



# Introduction to the use of GitHub and its applications in bioinformatics

---

**Adrián Martín Segura**  
Computational Biology Group (IMDEA)

03/10/25

# WHAT IS GIT?

## GIT VS GITHUB



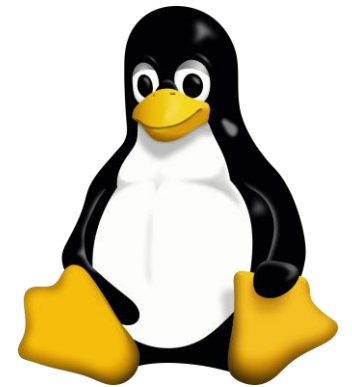
- Open-source version control system
- CLI
- Manage files & directories
- Track changes
- Ctrl + Z to previous versions

# WHAT IS GIT?

## GIT VS GITHUB



- Open-source version control system
- CLI
- Manage files & directories
- Track changes
- Ctrl + Z to previous versions



### Alternatives



# WHAT IS GIT?

## GIT VS GITHUB



- Open-source version control system
- CLI
- Manage files & directories
- Track changes
- Ctrl + Z to previous versions

```
MINGW64/c/Users/Adrian.m... X + v
PT-IMD-86+Adrian.martin@PT-IMD-86 MINGW64 ~/GitHub/Khawaja_et_al_2023 (main)
$ git log
commit 6d787fb1260cadd69e5c9a7b9adcc75105c96c28 (HEAD -> main, origin/main, origin/HEAD)
Author: amsegura <adrian.martinsegura@pm.me>
Date: Thu Apr 18 22:40:06 2024 +0200

    Lung removed, interactive UMAP for IF.

commit eebc2c0943f0007d1308c205ee07b4b12266fb78
Merge: b108c59 9abf305
Author: Amsegura <84419385+amsegura@users.noreply.github.com>
Date: Tue Apr 16 00:19:00 2024 +0200

    Merge pull request #1 from amsegura/alternatives

    Figures V3

commit 9abf305ac0271459cfab19f9fa55d5491f5a3fe1
Author: amsegura <adrian.martinsegura@pm.me>
Date: Tue Apr 16 00:03:38 2024 +0200

    Last data update (heart area correction)

commit f849e71c618974964a0dffe732b90bbf1bdf198d
Author: amsegura <adrian.martinsegura@pm.me>
Date: Fri Mar 15 15:53:08 2024 +0100

    1st explanatory calculations
```



Bash terminal to use Git on windows

# WHAT IS GIT?

## GIT VS GITHUB



- Open-source version control system
- CLI
- Manage files & directories
- Track changes
- Ctrl + Z to previous versions

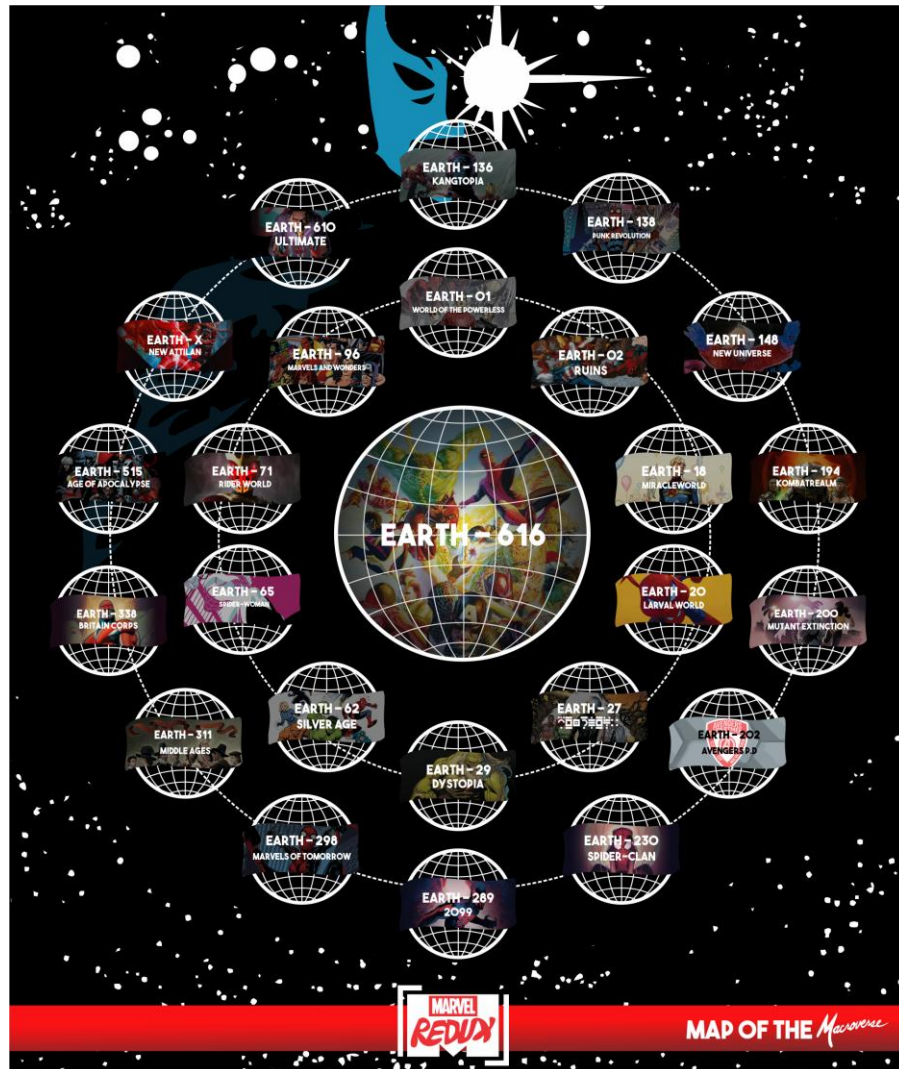


- Online hosting service for Git repos
- Collaboration hub



# Why GitHub? What is the advantage?

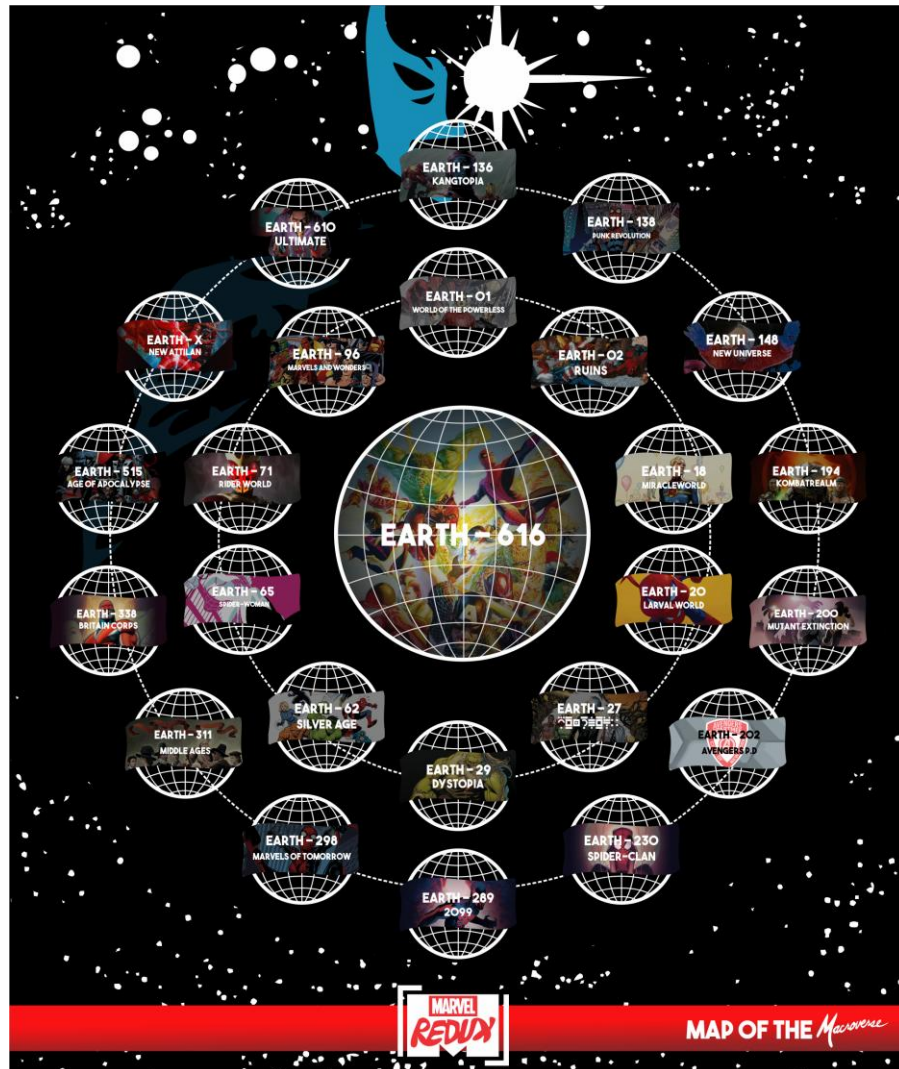
Multiple versions & further merge



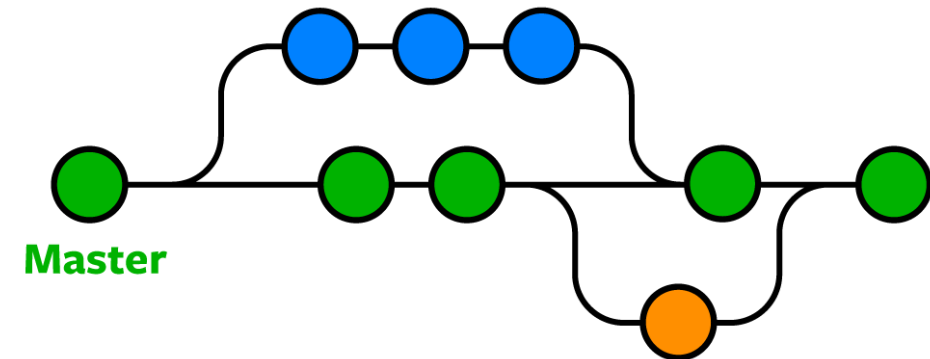


# Why GitHub? What is the advantage?

Multiple versions & further merge

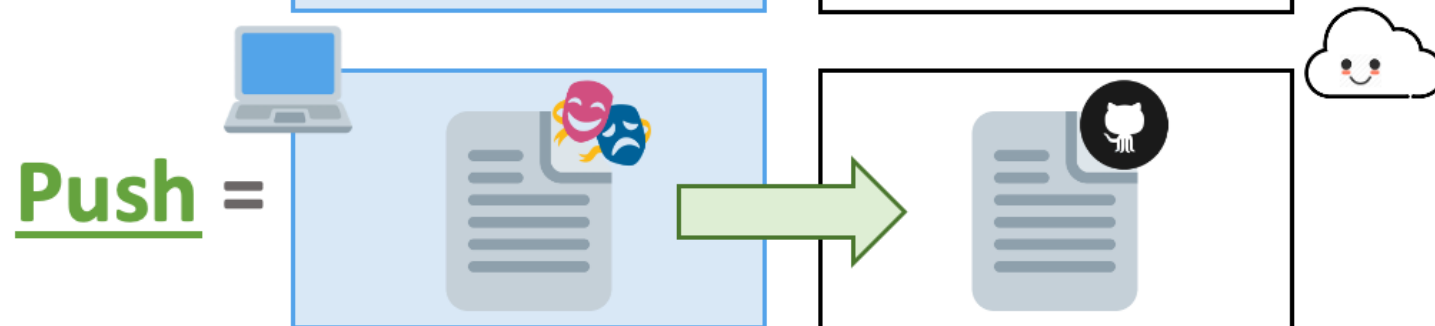
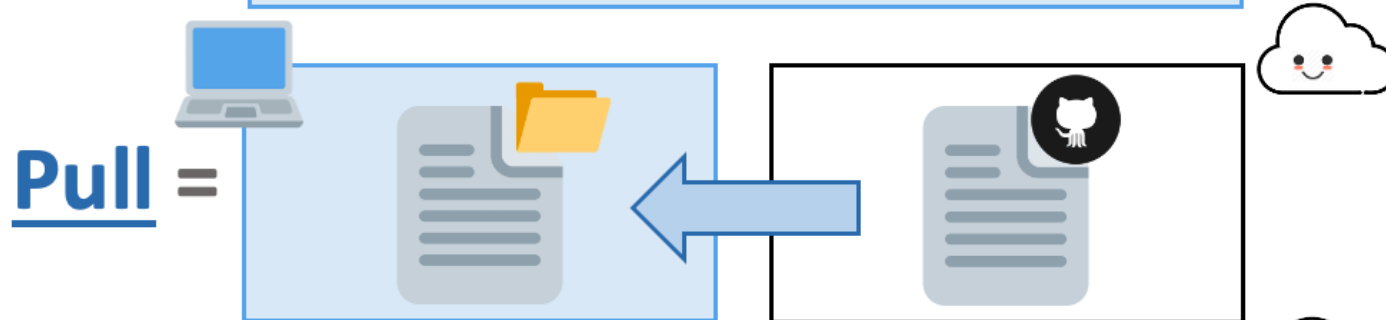
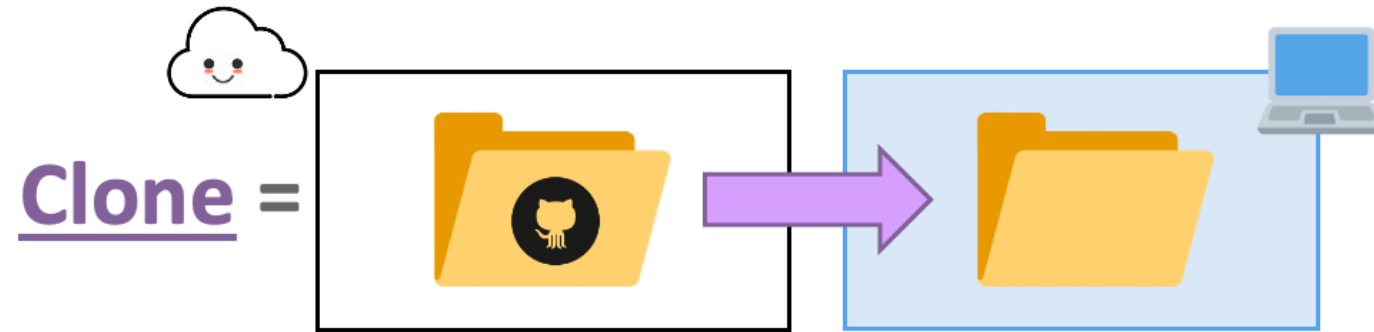


Your Work



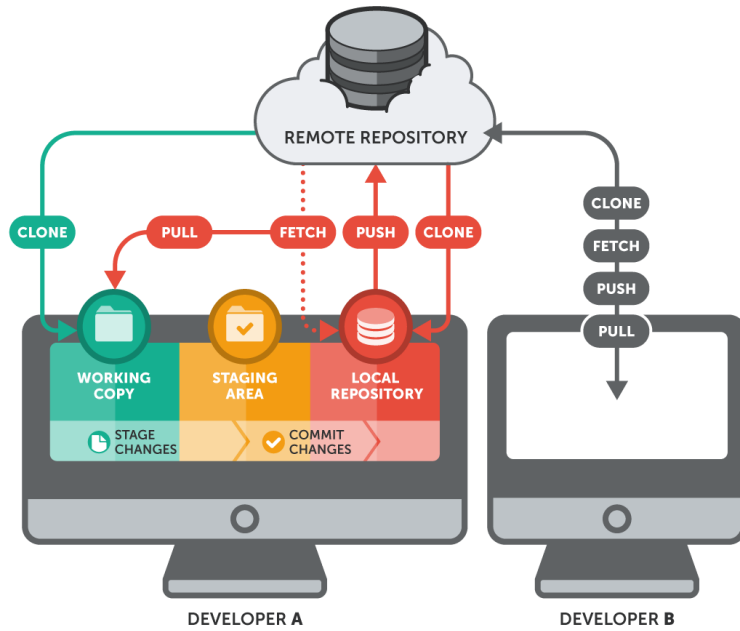
Master

Someone Else's Work

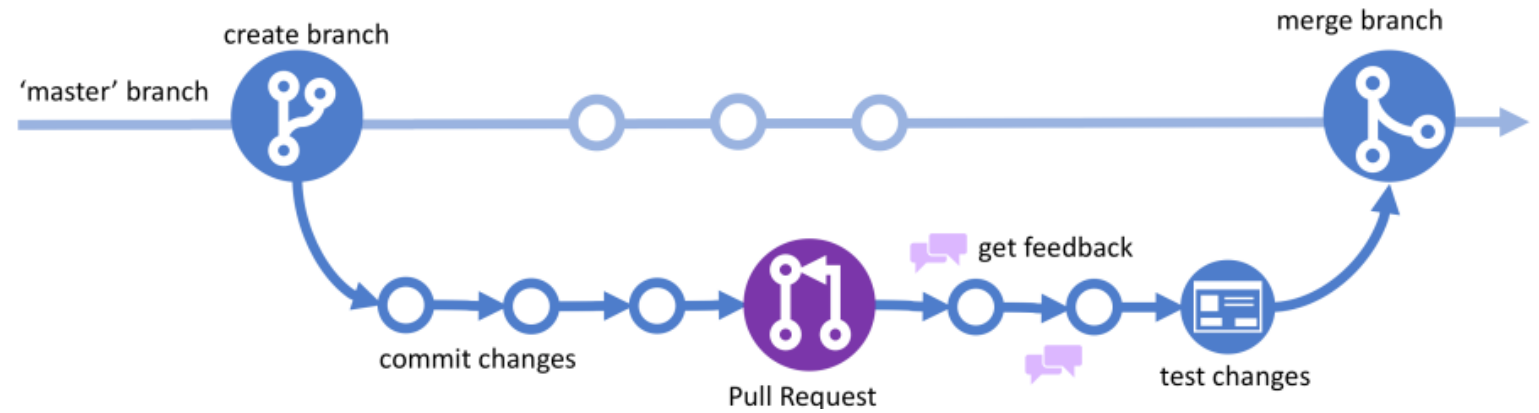


## Basic GitHub terms





## GitHub Flow





# Create a repository



```
cd route/to/your/directory
echo "# My first GitHub repo" >> README.md
git init
git add README.md
git commit -m "first commit"
git branch -M main
git remote add origin https://github.com/username/repo_name.git
git push -u origin main
```

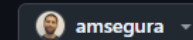
At this point it will ask you for a username and a password for pushing.

## Create a new repository

Repositories contain a project's files and version history. Have a project elsewhere? [Import a repository](#).  
Required fields are marked with an asterisk (\*).

### 1 General

Owner \*



Repository name \*

Great repository names are short and memorable. How about **stunning-chainsaw**?

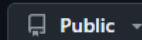
Description

0 / 350 characters

### 2 Configuration

Choose visibility \*

Choose who can see and commit to this repository



Add README

READMEs can be used as longer descriptions. [About READMEs](#)

Off ☐

Add .gitignore

.gitignore tells git which files not to track. [About ignoring files](#)

No .gitignore

Add license


Licenses explain how others can use your code. [About licenses](#)





No license




Create repository



# Create a repository






 **Training\_repo** Public



 Pin  Watch 0  Fork 0  Star 0

 main  1 Branch  0 Tags

 Add file  Code

 **amsegura** Initial commit a97dc4a · now  1 Commit

 README.md Initial commit now






 **README** 

## Training\_repo

Example repo for UAM bioinformatics master class (Oct 25)

### About

Example repo for UAM bioinformatics master class (Oct 25)

-  Readme
-  Activity
-  0 stars
-  0 watching
-  0 forks

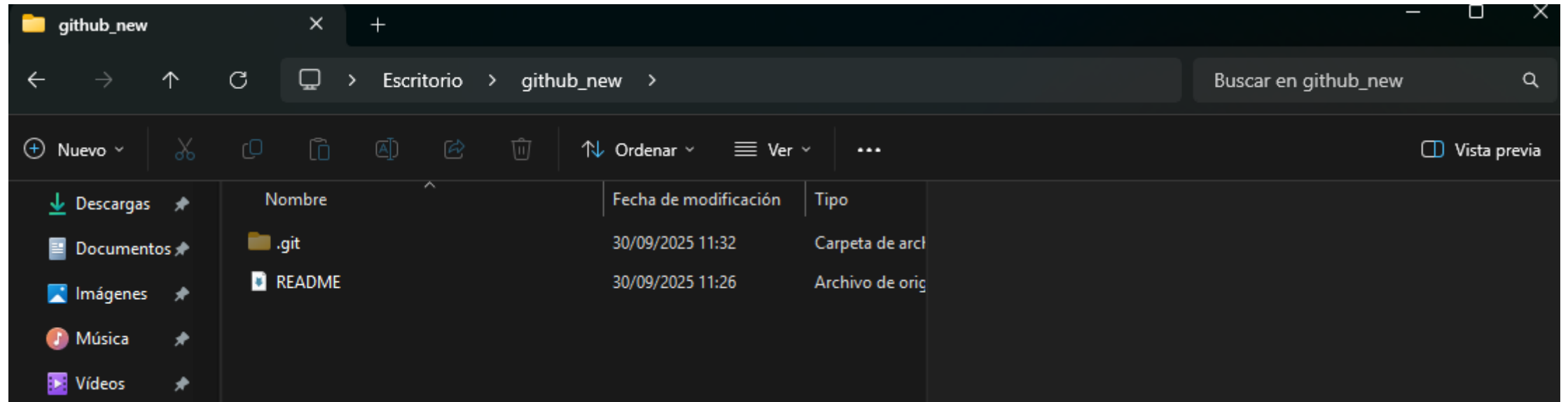
### Releases

No releases published  
[Create a new release](#)

### Packages

No packages published  
[Publish your first package](#)

# Create a repository



# Create a new branch

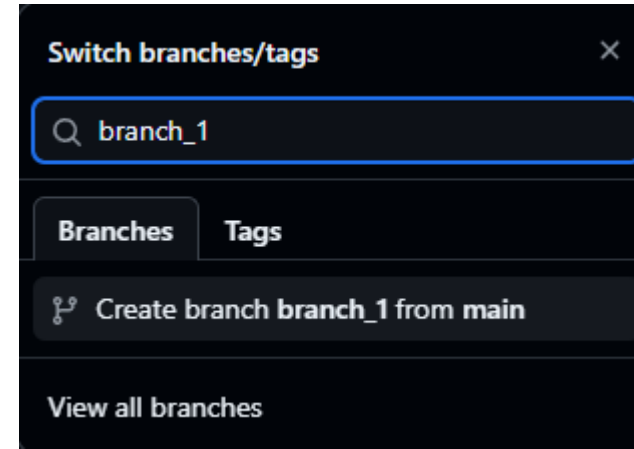


```
git branch branch_name # Create a new branch
git checkout branch_name # Move to new branch

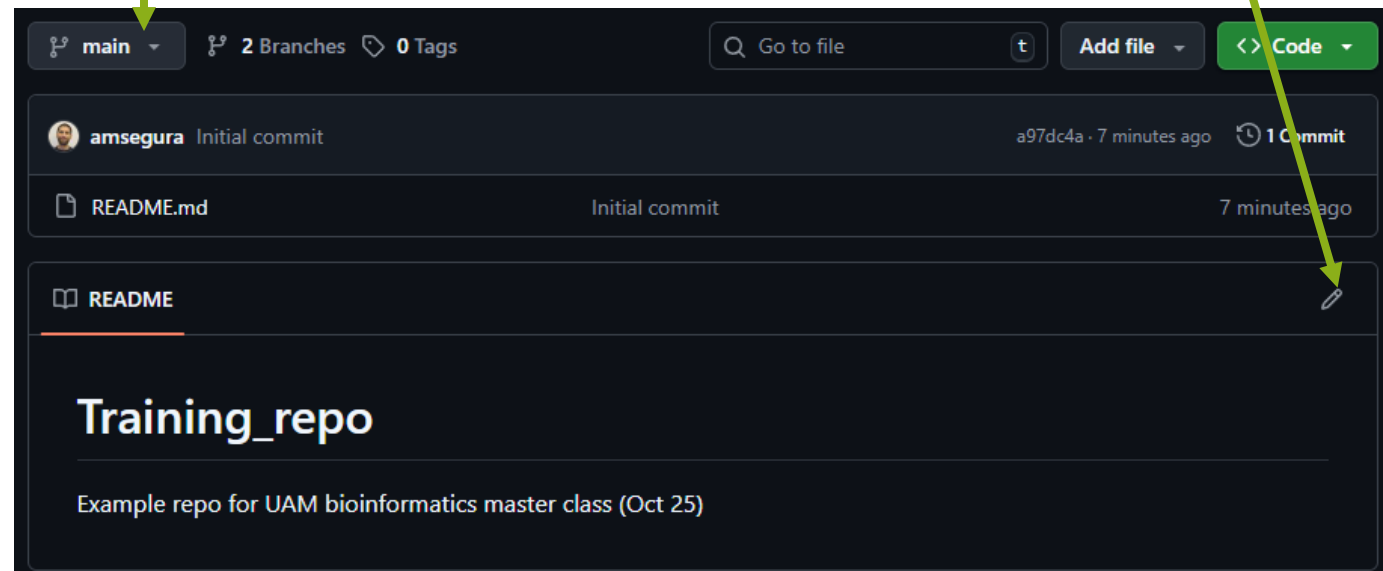
# One-step command
git checkout -b branch_name
```

```
PT-IMD-86+Adrian.martin@PT-IMD-86 MINGW64 ~/Desktop/github_new (branch_1)
$ |
```

Check & change  
branches



Edit README



# Modify Branch (commit)

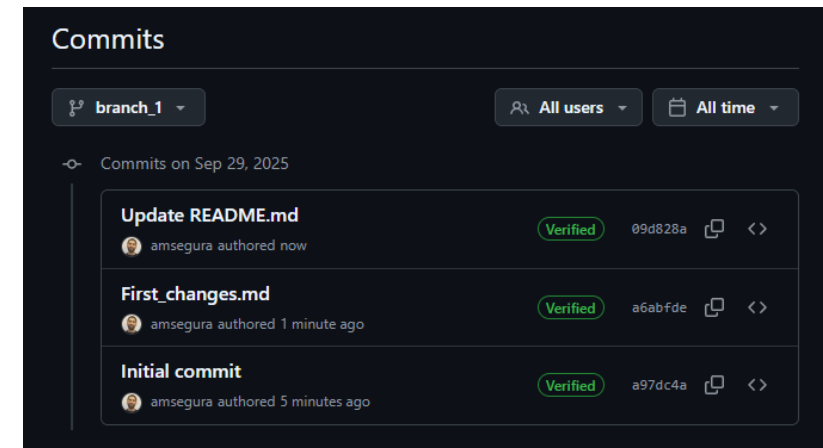
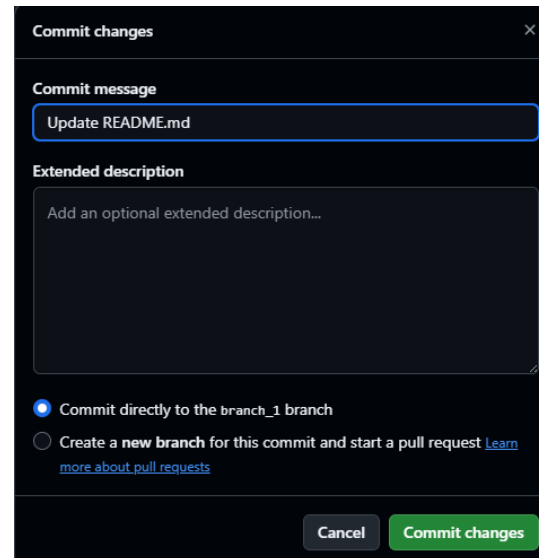
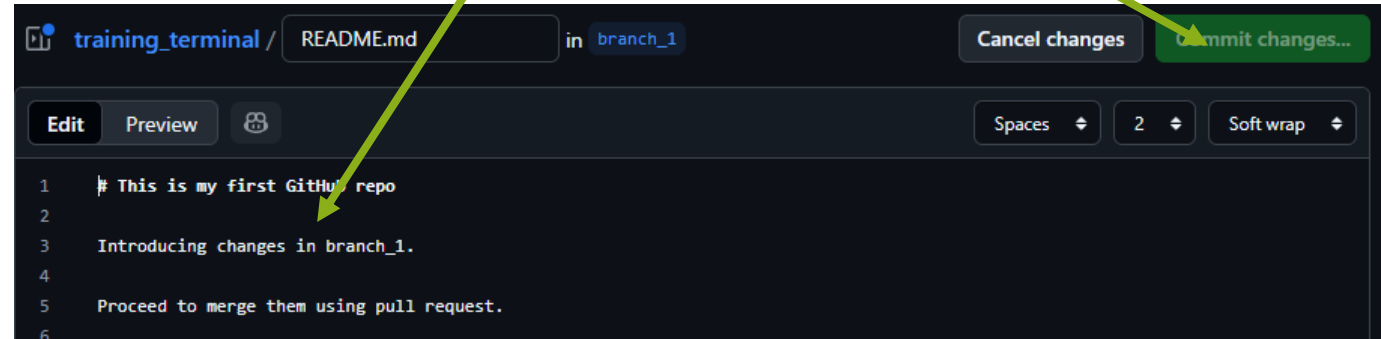


```
PT-IMD-86+Adrian.martin@PT-IMD-86 MINGW64 ~/Desktop/github_new (branch_1)
$ git branch
* branch_1
  main
```


```
git branch # Check branch
nano README.md # Edit README
git add README.md # Stage changes
git commit -m "Updating README.md via terminal"
git push -u origin branch_1 # Creating branch_1 remotely
```

Make changes


Commit








 **branch\_1** had recent pushes 3 seconds ago

[Compare & pull request](#)

 **branch\_1** ▾

 **2 Branches**  **0 Tags**


 Go to file


t


[Add file](#) ▾


[<> Code](#) ▾

This branch is 3 commits ahead of **main**.

 [Contribute](#) ▾


 **amsegura** example file uploaded

043331e · now  **4 Commits**

 **README.md**


Update README.md

6 minutes ago

 **example.xlsx**

example file uploaded

now

 **README**



# Training\_repo

Initial readme modified.

Uploading database in xlsx format, named "example.xlsx".

# Checking changes

Click on the commit



Commits

branch\_1

All users All time

Commits on Sep 29, 2025

Update README.md	Verified	09d828a	Copy icon	<>
amsegura authored now				
First_changes.md	Verified	a6abfde	Copy icon	<>
amsegura authored 1 minute ago				
Initial commit	Verified	a97dc4a	Copy icon	<>
amsegura authored 5 minutes ago				

Commit a6abfde

Browse files

amsegura authored 1 minute ago Verified

First\_changes.md

branch\_1

1 parent a97dc4a commit a6abfde

Filter files...



README.md

1 file changed +3 -1 lines changed

Search within code



README.md

+3 -1



```
@@ -1,2 +1,4 @@
1 1 # Training_repo
2 - Example repo for UAM bioinformatics master class (Oct 25)
2 + Initial readme modified.
3 +
4 + Uploading database in xlsx format.
```

# Checking changes



```
git log # Check commits
git show HEAD # Last commit
git show <hash_del_commit> # Specific commit
```

```
PT-IMD-86+Adrian.martin@PT-IMD-86 MINGW64 ~/Desktop/github_new (branch_1)
$ git log
commit 81bdf57154d2eeb1b3760a973c5f9180eb44d7a (HEAD -> branch_1, origin/branch_1)
Author: unknown <Adrian.martin@PT-IMD-86.IMDEAALI.local>
Date: Tue Sep 30 11:47:30 2025 +0200
```

Updating README.md via terminal

```
commit aaf757c7171d1f80d38af2027f5c57d22dc815e4 (origin/main, main)
Author: unknown <Adrian.martin@PT-IMD-86.IMDEAALI.local>
Date: Tue Sep 30 11:26:56 2025 +0200
```

first commit

```
PT-IMD-86+Adrian.martin@PT-IMD-86 MINGW64 ~/Desktop/github_new (branch_1)
$ git show HEAD
commit 81bdf57154d2eeb1b3760a973c5f9180eb44d7a (HEAD -> branch_1, origin/branch_1)
Author: unknown <Adrian.martin@PT-IMD-86.IMDEAALI.local>
Date: Tue Sep 30 11:47:30 2025 +0200
```


Updating README.md via terminal

```
diff --git a/README.md b/README.md
index 628d698..991b537 100644
--- a/README.md
+++ b/README.md
@@ -1,5 @@
 # This is my first GitHub repo
+
+Introducing changes in branch_1.
+
+Proceed to merge them using pull request.
```




You can use [Tig](#)(requires installation)



# Pull request






 **branch\_1** had recent pushes 12 minutes ago



Compare & pull request

 **main** ▾  **2 Branches**  **0 Tags**

Go to file  Add file ▾  Code ▾

 **unknown** and **unknown** first commit aaf757c · 32 minutes ago  **1 Commit**

 README.md first commit 32 minutes ago

 README 

## This is my first GitHub repo

# Pull request



## Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also [compare across forks](#). [Learn more about diff comparisons here](#).



base: main ▾



compare: branch\_1 ▾



### Add a title

Merging branch\_1

### Add a description

Write

Preview

H

B

I

≡

<>

🔗

≡

≡

≡

📎

@

📁

↩

📄

Hey, I just uploaded the excel file. Include it the main branch please

📖 Markdown is supported

📎 Paste, drop, or click to add files

Create pull request



📌 Remember, contributions to this repository should follow our [GitHub Community Guidelines](#).

Reviewers



No reviews

Assignees



No one—[assign yourself](#)

Labels



None yet

Projects



None yet

Milestone



No milestone

Development

Use [Closing keywords](#) in the description to automatically close issues

Helpful resources

[GitHub Community Guidelines](#)

# Pull request



## Merging branch\_1 #1

[Open](#) amsegura wants to merge 3 commits into `main` from `branch_1`

Conversation 0

Commits 3

Checks 0

Files changed 2

amsegura commented now Owner

Hey, I just uploaded the excel file. Include it the main branch please

amsegura added 3 commits 12 minutes ago

`First_changes.md` Verified `a6abfde`

`Update README.md` Verified `09d828a`

`example file uploaded` Verified `043331e`

**No conflicts with base branch**  
Merging can be performed automatically.

Merge pull request

You can also merge this with the command line. [View command line instructions.](#)

Add a comment

Write

Preview

H B I



# Pull request



Changes from 1 commit ▾ File filter ▾ Conversations ▾ Jump to ▾ ⚙ ▾

## Update README.md

branch\_1 (#1)

amsegura authored 12 minutes ago Verified

2 README.md

...	...	@@ -1,4 +1,4 @@
1	1	+ # Training_repo
2	2	Initial readme modified.
3	3	
4		- Uploading database in xlsx format.
4		+ Uploading database in xlsx format, named "example.xlsx".

### Commit message

Merge pull request #1 from amsegura/branch\_1

### Extended description

Merging branch\_1 done

This commit will be authored by 84419385+amsegura@users.noreply.github.com.

Confirm merge Cancel

# Pull request



Changes from 1 commit ▾ File filter ▾ Conversations ▾ Jump to ▾ ⚙ ▾

### Update README.md

🔑 **branch\_1** (#1)

**amsegura** authored 12 minutes ago Verified

▼ 2 README.md

...	...	@@ -1,4 +1,4 @@
1	1	+ # Training_repo
2	2	Initial readme modified.
3	3	
4		- Uploading database in xlsx format.
	4	+ Uploading database in xlsx format, named "example.xlsx".

**amsegura** merged commit **df98cad** into **main** now Revert

---

**Pull request successfully merged and closed** Delete branch

You're all set — the **branch\_1** branch can be safely deleted.

## Active branches

Branch	Updated	Check status	Behind   Ahead	Pull request	
<b>branch_1</b>	9 minutes ago		1   0	#1	...

# Pull request



```
git checkout main # Move to main branch
git pull origin main # Update main from remote
git merge branch_1 # Add branch 1 changes to main
```

Git Will let you now if there are conflicts.  
Resolve them manually.

```
git add conflicted_file # Stage conflicted file
git commit -m "Solving conflicts and merging branch_1 on main"
git push origin main # Update main on remote
```

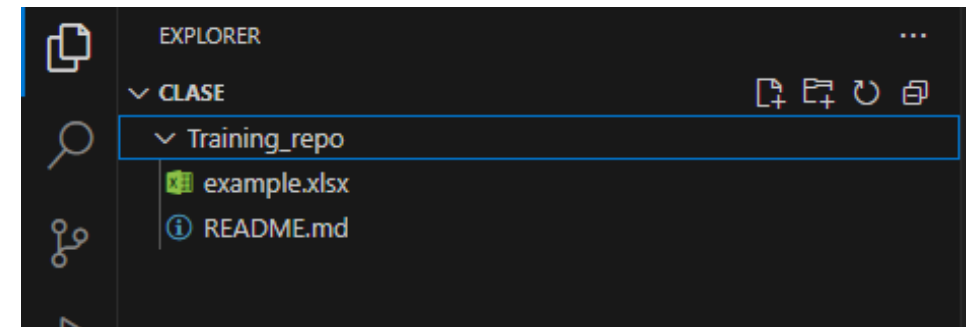
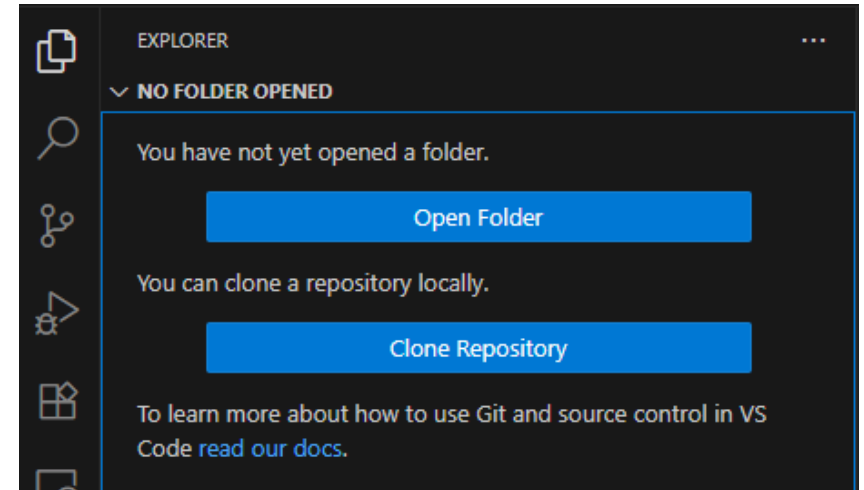
# Clone repo



```
MINGW64/c/Users/Adrian.mi X + v
PT-IMD-86+Adrian.martin@PT-IMD-86 MINGW64 ~/Desktop/Clase
$ git clone https://github.com/amsegura/Training_repo
```

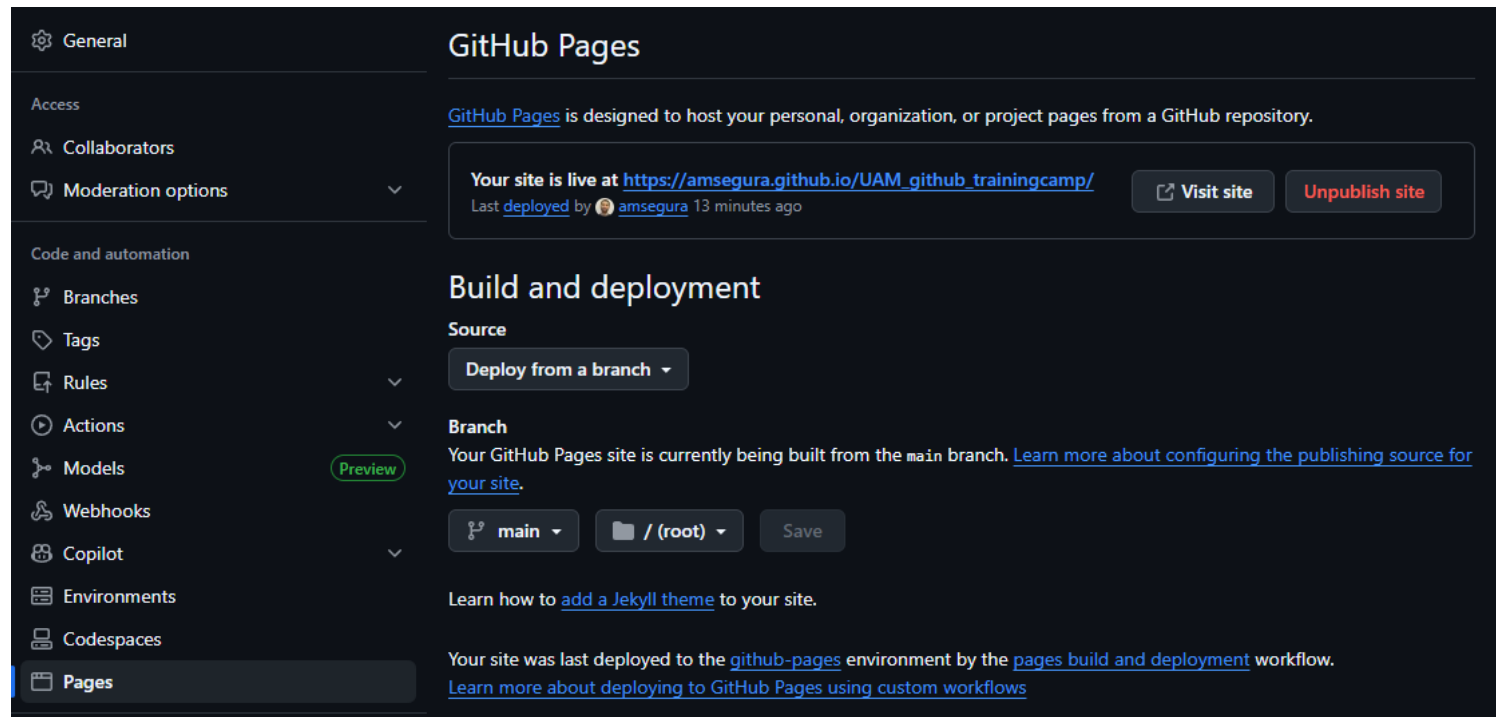
```
MINGW64/c/Users/Adrian.mi X + v
PT-IMD-86+Adrian.martin@PT-IMD-86 MINGW64 ~/Desktop/Clase
$ git clone https://github.com/amsegura/Training_repo
Cloning into 'Training_repo'...
remote: Enumerating objects: 13, done.
remote: Counting objects: 100% (13/13), done.
remote: Compressing objects: 100% (10/10), done.
remote: Total 13 (delta 1), reused 0 (delta 0), pack-reused 0 (from 0)
Receiving objects: 100% (13/13), 11.00 KiB | 3.67 MiB/s, done.
Resolving deltas: 100% (1/1), done.

PT-IMD-86+Adrian.martin@PT-IMD-86 MINGW64 ~/Desktop/Clase
$ |
```



# GitHub pages

- Allow you to create a “website” hosted in GitHub
- Repo must be public
- You need to create an index.html or .md → That will state your web configuration and look
- Interesting to showcase your research
- [Example 1](#) → A course ([GitHub repo](#))
- [Example 2](#) → A paper’s information



# Thank you for your attention!



<https://github.com/amsegura>



[www.linkedin.com/in/adrian-martin-segura](https://www.linkedin.com/in/adrian-martin-segura)