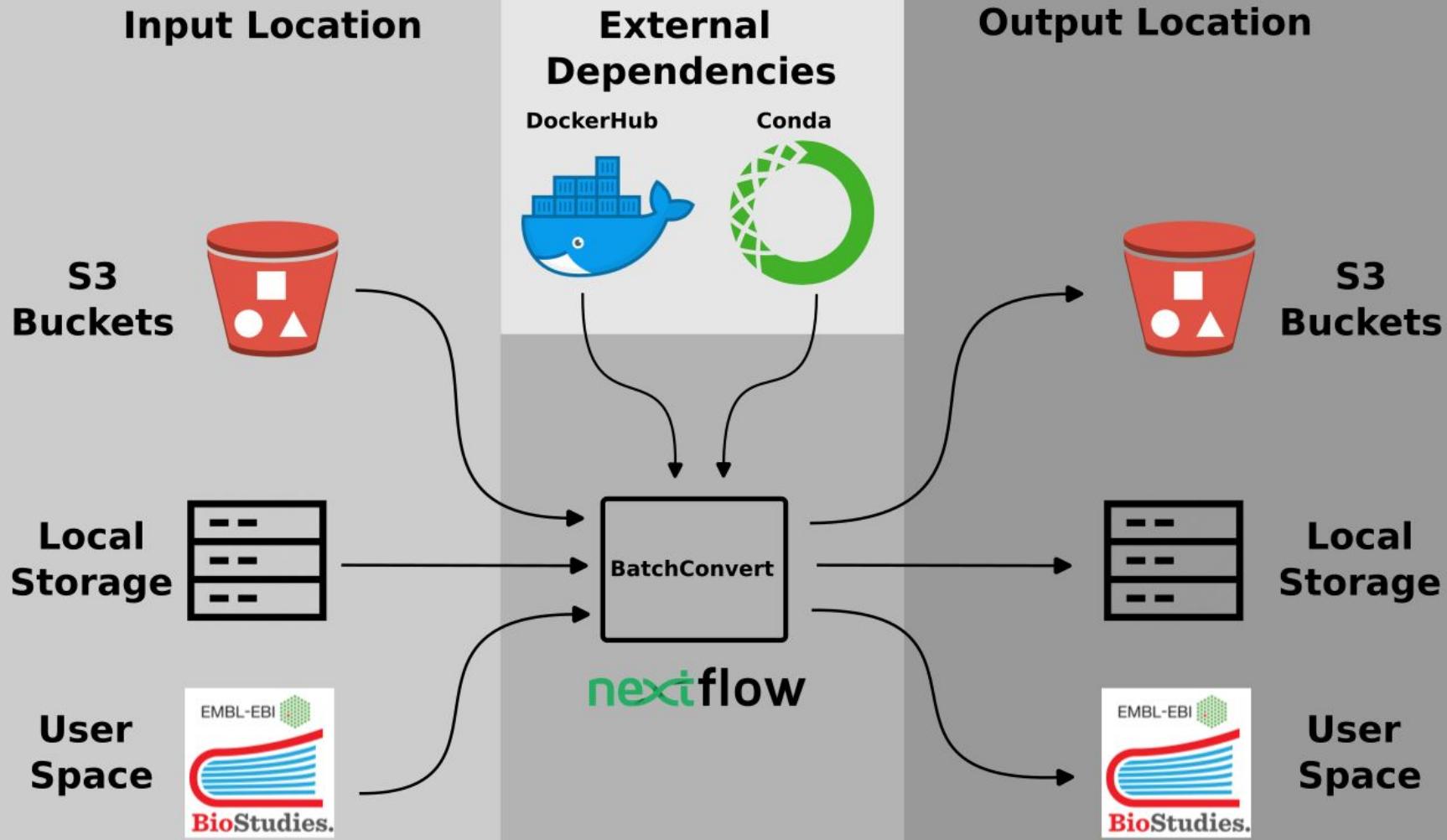
- Basic Statistics
- Per base sequence quality
- Per sequence quality scores
- Per base sequence content
- Per base GC content
- Per sequence GC content
- Per base N content
- Sequence Length Distribution
- Sequence Duplication Levels
- Overrepresented sequences
- Kmer Content

Quality scores across all bases (Illumina >v1.3 encoding)

Position in read (bp)

<https://github.com/s-andrews/FastQC/blob/master/Help/fastqc.png> highlight any areas where this library looks unusual and where you should take a closer look. The

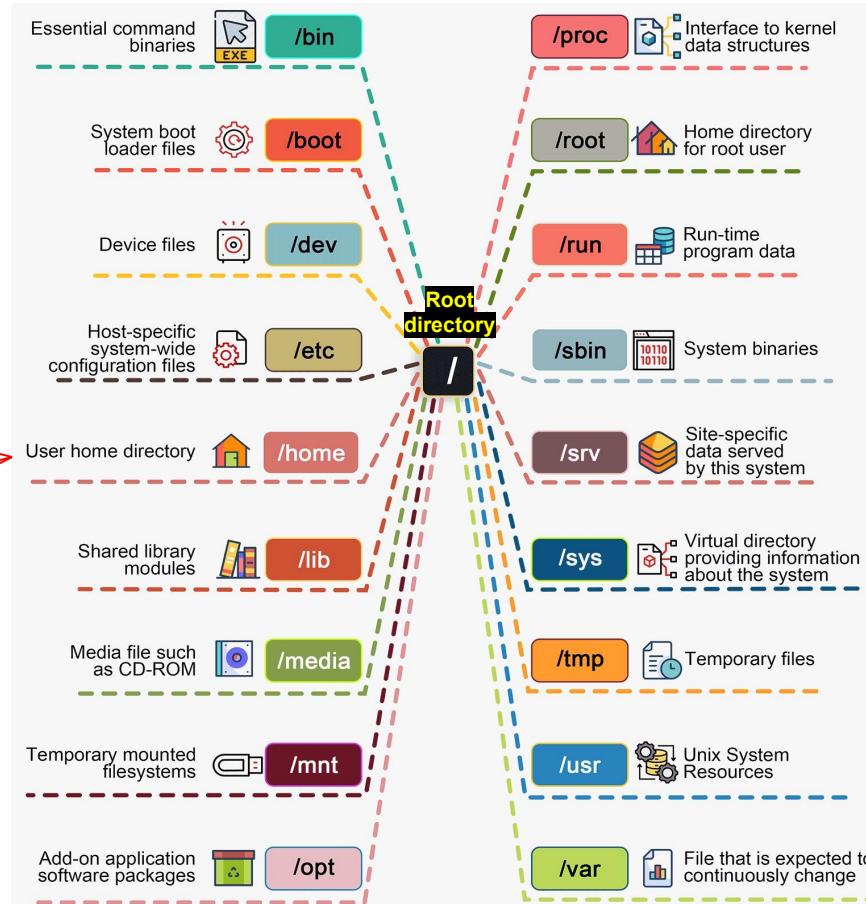
<https://github.com/s-andrews/FastQC>



# Linux file systems

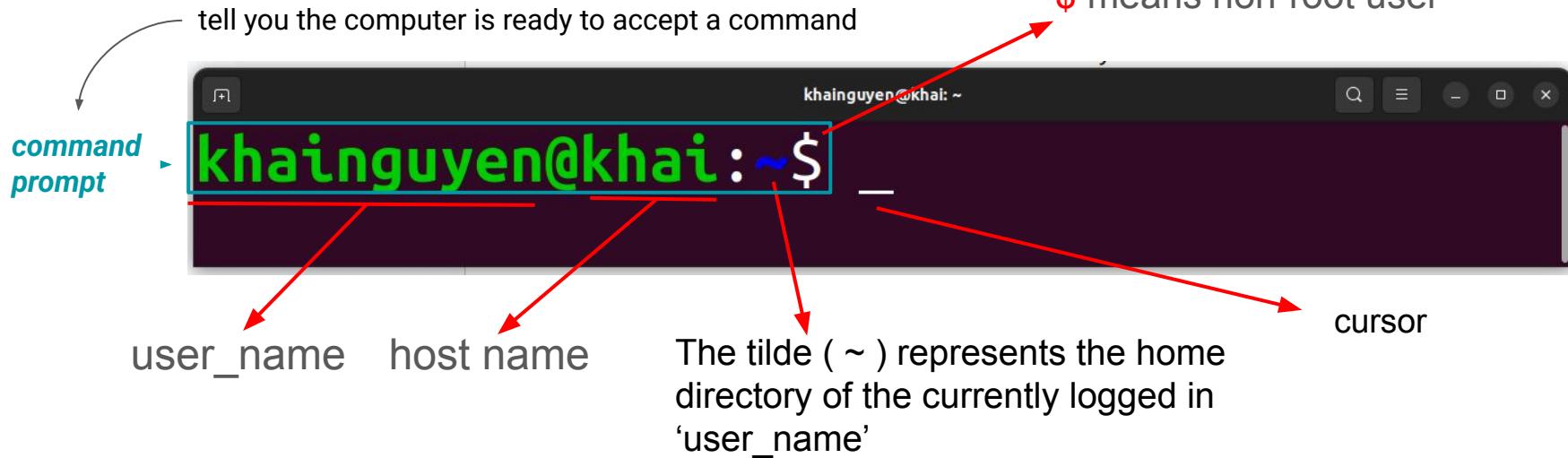
**user\_name** directory (or folder):

/home/khainguyen/  
/home/vanA/  
/home/vanB/



The root directory is a special directory that contains all of the other files and directories on the computer. The root directory is specified as a / at the beginning of a path

When opening the terminal, **default**:



This case, user\_name is **khainguyen**, so the path is: /home/khainguyen

```
khainguyen@khai:~$ pwd  
/home/khainguyen  
khainguyen@khai:~$ _
```

To print the current path, type the command: **pwd** → stands for 'print working directory', then hitting the ENTER key on keyboard to run the command

## A basic command, could be:

Example: ls command

The command line will be read **from left to right** by the shell  
once press ENTER

```
khainguyen@khai:~$ ls -l /var/
```

**command**  
(must have)

a space

**option/flag**  
(optional)  
hyphen-prefixed  
characters

a space

**parameter**  
(optional)

# How do I know what options a command has?

man command\_name

Example: ls command

```
khainguyen@khai:~$ 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 **-cftuvSUX** 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**

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

Press q key on keyboard to exit

command\_name --help

```
khainguyen@khai:~$ ls --help
```

Usage: ls [OPTION]... [FILE]...

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

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

<b>-a, --all</b>	do not ignore entries starting with .
<b>-A, --almost-all</b>	do not list implied . and ..
<b>--author</b>	with <b>-l</b> , print the author of each file
<b>-b, --escape</b>	print C-style escapes for nongraphic characters
<b>--block-size=SIZE</b>	with <b>-l</b> , scale sizes by SIZE when printing them; e.g., ' <b>--block-size=M</b> '; see SIZE format below
<b>-B, --ignore-backups</b>	do not list implied entries ending with ~
<b>-c</b>	with <b>-lt</b> : sort by, and show, ctime (time of last modification of file status information); with <b>-l</b> : show ctime and sort by name; otherwise: sort by ctime, newest first
<b>-C</b>	list entries by columns
<b>--color[=WHEN]</b>	colorize the output; WHEN can be 'always' (default if omitted), 'auto', or 'never'; more info below
<b>-d, --directory</b>	list directories themselves, not their contents
<b>-D, --dired</b>	generate output designed for Emacs' dired mode

# Using chat GPT to learn code

ls tutorial in ubuntu explain in detail. give me several example

Thought for 9s >

**ls tutorial (Ubuntu) — detailed, with examples**

`ls` lists files and directories. It's part of GNU coreutils on Ubuntu and is tiny but powerful. Below I'll explain common options, useful combos, and give several real examples with explanations so you can copy-paste and learn quickly.

---

**Basic usage**

bash

`ls`

Copy code

Lists filenames in the current directory (multiple columns if output is a terminal).

bash

`ls -1`

Copy code

List one filename per line (useful for piping).

## 2. Some basic Linux commands work with files and directories

## change working directory

`cd` command, an abbreviation for ‘change **directory**’.



A screenshot of a terminal window titled "khainguyen@khai: ~/Downloads". The terminal shows the following session:

```
khainguyen@khai:~$ cd /home/khainguyen/Downloads/
khainguyen@khai:~/Downloads$ pwd
/home/khainguyen/Downloads
khainguyen@khai:~/Downloads$ _
```

# Path shortcuts

- ~ the home directory of the currently logged in ‘user\_name’
- / the root directory
- . the current directory (or the working directory)
- .. the parent directory of the working directory
- ../../ the parent directory of the parent directory of the working directory

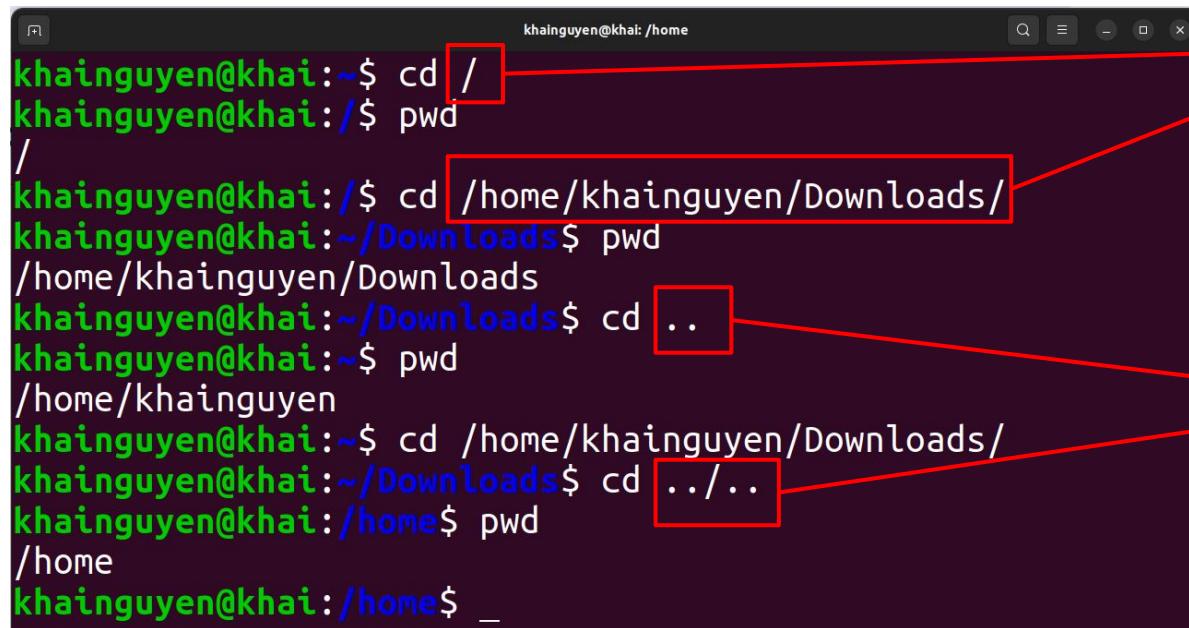
```
khainguyen@khai:~$ cd /
khainguyen@khai:~/Downloads$ pwd
/
khainguyen@khai:~/Downloads$ cd /home/khainguyen/Downloads/
khainguyen@khai:~/Downloads$ pwd
/home/khainguyen/Downloads
khainguyen@khai:~/Downloads$ cd ..
khainguyen@khai:~/Downloads$ pwd
/home/khainguyen
khainguyen@khai:~/Downloads$ cd /home/khainguyen/Downloads/
khainguyen@khai:~/Downloads$ cd ../..
khainguyen@khai:/home$ pwd
/home
khainguyen@khai:/home$ _
```

```
khainguyen@khai:~$ cd /home/khainguyen/Downloads/
khainguyen@khai:~/Downloads$ pwd
/home/khainguyen/Downloads
khainguyen@khai:~/Downloads$ cd ..
khainguyen@khai:~$ pwd
/home/khainguyen
khainguyen@khai:~$ _
```

just cd to  
change to ~

**Absolute path:** from the root directory to the interest directory/file.

**Relative path:** from the working directory to the interest directory/file.



The screenshot shows a terminal window with the following session:

```
khainguyen@khai:~$ cd /  
khainguyen@khai:~$ pwd  
/  
khainguyen@khai:~$ cd /home/khainguyen/Downloads/  
khainguyen@khai:~/Downloads$ pwd  
/home/khainguyen/Downloads  
khainguyen@khai:~/Downloads$ cd ..  
khainguyen@khai:~$ pwd  
/home/khainguyen  
khainguyen@khai:~$ cd /home/khainguyen/Downloads/  
khainguyen@khai:~/Downloads$ cd ../../..  
khainguyen@khai:/home$ pwd  
/home  
khainguyen@khai:/home$ _
```

Annotations with red boxes and arrows:

- A red box surrounds the command `cd /`. A red arrow points from this box to the text "Absolute path".
- A red box surrounds the command `cd /home/khainguyen/Downloads/`. A red arrow points from this box to the text "Absolute path".
- A red box surrounds the command `cd ..`. A red arrow points from this box to the text "Relative path".
- A red box surrounds the command `cd ../../..`. A red arrow points from this box to the text "Relative path".

Clean up all the command lines and results above, with command: clear

```
khainguyen@khai:~$ cd /
khainguyen@khai:/$ pwd
/
khainguyen@khai:~$ cd /home/khainguyen/Downloads/
khainguyen@khai:~/Downloads$ pwd
/home/khainguyen/Downloads
khainguyen@khai:~/Downloads$ cd ..
khainguyen@khai:~$ pwd
/home/khainguyen
khainguyen@khai:~$ cd /home/khainguyen/Downloads/
khainguyen@khai:~/Downloads$ cd ../../..
khainguyen@khai:/home$ pwd
/home
khainguyen@khai:/home$ clear_
```

ENTER

```
khainguyen@khai:/home$ _
```

or using: Ctrl-L

# **Listing content (files and subdirectories) of a directory**

with command: **ls** ("ls" stands for "list")

list files and directories in current directory (in short format):

**ls**

```
khainguyen@khai: $ ls  
2305am    ENTER          opt  
bin       Exercise_1      Pictures  
card      localDB        Public  
Desktop   ngs2amr        qiime2-amplicon-2024.2-py38-linux-conda.yml  
Documents Miniconda3-py312_24.1.2-0-Linux-x86_64.sh  qiime2-import  
Downloads Music          R  
khainguyen@khai: $ _
```

list all files and directories in current directory (in short format):

**ls -a**

or

**ls --all**

```
khainguyen@khai: $ ls -a  
..           .gnome  
./          .gnupg  
2305am     .hplip  
.enthy     .ibus  
.bash_history .java  
.bash_logout .lessht  
.bashrc     .local  
bin         localDB  
.cache     ngs2amr  
card        Miniconda3-py312_24.1.2-0-Linux-x86_64.sh  .sudo_as_admin_successful  
.conda     .Mozilla  
.condarc   Music  
.config    .ncbt  
.cups      .nv  
Desktop   .opt  
Documents .pam_environment  
Downloads Pictures  
ENTER     .pk1  
Exercise_1 .profile  
khainguyen@khai: $ _
```

**ls --help**

**-a, --all**

do not ignore entries starting with .

list files and directories in current directory (in long format): `ls -l`

```
khainguyen@khai:~$ ls -l
total 140772
drwxrwxr-x  4 khainguyen khainguyen          4096 Thg  3   7 19:26 230Sam
drwxrwxr-x  2 khainguyen khainguyen          4096 Thg 10   8 2023 bin
drwxrwxr-x  6 khainguyen khainguyen          4096 Thg  4  21 17:50 card
drwxr-xr-x  2 khainguyen khainguyen          4096 Thg 10   8 2023 Desktop
drwxr-xr-x  2 khainguyen khainguyen          4096 Thg 11  25 22:16 Documents
drwxr-xr-x  4 khainguyen khainguyen          4096 Thg  5   4 00:05 Downloads
drwxrwxr-x 19 khainguyen khainguyen          4096 Thg  3  25 19:50 ENTER
drwxrwxr-x  5 khainguyen khainguyen          4096 Thg  3   6 15:28 Exercise_1
drwxrwxr-x  2 khainguyen khainguyen          4096 Thg  4  21 10:35 localDB
drwxrwxr-x  9 khainguyen khainguyen          4096 Thg  4  18 13:33 ngs2amr
-rw-rw-r--  1 khainguyen khainguyen 144041912 Thg  3  25 17:29 Miniconda3-py312_24.1.2-0-Linux-x86_64.sh
drwxr-xr-x  2 khainguyen khainguyen          4096 Thg 10   8 2023 Music
drwxrwxr-x  3 khainguyen khainguyen          4096 Thg 10   8 2023 opt
drwxr-xr-x  3 khainguyen khainguyen          4096 Thg 10   8 2023 Pictures
drwxr-xr-x  2 khainguyen khainguyen          4096 Thg 10   8 2023 Public
-rw-rw-r--  1 khainguyen khainguyen 13837 Thg  3  25 20:09 qiime2-amplicon-2024.2-py38-linux-conda.yml
drwxrwxr-x 14 khainguyen khainguyen          4096 Thg  3  29 18:11 qiime2-import
drwxrwxr-x  3 khainguyen khainguyen          4096 Thg  4  16 20:03 R
drwxrwxr-x  3 khainguyen khainguyen          4096 Thg  4  18 13:25 r_ngs2amr
drwxrwxr-x  2 khainguyen khainguyen          4096 Thg  5   2 20:11 shotgun
drwx-----  7 khainguyen khainguyen          4096 Thg 10  24 2023 snap
drwxr-xr-x  2 khainguyen khainguyen          4096 Thg 10   8 2023 Templates
drwxr-xr-x  3 khainguyen khainguyen          4096 Thg 10  27 2023 Videos
khainguyen@khai:~$ _
```

`ls --help`

`-l`

use a long listing format

list all files and directories in current directory (in long format):

ls -al

```
khainguyen@khai:~$ ls -al
total 140964
drwxr-x--- 42 khainguyen khainguyen 4096 Thg 5   4 15:33 .
drwxr-xr-x  3 root      root       4096 Thg 10  8 2023 ..
drwxrwxr-x  4 khainguyen khainguyen 4096 Thg 3   7 19:26 230Sam
drwx----- 2 khainguyen khainguyen 4096 Thg 11 21 23:18 .anthy
-rw----- 1 khainguyen khainguyen 56345 Thg 5   4 15:28 .bash_history
-rw-r--r-- 1 khainguyen khainguyen 220 Thg 10  8 2023 .bash_logout
-rw-r--r-- 1 khainguyen khainguyen 4619 Thg 5   2 23:57 .bashrc
drwxrwxr-x 2 khainguyen khainguyen 4096 Thg 10  8 2023 bin
drwx----- 36 khainguyen khainguyen 4096 Thg 4   21 16:24 .cache
drwxrwxr-x 6 khainguyen khainguyen 4096 Thg 4   21 17:50 card
drwxrwxr-x 2 khainguyen khainguyen 4096 Thg 10 11 2023 .conda
-rw-rw-r-- 1 khainguyen khainguyen 26 Thg 3   25 22:13 .condarc
drwx----- 34 khainguyen khainguyen 4096 Thg 4   30 23:24 .config
drwx----- 2 khainguyen khainguyen 4096 Thg 3   6 17:33 .cups
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 10  8 2023 Desktop
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 11 25 22:16 Documents
drwxr-xr-x 4 khainguyen khainguyen 4096 Thg 5   4 00:05 Downloads
drwxrwxr-x 19 khainguyen khainguyen 4096 Thg 3   25 19:50 ENTER
drwxrwxr-x 5 khainguyen khainguyen 4096 Thg 3   6 15:28 Exercise_1
drwx----- 3 khainguyen khainguyen 4096 Thg 10  8 2023 .gnome
drwx----- 2 khainguyen khainguyen 4096 Thg 4   30 23:24 .gnupg
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 3   6 17:21 .hplip
drwxrwxr-x 3 khainguyen khainguyen 4096 Thg 10  8 2023 .ibus
drwxrwxr-x 3 khainguyen khainguyen 4096 Thg 12 13 16:41 .java
-rw----- 1 khainguyen khainguyen 20 Thg 4   16 18:10 .lesshtst
drwx----- 3 khainguyen khainguyen 4096 Thg 10  8 2023 .local
drwxrwxr-x 2 khainguyen khainguyen 4096 Thg 4   21 10:35 localDB
drwxrwxr-x 9 khainguyen khainguyen 4096 Thg 4   18 13:33 mszamr
-rw-rw-r-- 1 khainguyen khainguyen 144041912 Thg 3   25 17:29 Miniconda3-py312_24.1.2-0-Linux-x86_64.sh
drwx----- 3 khainguyen khainguyen 4096 Thg 11 25 20:56 .mozilla
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 10  8 2023 Music
drwxrwxr-x 2 khainguyen khainguyen 4096 Thg 11  9 20:23 .ncbi
drwx----- 3 khainguyen khainguyen 4096 Thg 10 12 2023 .nv
drwxrwxr-x 3 khainguyen khainguyen 4096 Thg 10  8 2023 opt
-rw-r--r-- 1 khainguyen khainguyen 303 Thg 10  9 2023 .pam_environment
```

```
drwxrwxr-x 5 khainguyen khainguyen 4096 Thg 10  8 2023 .py
-rw-r--r-- 1 khainguyen khainguyen 303 Thg 10  9 2023 .pam_environment
drwxr-xr-x 3 khainguyen khainguyen 4096 Thg 10  8 2023 Pictures
drwx----- 3 khainguyen khainguyen 4096 Thg 10  8 2023 .pki
-rw-r--r-- 1 khainguyen khainguyen 851 Thg 4   18 00:30 .profile
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 10  8 2023 Public
-rw----- 1 khainguyen khainguyen 858 Thg 3   3 16:25 .python_history
-rw-rw-r-- 1 khainguyen khainguyen 13837 Thg 3  25 20:09 qiime2-amplicon-2024.2-py38-linux-conda.yml
drwxrwxr-x 14 khainguyen khainguyen 4096 Thg 3  29 18:11 qitwe2-import
drwxrwxr-x 3 khainguyen khainguyen 4096 Thg 4   16 20:03 R
-rw-rw-r-- 1 khainguyen khainguyen 88 Thg 4   21 21:00 .Rhistory
drwxrwxr-x 3 khainguyen khainguyen 4096 Thg 4   18 13:25 r_ngszamr
drwxrwxr-x 2 khainguyen khainguyen 4096 Thg 5   2 20:11 shotgun
drwx----- 7 khainguyen khainguyen 4096 Thg 10 24 2023 snap
-rw-r--r-- 1 khainguyen khainguyen 0 Thg 10  8 2023 sudo_as_admin_successful
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 10  8 2023 Templates
drwx----- 6 khainguyen khainguyen 4096 Thg 11 25 20:56 .thunderbird
drwx----- 3 khainguyen khainguyen 4096 Thg 10  8 2023 .utn.d
drwxr-xr-x 3 khainguyen khainguyen 4096 Thg 10 18 2023 .var
drwxr-xr-x 3 khainguyen khainguyen 4096 Thg 10 27 2023 Videos
-rw----- 1 khainguyen khainguyen 7478 Thg 4   21 10:47 .viminfo
drwxrwxr-x 4 khainguyen khainguyen 4096 Thg 4   30 23:24 .vscode
-rw-rw-r-- 1 khainguyen khainguyen 530 Thg 4   18 12:31 wget-hsts
-rw-rw-r-- 1 khainguyen khainguyen 131 Thg 10  8 2023 xinputrc
khainguyen@khai:~$ _
```

list files and directories in another directory (in long format): `ls -l path_to_directory`

```
khainguyen@khai:~$ ls -l /var/
total 48
drwxr-xr-x  2 root root      4096 Thg  5   1 00:00 backups
drwxr-xr-x 18 root root      4096 Thg 10  11 2023 cache
drwxrwsrwt  2 root whoopsie  4096 Thg  5   5 13:28 crash
drwxr-xr-x 74 root root      4096 Thg  3   6 16:40 lib
drwxrwsr-x  2 root staff     4096 Thg  4   18 2022 local
lrwxrwxrwx  1 root root      9 Thg 10  8 2023 lock -> /run/lock
drwxrwxr-x 14 root syslog    4096 Thg  5   6 00:00 log
drwxrwsr-x  2 root mail      4096 Thg  8   8 2023 mail
drwxrwsrwt  2 root whoopsie  4096 Thg  8   8 2023 metrics
drwxr-xr-x  2 root root      4096 Thg  8   8 2023 opt
lrwxrwxrwx  1 root root      4 Thg 10  8 2023 run -> /run
drwxr-xr-x 16 root root      4096 Thg 10  24 2023 snap
drwxr-xr-x  7 root root      4096 Thg  8   8 2023 spool
drwxrwsrwt 13 root root     4096 Thg  5   6 15:55 tmp
khainguyen@khai:~$ _
```

```
khainguyen@khai:~$ ls -l
total 140772
drwxrwxr-x 4 khainguyen khainguyen 4096 Thg 3 7 19:26 230Sam
drwxrwxr-x 2 khainguyen khainguyen 4096 Thg 10 8 2023 bin
drwxrwxr-x 6 khainguyen khainguyen 4096 Thg 4 21 17:50 card
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 10 8 2023 Desktop
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 11 25 22:16 Documents
drwxr-xr-x 4 khainguyen khainguyen 4096 Thg 5 4 00:05 Downloads
drwxrwxr-x 19 khainguyen khainguyen 4096 Thg 3 25 19:50 ENTER
drwxrwxr-x 5 khainguyen khainguyen 4096 Thg 3 6 15:28 Exercise_1
drwxrwxr-x 2 khainguyen khainguyen 4096 Thg 4 21 10:35 localDB
drwxrwxr-x 9 khainguyen khainguyen 144041912 Thg 4 18 13:33 mgs2amr
-rw-rw-r-- 1 khainguyen khainguyen 4096 Thg 3 25 17:29 Miniconda3-py312_24.1.2-0-Linux-x86_64.sh
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 10 8 2023 Music
drwxrwxr-x 3 khainguyen khainguyen 4096 Thg 10 8 2023 opt
drwxr-xr-x 3 khainguyen khainguyen 4096 Thg 10 8 2023 Pictures
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 10 8 2023 Public
drwxr-wr-x 1 khainguyen khainguyen 13837 Thg 3 25 20:09 qiime2-amplicon-2024.2-py38-linux-conda.yml
drwxrwxr-x 14 khainguyen khainguyen 4096 Thg 3 29 18:11 qiime2-import
drwxrwxr-x 3 khainguyen khainguyen 4096 Thg 4 16 20:03 R
drwxrwxr-x 3 khainguyen khainguyen 4096 Thg 4 18 13:25 r_mgs2amr
drwxrwxr-x 2 khainguyen khainguyen 4096 Thg 5 2 20:11 shotgun
drwxr----- 7 khainguyen khainguyen 4096 Thg 10 24 2023 snap
drwxr-xr-x 2 khainguyen khainguyen 4096 Thg 10 8 2023 Templates
drwxr-xr-x 3 khainguyen khainguyen 4096 Thg 10 27 2023 Videos
```

**File type:**  
“d” means  
this is a  
directory

Permissions  
number of  
hard links

Owner of file  
(user\_name)

user  
group

size  
(in bytes)

Last modification time

directory/file name

# Create and remove directory

Create a directory named “Huka” in the current directory (~) , with the command: mkdir

mkdir Huka

or

mkdir ./Huka

“mkdir” stands for “make **directory**”

```
khainguyen@khai:~$ ls
230Sam    Downloads  Miniconda3-py312_24.1.2-0-Linux-x86_64.sh  qiime2-amplicon-2024.2-py38-linux-conda.yml  snap
bin       ENTER      Music                                qiime2-import
card      Exercise_i opt                                 R
Desktop   localDB   Pictures                            r_ngs2amr
Documents ngs2amr Public                             shotgun
khainguyen@khai:~$ mkdir Huka
khainguyen@khai:~$ ls
230Sam    Downloads  ngs2amr                           Public
bin       ENTER      Miniconda3-py312_24.1.2-0-Linux-x86_64.sh  qiime2-amplicon-2024.2-py38-linux-conda.yml  shotgun
card      Exercise_i Music                             qiime2-import
Desktop   Huka      opt                               R
Documents localDB  Pictures                          r_ngs2amr
snap
Templates
Videos
khainguyen@khai:~$
```

Run “ls” to check

a new directory is created

# Create and remove directory

Create three directory named “Huki”, “Huka”, “Huke” in the current directory

```
mkdir Huki Huka Huke
```

Delete a **empty** directory named “Huka” in current directory, with command: rmdir

```
rmdir Huka
```

“rmdir” stands for “remove directory”

Delete a **non-empty** directory named “Huka” in current directory, with the command “rm”, option -r:

```
rm -r Huka
```

or

```
rm -R Huka
```

or

```
rm --recursive Huka/
```

“rm” stands for “remove”

```
rm --help
```

**-r, -R, --recursive** remove directories and their contents recursively

# Create and remove file

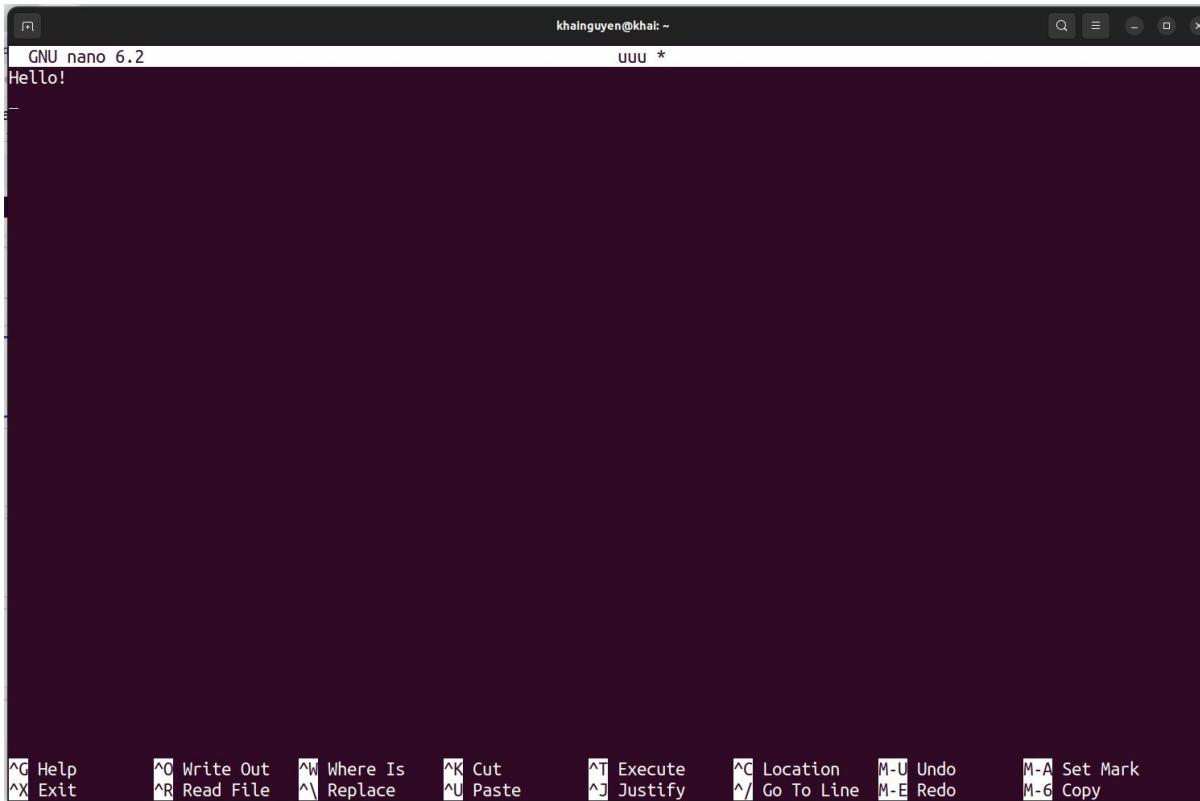
## Create and edit text file with nano, a text editor

1. Create a text file named "uuu" ("uuu" doesn't exist):

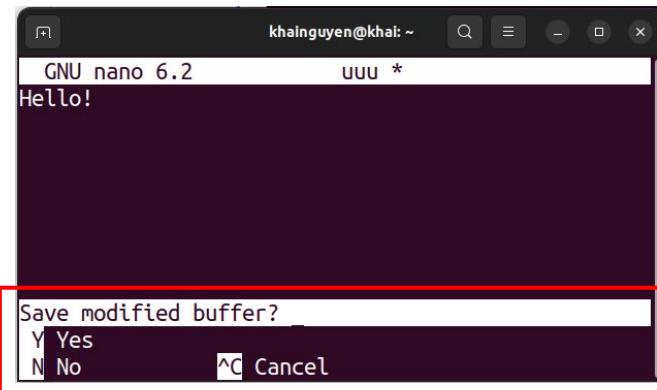
nano

or

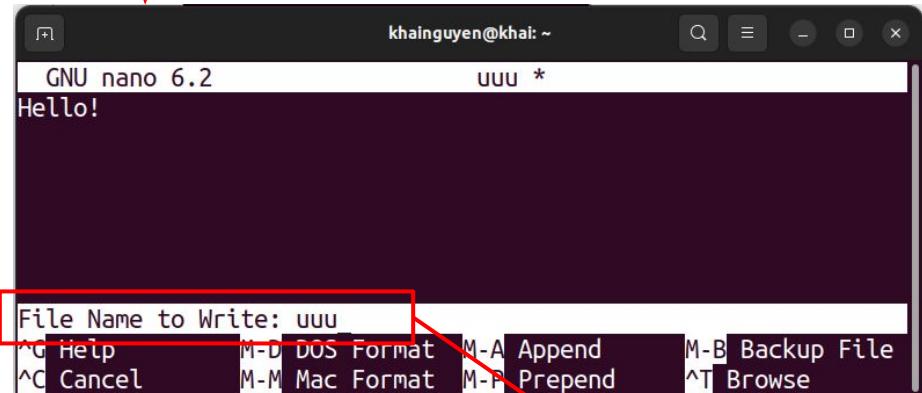
nano uuu



2. Exit nano: `ctrl + x`



3. Type "y" to save:



4. Finish: press ENTER key

Edit the file name if you don't want the name "uuu"

We can view the file "uuu" with nano by run (if the file exist in current directory):

```
nano uuu
```

Create a empty file named "uuu", with "touch" command :

```
touch uuu
```

Delete a (empty or non-empty) file named "uuu" in current directory, with the command "rm":

```
rm uuu
```

## View the file with another commands

View the file with command: less

```
khainguyen@khai:~$ less uuu
```

ENTER



```
dgdfg  
gdgdf  
dfgdfgd  
uuu (END)
```

press "q" key to quit

View the file with command: cat

```
khainguyen@khai:~$ cat uuu  
dgdfg  
gdgdf  
dfgdfgd
```

## Copy and move file/directory

**Copy a file named “uuu” in the current directory to ./Download/, with command: cp**

```
cp ./uuu ./Download/
```

“cp” stands for “**copy**”

**Copy three the file named “uuu”, “iii”, “yyy” in the current directory to./Download/**

```
cp ./uuu ./iii ./yyy ./Download/
```

or

```
cp uuu iii yyy ./Download/
```

or

```
cp ./{iii,yyy,uuu} ./Downloads/
```

**Create a copy of the file named "uuu" with a different name "ooo" in the current directory**

```
cp ./uuu ./ooo
```

**Copy a empty directory named “Huka” in the current directory to ./Download/**

```
cp ./Huka/ ./Download/
```

## Copy and move file/directory

Copy a **non-empty** directory named “Huka” in the current directory to ./Download/

```
cp -r ./Huka/ ./Download/
```

Move a file named “uuu” in the current directory to /home/khainguyen/Download/, with command: mv

```
mv ./uuu ./Download/
```

“mv” stands for “**move**”

Move a **empty** directory named “Huka” in the current directory to /home/khainguyen/Download/

```
mv ./Huka/ ./Downloads/
```

if Huka/ is a **non-empty** directory, add -r option:

```
mv -r ./Huka/ ./Downloads/
```

Rename a file named “uuu” to “eee”:

```
mv ./uuu ./eee
```

Rename a directory named “Huka” to “Huko”:

```
mv ./Huka/ ./Huko/
```

## Shortcuts:

- Ctrl-C stops the current in-progress command and/or

```
khainguyen@khai:~$ ls -l /var/_
```

Ctrl-C



```
khainguyen@khai:~$ ls -l /var/^C  
khainguyen@khai:~$ _
```

- Up arrow key: shows previous commands

```
khainguyen@khai:~$ _
```

- **history** command: will show the history of commands you have run.

## Shortcuts:

- Ctrl-A moves the cursor to the beginning of the line.
- Ctrl-E moves the cursor to the end of the line.
- Tab key automatically completes commands.

```
khainguyen@khai:~$ ls  
230Sam    ENTER      Minico  
bin       Exercise_1  Music  
card      Huka       opt  
Desktop   iii        Pictures  
Documents localDB    Public  
Downloads mgs2amr   qiime2
```

have the same "Do"

press tab a second time

type "c"

```
khainguyen@khai:~$ ls ./Do  
Documents/ Downloads/  
khainguyen@khai:~$ ls ./Doc_
```

press tab

```
khainguyen@khai:~$ ls ./Do  
Documents/ Downloads/  
khainguyen@khai:~$ ls ./Documents/_
```

- Ctrl-D exit the terminal.

## Summary

pwd	print working directory (or current directory) path
cd	change working directory
ls	Listing content (files and subdirectories) of the directory
clear	clean up all the command lines and results above
mkdir	create the directory
rmdir	delete the empty directory
rm	delete file
rm -r	delete non-empty (or empty) directory, delete file

## Summary

nano	a text editor: create, view, edit the text file
touch	create the empty file
less	view text file page by page
cat	Print the content of the text file to the terminal
cp	copy file/directory
mv	move file/directory, rename file/directory
man command_name	Instructions for using the command
command_name --help	

# Homework

1. Move to the “Documents” directory in “user\_name” directory in home directory. Use: cd

**Solve the questions below while **still** in the “Documents” directory**

1. Create 01 directory named “bio1” in “Documents” directory. Use: mkdir
2. Create 01 file named “chr1” in “bio1” directory. Use: touch or nano
3. Create 02 directories named “bio2” and “bio3” in “Documents” directory, with **one command line**. Use: mkdir
4. Create: 2 files named “chr2” and “chr3” in “bio2” directory, 2 files named “chr4” and “chr5” in “bio3” directory, with **one command line**. Use: mkdir
5. Copy “chr2” file into “bio1” directory, with a different name “c2”. Use: cp
6. Delete all newly created files and folders above, with **one command line**. Use: rm -r



ubuntu

# Basic Linux commands part 2

*Adapted and modified slides from Nguyen Quang Khai*

Nov 9, 2025

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HuyHa

## Summary

pwd	print working directory (or current directory) path
cd	change working directory
ls	Listing content (files and subdirectories) of the directory
clear	clean up all the command lines and results above
mkdir	create the directory
rmdir	delete the empty directory
rm	delete file
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## Summary

nano	a text editor: create, view, edit the text file
touch	create the empty file
less	view text file page by page
cat	Print the content of the text file to the terminal
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mv	move file/directory, rename file/directory
man command_name	Instructions for using the command
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# Homework

1. Move to the “Documents” directory in “user\_name” directory in home directory. Use: cd

**Solve the questions below while **still** in the “Documents” directory**

1. Create 01 directory named “bio1” in “Documents” directory. Use: mkdir
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5. Copy “chr2” file into “bio1” directory, with a different name “c2”. Use: cp
6. Delete all newly created files and folders above, with **one command line**. Use: rm -r

# Contents

## I. Working with text file.

1. Search and filter.
2. Input/output redirection.

## II. Some other commands

3. Download file.
4. File permission.
5. Compress and decompress.

# 1. Search and filter

# Search and filter

**find command:** search for files or directories in a directory

**Search for files and directories named "vui", with -name option:**

```
khainguyen@khai:~$ find -name vui  
./Documents/new/vui  
./Documents/vui  
khainguyen@khai:~$ _
```

**Search for directories named "vui", with -type option, d means directory:**

```
khainguyen@khai:~$ find -type d -name vui  
./Documents/vui  
khainguyen@khai:~$ _
```

**Search for files named "vui", with -type option, f means file:**

```
khainguyen@khai:~$ find -type f -name vui  
./Documents/new/vui  
khainguyen@khai:~$ _
```

**don't remember the file name clearly, but there is "vu" at the beginning of the name:**

```
khainguyen@khai:~$ find -type f -name vu*  
./var/app/com.usebottles.bottles/data/bottles/templates/ea3c7b87-f330-4eca-88df-29652  
1338473/drive_c/windows/system32/vulkan-1.dll  
./var/app/com.usebottles.bottles/data/bottles/templates/ea3c7b87-f330-4eca-88df-29652  
1338473/drive_c/windows/syswow64/vulkan-1.dll  
./var/app/com.usebottles.bottles/data/bottles/bottles/Chat/drive_c/users/khainguyen/A  
ppData/Local/Programs/Zalo/Zalo-23.10.1/vulkan-1.dll
```

\* means zero or any characters

# Search and filter

**head command:** prints the first few lines in the file

**Default:** prints the first 10 lines in the file:

```
khainguyen@khai:~$ cat view.txt  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
khainguyen@khai:~$ head view.txt  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
khainguyen@khai:~$ _
```

**print the first #number lines instead of the first 10**

```
khainguyen@khai:~$ cat view.txt  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
khainguyen@khai:~$ head -3 view.txt  
1  
2  
3  
khainguyen@khai:~$ _
```

## Search and filter

**tail command:** prints the last few lines in the file

**Default:** prints the last 10 lines in the file:

```
khainguyen@khai:~$ cat view.txt  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
khainguyen@khai:~$ tail view.txt  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
khainguyen@khai:~$ _
```

**print the last #number lines instead of the last 10**

```
khainguyen@khai:~$ cat view.txt  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
khainguyen@khai:~$ tail -5 view.txt  
9  
10  
11  
12  
13  
khainguyen@khai:~$ _
```

## Search and filter

**wc command:** print newline, word, and byte counts for each given file

**Default:**

```
khainguyen@khai:~$ cat view.txt
1 a
2
3
4
5
6
7
8
9
10
11
12
13
khainguyen@khai:~$ wc view.txt
13 14 32 view.txt
khainguyen@khai:~$ _
```

13 lines, 14 words, 32 bytes

**select which counts are printed:**

```
khainguyen@khai:~$ wc --lines view.txt
13 view.txt
khainguyen@khai:~$ _
```

```
khainguyen@khai:~$ wc --words view.txt
14 view.txt
khainguyen@khai:~$ _
```

```
khainguyen@khai:~$ wc --bytes view.txt
32 view.txt
khainguyen@khai:~$ _
```

# Search and filter

**cut command:** Print selected parts of lines from each FILE

```
khainguyen@khai:~$ cat state.txt
Andhra Pradesh
Arunachal Pradesh
Assam
Bihar
Chhattisgarh
khainguyen@khai:~$ _
```

Print the 3rd character, 5th to 7th characters of the file:

```
khainguyen@khai:~$ cut --characters 3,5-7 state.txt
dra
uach
sm
hr
htt
khainguyen@khai:~$ _
```

Specify fields separated by a space, printing the 2nd field:

```
khainguyen@khai:~$ cut --delimiter " " --fields 2 state.txt
Pradesh
Pradesh
Assam
Bihar
Chhattisgarh
khainguyen@khai:~$ _
```

use --only-delimited option: do not print lines not containing delimiters

```
khainguyen@khai:~$ cut --delimiter " " --fields 2 --only-delimited state.txt
Pradesh
Pradesh
khainguyen@khai:~$ _
```

# Search and filter

**grep command:** print lines that match patterns

**Default: case-sensitive**

```
khainguyen@khai:~$ cat state.txt
Andhra Pradesh
Arunachal Pradesh
Assam
Bihar
Chhattisgarh
khainguyen@khai:~$ grep "pra" state.txt
khainguyen@khai:~$ grep "Pra" state.txt
Andhra Pradesh
Arunachal Pradesh
khainguyen@khai:~$
```

**--ignore-case option: case-insensitive**

```
khainguyen@khai:~$ grep --ignore-case "pra" state.txt
Andhra Pradesh
Arunachal Pradesh
khainguyen@khai:~$
```

**--line-number option:** Display the matched lines and their line numbers.

```
khainguyen@khai:~$ grep --line-number --ignore-case "pra" state.txt
1:Andhra Pradesh
2:Arunachal Pradesh
khainguyen@khai:~$
```

**--count option:** print a count of matching lines

```
khainguyen@khai:~$ grep --count --ignore-case "pra" state.txt
2
khainguyen@khai:~$
```

**--invert-match option:** print non-matching lines

```
khainguyen@khai:~$ grep --count --invert-match --ignore-case "pra" state.txt
3
khainguyen@khai:~$
```

case-sensitive  
abc ≠ ABC

case-insensitive  
abc = ABC

## 2. input/output redirection

# input/output redirection

## Piping

Pipe is formed using **the vertical dash |**

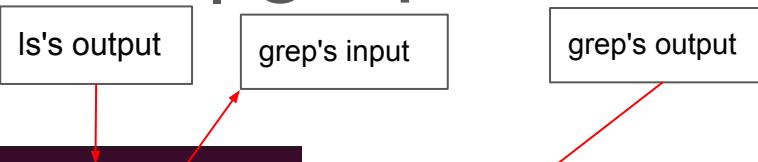
A | B |    output of command A will be input of B command.

A | B | C    output of command A will be input of B command, output of command B will be input of C command.

The pipe is used to combine two or more commands.

Example:

ls | grep "Do"



```
khainguyen@khai:~$ ls
230Sam      mgs2amr
bin        Miniconda3-py312_24.1.2-0-Linux-x86_64.sh
card       Music
Desktop    ooo
Documents   opt
Downloads  Pictures
ENTER      Public
Exercise_1 qiime2-amplicon-2024.2-py38-linux-conda.yml
localDB    qiime2-import
khainguyen@khai:~$
```

```
khainguyen@khai:~$ ls | grep "Do"
Documents
Downloads
khainguyen@khai:~$
```

# input/output redirection

## Output redirection: The ">" character

To redirect output to a file

```
khainguyen@khai:~$ ls | grep "Do" > view.txt
khainguyen@khai:~$ cat view.txt
Documents
Downloads
khainguyen@khai:~$ _
```

If the view.txt file already exists, its content will be overwritten

```
khainguyen@khai:~$ cat view.txt
Picture
Videos
khainguyen@khai:~$ ls | grep "Do" > view.txt
khainguyen@khai:~$ cat view.txt
Documents
Downloads
khainguyen@khai:~$ _
```

# input/output redirection

If you do not want the content to be overwritten, use the ">>" character

```
khainguyen@khai:~$ cat view.txt  
Picture  
Videos  
khainguyen@khai:~$ ls | grep "Do" >> view.txt  
khainguyen@khai:~$ cat view.txt  
Picture  
Videos  
Documents  
Downloads  
khainguyen@khai:~$ _
```

```
khainguyen@khai:~$ cat view.txt  
1 a  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13
```

Input redirection: The "<" character

```
khainguyen@khai:~$ grep -n "8" < view.txt  
8:8
```

# 3. Download file

# Download file

**wget command:** Downloader

**Default: Download file from a URL**

```
khainguyen@khai:~/Documents$ wget http://linuxcommand.org/index.php
--2024-05-15 19:08:44-- http://linuxcommand.org/index.php
Resolving linuxcommand.org (linuxcommand.org)... 216.105.38.11
Connecting to linuxcommand.org (linuxcommand.org)|216.105.38.11|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3929 (3,8K) [text/html]
Saving to: 'index.php'

index.php          100%[=====] 3,84K  --.-KB/s   in 0s

2024-05-15 19:08:45 (542 MB/s) - 'index.php' saved [3929/3929]

khainguyen@khai:~/Documents$ ls
index.php
khainguyen@khai:~/Documents$ _
```

**--output-document option: download file from URL, with a different name**

```
khainguyen@khai:~/Documents$ wget --output-document "edit.php" http://linuxcommand.org/index.php
--2024-05-15 19:11:22-- http://linuxcommand.org/index.php
Resolving linuxcommand.org (linuxcommand.org)... 216.105.38.11
Connecting to linuxcommand.org (linuxcommand.org)|216.105.38.11|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3929 (3,8K) [text/html]
Saving to: 'edit.php'

edit.php          100%[=====] 3,84K  --.-KB/s   in 0s

2024-05-15 19:11:23 (492 MB/s) - 'edit.php' saved [3929/3929]

khainguyen@khai:~/Documents$ ls
edit.php
khainguyen@khai:~/Documents$ _
```

## Download file

--input-file option: download from multiple URL

1. Create a text file containing URLs, each line includes a URL, use: nano.

```
khainguyen@khai:~/Documents$ cat link_down.txt
http://linuxcommand.org/index.php
http://linuxcommand.org/lc3_resources.php
http://linuxcommand.org/tlcl.php
khainguyen@khai:~/Documents$ _
```

2. wget --input-file link\_down.txt

```
khainguyen@khai:~/Documents$ wget --input-file link_down.txt
```

# 4. File permission

## When run: ls -l

drwx-----	7	khainguyen	4096	Thg	10	24	2023	snap
drwxr-xr-x	2	khainguyen	4096	Thg	10	8	2023	Templates
drwxr-xr-x	3	khainguyen	4096	Thg	10	27	2023	Videos

Diagram illustrating the breakdown of file permissions from the ls -l output:

- user (or owner) permission:** Points to the first column of permissions (blue box).
- group permission:** Points to the second column of permissions (orange box).
- other permission:** Points to the third column of permissions (green box).
- Owner of file (user\_name):** Points to the fourth column (red box).
- user group:** Points to the fifth column (cyan box).

Meaning of r, w, x, -:

**r** = readable

**w** = writeable

**x** = executable

- = denied

### snap directory

- User permission: read (yes), write (yes), execute (yes).
- Group permission: read (no), write (no), execute (no).
- Other permission: read (no), write (no), execute (no).

### Templates directory

- User permission: read (yes), write (yes), execute (yes).
- Group permission: read (yes), write (no), execute (yes).
- Other permission: read (yes), write (no), execute (yes).

## Permission Attributes

Attribute	Files	Directories
r	Allows a file to be opened and read.	Allows a directory's contents to be listed if the execute attribute is also set.
w	Allows a file to be written to or truncated; however, this attribute does not allow files to be renamed or deleted. The ability to delete or rename files is determined by directory attributes.	Allows files within a directory to be created, deleted, and renamed if the execute attribute is also set.
x	Allows a file to be treated as a program and executed. Program files written in scripting languages must also be set as readable to be executed.	Allows a directory to be entered, e.g., <code>cd directory</code> .

# chmod: Change File Mode

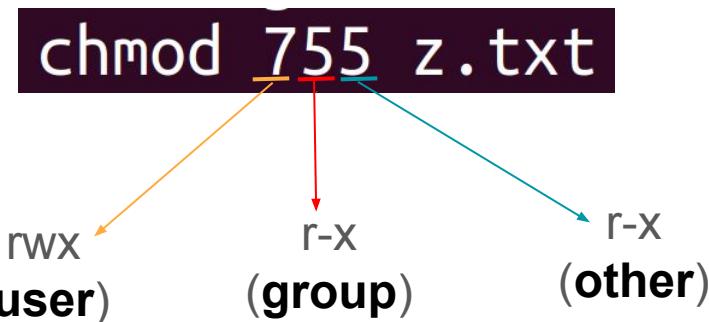
To change the mode (permissions) of a file or directory, use the **chmod** command.

chmod supports **two distinct ways** of specifying mode changes:

## 1. Octal number representation

Octal	Binary	File mode
0	000	---
1	001	--x
2	010	-w-
3	011	-wx
4	100	r--
5	101	r-x
6	110	r-w-
7	111	rwx

File Modes in Binary and Octal



```
khainguyen@khai:~/Documents/new$ ls -l
total 0
----- 1 khainguyen khainguyen 0 Thg 5 16 21:44 z.txt
khainguyen@khai:~/Documents/new$ chmod 755 z.txt
khainguyen@khai:~/Documents/new$ ls -l
total 0
-rwxr-xr-x 1 khainguyen khainguyen 0 Thg 5 16 21:44 z.txt
khainguyen@khai:~/Documents/new$ _
```

# chmod: Change File Mode

## 2. Symbolic representation

Symbol	Meaning
u	Short for "user" but means the file or directory owner.
g	Group owner.
o	Short for "others" but means world.
a	Short for "all." This is a combination of u, g, and o.

### chmod Symbolic Notation

If no character is specified, "all" will be assumed.

- + a permission is to be added.
- a permission is to be taken away.
- = only the specified permissions are to be applied and that all others are to be removed.

#### Permission:

- r readable
- w writeable
- x executable

```
khainguyen@khai:~/Documents/new$ ls -l
total 0
----- 1 khainguyen khainguyen 0 Thg 5 16 21:44 z.txt
khainguyen@khai:~/Documents/new$ chmod u+rx,o+xw z.txt
khainguyen@khai:~/Documents/new$ ls -l
total 0
-rwx---wx 1 khainguyen khainguyen 0 Thg 5 16 21:44 z.txt
```

```
-rwx---wx 1 khainguyen khainguyen 0 Thg 5 16 21:44 z.txt
khainguyen@khai:~/Documents/new$ chmod a=r z.txt
khainguyen@khai:~/Documents/new$ ls -l
total 0
-r--r--r-- 1 khainguyen khainguyen 0 Thg 5 16 21:44 z.txt
```

```
-r--r--r-- 1 khainguyen khainguyen 0 Thg 5 16 21:44 z.txt
khainguyen@khai:~/Documents/new$ chmod ug+wx z.txt
khainguyen@khai:~/Documents/new$ ls -l
total 0
-rwxrwxr-- 1 khainguyen khainguyen 0 Thg 5 16 21:44 z.txt
```

# 5. Compress and decompress

# Compress and decompress

**tar command:** compress and decompress

**Compress all files and directories in the “Documents” directory to a compressed file named “doc.tar.gz”**

-c --create: create a new archive file

-z, --gzip: Using gzip to compress

```
khainguyen@khai:~/Documents$ ls
index.php  lc3_resources.php  link_down.txt  new  tlcl.php  vui
khainguyen@khai:~/Documents$ tar cvzf doc.tar.gz ..../Documents/
tar: Removing leading `../' from member names
./Documents/
./Documents/link_down.txt
./Documents/lc3_resources.php
./Documents/index.php
./Documents/new/
./Documents/new/Ani.txt
./Documents/new/vui
./Documents/new/z.txt
./Documents/tlcl.php
./Documents/vui/
tar: ./Documents: file changed as we read it
khainguyen@khai:~/Documents$ ls
doc.tar.gz  index.php  lc3_resources.php  link_down.txt  new  tlcl.php  vui
khainguyen@khai:~/Documents$ _
```

The diagram shows a terminal session for compressing files. A red box highlights the directory path ..../Documents/. Three arrows point from specific parts of the command to their meanings: one arrow points from 'tar cvzf' to '-f or --file: compressed file name', another from '..../Documents/' to '-v or --verbose: Verbosely list files processed', and a third from 'doc.tar.gz' to '-z, --gzip: Using gzip to compress'.

The four options "-c -v -z -f" can be written as "cvzf"

# Compress and decompress

Decompress a compressed file named “doc.tar.gz”

```
khainguyen@khai:~/Documents$ ls  
doc.tar.gz index.php lc3_resources.php link_down.txt new tlcl.php vui  
khainguyen@khai:~/Documents$ tar xvf doc.tar.gz  
Documents/  
Documents/link_down.txt  
Documents/lc3_resources.php  
Documents/index.php  
Documents/new/  
Documents/new/Ani.txt  
Documents/new/vui  
Documents/new/z.txt  
Documents/tlcl.php  
Documents/vui/  
khainguyen@khai:~/Documents$ ls  
doc.tar.gz index.php link_down.txt tlcl.php  
Documents lc3_resources.php new vui  
khainguyen@khai:~/Documents$ ls ./Documents/  
index.php lc3_resources.php link_down.txt new tlcl.php vui  
khainguyen@khai:~/Documents$
```

-x, --extract: Extract files from an archive.

## Summary

find	search for files or directories in a directory
head	prints the first few lines in the file
tail	prints the last few lines in the file
wc	print newline, word, and byte counts for each given file
cut	Print selected parts of lines from each FILE
grep	print lines that match patterns

# Summary

	pipe
“>”, “>>”	output redirection
“<”	input redirection
wget	download file from <link>
chmod	Change File Mode
tar	compress and decompress

# Homeworks

1. Create a directory named "hw2".
2. Move to "hw2" directory, and download this file (SRR25653406.fasta.tar.gz) using wget command:

[https://github.com/UeenHuynh/MGMA\\_2024/raw/main/lecture\\_2/2.%20basic%20Linux%20commands%20part%202/SRR25653406.fasta.tar.gz](https://github.com/UeenHuynh/MGMA_2024/raw/main/lecture_2/2.%20basic%20Linux%20commands%20part%202/SRR25653406.fasta.tar.gz)

3. Decompressing this file SRR25653406.fasta.tar.gz using tar command.

## Additional information about FASTA format (The file has the extension .fasta, .faa, .fna, etc.):

FASTA format is a text-based format, contains two lines:

- First line: is the comment (description) line.
  - + Always starts with ">" sign (This information is useful for the exercise).
  - + Give basic information about the sequence (nucleotide or amino acid).
- Second line: The actual sequence of the first line description, using a standard one-letter character string.

Example:

```
>M35309.1 E.coli 16S rRNA fragment
GGCATGAAGACACACTGCTAACCTCCGAATACGCACAAGCCGTAATGGAGCGACGGTGGGCCTTGTCCCC
GTGCCCGATGTGGGTGGAGGTGACTGTGGTTGTGATATTGGGGAGGCAAAAGAAGTAGCGAGTCTA
ACCTTGCTTACCACTTGCCTAATACGGGAAACG
```

(<https://www.ncbi.nlm.nih.gov/nuccore/M35309.1?report=fasta>)

=> Let's call this single-sequence FASTA format ([https://en.wikipedia.org/wiki/FASTA\\_format](https://en.wikipedia.org/wiki/FASTA_format)), so if a text file contains a single-sequence FASTA format, this file is called a single-sequence FASTA file.

If a text file contains two or more single-sequence FASTA format, this file is called a multiple-sequence FASTA file or multi-FASTA file.

# Homeworks

An example of multi-FASTA format :

The diagram illustrates the multi-FASTA format. It consists of three entries, each enclosed in a pink rounded rectangle. Each entry has a 'Header' line (labeled 'Header') followed by a 'Sequence' line (labeled 'Sequence'). The first entry's header is '>VIT\_201s0011g03530.1' and its sequence starts with 'AATTAAGCATAAACTACTCTTACCCCTTATTTCTTATCTCATCACTTTGGTGCAGAAG'. The second entry's header is '>VIT\_201s0011g03540.1' and its sequence starts with 'GACCATGAGAACAGCTGCAATGGGTAGGGTCTCGAAGGCATGCAGCCAAGACTGCATCA'. The third entry's header is '>VIT\_201s0011g03550.1' and its sequence starts with 'CAGGTAGCGTGAAGTTAACCTAGCGCTTAGACAAACAGCTGTAGTCACGCCACAAACACC'. The sequence lines are continued with several more lines of DNA sequence.

```
>VIT_201s0011g03530.1
AATTAAGCATAAACTACTCTTACCCCTTATTTCTTATCTCATCACTTTGGTGCAGAAG
GACCATGAGAACAGCTGCAATGGGTAGGGTCTCGAAGGCATGCAGCCAAGACTGCATCA
>VIT_201s0011g03540.1
CAGGTAGCGTGAAGTTAACCTAGCGCTTAGACAAACAGCTGTAGTCACGCCACAAACACC
AGCCTCTGAGACACCACCTAACACCTTCCACTAAATACACATCCCTCACACCCTTTCAATT
>VIT_201s0011g03550.1
CATGCAAAGCTGAACCGCATGCTGTGATTGGTGGTAAGTGGTAGTTGAGTAATTTGACAGTGAA
GCCGAAATGGTAAAGACTAAGGCTAGAAGTAGAATACCACTGTTCTCATCACGTGGGCCA
```

([https://www.researchgate.net/figure/A-sample-of-the-Multi-FASTA-file\\_fig1\\_309134977](https://www.researchgate.net/figure/A-sample-of-the-Multi-FASTA-file_fig1_309134977))

**Additional information for this file: SRR25653406.fasta (after decompressing using tar command).**

- This is a multi-FASTA file. It is converted from fastq to fasta format file (Don't worry about fastq format in this exercise), the original fastq format file is obtained from the sequencing machine.
- Each single-sequence FASTA in this file is information about **a read** - a piece of DNA sequence obtained from the sequencing machine:
  - + First line: some information about the sequencing platform of this file, that's all, don't worry about the details.
  - + Second line: DNA sequence of that **read**, a character string consisting of 4 types of letters: A, T, G, C representing 4 types of nucleotides. In addition, there is the letter N, which means 1 of 4 possible types of nucleotides, because the sequencing machine cannot identify which type of nucleotide it is.

# Homeworks

A single-sequence FASTA in this file:

```
>SRR25653406.lite.3.8 M02606:41:000000000-J3RLF:1:1101:8131:2344 length=200
TTGGTCCAGCAGGCTATTGCTGGATTGCTTAGCTTCGGGATCCATTATTGGCGGTGTGCTCATCTACCACTTCAAACATTATAGAGCGGGGTG
ATGTGGTAAACACGGGGCGAACATGACTTACCGAACATAACTAACACTATGTATTGATAGGCTTCAATGAACACTATCAATATGATACCGAA
```

(The DNA sequence has 2 lines because the screen is not enough to display 1 line, so it is split into 2 lines)

4. How many lines does this file have? Using: wc.
5. How many reads does this file have? Using: grep for the search “^>” means the line starts with the character ">", and -c option.
6. How many reads **do not have any N**? Using: grep with -v, -c option; pipe.
7. Create a file named "id\_read.txt" containing only the first line (the line contains information) of all reads. Using: grep with “^v”; output redirection.

# Homeworks

8. Create a file named "part\_of\_id\_read.txt" containing **a part of the first line** (the line contains information) of **all reads**. Using: grep; pipe; cut; output redirection.

Two lines of 1 read:

```
>SRR25653406.lite.3.8 M02606:41:000000000-J3RLF:1:1101:8131:2344 length=200
TTTGGTCCAGCAGGCTATTGCTGGATTGTTAGCTTTCGGGATCCATTTATTGGCGGTGTGCTCATCTACCATTCCAACATTATAAGAGCGGCGTGTGG
ATGTTAAACACGGGGCGAATGACTTACCGAACATAACTCAACACTATGTATTGATAGGCTTCAATGAACTAACTATCAATATGATACCGCAA
```

(The line containing the DNA sequence has 2 lines because the screen is not enough to display 1 line, so it is split into 2 lines).

**a part of the first line of 1 reads:**

```
M02606:41:000000000-J3RLF:1:1101:8131:2344
```