Université
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Git : Part 1
Introduction & basics

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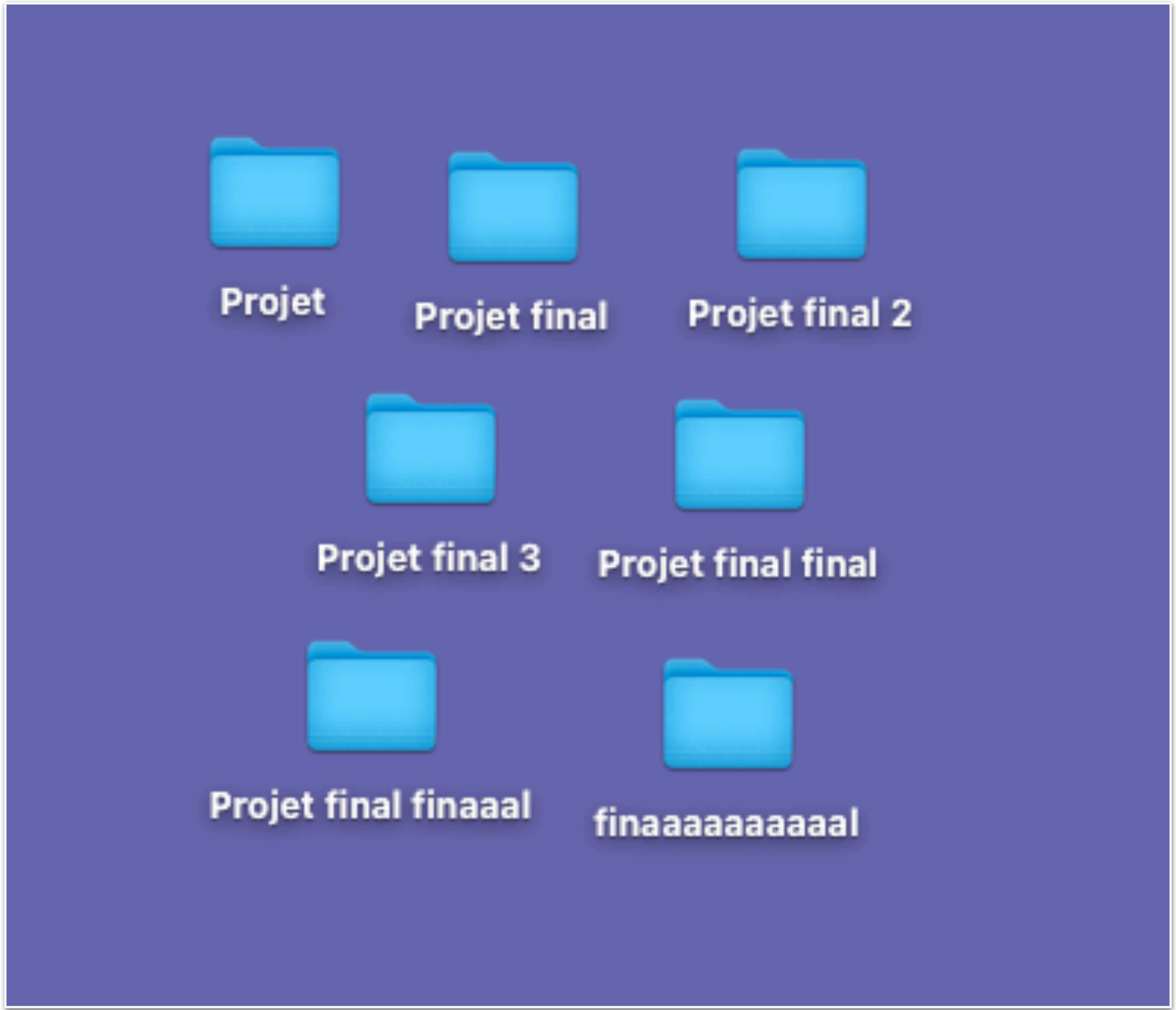
Contenu du cours

What is Git ?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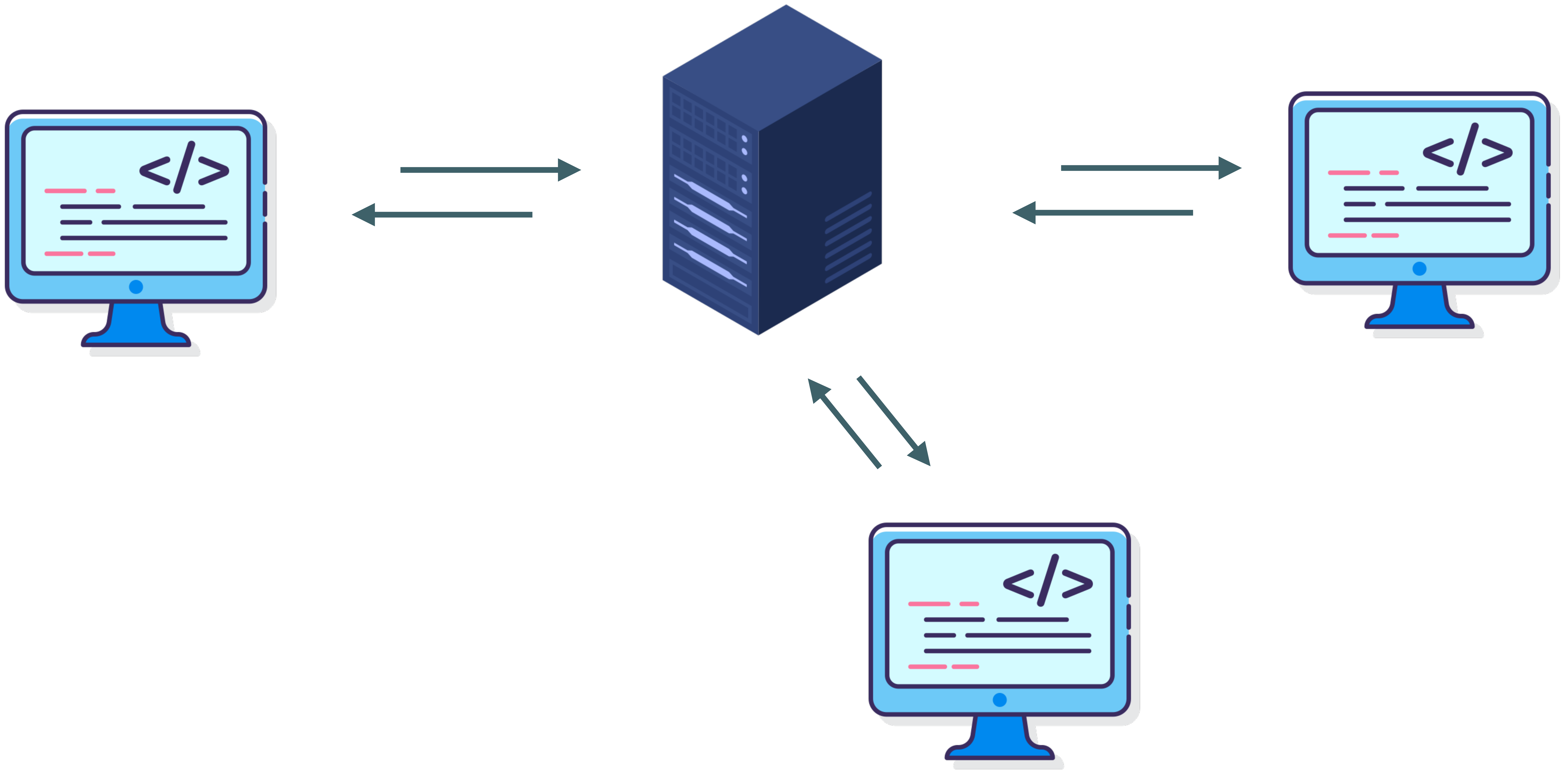
What is Git ?

- Git is a distributed version control system (VCS).
- Track changes made on files and revert back to them (like a time traveling machine).
- Developed and released in 2005 by Linus Torvalds, the creator of Linux.
- It is a free and open source.
- According to a Stack Overflow developer survey over 87% of developers use Git.

What is a distributed VCS

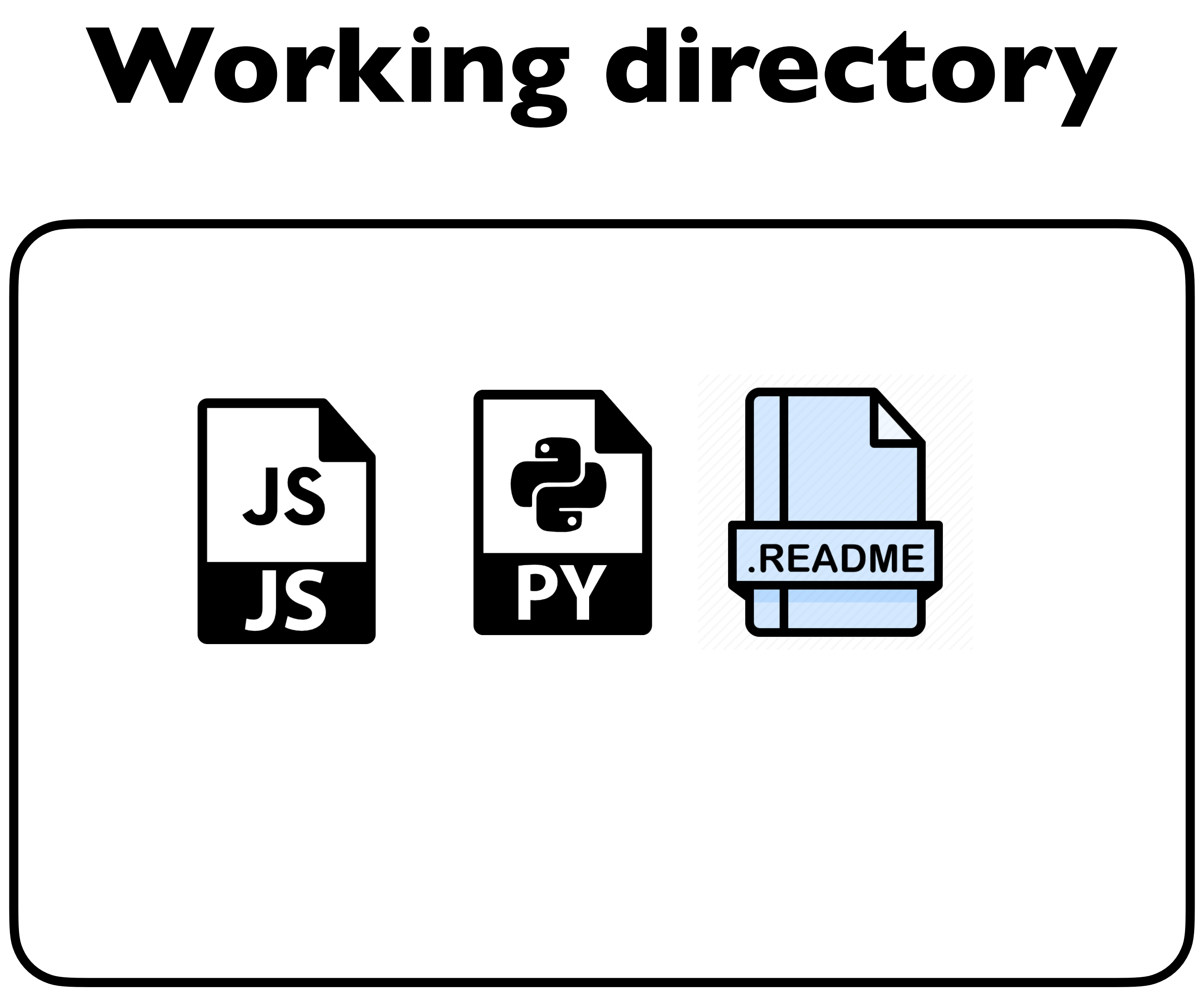
No single point of failure



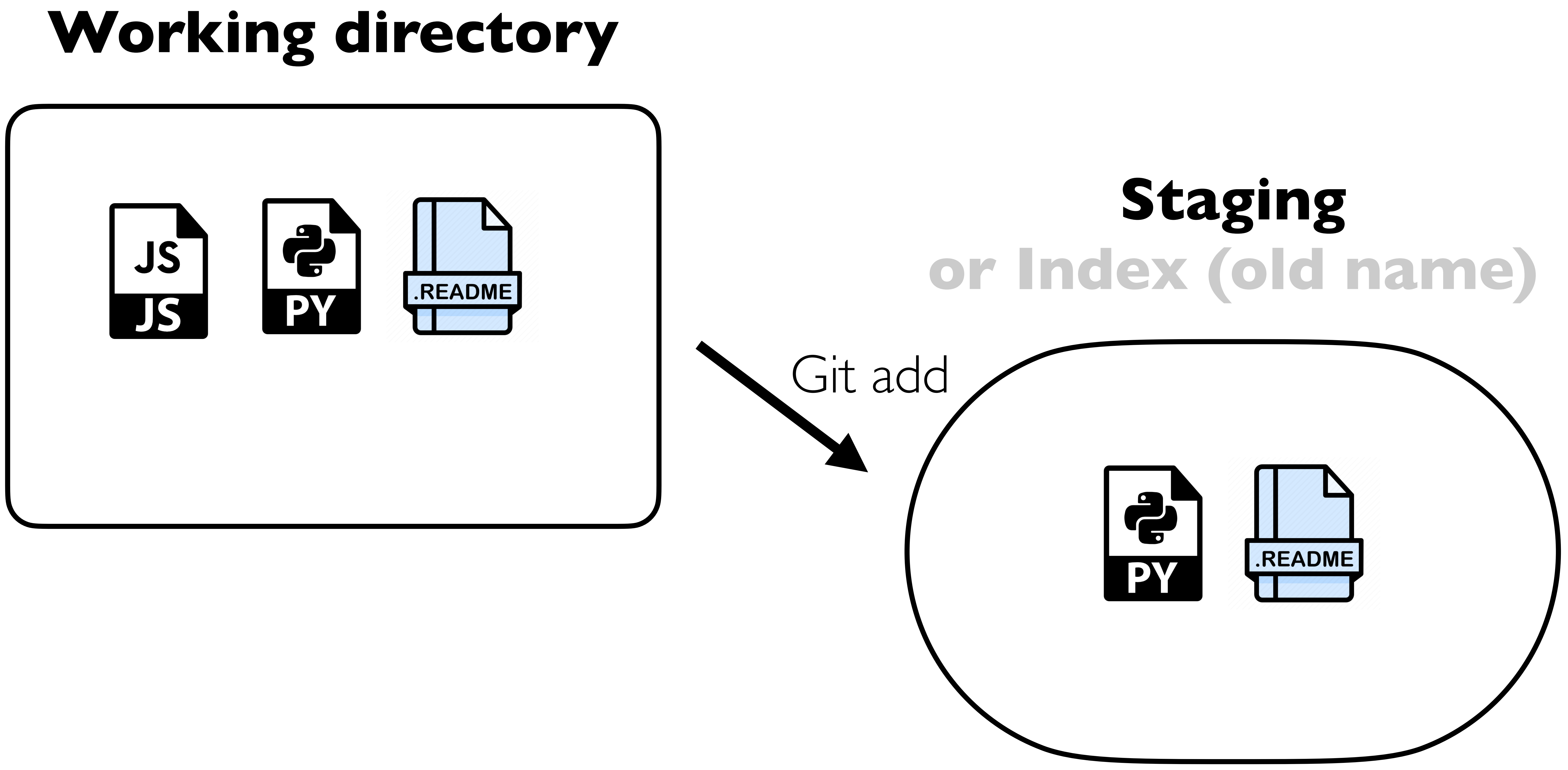
Git hosting service

- Web hosting service that hosts git projects on the cloud.
- The most used ones are : Github, bitbucket and gitlab.
- **Github** is the most popular one, it was bought by Microsoft in 2018.

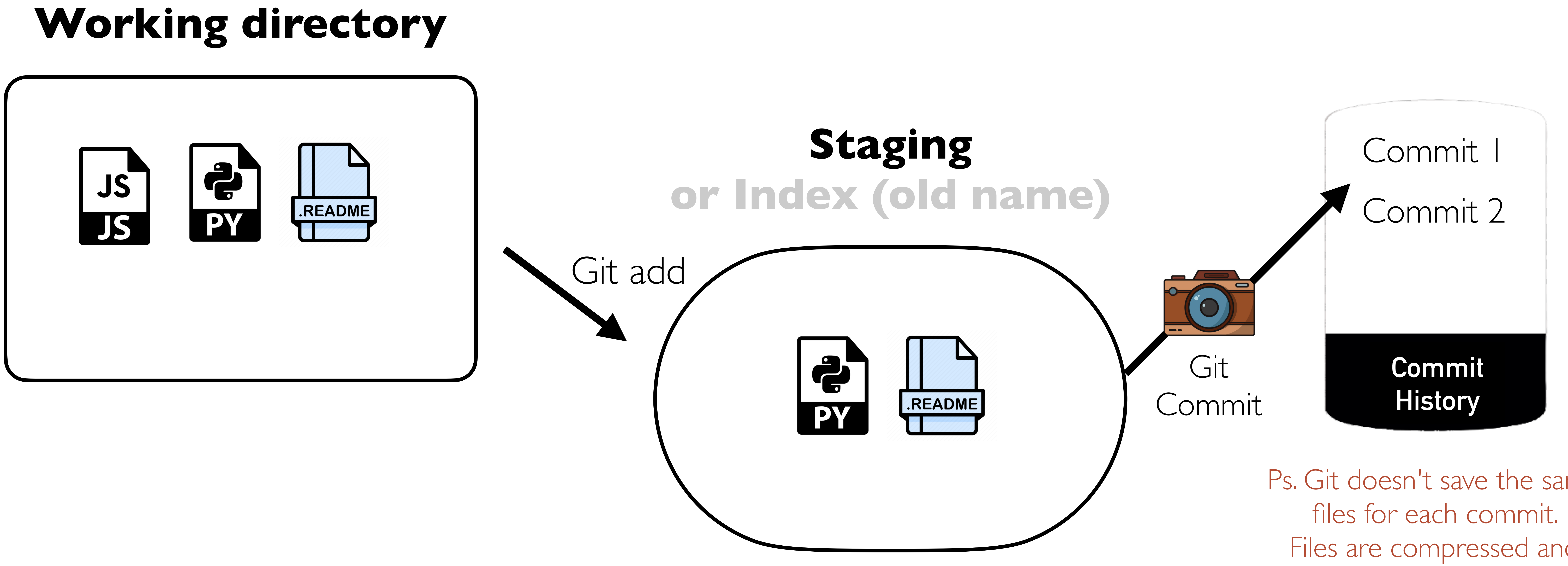
General git workflow



General git workflow

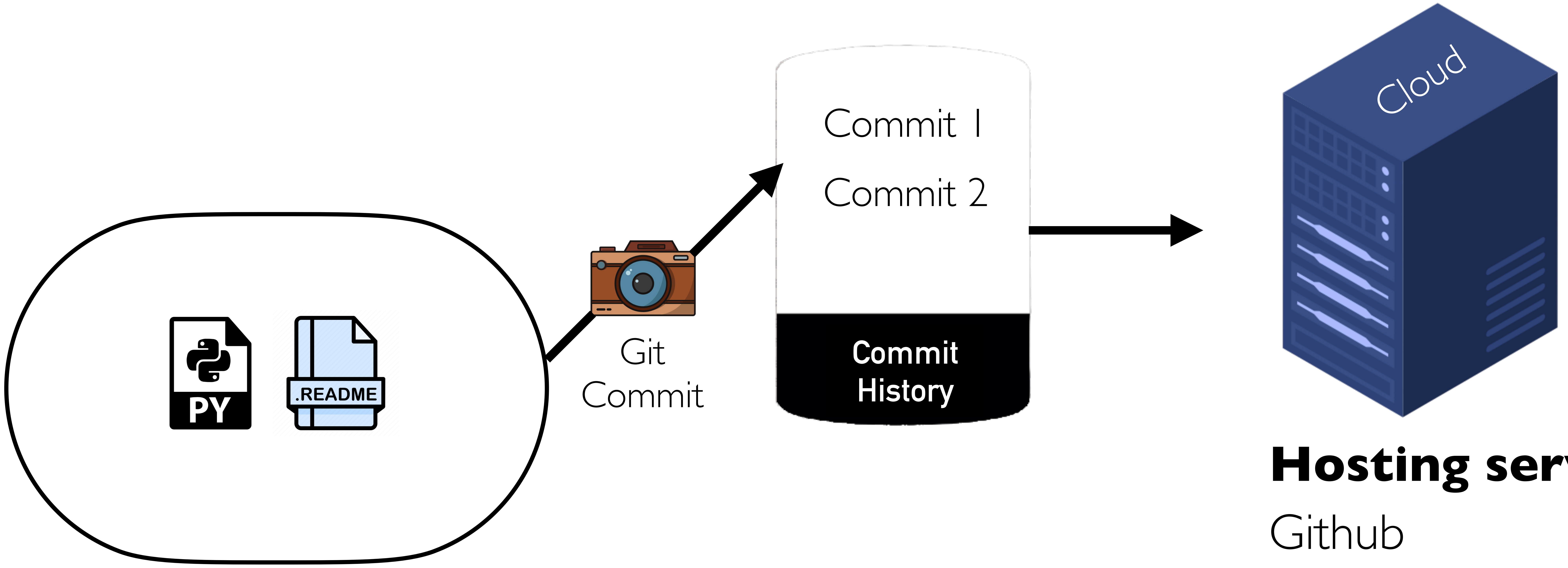


General git workflow



Ps. Git doesn't save the same files for each commit.
Files are compressed and saved uniquely

General git workflow



Hosting service

Github

Bitbucket

Gitlab

etc.

Staging / Index (old name)

Git installation

- Installation instructions : https://github.com/git-guides/install-git
- For windows use Git BASH

```
$ git version
git version ****
```

Git configuration

Cf. https://git-scm.com/book/sv/v2/Customizing-Git-Git-Configuration

```
$ git config [config level] [config name] [config value]
```

- [config levels] :

  --local : (default) applies to the local repository, config is found in .git/config

  --global : applies to the OS user repositories, config is found in ~/.gitconfig

  --system : applies to the all OS users, config is found in /etc/gitconfig

- [config Name] :

  user : email | name

  core : editor

  alias : git command

```
$ git config --global user.name 'amine'
```

```
$ git config --global user.email 'youremail@domain.com'
```

```
$ git config --local alias.st status -s
```

```
$ git config --global alias.lg 'log --oneline --graph --all'
```

```
$ git config --global -e #To see the current configuration
```

Bash commandes reminder

```
$ cd
$ ls -A
$ pwd
$ chmod
$ grep
$ mv
$ cp
$ rm -r
$ mkdir
$ touch
$ cat
$ diff
$ echo
$ man
$ history
$ clear
$ locate
$ open .
$ exit
$ kill
$ head
$ tail
$ ps
```

Initialise git

```
$ git init .
```

```
$ mkdir "hello git" && cd "$_"

$ git init .

$ ls -a
.       . .     .git
```

Add file(s) to the staging area

```
$ git add <file>
$ git ls-files
```

- <file> can be :
  - String : File name
  - . : all file within directory (Not recommended)
  - *. [extension]

```
$ touch main.py
$ echo "print('hello world')" > main.py
$ cat main.py
$ git add main.py
```

Take snapshot (commit)

```
$ git commit -m "your commit message here"
```

```
$ git commit -m "Initial commit."
```

Change (last) commit message

```
$ git commit --amend -m "your new commit message"
```

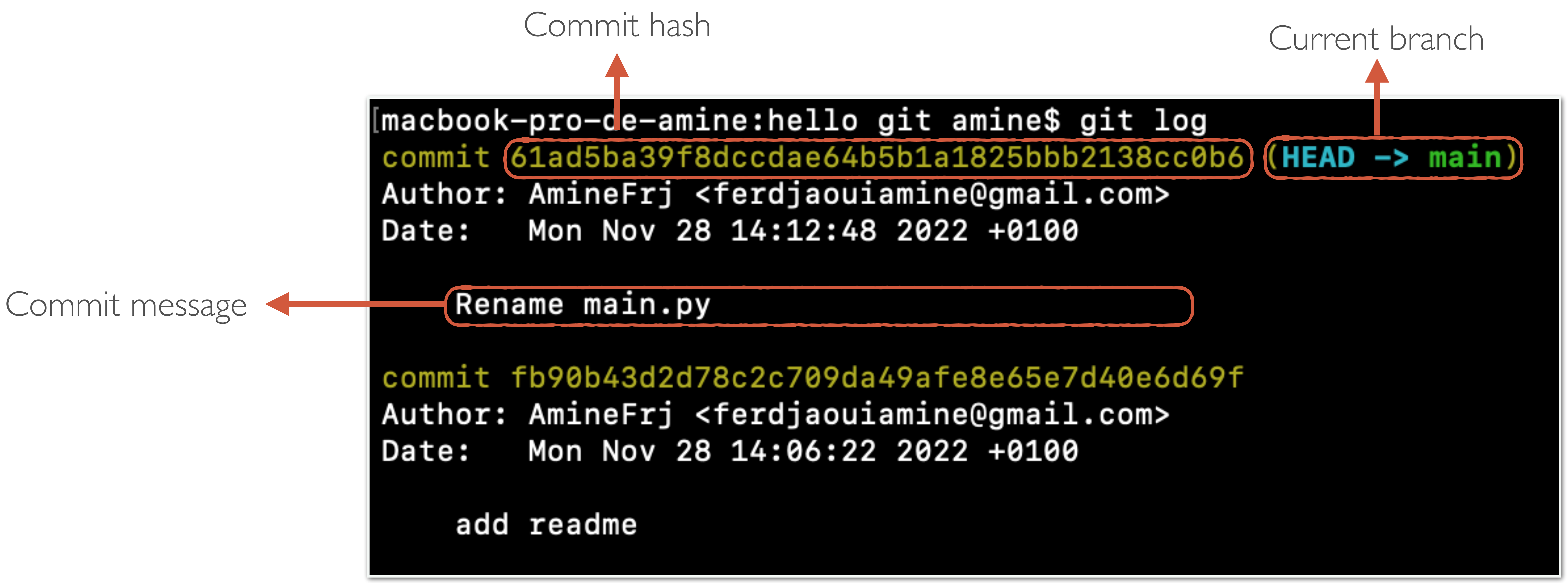
You can commit and add on the same time (adds files already tracked to the staging)

```
$ git commit -am "your new commit message"
```

Git log

Log history of commits

```
$ git log
$ git log --oneline
$ git log --oneline --reverse #start from the first commit
```



```
macbook-pro-de-amine:hello git amine$ git log
commit 61ad5ba39f8dccdae64b5b1a1825bbb2138cc0b6 (HEAD -> main)
Author: AmineFrj <ferdjaouiamine@gmail.com>
Date:   Mon Nov 28 14:12:48 2022 +0100

    Rename main.py

commit fb90b43d2d78c2c709da49afe8e65e7d40e6d69f
Author: AmineFrj <ferdjaouiamine@gmail.com>
Date:   Mon Nov 28 14:06:22 2022 +0100

    add readme
```

Git show & HEAD

View commit details

```
$ git show <hash>
$ git show  HEAD~N #The N-th commit before head
$ git show  HEAD~N:<filename>
$ git ls-tree HEAD~N #like ls -a
```

Head is a pointer to the a branch (branche's latest commit)*

*The HEAD could also be pointing to another commit and in that case it is called *Detached HEAD*

Check changes

```
$ git status
$ git status -s #cf. https://git-scm.com/docs/git-status
```

```
$ git status
$ echo "print("Here is a new line")" >> main.py
$ git status
$ git add main.py
$ git status
$ git commit -m "Add new print"
```

Delete file(s)

Remove file(s) from working dir and in staging

```
$ git rm <file>
```

```
$ echo "test" >> README.txt
$ git add README.txt
$ git commit -m "Add a README."
$ git rm README.txt
$ git status
$ git commit -m "Remove README"
```

Delete file(s) from staging

Remove file(s) from staging

```
$ git rm --cached <file>
$ git ls-files
```

```
$ touch main.py
$ echo "print('hello world')" > main.py
$ cat main.py
$ git add main.py
```

Rename file(s)

```
$ git mv <old_name> <new_name>
```

```
$ git mv main.py model.py

$ git status

$ git commit -m "Rename main.py"

$ git status
```

Ignore files

Cf. https://github.com/github/gitignore

```
$ vi .gitignore
```

```
$ echo requirements.txt > .gitignore
```

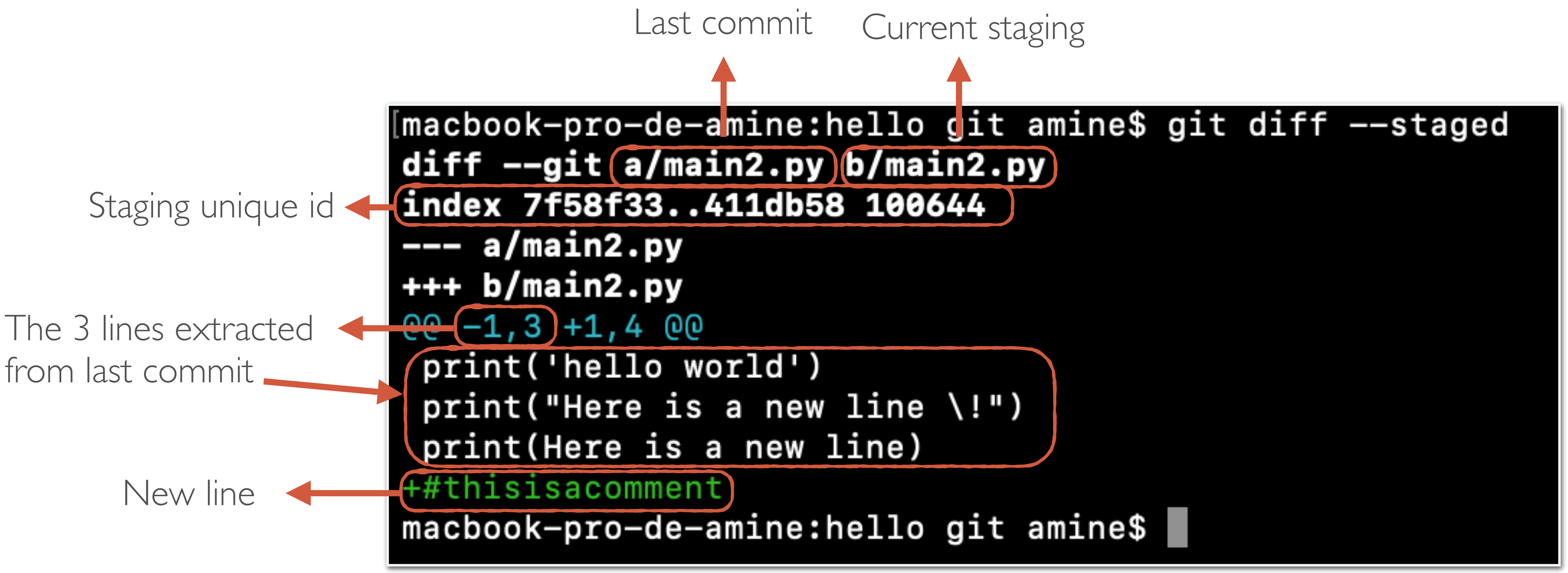
Ps. Files created before .gitignore will not be ignored, you have to remove them from the staging

```
$ git rm --cached <file>
```

Then commit the changes

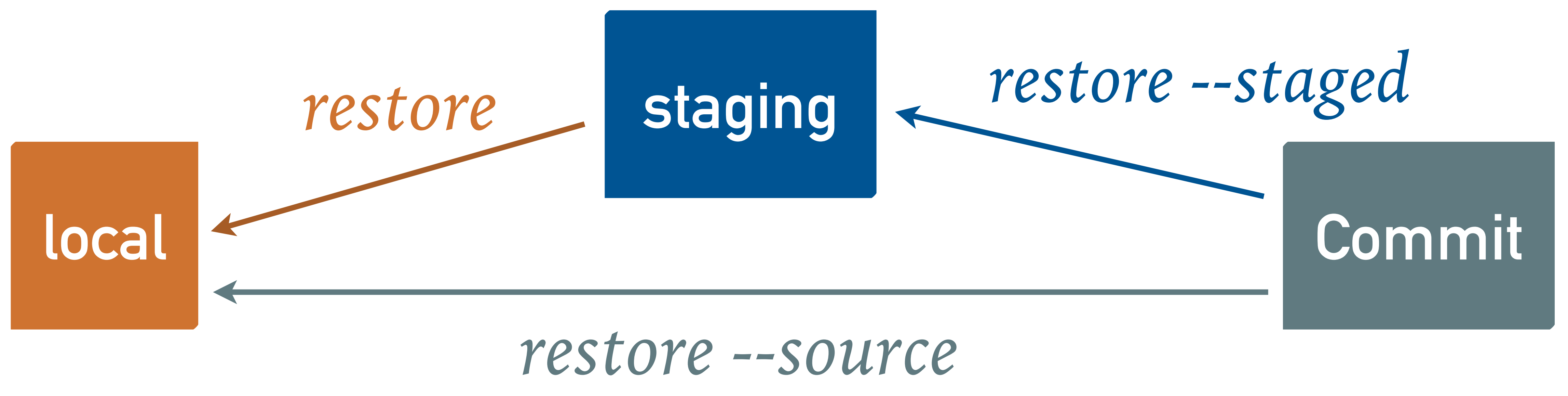
View Staged differences

$ git diff #Difference between working dir and staging
$ git diff --staged #Difference between staging and last commit



```
macbook-pro-de-amine:hello git amine$ git diff --staged
diff --git a/main2.py b/main2.py
index 7f58f33..411db58 100644
--- a/main2.py
+++ b/main2.py
@@ -1,3 +1,4 @@
 print('hello world')
 print("Here is a new line \!")
 print(Here is a new line)
+#thisisacomment
macbook-pro-de-amine:hello git amine$ 
```

Some commands to cancel changes



Cancel local changes : go back to the last staged files

```
$ git restore <file>
```

Cancel staged files : go back to the previous commit

```
$ git restore --staged <file>
```

Restore local files from commit

```
$ git restore --source=HEAD <file>
$ git restore --source=HEAD~[N] <file>
```

Best practices

- Commit messages should be meaningful, not too short nor too long
- Use present tense in commit message (for exp. "Fix the bug")
- Avoid using force command as much as possible (the -f flag)
- Use the terminal instead of service providers web pages