

# Workshop materials

- Repository: <https://github.com/nuitrcs/CoDEx-Github-Gui-Workshop/>
- Consult request form: [bit.ly/rcdsconsult](http://bit.ly/rcdsconsult)
- RCDS listserv  
signup: <https://listserv.it.northwestern.edu/scripts/wa.exe?SUBED1=NUIT-research&A=1>

# Version Control Using GitHub

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Research Computing and Data Services

April 2<sup>nd</sup>, 2024

# Today we're going to cover:

- What is **version control**?
- What is **git**?
- Version control using **GitHub**
- **Collaboration** in GitHub



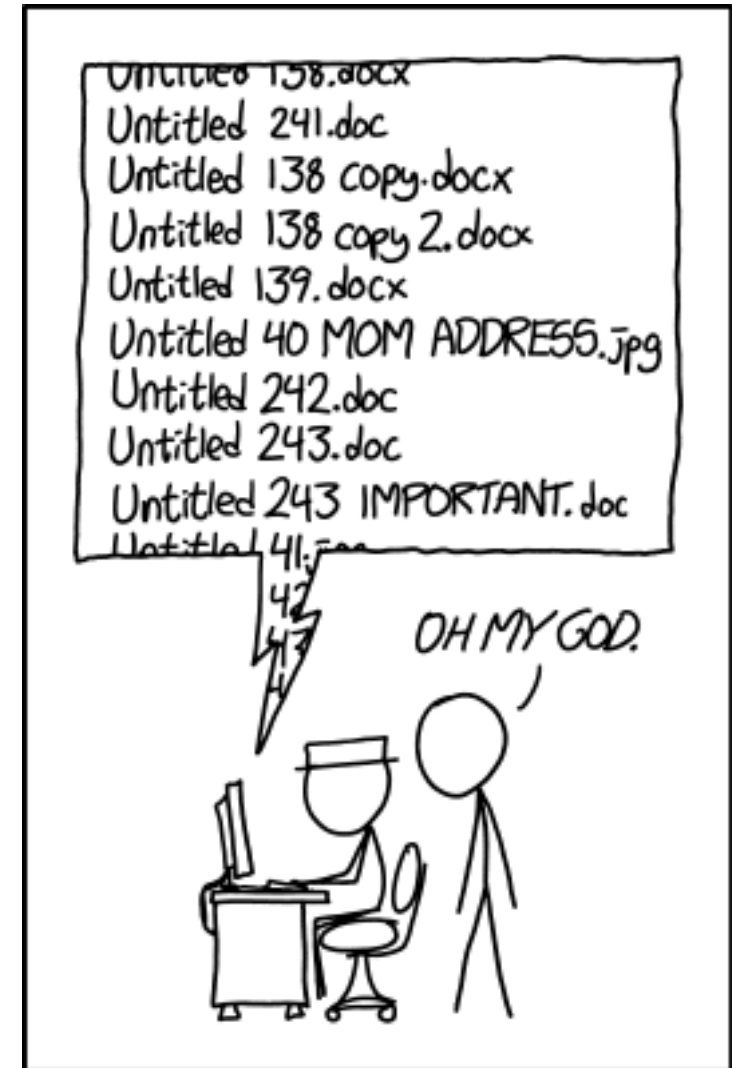
# How to get help after today's talk

- [bit.ly/rcdsconsult](https://bit.ly/rcdsconsult)
- We provide free consultations for programming, data science, and data management issues that are related to research

# Manual Version Control

## “Renaming files”

- Creates many files
- Relies on your ability to name files consistently
- Not designed for collaboration



PROTIP: NEVER LOOK IN SOMEONE ELSE'S DOCUMENTS FOLDER.

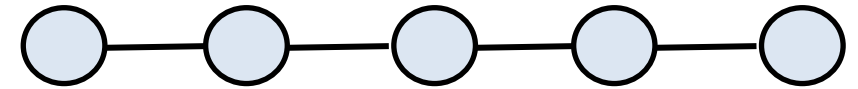
<https://xkcd.com/1459/>

# Version Control Systems

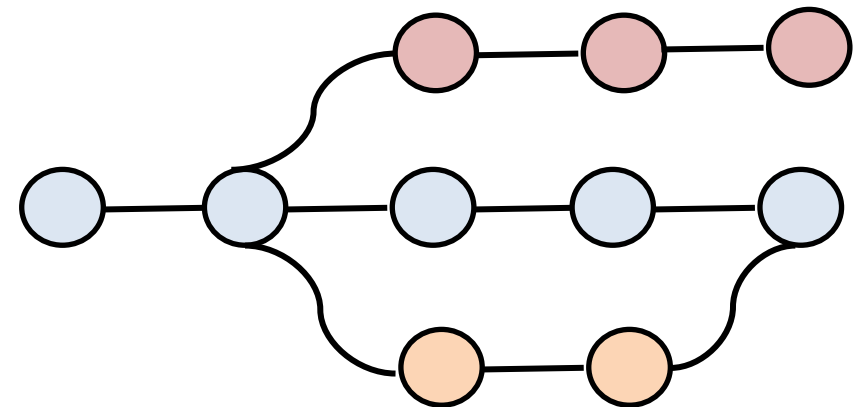
## “Unlimited undo”

- One file, many versions
- Records who made what change when
- Good for **collaboration**: identifies and helps resolve conflicting changes

Solo



Collaborative



# Today we're using **git**

- Built for large software development projects
- Can get complicated, but the basics are simple
- Free, open source
- Many online resources/tutorials



<https://xkcd.com/1597/>

# Ways to use Git

## Command line

```
C:\Windows\System32\cmd.exe

D:\GFG>git status
On branch master

Initial commit

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

    new file:   Basic Code/C++ Project.cbp
    new file:   Basic Code/README.md
    new file:   Basic Code/bin/Debug/C++ Project.exe
    new file:   Basic Code/data.in
    new file:   Basic Code/data.out
    new file:   Basic Code/main.cpp
    new file:   Basic Code/obj/Debug/main.o
    new file:   DS/stackPar.cpp
    new file:   DS/stackPar.exe
    new file:   DS/stackPar.o
    new file:   DS/stlSort.cpp
    new file:   DS/structcar.cpp
    new file:   DS/triplesum.cpp
    new file:   Debugging/Debugging.cbp
    new file:   Debugging/Debugging.depend
    new file:   Debugging/Debugging.layout
    new file:   Debugging/bin/Debug/Debugging.exe
    new file:   Debugging/bin/Release/Debugging.exe
    new file:   Debugging/main.cpp
    new file:   Debugging/obj/Debug/main.o
    new file:   Debugging/obj/Release/main.o
```

## Desktop Clients

The screenshot shows a desktop application window for a Git client. At the top, it displays the current branch as 'esc-pr' with a commit hash '#3972'. Below this, the commit message is 'Add event handler to dropdown component', attributed to 'iAmWillShepherd and Markus Olsson'. The main area shows a diff for the file 'app\src\ui\toolbar\dropdown.tsx', with line numbers 145-151 on the left and 145-151 on the right, indicating changes to the 'this.state' and 'isOpen()' methods.

## GitHub Website

### Edited the readme file

Changed the title to something better. Added a bulleted list

main

maglet committed 38 minutes ago Verified

Showing 1 changed file with 5 additions and 2 deletions.

7 README.md

@@ -1,3 +1,6 @@

1 - # github-gui-demo

2

3 - demo for adding and editing files in GitHub

1 + # De

2

3 + Thin

4 + \* ad



# Ways to use Git

## Command line

```
C:\Windows\System32\cmd.exe

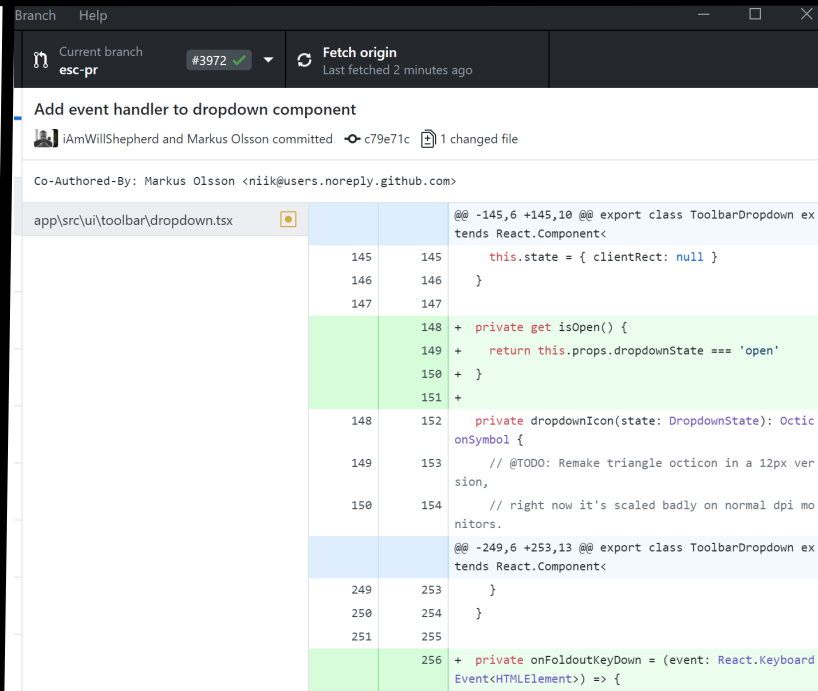
D:\GFG>git status
On branch master

Initial commit

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

    new file:   Basic Code/C++ Project.cbp
    new file:   Basic Code/README.md
    new file:   Basic Code/bin/Debug/C++ Project.exe
    new file:   Basic Code/data.in
    new file:   Basic Code/data.out
    new file:   Basic Code/main.cpp
    new file:   Basic Code/obj/Debug/main.o
    new file:   DS/stackPar.cpp
    new file:   DS/stackPar.exe
    new file:   DS/stackPar.o
    new file:   DS/stlSort.cpp
    new file:   DS/structcar.cpp
    new file:   DS/triplesum.cpp
    new file:   Debugging/Debugging.cbp
    new file:   Debugging/Debugging.depend
    new file:   Debugging/Debugging.layout
    new file:   Debugging/bin/Debug/Debugging.exe
    new file:   Debugging/bin/Release/Debugging.exe
    new file:   Debugging/main.cpp
    new file:   Debugging/obj/Debug/main.o
    new file:   Debugging/obj/Release/main.o
```

## Desktop Clients



## GitHub Website

### Edited the readme file

Changed the title to something better. Added a bulleted list

main

maglet committed 38 minutes ago Verified

Showing 1 changed file with 5 additions and 2 deletions.

7 README.md

@@ -1,3 +1,6 @@

1 - # github-gui-demo

2

3 - demo for adding and editing files in GitHub

1 + # De

2

3 + Thin

4 + \* ad

# GitHub is a place to

- Store your work remotely
  - Free public repositories
  - Unlimited private repositories with Northwestern GitHub Org
- Edit files in the web browser
- Collaborate



<https://services.northwestern.edu/TDClient/30/Portal/Requests/ServiceDet?ID=55>

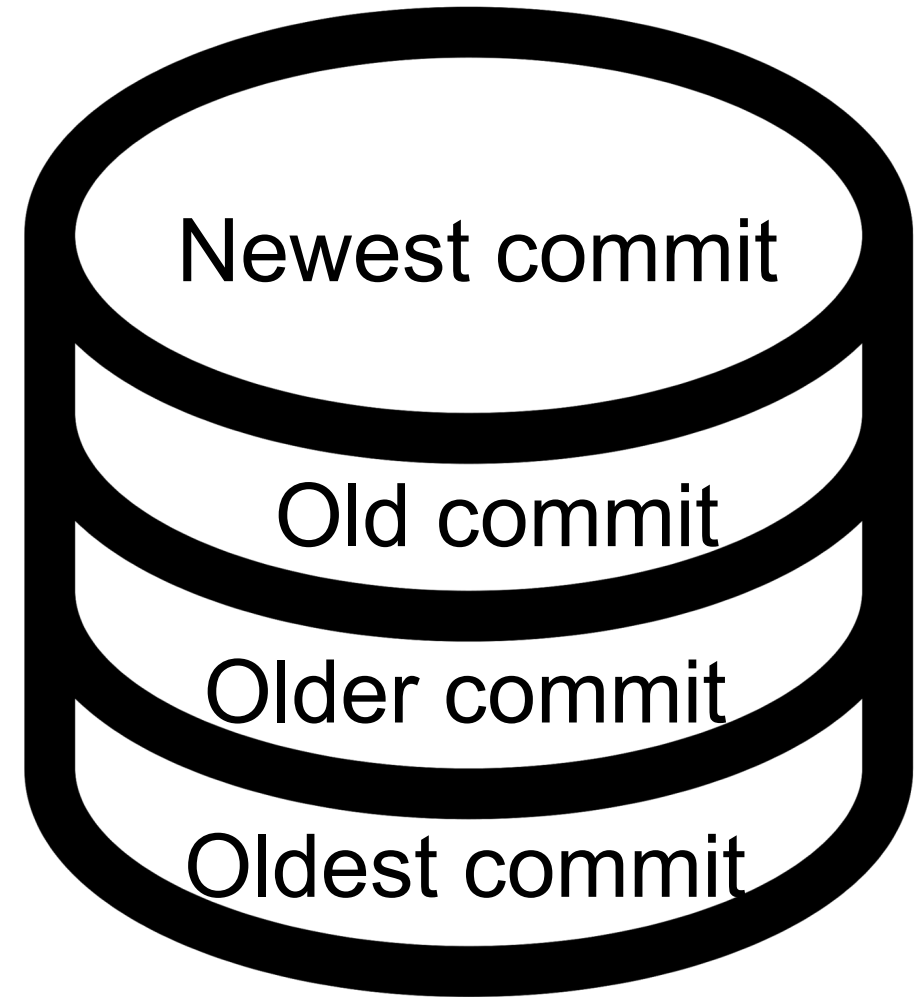
# GitHub best practices

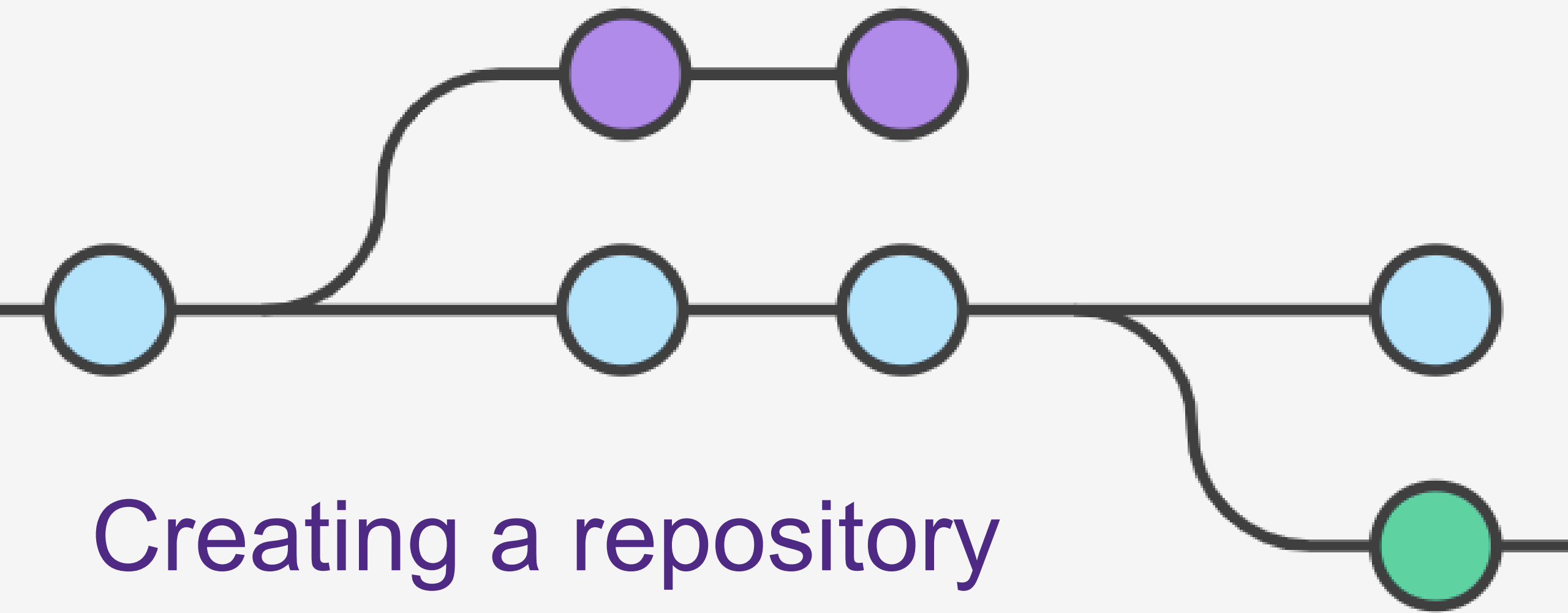
- GitHub is for **code and documentation**, not data
- **No protected or personal data on GitHub**, even in a private repo
- **Don't store credentials in your code**. Store private keys or tokens a separate file outside of your repository
- **Add a personal email to your GitHub account**, so you can use it when you leave Northwestern



# GitHub jargon

- **Commit** - save your changes to the files in the repository – each has a unique id
- **Repository** (“repo”) - a running log of changes that were committed - all you see is the most recent version
- **History** - a list of commits
- **Diff** - compare what has changed between versions line by line

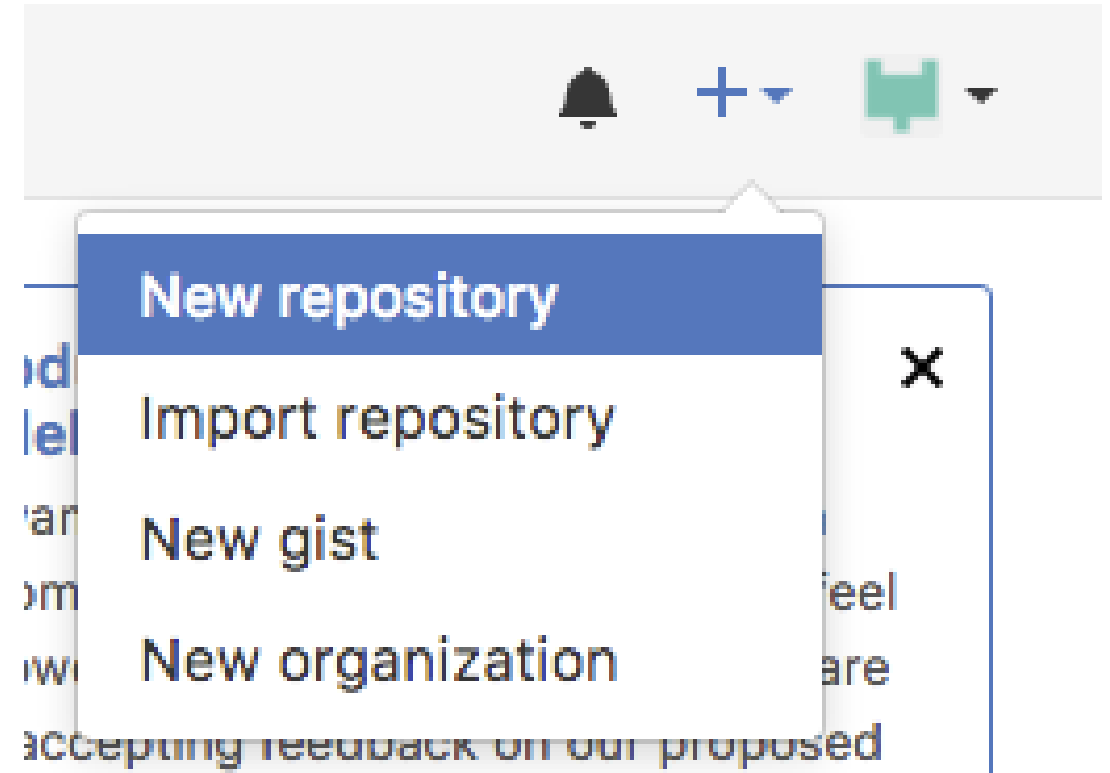




Creating a repository

# Make an empty GitHub repo

- Go to <http://github.com>
- Click the plus sign on the upper right hand side of the screen
- Select New repository



# Make an empty repository


Name your repository

Provide a description

Keep it public

Initialize with a README


Create a repo


Owner:  maglet ▾ /

Repository name \*


Great repository names are short and memorable. Need inspiration? How about [miniature-octo-broccoli](#)?

Description (optional)

☒  **Public**  
Anyone can see this repository. You choose who can commit.

☐  **Private**  
You choose who can see and commit to this repository.

☒ **Initialize this repository with a README**  
This will let you immediately clone the repository to your computer. Skip this step if you're importing an existing repository.

Add .gitignore: **None** ▾ | Add a license: **None** ▾ 

**Create repository**

# What you should see

The screenshot shows a GitHub repository page for 'maglet / github-gui-demo'. The repository is public. At the top, there are buttons for 'Pin', 'Unwatch' (1), 'Fork' (0), and 'Star' (0). Below these are tabs for 'Code', 'Issues', 'Pull requests', 'Actions', 'Projects', 'Wiki', 'Security', and a menu icon. The 'Code' tab is selected. Below the tabs, there are buttons for 'main', 'Go to file', 'Add file', and 'Code'. The 'Code' button is highlighted in green. To the right of these buttons is the 'About' section, which includes a gear icon. The 'About' section contains the text 'demo for adding and editing files in GitHub' and statistics: '0 stars', '1 watching', and '0 forks'. Below the 'About' section, there is a list of files. The first file is 'README.md', which has been updated by 'maglet' 'now'. The 'Files' tab is selected. Below the file list, there is a 'Rendered README doc' section. This section shows the rendered content of the README file, which includes the title 'github-gui-demo' and the subtitle 'demo for adding and editing files in GitHub'. The 'Rendered README doc' section is highlighted with a red border. The 'Files' tab and the file list are also highlighted with a red border.

maglet / [github-gui-demo](#) Public

Pin Unwatch 1 Fork 0 Star 0

<> Code Issues Pull requests Actions Projects Wiki Security ...

main Go to file Add file <> Code About

maglet Update README.md ... **Files** now 7

README... Update README.md now

README.md **Rendered README doc**

## github-gui-demo

demo for adding and editing files in GitHub

Readme  
0 stars  
1 watching  
0 forks



# What you should see

The screenshot shows a GitHub repository page for 'maglet/github-gui-demo'. The repository is public. The main navigation bar includes 'Code', 'Issues', 'Pull requests', 'Actions', 'Projects', 'Wiki', and 'Security'. The repository name 'github-gui-demo' is highlighted with a red box. Below the navigation bar, there are buttons for 'main', 'Go to file', 'Add file', and 'Code'. The repository description is 'demo for adding and editing files in GitHub'. The repository statistics show 0 stars, 1 watching, and 0 forks. The repository files list shows 'README.md' with a 'Text' file type. The repository README content is displayed below, with the repository name 'github-gui-demo' highlighted by a red box.

maglet / **github-gui-demo** Public

Pin Unwatch 1 Fork 0 Star 0

<> Code Issues Pull requests Actions Projects Wiki Security ...

main Go to file Add file <> Code About

maglet Update README.md ... now 7

README.... Update README.md Text now

README.md

**github-gui-demo**

demo for adding and editing files in GitHub

demo for adding and editing files in GitHub

Readme 0 stars 1 watching 0 forks

Repo name

# What you should see

The screenshot shows a GitHub repository page for 'maglet / github-gui-demo'. The repository is public. At the top, there are buttons for 'Pin', 'Unwatch' (1), 'Fork' (0), and 'Star' (0). Below these are tabs for 'Code', 'Issues', 'Pull requests', 'Actions', 'Projects', 'Wiki', 'Security', and a menu icon. The 'Code' tab is selected. Below the tabs, there are buttons for 'main', 'Go to file', 'Add file', and 'Code'. The 'Code' button is highlighted in green. To the right of these buttons is the 'About' section, which is highlighted with a red box. The 'About' section contains the text 'demo for adding and editing files in GitHub'. Below the 'About' section, there are statistics: 'Readme', '0 stars', '1 watching', and '0 forks'. The 'Repo description' is also highlighted with a red box. The repository name 'github-gui-demo' is displayed in a large font. Below the name, the description 'demo for adding and editing files in GitHub' is shown, also highlighted with a red box. The repository was updated 'now' (7 minutes ago) by 'maglet'.

maglet / [github-gui-demo](#) Public

Pin Unwatch 1 Fork 0 Star 0

<> Code Issues Pull requests Actions Projects Wiki Security ...

main Go to file Add file <> Code About

maglet Update README.md ... now 7

README... Update README.md now

README.md

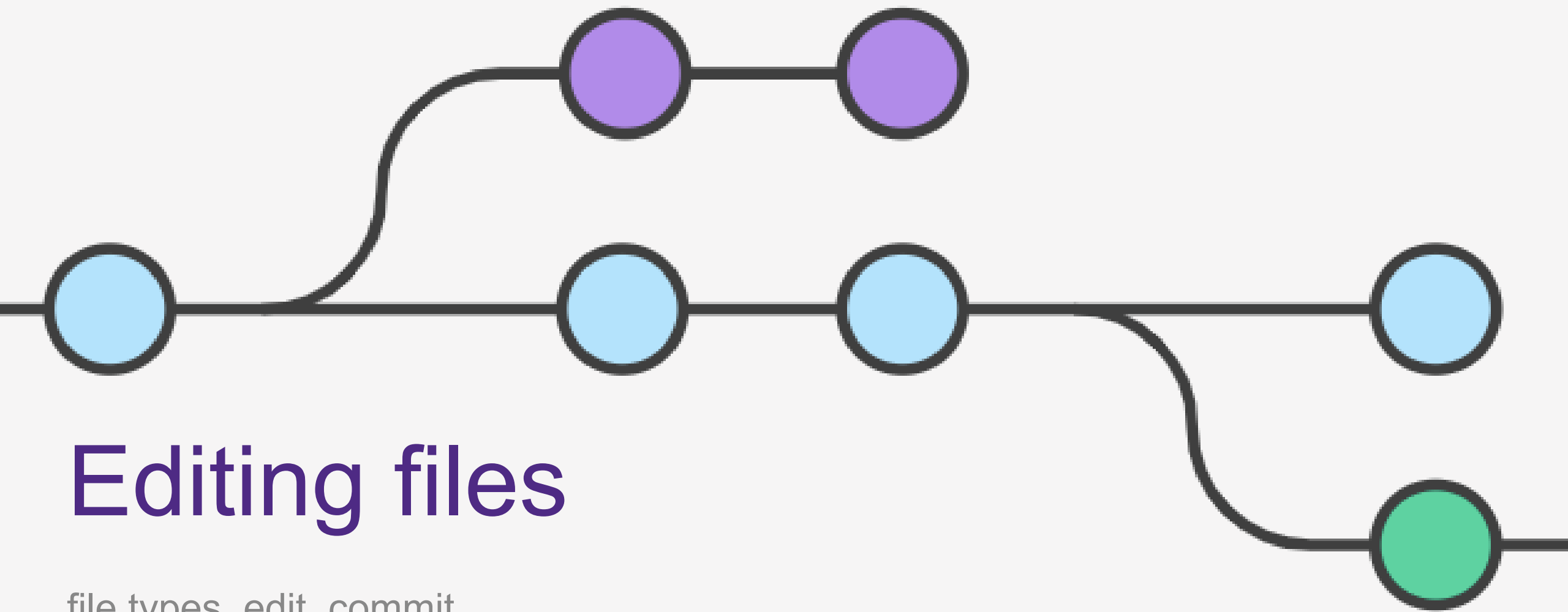
**github-gui-demo**

demo for adding and editing files in GitHub

demo for adding and editing files in GitHub

Readme 0 stars 1 watching 0 forks

Repo description



# Editing files

file types, edit, commit

# Types of files git works best with

## **“Good” formats (text based)**

- Documents (.txt, .tex, .rtf, .md)
- Tabular Data (.csv)
- Source code (.R, .py, .c, .sh)

## **“Bad” formats (binary files)**

- Documents (.docx, .pdf, .ppt)
- Excel spreadsheets (.xlsx)
- Media (.jpg, .mp3, .mp4)
- Databases (.mdb, .sqlite)


<https://www.nayuki.io/page/what-are-binary-and-text-files>


# Edit the README file


The screenshot shows the GitHub interface for the repository 'maglet / github-gui-demo'. The repository is public. The 'Code' tab is selected. The main branch is 'main'. A recent commit by 'maglet' is shown, titled 'changed readme again', with a timestamp of 'now' and a clock icon indicating it was 5 minutes ago. Below the commit list, the README file is displayed. The file name 'README.md' is at the top left. To the right of the file name, there is an 'Edit' button with a pencil icon, which is highlighted by a red square. The README content includes the title 'GitHub GUI demo' and a list of tasks to do in the GitHub GUI:


- Edit files
- Add files
- Look at changes


# File editor


 **maglet / github-gui-demo** Public


 Pin


 Unwatch 1 ▾


 Fork 0 ▾


 Star 0 ▾


 **Code**


 Issues


 Pull requests

 Actions

 Projects

 Wiki

 Security


 Insights


...

**Change name**

github-gui-demo /  in main

Cancel changes

 **Edit file**

 Preview

Spaces ▾


2 ▾

Soft wrap ▾

```
1 # github-gui-demo
2
3 demo for adding and editing files in GitHub
4
```

**Edit text**

# Commit Changes




## Commit changes

Edited the readme file

Short message about the edits

Changed the title to something better. Added a bulleted list

More details if necessary



tobin.magle@northwestern.edu

Choose which email address to associate with this commit

☒ Commit directly to the `main` branch.

☐ Create a **new branch** for this commit and start a pull request. [Learn more about pull requests.](#)

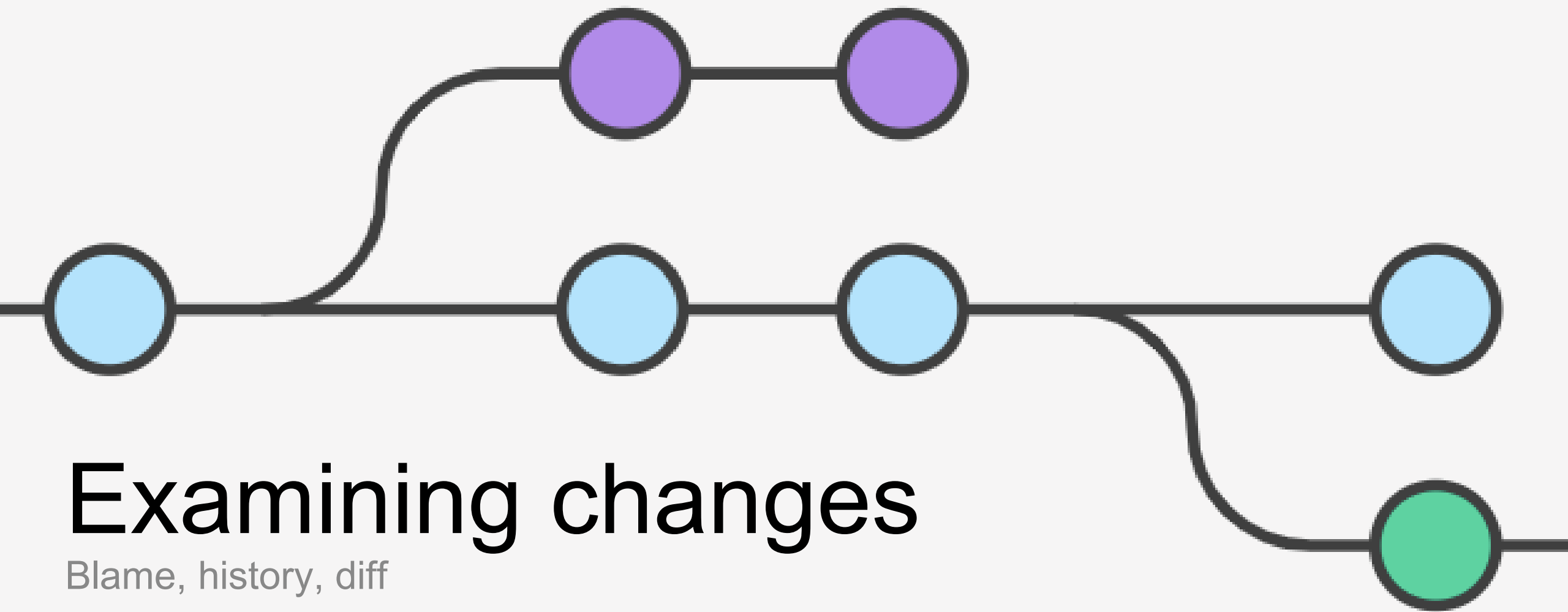
Commit changes

Cancel

Who made the change?

Change the file directly

Create an alternate version that can be combined later (like track changes)



# Examining changes

Blame, history, diff





# View File History

See all commits that have been made

**Beta** Try the new code view

main ▾ github-gui-demo / README.md Go to file ...

 **maglet** Edited the readme file ... Latest commit e1b19cd 33 minutes ago  **History**

1 contributor

# View File History

History for [github-gui-demo](#) / README.md

Commits on May 8, 2023

Added collab things to do to readme



aGitHasNoName committed 10 hours ago

Verified



ec63244



Commits on Apr 21, 2023

Edited the readme file ...



maglet committed 2 weeks ago

Verified



e1b19cd



Update README.md



maglet committed 2 weeks ago

Verified



20225f0



Update README.md



maglet committed 2 weeks ago

Verified



596c419



changed readme again



maglet committed 2 weeks ago

Verified



dcd9cb8



Update README.md ...



maglet committed 2 weeks ago

Verified



c42588e



# View File History

See who made the commit, when, and the commit message

History for [github-gui-demo](#) / README.md

Commits on Apr 21, 2023

	Commit message	Commit ID
who	 maglet committed 34 minutes ago	<div>Edited the readme file ...</div> <div>Verified</div> <div> <a href="#">e1b19cd</a>  </div>

# diff


See what changed in the file line by line

Edited the readme file



Changed the title to something better. Added a bulleted list

[Browse files](#)

main

 **maglet** committed 38 minutes ago Verified 1 parent [20225f0](#) commit [e1b19cd](#)

Showing 1 changed file with 5 additions and 2 deletions. Split Unified

7  README.md 


...	@@ -1,3 +1,6 @@	
1	- # github-gui-demo	1 + # Demo repository for using the GitHub GUI
2		2
3	- demo for adding and editing files in GitHub	3 + Things to do
		4 + * add a file
		5 + * edit a file
		6 + * look at what has changed

Red = deleted


Green = added

# View Repo History

From the main page

 **github-gui-demo** PublicPin Unwatch 1

main 1 branch 0 tagsGo to file Add file <> Code

 **maglet** Rename README2.md to README.md ... 4664b1c 5 minutes ago



🕒 27 commits







data	Create blank.csv	6 months ago
README.md	Rename README2.md to README.md	5 minutes ago
github-gui.pdf	uploading post workshop slide updates	5 months ago
script.R	Merge branch 'main' into main	5 months ago

README.md

## Demo repository for using the GitHub GUI


# View Repo History


maglet / github-gui-demo



[Code](#) [Issues](#) [Pull requests](#) [Actions](#) [Projects](#) [Wiki](#) [Security](#) [...](#)

## Commits


main





Commits on Oct 13, 2023

Rename README2.md to README.md ...

Verified


4664b1c





maglet committed 8 minutes ago


Rename README.md to README2.md ...

Verified

57a4f79




maglet committed 8 minutes ago





Commits on May 11, 2023


uploading post workshop slide updates

Verified

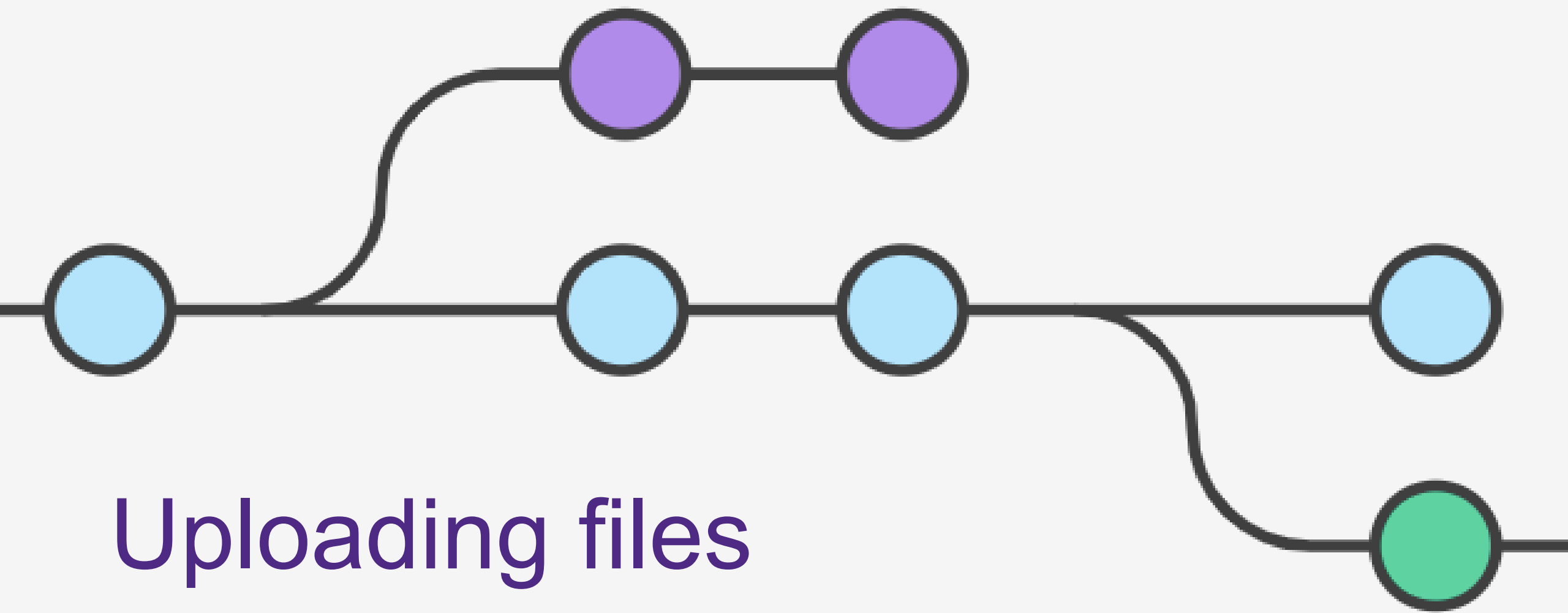
572441b



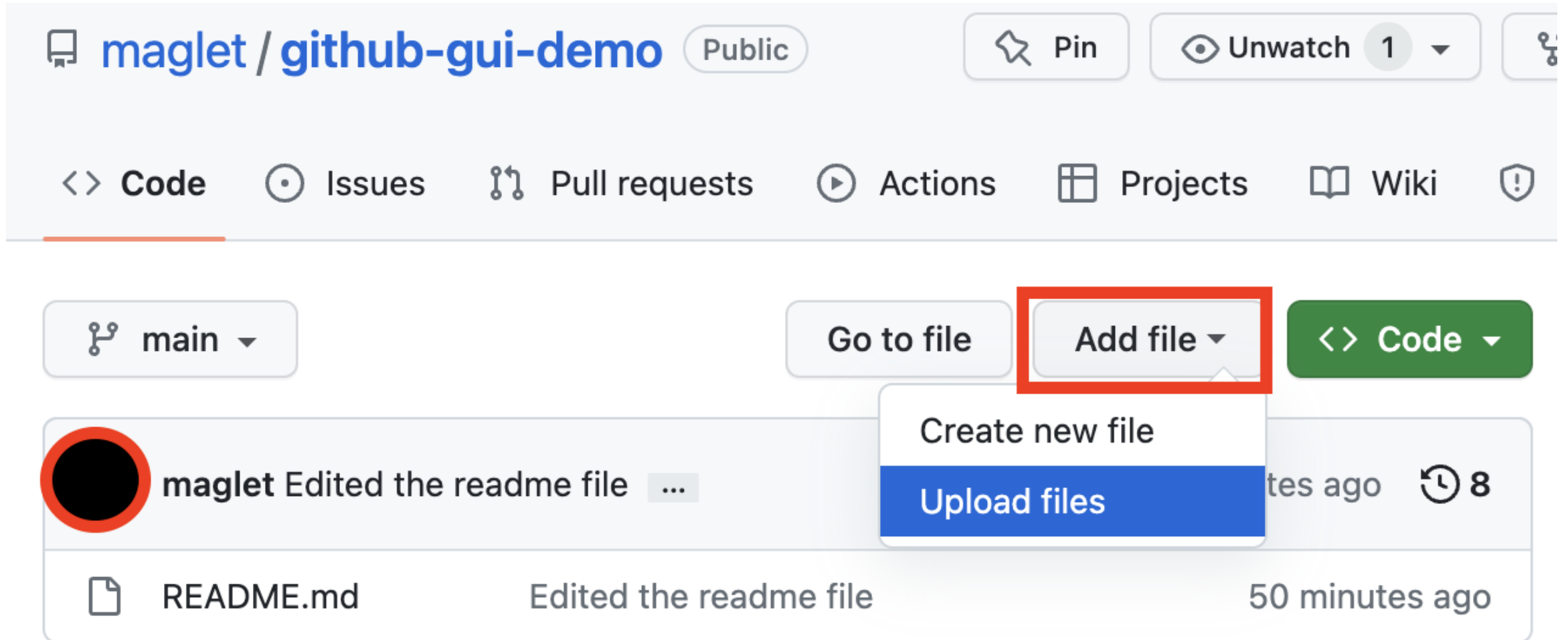
maglet committed on May 11



Commits on May 8, 2023



# Add a file from your computer



The screenshot shows the GitHub interface for the repository 'maglet / github-gui-demo'. The repository is public. The navigation bar includes links for Code, Issues, Pull requests, Actions, Projects, Wiki, and a shield icon. Below the navigation bar, there are buttons for 'main', 'Go to file', 'Add file', and 'Code'. The 'Add file' button is highlighted with a red box, and its dropdown menu is open, showing options for 'Create new file' and 'Upload files'. Below the dropdown menu, there is a commit history section showing a commit by 'maglet' titled 'Edited the readme file' with a timestamp of '50 minutes ago'.

maglet / github-gui-demo Public

Pin Unwatch 1

<> Code Issues Pull requests Actions Projects Wiki

main Go to file Add file Code

Create new file

Upload files

maglet Edited the readme file ...

tes ago 8

README.md Edited the readme file 50 minutes ago



# Choose files

github-gui-demo /



**Drag files here to add them to your repository**

Or [choose your files](#)

# Commit



## Commit changes

Added an R script


Add an optional extended description...

- ☒ Commit directly to the `main` branch.
- ☐ Create a **new branch** for this commit and start a pull request. [Learn more about pull requests.](#)

Commit changes

Cancel

# File was added

 main ▾

Go to file

Add file ▾

 Code ▾



**maglet** Added an R script ...

now  9



README.md

Edited the readme file

1 hour ago



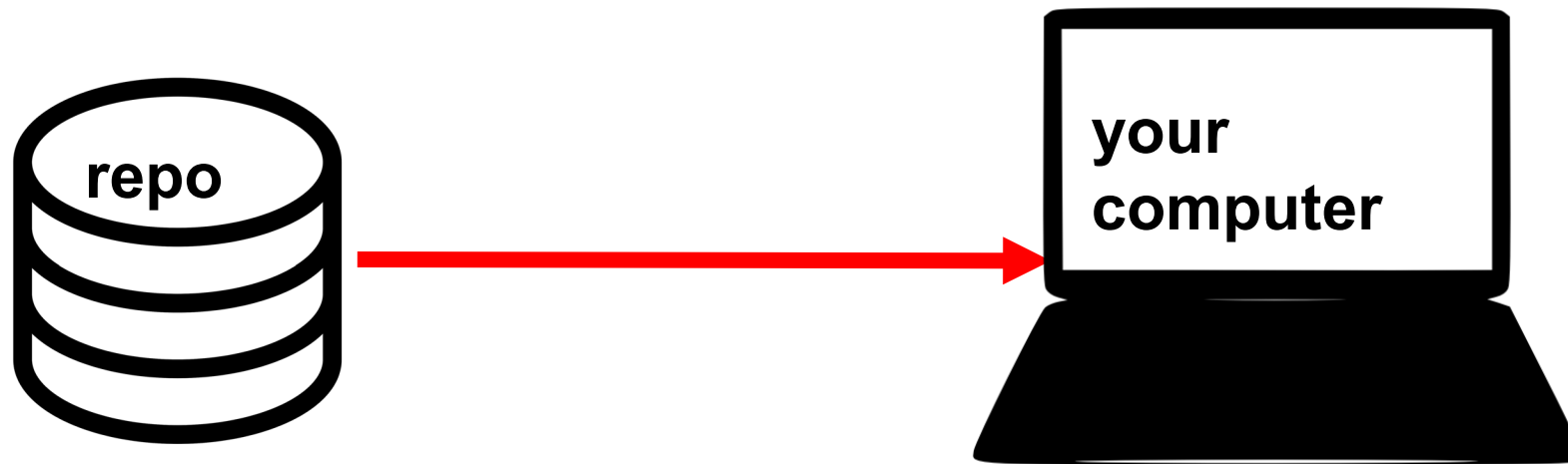
script.R

Added an R script

now

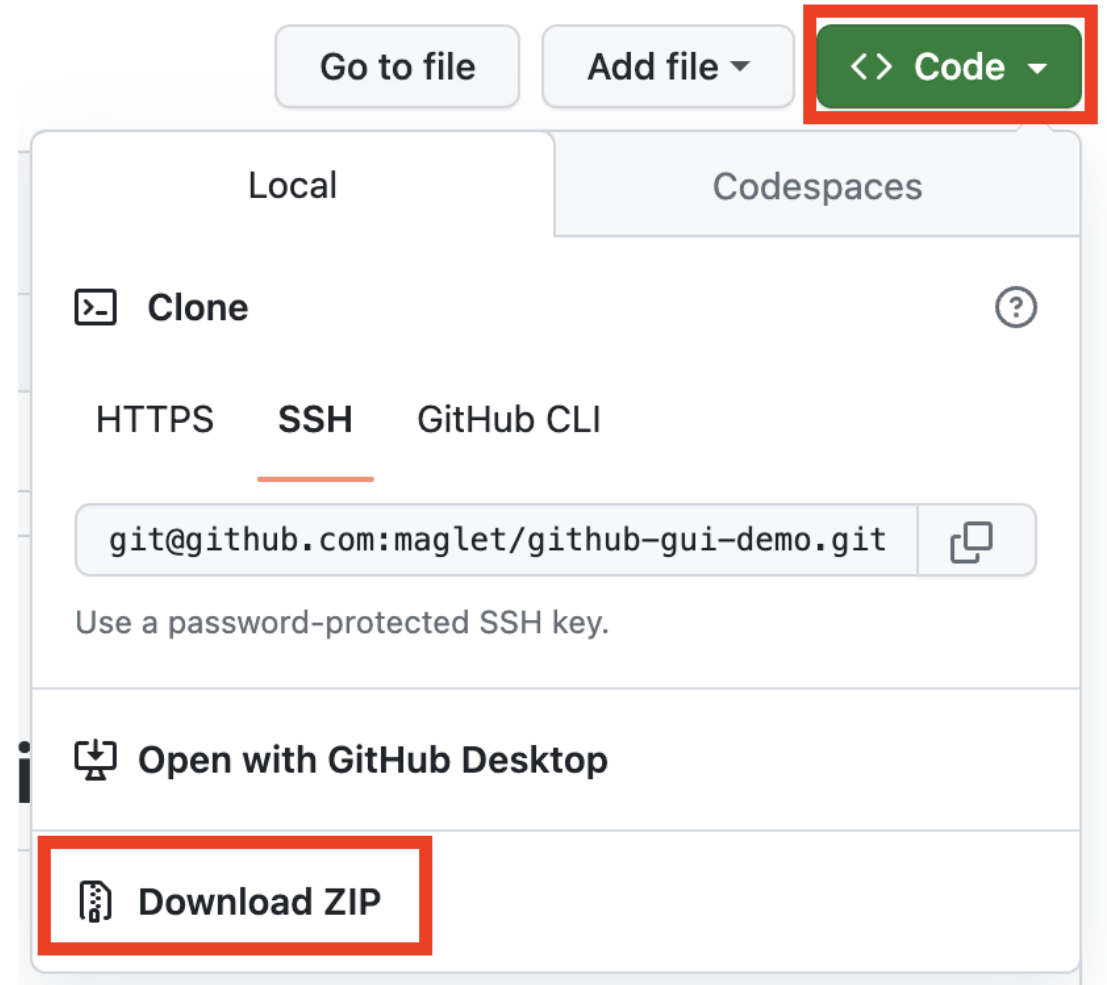
# Running code

- **Copy and paste** - take the lines of code you need to run locally
- **Download** - download most recent version of files
- **Clone** - downloads the whole repository to do version control on your computer



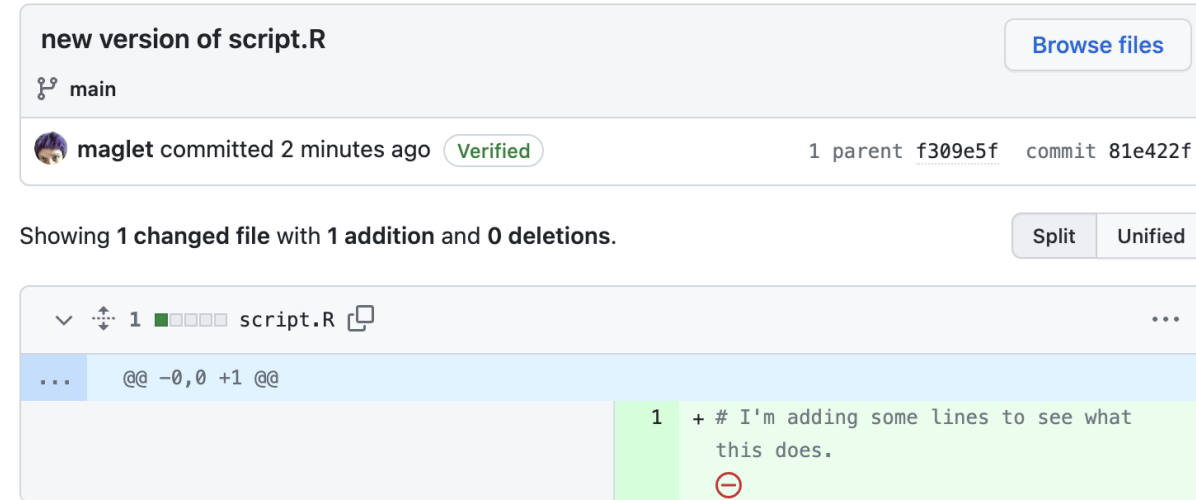
# Download

- Click the green code button
- Click download ZIP
- Extract files using a program on your computer
- Open your files



# Save changes

- Add file > upload file
- Select the file you changed
- Commit with a message
- File is updated





Collaboration through  
Fork and Pull Request

# SO MUCH JARGON

## with Git



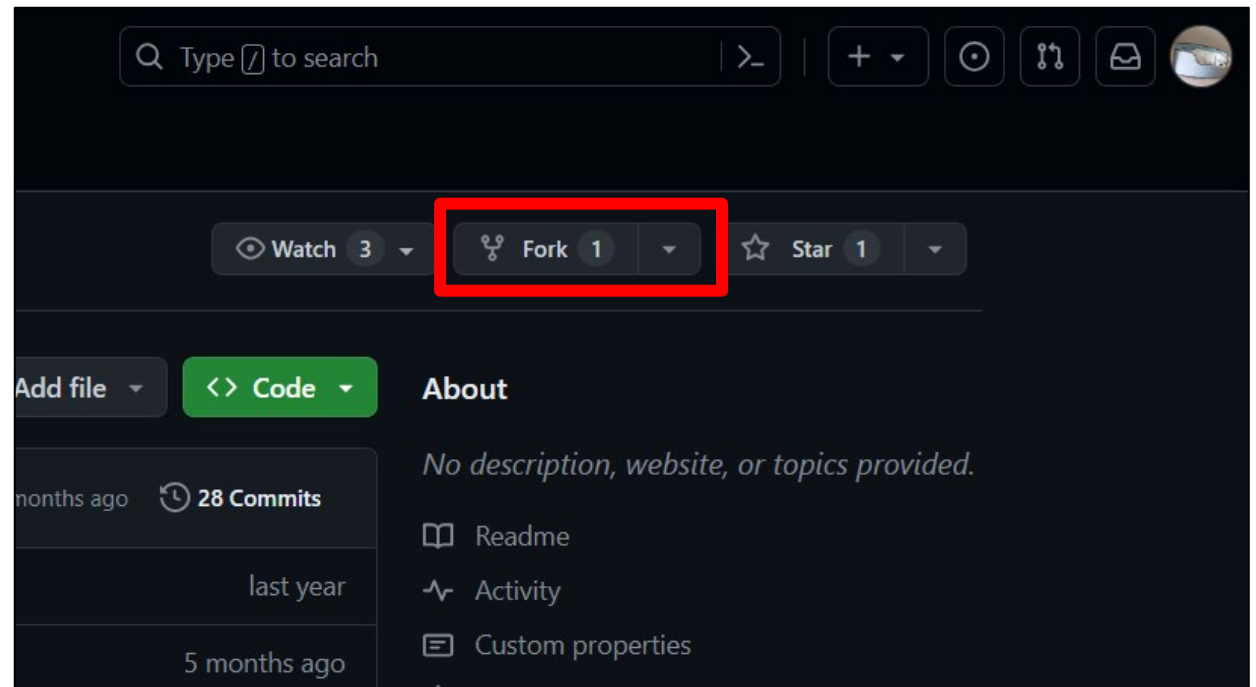
# STEP ONE: CREATE A FORK

Link : <https://github.com/nuitrcs/CoDEX-Github-Gui-Workshop>

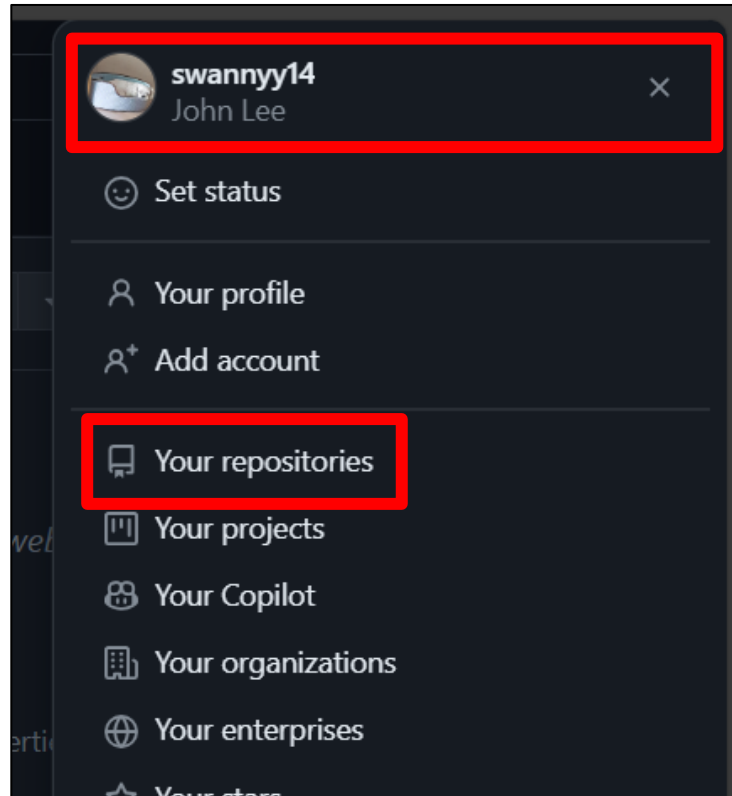
**Create a Fork from this workshop's repo**

- this creates a copy of the repo under your own github account (that's all a fork is)

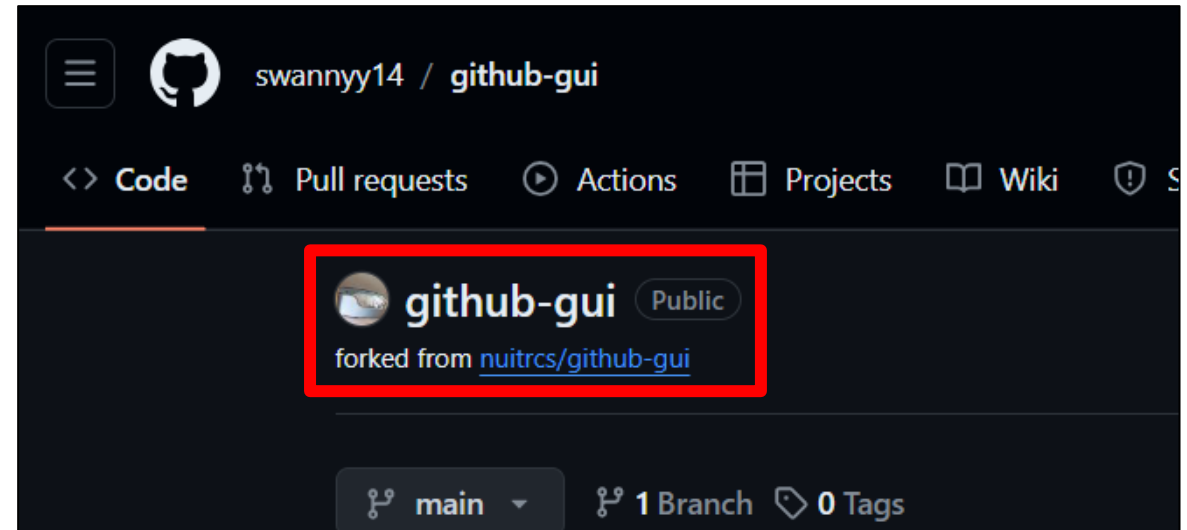
You can now play around the repository as if it was yours without having to worry about affecting the original code.



# STEP TWO: OPEN your version of the repo



Click on your account in the top right corner of your screen. Then click on Your repositories. Choose the forked repo.

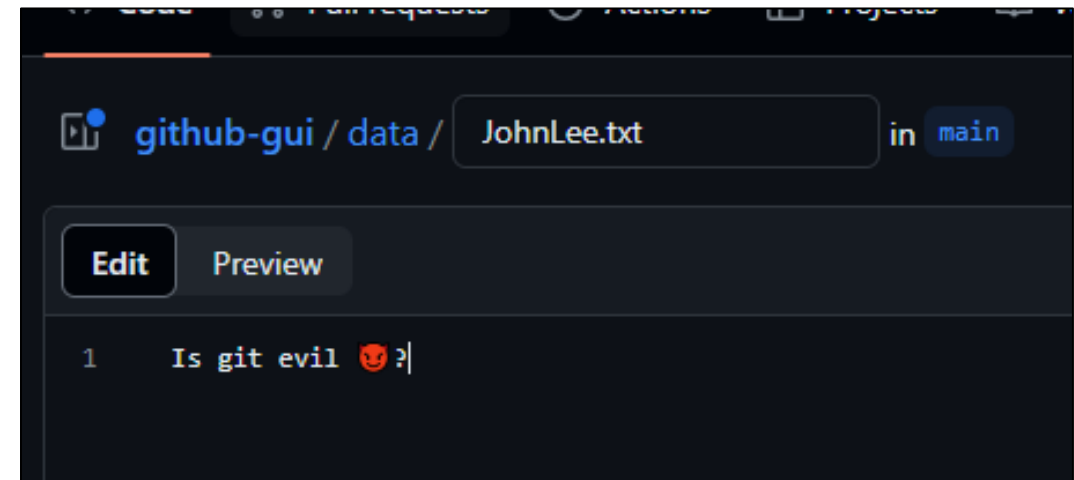
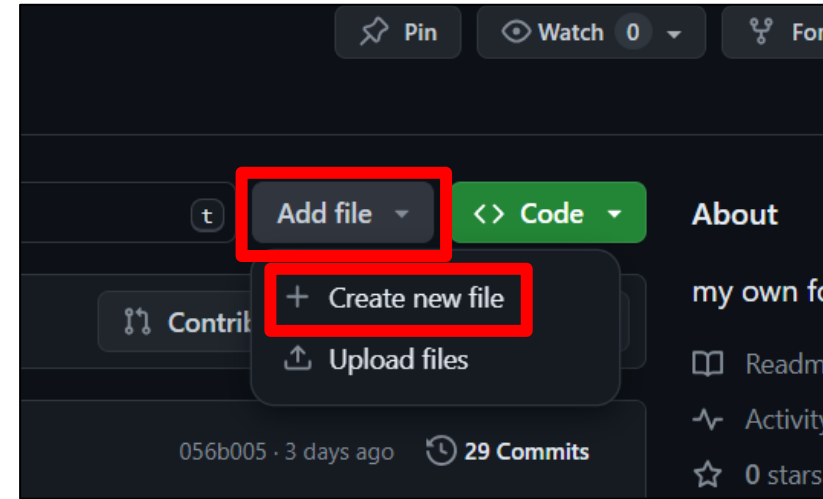


You can see it's your version of the repo in the top left of your screen.

# STEP THREE: Create a file in data/ folder

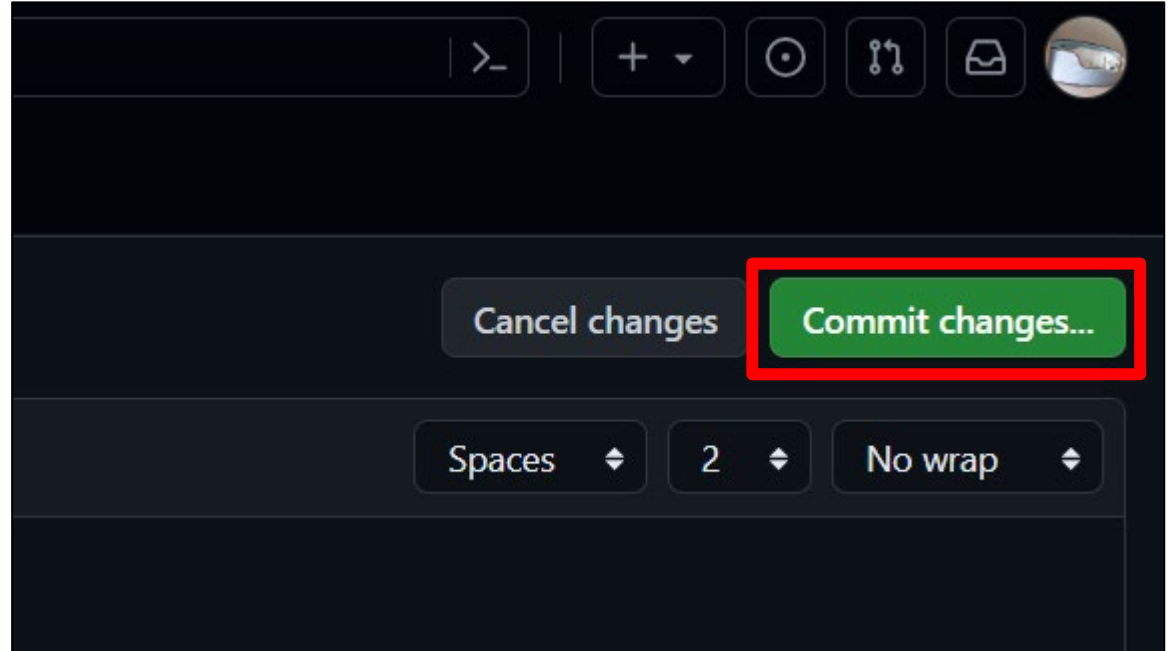
**Navigate to the data/ folder** in the repository, and create a new file named **<your-name.txt>**.

Inside the file, write a question you have about Git or Github.



# STEP FOUR (a): COMMIT your changes

The "Commit changes" button will light up once you've made a change to the file.



# STEP FOUR (b): COMMIT your changes

Name your commit.

You can commit directly to the **main branch** (that's the main branch in YOUR version of the repo).

This lets you keep working on this file or on other files too before sending all your changes to your friend.

Commit changes

Commit message

Create JohnLee.txt

Extended description

Add an optional extended description..

Commit Email

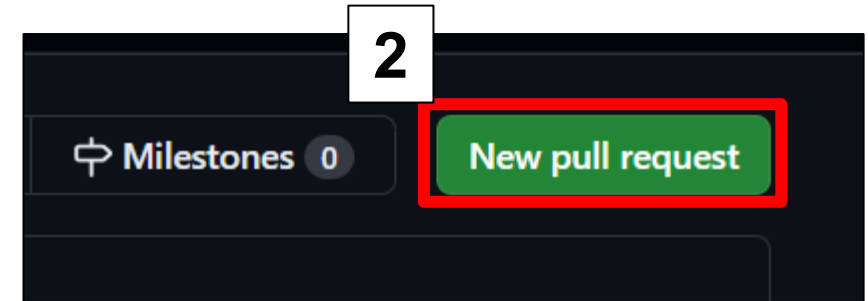
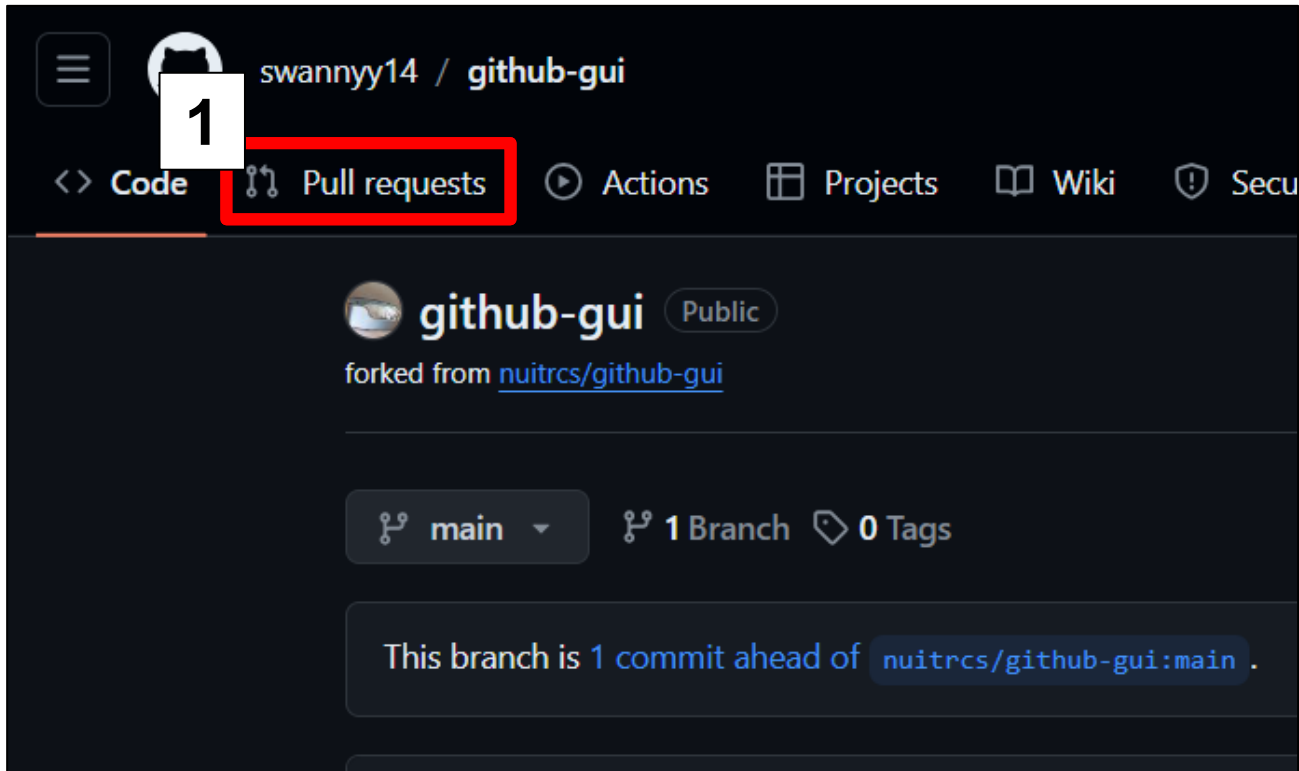
swannyy.stat@gmail.com

☒ Commit directly to the main branch

☐ Create a new branch for this commit and start a pull request [Learn more about pull requests](#)

Cancel Commit changes

# STEP FIVE (a): Create a **PULL** request

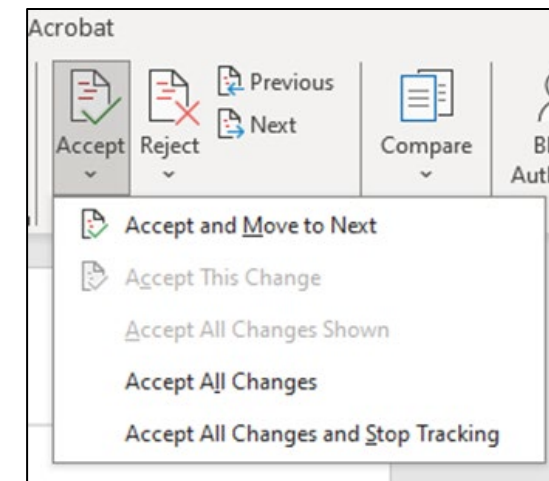


# PUSH

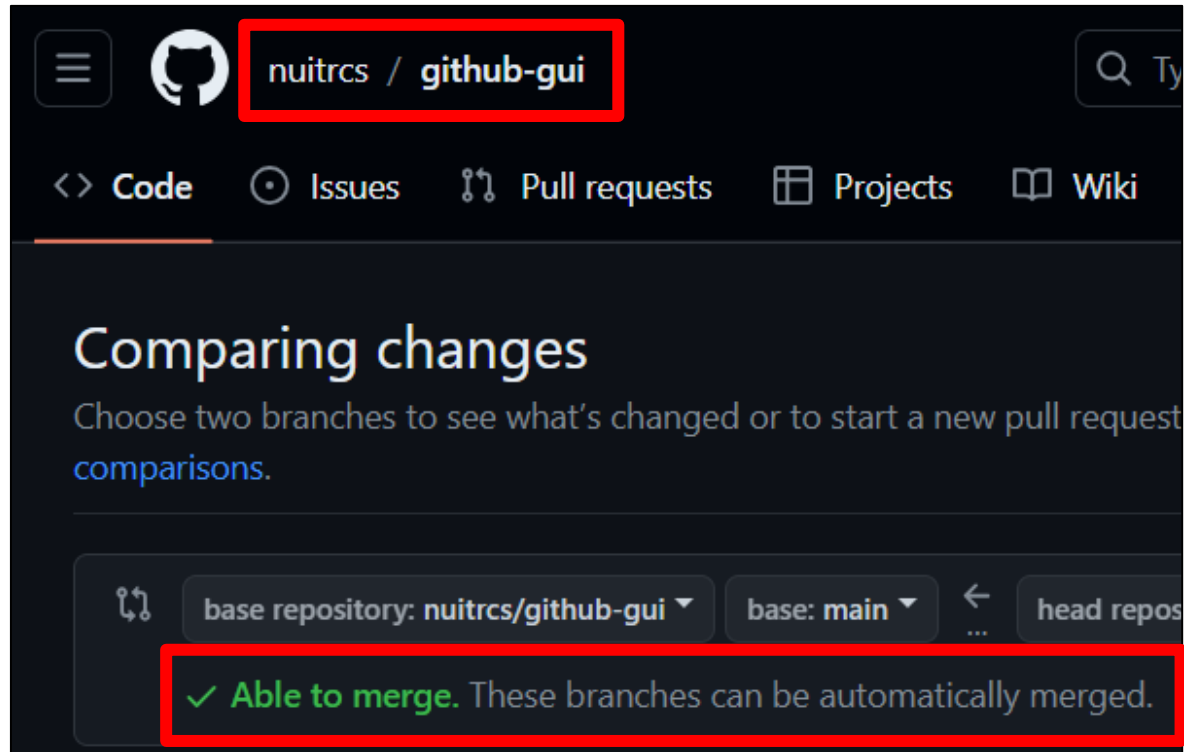
- AKA "**Create a pull request**" when working with someone else's repo
- Make changes (AKA **commits**) to your version of the repo and ask them to accept those changes into their version of the repo
- *Remember, your friend won't lose their previous version if they accept your changes – all versions are saved!*

# PULL

- Like "**Accept all changes**" in Microsoft Word when you let someone else review and make suggestions to your doc

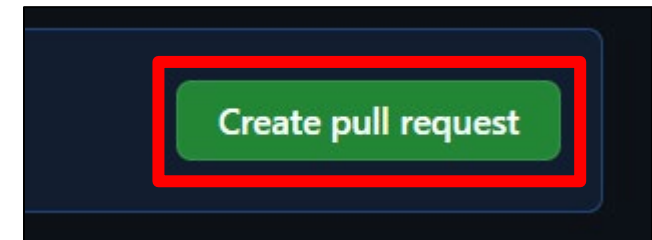


# STEP FIVE (b): Create a **PULL** request



It will now list original version of the repo.

If it says "Able to merge", click the green "Create pull request" button.





⚠️ Oftentimes when you are working on some file that's also being worked on in the original repo, it might say "Can't automatically merge". This is a result of what is called **merge conflict**, which we might go over if we have time.






## STEP FIVE (c): Create a **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](#)


 base repository: `nuitrcs/github-gui` 

base: `main` 

 head repository: `swanny14/github-gui` 

compare: `main` 

 Able to merge














### Add a title


Create JohnLee.txt


### Add a description

Write Preview


H B I           

Add your description here...

 Markdown is supported

 Paste, drop, or click to add files

☒ Allow edits by maintainers

Create pull request 

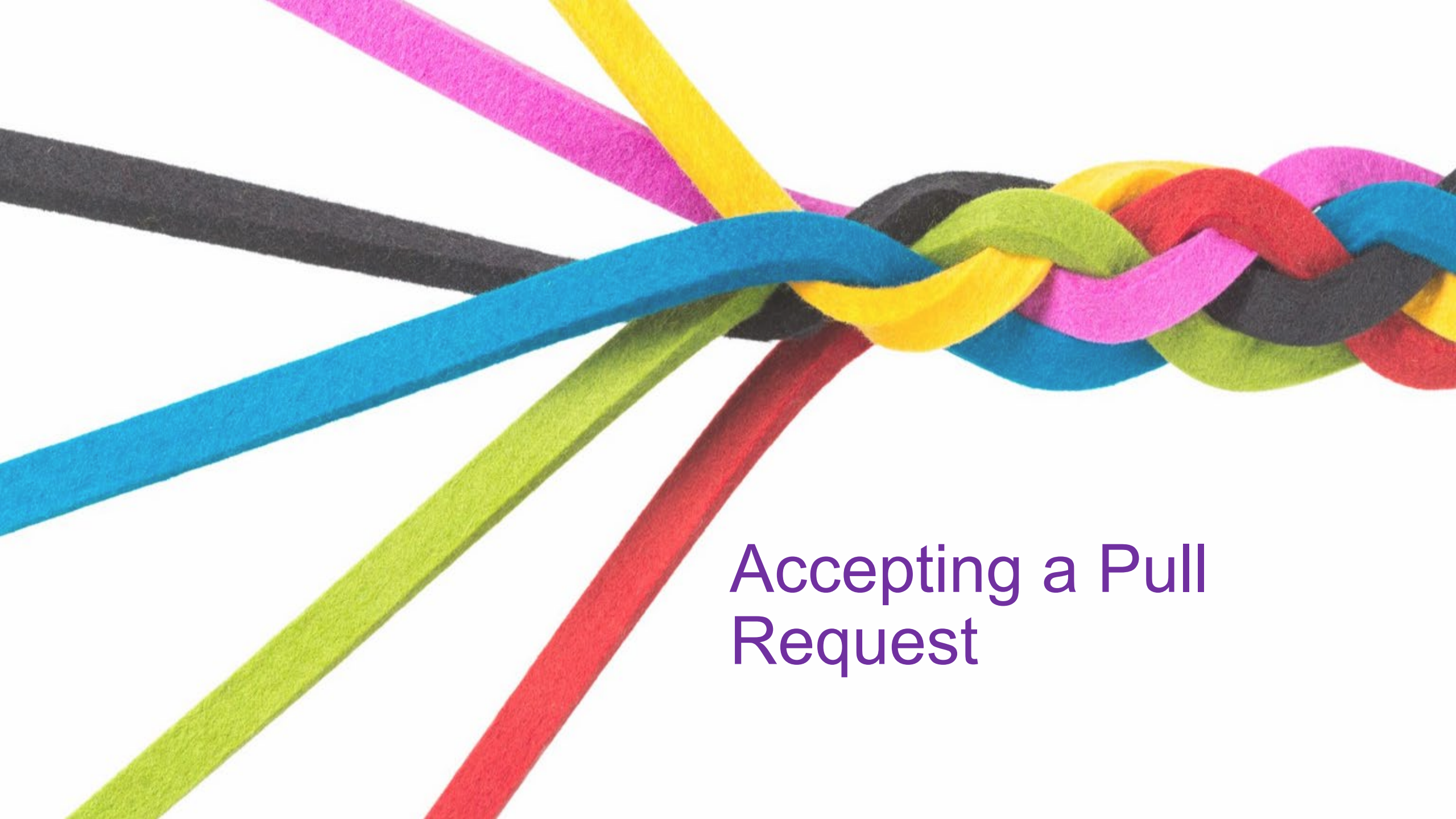
Give the pull request a name. You can also write a comment to your friend.

Click the green button.

# STEP FIVE (d): **WAIT**

Wait for your friend to accept your pull request.

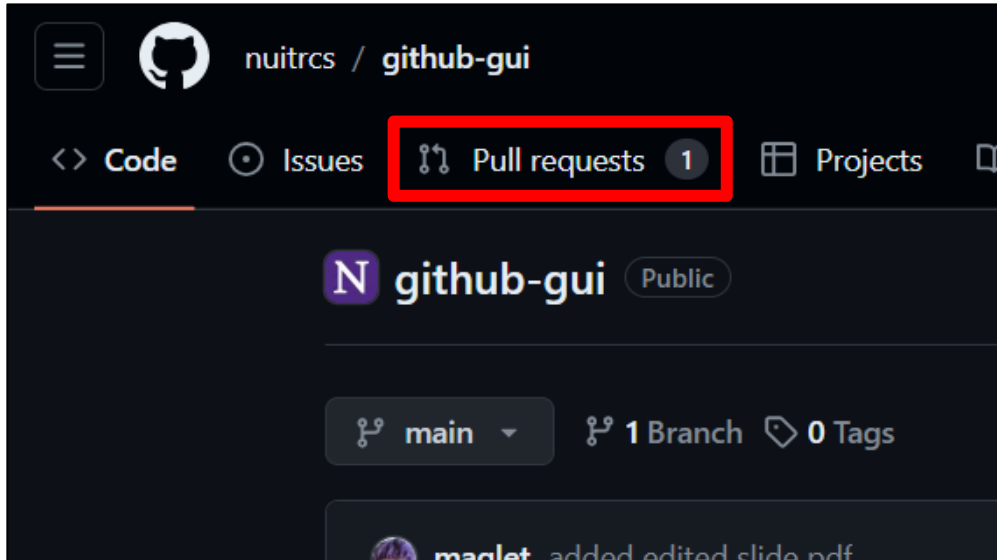
NOTE: "Close a pull request" means CANCEL the pull request.



Accepting a Pull  
Request

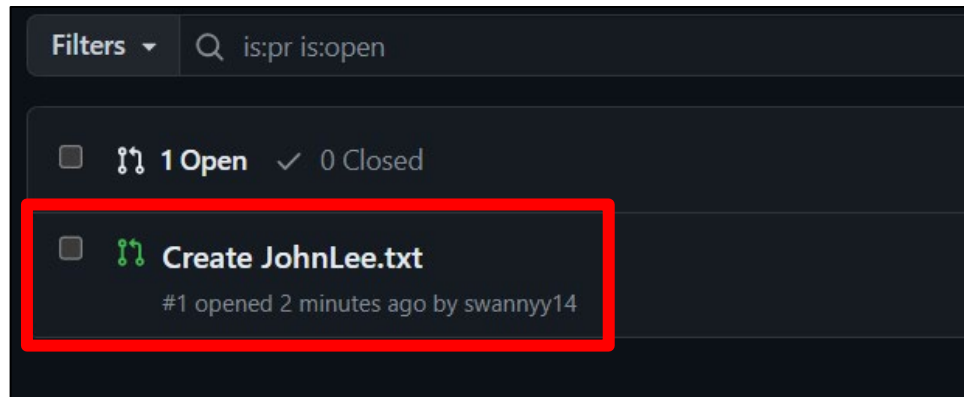
Since only the owner and collaborator of the repository can accept pull requests, you can sit back and watch us accept a pull request.

# STEP ONE: Open the pull request

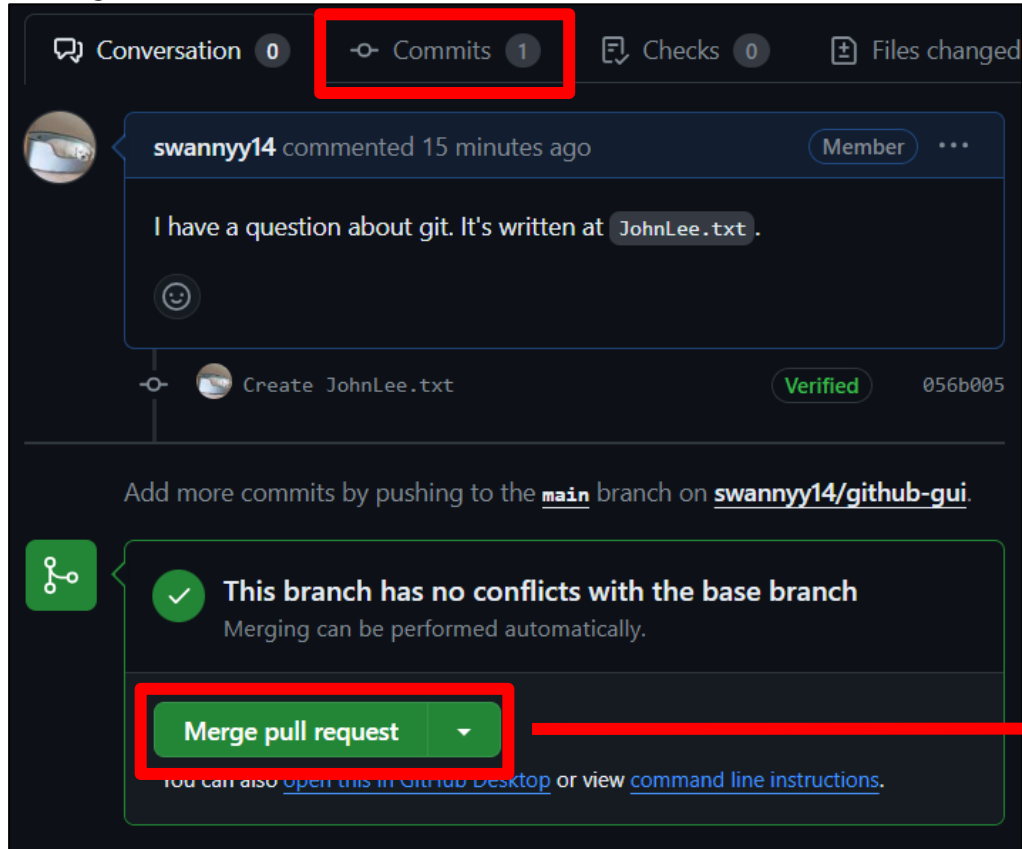


Click on "Pull requests" in your repo.

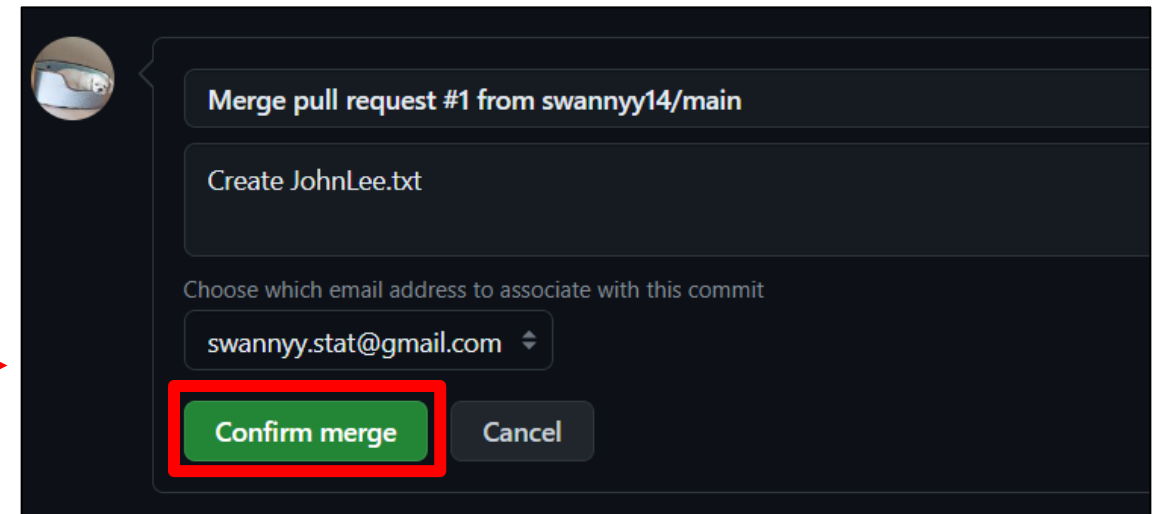
Choose the appropriate pull request from the menu.



# STEP TWO: **MERGE** your friend's changes into your repo

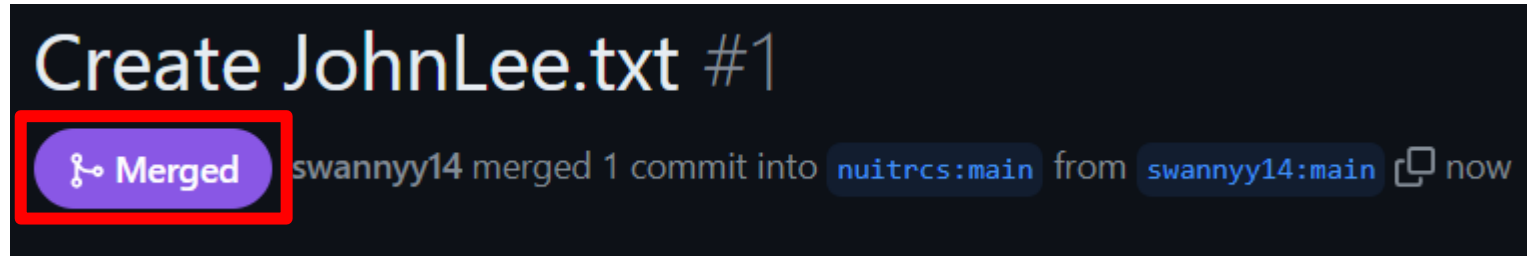


- You can check what changes have been committed in the "Commits" tab.
- Click on "Merge pull request", then "Confirm merge"



*NOTE: You can reject a pull request by "Closing" it.*

# STEP TWO: **MERGE** your friend's changes into your repo



It worked!





Other Ways to  
Collaborate: Create an  
Issue

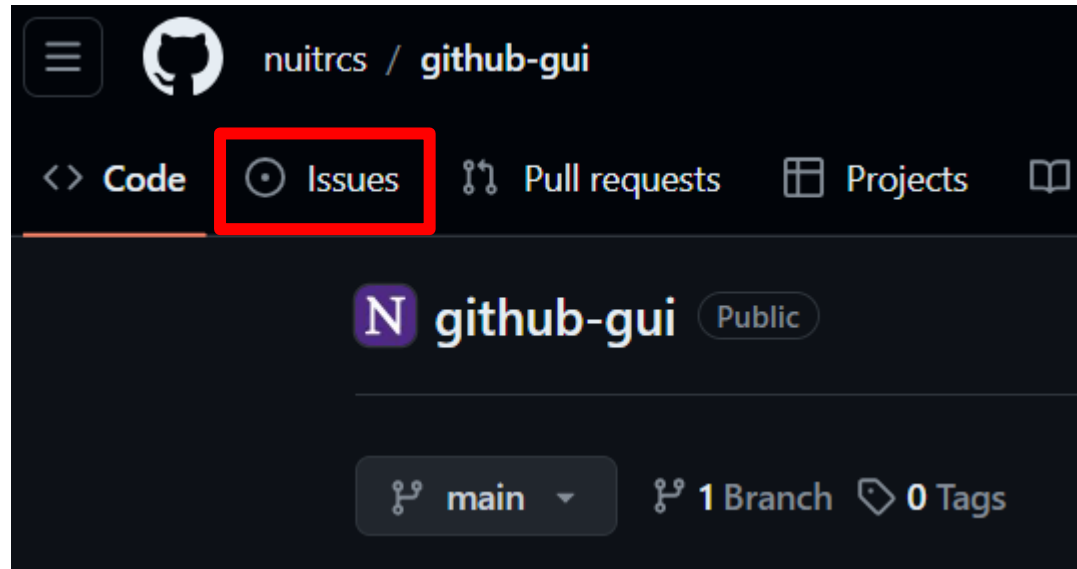


# OPEN AN **ISSUE**

Issues are a great way to

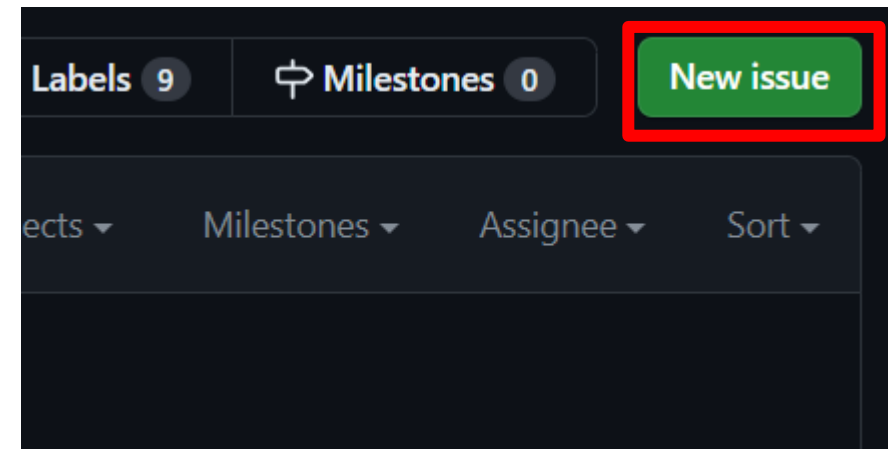
- track what still needs to be done on a project
- report bugs that need to get fixed
- have discussions about the what, why, how, and who of your code and documentation

# OPEN AN **ISSUE**




On your friend's repo,  
click Issues.

Then click New issue.



# OPEN AN ISSUE

**X-axis scale #1**

 **Closed** mfazel opened this issue on Sep 27, 2023 · 2 comments




 commented on Sep 27, 2023



Hi,

I'm trying to use `ggmanh` `manhattan_plot` and noticed all chromosome widths are drawn equally, however, this is not the reality and x-axis is not a pure categorical variable.

Is there a way to make it scale to the chromosome size? I even noticed in the package vignettes the images are drawn the same way. (<https://bioconductor.org/packages/devel/bioc/vignettes/ggmanh/inst/doc/ggmanh.html>)

Thanks,  
Mehdi



**leejs-abv** commented on Sep 27, 2023 · edited  Collaborator 

Hi Mehdi, you can set the argument `preserve.position` to `TRUE` to use the actual position / scale the width of each chromosomes.

Best,  
John

Submitting an issue will start a discussion thread.

Interested in learning more?

# Resources

This repository provides additional examples of why you should Git in your scientific workflow

- [https://github.com/mikecroucher/Git\\_Academic\\_Benefits](https://github.com/mikecroucher/Git_Academic_Benefits)

Git is also very powerful when using it from a command line. To learn how to use Git from the command line, take a look at a tutorial from Software Carpentry

- <https://swcarpentry.github.io/git-novice/>

If you would like to use Git from your local computer without having to worry about using command line, here are some additional options

- GitHub Desktop: <https://desktop.github.com/>
- You can also perform many Git operations in R Studio: <https://happygitwithr.com/rstudio-git-github.html>
- Using Git from VS Code: <https://code.visualstudio.com/docs/sourcecontrol/github>

Questions?