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Session 4: Git version control and GitHub

Skills Development

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What is Git and GitHub?

Git is a software that tracks changes to files. Changes include creating new files, deleting files or folders or editing the content of a file.

When can Git be useful?

GitHub is an internet hosting service for software development and version control using Git.

When can GitHub be useful?

Installing Git

https://git-scm.com/downloads

Windows set up:

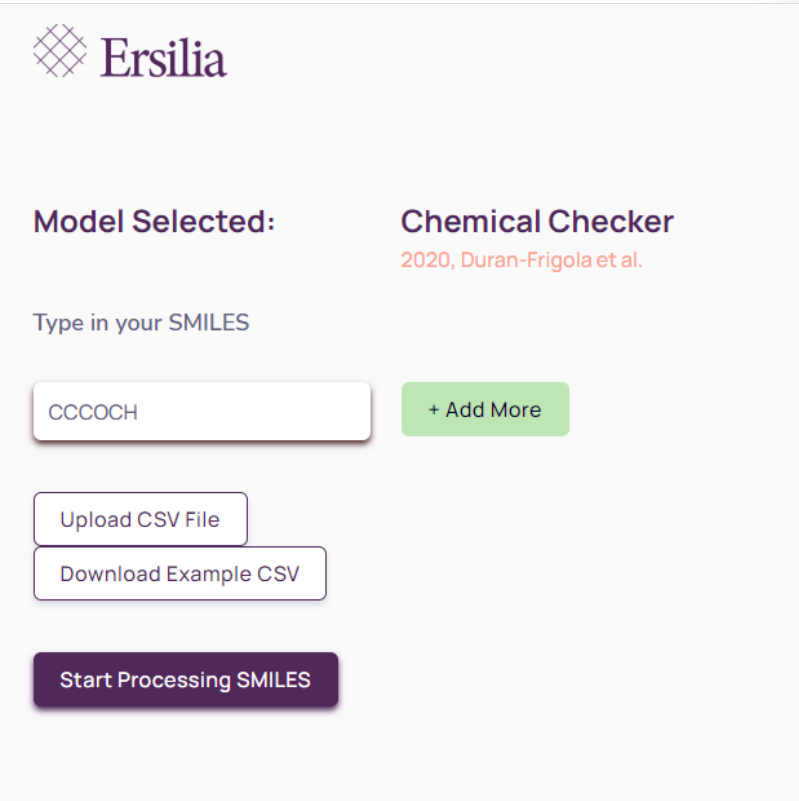
- Adjusting your PATH environment: select *Run Git from the Windows Command Prompt*
- Configuring line ending: select *Checkout Windows-style, commit Unix-style line endings*

Linux: it is usually pre-installed

Mac: download and install following instructions

CLI vs GUI

Graphical user interface: clicking with the mouse via interactive menus




```
#using ersilia through the CLI
ersilia fetch eos4e40
ersilia serve eos4e40
ersilia api predict -i "CCCCC"
ersilia close eos4e40
ersilia delete eos4e40
```

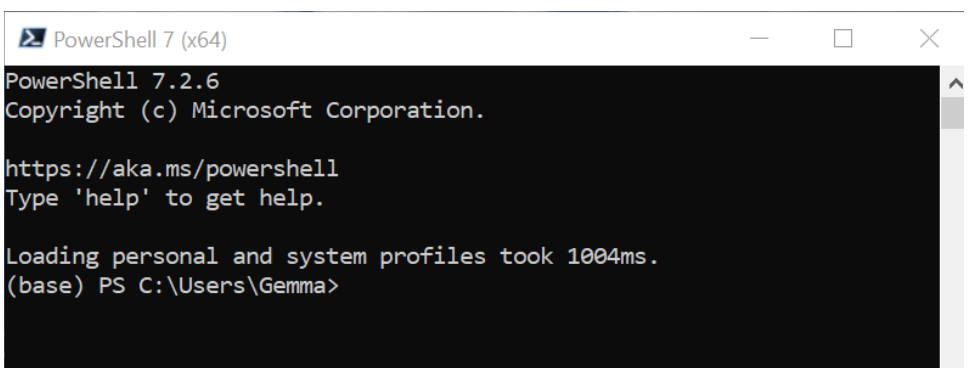
Git does not have a native GUI

Command Line Interface

Send commands in the form of lines of text to the computer, to run programs, manage computer files and interact with the computer.

The language of the command varies between systems:

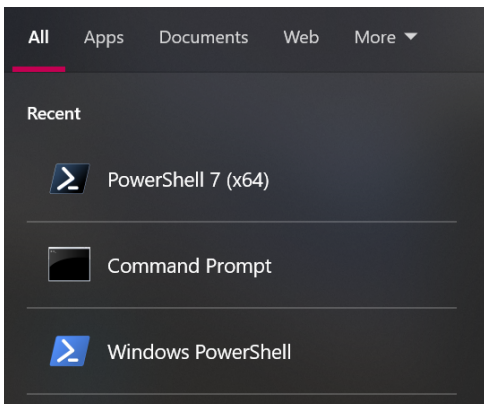
- Command Prompt (CMD): Windows
- Bash: Linux, Mac



Command Line Interface

Open your Command Line Interface:

- Linux: terminal
- Mac: terminal
- Windows:
  - Command Prompt ✗
  - Windows PowerShell (cmdlet) ✓
  - PowerShell 7 (cmdlet) ✓



**tip: use the search function to find the CLI*

Basic CLI commands

```
#move from the root to a directory
(base) PS C:\Users\Gemma> cd Desktop
(base) PS C:\Users\Gemma\Desktop>

#create a new directory (folder)
(base) PS C:\Users\Gemma\Desktop> mkdir test

    Directory: C:\Users\Gemma\Desktop

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d----           21/09/2022    14:16                test

#enter the new folder we have created
(base) PS C:\Users\Gemma\Desktop> cd test
(base) PS C:\Users\Gemma\Desktop\test>
```

cd: move to a directory

mkdir: make a new directory

Basic CLI commands

```
#we can go back with ..
(base) PS C:\Users\Gemma\Desktop\test> cd ..
(base) PS C:\Users\Gemma\Desktop>
(base) PS C:\Users\Gemma\Desktop> cd test
(base) PS C:\Users\Gemma\Desktop\test>

#list files in a folder
(base) PS C:\Users\Gemma\Desktop\test>ls
(base) PS C:\Users\Gemma\Desktop\test>

#create a new file inside the folder
(base) PS C:\Users\Gemma\Desktop\test> notepad example.txt
(base) PS C:\Users\Gemma\Desktop\test> ls

    Directory: C:\Users\Gemma\Desktop\test

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a---          21/09/2022    14:24              7 example.txt
```

cd .. : to move back

ls: list files in a folder

notepad: creates file (PS7)

nano: creates file (bash)

Basic CLI commands

```
#we can make a new sub directory and move the file there
(base) PS C:\Users\Gemma\Desktop\test> mkdir subfolder

(base) PS C:\Users\Gemma\Desktop\test> ls

    Directory: C:\Users\Gemma\Desktop\test

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d----           21/09/2022    14:42                subfolder
-a---           21/09/2022    14:24              7 example.txt

(base) PS C:\Users\Gemma\Desktop\test> mv example.txt subfolder

(base) PS C:\Users\Gemma\Desktop\test> cd subfolder
(base) PS C:\Users\Gemma\Desktop\test\subfolder> ls

    Directory: C:\Users\Gemma\Desktop\test\subfolder

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a---           21/09/2022    14:24              7 example.txt
```

mv: moves a file

Basic CLI commands

```
#copy a file instead of moving it
(base) PS C:\Users\Gemma\Desktop\test\subfolder> cp example.txt ../
(base) PS C:\Users\Gemma\Desktop\test\subfolder> ls

    Directory: C:\Users\Gemma\Desktop\test\subfolder

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a---          21/09/2022    14:24              7 example.txt

(base) PS C:\Users\Gemma\Desktop\test\subfolder> cd ..
(base) PS C:\Users\Gemma\Desktop\test> ls

    Directory: C:\Users\Gemma\Desktop\test

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d----          21/09/2022    14:42                subfolder
-a---          21/09/2022    14:24              7 example.txt

(base) PS C:\Users\Gemma\Desktop\test>
```

cp: copies a file

Basic CLI commands

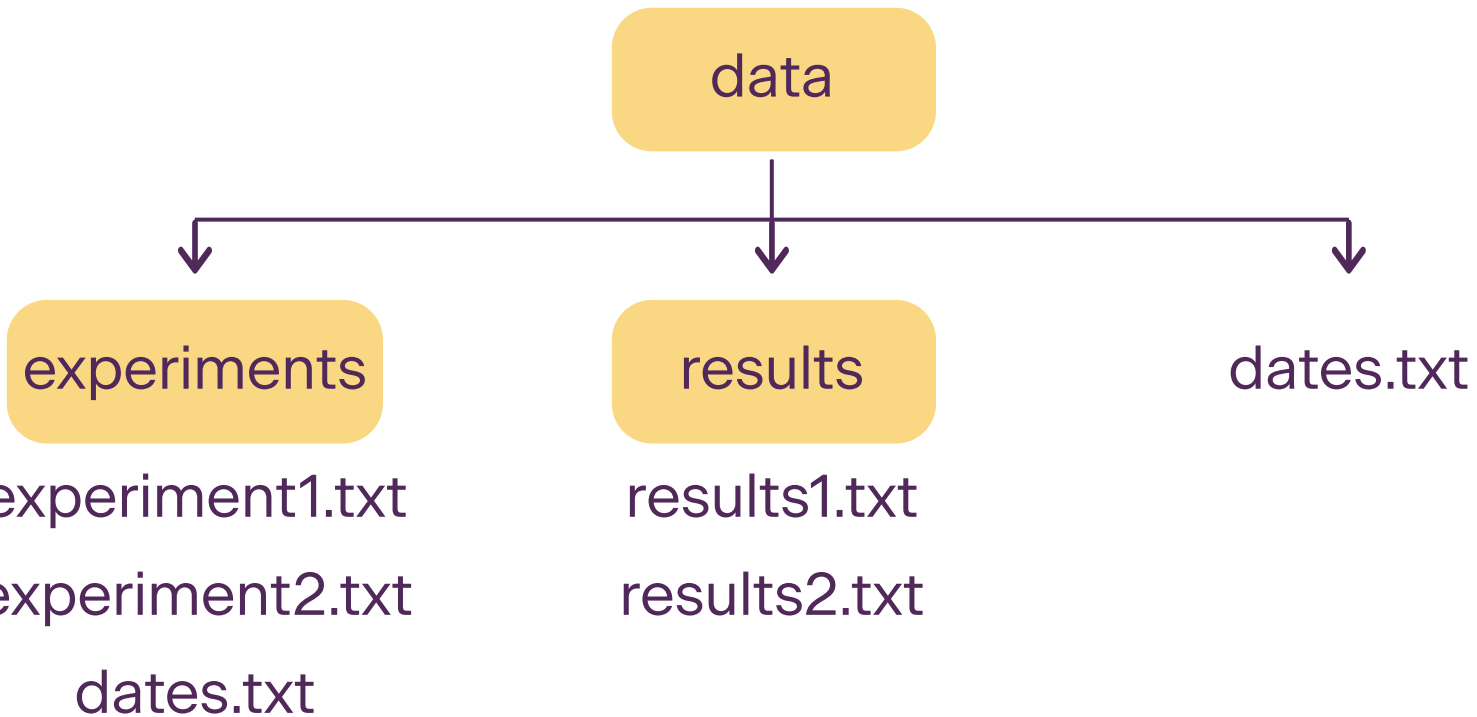
```
#remove a file instead of moving it
(base) PS C:\Users\Gemma\Desktop\test> ls

    Directory: C:\Users\Gemma\Desktop\test

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d----           21/09/2022    14:42                subfolder
-a---           21/09/2022    14:24              7 example.txt

(base) PS C:\Users\Gemma\Desktop\test> rm example.txt
(base) PS C:\Users\Gemma\Desktop\test> ls

    Directory: C:\Users\Gemma\Desktop\test

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
d----           21/09/2022    14:42                subfolder

(base) PS C:\Users\Gemma\Desktop\test>cd ..
(base) PS C:\Users\Gemma\Desktop> rm -r test
```

rm: removes a file

rm -r: removes a directory

A small exercise:

Using the Command Line create the following directory



Let's go back to Git

After setting up Git in the CLI, we will need to convert our new folder into a Git-tracked folder using the `git init` command

To track and make changes in Git, there are three basic commands:

- `git status`: check which files are being tracked by Git and which ones not
- `git add`: once a change has been made, you add it to the list of things to track with Git
- `git commit`: indicate which changes in the staging area you want to definitely move to the Git control

Set up Git in the CLI

```
# First, let's check we can use Git in the CLI

(base) PS C:\Users\Gemma\Desktop> git --version
git version 2.31.1.windows.1
(base) PS C:\Users\Gemma\Desktop>

#now, let's set our username (if you have a GitHub user, keep the same)
git config --global user.name "Gemma Turon"
git config --global user.email "gemma@example.com"
```

we type `git` on the CLI to indicate this is a git command

`git -version` which version of git we have installed

`git config` changes basic git settings on your system

Use Git

```
#Let's go into our folder
(base) PS C:\Users\Gemma\Desktop> cd data
(base) PS C:\Users\Gemma\Desktop\data>

#Now, we use the git init command to initialize it
(base) PS C:\Users\Gemma\Desktop\data> git init
Initialized empty Git repository in C:/Users/Gemma/Desktop/data/.git/

#let's see what we have at the moment:
(base) PS C:\Users\Gemma\Desktop\data> git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        dates.txt
        experiments/
        results/

nothing added to commit but untracked files present (use "git add" to track)
```

`git init` converts a folder into a Git tracked folder

`git status` checks which files are tracked by Git

Use Git

```
#Add files to git

#we can add the file one by one:
(base) PS C:\Users\Gemma\Desktop\data> git add dates.txt
(base) PS C:\Users\Gemma\Desktop\data> git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
        new file:   dates.txt

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        experiments/
        results/
```

`git add <filename>` to add a file to the staging area

Use Git

```
#Add files to git

#we can add all at once using .
(base) PS C:\Users\Gemma\Desktop\data> git add .
(base) PS C:\Users\Gemma\Desktop\data> git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
        new file:   dates.txt
        new file:   experiments/dates.txt
        new file:   experiments/experiment1.txt
        new file:   experiments/experiment2.txt
        new file:   results/results1.txt
        new file:   results/results2.txt

#we are now ready to commit those changes
```

`git add .` to add all files to the staging area

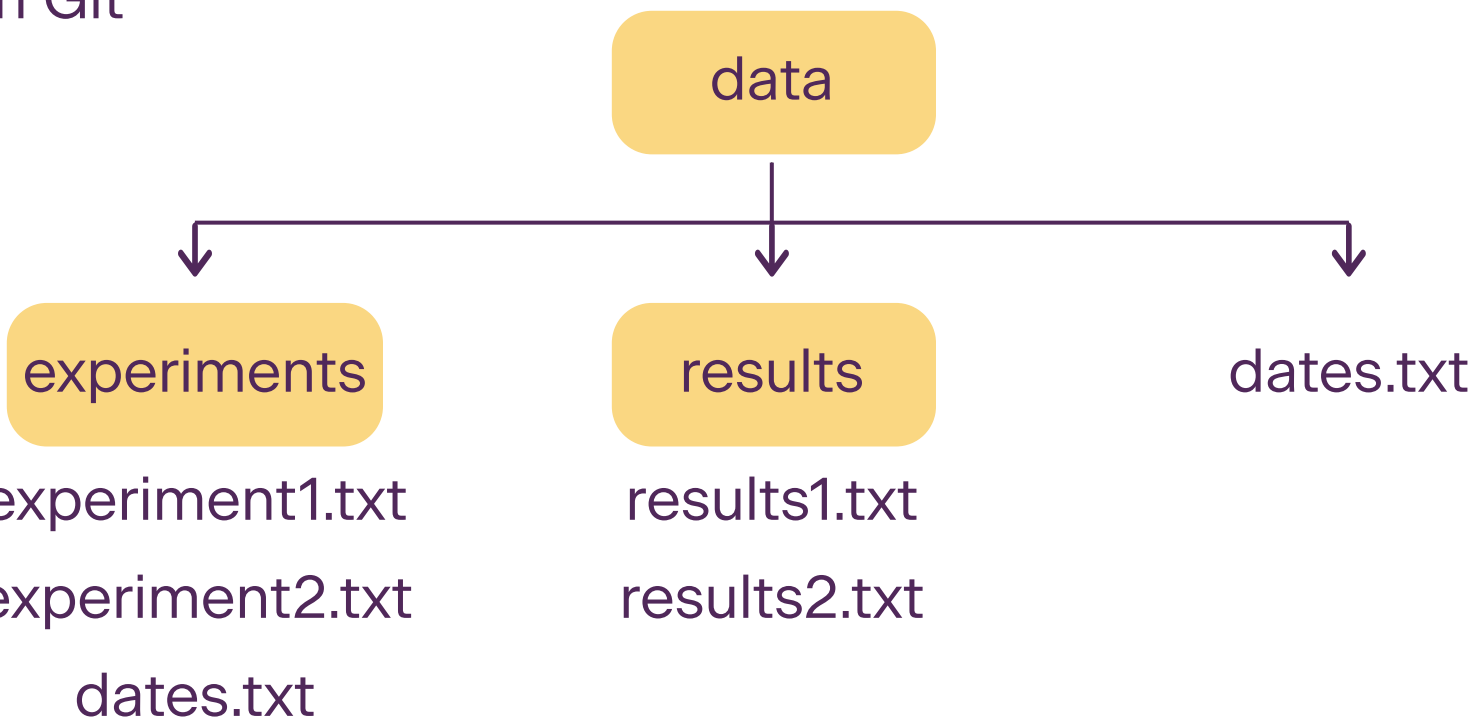
Use Git

```
#Add files to git

#we are now ready to commit those changes
(base) PS C:\Users\Gemma\Desktop\data> git commit -m "first commit"
[master (root-commit) 0289303] first commit
 6 files changed, 8 insertions(+)
 create mode 100644 dates.txt
 create mode 100644 experiments/dates.txt
 create mode 100644 experiments/experiment1.txt
 create mode 100644 experiments/experiment2.txt
 create mode 100644 results/results1.txt
 create mode 100644 results/results2.txt


(base) PS C:\Users\Gemma\Desktop\data> git status
On branch master
nothing to commit, working tree clean
```

`git commit` to save changes in git (-m allows you to name the commit to know what is it about)

A small exercise:

Introduce some changes in your files and try to track them with Git



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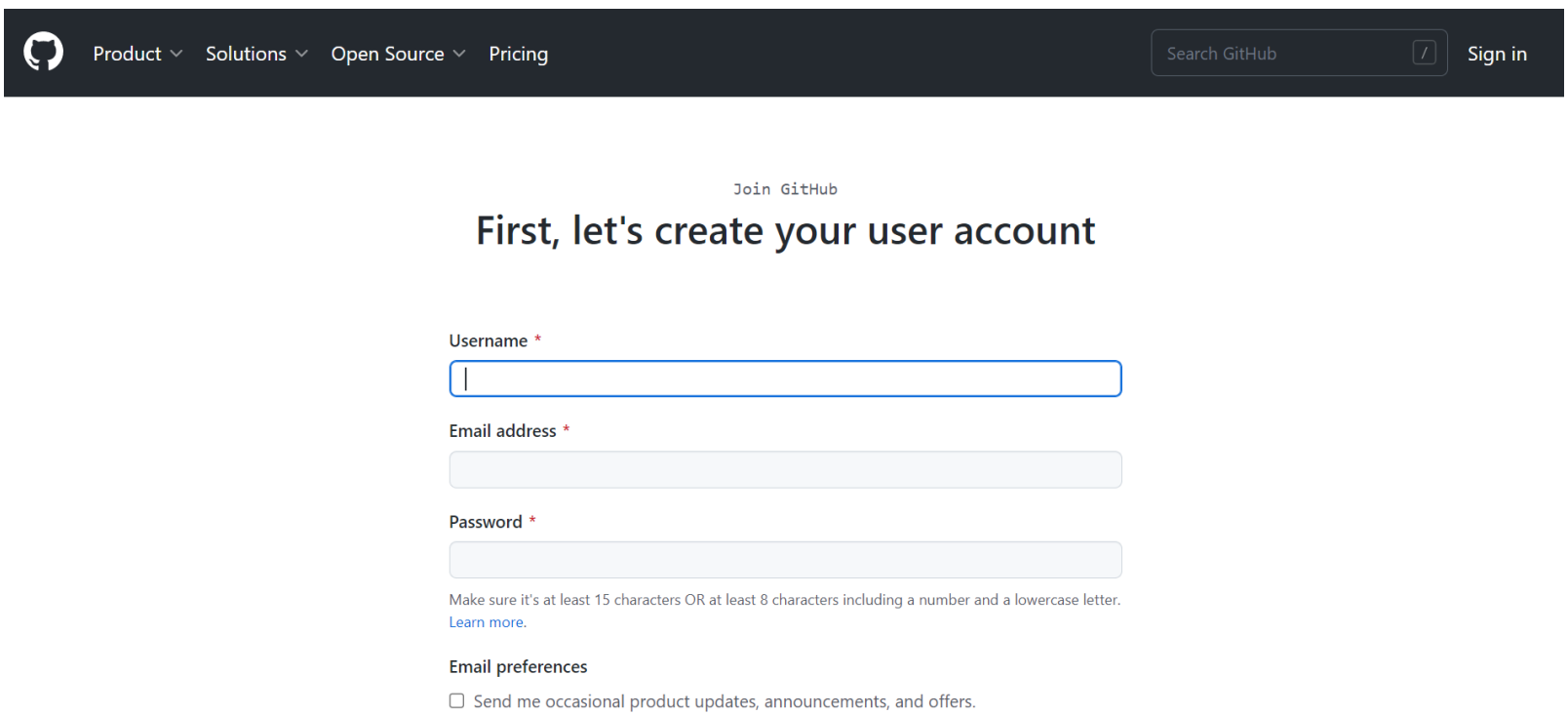
GitHub

"A code hosting platform for version control and collaboration. It lets you and others work together on projects from anywhere."

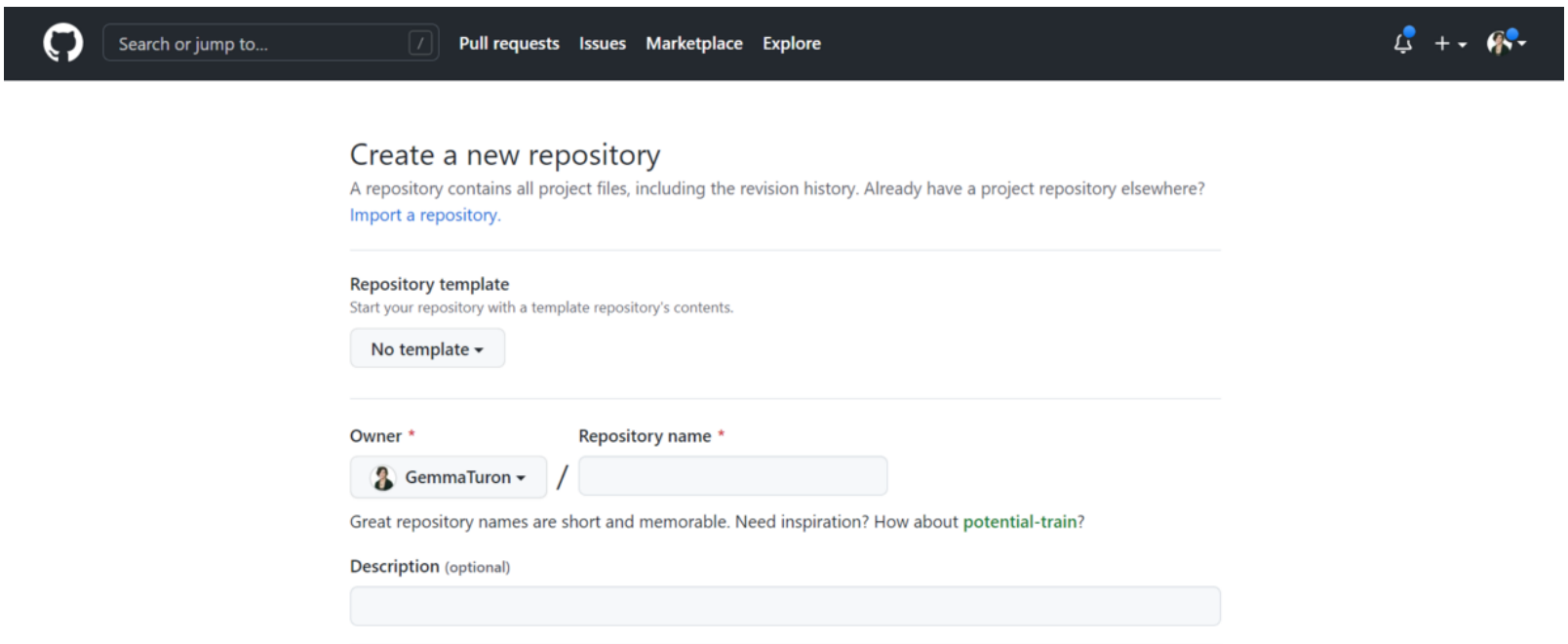
Create a GitHub account

https://github.com/join



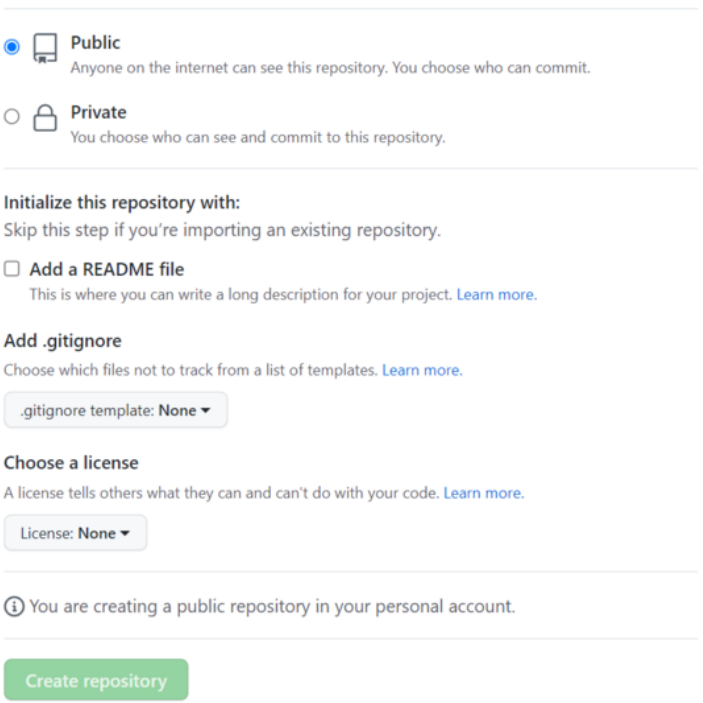
Create a new repository

Select the New icon on the left hand-side of your profile 



Create a new repository

New Select the New icon on the left hand-side of your profile



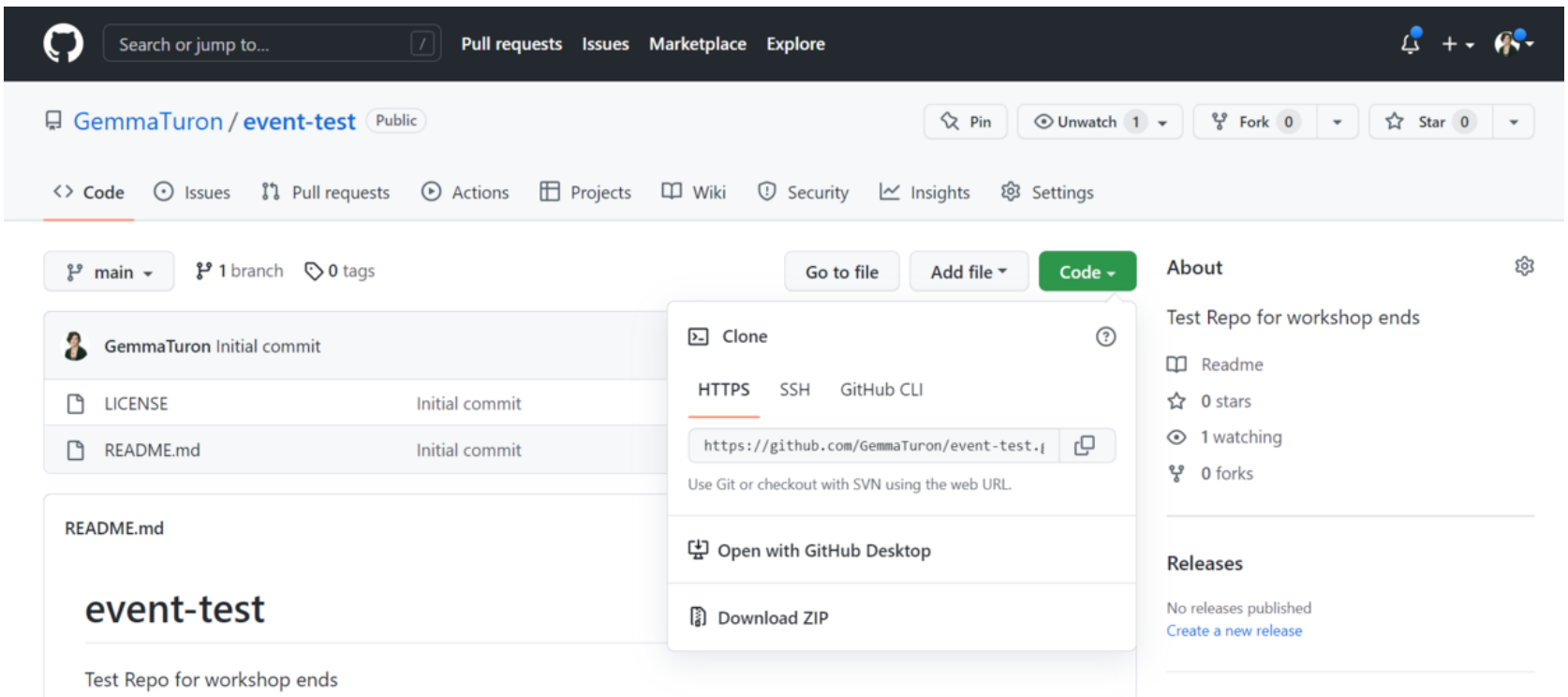
Private repositories are only accessible by invite

README: project description

.gitignore: depends on the end use of the repository

License: Open Source License

Clone the repository in your local computer



Clone a GitHub Repo

```
#Clone the repository in your Desktop
(base) PS C:\Users\Gemma> cd Desktop
(base) PS C:\Users\Gemma\Desktop> git clone https://github.com/GemmaTuron/event-test.git
Cloning into 'event-test'...
remote: Enumerating objects: 4, done.
remote: Counting objects: 100% (4/4), done.
remote: Compressing objects: 100% (3/3), done.
remote: Total 4 (delta 0), reused 0 (delta 0), pack-reused 0
Receiving objects: 100% (4/4), done.
(base) PS C:\Users\Gemma\Desktop>

#Let's check what happend
(base) PS C:\Users\Gemma\Desktop> cd event-test
(base) PS C:\Users\Gemma\Desktop\event-test> ls

    Directory: C:\Users\Gemma\Desktop\event-test

Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a---          21/09/2022    16:37           1088 LICENSE
-a---          21/09/2022    16:37             43 README.md
```

Make changes to local repo

```
#We first add a file to the repository
(base) PS C:\Users\Gemma\Desktop\event-test> notepad file1.txt
(base) PS C:\Users\Gemma\Desktop\event-test> git status
On branch main
Your branch is up to date with 'origin/main'.

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        file1.txt

nothing added to commit but untracked files present (use "git add" to track)

(base) PS C:\Users\Gemma\Desktop\event-test> git add file1.txt
(base) PS C:\Users\Gemma\Desktop\event-test> git commit -m "adding file1"
[main b333f13] adding file1
 1 file changed, 1 insertion(+)
 create mode 100644 file1.txt
(base) PS C:\Users\Gemma\Desktop\event-test> git status
On branch main
Your branch is ahead of 'origin/main' by 1 commit.
  (use "git push" to publish your local commits)

nothing to commit, working tree clean
```

Push changes to remote

```
(base) PS C:\Users\Gemma\Desktop\event-test> git push
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Delta compression using up to 8 threads
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 315 bytes | 157.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
To https://github.com/GemmaTuron/event-test.git
   bcc9514..b333f13  main -> main
(base) PS C:\Users\Gemma\Desktop\event-test>
```

When working with a remote Git folder, in GitHub or another online server, we need to push the changes using the `git push`

Go online and check what happened!

A small exercise:

Go to your online repository, and add a file directly using the Add File button.

Explore the `git pull` command to get a copy of this file on your local repository as well!