



Getting started with Git, GitHub & GitHub Desktop

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TTS Research Technology

Upcoming Workshop:

Best Practices for using GPUs in Jupyter for Data Science

Wednesday, October 29, 2025

Register [HERE](#)

- Run GPU-accelerated Jupyter notebooks on the Tufts HPC cluster
- Fine-tune a convolutional neural network (CNN) as a hands-on example
- Learn best practices to leverage Tufts GPU resources efficiently



Overview

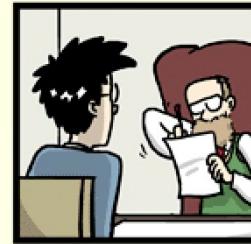
- 1. Git & GitHub & Version Control Basics**
- 2. Navigating GitHub Desktop**
- 3. Resolving Merge Conflicts**
- 4. Best Practices for GitHub Usage**

Why Version Control?

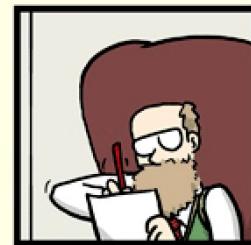
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FINAL.doc!



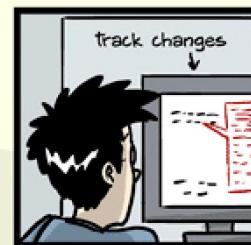
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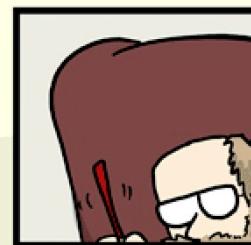


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CORRECTIONS.doc



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corrections9.MORE.30.doc FINAL_rev.22.comments49.
corrections.10.#@\$%WHYDID
ICOMETOGRAD SCHOOL????.doc



Version Control

- Version control is a record of who make changes to what, and when they did it.
- We can always undo.
- Easier for collaboration without overwriting.
- A key skill in code & data management!

What is Git



- A version control system.
- Manage source code changes (changes to files)
- Two key features: Commit and Branches.
- **With Git, you can easily roll back to older code snapshots (commits) or develop new features without breaking production code.**

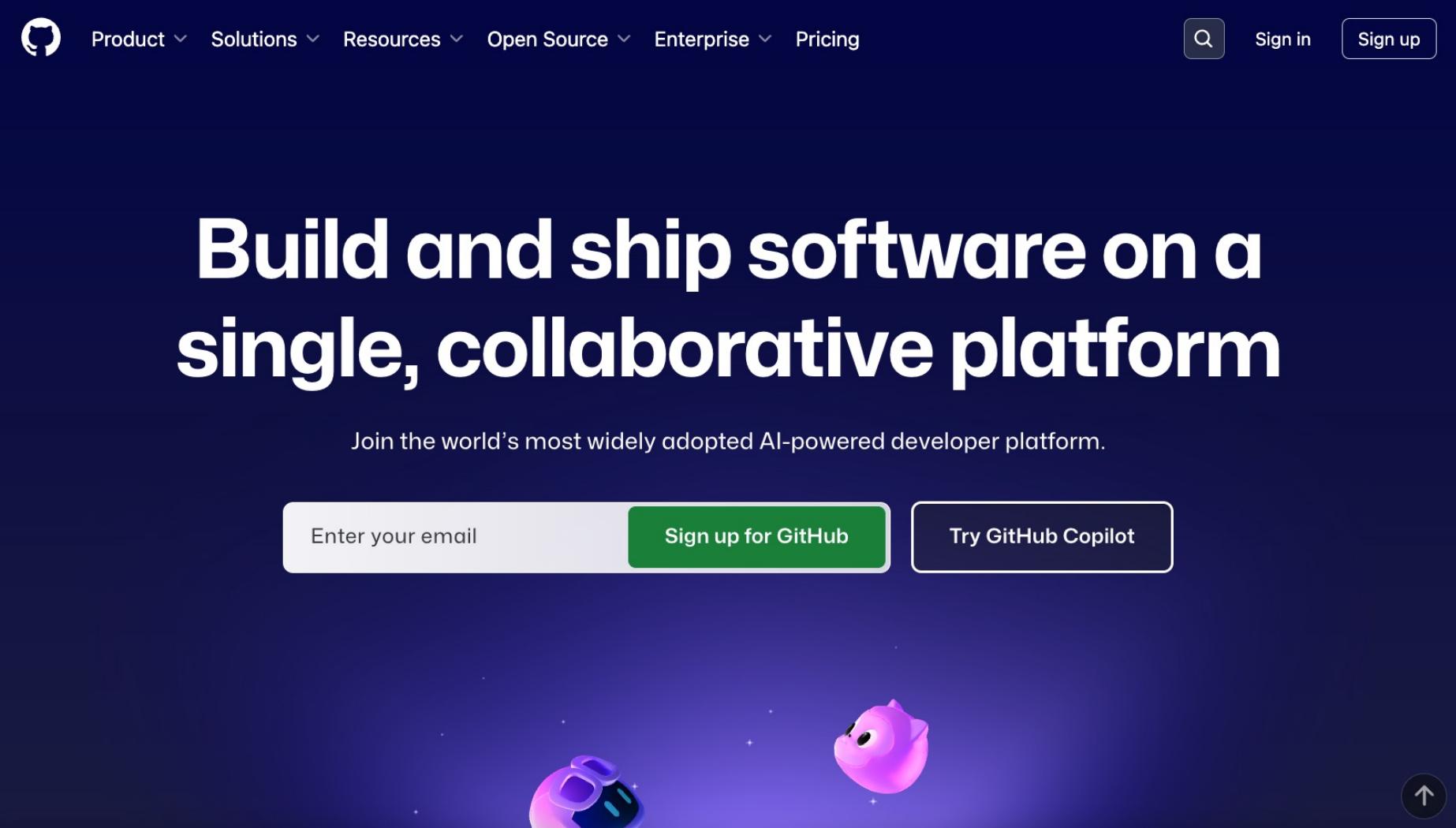
What is GitHub



GitHub

- A cloud Git repository & services provider.
- Code management & collaborative development.
- It can handle all the versioning and allows multiple people to collaborate on the same project.
- Repositories support version control capabilities through Git.
- Graphical User Interface, beginner friendly

<https://github.com/>



The image shows the GitHub homepage. At the top, there is a navigation bar with links for Product, Solutions, Resources, Open Source, Enterprise, and Pricing. To the right of the navigation bar are a search icon, a "Sign in" button, and a "Sign up" button. The main feature of the page is a large, bold white text on a dark blue background that reads "Build and ship software on a single, collaborative platform". Below this text is a subtitle: "Join the world's most widely adopted AI-powered developer platform." At the bottom of the banner, there are three calls-to-action: a white button with a rounded rectangle containing the text "Enter your email", a green button with the text "Sign up for GitHub", and a dark grey button with the text "Try GitHub Copilot". In the bottom right corner of the banner, there is a small circular icon with an upward-pointing arrow. The background of the banner features a dark blue gradient with two stylized, colorful 3D-rendered objects: a purple and blue spherical object on the left and a pink and purple spherical object on the right.

What is GitHub Desktop

- A user-friendly app for managing Git and GitHub projects.
- Simplifies version control with a visual interface.
- Supports cloning, committing, branching, and merging.
- Great for beginners and those who prefer a GUI over the command line.
- Works on macOS and Windows.
- Helps sync local changes with remote GitHub repositories.

<https://desktop.github.com/download/>

The screenshot shows the GitHub Desktop download page with a dark background. At the top left is the GitHub Desktop logo. To its right are navigation links: Download, Release Notes, and Help. The main title "Download GitHub Desktop" is centered above a subtitle: "Focus on what matters instead of fighting with Git. Whether you're new to Git or a seasoned user, GitHub Desktop simplifies your development workflow." Below this is a large button labeled "Download for macOS". A yellow arrow points from the text "You may see 'Download for Windows'" to this button. To the right of the "macOS" button is a section titled "Try beta features and help improve future releases" with a "Check out Beta" link. In the center is a section about Apple silicon Macs with a "Download for Apple silicon Mac" link. To the right is a section for Windows users with a "Download for Windows" link. A second yellow arrow points from the text "if you are on windows" to the "Windows" download link.

GitHub Desktop Download Release Notes Help

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[Download for macOS](#)

You may see "Download for Windows" if you are on windows

Try beta features and help improve future releases

Experience the latest features and bug fixes before they're released.

[Check out Beta](#)

Do you use an Apple silicon Mac?

See the [Apple docs](#) about Apple vs Intel chips.

[Download for Apple silicon Mac](#)

Looking for Windows?

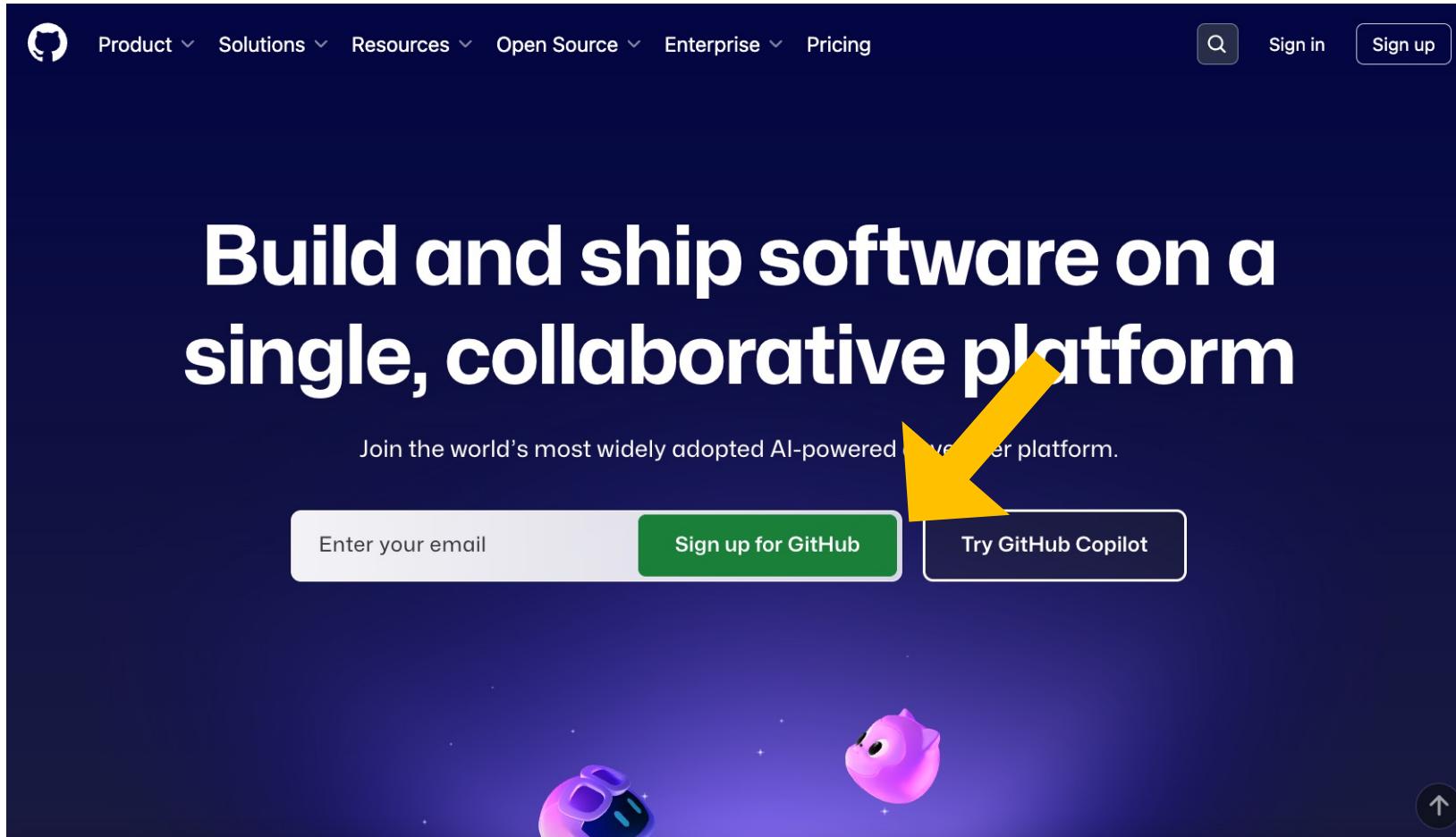
Need to download the install for Windows?

[Download for Windows](#)

Let's create a GitHub repo

Sign up for GitHub account

<https://github.com/>



Install GitHub Desktop

<https://desktop.github.com/download/>

The screenshot shows the GitHub Desktop download page with a dark background. At the top, there's a navigation bar with links for "GitHub Desktop", "Download", "Release Notes", and "Help". Below the navigation, the main heading is "Download GitHub Desktop". A sub-headline says, "Focus on what matters instead of fighting with Git. Whether you're new to Git or a seasoned user, GitHub Desktop simplifies your development workflow." There are three main download options: a large white button labeled "Download for macOS" with a yellow arrow pointing to it, a box for "Try beta features and help improve future releases" with a "Check out Beta" link, and a box for "Do you use an Apple silicon Mac?" with a "Download for Apple silicon Mac" link. Another box asks "Looking for Windows?" with a "Download for Windows" link, also accompanied by a yellow arrow.

GitHub Desktop

Download Release Notes Help

Download GitHub Desktop

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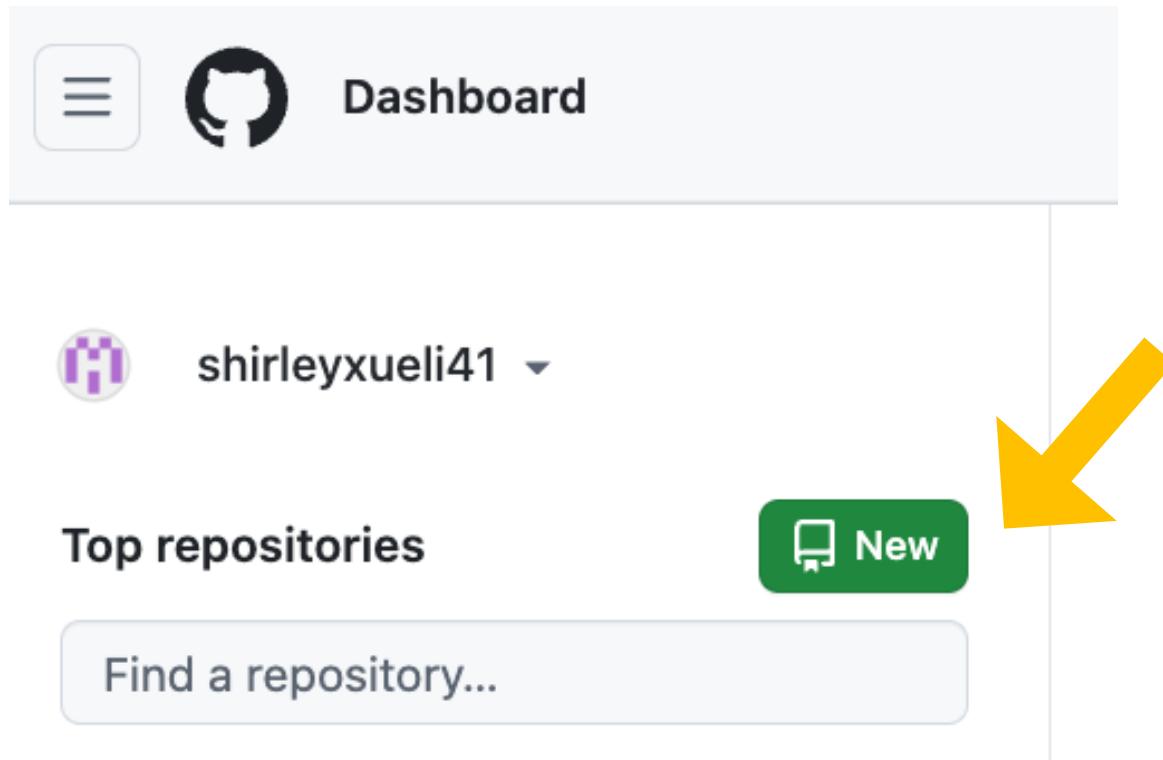
Looking for Windows?

Need to download the install for Windows?

[Download for Windows](#)

Create a GitHub Repo

In the browser, go to <https://github.com/>



Enter the details

Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere? [Import a repository.](#)

Required fields are marked with an asterisk (*).

Name of the repo, no space

Owner *



shirleyxueli41

Repository name *

githubtraining

✓ githubtraining is available.



Great repository names are short and memorable. Need inspiration? How about [cautious-fiesta](#) ?

Description (optional)

- Public: everyone can see
- Private: Only you and your collaborator can see



Public

Anyone on the internet can see this repository. You choose who can commit.



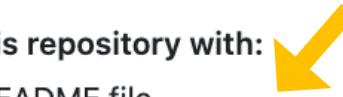
Private

You choose who can see and commit to this repository.

Initialize this repository with:

Add a README file

This is where you can write a long description for your project. [Learn more about READMEs.](#)



Good practice: always create a README file and write the description about the repo



Create repository



shirleyxueli41 / githubtraining

Type / to search

Code

Issues

Pull requests

Actions

Projects

Wiki

Security

Insights

Settings



githubtraining

Public

Pin

Unwatch

1

main ▾

1 Branch 0 Tags

Go to file

t

+

Code ▾



shirleyxueli41 Initial commit

b1449f6 · now 1 Commit

README.md

Initial commit

now

README



githubtraining

Getting started with GitHub Desktop App

<https://docs.github.com/en/desktop/overview/getting-started-with-github-desktop>

- **Installing and authenticating**
- **Configuring and customizing GitHub Desktop**
- **Contributing to projects with GitHub Desktop**

.git hidden folder

.git folder is created after you initiate a repository

.git contains all information required for version control.

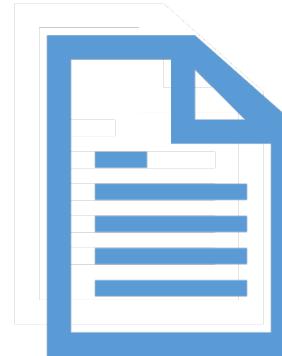
Mac users, to view hidden folders and files:

Shift + Command + .

GitHub



a central hub for stored code, allowing team members to push and pull changes



Git Command

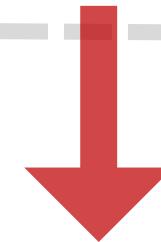
BASIC GIT COMMANDS EVERY DEV MUST KNOW



remote



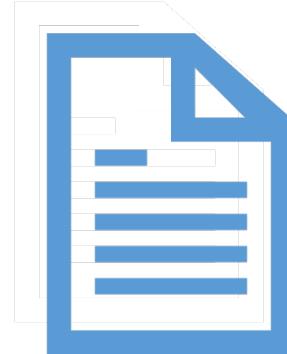
git clone



local



remote

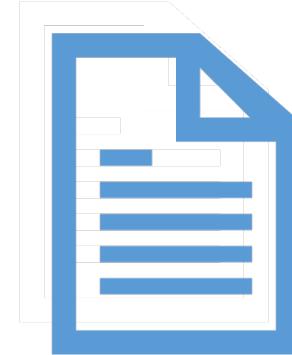


local



Make changes locally

remote



local



git commit

remote



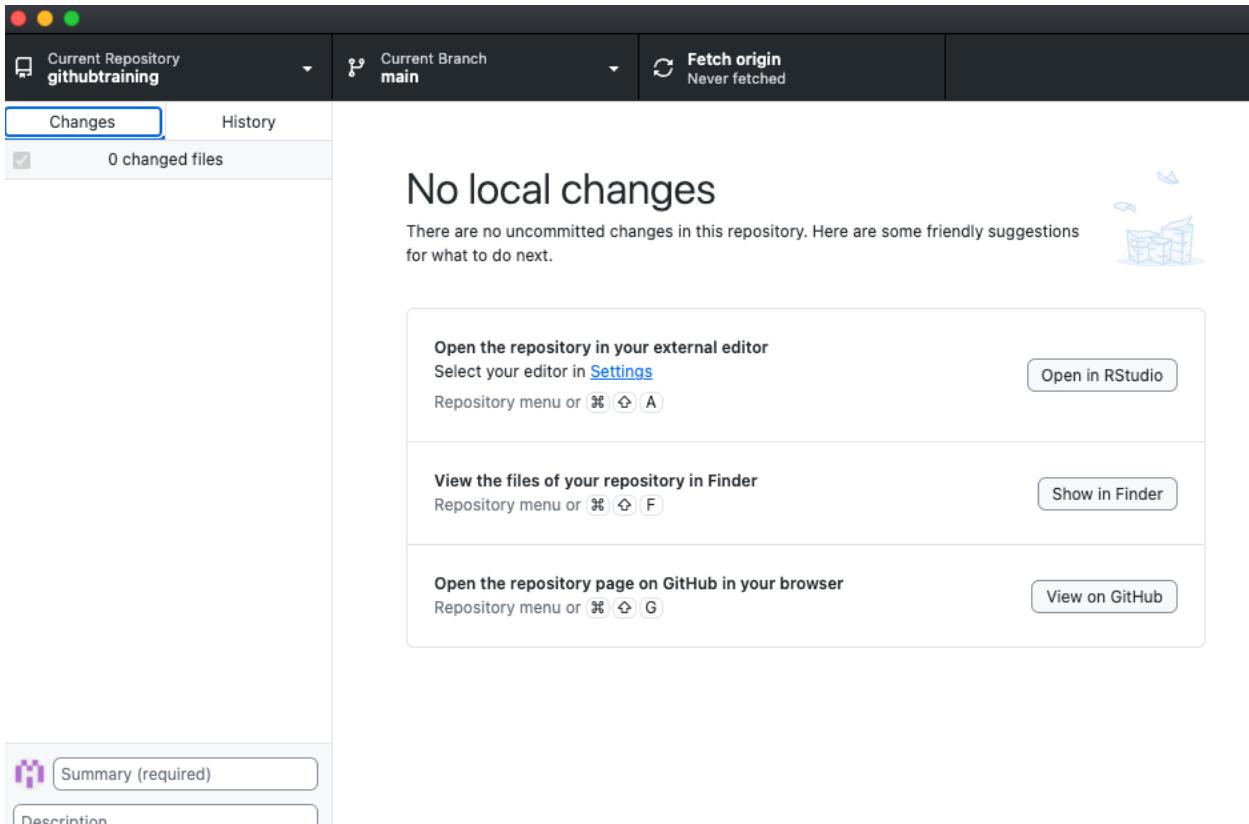
local



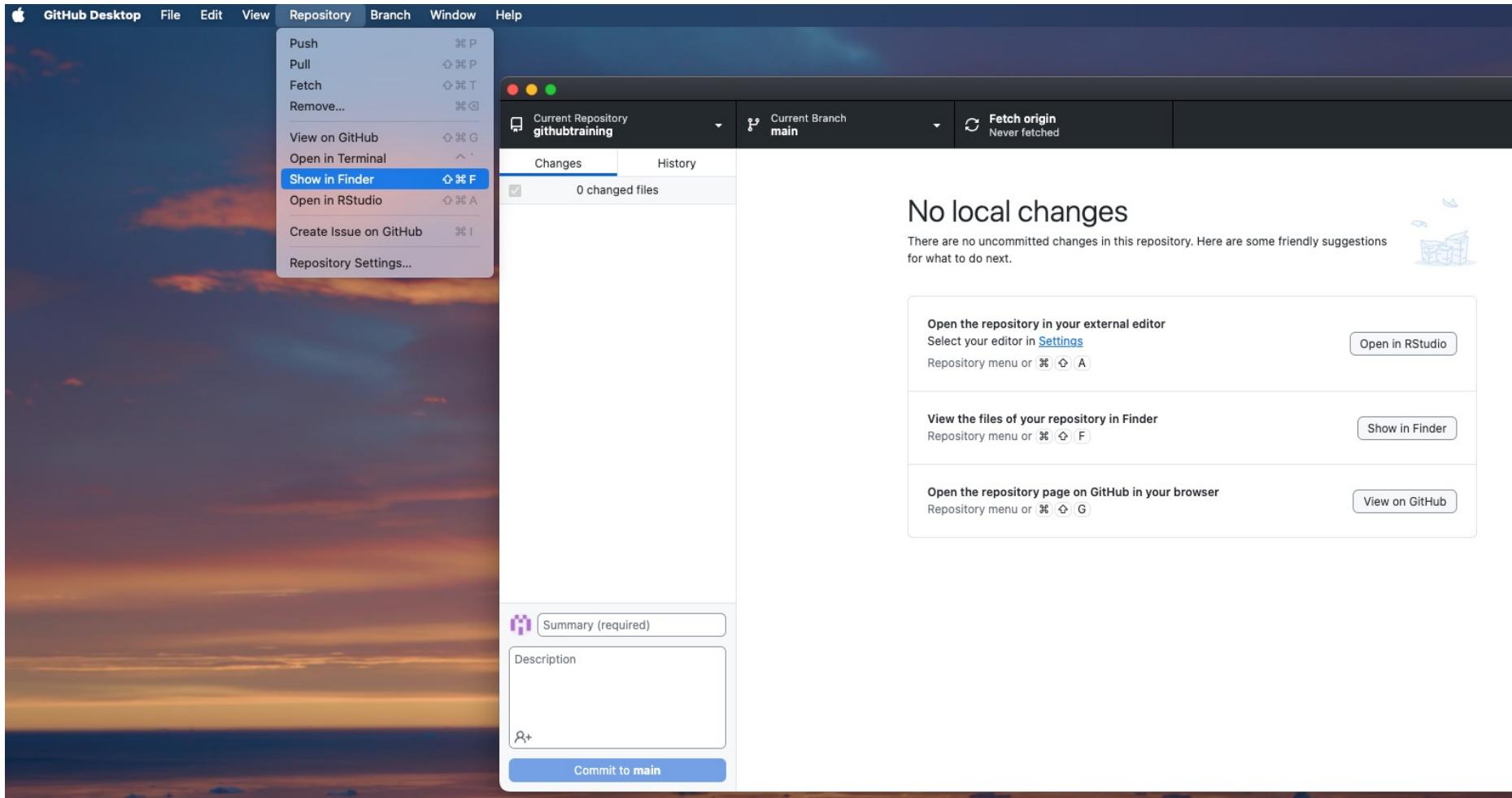
git push

Making Local Changes and Pushing to Remote

Make sure you have cloned the remote repo to your laptop



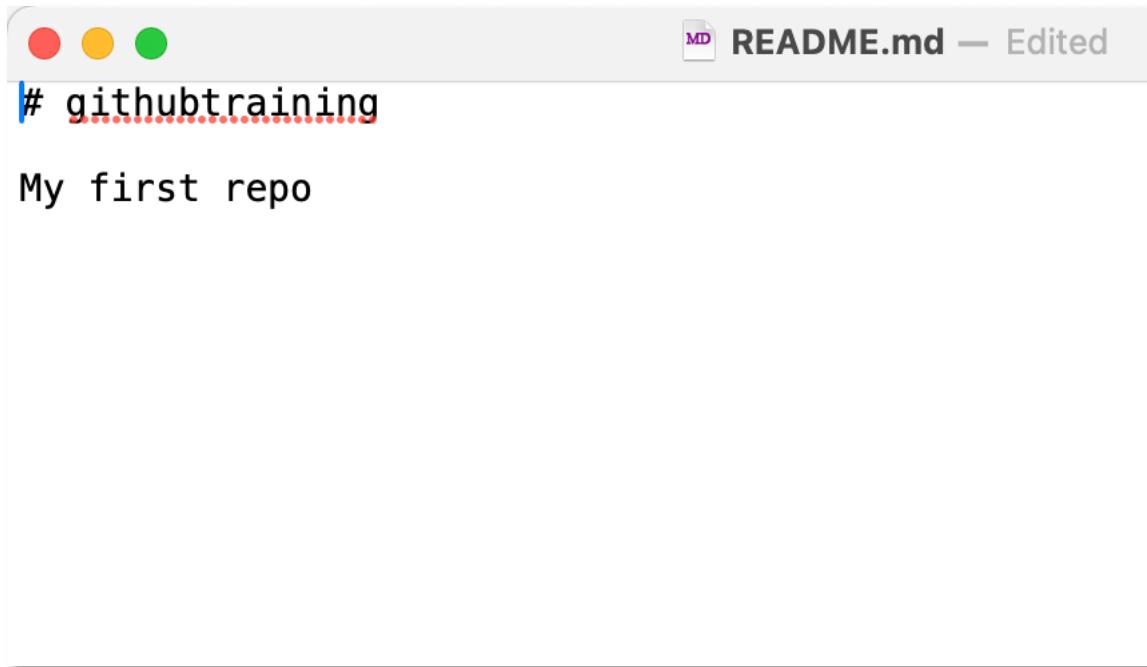
Opening the Local Folder for the Repository



Make changes to README.md file

Use any editor, write some text to this file.

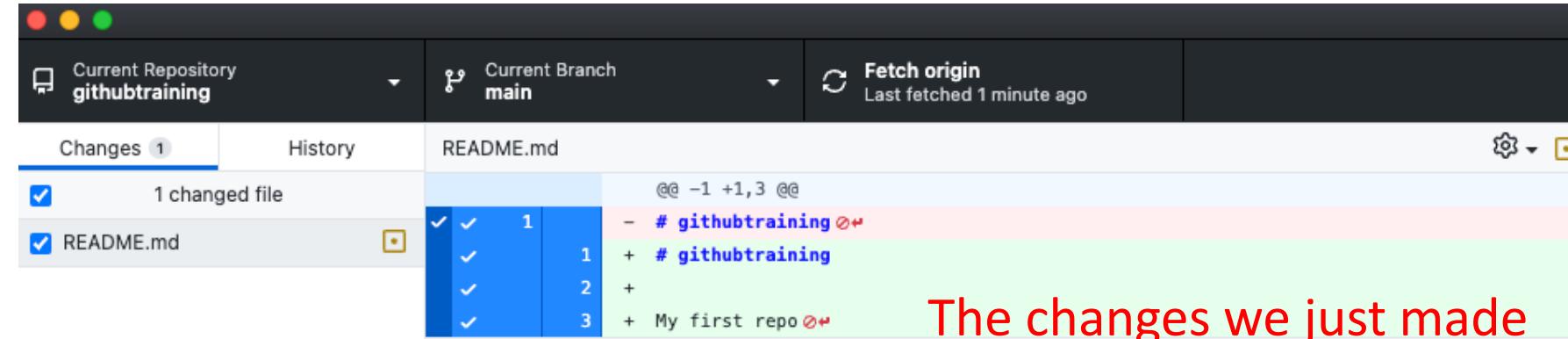
Ex:



A screenshot of a Mac OS X TextEdit window. The window title is "README.md — Edited". The text area contains the following content:

```
# githubtraining
My first repo
```

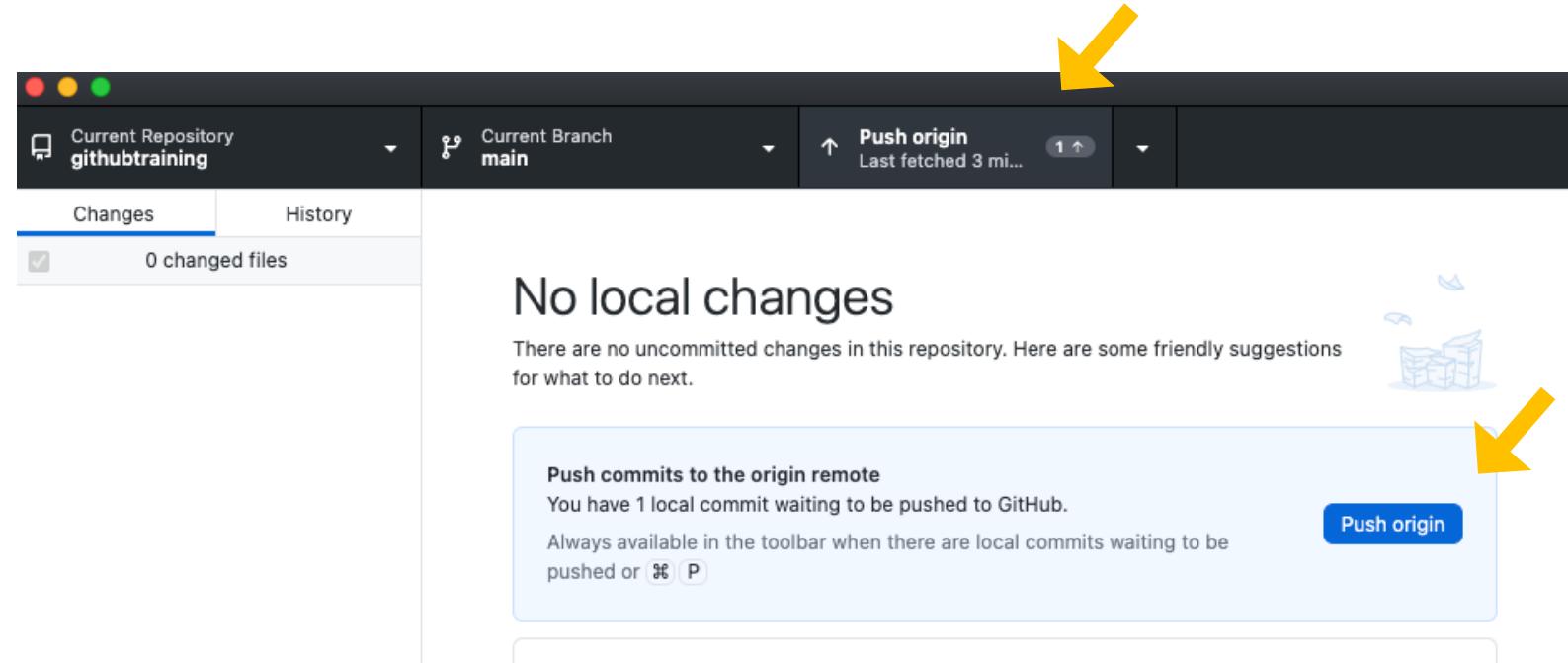
Git commit



Write a clear commit message

Click here to git commit

Git push



Check your remote repo after git push

Git Commit

- A core function in the Git version control system that saves a snapshot of the project's staged changes, creating a "commit" object in the repository history.
- **Each commit includes:**
 - Snapshot of Changes
 - Unique Identifier
 - Author Information
 - Timestamp
 - Commit Message

remote



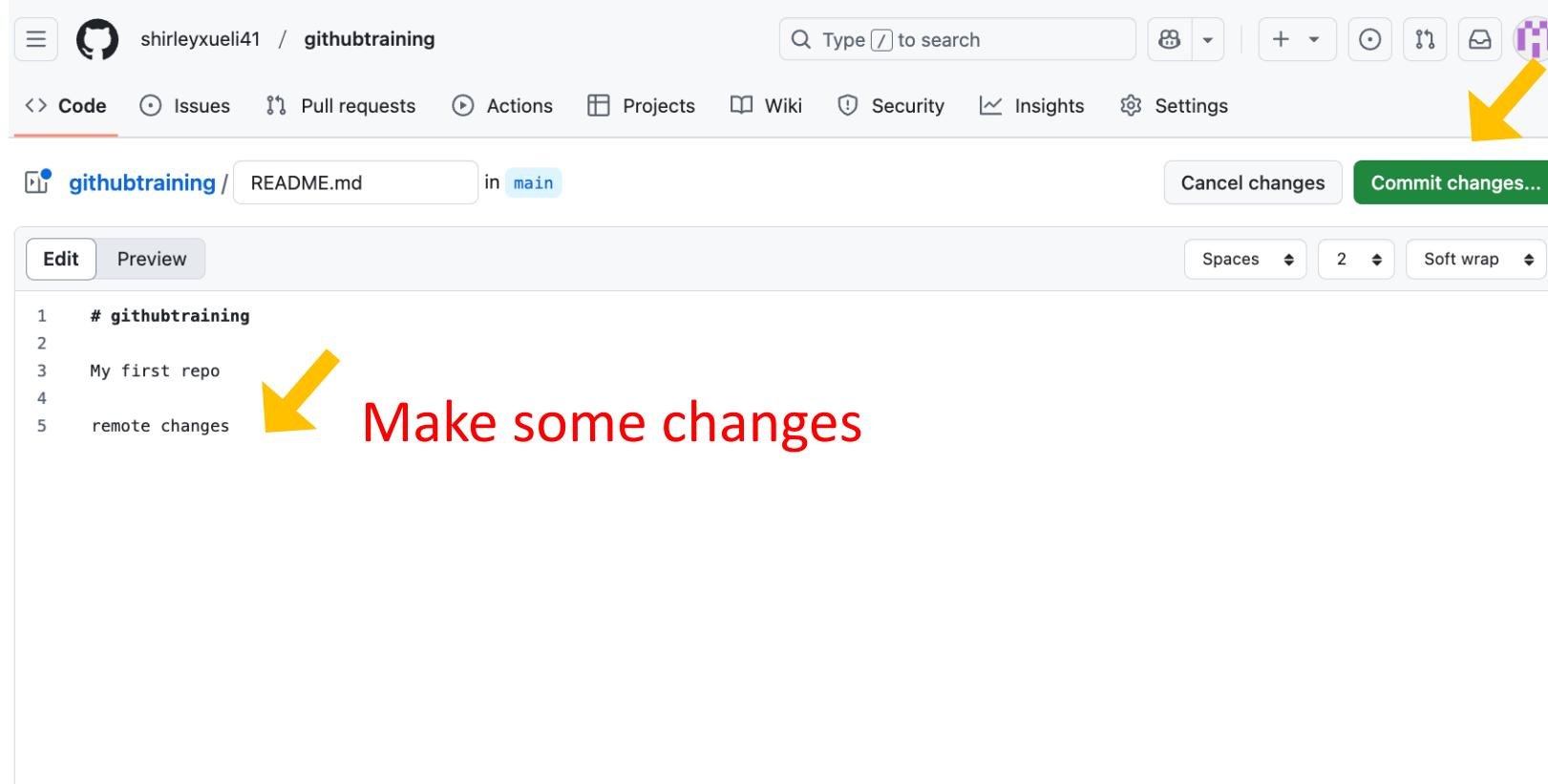
Local (collaborator)



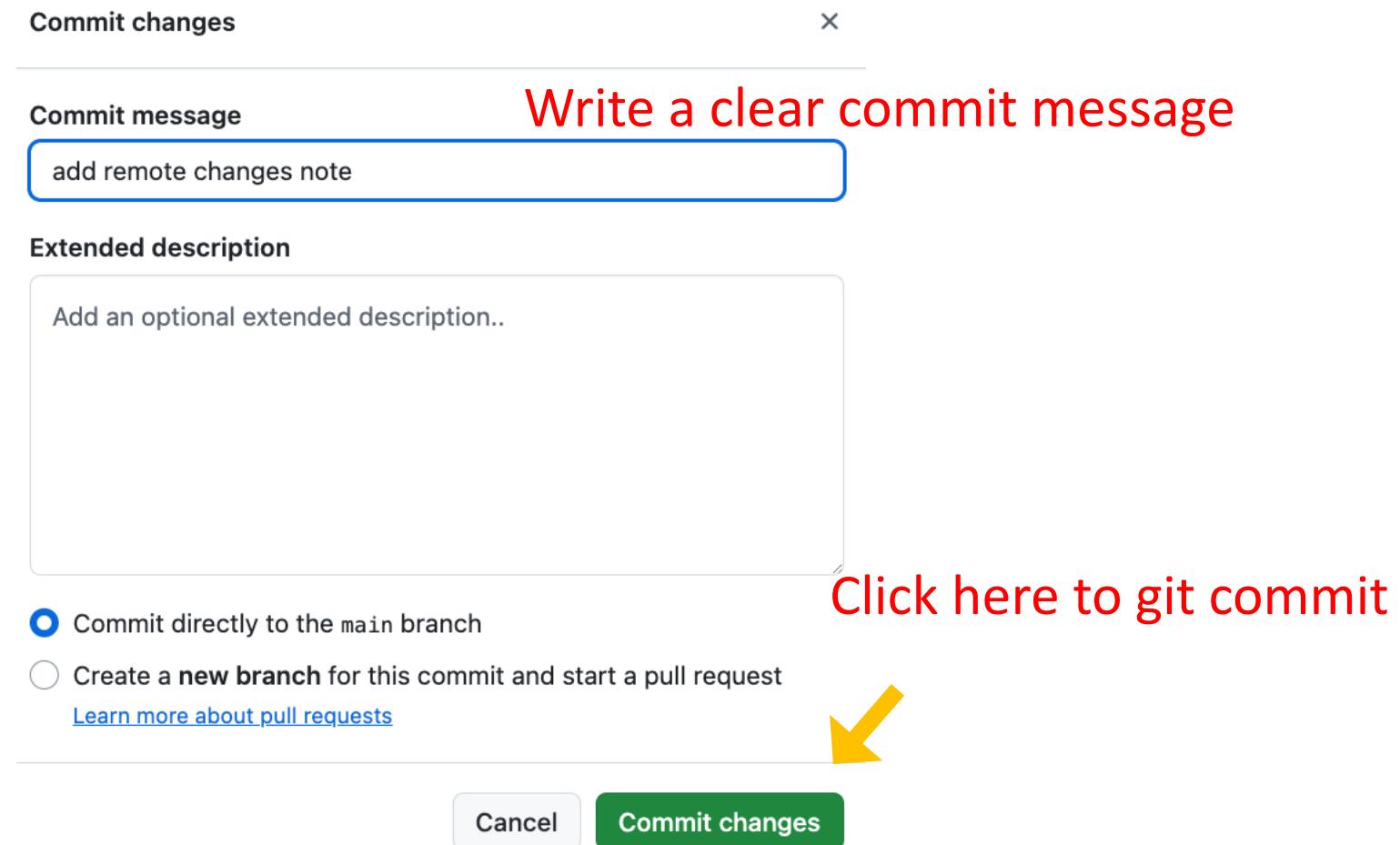
git fetch & pull

Make changes to README.md file remotely

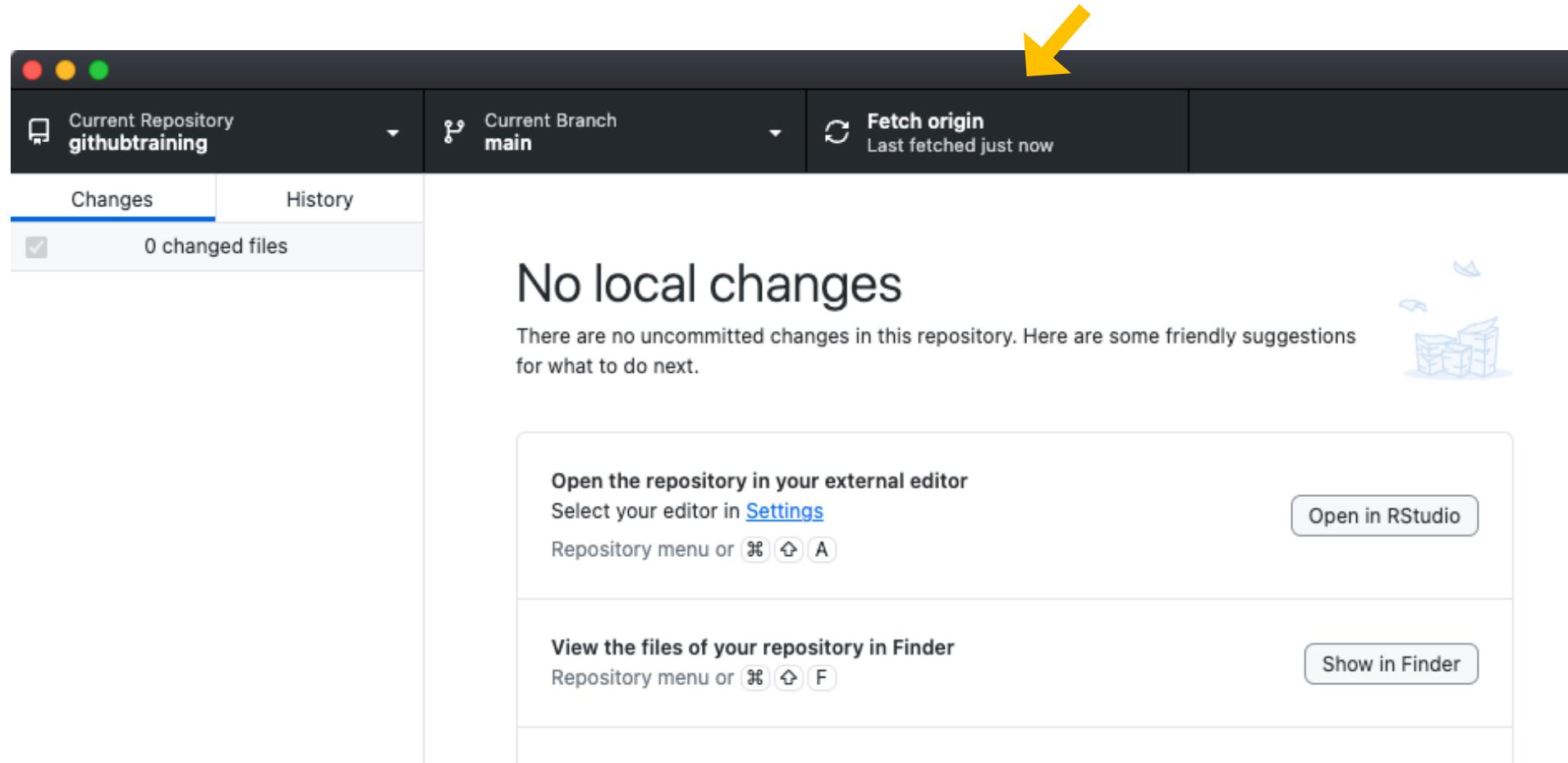
Click here to git commit



Write clear commit message



Git Fetch



A screenshot of the GitHub Desktop application interface. At the top, there's a dark header bar with three colored window control buttons (red, yellow, green) on the left. To the right of these are three dropdown menus: 'Current Repository' set to 'githubtraining', 'Current Branch' set to 'main', and 'Fetch origin' which says 'Last fetched just now'. A large yellow arrow points to the 'Fetch origin' text. Below the header is a navigation bar with tabs: 'Changes' (which is selected and highlighted in blue), 'History', and a checkbox indicating '0 changed files'. The main content area has a heading 'No local changes' and a message: 'There are no uncommitted changes in this repository. Here are some friendly suggestions for what to do next.' To the right of this message is a small blue icon depicting a person sitting at a desk with a laptop and a coffee cup. Below the message are two sections: 'Open the repository in your external editor' with instructions to select an editor in 'Settings' or use the Repository menu or keyboard shortcut ⌘ ⌘ A, and 'View the files of your repository in Finder' with instructions to use the Repository menu or keyboard shortcut ⌘ ⌘ F. There are also 'Open in RStudio' and 'Show in Finder' buttons.

Current Repository
githubtraining

Current Branch
main

Fetch origin
Last fetched just now

Changes History

0 changed files

No local changes

There are no uncommitted changes in this repository. Here are some friendly suggestions for what to do next.

Open the repository in your external editor

Select your editor in [Settings](#)

Repository menu or ⌘ ⌘ A

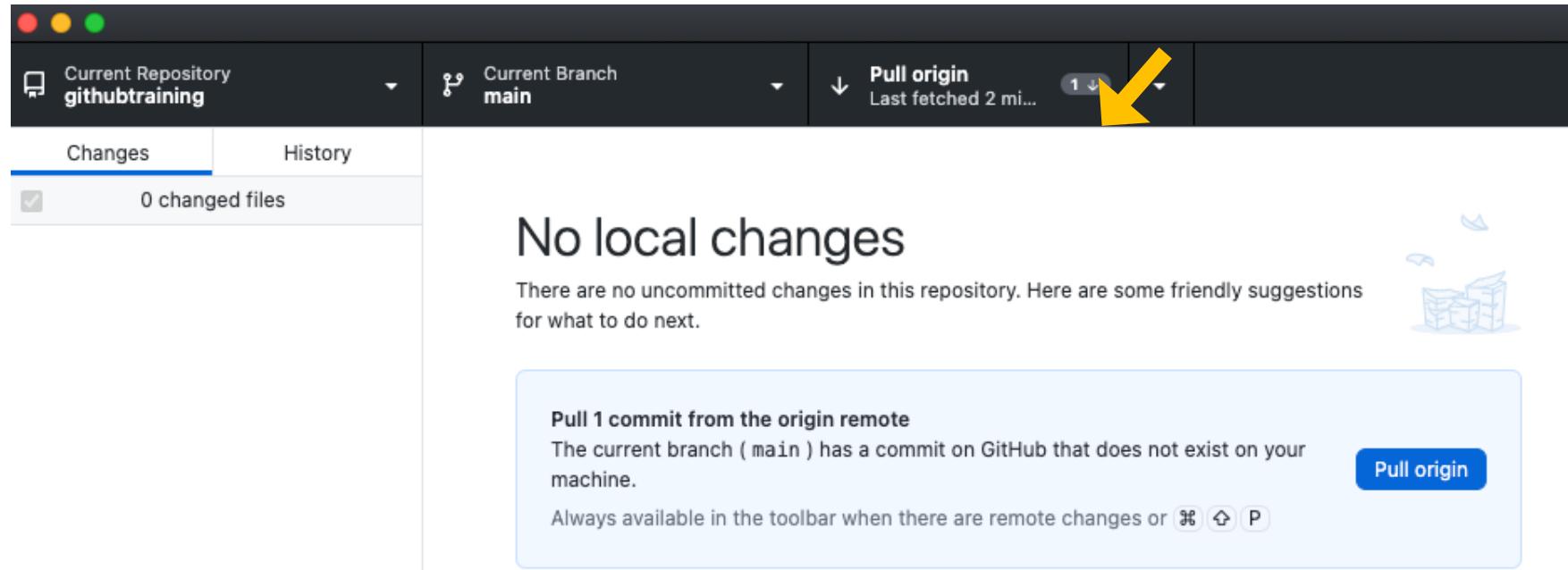
Open in RStudio

View the files of your repository in Finder

Repository menu or ⌘ ⌘ F

Show in Finder

Git Pull



After fetch and pull, check README.md file locally to view the changes

Revert to old version

Commit 1:
Create file.txt

Commit 2:
Delete file.txt

- How to recover file.txt?

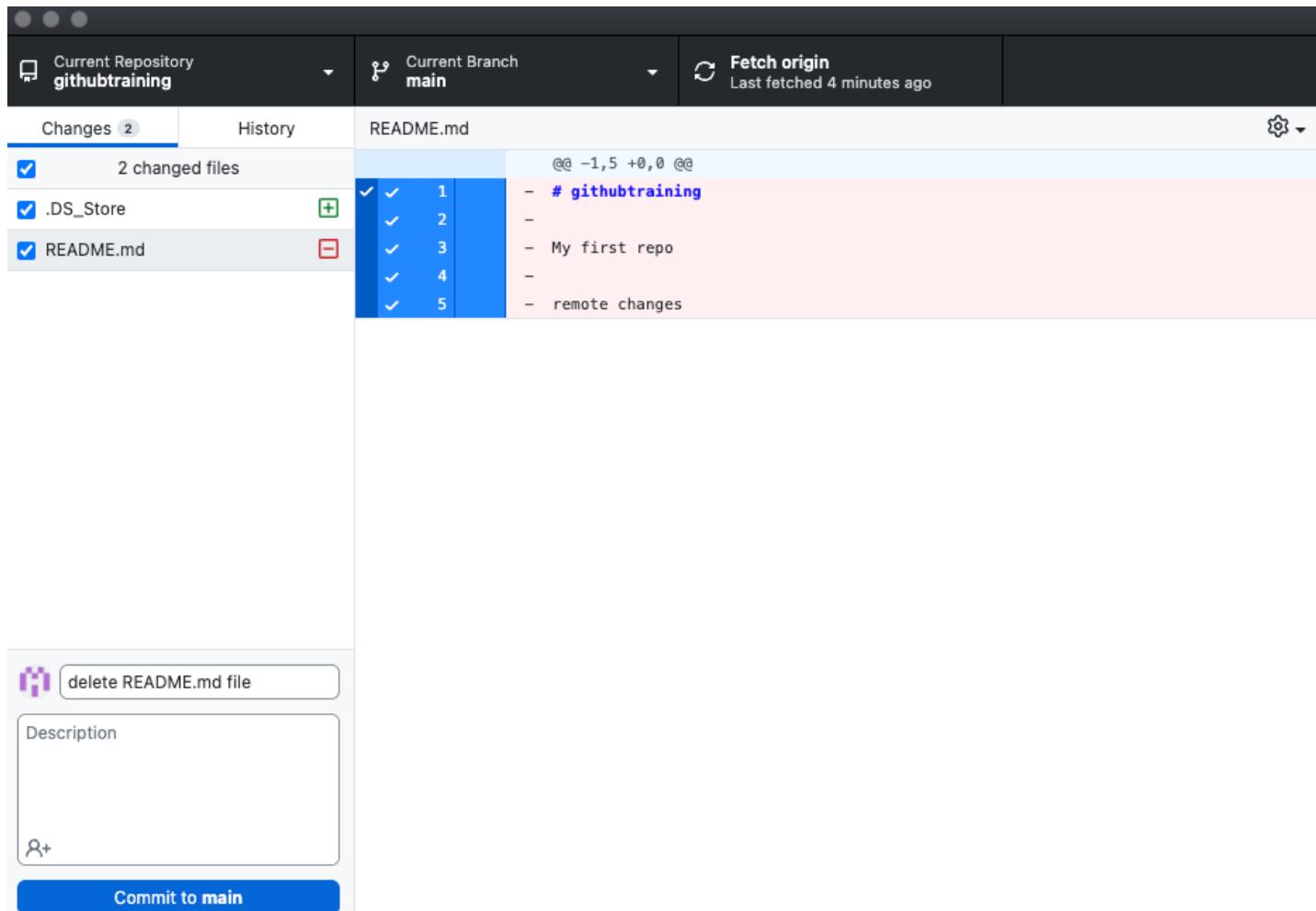
Commit 1:
Create file.txt

Commit 2:
Delete file.txt

A new commit

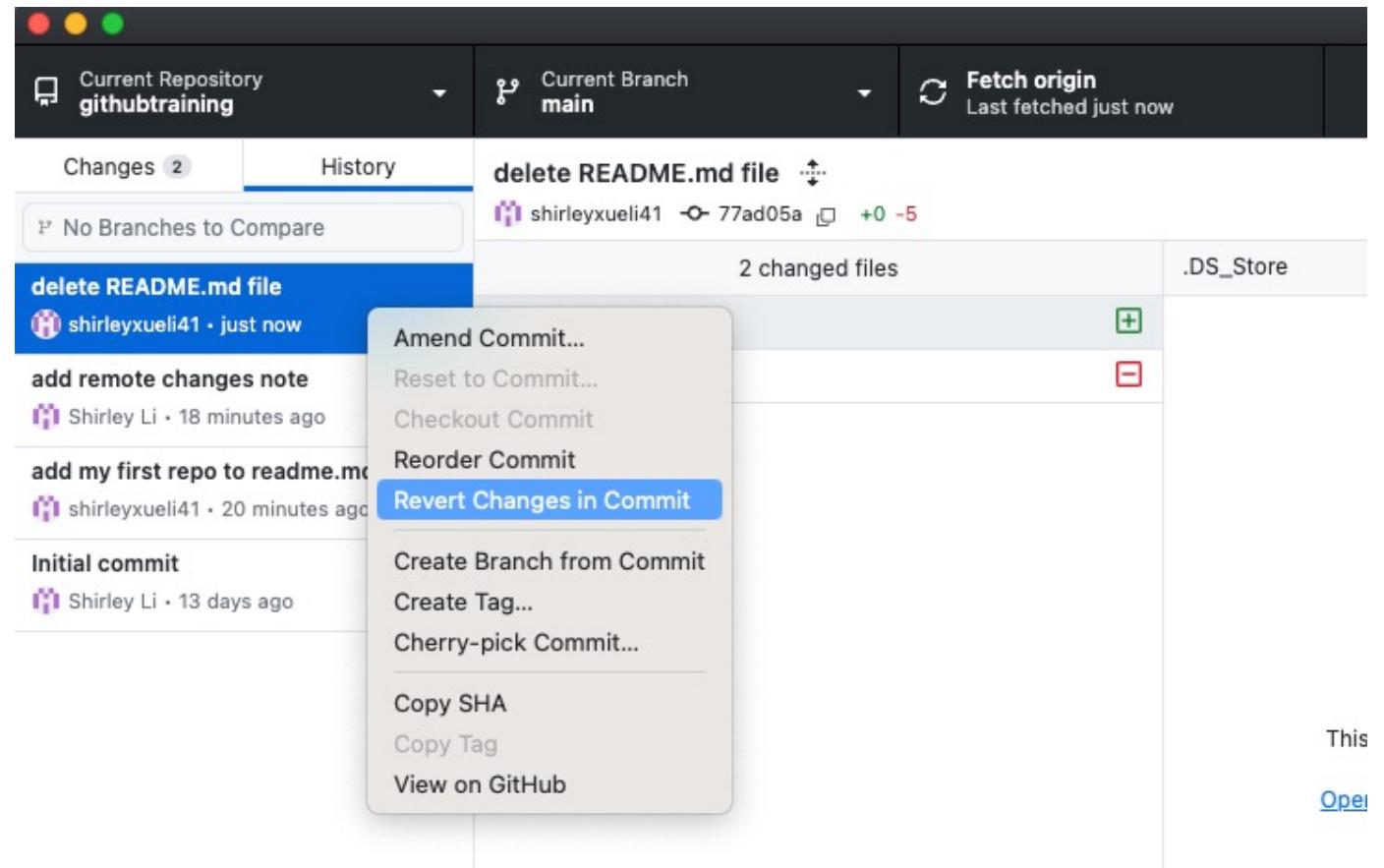
Commit 3:
Revert “Delete file.txt”

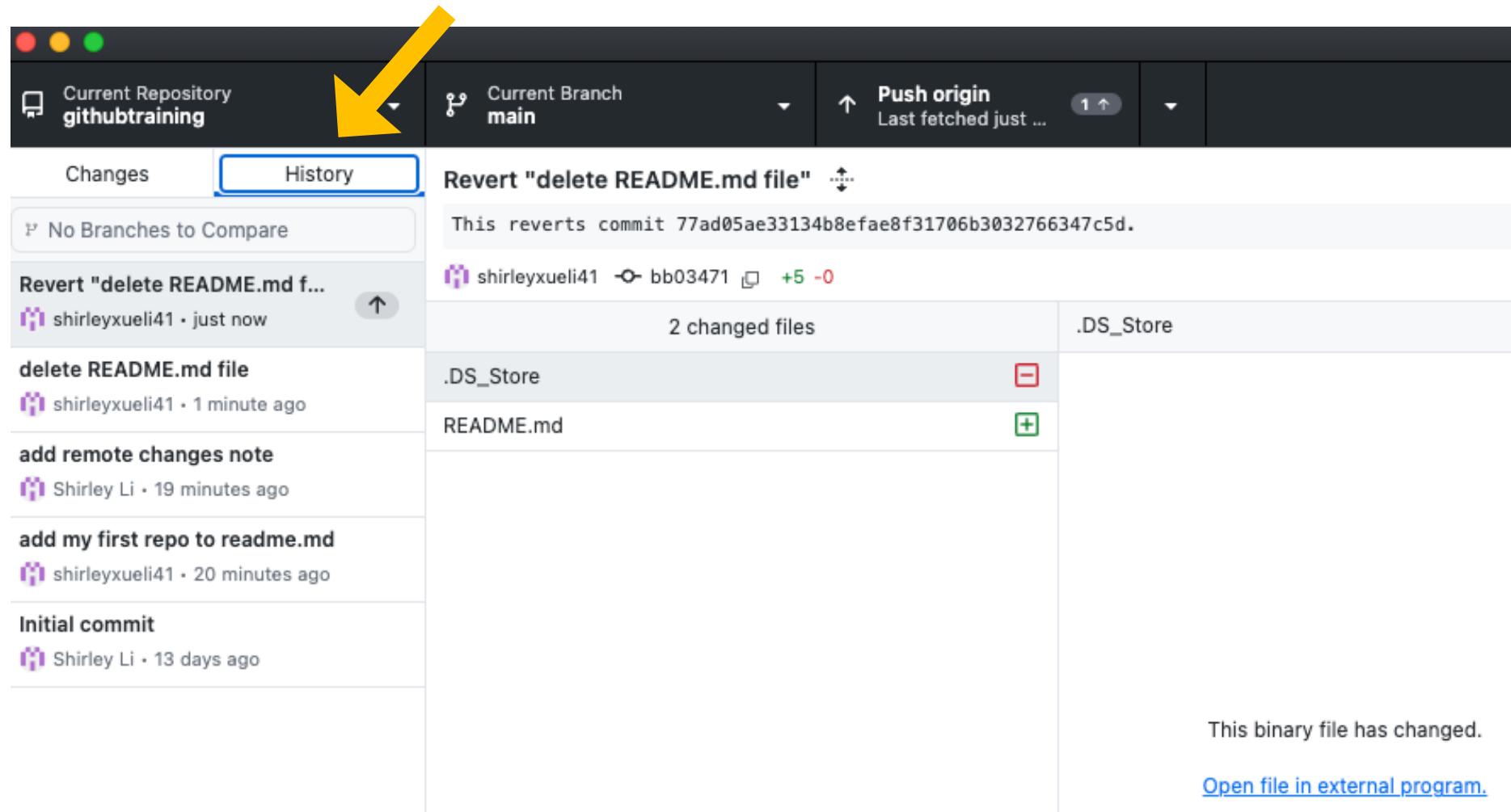
Delete README.md file locally and then revert



Revert changes in commit

This will create a new commit that reverses your changes while preserving the history





Git Fetch vs. Pull

Command	What It Does	Use Case
Git fetch	Downloads changes but doesn't merge.	Check remote updates before merging.
Git pull	Fetches and merges changes automatically.	Quickly update your branch.

Git vs. GitHub Desktop

- **Git: a command line tool**
 - Git provides more detailed control over all aspects of version control, suitable for complex development workflows.
- **GitHub Desktop: a graphical user interface (GUI)**
 - GitHub Desktop focuses on simplifying common Git operations, which may limit some advanced functions.

.gitignore

- A file that tells Git which files or directories to ignore.
- Helps keep unnecessary or sensitive files out of version control.
- Avoid committing large files
- Protect sensitive information

Common .gitignore examples

```
# Ignore all log files  
*.log
```

```
# Ignore environment files  
.env
```

```
# Ignore data files  
data/
```

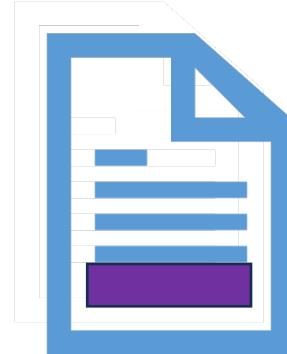
Place .gitignore in your repository's root directory

How conflicts are generated and how should we resolve them?

Conflicts

- In services like Box or Dropbox, conflicts arise when two team members simultaneously make changes to the same file.
- Similarly, in a GitHub repository, conflicts occur when two team members modify **the same part of a file concurrently**.

remote



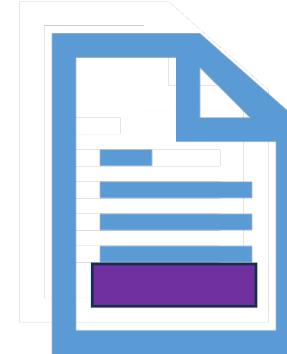
Your collaborator make changes remotely
or they make changes on their local copy
and commit and push back to GitHub.

local



You make changes locally

remote



local



**Commit and push will
cause conflicts**

remote



When two team members modify
different part of a file concurrently, no
conflicts will occur.

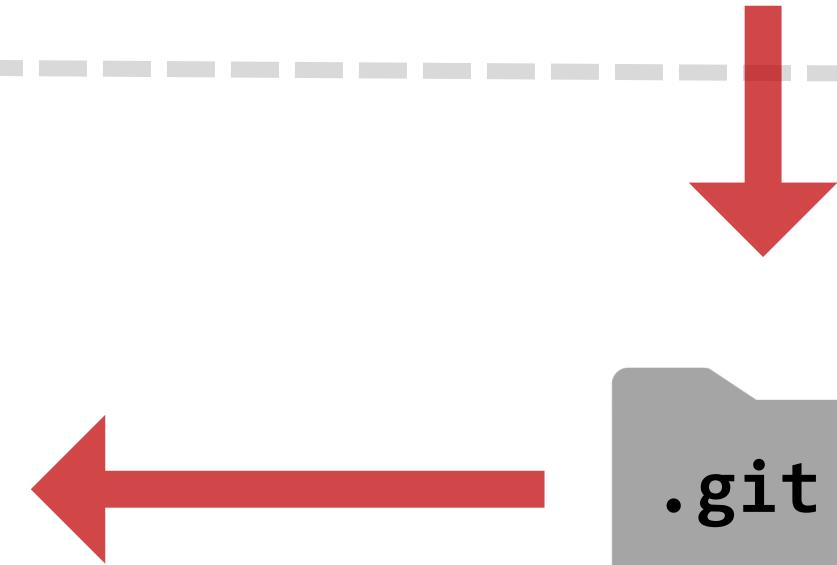
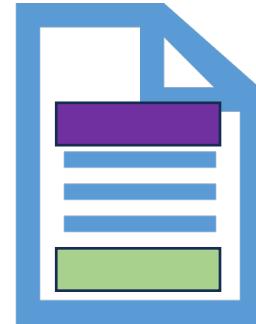
local



remote

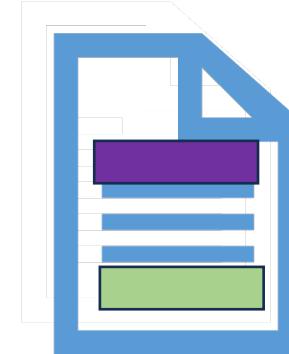


local



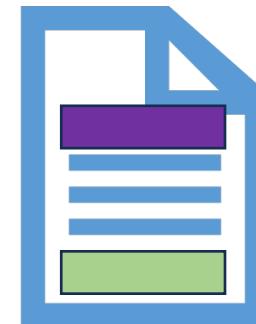
You will first pull to update your local copy with the latest changes

remote



then push to apply your changes to
the remote copy.

local



Best practices for GitHub Usage

Best practices

- Sync frequently to make your changes available to others. Frequently: Fetch& pull before making any local changes.
- Small, Frequent Commits.
- Push Regularly: Push your commits
- Branch Strategically: Use branches to manage features, bug fixes, and experiments separately from the main codebase.
- Communicate Regularly.
- Document Changes: Update README.
- Do not store large files in GitHub. It has limited storage.

Good commit

- Single Focus: Each commit should represent a single logical change.
- Small Size: Smaller commits are easier to understand and less likely to introduce complex merge conflicts.
- Always write good commit messages.

Good commit messages

- **Concise, specific.**
 - Good: “Added comments explaining job script parameters”
 - Bad: “Update of file.txt”, “Fixed it”
- **Detailed explanation including what, why, and how.**
- **Not too long, not too short. ~50 characters.**
- **References to related issue or pull requests: “See also #46”**

Example repositories

<https://github.com/orgs/fanzhanglab/repositories>

<https://github.com/tuftsdatalab/tuftsWorkshops/tree/main>

A summary of what we learned

- Learned the basics of Git and how it works
- Created a GitHub repository
- Used GitHub Desktop to manage repositories
- Explored common scenarios like ignoring files and resolving conflicts
- Discussed best practices for commits and repository organization

More about best practices

- <https://docs.github.ncsu.edu/github-best-practices/>
- <https://docs.github.com/en/repositories/creating-and-managing-repositories/best-practices-for-repositories>
- <https://github.com/orgs/community/discussions/39082>
- <https://dangitgit.com/>

Recommended tools



<https://code.visualstudio.com/>

VSCode server on Tufts OOD

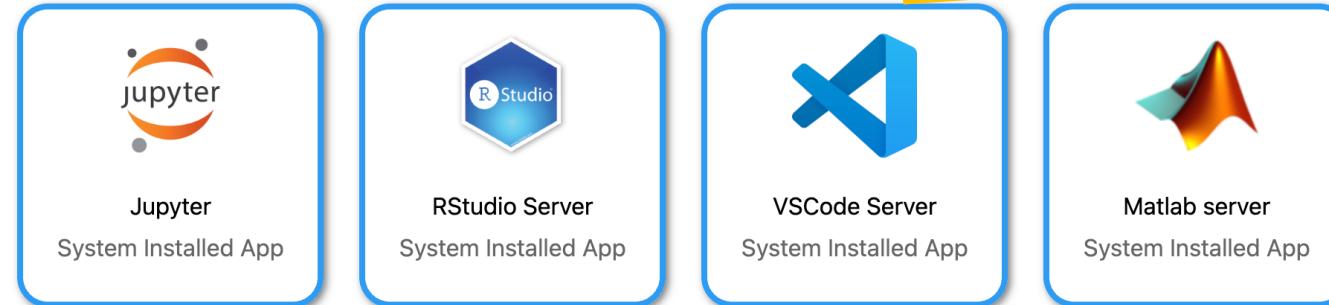


Tufts UNIVERSITY | High Performance Computing

Research Technology, TTS

Welcome to the Open OnDemand web portal to Tufts HPC cluster. It provides convenient access to many HPC applications.

Pinned Apps A featured subset of [all available apps](#)



Useful Materials

- [Git and GitHub for Beginners – Crash Course from freeCodeCamp.org](#)
- [Git cheatsheet](#)