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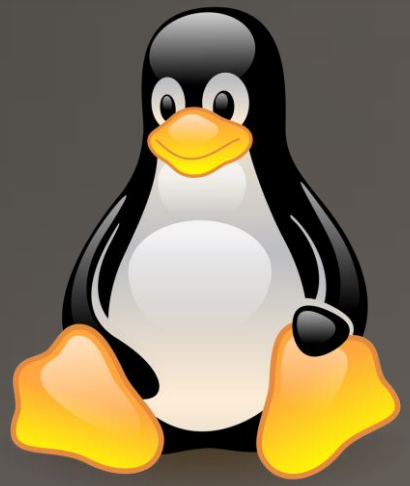
Linux -Ubuntu



Introduction To Linux

What is Linux ?

- Just like Windows , and Mac OS,Linux is an Operating System.
- Developed in 1991 by linus Torvalds.
- Open Source!
- Extremely customizable.

Command Line Interface

What is CLI ?

The most frequent tasks that you perform on your PC is creating, moving or deleting Files.

File Management:

1. Terminal (Command Line Interface - CLI)
2. File manager (Graphical User Interface -GUI)

Using CLI, we could write commands to do the same as GUI.

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Why learn Command Line Interface?

- Commands are flexible and offer more options.
- Work on multiple files at a time.
- CLI is Fast.

GUI is important too !!

- Browsing
- Performance Graphs
- Editing Video and Images

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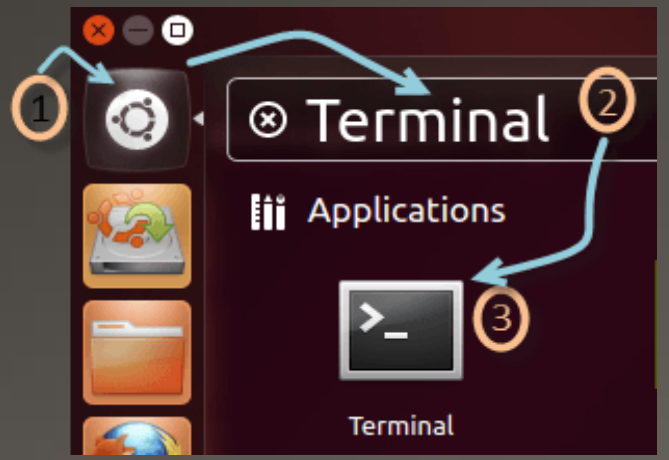
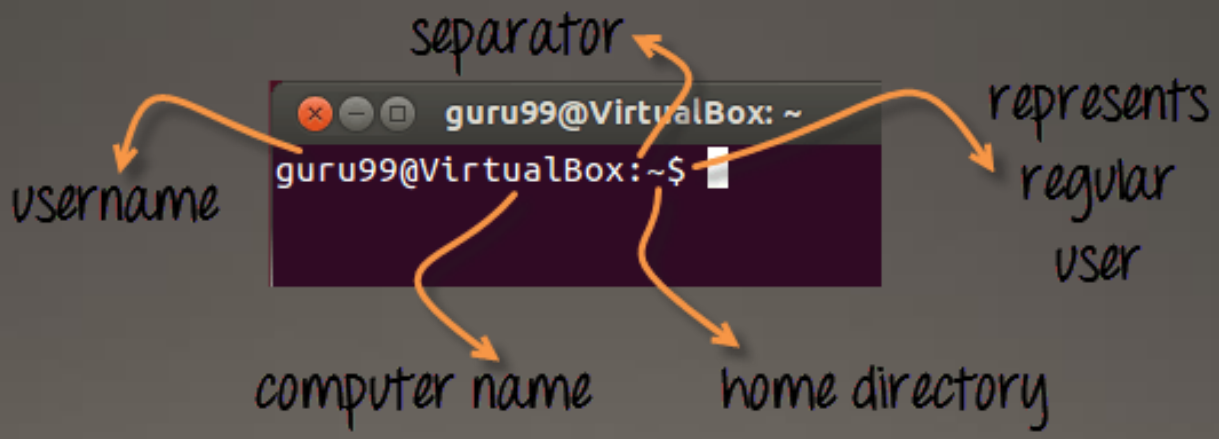
Launching the CLI on Ubuntu

There are 2 ways to launch the terminal.

1) Go to the Dash and type terminal
2) Or you can press CTRL + Alt + T to launch the Terminal





Basic Commands

Present Working Directory

The directory that you are currently browsing is called the Present working directory.
If you want to determine the directory you are presently working on,
use the command -pwd

Relative & Absolute Paths

- Absolute path is the full path to reach file
  - Example: If you want to access Pictures directory:
    cd /home/user/Pictures
- Relative path allows you to browse another subdirectory
  - It saves you from effort to type complete paths all the time.
  - Example: If you are on home directory and want to access Pictures directory :
    cd Pictures or cd ./Pictures

Changing Directories

If you want to change your current directory use the 'cd' command.

Command	Description
cd or cd ~	Navigate to HOME directory
cd ..	Move one level up
cd	To change to a particular directory
cd /	Move to the root directory

Listing files (ls)

If you want to see the list of files on your UNIX or Linux system, use the 'ls' command.

It shows the files /directories in your current directory.

Command	Description
ls	Lists all files and directories in the present working directory
ls - R	Lists files in sub-directories as well
ls - a	Lists hidden files as well
ls - al	Lists files and directories with detailed information like permissions, size, owner, etc.

- Directories are denoted in blue color.
- Files are denoted in white.

Directory Tree

- (tree) List tree from current directory that includes all sub-directories and files.

```
test
├── dir1
│   └── file3
├── file1
└── file2

1 directory, 3 files
```

Echo text

- (echo) prints line of text “echoing”.

```
echo "Hello World!"
Hello World!
```

Creating & Viewing Files

- The 'cat' server command is used to display text files. It can also be used for copying, combining and creating new text files.

1. cat > filename
2. Add content
3. Press 'ctrl + d' to return to command prompt.

Create a File

```
guru99@VirtualBox:~$ cat > sample1
```

Enter Content

```
This is sample1
```

Press Control + D to exit

```
guru99@VirtualBox:~$
```

```
guru99@VirtualBox:~$ cat sample1
This is sample1
```

```
guru99@VirtualBox:~$ cat > sample2
This is sample2
```

```
guru99@VirtualBox:~$ cat sample1 sample2 > sample
```

```
guru99@VirtualBox:~$ cat sample
This is sample1
This is sample2
```

Copying Files

- (cp) copy files from source to destination.
- (cp <source> <destination>)
- (cp –r) is for copying directories recursively

Creating file

- (touch) Creates an empty file.

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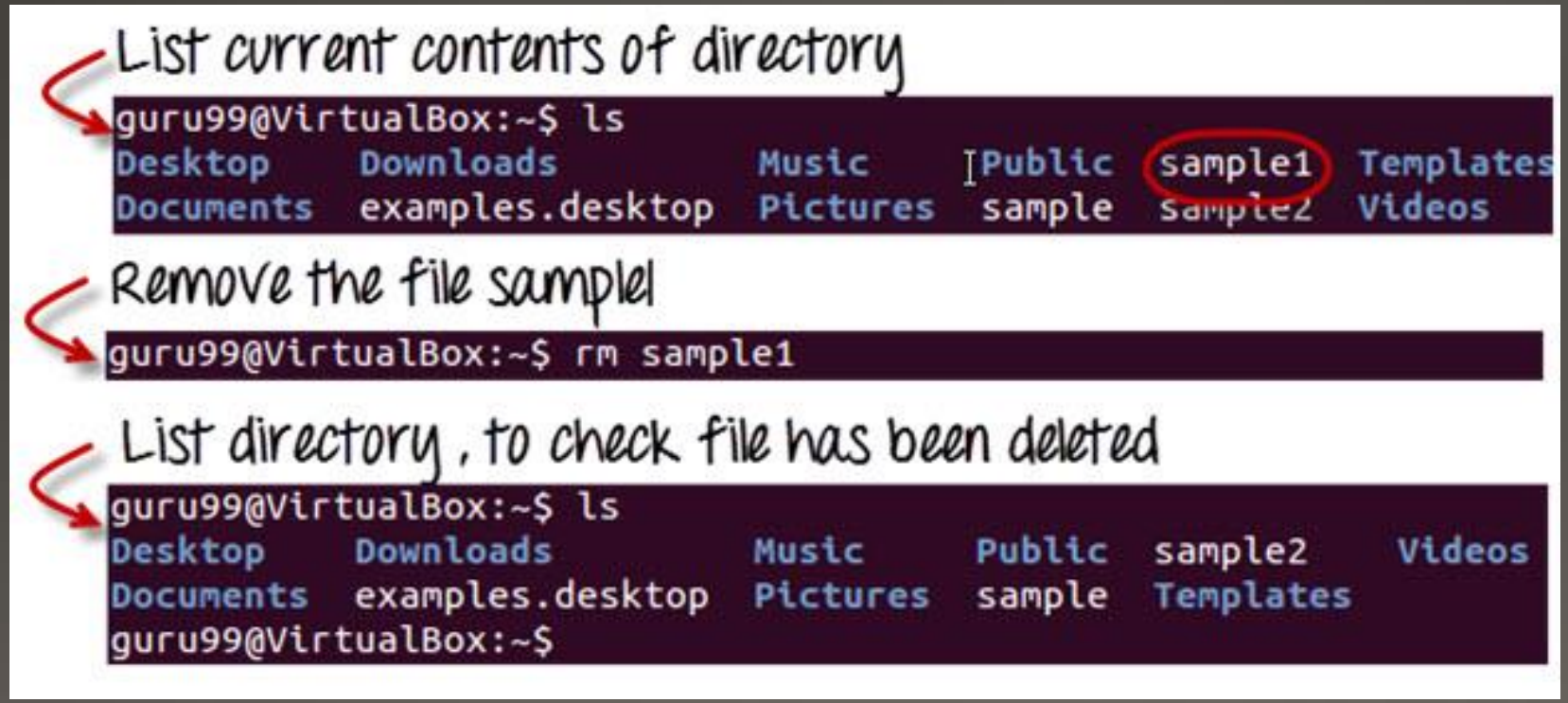
Deleting Files

- The 'rm' command removes files from the system without confirmation.



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Moving and Re-naming files

- To move a file, use the command "mv".

```
guru99@VirtualBox:~$ mv sample2 /home/guru99/Documents
mv: cannot move `sample2' to `/home/guru99/Documents': Permission denied
```

- sudo command_you_want_to_execute
- sudo mv sample2 /home/guru99/Documents
- For renaming file:

```
guru99@VirtualBox:~$ mv test test1
guru99@VirtualBox:~$ ls
Desktop    Downloads         Music     Public     test1
Documents  examples.desktop  Pictures  Templates  Videos
guru99@VirtualBox:~$
```

Directory Manipulations

- Directories can be created on a Linux operating system using "mkdir" command.

```
home@VirtualBox:~$ mkdir mydirectory
home@VirtualBox:~$ ls
Desktop     Downloads           Music        Pictures  Templates
Documents   examples.desktop    mydirectory  Public    Videos
home@VirtualBox:~$
```

```
home@VirtualBox:~$ mkdir /tmp/MUSIC
home@VirtualBox:~$ ls /tmp
keyring-yCD2no  pulse-Ob9vyJcXyHZz  ssh-SSSsjczv1036      virtual-home.HaC7Mw
MUSIC           pulse-PKdhtXMmr18n  unity_support_test.1
home@VirtualBox:~$
```

```
home@VirtualBox:~$ mkdir dir1 dir2 dir3
home@VirtualBox:~$ ls
Desktop  dir2  Documents  examples.desktop  Pictures  Templates
dir1     dir3  Downloads  Music              Public    Videos
home@VirtualBox:~$
```

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Removing Directories

- To remove a directory, use the command –rmdir | rm -r

```
home@VirtualBox:~$ rmdir mydirectory
home@VirtualBox:~$ ls
Desktop  dir2  Documents  examples.desktop  Pictures  Templates
dir1     dir3  Downloads  Music             Public    Videos
home@VirtualBox:~$
```

Renaming Directory

```
home@VirtualBox:~$ mv mydirectory newdirectory
home@VirtualBox:~$ ls
Desktop    Downloads         Music          Pictures  Templates
Documents  examples.desktop  newdirectory   Public    Videos
home@VirtualBox:~$
```

How to Make Parent Directories

- Building a structure with multiple subdirectories using mkdir requires adding the -p option. This makes sure that mkdir adds any missing parent directories in the process.
- For example:
  - if you want to create "dirtest2" in "dirtest1" inside the Linux directory (i.e., Linux/dirtest1/dirtest2), run the command:
  - mkdir –p Linux/dirtest1/dirtest2
  - Use ls -R to show the recursive directory tree.
  - Without the -p option ????????

The 'Man' command

- Man stands for manual which is a reference book of a Linux operating system. It is similar to HELP file found in popular software.

```
@VirtualBox:~$ man man
MAN(1)                          Manual pager utils                          MAN(1)

NAME
       man - an interface to the on-line reference manuals

SYNOPSIS
       man  [-C  file]  [-d]  [-D]  [--warnings[=warnings]]  [-R encoding] [-L
       locale] [-m system[,...]] [-M path] [-S list]  [-e  extension]  [-i|-I]
       [--regex|--wildcard]   [--names-only]  [-a]  [-u]  [--no-subpages]  [-P
       pager] [-r prompt] [-7] [-E encoding] [--no-hyphenation] [--no-justifi-
       cation]  [-p  string]  [-t]  [-T[device]]  [-H[browser]] [-X[dpi]] [-Z]
       [[section] page ...] ...
       man -k [apropos options] regexp ...
       man -K [-w|-W] [-S list] [-i|-I] [--regex] [section] term ...
       man -f [whatis options] page ...
       man -l [-C file] [-d] [-D] [--warnings[=warnings]]  [-R  encoding]  [-L
       locale]  [-P  pager]  [-r  prompt]  [-7] [-E encoding] [-p string] [-t]
       [-T[device]] [-H[browser]] [-X[dpi]] [-Z] file ...
       man -w|-W [-C file] [-d] [-D] page ...
       man -c [-C file] [-d] [-D] page ...
       man [-hV]

DESCRIPTION
 Manual page man(1) line 1 (press h for help or q to quit)
```

The History Command

- History command shows all the basic commands in Linux that you have used in the past for the current terminal session.
- This can help you refer to the old commands you have entered and re-used them in your operations again.

```
guru99@VirtualBox:~$ history
    1  cat > sample
    2  cat sample
    3  cat sample ^a
    4  cat sample a
    5  cat sample | grep a
    6  cat sample | grep ^a
    7  useradd home
    8  useradd mycomputer
    9  sudo useradd mycomputer
   10  sudo adduser MyLinux
   11  sudo adduser mylinux
   12  vi scriptsample.sh
```

The clear command

- This command clears all the clutter on the terminal and gives you a clean window to work on, just like when you launch the terminal.

Editing Files

- The most common file editors are (**nano**) ,(**vim**)and (**gedit**).
- (**nano**) is simpler to use , but (vim) is more powerful .
- Example : **nano** file.txt
- To exit (**nano**) use (ctrl + x) then (y) to save file.

The 'grep' command

- Suppose you want to search a particular information the postal code from a text file.

The contents of the 'sample' file

```
home@VirtualBox:~$ cat sample
Bat
Goat
Apple
Dog
First
Eat
Hide
```

Using 'grep' for searching Apple

```
home@VirtualBox:~$ cat sample | grep Apple
Apple
```

Using 'grep' for searching Eat

```
home@VirtualBox:~$ cat sample | grep Eat
Eat
```

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The 'grep' command

Option	Function
-v	Shows all the lines that do not match the searched string
-c	Displays only the count of matching lines
-n	Shows the matching line and its number
-i	Match both (upper and lower) case
-l	Shows just the name of the file with the string
-R	will follow all symbolic links

```
home@VirtualBox:~$ cat sample | grep -i a
Bat
Goat
Apple
Eat
```

Installing Software

- In debian-based distributions , software is packaged and get distributed in "deb" format.
- (apt) command is used to download these packages ,then it uses (apkg) command to install it on your system.
- First , we need to update the caches of software packages .
  - **sudo apt update**
- Then ,we cloud install the desired package .Example: to install (tree)
  - **sudo apt install tree**

Processes

- Any running program or command in Linux is called a process.
- Each running process has a process ID (PID)
- Processes could be started , stopped , run in background and in foreground.
- Background process runs independently of the user, which means no interaction with the user.
- We could Monitor resources of running processes like **cpu** and memory used using different commands like **(top),(htop),(ps)**

Development Editing and IDEs

- Popular IDEs or code editors used on Linux for C and C++ are :
  - Eclipse
  - Vscode
  - Sublime
  - Atom
  - Geany
  - Vim
- Python , Java , Nodejs , and many more languages could be developed on Linux too

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Important Commands

Shutdown and Reboot the System

shutdown

- it can be used to shutdown a system or restart it. It is commonly used to shutdown or reboot both local and remote machines.

shutdown [OPTION] [TIME] [MESSAGE]

- # shutdown -h now

  The h option is for halt which means to stop. The second parameter is the time parameter. "now" means that shutdown the system right away.

Important Commands

Shutdown and Reboot the System

reboot

- This will perform a graceful shutdown and restart of the machine. This is what happens when you click restart from your menu.

```
# reboot
```

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Important Commands

hostname Command

hostname

- The Linux hostname command is used to view or change a system's domain and hostname. It can also check a computer's IP address.

  # hostname [options] [new_hostname]

- Use the [options] parameter to add more specific instructions to the hostname command. Without it, the default output shows your computer's hostname: Use the [new_hostname] parameter when you want to change your computer's hostname.

Important Commands

hostname Command

Display All Network Addresses

- Use the -I or --all-ip-addresses option to display all of the host's network addresses. Unlike -i, this option doesn't depend on hostname resolution:

#hostname -I
#hostname --all-ip-addresses

```
test@controlnode:~$ hostname -I
10.0.2.15
```

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Important Commands

chmod command

chmod

- In Unix-like operating systems, the chmod command is used to change the access mode of a file.
- The name is an abbreviation of change mode.

chmod [reference][operator][mode] file...

Reference	Class	Description
u	owner	file's owner
g	group	users who are members of the file's group
o	others	users who are neither the file's owner nor members of the file's group
a	all	All three of the above, same as ugo

Important Commands

chmod command

chmod

- The operator is used to specify how the modes of a file should be adjusted.

Operator	Description
+	Adds the specified modes to the specified classes
-	Removes the specified modes from the specified classes
=	The modes specified are to be made the exact modes for the specified classes

Important Commands

chmod command

chmod

- The modes indicate which permissions are to be granted or removed from the specified classes.

Mode	Description
r	Permission to read the file.
w	Permission to write (or delete) the file.
x	Permission to execute the file, or, in the case of a directory, search it.

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Important Commands

exit command

exit

- exit command in Linux is used to exit the shell where it is currently running. It takes one more parameter as [N] and exits the shell with a return of status N.

#exit [n]

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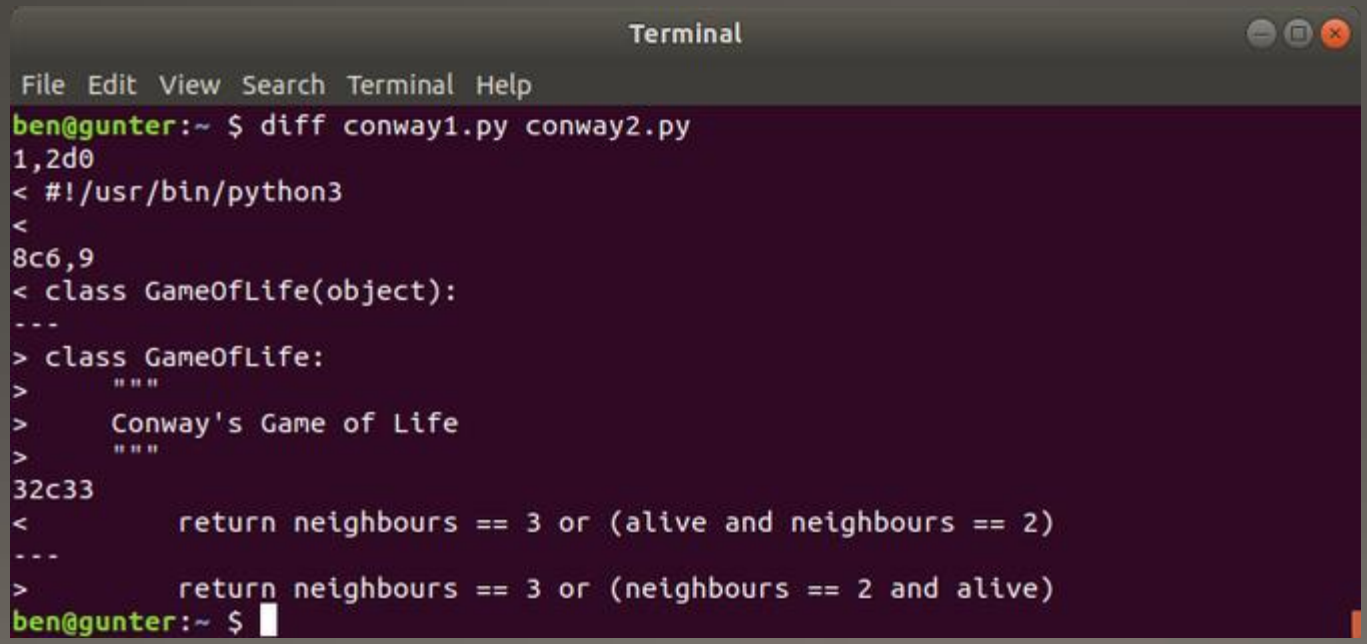
Important Commands

Meld vs. the diff command

diff

- If you have two similar files (perhaps one is a modified version of the other) and want to see the changes between them, you could run the diff command to see their differences in the terminal:



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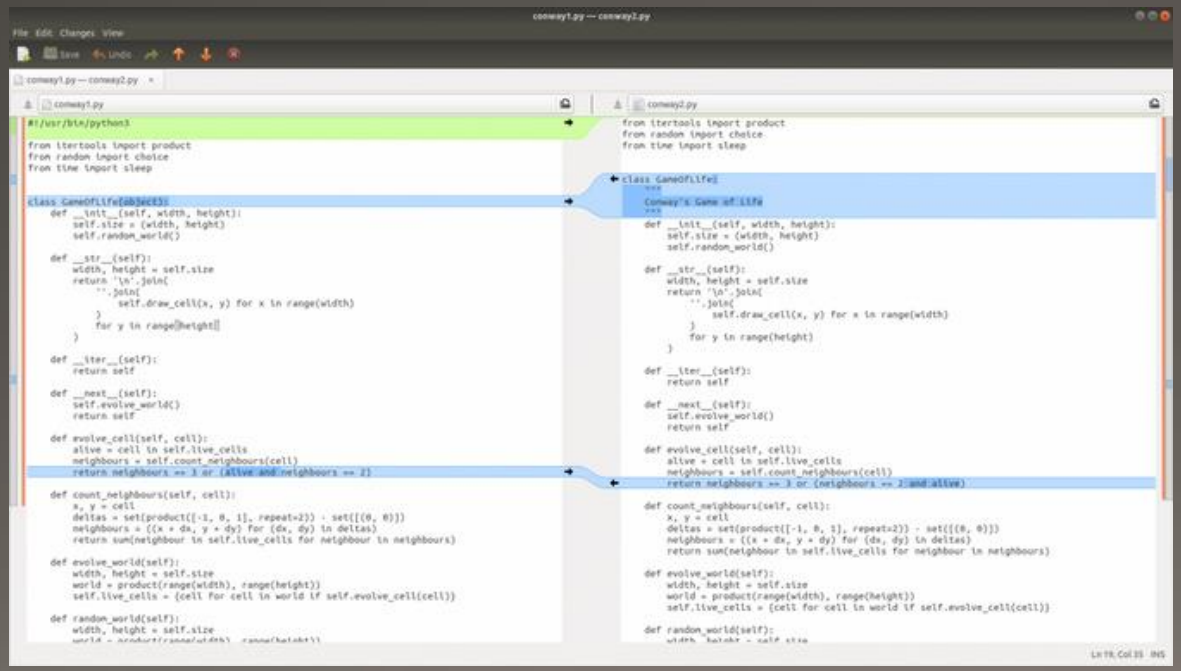
Important Commands

Meld vs. the diff command

meld

- Here's the same example using the meld command. You can run the same comparison from the command line with:

```
$ meld file1.py file2.py
```



Important Commands

Check hardware information on Linux with hwinfo command

Hwinfo

- The hwinfo command is a very handy command line tool that can be used to check details about hardware components. It reports information about most hardware units including cpu, hdd controllers, usb controllers, network card, graphics cards, multimedia, printers etc.

sudo apt-get install hwinfo

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Important Commands

Display all information

Hwinfo

- Running hwinfo without any options would display detailed information about all hardware units

```
# hwinfo
```

Display brief information

- **The "--short" option will display brief information about the hardware and not the details.**

```
# hwinfo --short

# sudo hwinfo --short --usb

#sudo hwinfo --short --usb --cpu --block
```

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Thank You