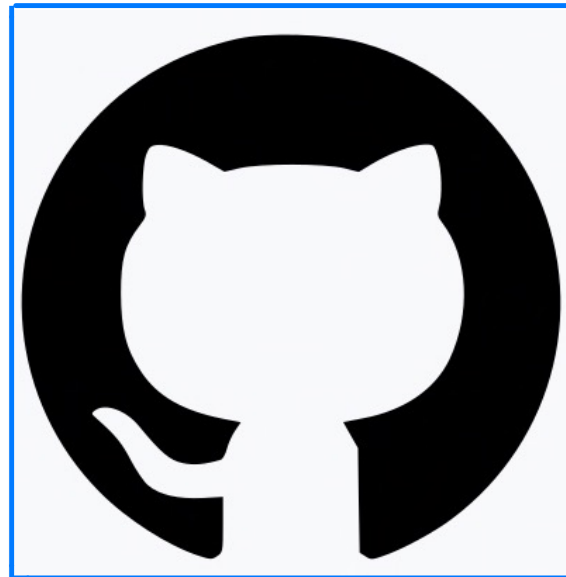


Proseminar on computer-assisted mathematics

Session 2 - Introduction to Git



The GitHub "invertocat" logo

Judith Ludwig and Florent Schaffhauser
Heidelberg University, Summer semester 2024

What **Git** is:

A distributed version control system originally authored by Linus Torvalds in 2005.

What Git does:

It tracks changes in computer files.

What Git is usually used for:

Coordinating work among people working collaboratively on a project.

What **GitHub** is:

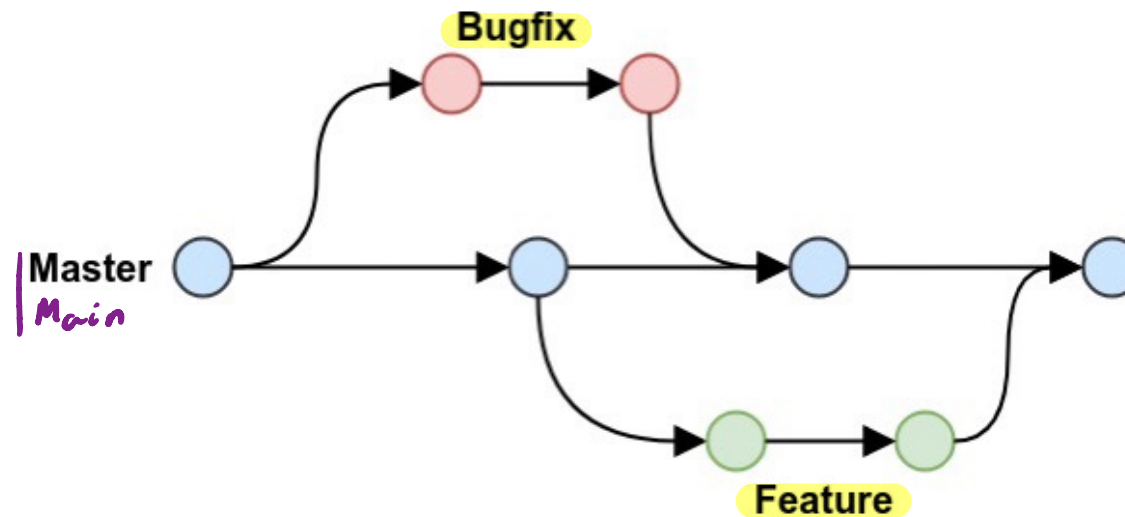
An Internet hosting service for software development and version control using Git. Created in 2008, it has been a subsidiary of Microsoft since 2018.

Other options: GitLab, Gitea.

Branches

A characteristic feature of Git is the existence of **branches**.

Branches allow for **distributed and parallel** workflows, that can later be **merged** back to the main workflow of the project:



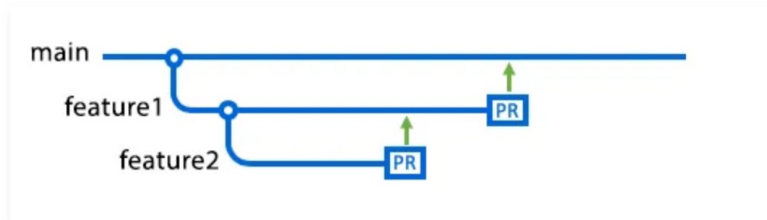
A branch on a branch on a branch

Branches are very flexible, allowing for several patterns.

About branches

Use a branch to isolate development work without affecting other branches in the repository. Each repository has one default branch, and can have multiple other branches. You can merge a branch into another branch using a pull request.

Here someone has created a branch called `feature1` from the `main` branch, and you've then created a branch called `feature2` from `feature1`. There are open pull requests for both branches. The arrows indicate the current base branch for each pull request. At this point, `feature1` is the base branch for `feature2`. If the pull request for `feature2` is merged now, the `feature2` branch will be merged into `feature1`.



Add feature 2 on top of feature 1 and then merge into main.

Add feature 2 half-way through feature 1 and merge it later.

In the next diagram, someone has merged the pull request for `feature1` into the `main` branch, and they have deleted the `feature1` branch. As a result, GitHub has automatically retargeted the pull request for `feature2` so that its base branch is now `main`.



Now when you merge the `feature2` pull request, it'll be merged into the `main` branch.

Concretely, projects administered via Git are stored in a repository that can be cloned or forked by anyone who wants to use it.

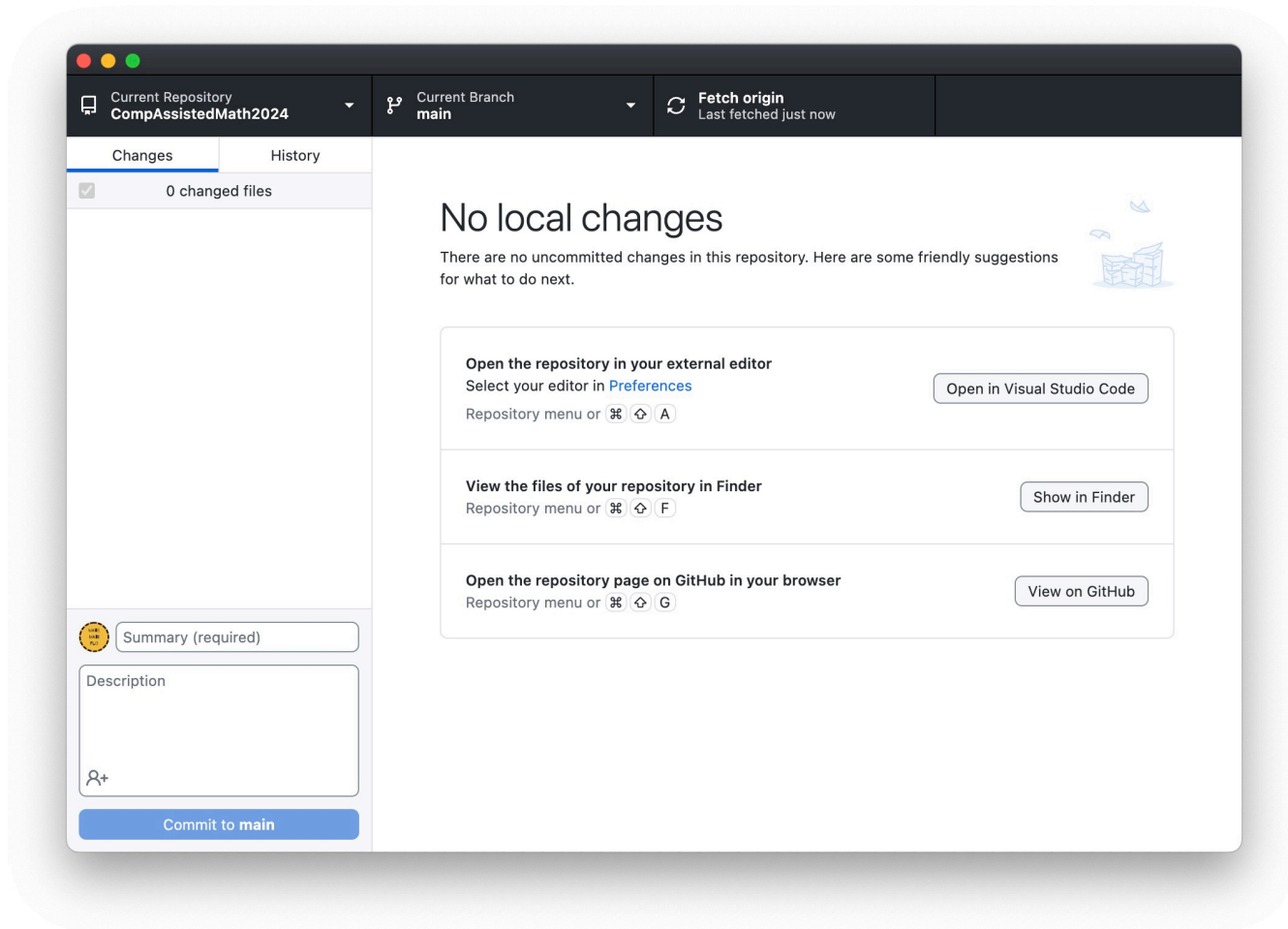
If you clone it, then you will be working directly on it (if authorized).

If you fork it, then you create a new copy and you can decide later if you want to contribute to the original repo (requires managing two repos).

The repository for our seminar (main branch).

The screenshot shows the GitHub interface for the repository 'CompAssistedMath2024' by user 'matematiflo'. The repository is public and has 1 branch (main) and 0 tags. The main branch is selected. The file list includes: .vscode, Sage, .gitignore, LICENSE, and README.md. The README content is visible, featuring the title 'Computer-assisted mathematics 2024' and a description: 'GitHub repository for the seminar on Computer-assisted mathematics held at the University of Heidelberg during the Summer Semester of 2024.' It also includes links for 'Homepage', 'Zulip', 'Sage Docs', and 'Sage Installation guide'. The repository has 19 commits, 1 star, 1 watching, and 1 fork. The language is identified as Jupyter Notebook (100.0%).

You can create, clone or fork repositories on your GitHub account, and then manage them using GitHub Desktop.



Download it at desktop.github.com !

Assignment #1 (due on 29.04.2024)

Learn the basics of Git and create a short personal presentation file in Markdown format in the repository that will be created for you.

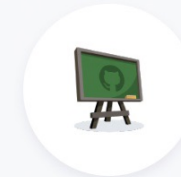
- ① Team up and go to the Zulip channel to get the link for the assignment.
- ② Follow the step-by-step from this file.

Step 1

Click on the link and login to GitHub Classroom using your GitHub account.

You will need to enter the name of your team! Please use something that we can easily link to you :-)

Example: Judith-Florent



Sign in to GitHub
to continue to GitHub Classroom

Username or email address

Password

[Forgot password?](#)

Sign in

New to GitHub? [Create an account.](#)

This is what you should see next:

matematilab-classroom-CompAssistedMath2024

Accept the group assignment — Intro to GIT (Assignment #1)

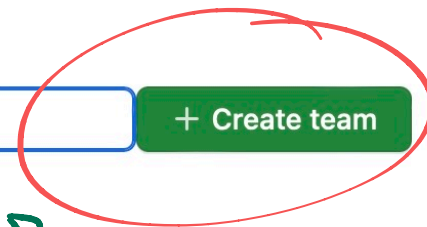
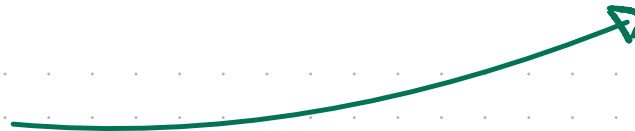
Before you can accept this assignment, you must create or join a team. Be sure to select the correct team as you won't be able to change this later.

Create a new team:

Judith-Florent

+ Create team

Enter the name
of your team



✓ You have successfully created team: Judith-Florent

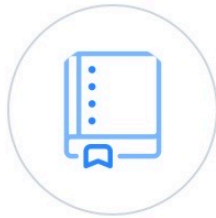
matematilab-classroom-CompAssistedMath2024

Accept the assignment — Intro to GIT (Assignment #1)

Once you accept this assignment, you will be granted access to the `assignment-1-matematiflo` repository in the `matematilab` organization on GitHub.

Accept this assignment

Hold on...



You accepted the assignment, **Intro to GIT (Assignment #1)** . We're configuring your repository now. **This may take a few minutes to complete.** Refresh this page to see updates.

📅 Your assignment is due by **Apr 29, 2024, 21:59 UTC**

Note: You may receive an email invitation to join [matematilab](#) on your behalf. No further action is necessary.

Congratulations!



You're ready to go —
Judith-Florent

You accepted the assignment, **Intro to GIT (Assignment #1)**.

Your team's assignment repository has been created:

 <https://github.com/matematilab/assignment-1-judith-florent>

We've configured the repository associated with this assignment ([update](#)).

 [Open in GitHub Codespaces](#)

 Your assignment is due by **Apr 29, 2024, 21:59 UTC**

Note: You may receive an email invitation to join [matematilab](#) on your behalf. No further action is necessary.

Click
here

You can ignore this.

You will need this address
later to go back to your
repository. My advice:
copy-paste it somewhere!

Your (private) repo

Created only for the assignment

You will not see this, because you do not own the repo :-/

The screenshot shows a GitHub repository page for 'assignment-1-judith-florent' forked from 'matematilab/github-starter-course'. The repository is private and contains one file, 'README.md'. The page includes navigation tabs for Code, Issues, Pull requests, Actions, Projects, Security, Insights, and Settings. The 'Settings' tab is circled in red. The repository is currently 1 commit ahead of the parent repository. The commit history shows a commit by 'github-classroom[bot]' with the message 'add online IDE url; add deadline' and a commit by 'github-classroom[bot]' with the message 'add online IDE url; add deadline'. The README file is highlighted in yellow. The README content includes a button to 'Review the assignment due date' and a button to 'Open in GitHub Codespaces'. The title of the README is 'The Basics of GitHub'.

Contains only 1 file

Step 2

Add a bookmark for the webpage you are at and start exploring your repository.

On a repo that you create yourselves, you would need to protect your branch (See instructions below).

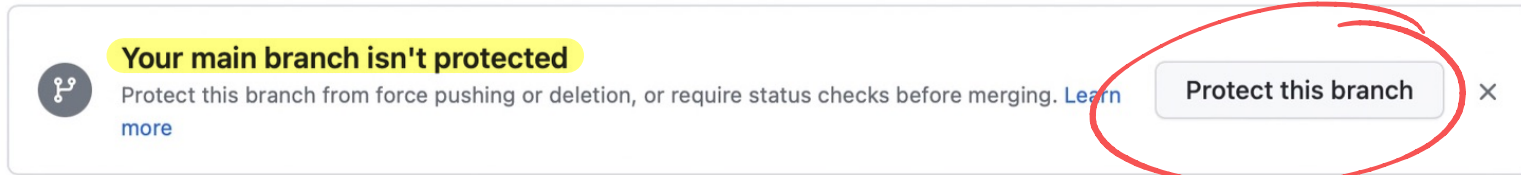
Next, open Codespaces, modify the README.md file and then save it (see instructions below).

Finally, create a personal-presentation.md file and write something in it!

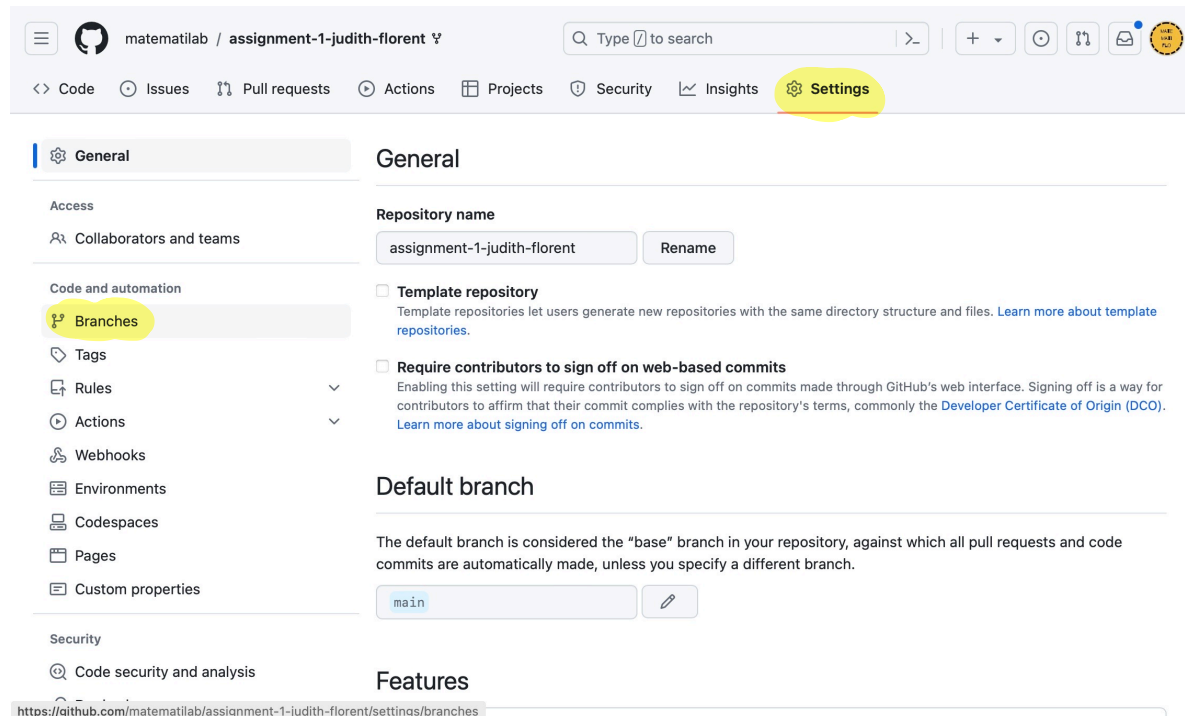
Protect your (main) branch

When you open a repo that you created or forked, you might see something like this:

If you see this, click on it.



If you don't see such a message, click on "Settings" and then "Branches".



Add a branch protection rule

- General
- Access
- Collaborators and teams
- Code and automation
- Branches**
- Tags
- Rules Beta
- Actions
- Webhooks
- Environments
- Codespaces
- Pages
- Security
- Code security and analysis
- Deploy keys
- Secrets and variables

Branch protection rule

Protect your most important branches
Branch protection rules define whether collaborators can delete or force push to the branch and set requirements for any pushes to the branch, such as passing status checks or a linear commit history.

Branch name pattern *

main

Protect matching branches

- Require a pull request before merging**
When enabled, all commits must be made to a non-protected branch and submitted via a pull request before they can be merged into a branch that matches this rule.
- Require status checks to pass before merging**
Choose which status checks must pass before branches can be merged into a branch that matches this rule. When enabled, commits must first be pushed to another branch, then merged or pushed directly to a branch that matches this rule after status checks have passed.

Before

After

Protect matching branches

- Require a pull request before merging**
When enabled, all commits must be made to a non-protected branch and submitted via a pull request before they can be merged into a branch that matches this rule.
- Require approvals**
When enabled, pull requests targeting a matching branch require a number of approvals and no changes requested before they can be merged.
Required number of approvals before merging: 1
- Dismiss stale pull request approvals when new commits are pushed**
New reviewable commits pushed to a matching branch will dismiss pull request review approvals.
- Require review from Code Owners**
Require an approved review in pull requests including files with a designated code owner.
- Restrict who can dismiss pull request reviews**
Specify people, teams, or apps allowed to dismiss pull request reviews.
- Allow specified actors to bypass required pull requests**
Specify people, teams, or apps who are allowed to bypass required pull requests.
- Require approval of the most recent reviewable push**
Whether the most recent reviewable push must be approved by someone other than the person who pushed it.

Scroll to the bottom and click on "Create".

this rule.

- Lock branch**
Branch is read-only. Users cannot push to the branch.
- Do not allow bypassing the above settings**
The above settings will apply to administrators and custom roles with the "bypass branch protections" permission.
- Restrict who can push to matching branches**
Specify people, teams, or apps allowed to push to matching branches. Required status checks will still prevent these people, teams, and apps from merging if the checks fail.

Rules applied to everyone including administrators

- Allow force pushes**
Permit force pushes for all users with push access.
- Allow deletions**
Allow users with push access to delete matching branches.

Create

matematilab / assignment-1-judith-florent

Code Issues Pull requests Actions Projects Security Insights Settings

Branch protection rule created.

General

Access

Collaborators and teams

Code and automation

Branches

Tags

Rules

Actions

Webhooks

Environments

Codespaces

Pages

Custom properties

Security

Branch protection rules

main

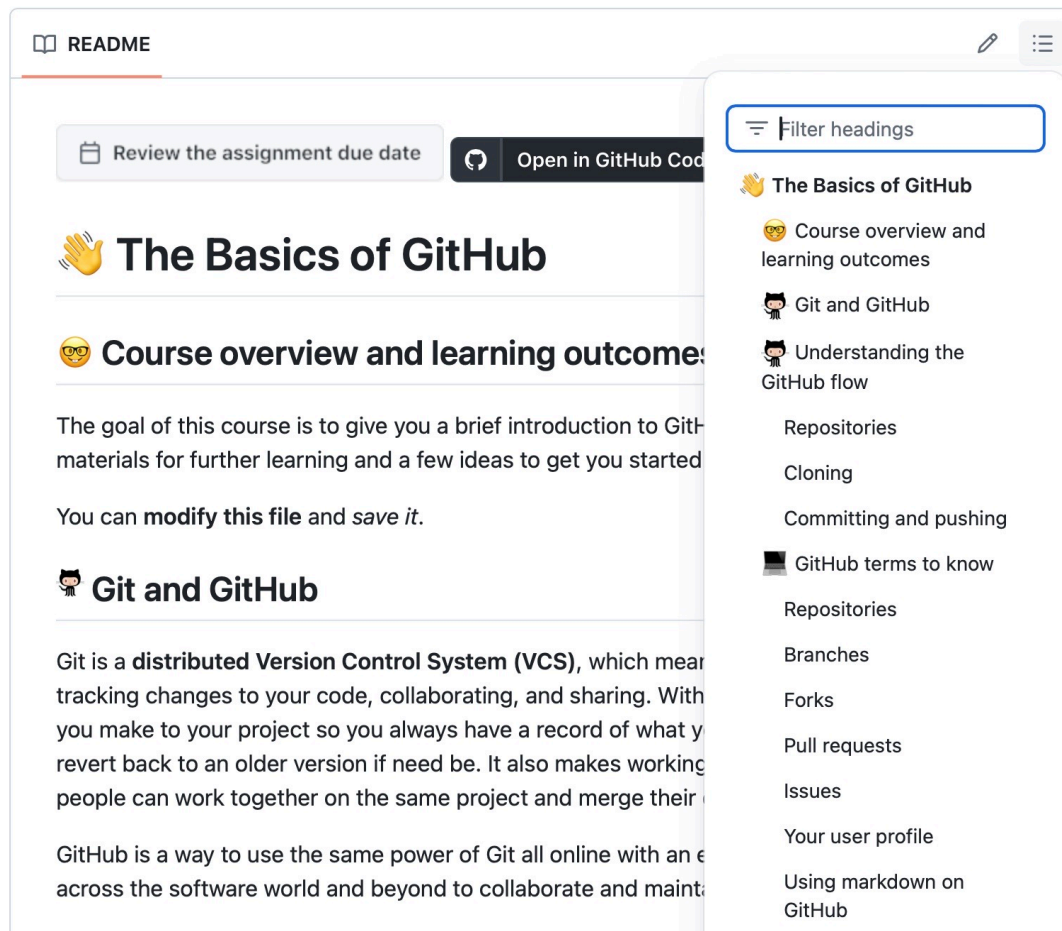
Currently applies to 1 branch

Edit Delete

Add rule

It's done!

Start reading the README.md file



README

Review the assignment due date Open in GitHub Code

👋 The Basics of GitHub

🧐 Course overview and learning outcomes

The goal of this course is to give you a brief introduction to GitHub materials for further learning and a few ideas to get you started.

You can **modify this file** and *save it*.

🐙 Git and GitHub

Git is a **distributed Version Control System (VCS)**, which means tracking changes to your code, collaborating, and sharing. With you make to your project so you always have a record of what you revert back to an older version if need be. It also makes working people can work together on the same project and merge their

GitHub is a way to use the same power of Git all online with an e across the software world and beyond to collaborate and mainta

Filter headings

- 👋 The Basics of GitHub
 - 🧐 Course overview and learning outcomes
 - 🐙 Git and GitHub
 - 🐙 Understanding the GitHub flow
 - Repositories
 - Cloning
 - Committing and pushing
- 📖 GitHub terms to know
 - Repositories
 - Branches
 - Forks
 - Pull requests
 - Issues
 - Your user profile
 - Using markdown on GitHub

Table of contents

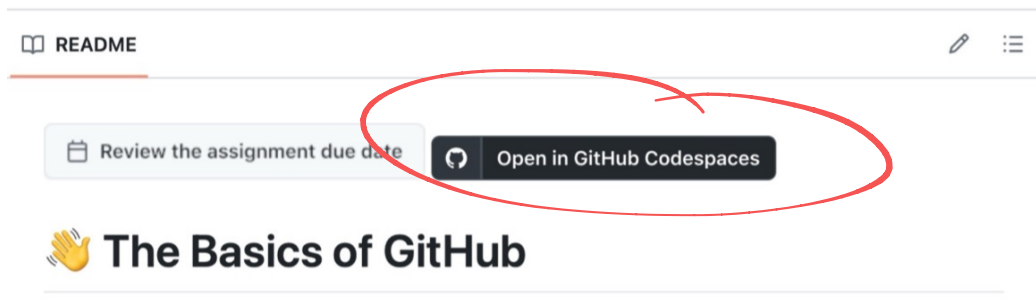
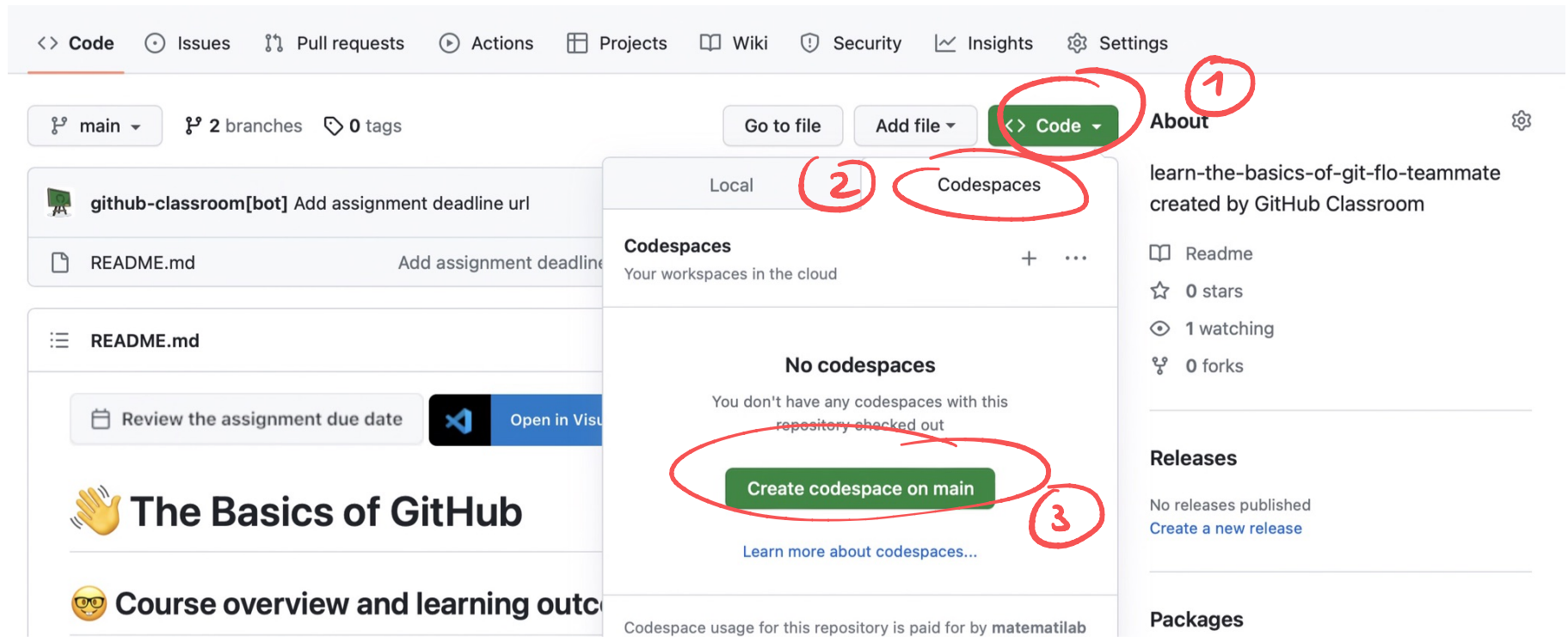
Link at the bottom of the README file.

📖 Resources

- A short video explaining what GitHub is
- Git and GitHub learning resources
- Understanding the GitHub flow
- How to use GitHub branches
- Interactive Git training materials
- GitHub's Learning Lab
- Education community forum
- GitHub community forum

Modifying the README file

Click on "Code", then on "Codespaces", and finally on "Create codespace on main".



Alternately, use this button.

A Visual Studio Code workspace will open in your browser:

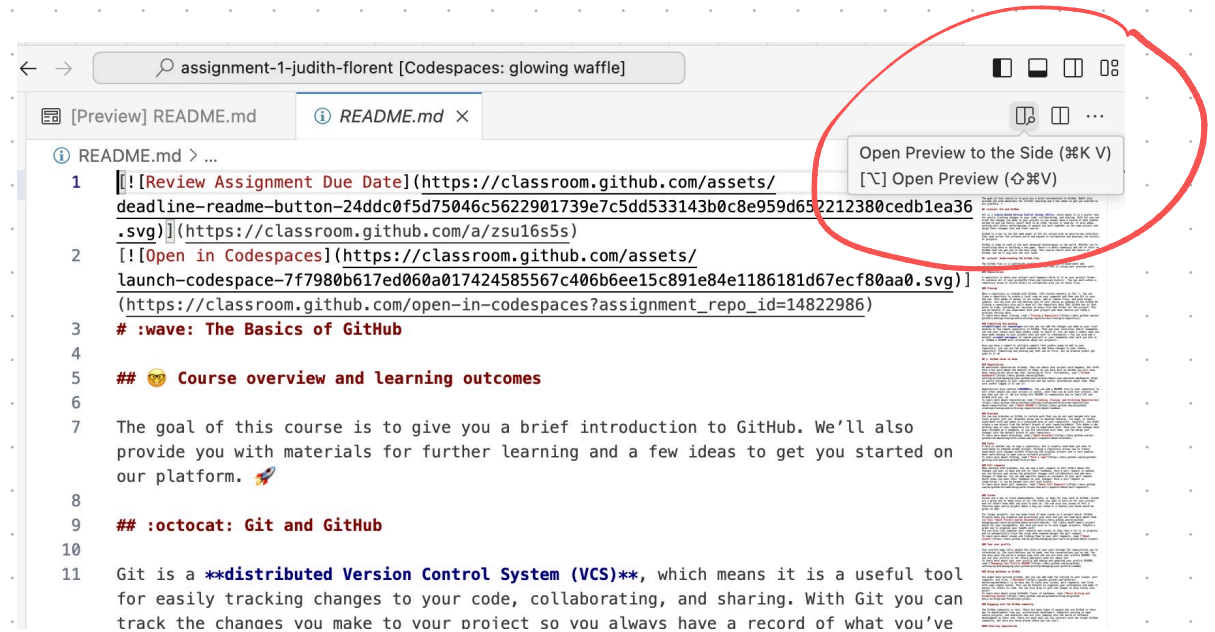
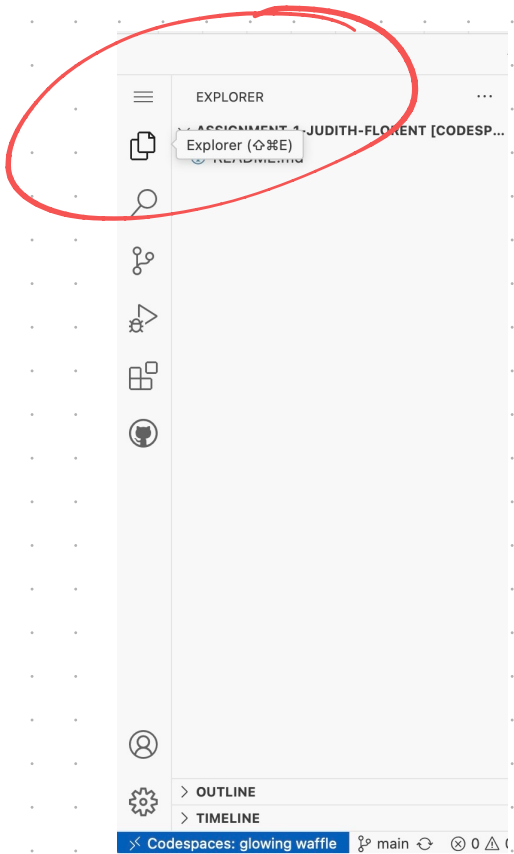
→ Same repo

The screenshot displays a browser window with the URL `assignment-1-judith-florent [Codespaces: glowing waffle]`. The interface is divided into several sections:

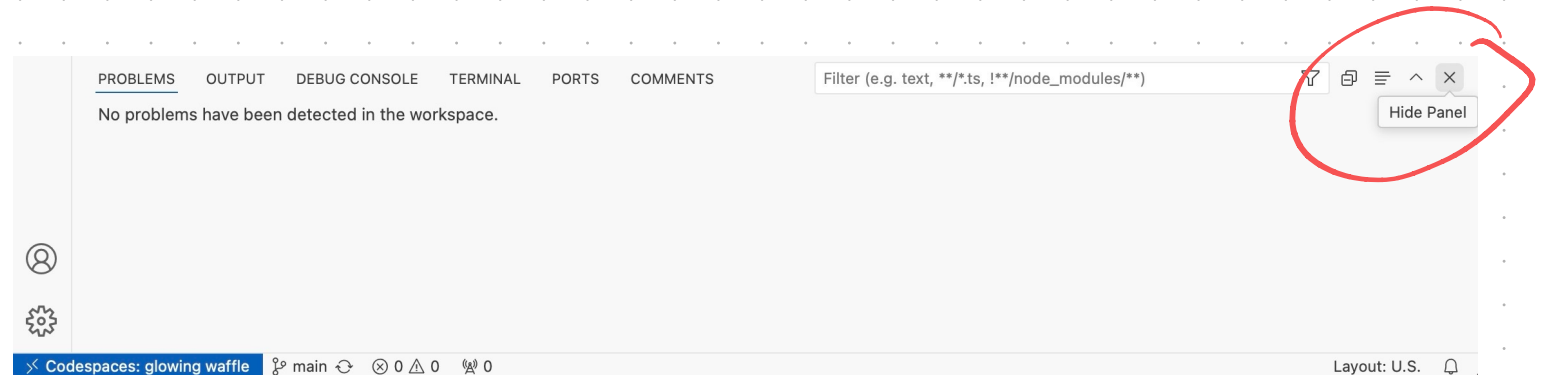
- EXPLORER:** Shows a file named `README.md` under the workspace `ASSIGNMENT-1-JUDITH-FLORENT [CODESP...`. A red arrow points to this file with the text "Click on the file to open it".
- Buttons:** Two buttons are visible: "Review the assignment due date" and "Open in GitHub Codespaces". A red arrow points to the latter with the text "Show source file".
- Main Content:** The README file content is displayed, starting with `:wave: The Basics of GitHub`, followed by a section on "Course overview and learning outcomes" and another on `:octocat: Git and GitHub`.
- Terminal:** A terminal window at the bottom shows the following text:

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS bash + v [] [] ... ^ x
👉 Welcome to Codespaces! You are on our default image.
- It includes runtimes and tools for Python, Node.js, Docker, and more. See the full list here: https://aka.ms/ghcs-default-image
- Want to use a custom image instead? Learn more here: https://aka.ms/configure-codespace
🔍 To explore VS Code to its fullest, search using the Command Palette (Cmd/Ctrl + Shift + P or F1).
👉 Edit away, run your app as usual, and we'll automatically make it available for you to access.
@matematiflo → /workspaces/assignment-1-judith-florent (main) $
```
- Status Bar:** The bottom status bar shows `Codespaces: glowing waffle`, which is circled in red. A red arrow points to it with the text "Name assigned automatically by GitHub".

→ Name assigned automatically by GitHub



It is good practice to open the preview to the side, close the explorer and hide the lower panel.



Next, you will be able to access the README file, modify it and save it to your repository. Try it!

2

Git tells you that changes have been made

assignment-1-judith-florent [Codespaces: glowing waffle]

README.md M x

> # :wave: The Basics of GitHub > ## 🧑‍🎓 Course overview and learning outcomes

```
1  [!Review Assignment Due Date](https://classroom.
2  github.com/assets/
3  deadline-readme-button-24ddc0f5d75046c5622901739e7c5dd5
4  33143b0c8e959d652212380cedb1ea36.svg)](https://
5  classroom.github.com/a/zsu16s5s)
6  [!Open in Codespaces](https://classroom.github.com/
7  assets/
8  launch-codespace-7f7980b617ed060a017424585567c406b6ee15
9  c891e84e1186181d67ecf80aa0.svg)](https://classroom.
10 github.com/open-in-codespaces?
11 assignment_repo_id=14822986)
12 # :wave: The Basics of GitHub
13 ## 🧑‍🎓 Course overview and learning outcomes
14
15 The goal of this course is to give you a brief
16 introduction to GitHub. We'll also provide you with
17 materials for further learning and a few ideas to get
18 you started on our platform. 🚀
19
20 You can modify this file and save it.
21
22 ## :octocat: Git and GitHub
23
24 Git is a distributed Version Control System (VCS),
25 which means it is a useful tool for easily tracking
26 changes to your code, collaborating, and sharing. With
27 Git you can track the changes you make to your project
28 so you always have a record of what you've worked on
29 and can easily revert back to an older version if need
30 be. It also makes working with others easier—groups of
31 people can work together on the same project and merge
```

Review the assignment due date

Open in GitHub Codespaces

:wave: The Basics of GitHub

🧑‍🎓 Course overview and learning outcomes

The goal of this course is to give you a brief introduction to GitHub. We'll also provide you with materials for further learning and a few ideas to get you started on our platform. 🚀

You can **modify this file** and *save it*.

:octocat: Git and GitHub

Git is a **distributed Version Control System (VCS)**, which means it is a useful tool for easily tracking changes to your code, collaborating, and sharing. With Git you can track the changes you make to your project so you always have a record of what you've worked on and can easily revert back to an older version if need be. It also makes working with others easier—groups of people can work together on the same project and merge their changes into one final source!

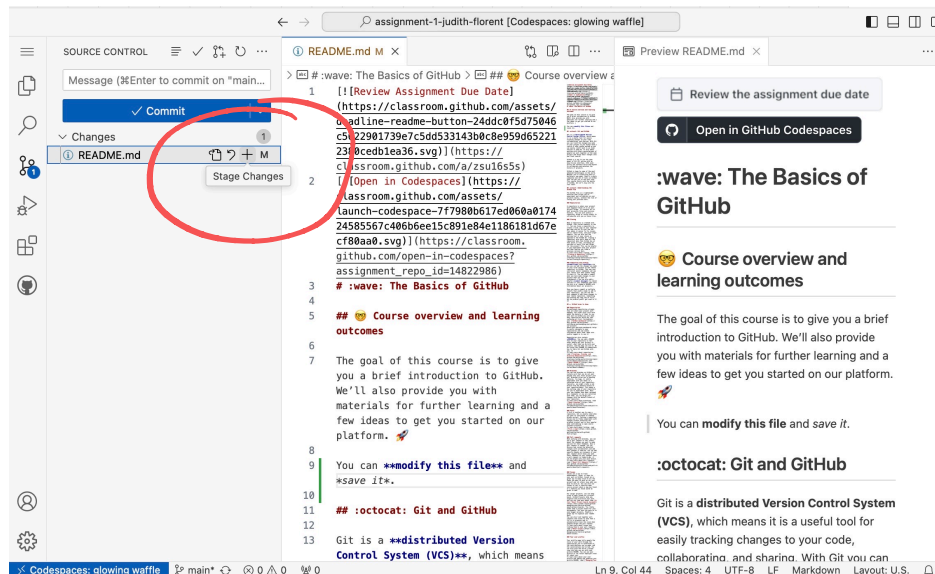
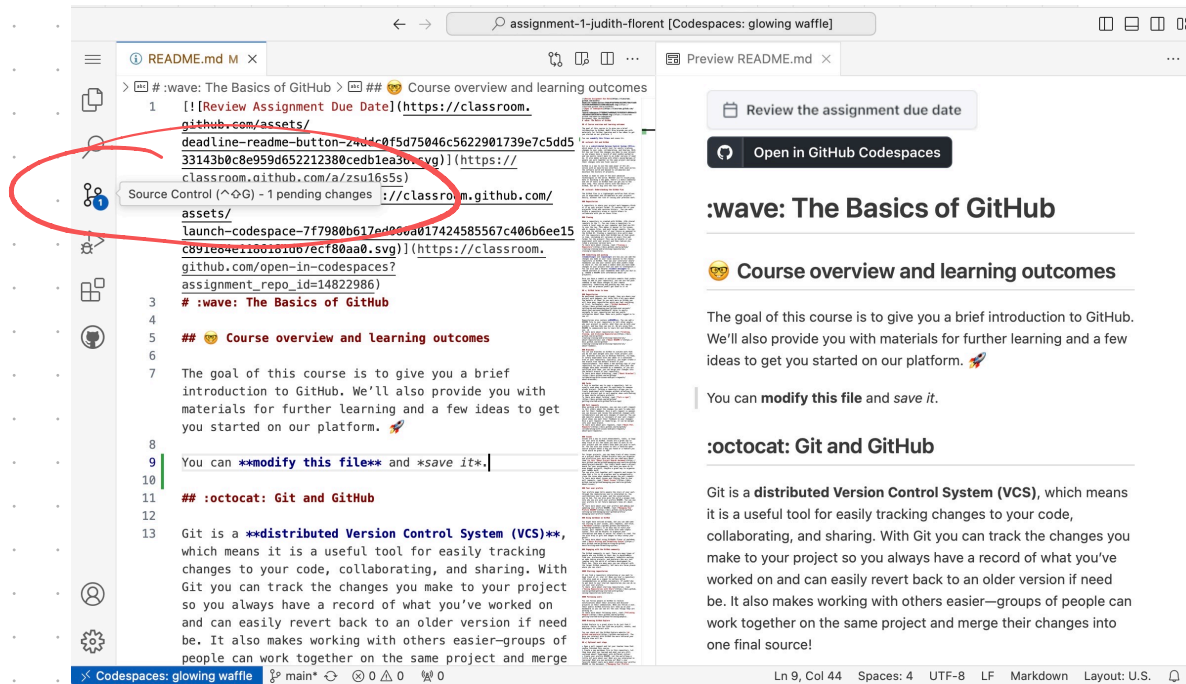
Ln 9, Col 44 Spaces: 4 UTF-8 LF Markdown Layout: U.S.

1

Access the file and write something in it

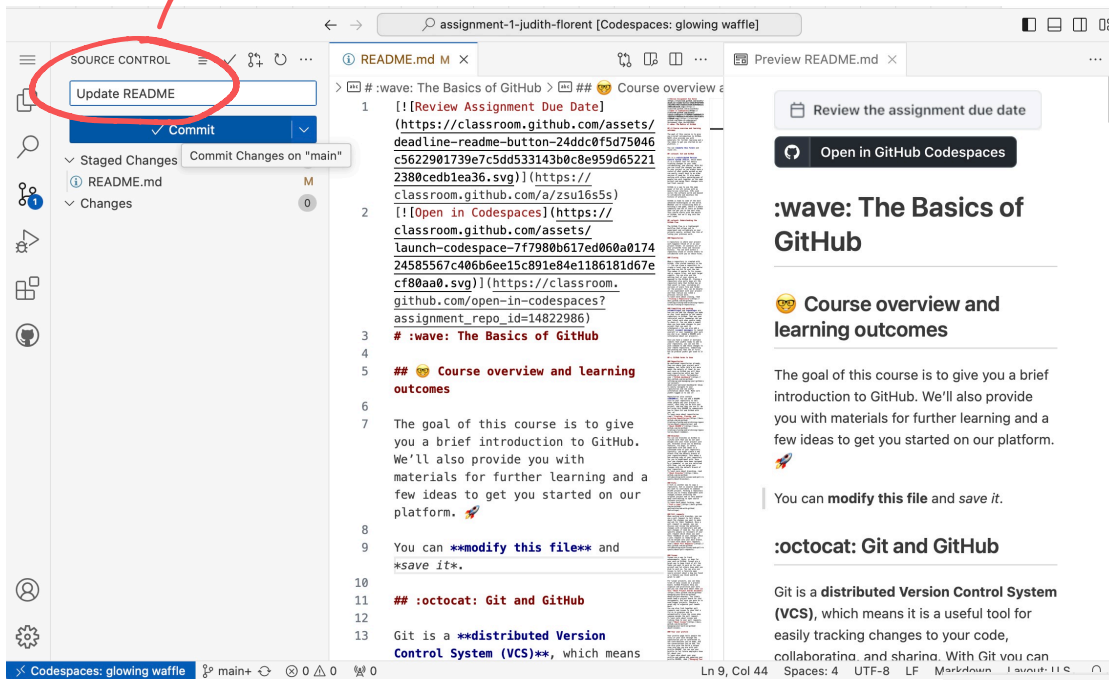
Saving your changes and updating your repository

Click here

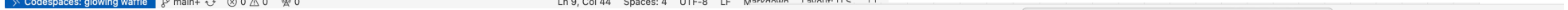


Then here to "stage" your changes (= tell Git you will update these files)

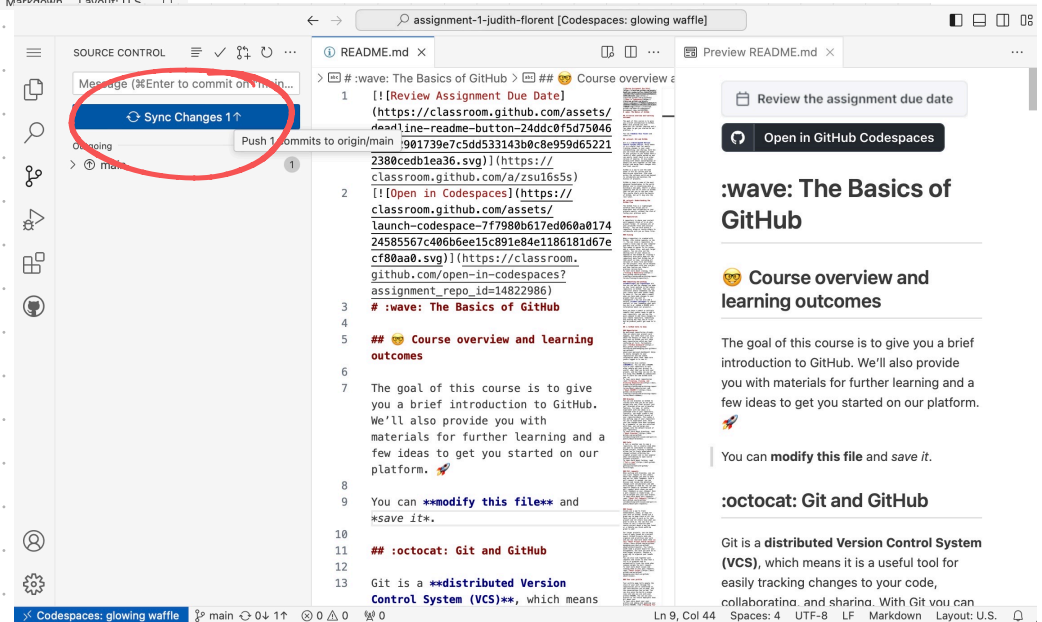
1 You must add a message (saying briefly what changes you have made)

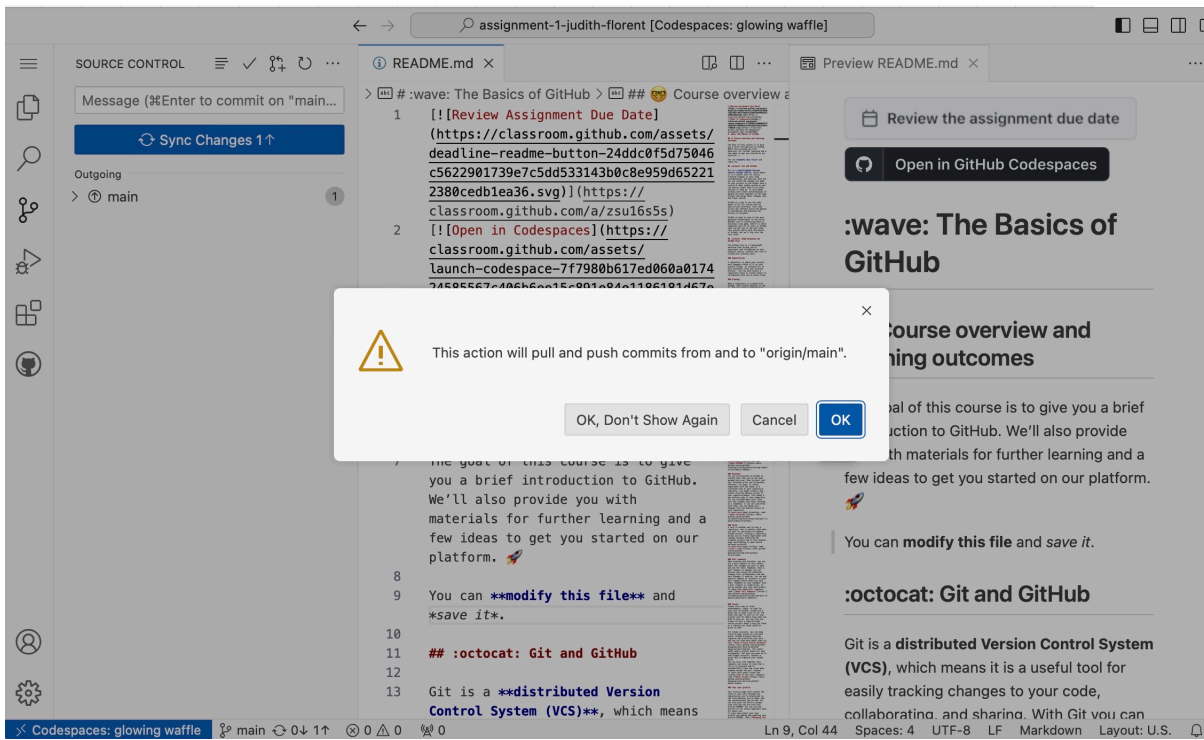


2 Then click on "Commit"

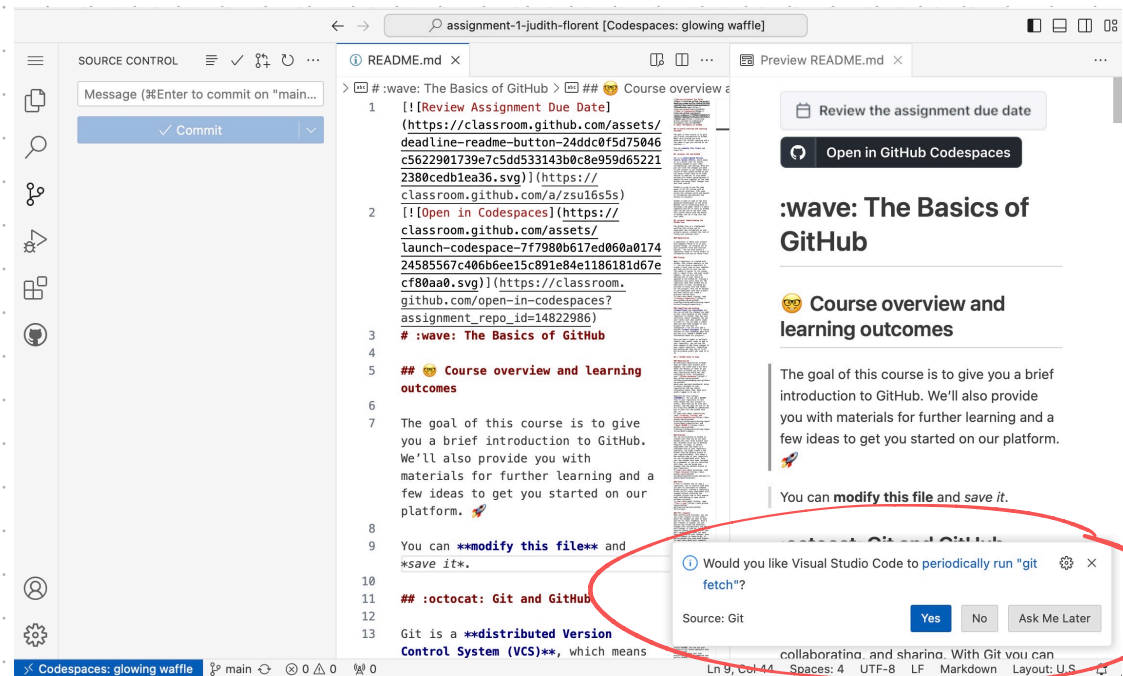


3 Finally, you can sync your changes and update your repo (you will get a warning message; see next page of this file)





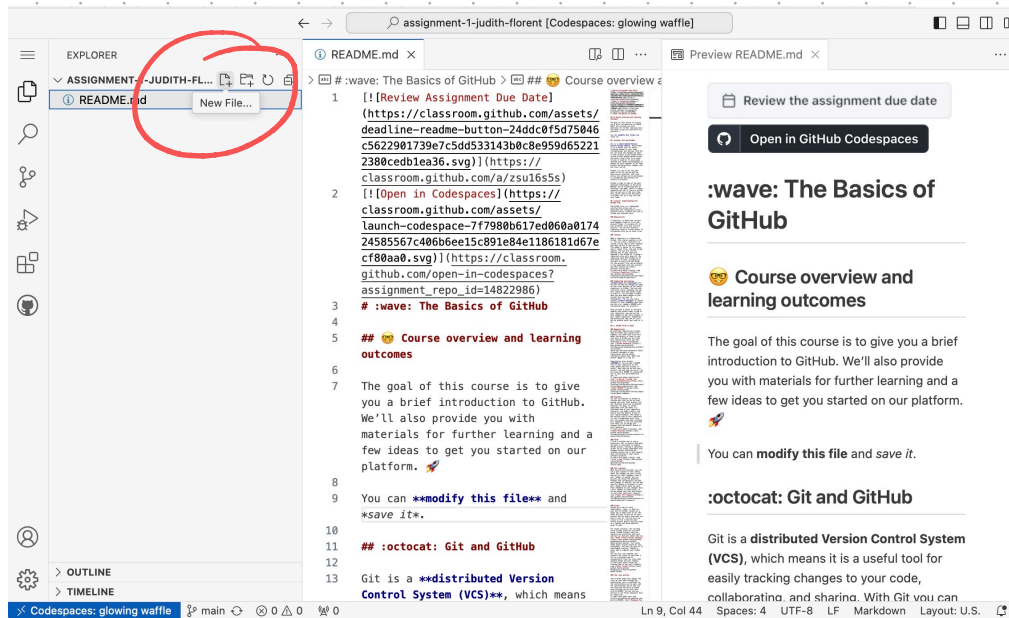
Yes, it's ok!



No need

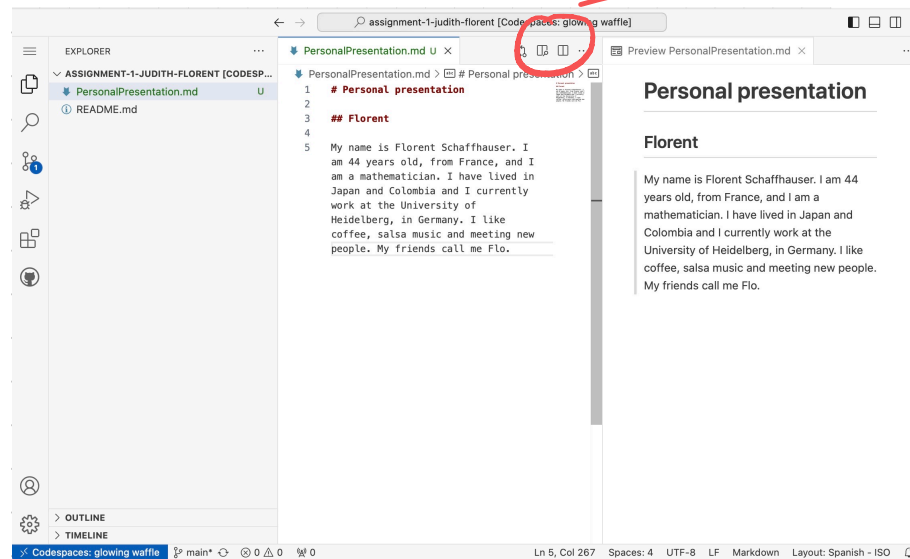
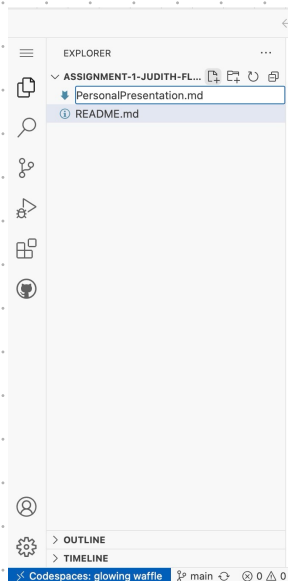
Creating a personal presentation file

1



Click here and create a file called `personal-presentation.md` then write something in it (you can close the other tabs if you want)

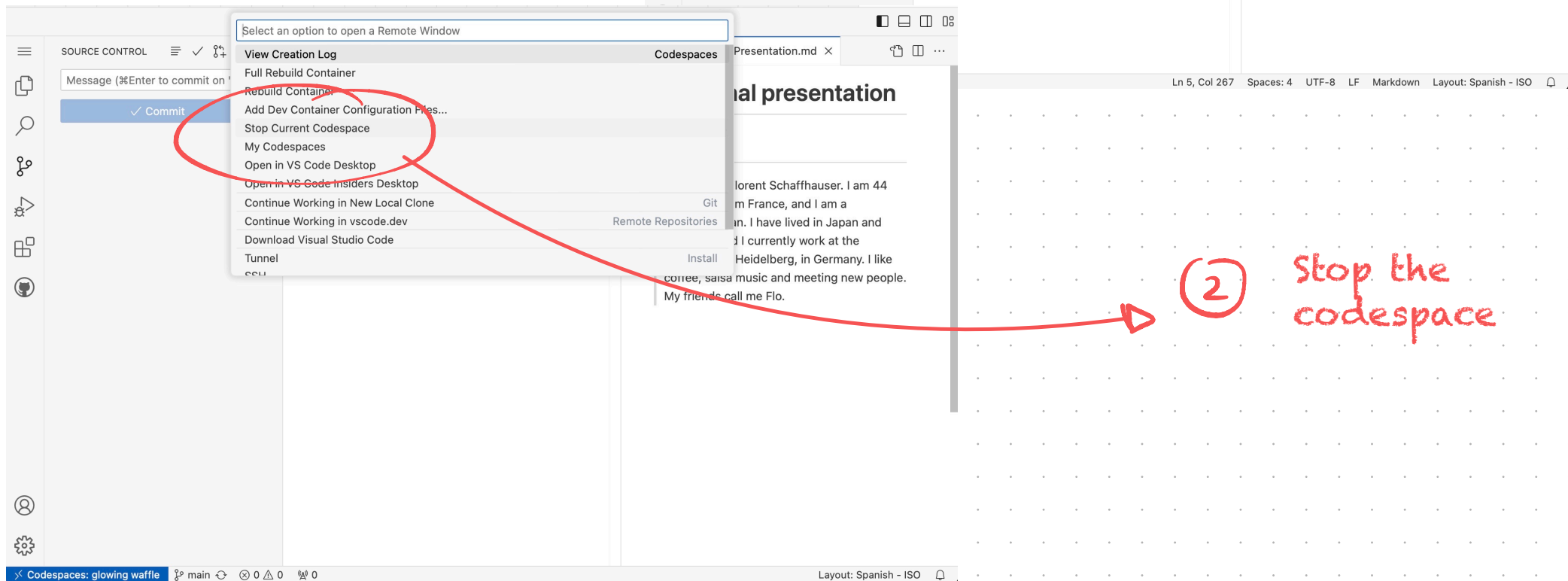
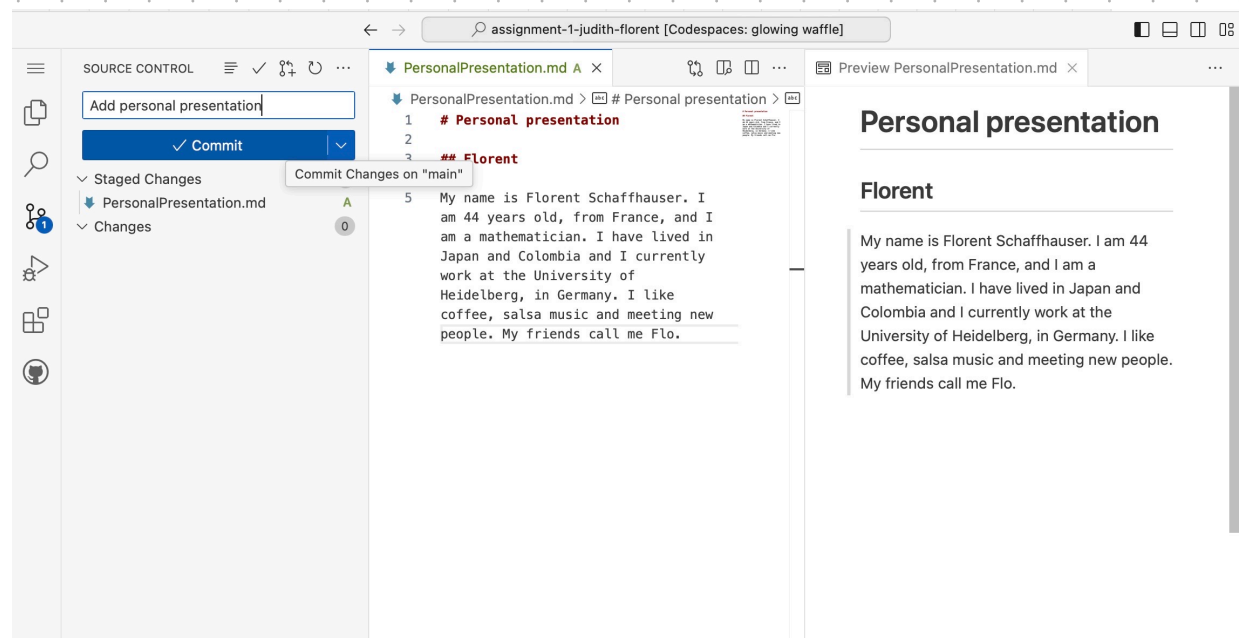
2



3

Markdown is rendered automatically in the side preview

Save the file to your repo.
(same procedure as for
the README file) then exit
your Codespace



① Click here

② Stop the codespace

The screenshot shows a GitHub Codespace interface. The top bar indicates the workspace is named "assignment-1-judith-florent [Codespaces: glowing waffle]". The editor is open to a file named "PersonalPresentation.md". The source control panel on the left shows a commit message: "Message (%Enter to commit on 'main...)" with a "Commit" button. The code editor displays the following content:

```
1 # Personal presentation
2
3 ## Florent
4
5 My name is Florent Schaffhauser. I
  am 44 years old, from France, and I
  am a mathematician. I have lived in
  Japan and Colombia and I currently
  work at the University of
  Heidelberg, in Germany. I like
  coffee, salsa music and meeting new
  people. My friends call me Flo.
```

The preview pane on the right shows the rendered markdown:

Personal presentation

Florent

My name is Florent Schaffhauser. I am 44 years old, from France, and I am a mathematician. I have lived in Japan and Colombia and I currently work at the University of Heidelberg, in Germany. I like coffee, salsa music and meeting new people. My friends call me Flo.

A notification at the bottom of the editor reads: "Stopping codespace 'glowing waffle'". The status bar at the bottom shows "Codespaces: glowing waffle", "main", and "Layout: Spanish - ISO".

It takes time...



Codespace is stopped

Restart codespace

It's finally done!

Next, go back to your team's repo on GitHub classroom. You should be able to see your presentation file there

This screenshot shows the GitHub repository page for 'assignment-1-judith-florent'. The repository is a fork of 'matematilab/github-starter-course'. The main branch is selected, and it is 3 commits ahead of the upstream repository. A commit by 'matematiflo' titled 'Add personal presentation' is highlighted, showing the file 'PersonalPresentation.md' was added 4 minutes ago. Below the commit list, the README file is visible, with a button to 'Open in GitHub Codespaces'. The right sidebar shows repository statistics: 0 stars, 0 watching, and 0 forks.

This screenshot shows the GitHub file viewer for the file 'PersonalPresentation.md'. The file was added by 'matematiflo' 2 days ago. The preview shows a document with the following content:

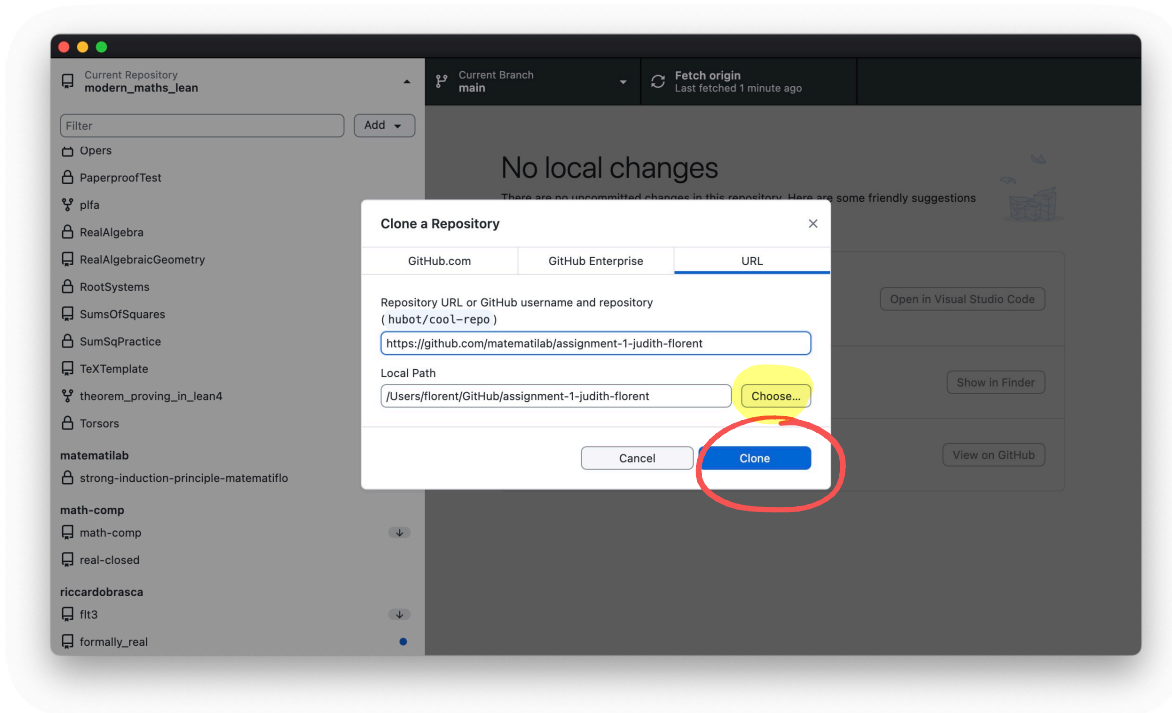
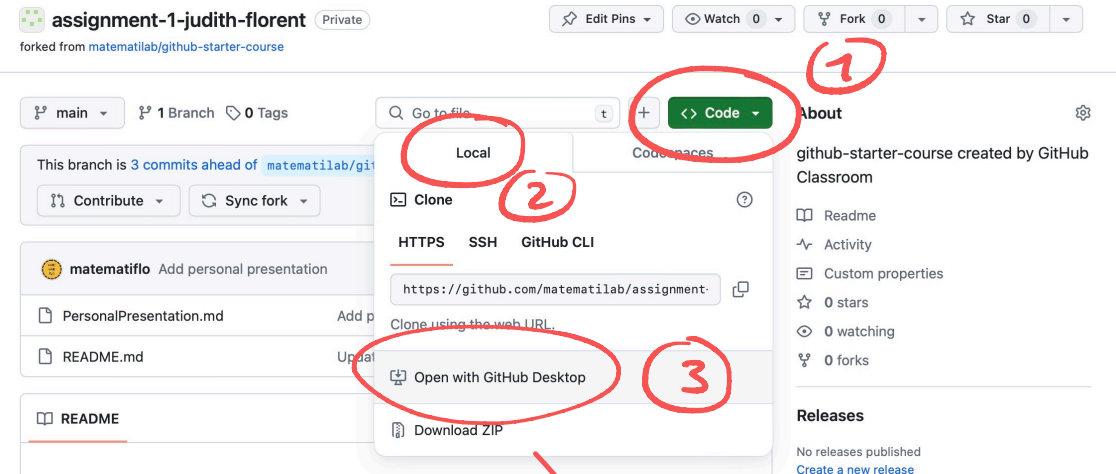
Personal presentation

Florent

My name is Florent Schaffhauser. I am 44 years old, from France, and I am a mathematician. I have lived in Japan and Colombia and I currently work at the University of Heidelberg, in Germany. I like coffee, salsa music and meeting new people. My friends call me Flo.

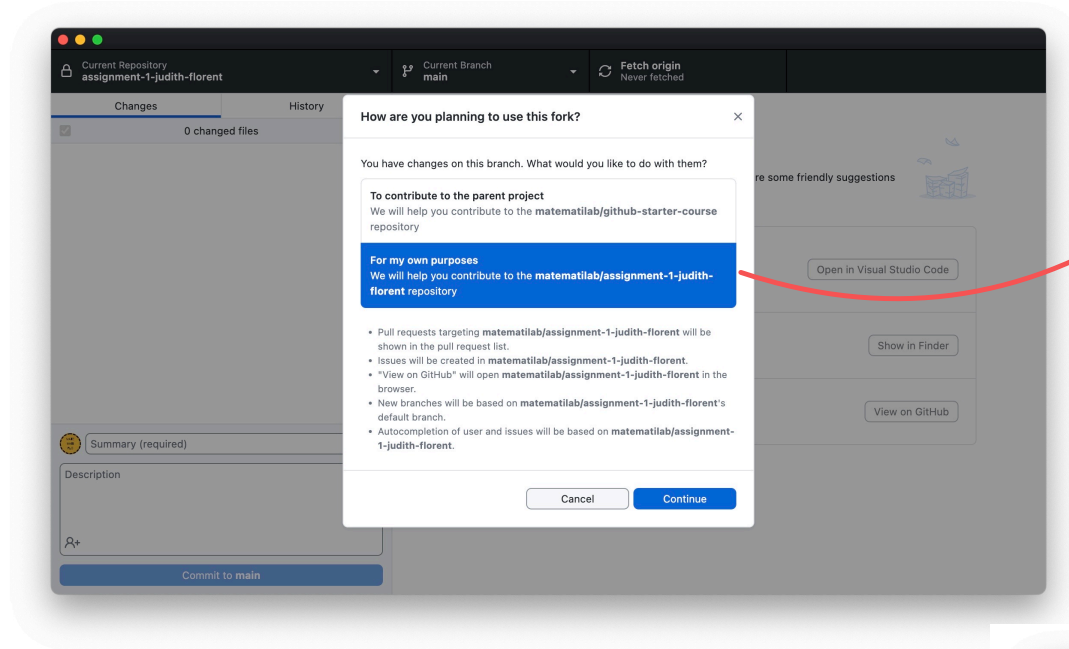
You can view the file within GitHub by clicking on it, thanks to the fact that it is a .md file (Markdown)

You can also clone the repo to your machine (local copy)

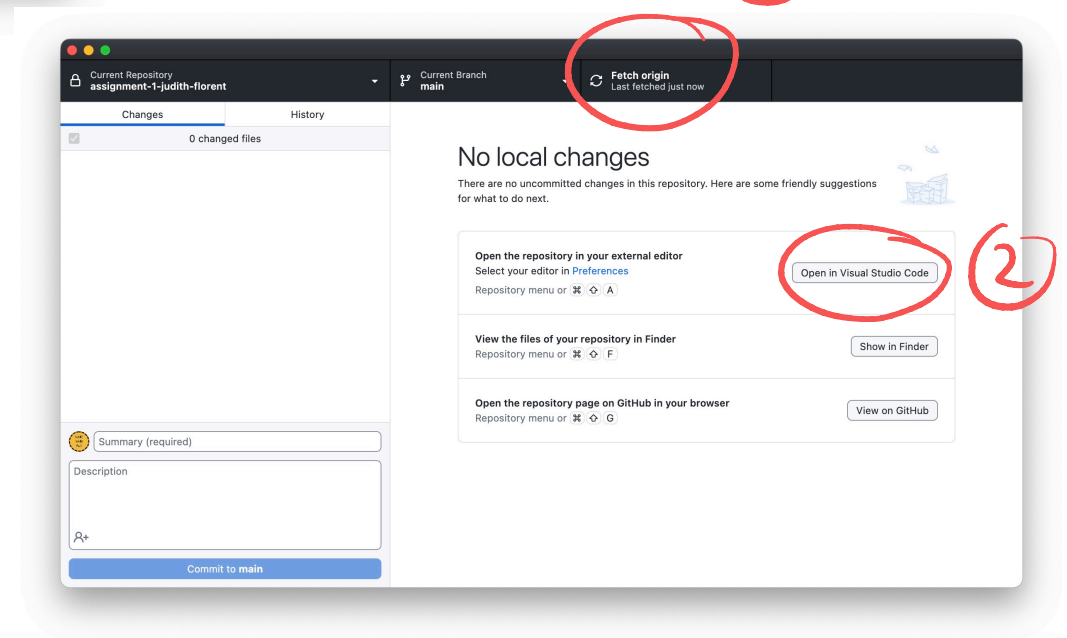


GitHub Desktop will guide you through the process

Choose this option to be able work on your repo directly from your machine



Fetch your repo and open it in Visual Studio Code (requires having it installed)



You can then work on your files as you did in Codespace

The screenshot shows a code editor interface with a browser-like address bar at the top displaying "assignment-1-judith-florent". The interface is divided into three main sections:

- EXPLORER (Left Panel):** Shows a file tree for "ASSIGNMENT-1-JUDITH..." containing "PersonalPrese... M" and "README.md".
- Editor (Middle Panel):** Displays the content of "PersonalPresentation.md" with line numbers 1 through 6. The text is as follows:

```
1 # Personal presentation
2
3 ## Florent
4
5 🌟 name is Florent Schaffhauser. I am 44 years old,
   from France, and I am a mathematician. I have lived in
   Japan and Colombia and I currently work at the
   University of Heidelberg, in Germany. I like coffee,
   salsa music and meeting new people. My friends call me
   Flo.
6
```
- Preview (Right Panel):** Shows the rendered HTML output of the markdown, featuring a main heading "Personal presentation" and a sub-heading "Florent", followed by the paragraph text.

At the bottom of the editor, a status bar indicates "Ln 6, Col 1 Spaces: 4 UTF-8 LF Markdown".

Step 3

Go back to your repo on GitHub classroom and, in the README file, learn more about the basics of GIT.

The screenshot shows the GitHub interface for the repository 'matematiflo / CompAssistedMath2024'. The repository is public and has 19 commits. The commit history shows updates to the README, .vscode settings, Sage notebook files, and .gitignore. The README file is selected, displaying the title 'Computer-assisted mathematics 2024' and a description: 'GitHub repository for the seminar on Computer-assisted mathematics held at the University of Heidelberg during the Summer Semester of 2024.' The README also includes links for 'Homepage | Zulip | Sage Docs | Sage Installation guide'. The right sidebar shows repository statistics: 1 star, 1 watching, and 1 fork. Contributors listed are Florent Schaffhauser, Splines Splines, and judithludwig. The language bar indicates 100.0% Jupyter Notebook.

If you feel comfortable, you can fork the repo for our seminar (link available on the seminar webpage and on Zulip)

You have until 29.04.2024 to complete as much as you can of this assignment! If you experience some trouble, ask for help in the Zulip channel :-)