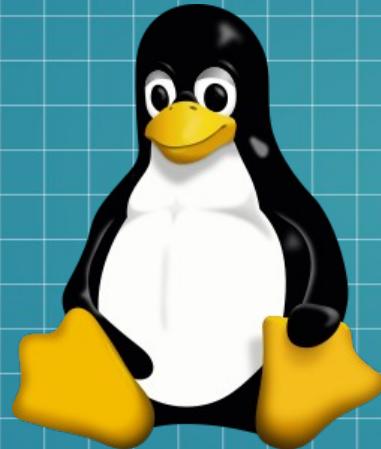
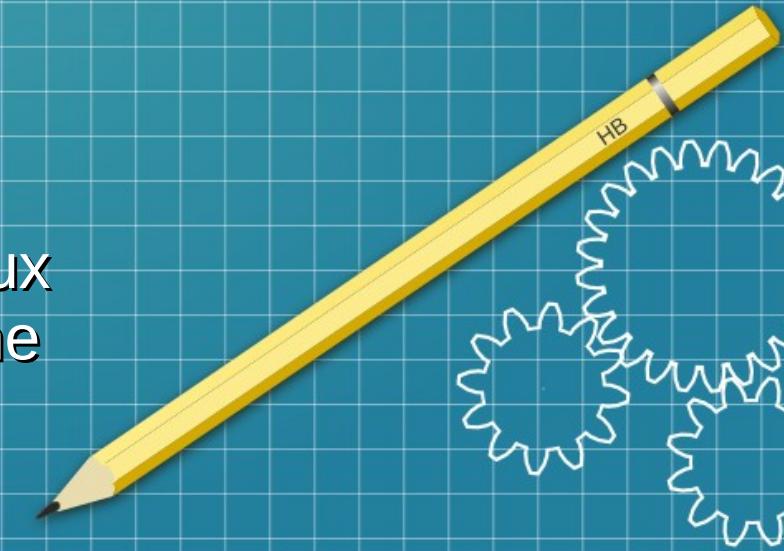


Linux



An introduction to Linux
and the command line



BIOS



- Few definitions : to understand each other !
- Live Test or Hard Drive Installation ?
- Linux Fundamentals
- Ubuntu 20.04 LTS / Ubuntu 22.04 LTS
- Why use Linux ?
- The command line

Definitions



Computer

Software

Operating system

Computer ?



1 – Equipment giving access to digital content

- Desktop PC, laptop PC
- Pad, smartphone
- TV, game console

2 - Equipment connected to internet

- Internet of Things (IoT)



Software ?



**« The digital tool you used to interact with
a computer »**

Synonymous of « software »

- Program
- Code
- Application
- ****ware

The 4 Essential Freedom of Software



- 1) The freedom to use a software « Execution »
 - 2) The freedom to copy a sofware « Distribution »
 - 3) **The freedom to study a software** « Source code »
 - 4) The freedom to modify a software « Edition »
-
- Depending on the access to these « freedoms » it is possible to classify software in 2 categories ...

Software categories



- Proprietary : none or **1)**
- Free : **1)**, and/or **2)** and/or **3)** and/or **4)**

... like any other product software is (or should be) protected, by what is called a user license. There are many kind of Free (Open Source) software licenses that differ based on the access to the 4 Freedoms.

Open source software licences : GPL, BSD, Apache, Creative commons

Proprietary software



- Proprietary = someone owns the software (**not you**) and sells you access to some of the 4 Freedoms, usually only **1)**

Hack proprietary software ?

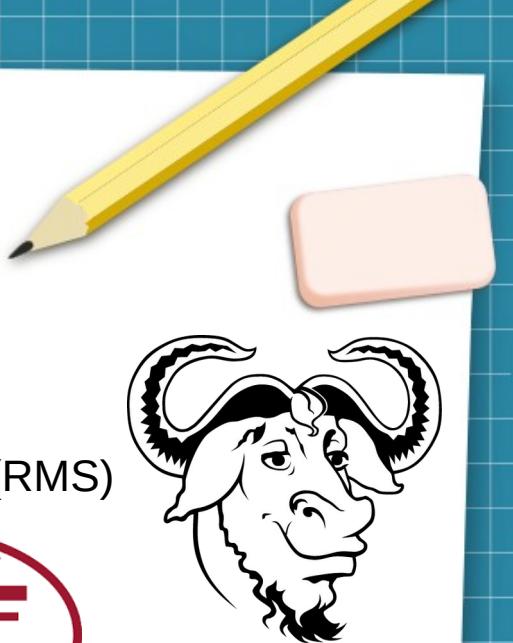


- That is wrong bouuuuuuhhhhhh
- Who does (did) it among you ?
- Why ?
 - Games ?
 - Anything else ?
- How much of the software capabilities where you using ?
- What if there was something better ? ...

Open Source Software



Open Source Software



A little bit of history:

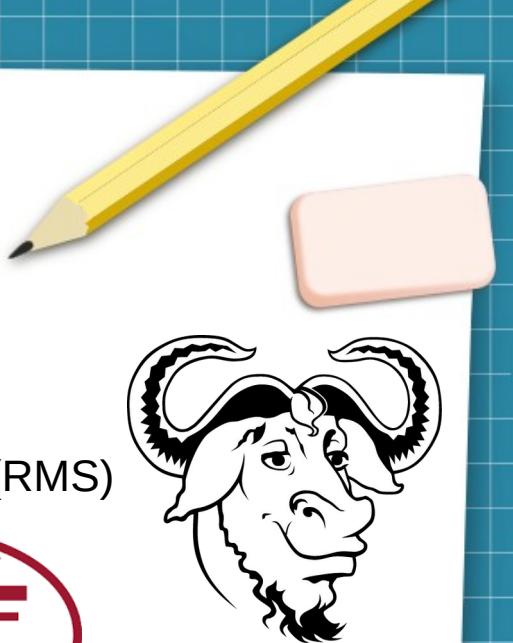
- **1983** : Creation of GNU and the GPL license by **Richard M. Stallman (RMS)**
- **1985** : Creation of the **Free Software Foundation** by RMS
- **1991** : Linux is developed by **Linus Torvalds**
- **2004** : Open source software officially enter UNESCO world heritage



Open Source Software



Open Source Software



A little bit of history:

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Famous Open Source Software

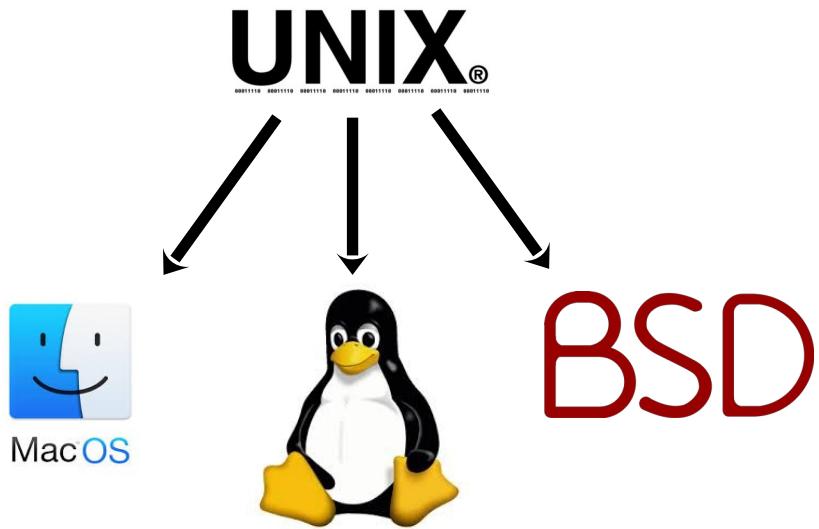
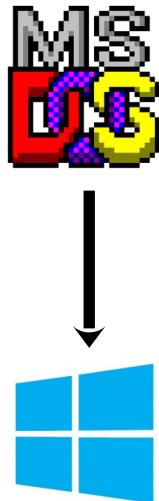


Operating System



« The first program that will start when you turn on your computer, without it is not possible to use other programs »

- Short name « **OS** », Système d'Exploitation « **SE** »



Operating Systems ?!



Android: **40.5%**



Windows: **34.2%**



MacOS



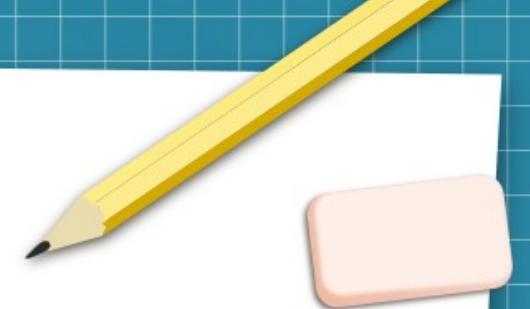
iOS



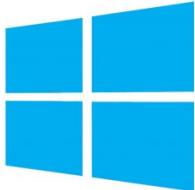
Linux: **1%**

Proportion of each OS **all devices** considered

Operating Systems ?!



Android: **40.5%**



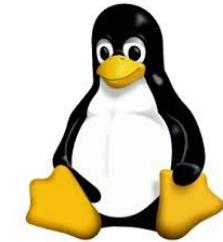
Windows: **34.2%**



Mac OS



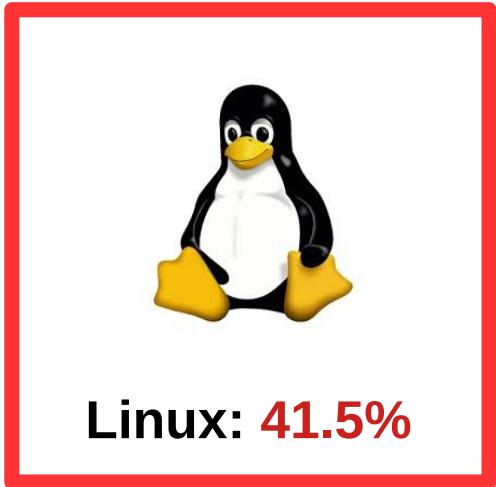
iOS



Linux: **1%**

Proportion of each OS **all devices** considered

The Operating System !



Windows: **34.2%**



Mac**OS**



iOS

OSX+iOS: **22.3%**

Proportion of each OS **all devices** considered

Linux Distributions: GNU/Linux

- A set of open source software composed of:
 - **Linux system** (“Kernel” or “Noyau”)
 - **Complementary and pre-installed / pre-parametrized software**
 - A graphical user interface
 - An office suite
 - Web browsers and mail readers
 - Multimedia packages ... and many more !



GNU components



Linux Distributions: GNU/Linux

- A set of open source software composed of:
 - **Linux system** (“Kernel” or “Noyau”)
 - **Complementary and pre-installed parametrized software**
 - A graphical user interface
 - An office suite
 - Web browsers and servers
 - Multimedia packages
- Up to 20 000 !!!**
- any more !



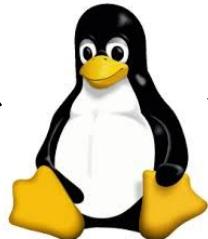
GNU components



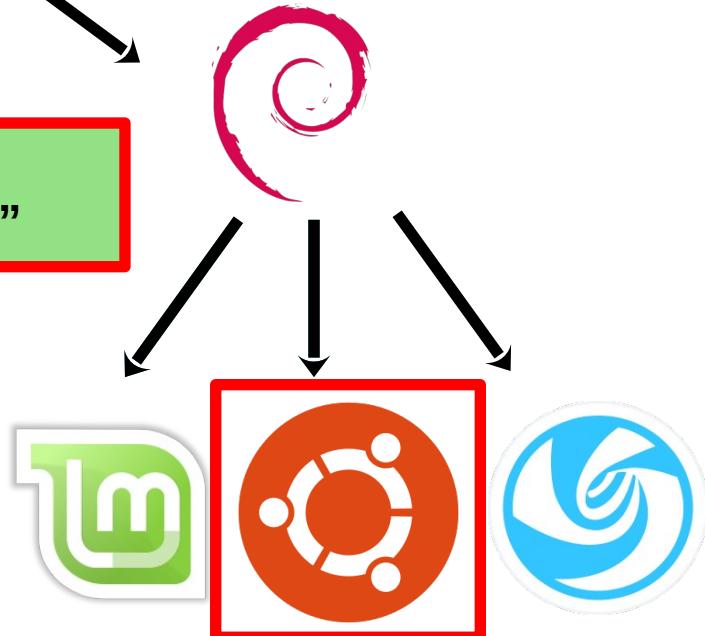
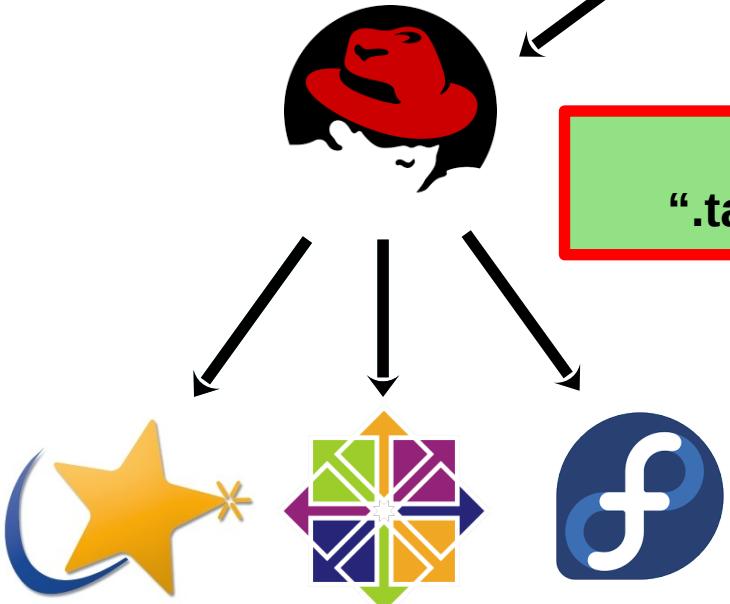
Linux Distributions

Red Hat Package Manager
“.rpm”

Debian Package Manager
“.deb”

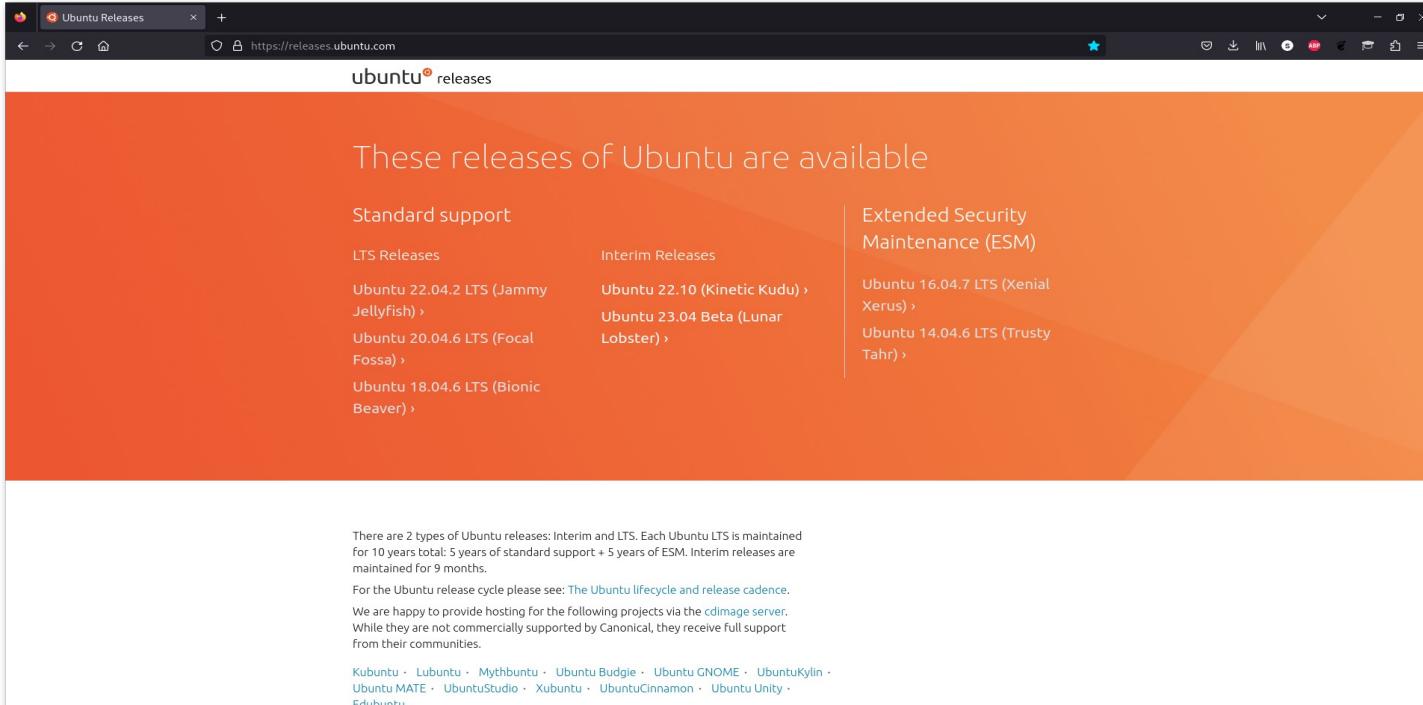


Sources Codes
“.tar.gz” or “.tar.bz2”



Linux Distribution: Which One ?

- Ubuntu is the best choice for beginners !



The screenshot shows a web browser window with the title "Ubuntu Releases". The URL in the address bar is <https://releases.ubuntu.com>. The page content is as follows:

These releases of Ubuntu are available

Standard support	Interim Releases	Extended Security Maintenance (ESM)
LTS Releases	Ubuntu 22.10 (Kinetic Kudu) › Ubuntu 23.04 Beta (Lunar Lobster) ›	Ubuntu 16.04.7 LTS (Xenial Xerus) › Ubuntu 14.04.6 LTS (Trusty Tahr) ›
Ubuntu 22.04.2 LTS (Jammy Jellyfish) › Ubuntu 20.04.6 LTS (Focal Fossa) › Ubuntu 18.04.6 LTS (Bionic Beaver) ›		

There are 2 types of Ubuntu releases: Interim and LTS. Each Ubuntu LTS is maintained for 10 years total: 5 years of standard support + 5 years of ESM. Interim releases are maintained for 9 months.

For the Ubuntu release cycle please see: [The Ubuntu lifecycle and release cadence](#).

We are happy to provide hosting for the following projects via the [cdimage server](#). While they are not commercially supported by Canonical, they receive full support from their communities.

[Kubuntu](#) · [Lubuntu](#) · [Mythbuntu](#) · [Ubuntu Budgie](#) · [Ubuntu GNOME](#) · [UbuntuKylin](#) · [Ubuntu MATE](#) · [UbuntuStudio](#) · [Xubuntu](#) · [UbuntuCinnamon](#) · [Ubuntu Unity](#) · [Edubuntu](#)



<https://releases.ubuntu.com/>

or

<https://ubuntu.com/download/desktop>

Linux Distribution: Which One ?



These releases of Ubuntu are available

Ubuntu 18.04.6 LTS (Bionic Beaver) ›

Ubuntu 16.04.7 LTS (Xenial Xerus) ›

Ubuntu 20.04.3 LTS (Focal Fossa) ›

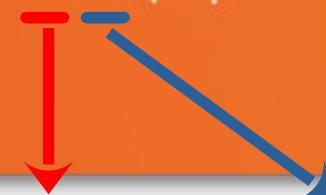
Ubuntu 21.04 (Hirsute Hippo) ›

Ubuntu 21.10 (Impish Indri) ›

LTS = Long Term Support = 5 years support

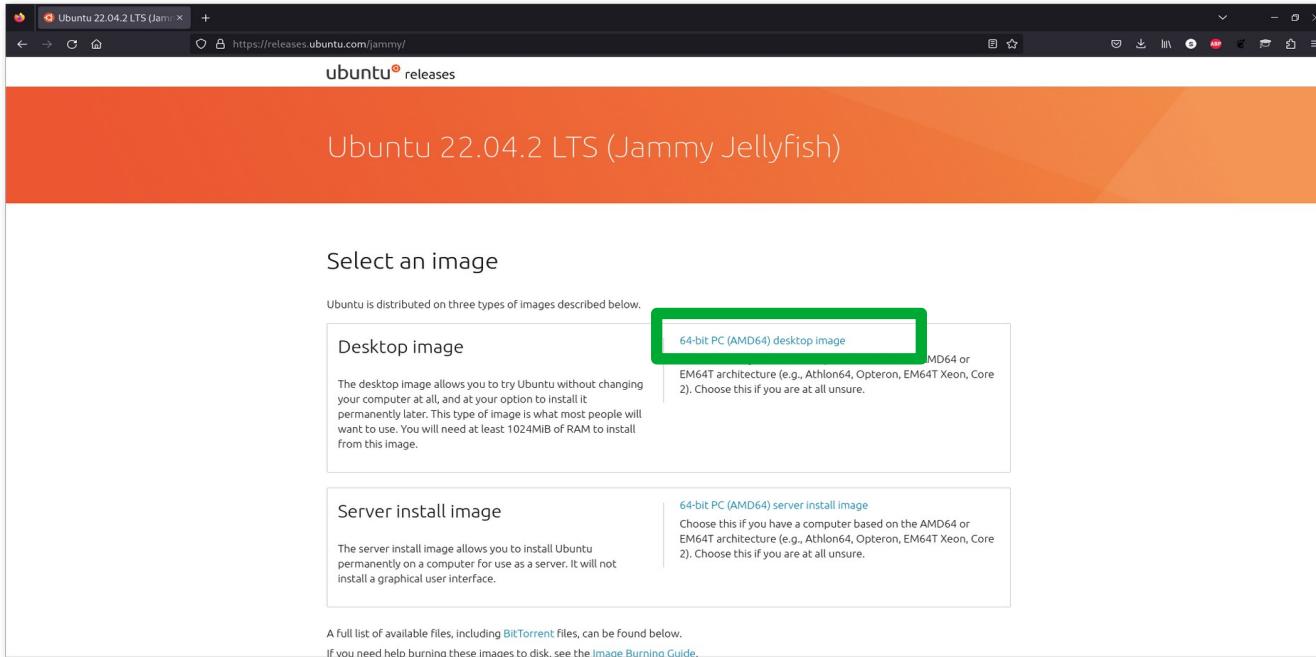
Year

Month



Linux Distribution: Ubuntu 22.04.2 LTS

- Code name “Jammy Jellyfish”



<https://releases.ubuntu.com/focal/ubuntu-22.04.2-desktop-amd64.iso>

Linux Distribution: Ubuntu 22.04.3 LTS



Ubuntu 22.04.2 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, guaranteed until April 2027.

[Ubuntu 22.04 LTS release notes](#)

Recommended system requirements:

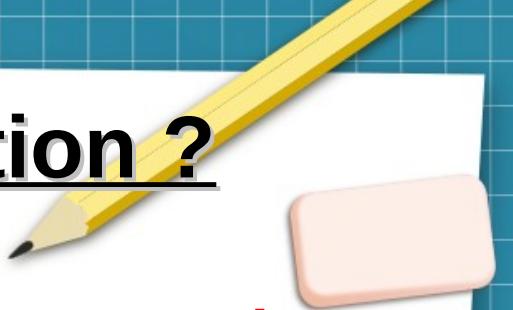
- ✓ 2 GHz dual-core processor or better
- ✓ 4 GB system memory
- ✓ 25 GB of free hard drive space
- ✓ Internet access is helpful
- ✓ Either a DVD drive or a USB port for the installer media



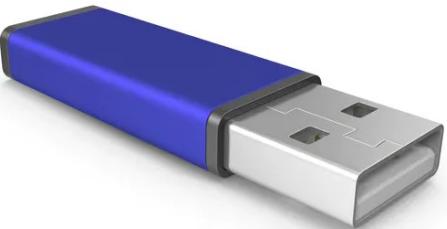
[Download](#)

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

Live Test or Hard Drive Installation ?



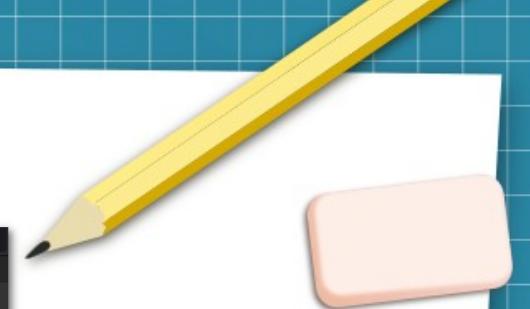
- **Live test:** no risk for your hard drive: **that's the easy way !**



Hard drive installation:

- Be careful not to wipe out everything when you install Linux !
- Multiple boot is possible (to have multiple OS on the same computer)
 - **Linux can see MS Windows partition(s)**
 - **MS Windows can not see Linux partition(s)**
- Ask for help !

Preparing the USB key



https://ubuntu.com/tutorials/create-a-usb-stick-on-windows#1-overview

CANONICAL

ubuntu® Enterprise Developer Community Download

We are hiring Products

Search Sign in

Create a bootable USB stick on Windows

1 Overview

2 Requirements

3 USB selection

4 Boot selection and Partition scheme

5 Select the Ubuntu ISO file

6 Write the ISO

7 Additional downloads

8 Write warnings

9 Writing the ISO

10 Installation complete

With a bootable Ubuntu USB stick, you can:

- Install or upgrade Ubuntu
- Test out the Ubuntu desktop experience without touching your PC configuration
- Boot into Ubuntu on a borrowed machine or from an internet cafe
- Use tools installed by default on the USB stick to repair or fix a broken configuration

Creating a bootable Ubuntu USB stick from Microsoft Windows is very simple and we're going to cover the process in the next few steps.

Alternatively, we also have tutorials to help you create a bootable USB stick from both Ubuntu and Apple macOS.



Suggest changes < >

about 15 minutes to go

<https://ubuntu.com/tutorials/create-a-usb-stick-on-windows>

Linux Fundamentals

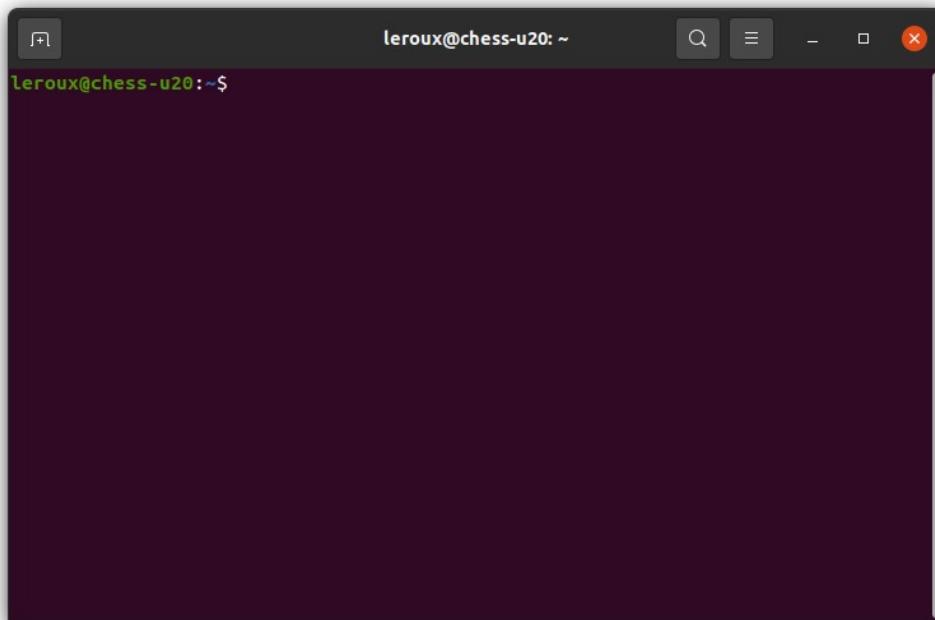


- The Terminal
- File System
- Users
- File Permissions
- Tips

Linux Fundamentals: The Terminal



- Text interface to your computer
- Often referred as
 - Shell
 - Console
 - Prompt
 - Bash ...

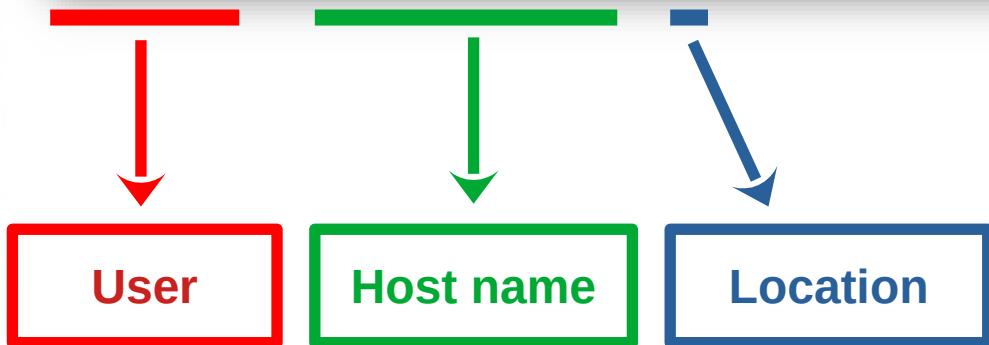


Linux Fundamentals: The Terminal



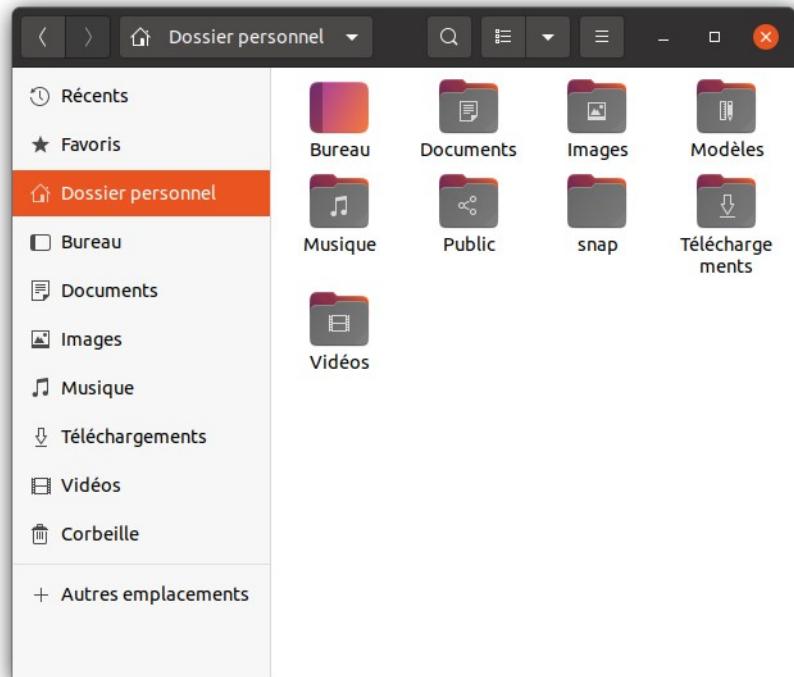
- The “Prompt” or “Invite de commandes”

```
leroux@chess-u20:~$
```



- **User** : the name of the user that opened the terminal
- **Host name**: the name of the computer
- **Location**: where you are in the file system tree

Linux Fundamentals: The Terminal



=

A terminal window titled "leroux@chess-u20: ~\$". It displays the output of the "ls -l" command, listing the contents of the current directory. The output is as follows:

```
total 36
drwxr-xr-x  2 leroux dmo 4096 oct.  23  2020 Bureau
drwxr-xr-x  3 leroux dmo 4096 oct.  20 13:40 Documents
drwxr-xr-x  3 leroux dmo 4096 oct.  26 14:06 Images
drwxr-xr-x  2 leroux dmo 4096 oct.  23  2020 Modèles
drwxr-xr-x  2 leroux dmo 4096 oct.  23  2020 Musique
drwxr-xr-x  2 leroux dmo 4096 oct.  23  2020 Public
drwx-----  3 leroux dmo 4096 oct.  23  2020 snap
drwxr-xr-x 11 leroux dmo 4096 oct.  25 14:23 Téléchargements
drwxr-xr-x  2 leroux dmo 4096 oct.  23  2020 Vidéos
leroux@chess-u20: ~$
```

Linux Fundamentals: File System

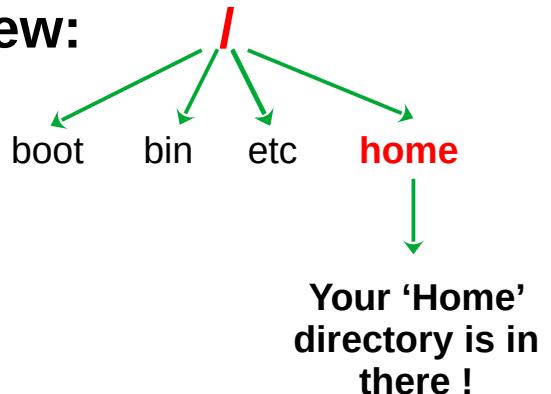
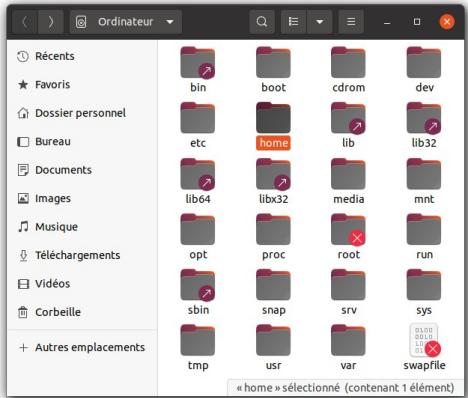


- Windows

- Letters for the hard drive(s): C:\, D:\, E:\ ...
- Your 'Home' directory: C:\Users\leroux

- Linux

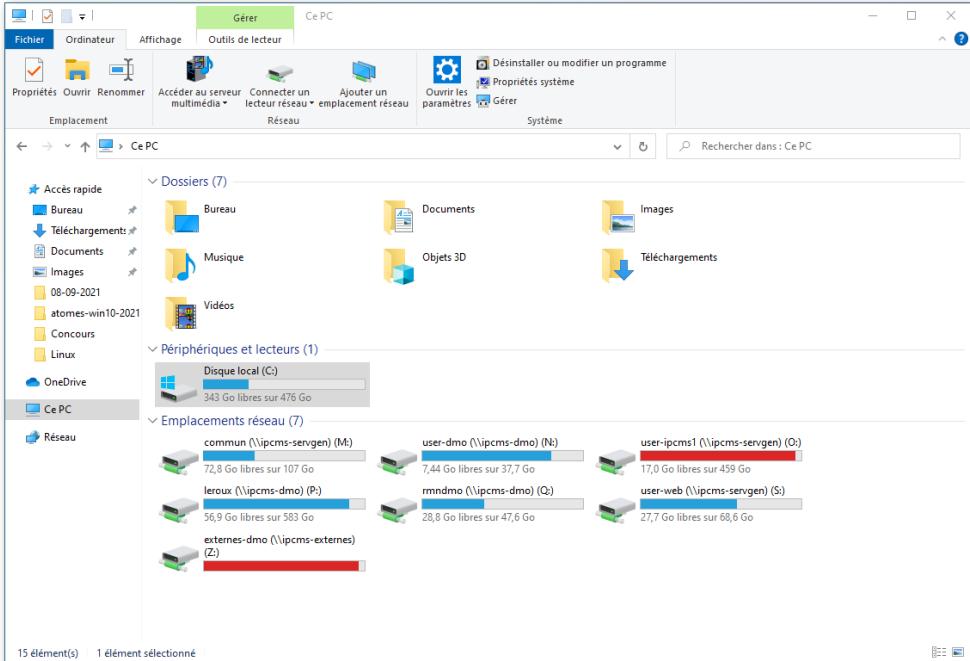
- A single tree-view:



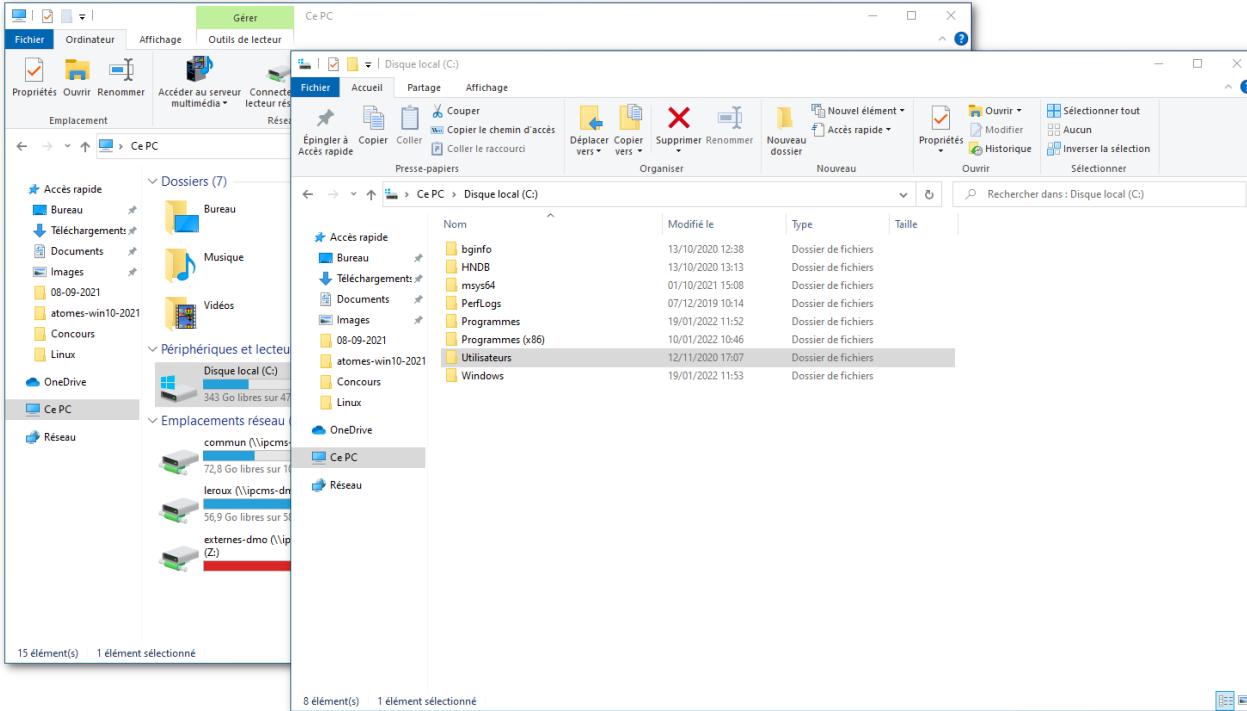
"Everything is a File"

All the hard drive(s), devices, component of your computer, is to be found somewhere in this tree-view

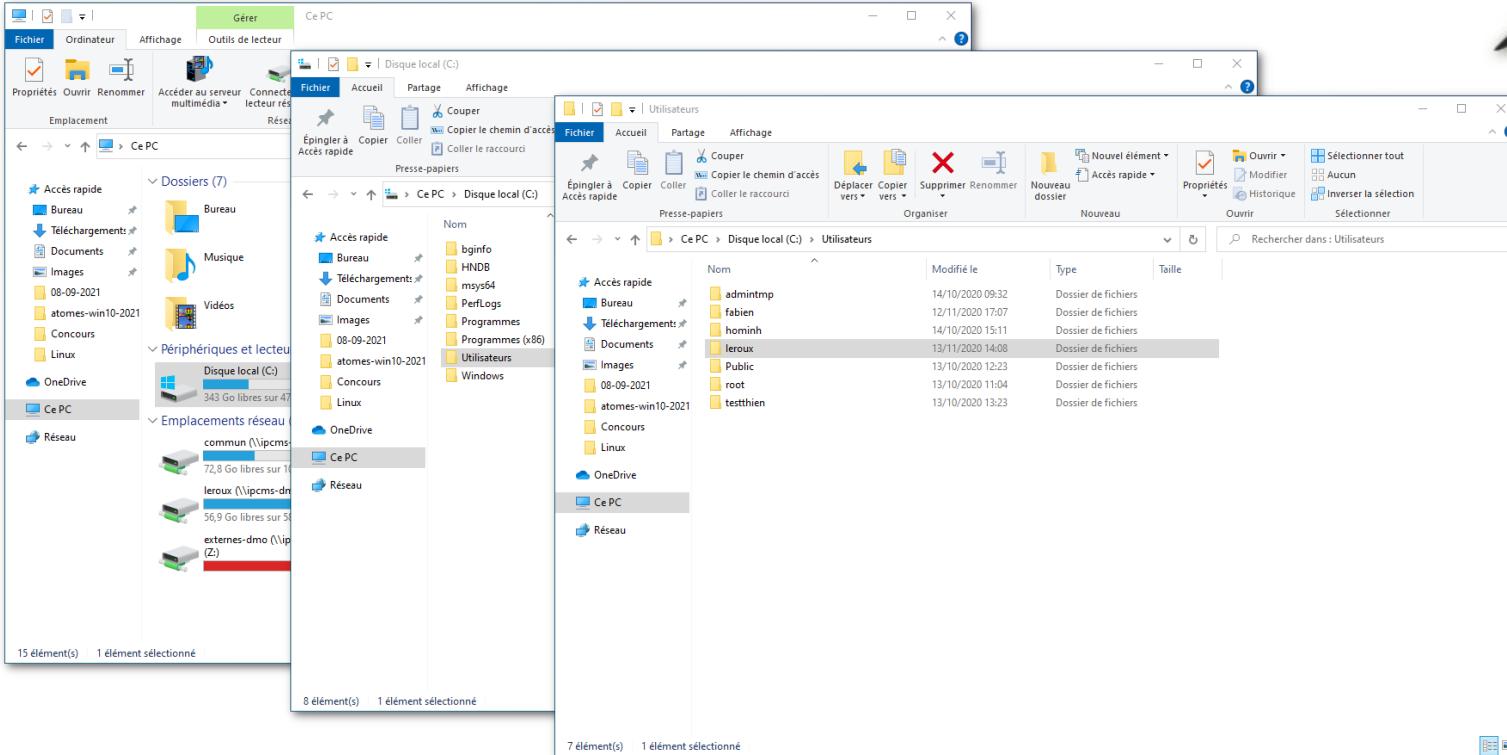
File system: windows



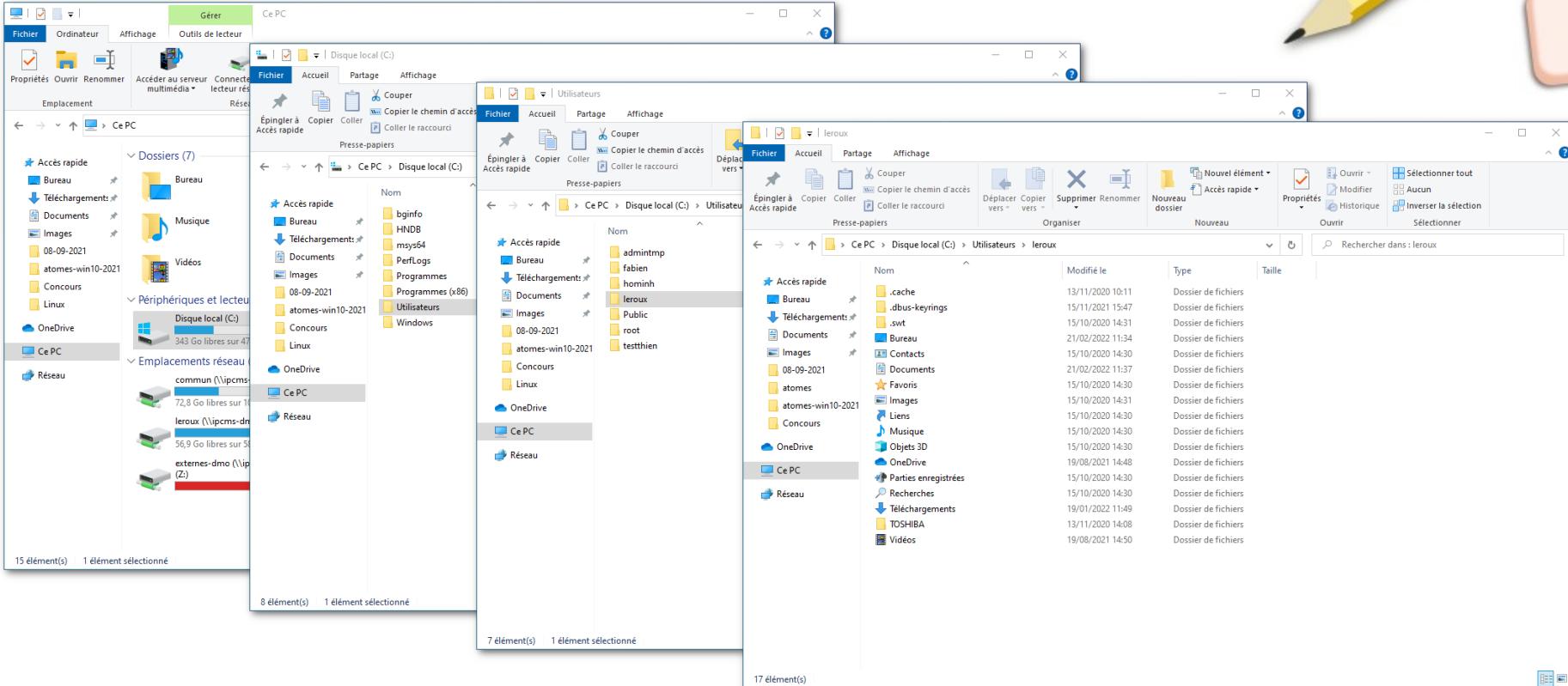
File system: windows



File system: windows

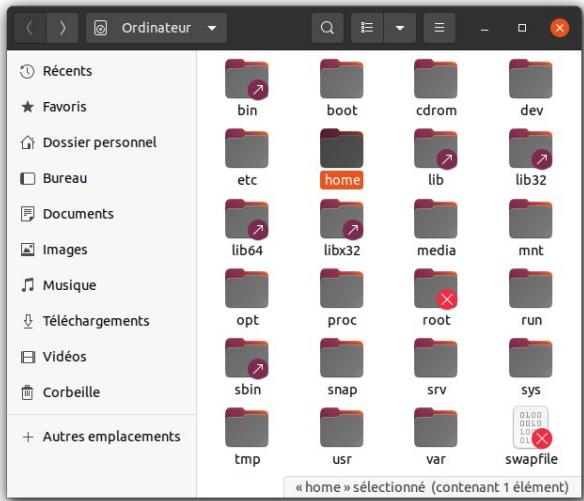


File system: windows



C:\Utilisateurs\leroux\

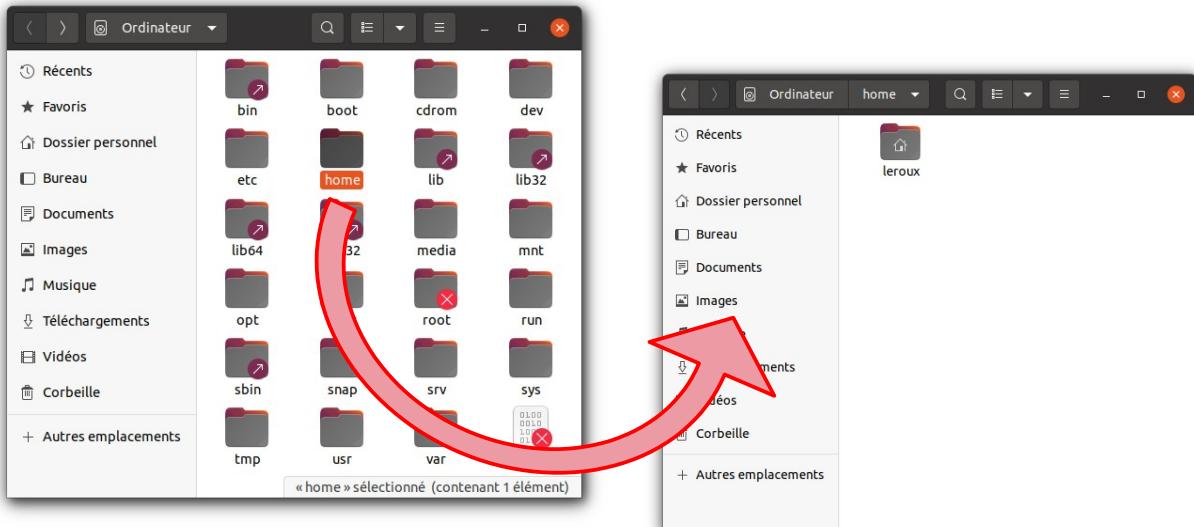
Linux Fundamentals: File System



/

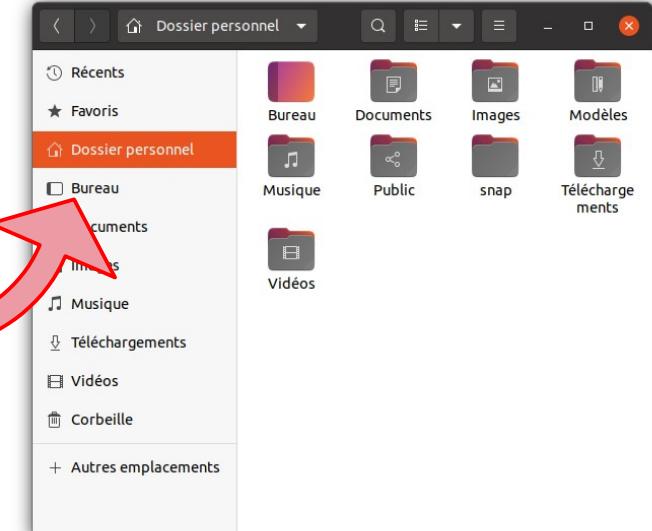
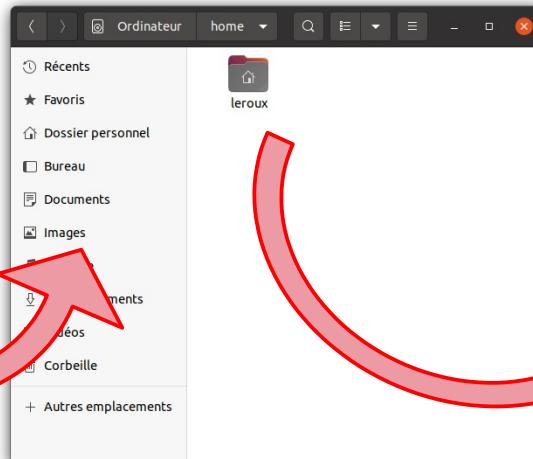
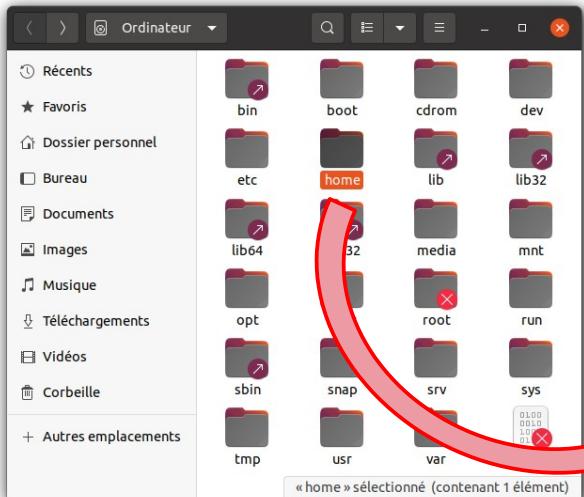


Linux Fundamentals: File System



home

Linux Fundamentals: File System

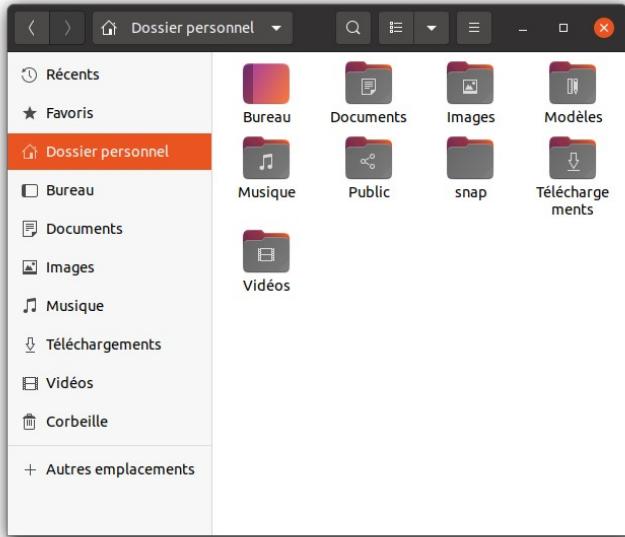


home

leroux

/home/leroux

Linux Fundamentals: File System



/home/leroux = ~



/home/leroux/Documents

~/Documents

Linux Fundamentals: Users



- The Administrator (**root**) “optional”
 - All privileges !
- The “**sudoers**” for “super user do”-users
 - Users that can use the **sudo** command to request admin privileges
 - When using the **sudo** command **sudoers** are required to confirm their identity by entering their user password
- The normal users

Linux Fundamentals: Users



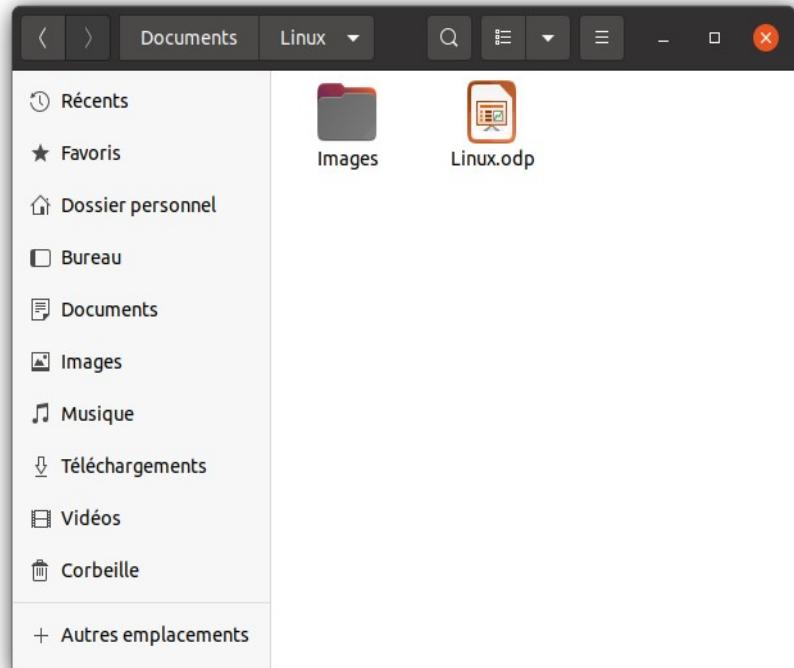
- The Administrators (**root**) “optional”
 - All privileges!
- The “**sudoers**” for “super user do”-users
 - Users that can use the **sudo** command to request admin privileges
 - When using the **sudo** command **sudoers** are required to confirm their identity by entering their user password
- The normal users

Linux Fundamentals: File Permissions



- The different permissions that can be granted for a **file** are:
 - **read**: to visualize its content
 - **write**: to modify its content (ex: editing)
 - **execute**: to execute its content (ex: program)
- The different permissions that can be granted for a **directory** are:
 - **read**: to visualize its content
 - **write**: to modify its content (ex: adding new files)
 - **execute**: to go inside this directory (ex: changing directory)

Linux Fundamentals: File Permissions



=

A screenshot of a terminal window titled 'leroux@chess-u20: ~/Documents/Linux'. The command 'ls -l' is run, displaying the following file listing:

```
total 15108
drwxrwxr-x 2 leroux dmo 4096 oct. 20 13:40 Images
-rw-r--r-- 1 leroux dmo 15463386 oct. 20 13:55 Linux.odp
```

The word 'Images' is highlighted in blue, indicating it is a link.

Linux Fundamentals: File Permissions



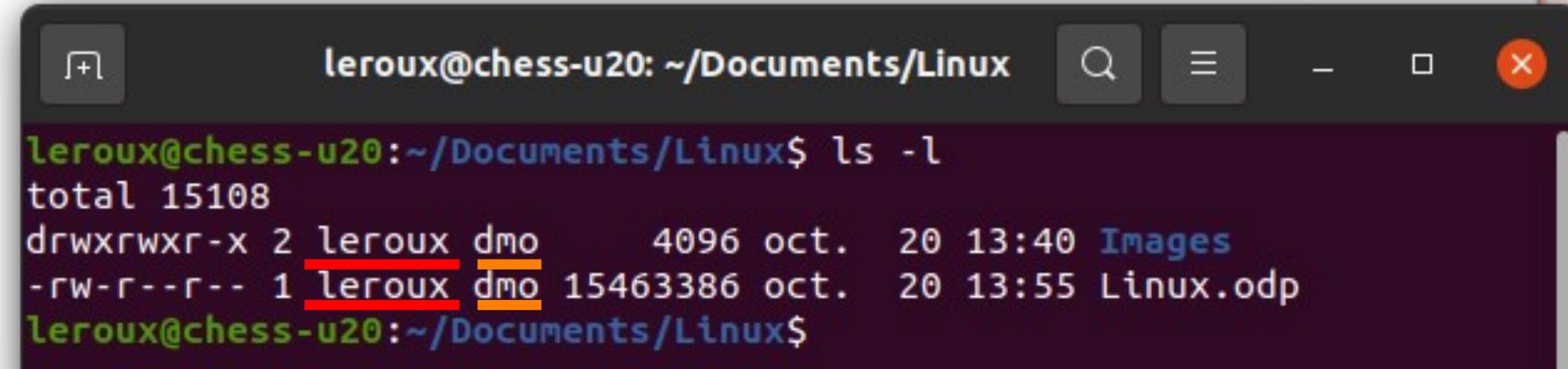
- The permissions are decomposed in **3** series of **3** letters
r (for read), **w** (for write) and **x** (for execute)
the symbol "**-**" means that the permission is denied



```
leroux@chess-u20: ~/Documents/Linux$ ls -l
total 15108
drwxrwxr-x 2 leroux dmo 4096 oct. 20 13:40 Images
-rw-r--r-- 1 leroux dmo 15463386 oct. 20 13:55 Linux.odp
leroux@chess-u20:~/Documents/Linux$
```

```
leroux@chess-u20: ~/Documents/Linux$ ls -l
total 15108
drwxrwxr-x 2 leroux dmo 4096 oct. 20 13:40 Images
-rw-r--r-- 1 leroux dmo 15463386 oct. 20 13:55 Linux.odp
leroux@chess-u20:~/Documents/Linux$
```

Linux Fundamentals: File Permissions



drwxrwxr-x

d rwx rwx r-x

-rw-r--r--

- rw- r-- r--

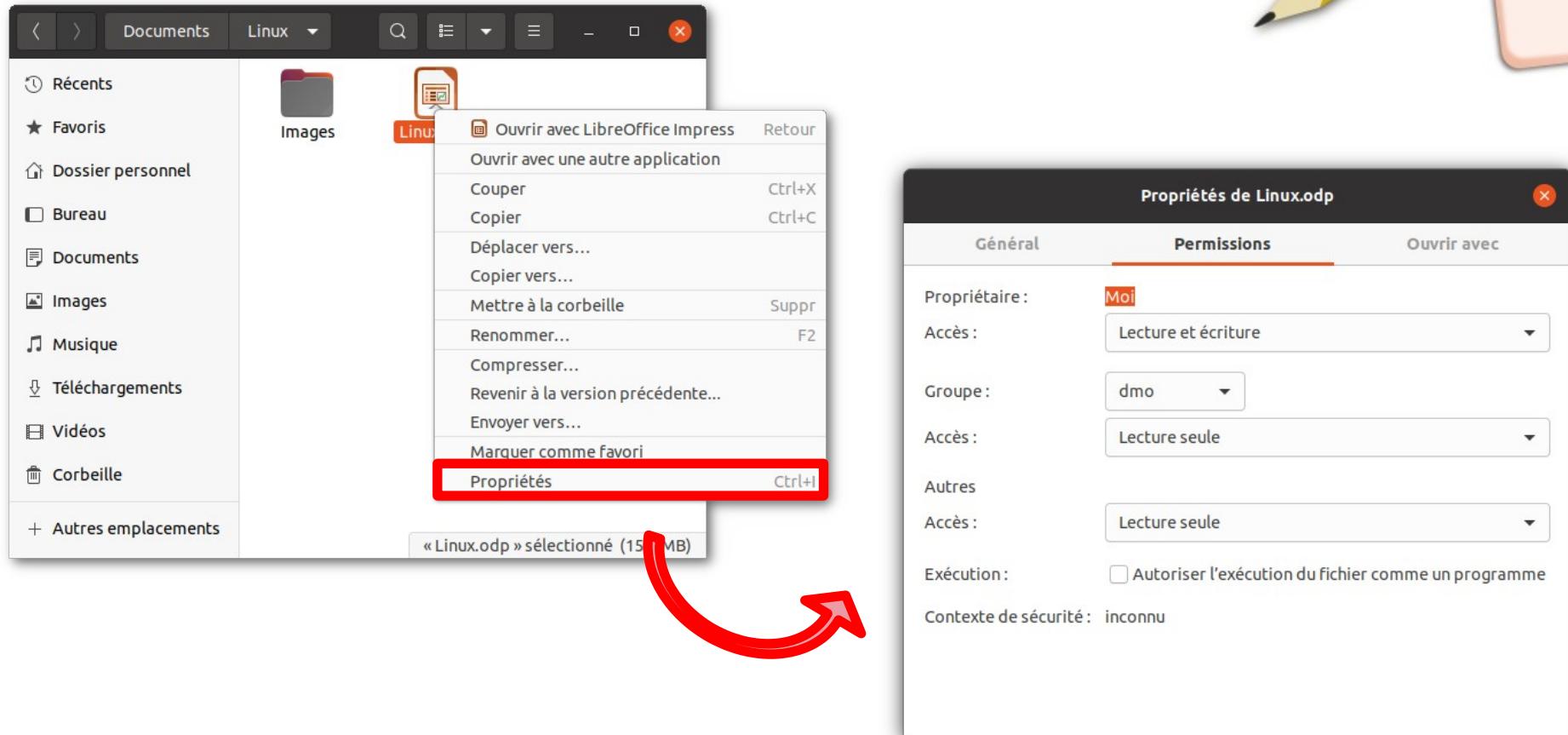
Object

Owner

Group

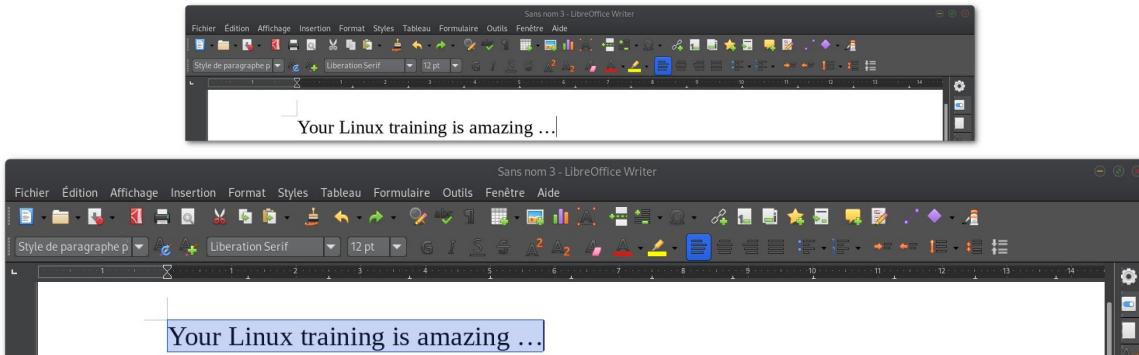
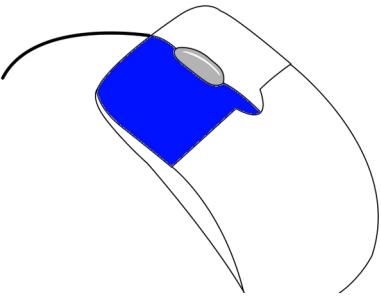
The other user(s)

Linux Fundamentals: File Permissions

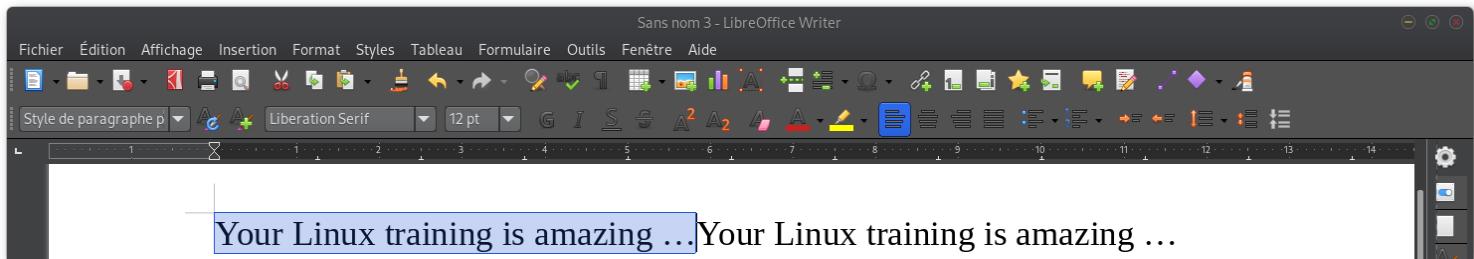
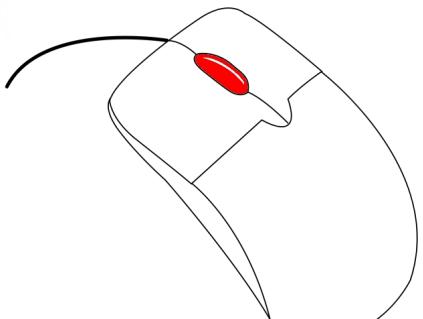


Linux Fundamentals: Mouse

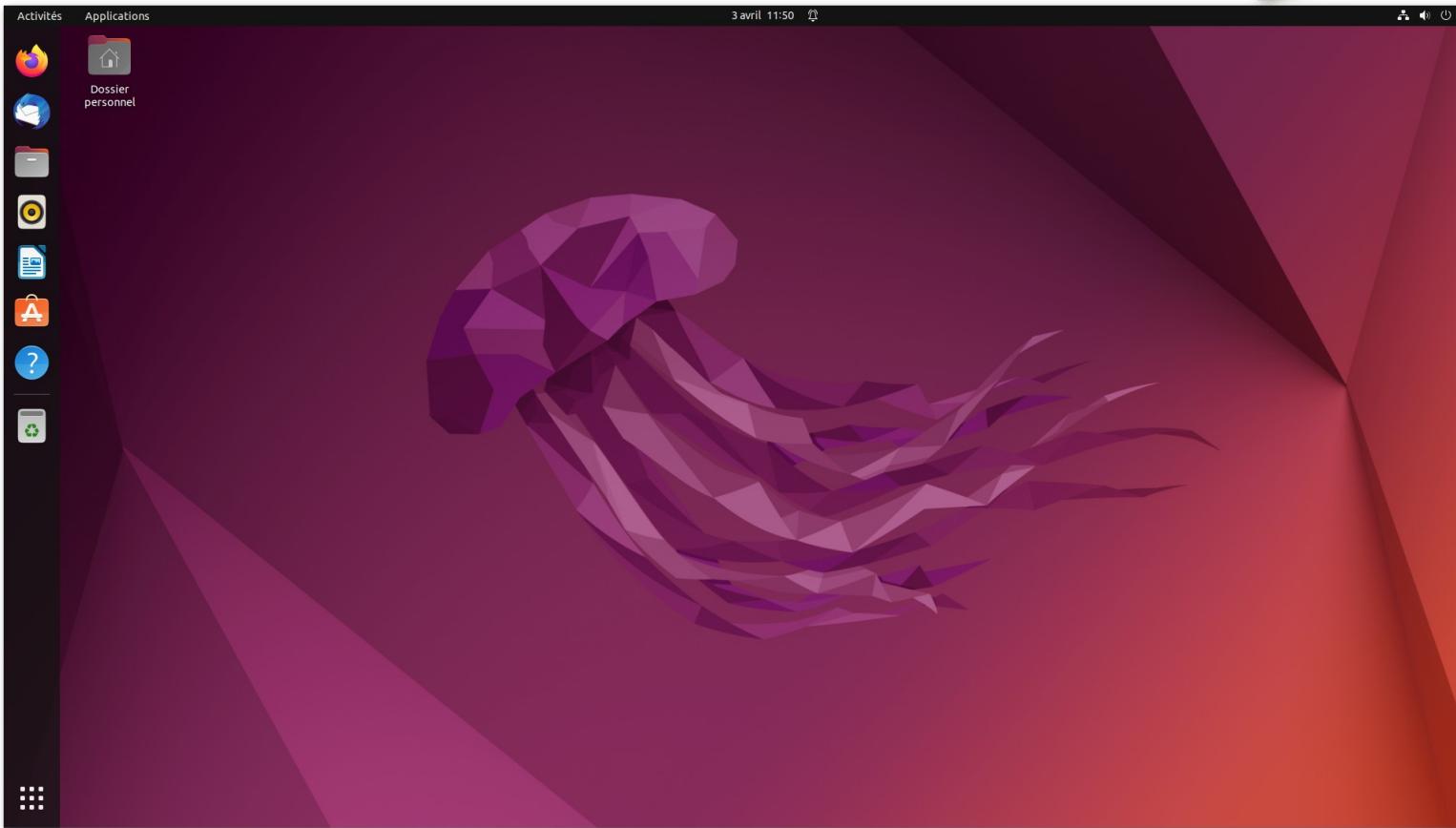
- Text selected using the left click...



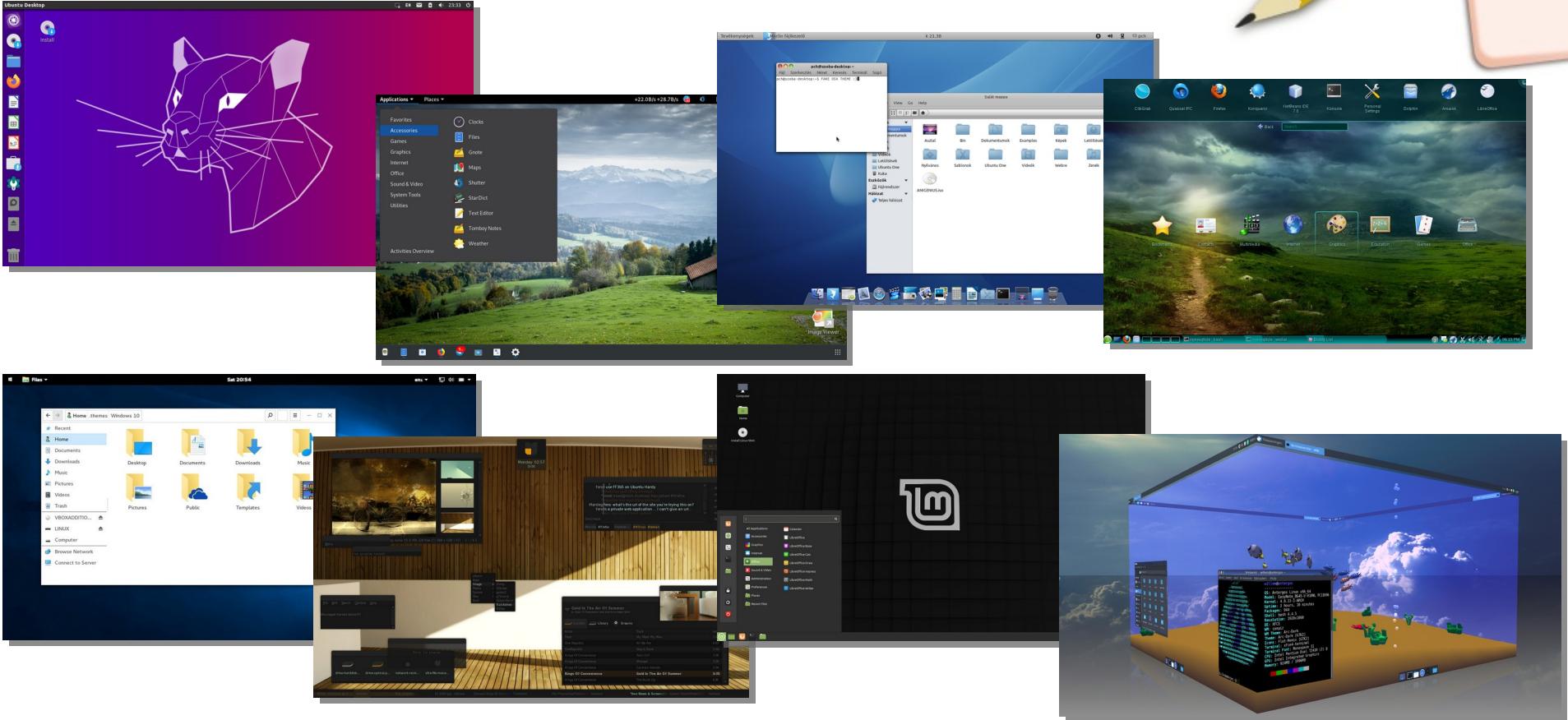
- Is copied, and can be pasted back pressing the 2nd button:



Ubuntu 2[0-2].04 LTS



Ubuntu 2[0-2].04 LTS



Ubuntu 2[0-2].04 LTS: Desktop Environments



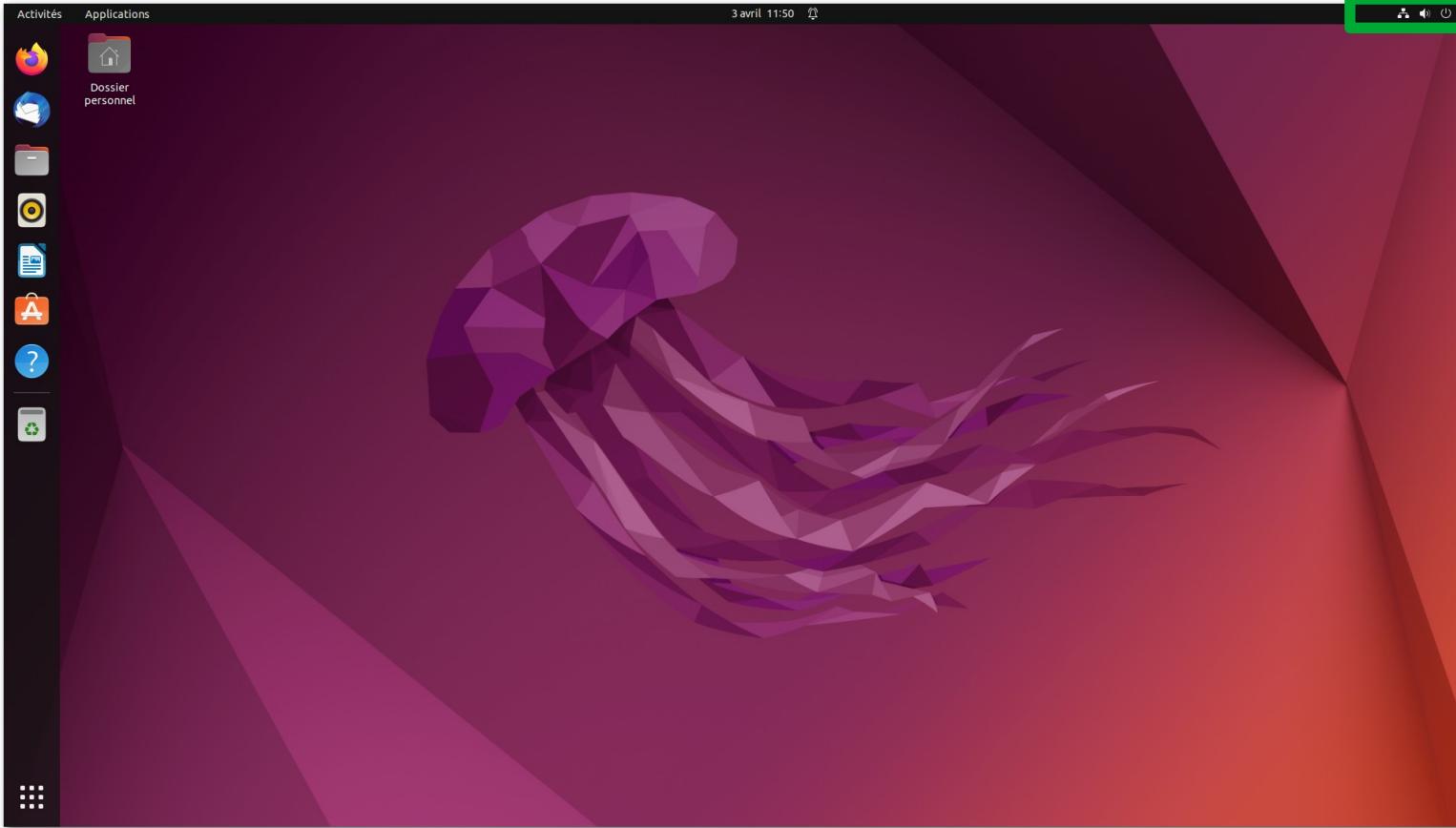
Gnome	https://www.gnome.org/	
KDE	https://kde.org/	
Cinnamon	https://projects.linuxmint.com/cinnamon/	
Xfce	http://www.xfce.org/	
MATE	http://mate-desktop.com/	
LXQt	https://lxqt-project.org/	
Enlightenment	https://www.enlightenment.org/	
Deepin	https://www.deepin.org/	
Pantheon	https://elementary.io/	

Ubuntu 2[0-2].04 LTS: Desktop Environments

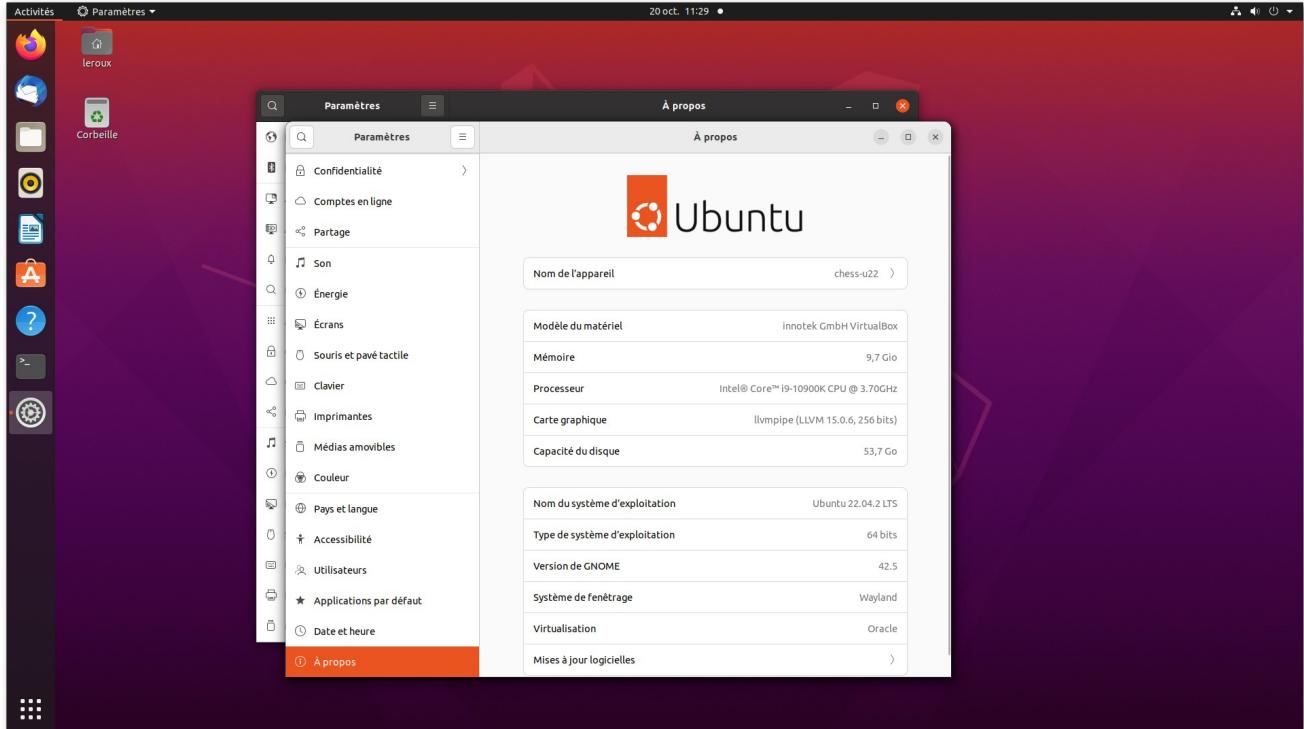
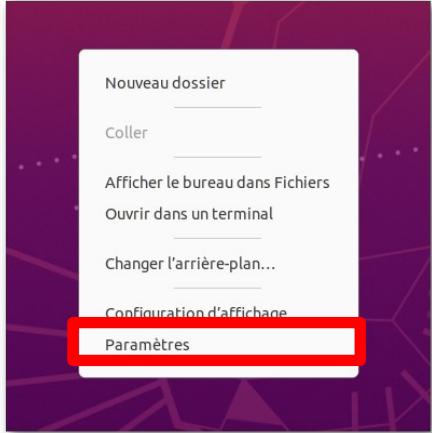
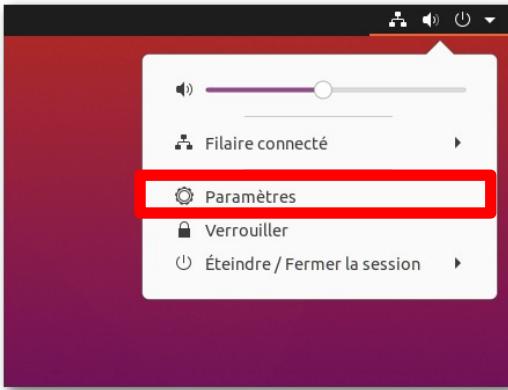


Gnome	https://www.gnome.org/	
KDE	https://kde.org/	
Cinnamon	https://projects.linuxmint.com/cinnamon/	
Xfce	http://www.xfce.org/	
MATE	http://mate-desktop.com/	
LXQt	https://lxqt-project.org/	
Enlightenment	https://www.enlightenment.org/	
Deepin	https://www.deepin.org/	
Pantheon	https://elementary.io/	

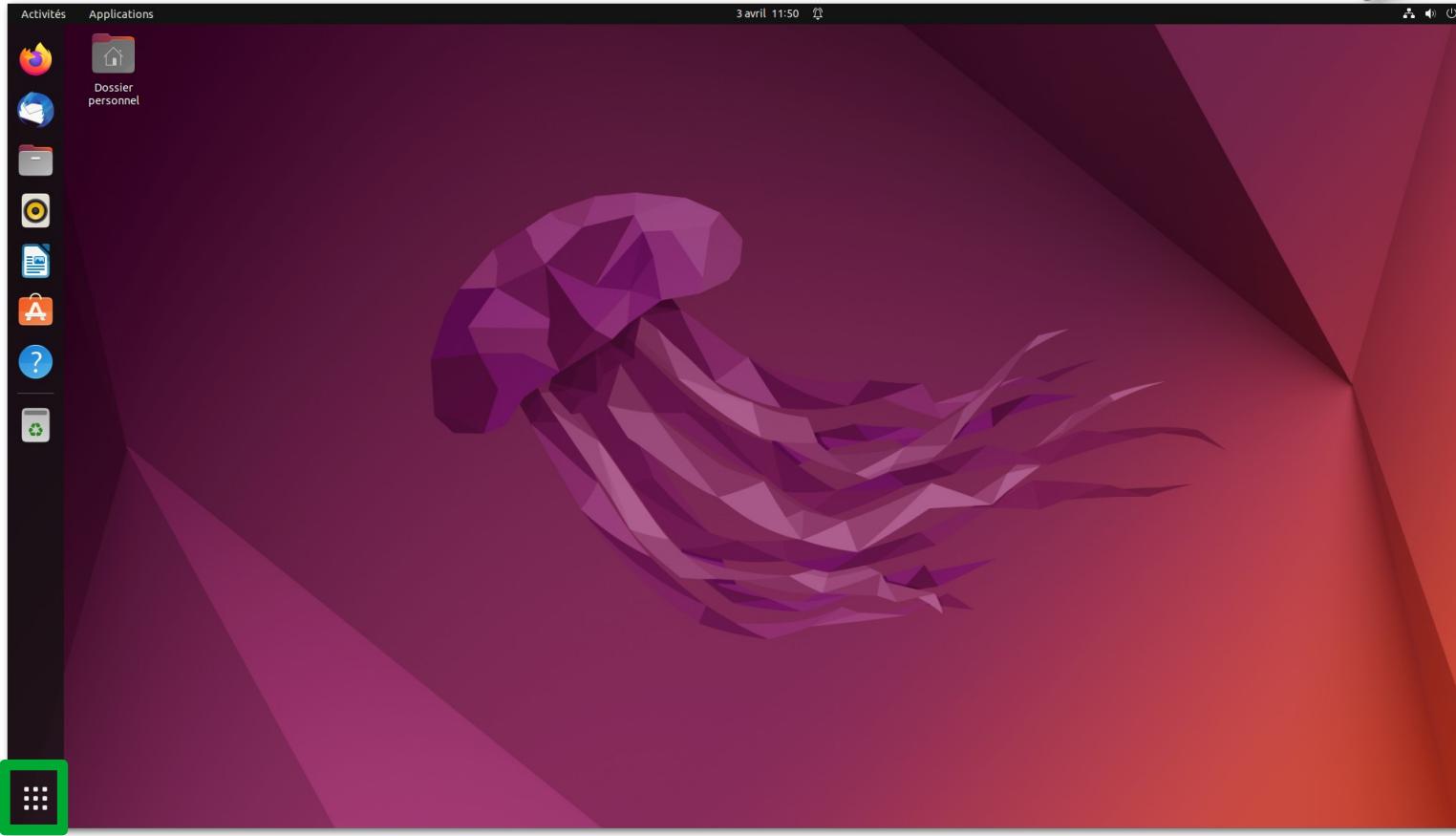
Ubuntu 22.04 LTS



Ubuntu 2[0-2].04 LTS: Control Panel



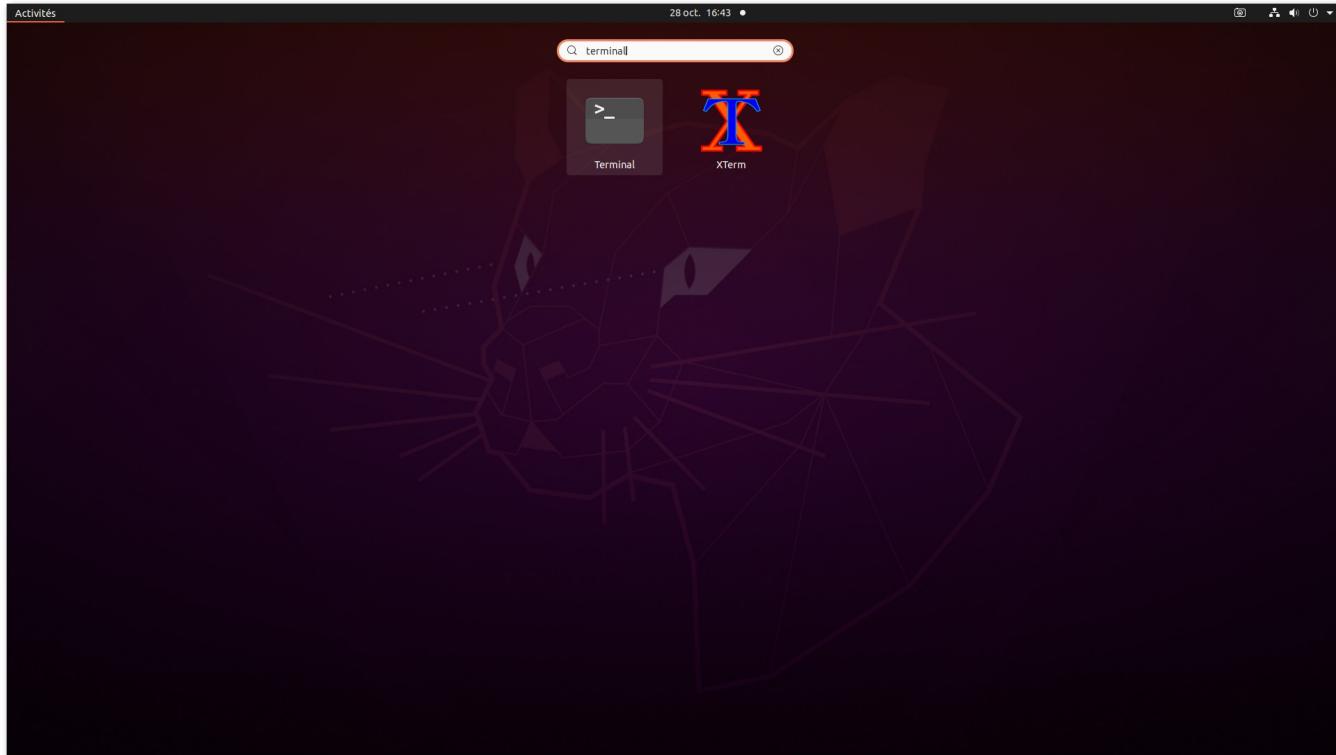
Ubuntu 22.04 LTS



U. 2[0-2].04 LTS: Applications



U. 2[0-2].04 LTS: Open the Terminal



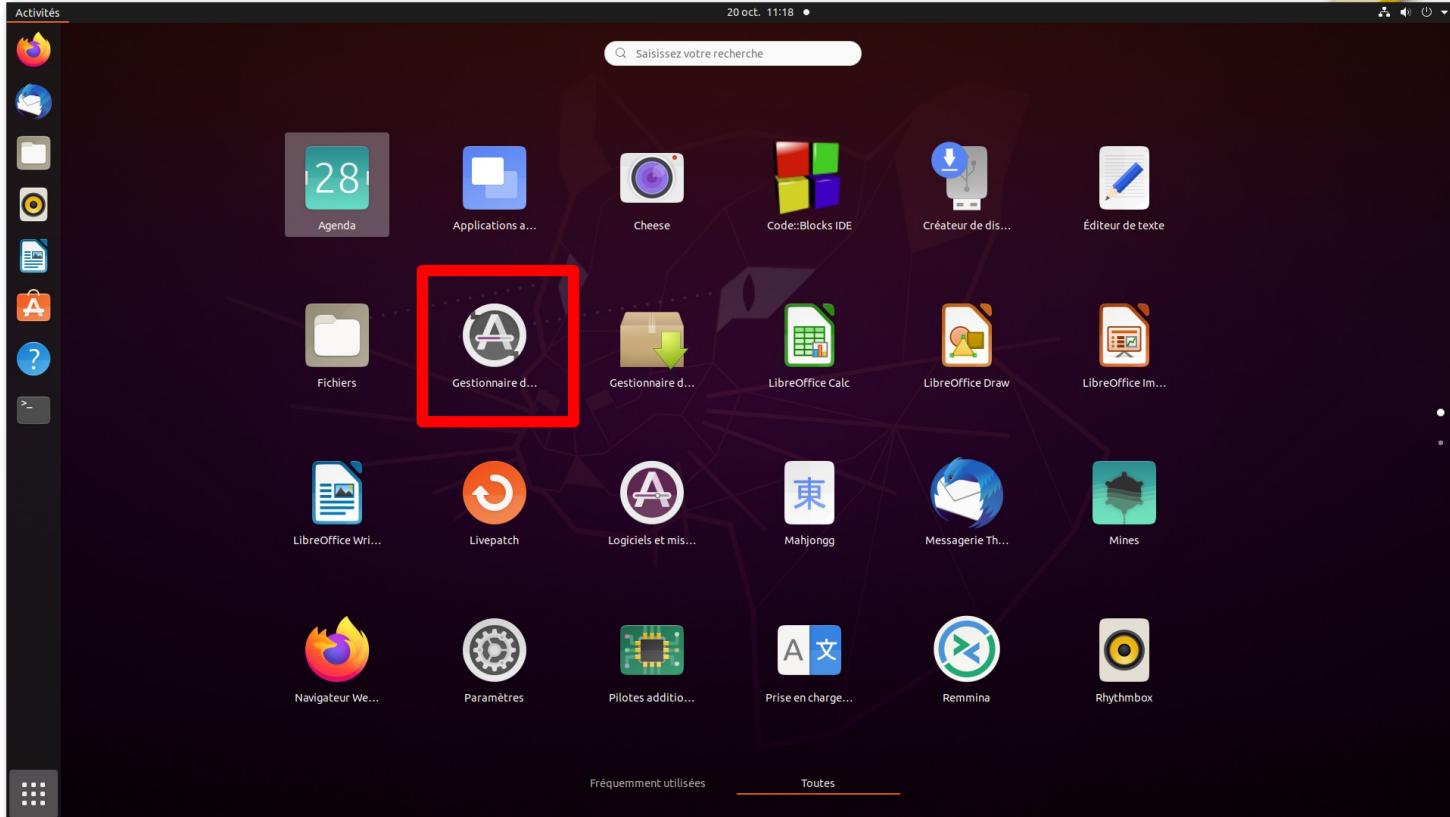
Ctrl + Alt + t

Things to do after installation



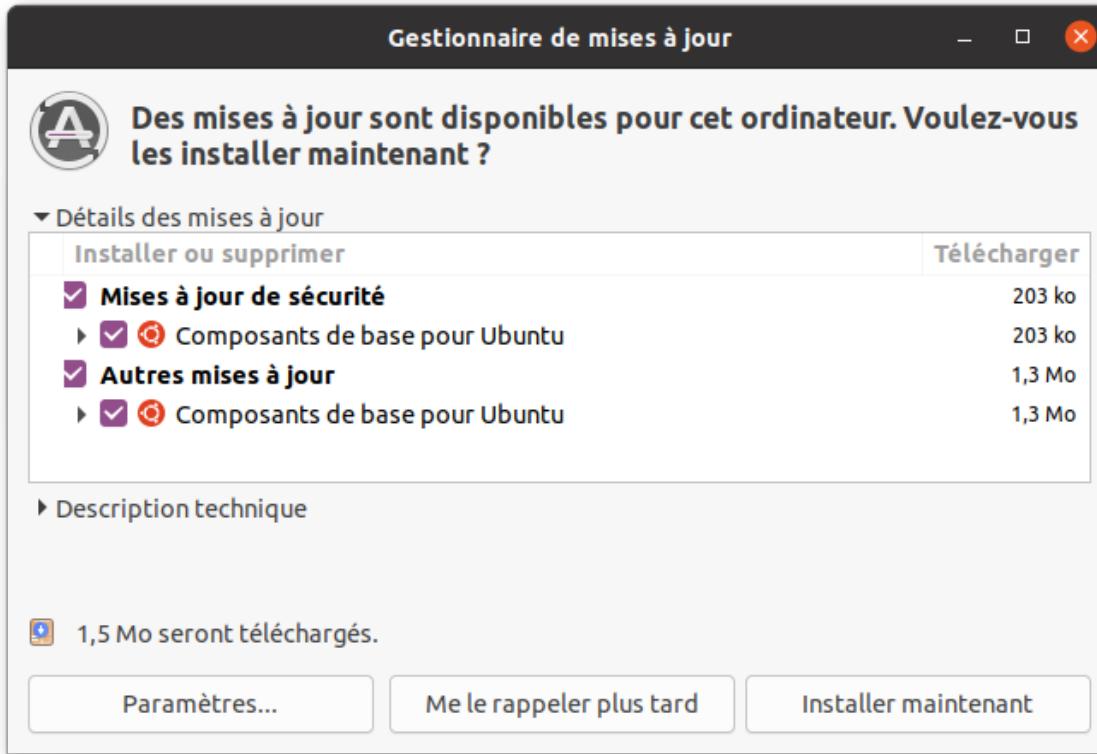
- Check for Updates (if not done during installation)
- Enable Partner Repositories
- Install Possibly Missing Graphics Drivers
- Install Extra Multimedia Codecs

U. 2[0-2].04 LTS: Check for Updates

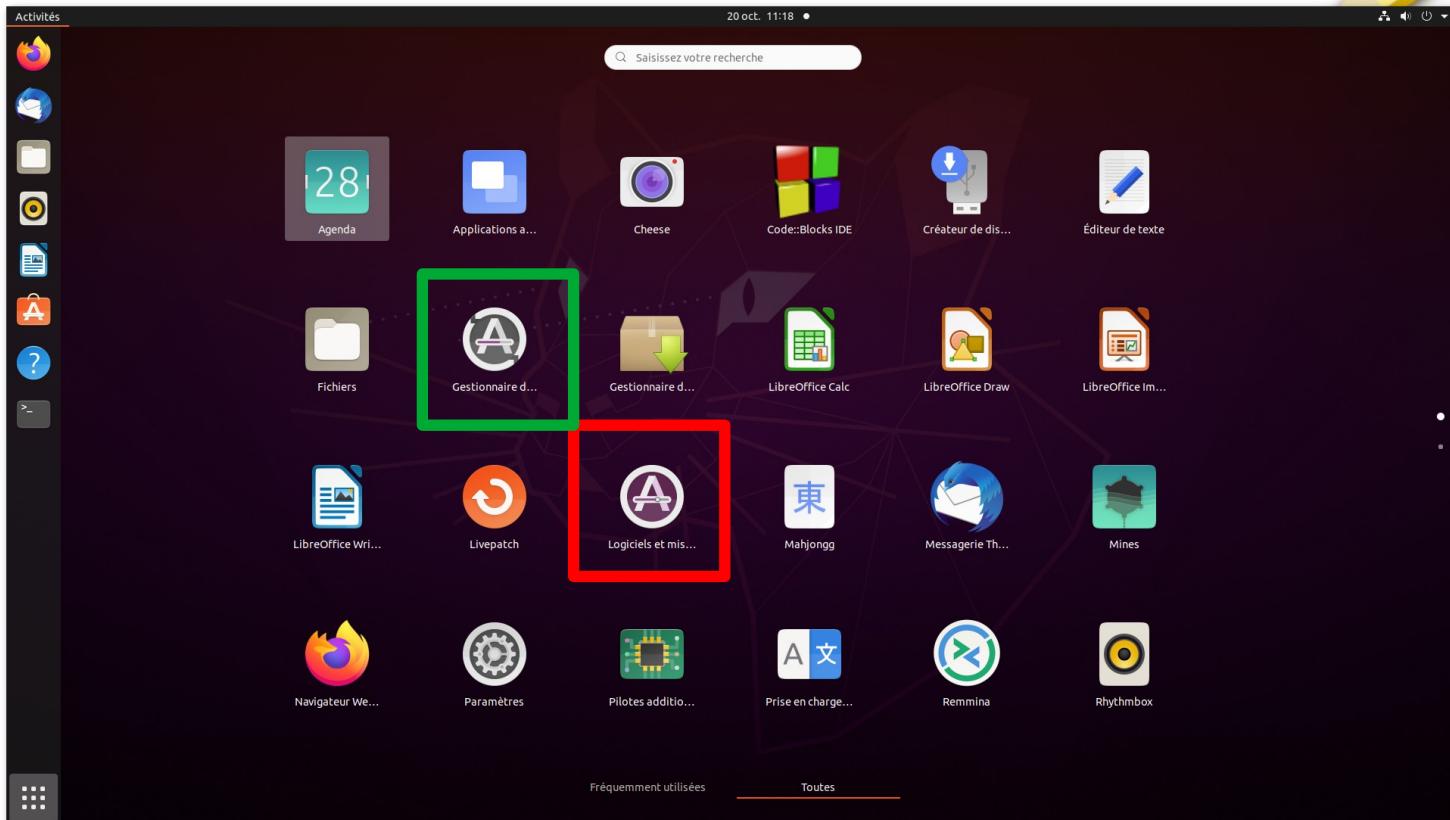


Terminal command: `update-manager`

U. 2[0-2].04 LTS: Updates

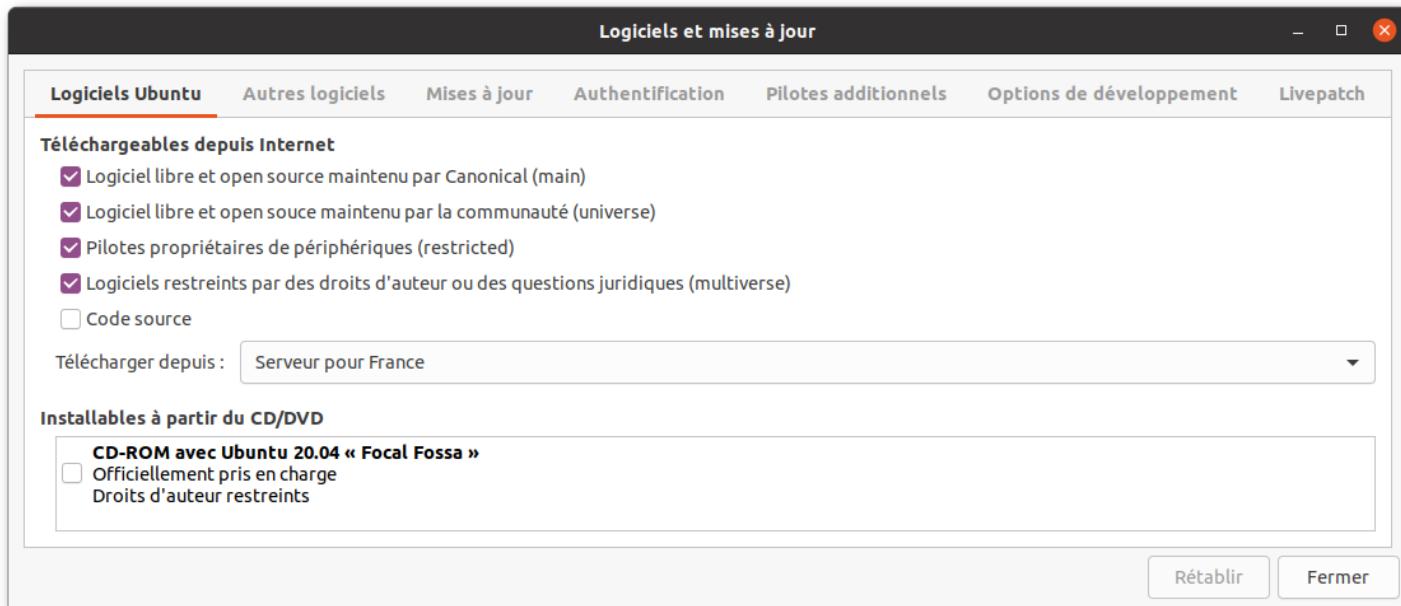


U. 2[0-2].04 LTS: Enable Repo.

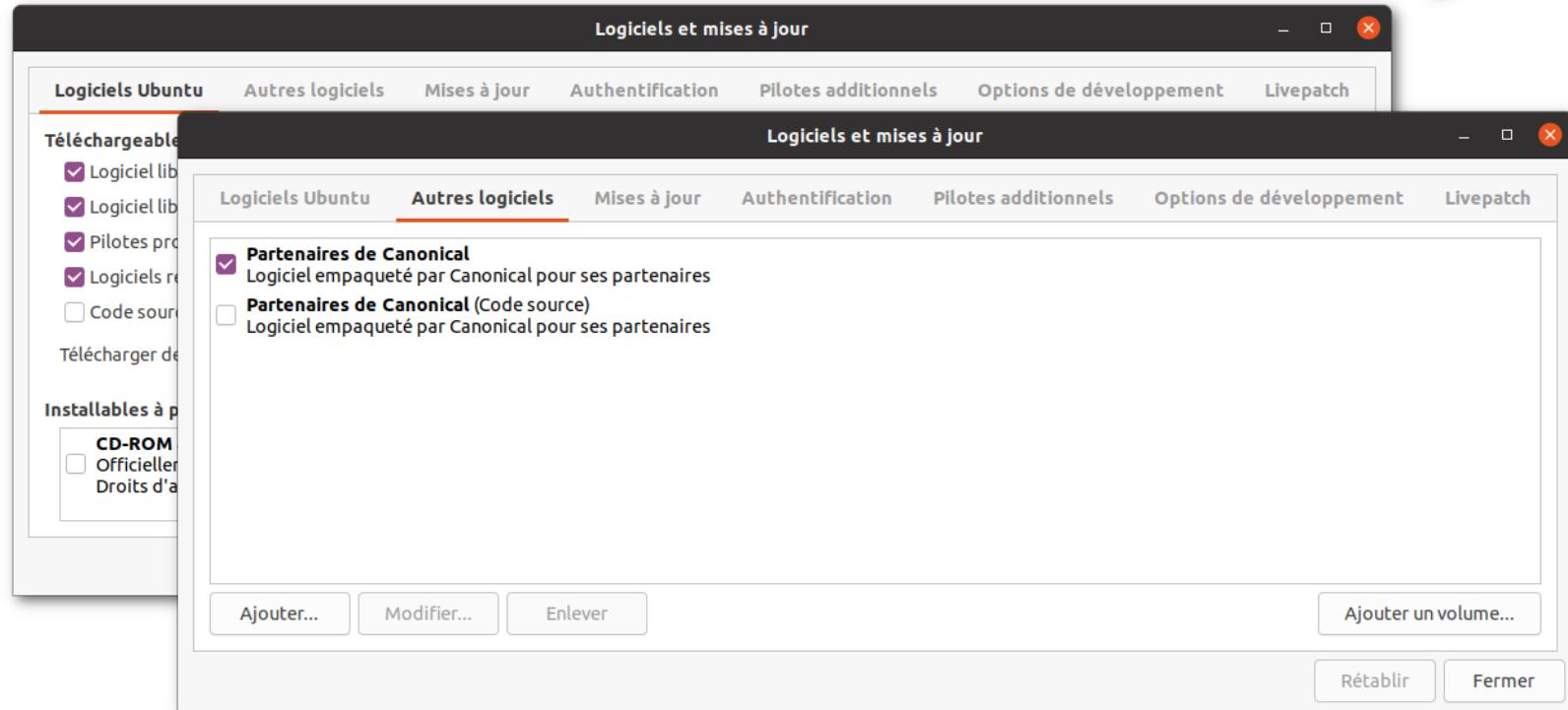


Terminal command: **software-properties-gtk**

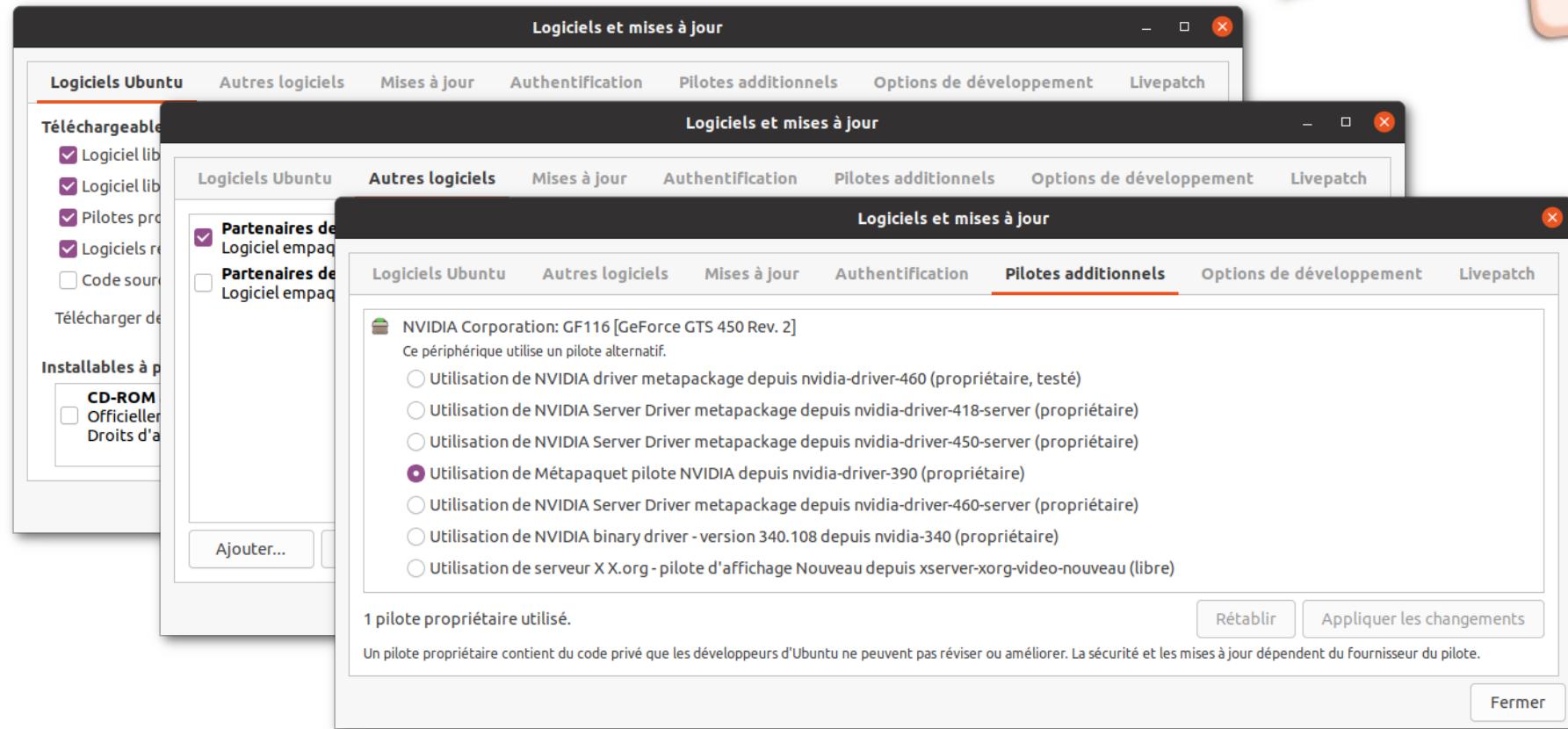
U. 2[0-2].04 LTS: Repo. and more



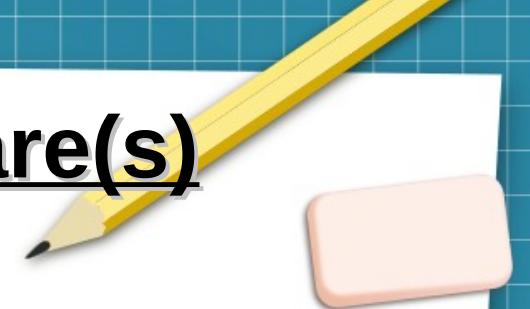
U. 2[0-2].04 LTS: Repo. and more



U. 2[0-2].04 LTS: Repo. and more



U. 2[0-2].04 LTS: Install software(s)



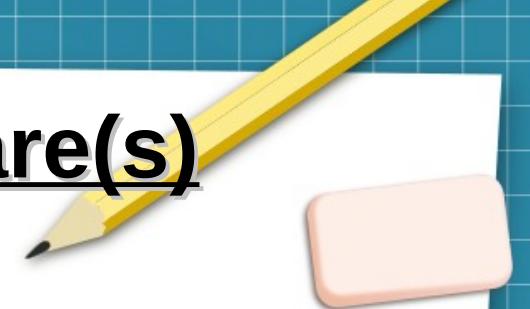
- Using the command line (the terminal)

```
$ sudo apt install package-name
```

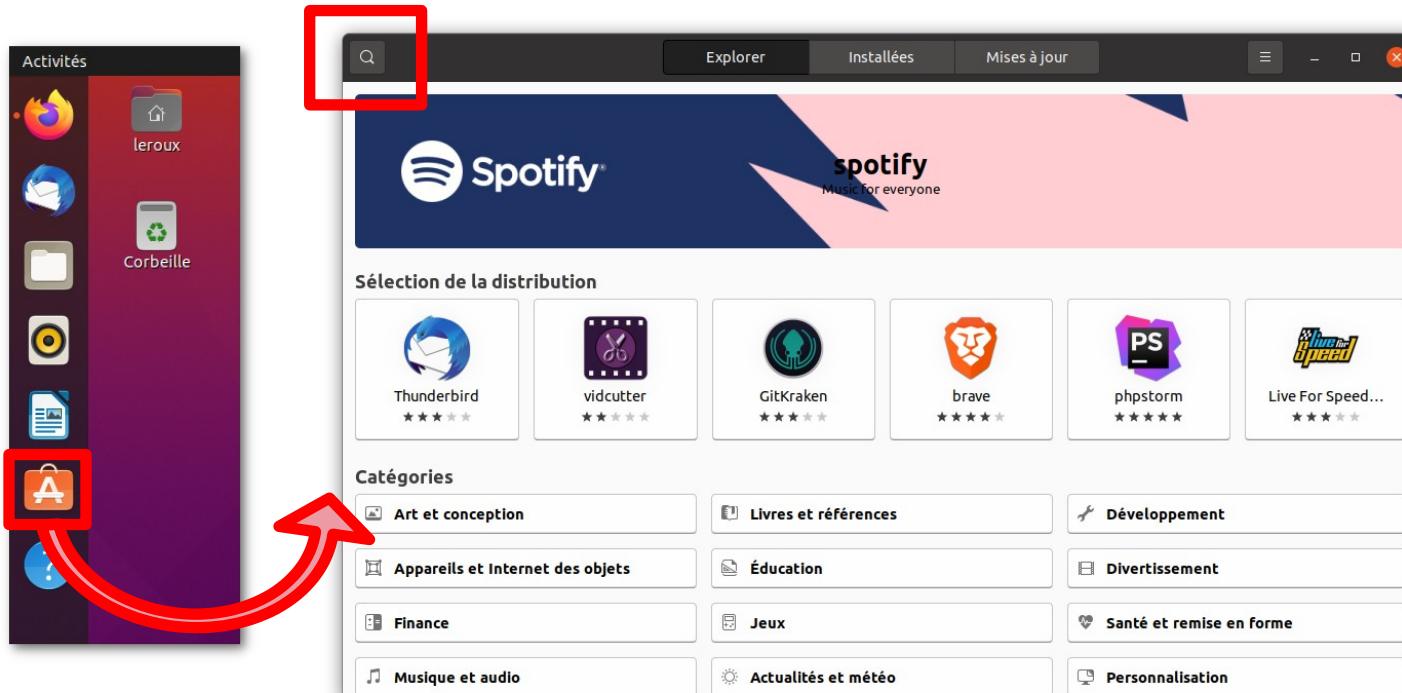
- Example:

```
$ sudo apt install synaptic
```

U. 2[0-2].04 LTS: Install software(s)



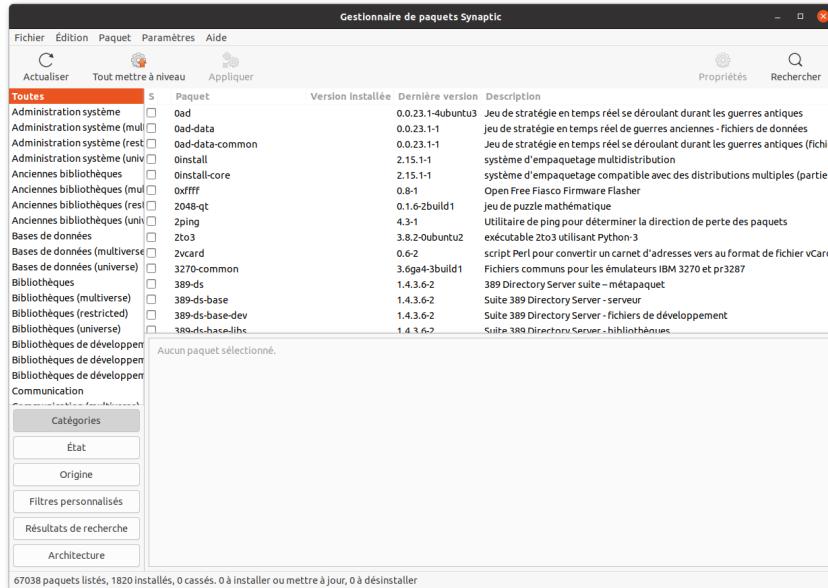
Using “Ubuntu Software”



Terminal command: `sudo snap-store`

U. 2[0-2].04 LTS: Install software(s)

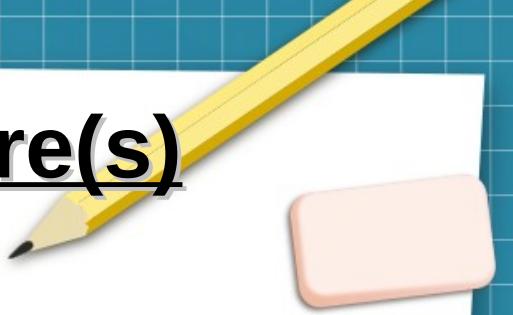
- Using “Synaptic”



Prerequisite: Install “Synaptic” using “Ubuntu Software”

Terminal command: `synaptic`

U. 2[0-2].04 LTS: Install software(s)



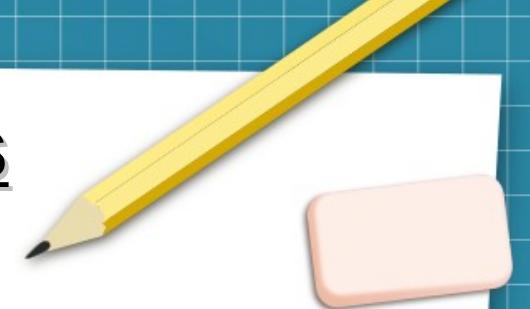
- **No matter the method, you need to have admin privileges to install a software and/or the updates !**

For Ubuntu 2[0-2].04 LTS you need to be in the “**sudoers**” group

- What if you can not find what you are looking for ?

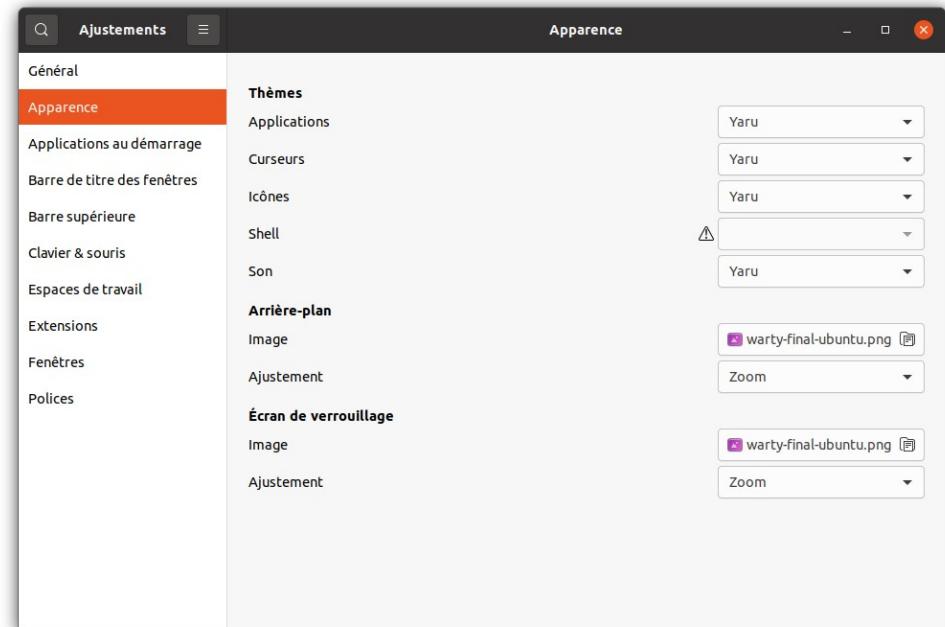
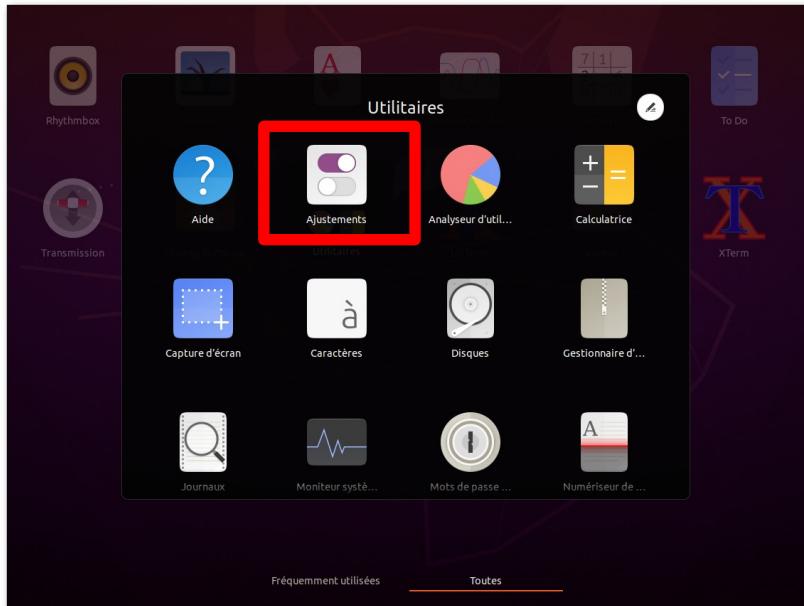
Add extra package repository: https://doc.ubuntu-fr.org/depots_focal

U. 2[0-2].04 LTS: GNOME Extras



- Tweaks “Ajustements” (gnome-tweaks)

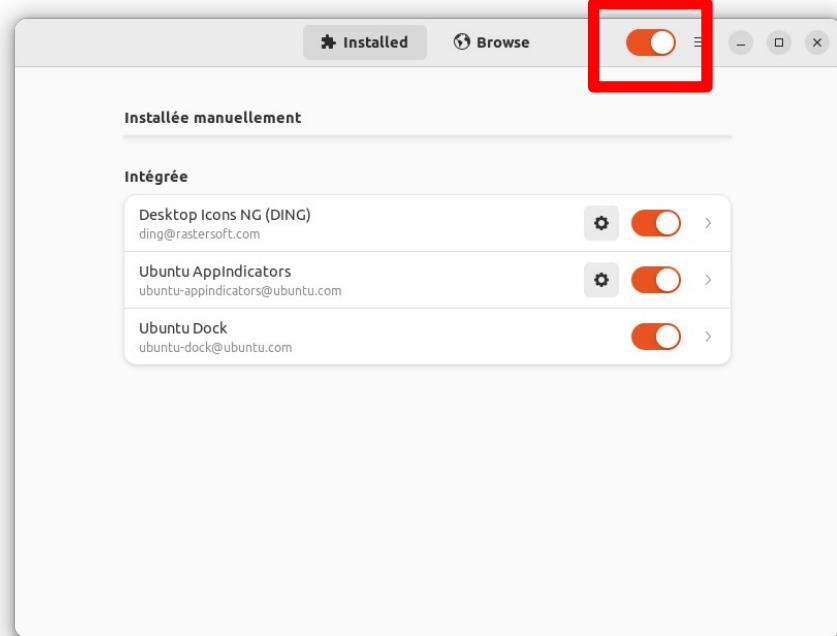
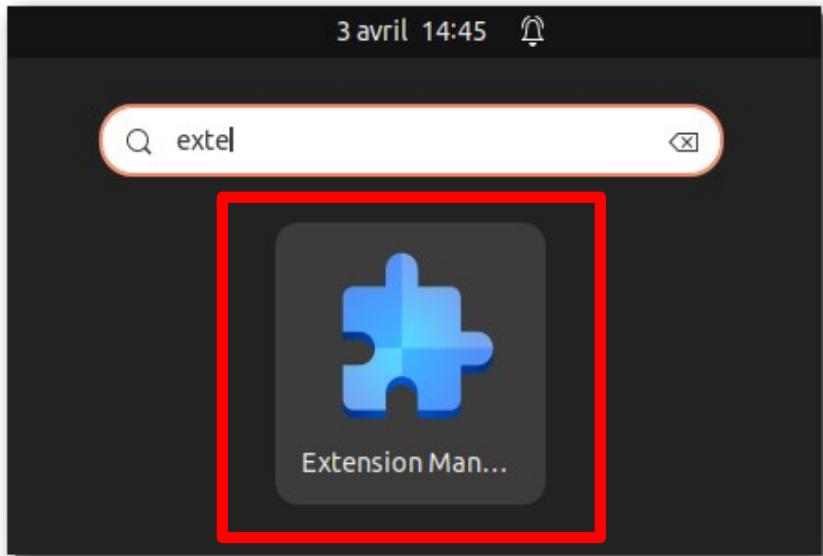
\$ sudo apt install gnome-tweaks



U. 22.04 LTS: GNOME Extras

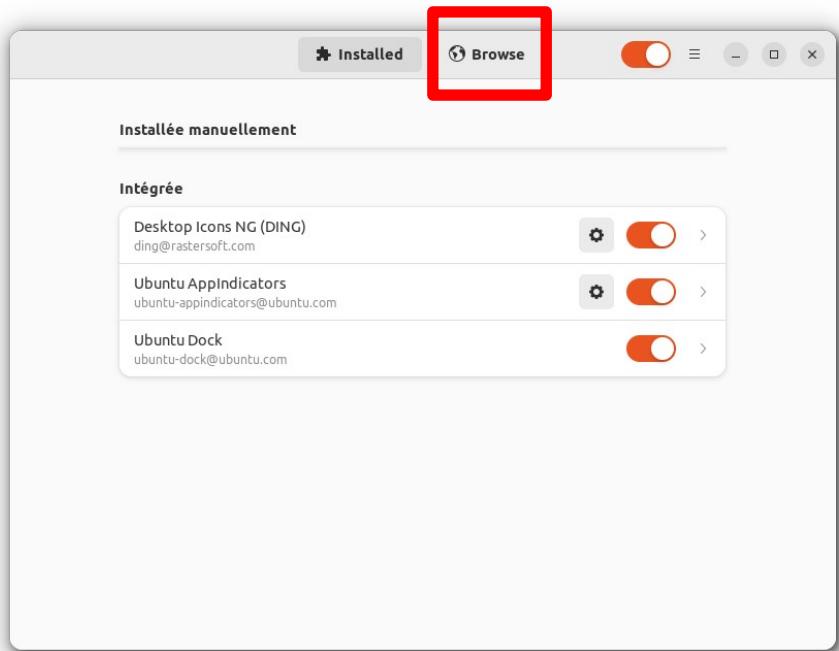
- Extension manager (gnome-shell-extension-manager)

```
$ sudo apt install gnome-shell-extension-manager
```



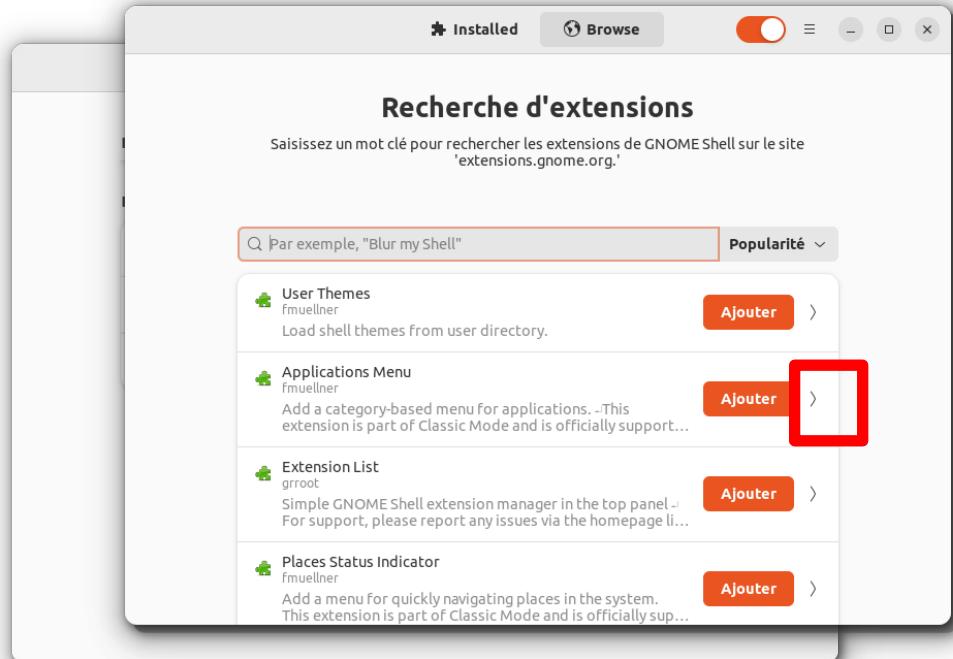
U. 22.04 LTS: GNOME™ Extras

- Extension manager (\$ **extension-manager**)



U. 22.04 LTS: GNOME Extras

- Extension manager (\$ extension-manager)



U. 22.04 LTS: GNOME™ Extras

- Extension manager (\$ extension-manager)

The image shows two screenshots of the GNOME Extension Manager. The left screenshot displays the 'Installed' tab with a search bar and a list of extensions. The 'Applications Menu' extension by fmuellner is highlighted with a red box around its 'Ajouter' button. The right screenshot shows the details for the 'Applications Menu' extension, including a preview of the application menu and its description.

Recherche d'extensions

Saisissez un mot clé pour rechercher les extensions de GNOME Shell sur le site 'extensions.gnome.org.'

Q Par exemple, "Blur my Shell" Popularité ▾

Ajouter

Applications Menu
fmuellner

Add a category-based menu for applications. -This extension is part of Classic Mode and is officially supported by GNOME.

Ajouter

Extension List
grrroot

Simple GNOME Shell extension manager in the top panel. -For support, please report any issues via the homepage li...

Ajouter

Places Status Indicator
fmuellner

Add a menu for quickly navigating places in the system. This extension is part of Classic Mode and is officially sup...

Ajouter

Applications Menu
fmuellner

Applications Menu

(Nightly) To Do
(Nightly) Tweak Tool
Books
Calculator
Clocks
Documents
Tiles
Maps
Text Editor
Weather

Description

Add a category-based menu for applications. This extension is part of Classic Mode and is officially supported by GNOME. Please do not report issues via the GitHub repository. Instead, use the extension's issue tracker or contact the maintainer directly.

Why use Linux ?



- It's free !
- No need to change your computer to use the newest Linux !

How long should you use your computer so that the CO₂ footprint of its usage ⚡ becomes as large of the CO₂ footprint of its production ?

- High security: no viruses ... no viruses at all !
- High stability: the world best servers use Linux !
- Ease of use: you are already using it on your smartphone !
- Its Free ! = Open Source: the code source is available !!!

Why use Linux ?



- It's free !
- No need to change your computer to use the newest Linux !

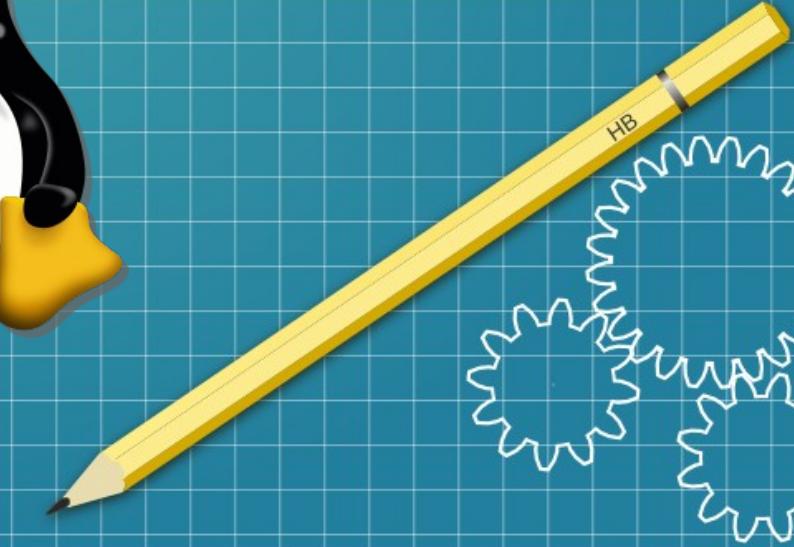
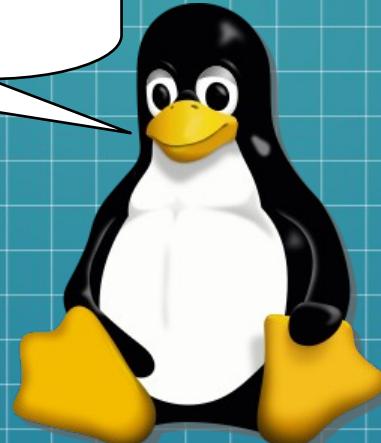
How long should you use your computer so that the CO₂ footprint of its usage becomes as large of the CO₂ footprint of its production ?

139 years !!!

- High security: no viruses ... no viruses at all !
- High stability: the world best servers use Linux !
- Ease of use: you are already using it on your smartphone !
- Its Free ! = Open Source: the code source is available !!!

**“Astronauts use Linux ...
... because you can't open windows in space”**

Questions ?



The command line ?



- What is a command interpreter ?
- What is a command ?
- Where to find command(s) ?
- How to execute a command ?
- How to use a command ?
- How to get help ?
- What are the basic commands ?
- What are the filters ?
- What is a redirection ?
- What is scripting ?

Command interpreter ?



- A command interpreter, or **Shell**, is a program that allows users to interact with the system using the command line.
- Many shells are available: **BASH**, **KSH**, **TCSH**, **ZSH**
- **BASH** “Bourne-Again Shell”

BASH

- BASH native (built-in) commands: **echo**, **pwd**, **export** ...
- Special characters

" " (space)

\$

what follow is a variable.

*

stands for any number of any character(s) = everything.

?

any single character.

{ } () []

used to encompass expressions.

/

to define file and directory path(s).

\`

to substitute enclosed command(s).

''

to enclose command(s).

""

to enclose command(s) with variable(s) expansion.

#

to start a comment in BASH.

| & < >

redirections.

. and ..

navigation in the directory tree.

\

to “protect” the other special characters

Linux: files and terminology



- On a computer you can have **2** types of files:
 - **Text files**
 - Other types of files = files that are not text files = **binary files**

Easy to work of text files !

- Not matter the type of file, on a Linux system you have:
 - Standard files and repositories.
 - Hidden files and repositories which names, by convention, start by a “.” dot symbol.

Example: “~/**.bashrc**”

Exercise: Compare the results of the commands: **ls** and “**ls -a**”

What is a command ?



**A file that has the execute permission ! ...
... A file that you can execute.**

Linux Fundamentals: File Permissions



- The different permissions that can be granted for a **file** are:
 - **read**: to visualize its content
 - **write**: to modify its content (ex: editing)
 - **execute**: to execute its content (ex: program)
- The different permissions that can be granted for a **directory** are:
 - **read**: to visualize its content
 - **write**: to modify its content (ex: adding new files)
 - **execute**: to go inside this directory (ex: changing directory)

Linux Fundamentals: File Permissions



```
leroux@chess-u20: ~/Documents/Linux$ ls -l
total 15108
drwxrwxr-x 2 leroux dmo      4096 oct.  20 13:40 Images
-rw-r--r-- 1 leroux dmo 15463386 oct.  20 13:55 Linux.odp
leroux@chess-u20:~/Documents/Linux$
```

drwxrwxr-x

d rwx rwx r-x

-rw-r--r--

- rw- r-- r--

Object

Owner

Group

The other user(s)

Object

Owner

Group

The other user(s)

Command = Executable



- Command = “**a file that has the execute permission**”

A screenshot of a terminal window titled "leroux@chess-u24: ~/Documents". The window has a dark theme with light-colored text. The command "ls -l" is run, showing the following output:

```
leroux@chess-u24:~/Documents$ ls -l
total 4
-rwx----- 1 leroux leroux 26 avril 3 15:23 test.sh
```

Where to find commands ?



- In the **PATH**
- Anywhere you need ...
... because you can create command(s) yourself

PATH



- **Environment variable(s) [EV]:**

“Set of dynamic named values used to create the operating environment in which a process runs”

- To access the **EV** list use the **env** command:

```
user@localhost:~$ env
```

- To display the value of a variable:

```
user@localhost:~$ echo $PATH
```

Locating a command



- To locate a command use the **which** command:

```
user@localhost:~$ which ls  
/usr/bin/ls  
user@localhost:~$
```

How to execute a command ?

- Use it name directly:

```
user@localhost:~$ ls
```

*The command **MUST** be in the PATH*

- Use the direct path + name of the executable:

```
user@localhost:~$ /usr/bin/ls
```

- Change directory to the folder of the executable and use “**./**”

```
user@localhost:~$ cd /usr/bin  
user@localhost:/usr/bin$ ./ls $HOME
```

How to use a command ?



- A **command** can receive **argument(s)**:

```
user@localhost:~$ cd ~/Documents
```

- A **command** can receive **option(s)**:

```
user@localhost:~$ ls -l -h
```

```
user@localhost:~$ ls -lh
```

```
user@localhost:~$ ls -l --human-readable
```

How to get help



- The **-h** or **--help** option(s):

Accepted by most commands, to get basic help.

```
user@localhost:~$ ls --help
```

- The **man** command:

To access the manual pages

```
user@localhost:~$ man ls
```

Basic commands (1/6)



- File system management: **ls, pwd, cd, touch, mkdir
mv, cp, rmdir, rm**
- File printing: **wc, cat, tac, more, tail, cut**
- File management: **chown, chmod, diff, ln**

Basic commands (2/6)



```
user@localhost:~$ ls
Bureau      Images      Musique    snap          vidéo
Documents   Modèles   Public    Téléchargements
user@localhost:~$ ls -l
total 36
drwxr-xr-x. 2 user ipcms 4096 avril 12 11:04 Bureau
drwxr-xr-x. 2 user ipcms 4096 avril 12 11:04 Documents
drwxr-xr-x. 2 user ipcms 4096 avril 12 11:04 Images
drwxr-xr-x. 2 user ipcms 4096 avril 12 11:04 Modèles
drwxr-xr-x. 2 user ipcms 4096 avril 12 11:04 Musique
drwxr-xr-x. 2 user ipcms 4096 avril 12 11:04 Public
drwx----- 2 user ipcms 4096 avril 12 11:04 snap
drwxr-xr-x. 2 user ipcms 4096 avril 12 11:04 Téléchargements
drwxr-xr-x. 2 user ipcms 4096 avril 12 11:04 Vidéos
user@localhost:~$
```

Basic commands (3/6)



```
user@localhost:~$ cd Images
user@localhost:~/Images$ ls
user@localhost:~/Images$ cd ..
user@localhost:~/..$ cd ..
user@localhost:/$ cd
user@localhost:~$ cd Documents
user@localhost:~/Documents$
```

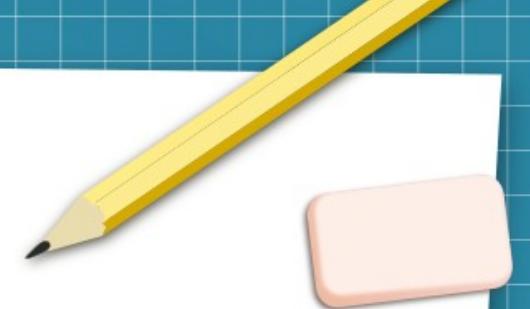
```
user@localhost:~/Documents$ touch file
user@localhost:~/Documents$ ls
file
user@localhost:~/Documents$
```

Basic commands (4/6)

- The **rm** command, important option: **-i**

```
user@localhost:~/Documents$ rm file
user@localhost:~/Documents$ ls
user@localhost:~/Documents$ touch nfile
user@localhost:~/Documents$ ls
nfile
user@localhost:~/Documents$ rm -i nfile
rm : supprimer 'nfile' du type fichier ? n
user@localhost:~/Documents$ ls
nfile
```

Basic commands (5/6)



- The **cat**, **tac** and **wc** commands

```
user@localhost:~/Documents$ cat Ethanol.xyz
      9

    C    1.0111998889    -0.0452918889    -0.0626048889
    C    -0.4620761111     0.0306281111    0.2946991111
    H    1.6265438889    -0.0376928889    0.8456121111
    H    1.3252608889     0.8030881111    -0.6846978889
    H    1.2501238889    -0.9611748889    -0.6188868889
    H    -0.7580021111    -0.8263228889    0.9315601111
    H    -0.6822251111     0.9536901111    0.8665561111
    H    -2.1126961111     0.0649821111    -0.6649928889
    O    -1.1981291111     0.0180941111    -0.9072448889

user@localhost:~/Documents$ wc -l Ethanol.xyz
11 Ethanol.xyz
user@localhost:~/Documents$
```

Basic commands (6/6)

- The **chmod** command “to change file permissions”

- **rW** - **r** - - **r** - -



Using 3 series (**owner**, **group**, **others**) of 3 numbers as well as their combinations:

(0 = nothing = - - -)	1	= execute (x) = - - x
	2	= write (w) = - w -
	4	= read (r) = r - -
	3 = 1 + 2	= x + r = r - x
	5 = 1 + 4	= x + w = - w x
	6 = 2 + 4	= w + r = - w r
	7 = 1 + 2 + 4	= x + w + r = r w

Basic commands (6/6)

- The **chmod** command “to change file permissions”

- rW- r - - r - -

Object

Owner

Group

The other user(s)

Using 3 series (**owner**, **group**, **others**) of 3 numbers as well as their combinations:

```
user@localhost:~/Documents$ ls -l Ethanol.xyz
-rw-r--r--. 1 user ipcms 525 avril 14 11:22 Ethanol.xyz
user@localhost:~/Documents$ chmod 600 Ethanol.xyz
user@localhost:~/Documents$ ls -l Ethanol.xyz
-rw-----. 1 user ipcms 525 avril 14 11:22 Ethanol.xyz
user@localhost:~/Documents$
```

What are the filters ?



- Filters are a type of command line utility designed to manipulate and process text data.
- The most common filters are **awk**, **sed** and **grep**

```
user@localhost:~$ filter option(s) 'regular expression' file
```

```
user@localhost:~$ filter option(s) "regular expression" file
```

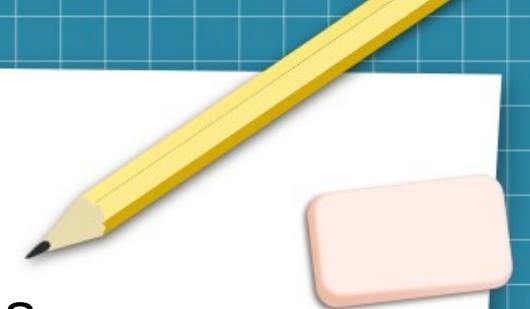
- Filter use regular expressions or **regexp**
“Set of rules and patterns to match and manipulate text data”

grep

- To find line(s) with pattern(s) in text files

```
user@localhost:~$ grep --color=always 'C' Ethanol.xyz
C      1.0111998889      -0.0452918889      -0.0626048889
C      -0.4620761111      0.0306281111      0.2946991111
user@localhost:~$ grep -n --color=always '0' Ethanol.xyz
11:0      -1.1981291111      0.0180941111      -0.9072448889
user@localhost:~$
```

sed



- To find, substitute and delete pattern(s) in text files

```
user@localhost:~$ sed 's/0/?/g' Ethanol.xyz
9

C      1.?111998889      -?.?452918889      -?.?626?48889
C      -?.462?761111      ?.?3?6281111      ?.2946991111
H      1.6265438889      -?.?376928889      ?.8456121111
H      1.32526?8889      ?.8?3?881111      -?.6846978889
H      1.25?1238889      -?.9611748889      -?.6188868889
H      -?.758??21111      -?.8263228889      ?.93156?1111
H      -?.6822251111      ?.95369?1111      ?.8665561111
H      -2.1126961111      ?.?649821111      -?.6649928889
O      -1.1981291111      ?.?18?941111      -?.9?72448889

user@localhost:~$
```

awk



- To find pattern(s) and process line(s) in text files

```
user@localhost:~$ awk '{print $1}' Ethanol.xyz
9
C
C
H
H
H
H
H
H
H
O
user@localhost:~$
```

What is a redirection ?



- Sending a command to the background:
 - Foreground job to the background:

Ctrl + **Z**

Followed by:

```
user@localhost:~$ bg
```

- Job directly to the background, using: **&**

```
user@localhost:~$ gedit &
```

- Sending the output of a command to a file:

```
user@localhost:~$ cat Ethanol.xyz > Eth.xyz
user@localhost:~$ cat Ethanol.xyz >> Eth.xyz
```

- **Sending the output of a command in another command: the pipe |**

The pipe (pipeline) |

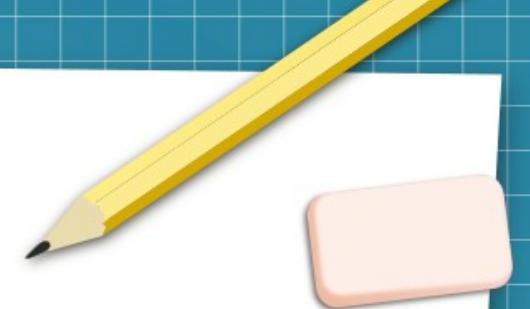
- Redirecting a command in another command, using: |

```
user@localhost:~$ cat Ethanol.xyz | wc -l  
11  
user@localhost:~$
```

```
user@localhost:~$ ls -l E* | grep '^-'  
-rw-r--r--. 1 user ipcms 525 avril 14 11:22 Ethanol.xyz  
-rw-r--r--. 1 user ipcms 525 avril 14 11:23 Eth.xyz  
user@localhost:~$
```

```
user@localhost:~$ ls -l E* | grep '^-' | awk '{printf $NF" "}'  
Ethanol.xyz Eth.xyz user@localhost:~$
```

What is scripting ?



- To program a list of command(s) and action(s) in a file

```
#!/bin/bash

# This little example to say "Hello" in BASH
echo "Hello"
```

- The first line tells the system which program use to run the script.
 - The other lines describe the commands to be performed.
- To execute the script:

```
user@localhost:~$ bash MyScript
```

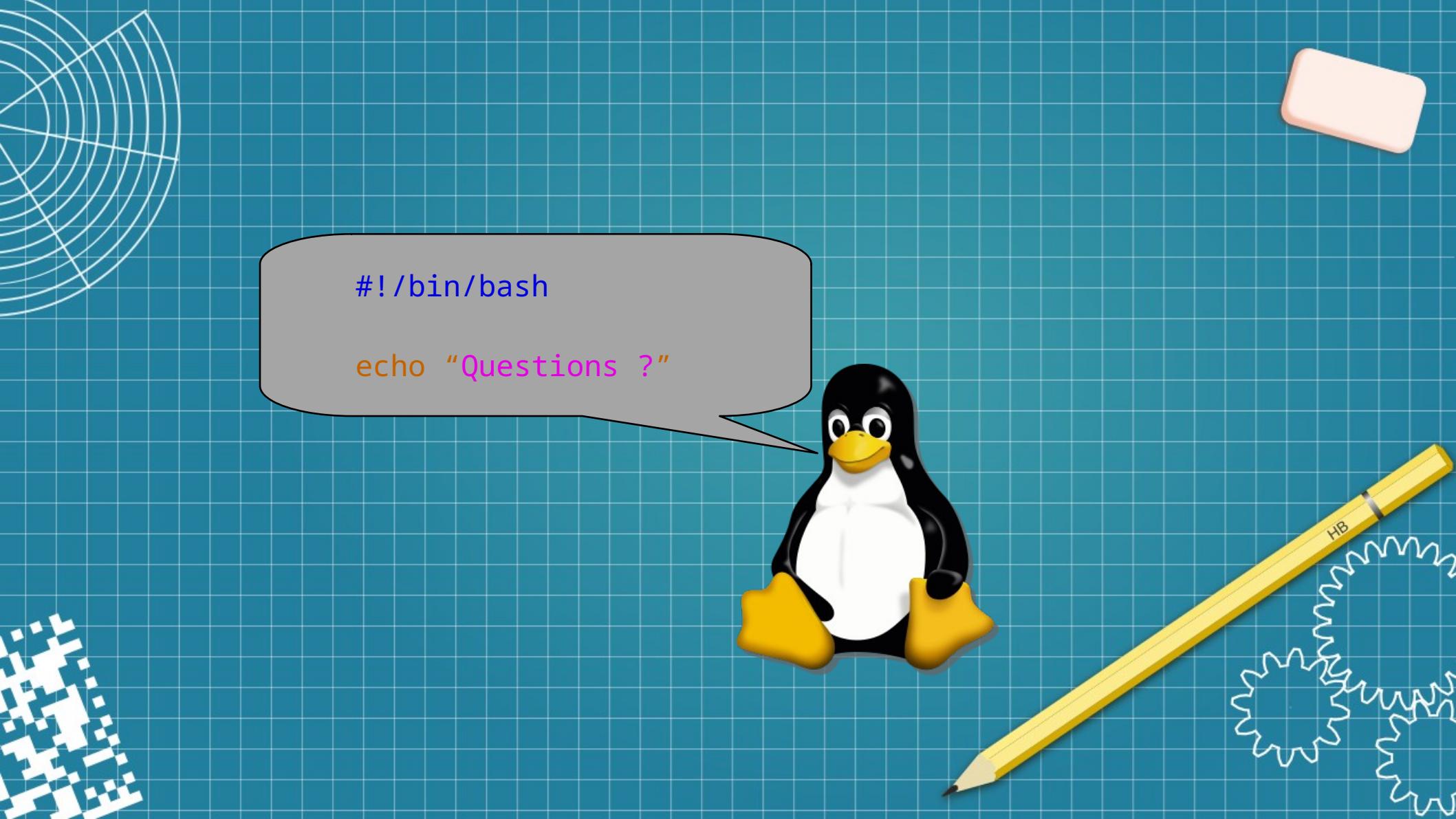
or

```
user@localhost:~$ chmod 755 MyScript
user@localhost:~$ ./MyScript
```

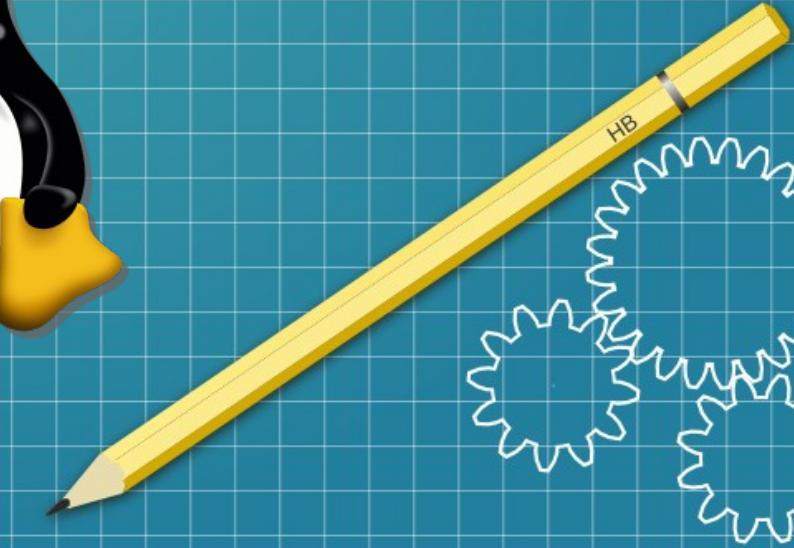
The file `~/.bashrc`

- Configuration file that BASH reads every time a shell starts
- BASH then executes the commands in `~/.bashrc`

```
# Modifying the PATH environment variable:  
PATH=$PATH:~/bin  
  
# Creating aliases, using: alias name='what to do'  
  
alias ll='ls -lh'  
alias lla='ls -lha'  
  
alias rm='rm -i'  
  
alias grep='grep --color=always'
```



```
#!/bin/bash  
echo "Questions ?"
```

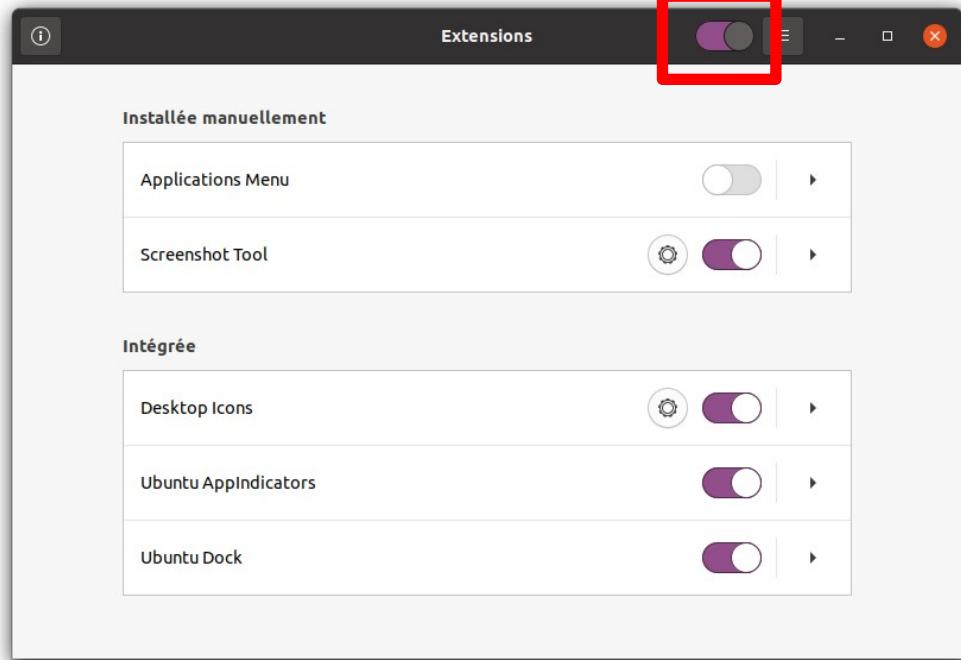
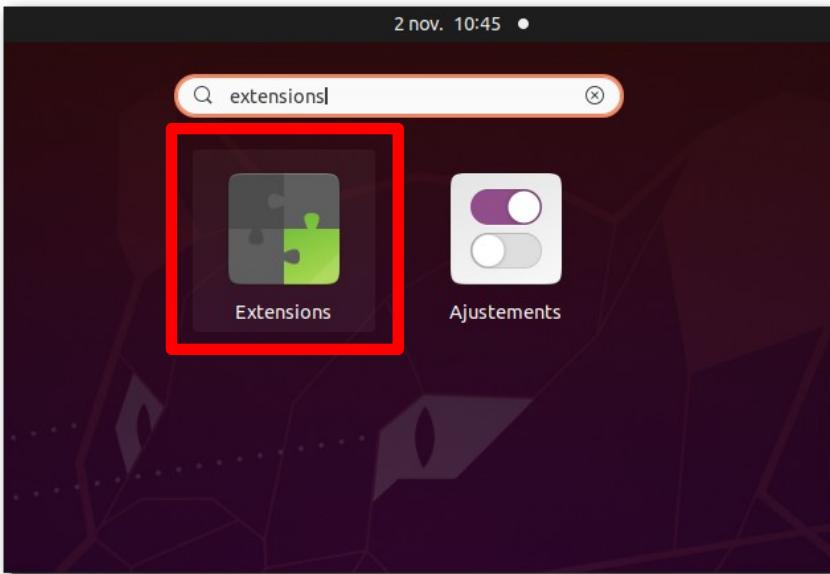


U. 20.04 LTS: GNOME Extras



- Extension preferences (gnome-shell-extension-prefs)

```
$ sudo apt install gnome-shell-extension-prefs
```



U. 20.04 LTS: GNOME Extras

- Gnome-shell extensions: <https://extensions.gnome.org/>

