✨Git 101✨

Kristen Kwong

Kristen Kwong, 2020

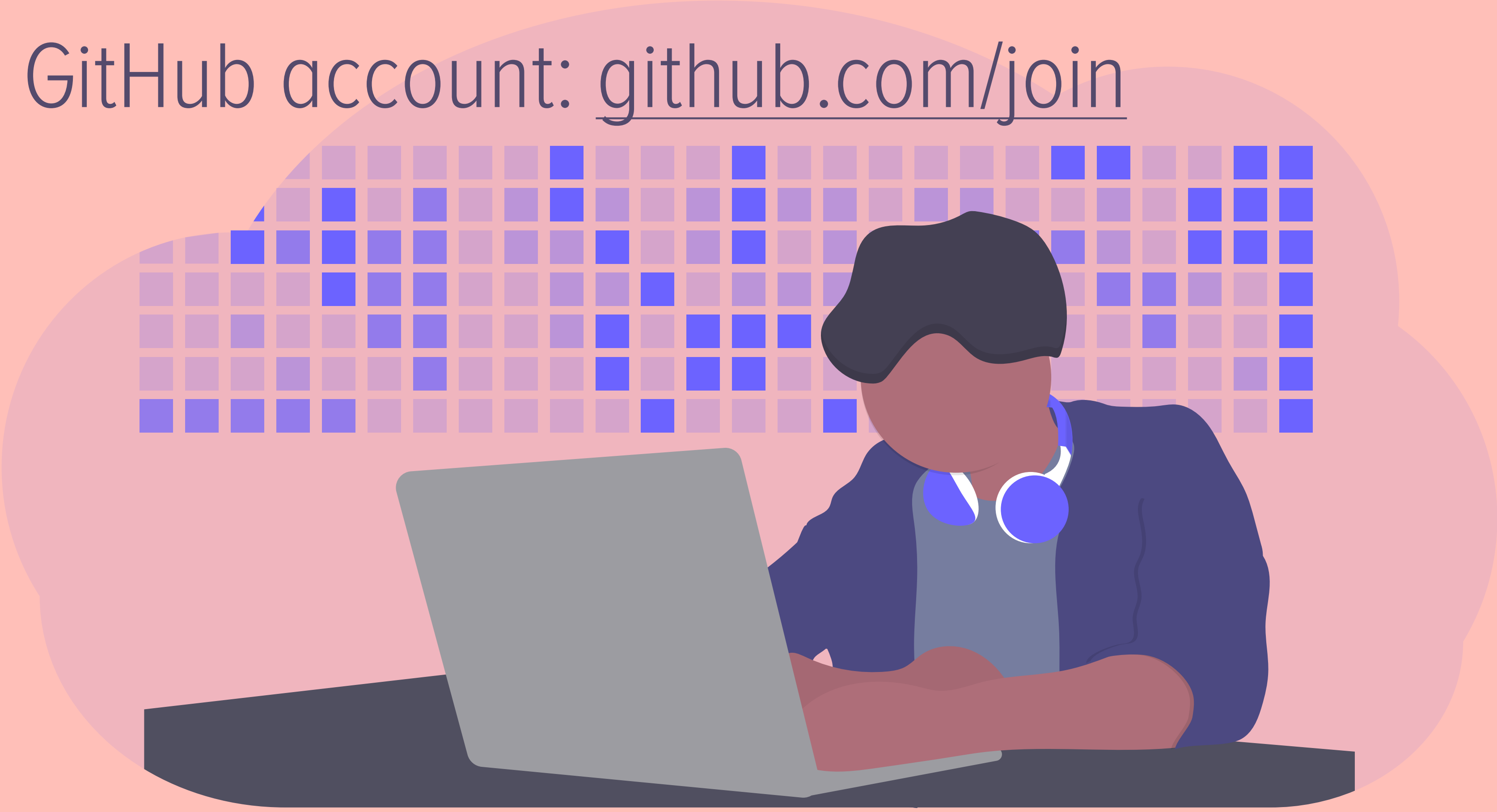
✨Git 101✨

Kristen Kwong

Slides: https://kristen.dev/blog/git

Install Git: git-scm.com/book/en/v2/Getting-Started-Installing-Git

Make a GitHub account: github.com/join



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Hey I'm Kristen! 👋

- ✨ final year of Computer Science
- ✨ Organized Local Hack Day 2016, 2017, & 2018
- ✨ Interned at Netgear and Apple
- ✨ Soon: full-time software engineer @ Apple
- ✨ Operating systems, networking, compilers
- ✨ Also have experience with Python scripting, web development, CSS for fun

Agenda

- ✨ What is Git? Why use Git?
- ✨ How does Git work?
- ✨ Installing & setting up Git and GitHub
- ✨ Your Project + Git = 💖

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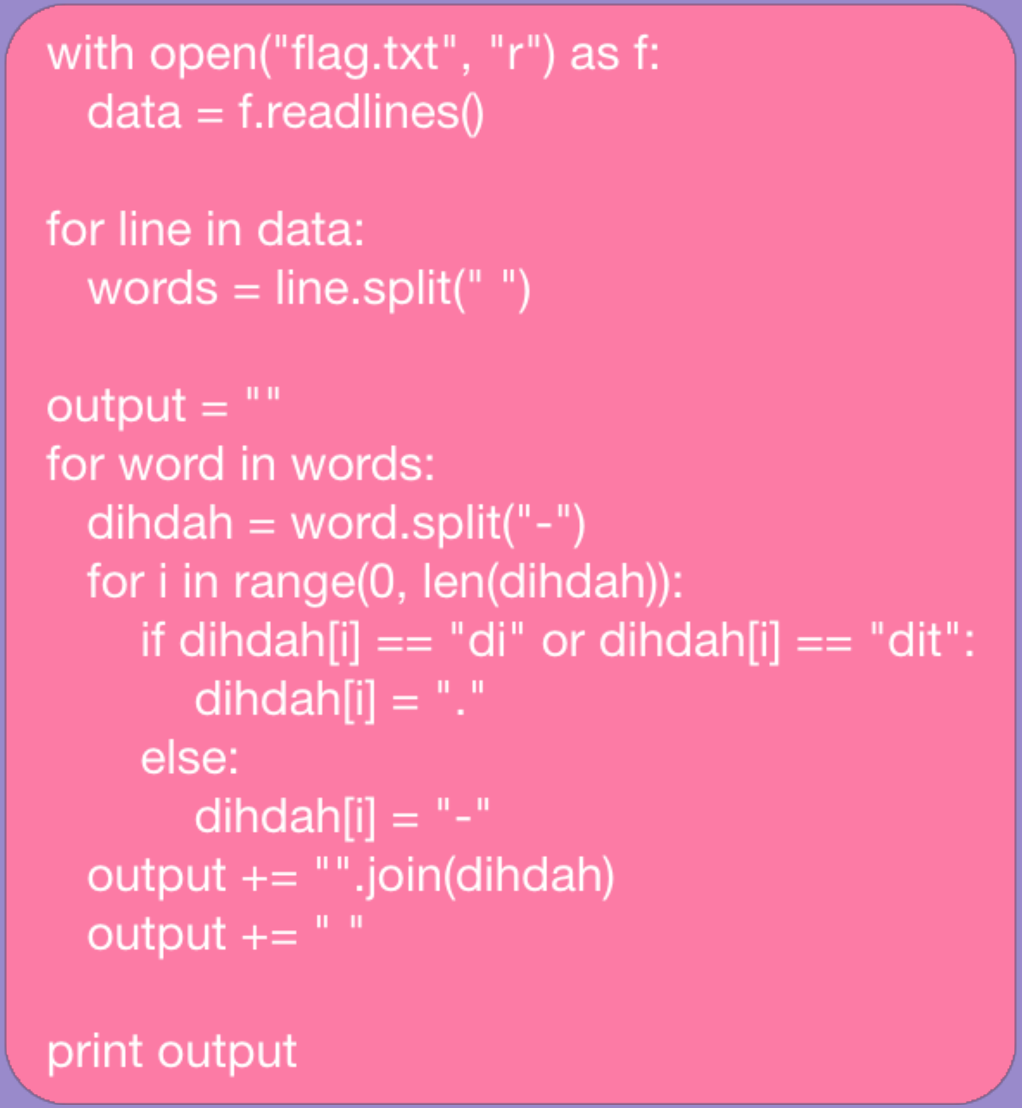
Let's talk about collaboration.

If we were building a project as a team, how would you get your code to each other?

Collaborating on projects*

*without git :(

What about sending snippets on FB Messenger?

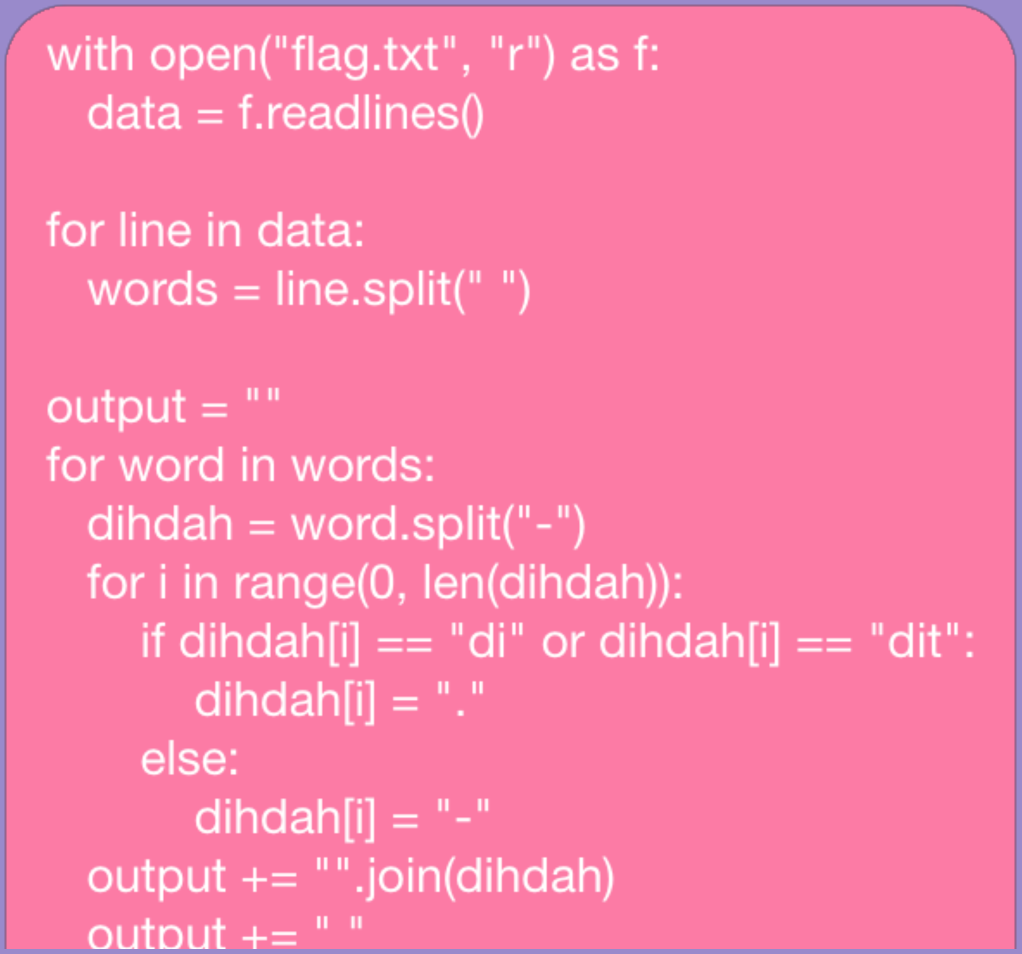


```
with open("flag.txt", "r") as f:
   data = f.readlines()

for line in data:
   words = line.split(" ")

output = ""
for word in words:
   dihdah = word.split("-")
   for i in range(0, len(dihdah)):
       if dihdah[i] == "di" or dihdah[i] == "dit":
           dihdah[i] = "."
       else:
           dihdah[i] = "-"
   output += "".join(dihdah)
   output += " "

print output
```



```
with open("flag.txt", "r") as f:
  data = f.readlines()

for line in data:
  words = line.split(" ")

output = ""
for word in words:
  dihdah = word.split("-")
  for i in range(0, len(dihdah)):
     if dihdah[i] == "di" or dihdah[i] == "dit":
        dihdah[i] = "."
     else:
        dihdah[i] = "-"
  output += "".join(dihdah)
  output += " "
```

✨ inconvenient to describe where & how to insert code

✨ what if we have small changes?

ie. we want to change the strings on line 15 & 17

✨ how do we know what we changed in our code previously?

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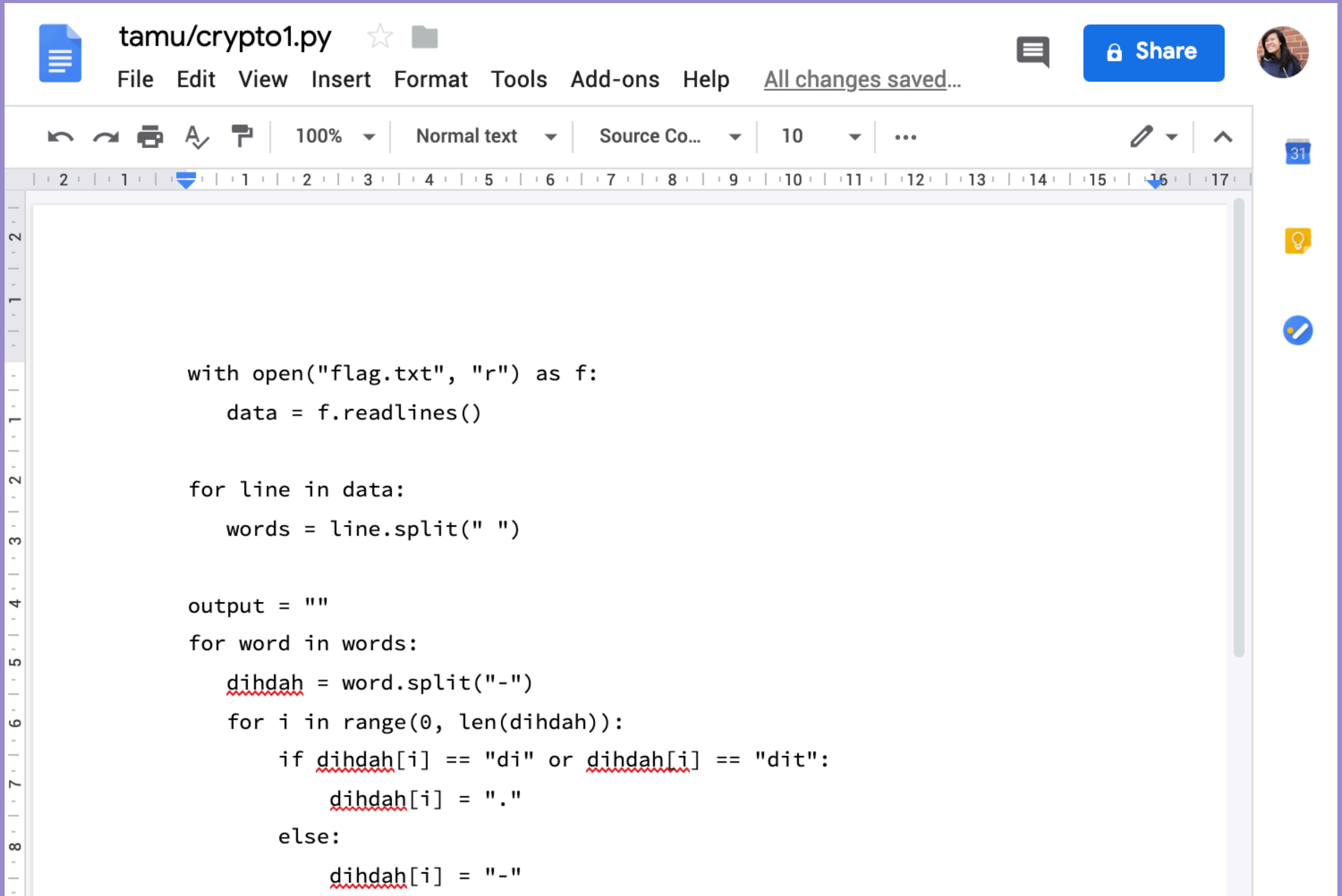
*without git :(

Maybe Google Docs?



```
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for line in data:
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output = ""
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   for i in range(0, len(dihdah)):
       if dihdah[i] == "di" or dihdah[i] == "dit":
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       else:
           dihdah[i] = "-"
```

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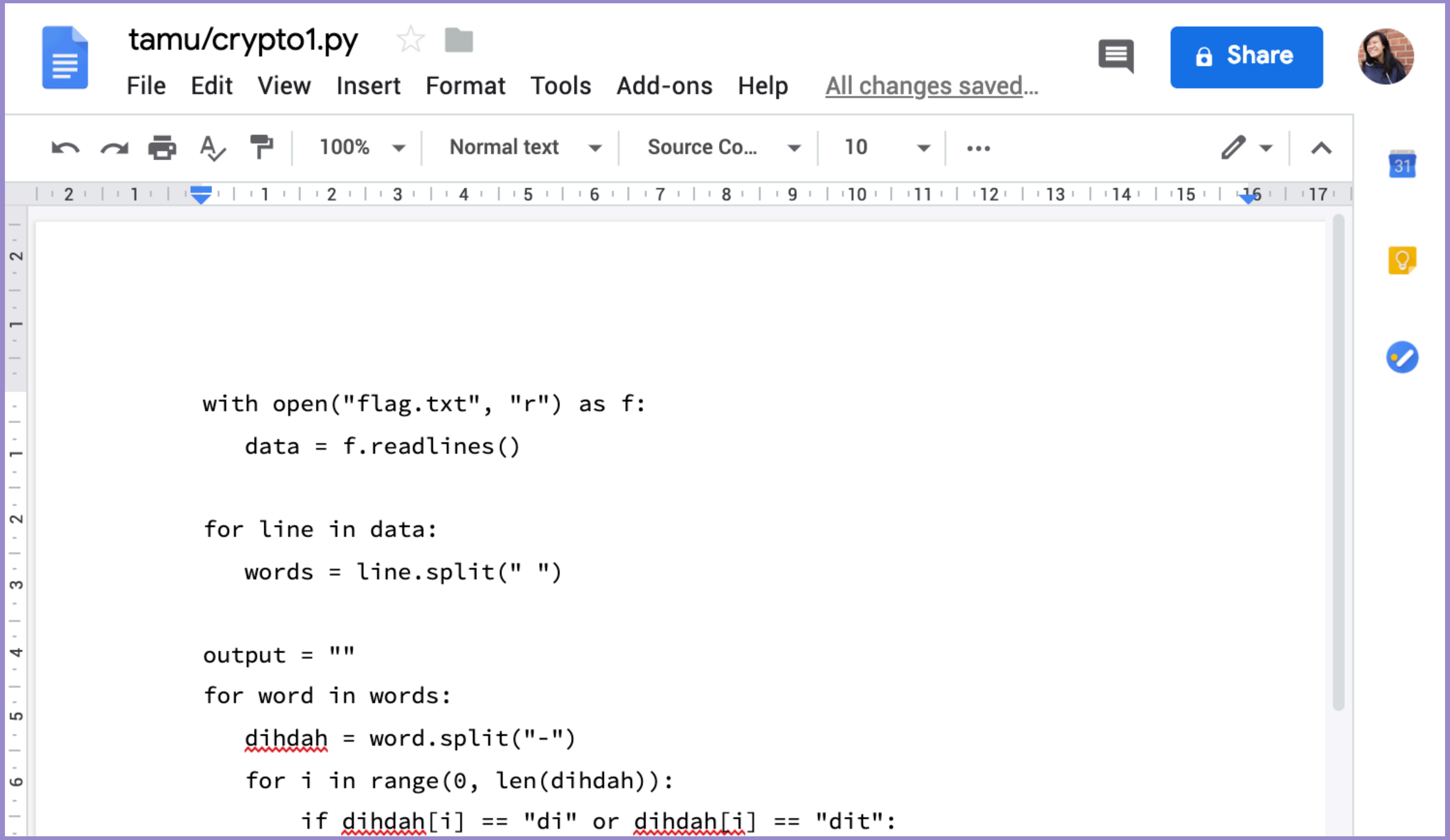

```
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    data = f.readlines()

for line in data:
    words = line.split(" ")

output = ""
for word in words:
    dihdah = word.split("-")
    for i in range(0, len(dihdah)):
        if dihdah[i] == "di" or dihdah[i] == "dit":
```

- ✨ annoying to have to copy & paste code into file that can actually be run locally
- ✨ low-key kinda ugly to look at code this way - format not meant for coding projects

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Collaborating on projects*

*without git :(

Some other ideas:

✨ Working all on the same computer - inefficient

✨ Emailing files - what if files are large? or there are many?

✨ Just don't have teammates??

Version control to the rescue!

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What is Version Control?

✨ Keeps track of a history of changes

✨ Allows for collaborative development

✨ Go back and revert to an older version

for when we mess up so badly we just want to give up 🤦‍♀️ (but also if requirements change)

What is Git?

- ✨ type of version control - not the only one!
    - ✨ Subversion, Perforce, Bazaar
- ✨ integrates directly into your project workflow - most IDEs support version control

Repository

- ✨ “repo” for short
- ✨ each developer has a copy of the code in a local repository, and (most likely) a remote repository on a server
- ✨ where Git stores the metadata and object database for the project

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Snapshots

✨ Other VCs tend to have a single file and records changes to that base file - but not Git

✨ Git saves a “picture” of what your files look like

✨ If it hasn’t changed, Git doesn’t store the file again - just link to previous unchanged version

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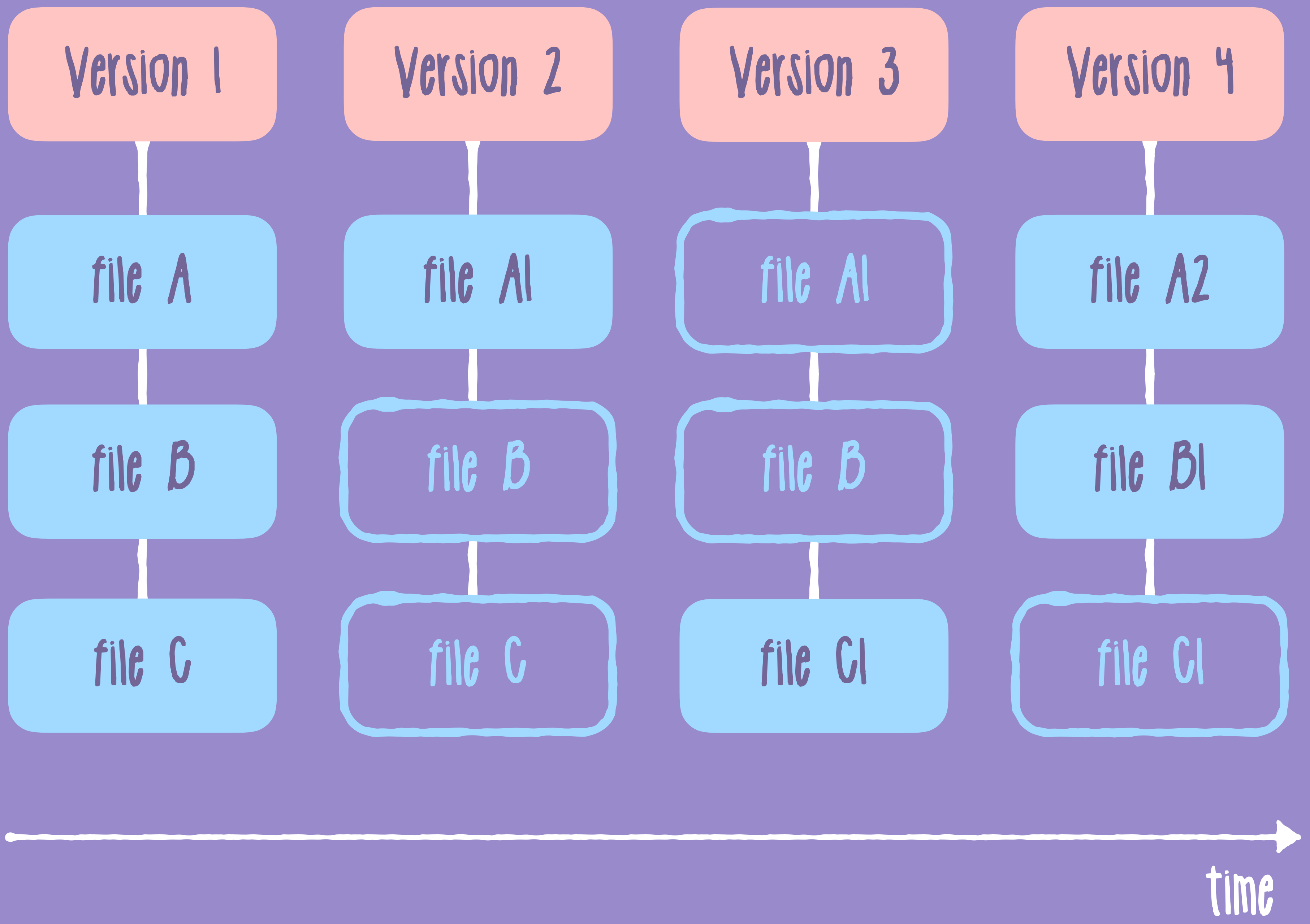
Snapshots



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💍 Committing

✨ refers to making a snapshot

✨ common phrases: “I just committed code”, “I made a commit”

✨ projects are a bunch of commits

✨ like saving in a video game

A Git File's Three States

✨ Modified - changed but not stored in repository yet

✨ Staged - marked that this goes into the next commit to be stored into repository

✨ Committed - stored into the repository

all files in your Git project will always be in one of these states

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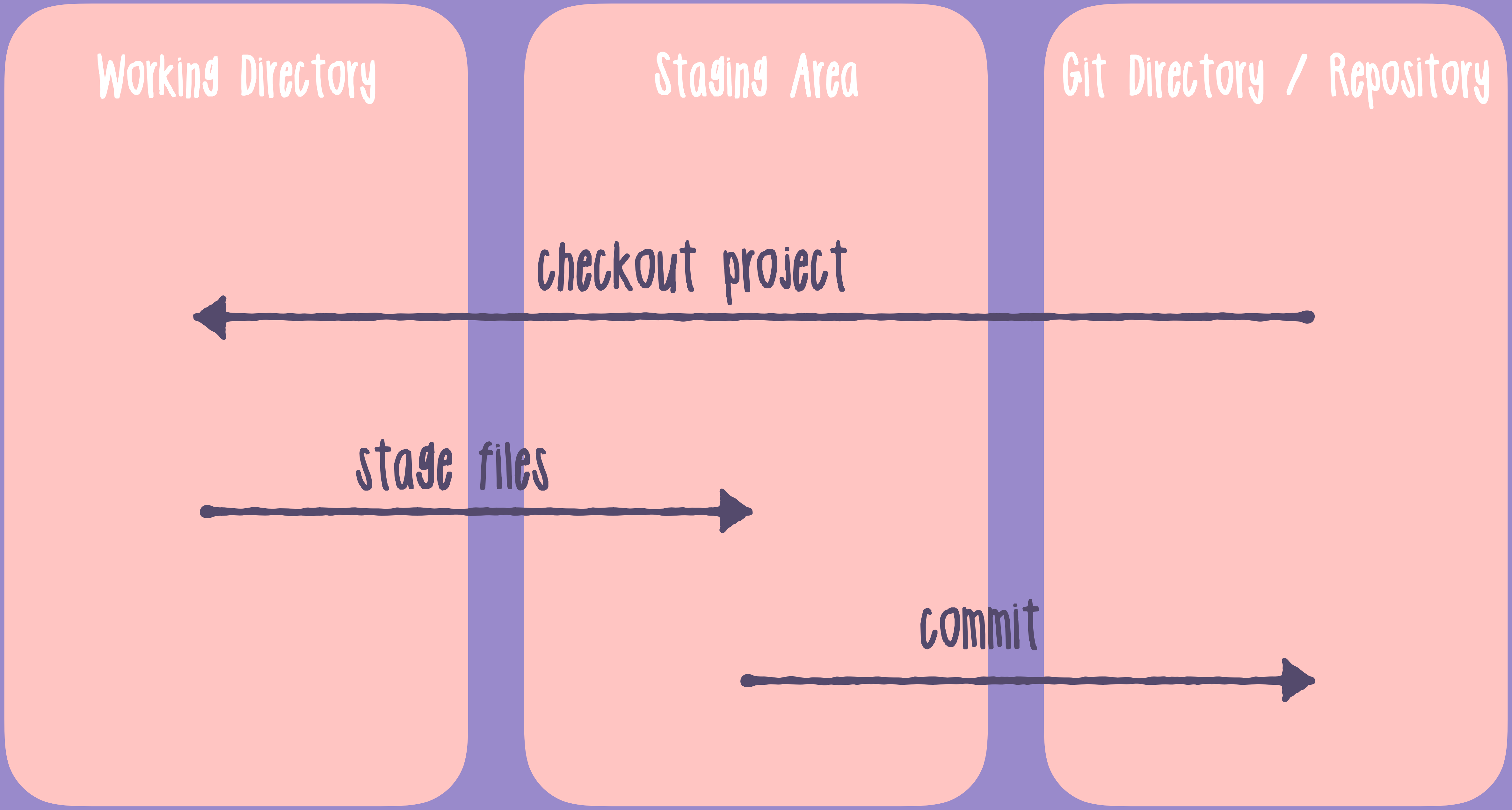
Three Sections of Git



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Let's GIT going!

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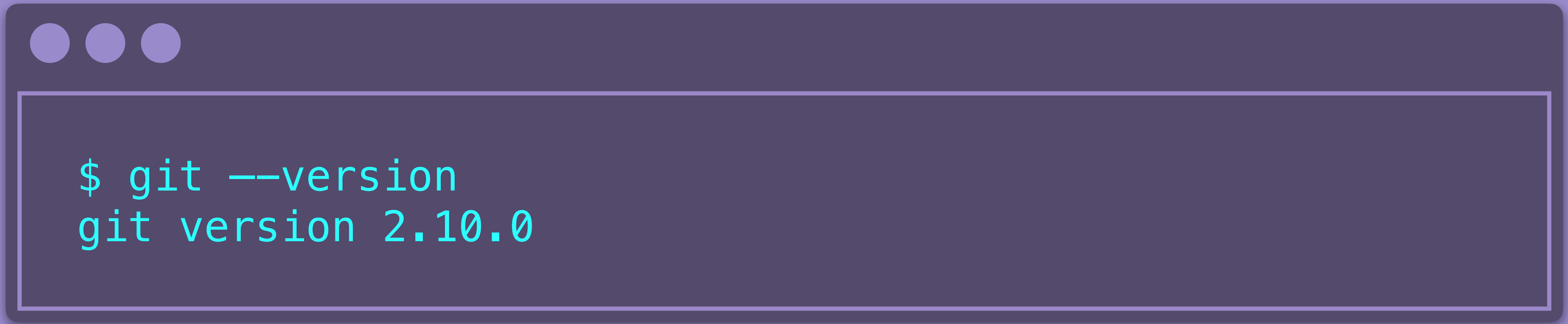
Installing Git

- ✨ Instructions: https://git-scm.com/book/en/v2/Getting-Started-Installing-Git
- ✨ Check if installed correctly:



```
$ git ––version
git version 2.10.0
```

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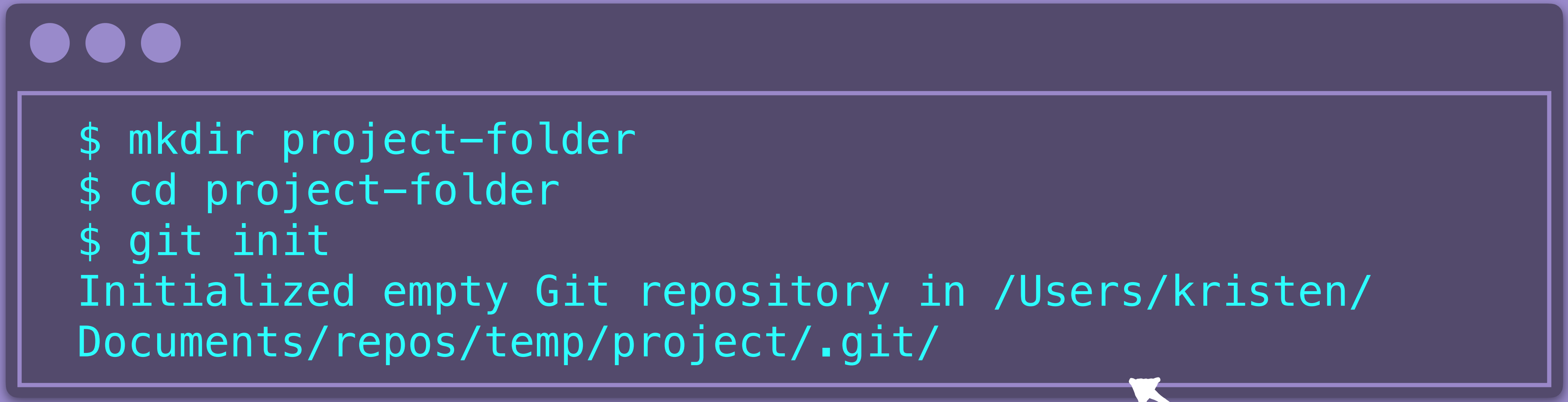
Setting up a Git repo

Use `git init` to make any folder a git repository.



```
$ mkdir project-folder
$ cd project-folder
$ git init
Initialized empty Git repository in /Users/kristen/
Documents/repos/temp/project/.git/
```

Adds a local git repo to the project

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Configuring Git

Use `git config --global user.name “<your name>”` and `git config --global user.email <email>` so your contributions can be identified.

To show your configs, just use `git config --list`

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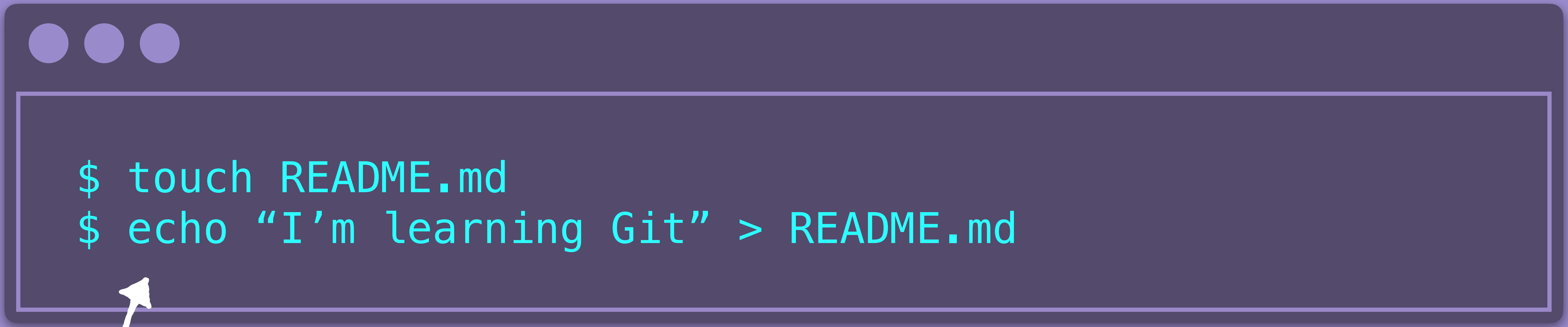
Let's add some code

Let’s make a file in our new Git directory:



```
$ touch README.md
$ echo “I’m learning Git” > README.md
```

This makes a file called README.md and writes "I'm learning Git" to it!

You could also just make a new file with Notepad or TextEdit and save it to the folder.

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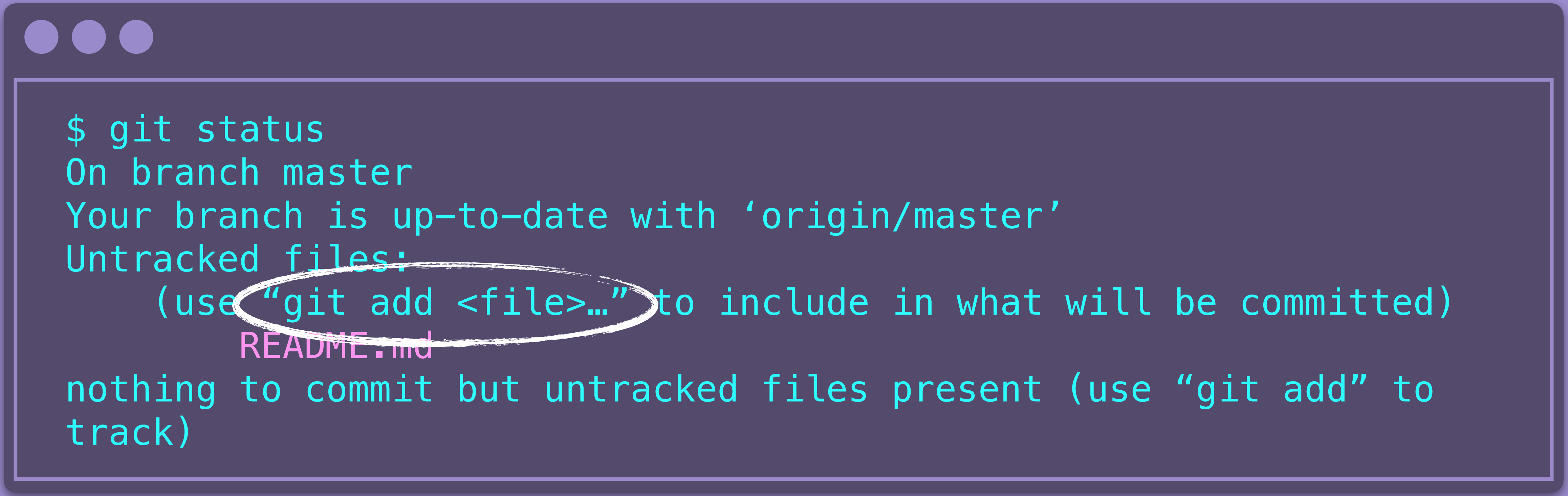
See changes

Use `git status` to view differences between your working directory and the git local repo.



```
$ git status
On branch master
Your branch is up-to-date with ‘origin/master’
Untracked files:
    (use “git add <file>…” to include in what will be committed)
        README.md
nothing to commit but untracked files present (use “git add” to
track)
```

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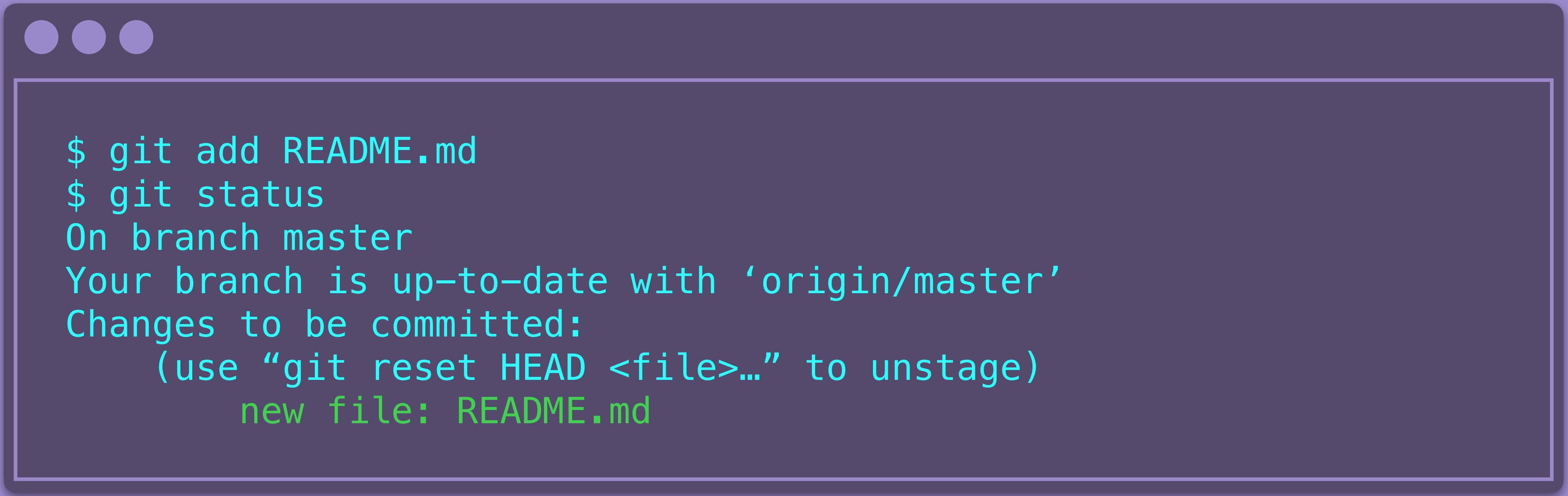
Staging Changes

`git add .` to add all files in the folder to staging

`git add <file>` to add a single file

`git add <file1> <file2> <file3>` to add multiple



```
$ git add README.md
$ git status
On branch master
Your branch is up-to-date with ‘origin/master’
Changes to be committed:
    (use “git reset HEAD <file>…” to unstage)
        new file: README.md
```

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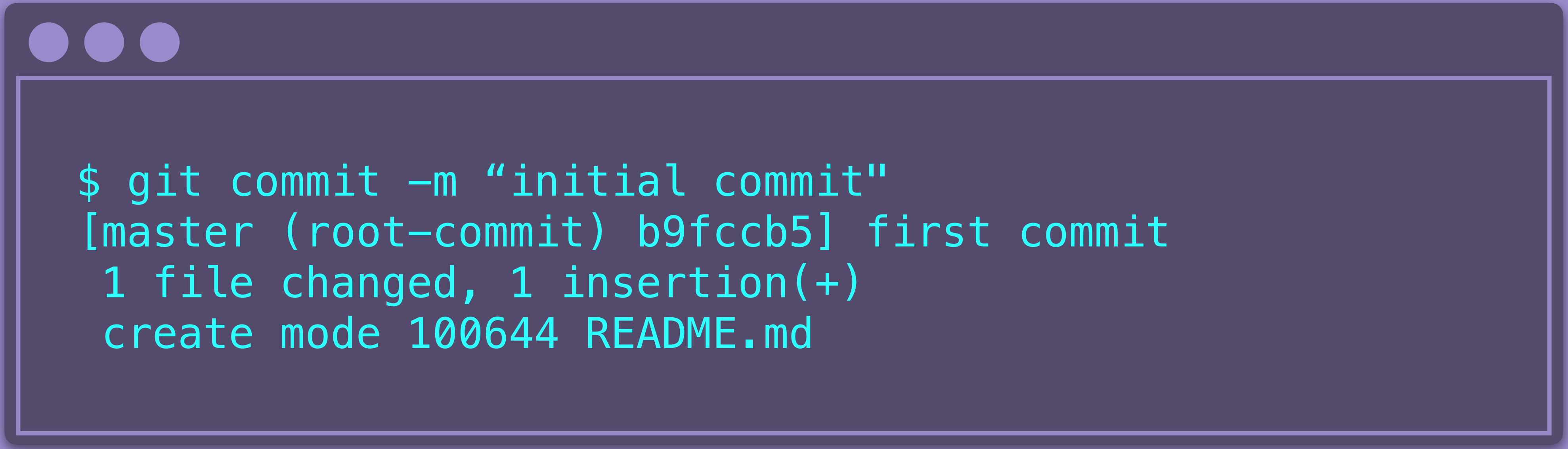
Making a commit

`git commit -m “commit message”` makes a new commit to the local repository with the given commit message



```
$ git commit -m “initial commit"
[master (root-commit) b9fccb5] first commit
 1 file changed, 1 insertion(+)
 create mode 100644 README.md
```

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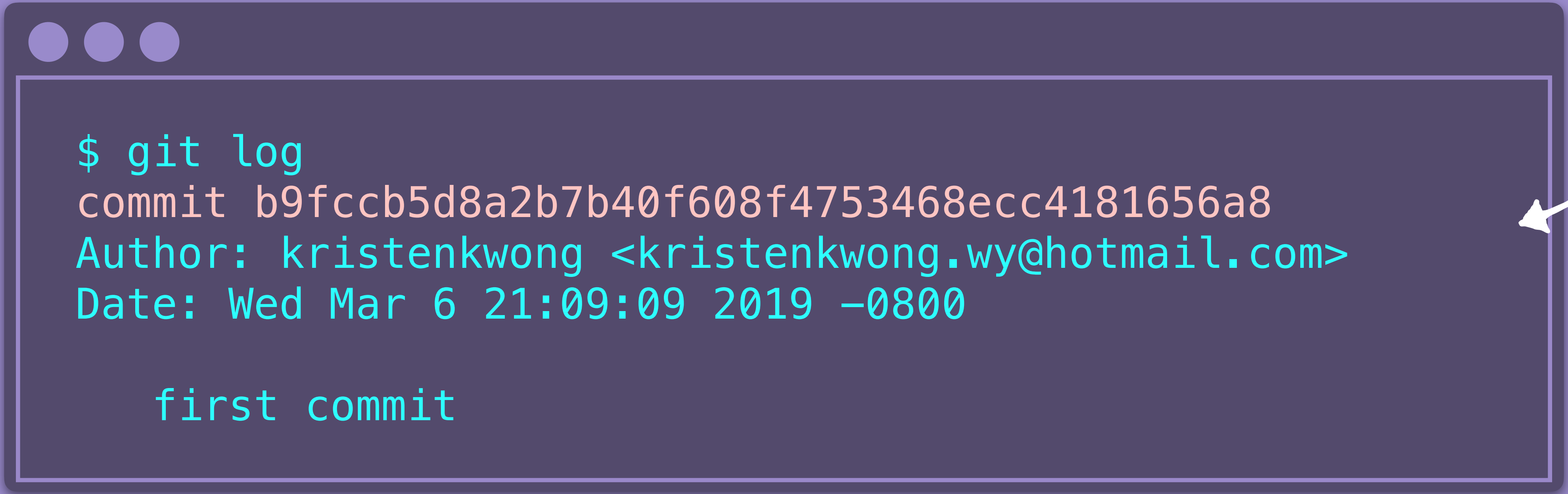
Showing all commits

`git log` shows all the commits you've made up to this point

author, date, and commit message



```
$ git log
commit b9fccb5d8a2b7b40f608f4753468ecc4181656a8
Author: kristenkwong <kristenkwong.wy@hotmail.com>
Date: Wed Mar 6 21:09:09 2019 -0800

   first commit
```

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Branches!

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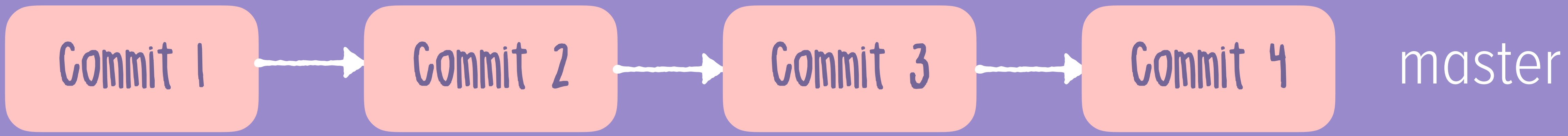
Branches in Git



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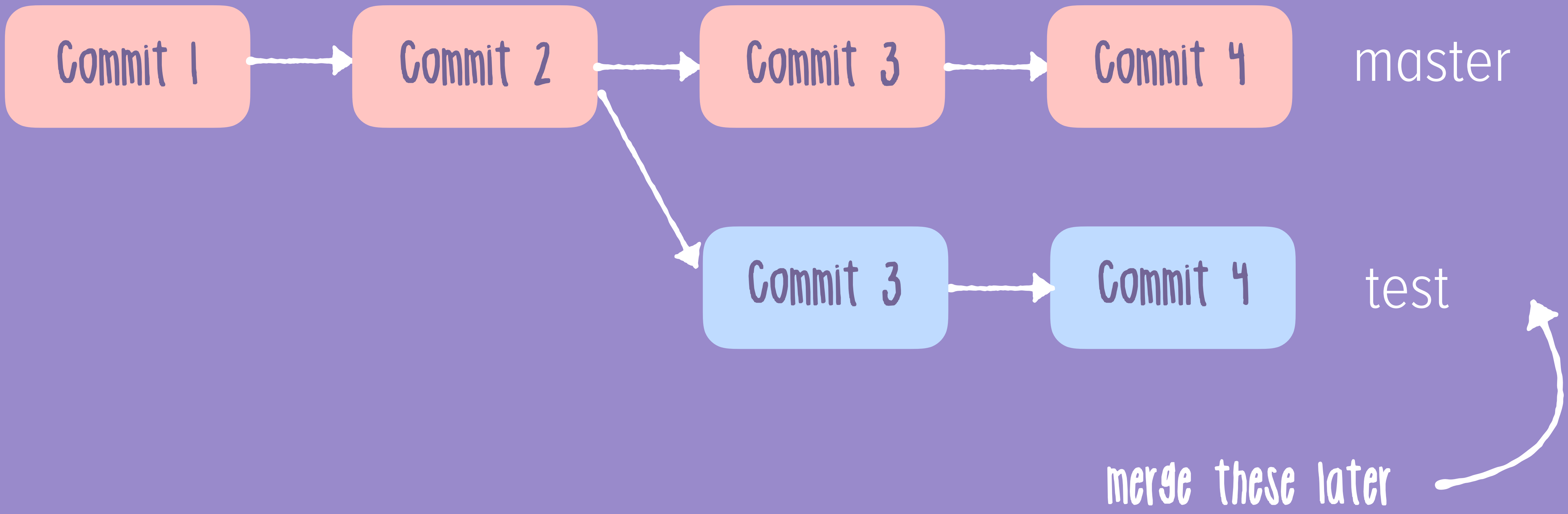
Branches in Git



Commit 1

Commit 2

Commit 3

Commit 4

master

Commit 3

Commit 4

test

merge these later

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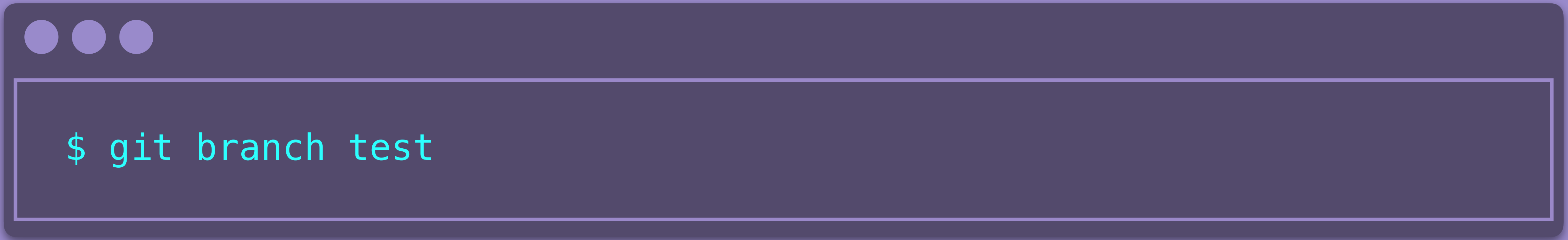
Make a new branch

Use `git branch <name>` to create a new branch.



```
$ git branch test
```

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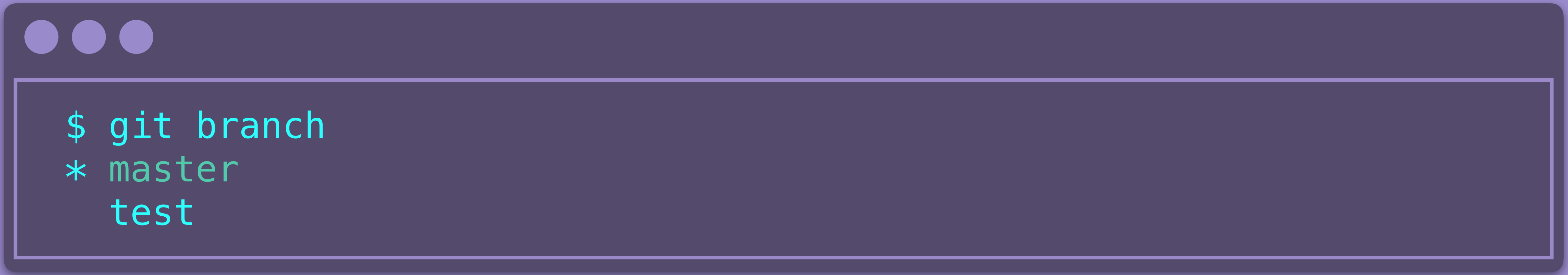
List all branches

Use `git branch` to see all the branches in the repo.



```
$ git branch
* master
  test
```

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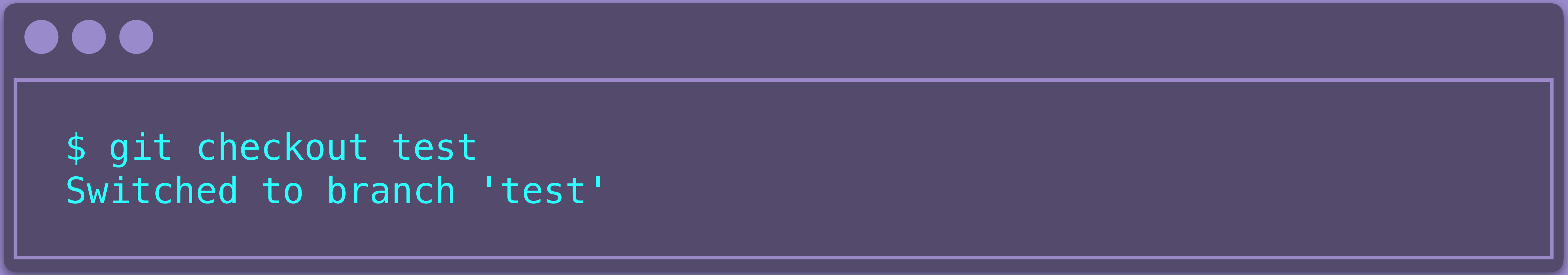
Switch branches

Use `git checkout <name>` to switch to that branch.



```
$ git checkout test
Switched to branch 'test'
```

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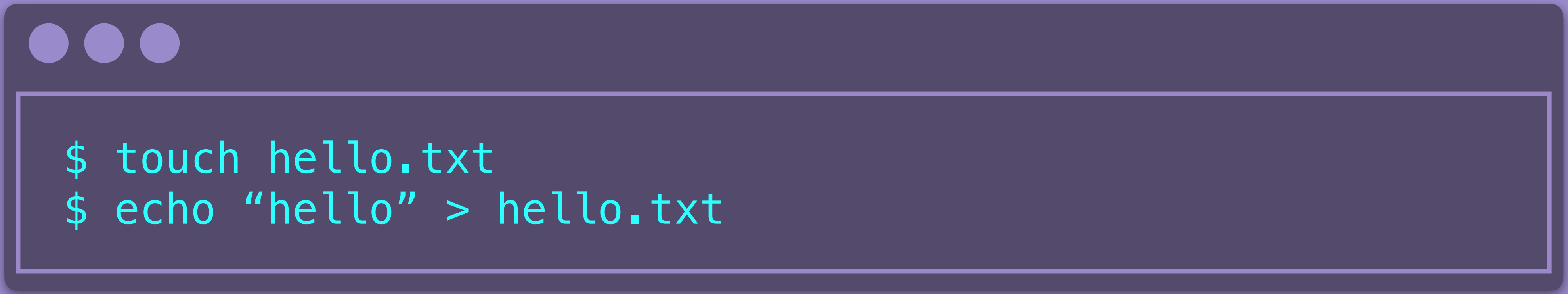
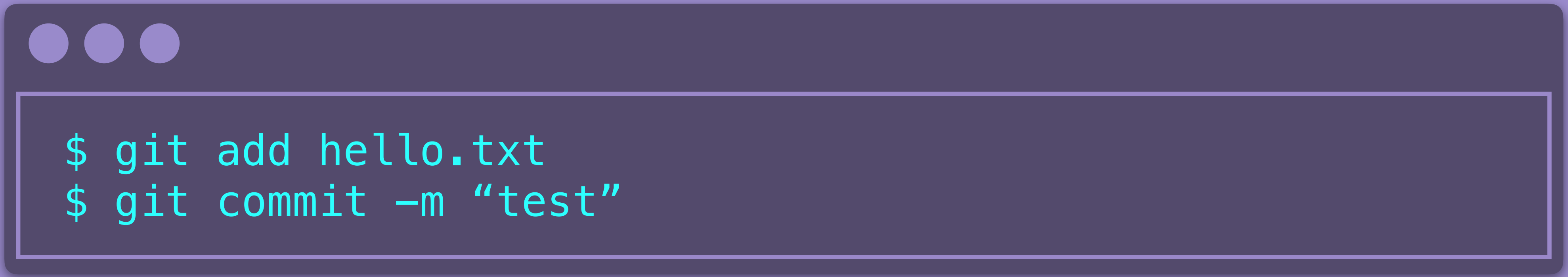
Let's add some stuff

Let’s add some stuff to our new branch so we can merge:



```
$ touch hello.txt
$ echo “hello” > hello.txt
```

Then add and commit to the repo:



```
$ git add hello.txt
$ git commit –m “test”
```

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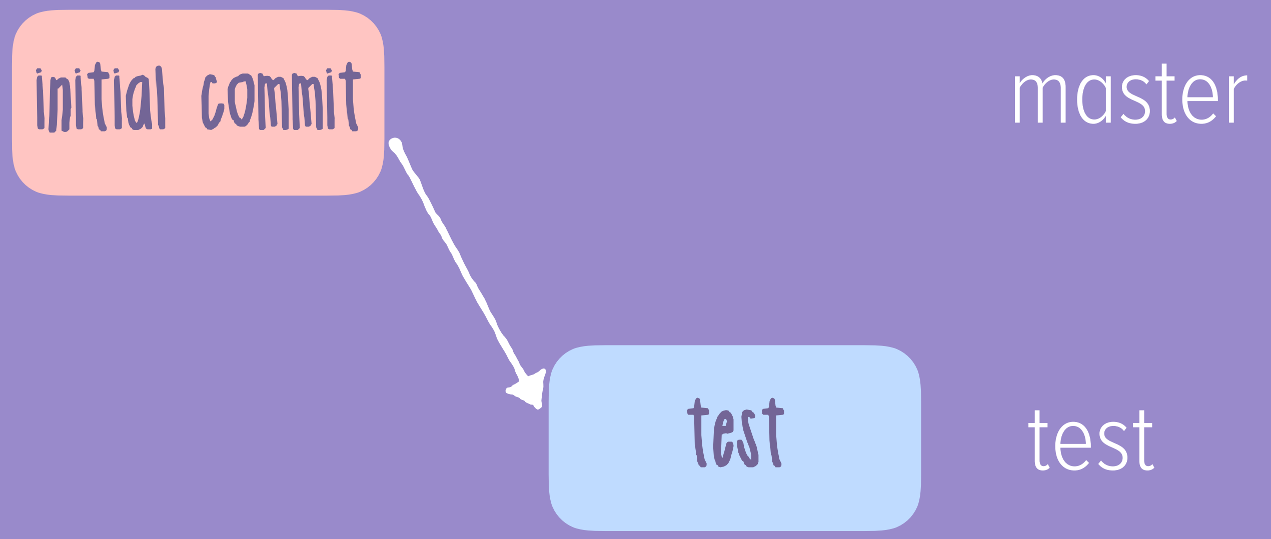
Example



test is ahead of master by 1 commit

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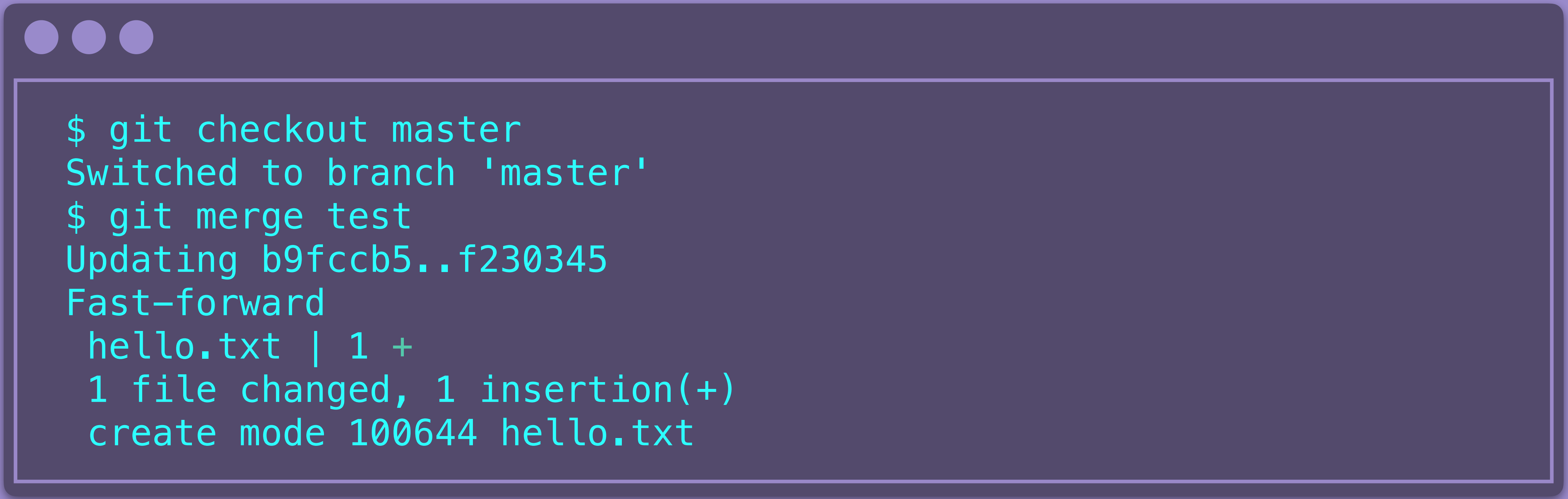
Merging branches

Use `git checkout master` to switch back to master.

Use `git merge <branch>` to copy code into checked out branch from the specified one.



```
$ git checkout master
Switched to branch 'master'
$ git merge test
Updating b9fccb5..f230345
Fast-forward
 hello.txt | 1 +
 1 file changed, 1 insertion(+)
 create mode 100644 hello.txt
```

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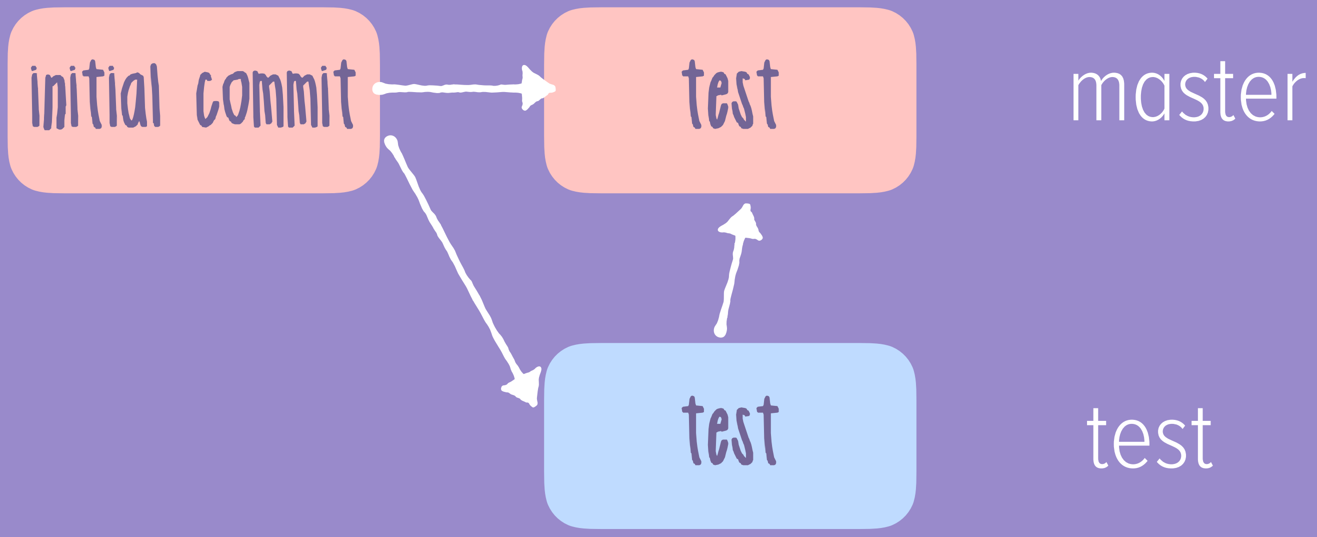
Example



successfully merged code in test into master!

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Resolving conflicts

You have to manually edit files to remove conflicts and then use `git add <filename>` to mark them as merged.

You can preview merges with:

```
git diff <source-branch> <dest-branch>
```

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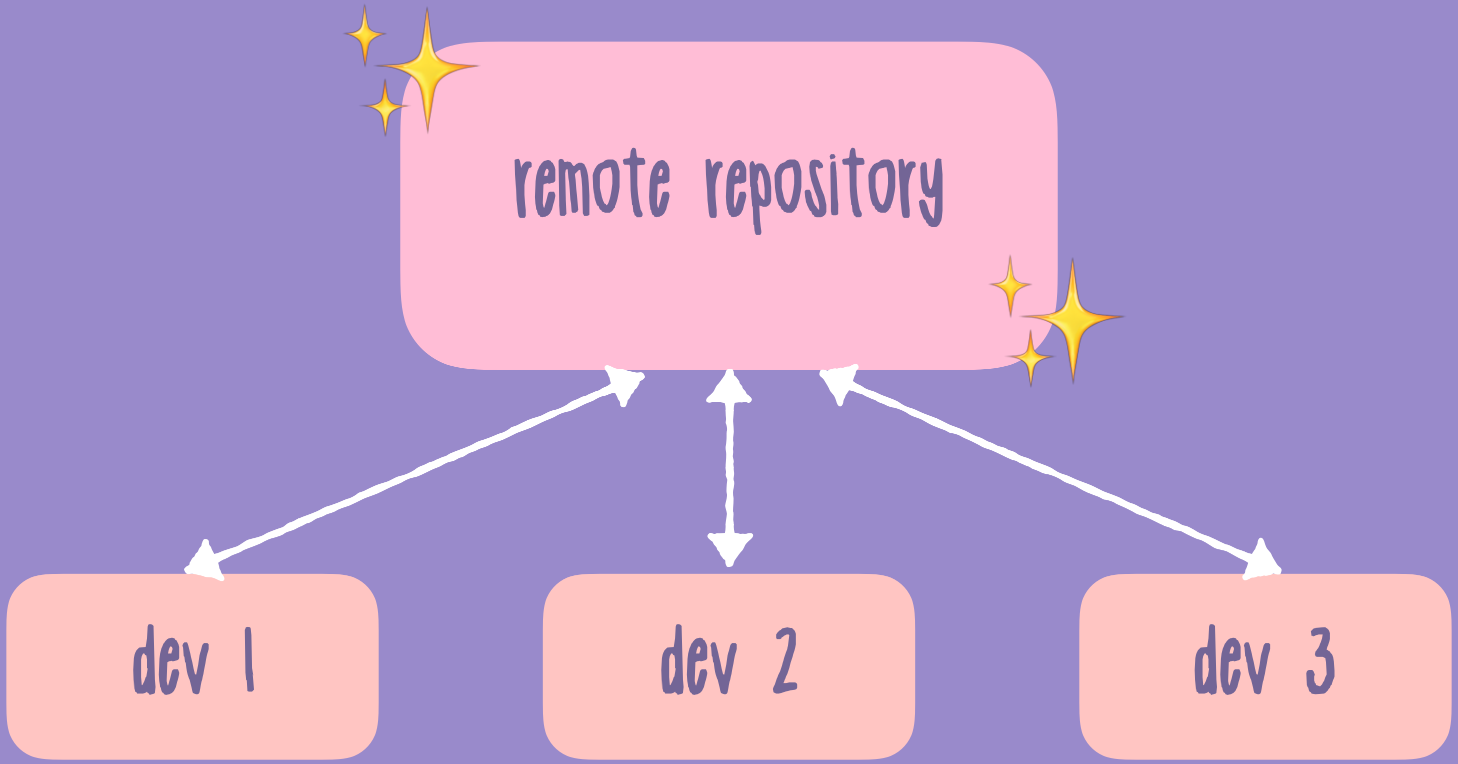
But wait!

- ✨ So far… we’ve only put our changes in our LOCAL repo
- ✨ I said it was about collaboration! 😠

Remote Repository



so that everyone can see your code :)

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GitHub

- ✨ Web-hosted version control
- ✨ Make an account at github.com/join
- ✨ Students: education.github.com/pack
- ✨ Free :)

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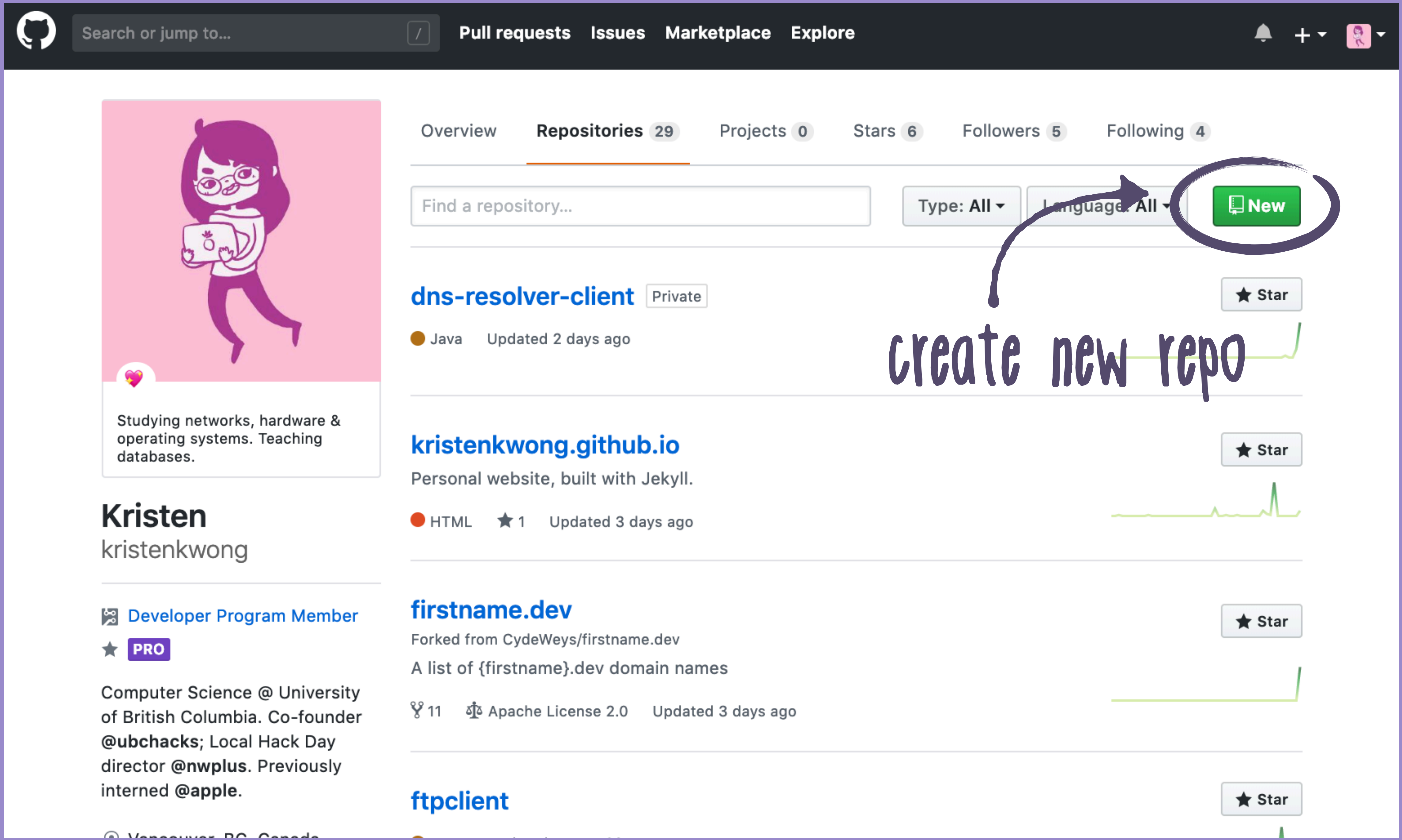
Make a new GitHub project



create new repo

Studying networks, hardware & operating systems. Teaching databases.

Kristen
kristenkwong

Developer Program Member
★ PRO

Computer Science @ University of British Columbia. Co-founder **@ubchacks**; Local Hack Day director **@nwplus**. Previously interned **@apple**.

Vancouver, BC, Canada

dns-resolver-client Private
● Java Updated 2 days ago

kristenkwong.github.io
Personal website, built with Jekyll.
● HTML ★ 1 Updated 3 days ago

firstname.dev
Forked from CydeWeys/firstname.dev
A list of {firstname}.dev domain names
11 Apache License 2.0 Updated 3 days ago

ftpclient

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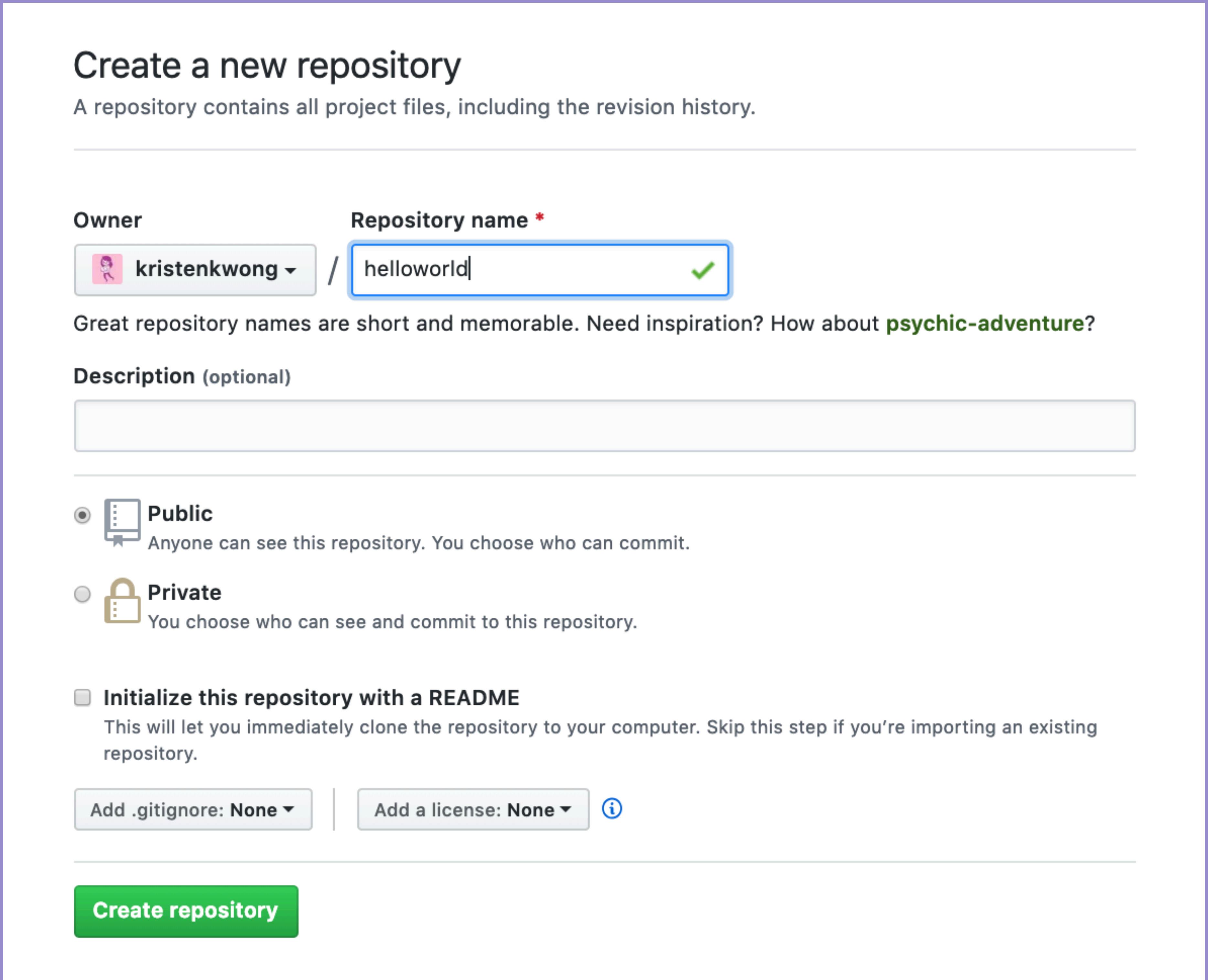

Create a new repository

A repository contains all project files, including the revision history.

Owner kristenkwong ▾ / **Repository name** * helloworld ✓

Great repository names are short and memorable. Need inspiration? How about **psychic-adventure**?

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.

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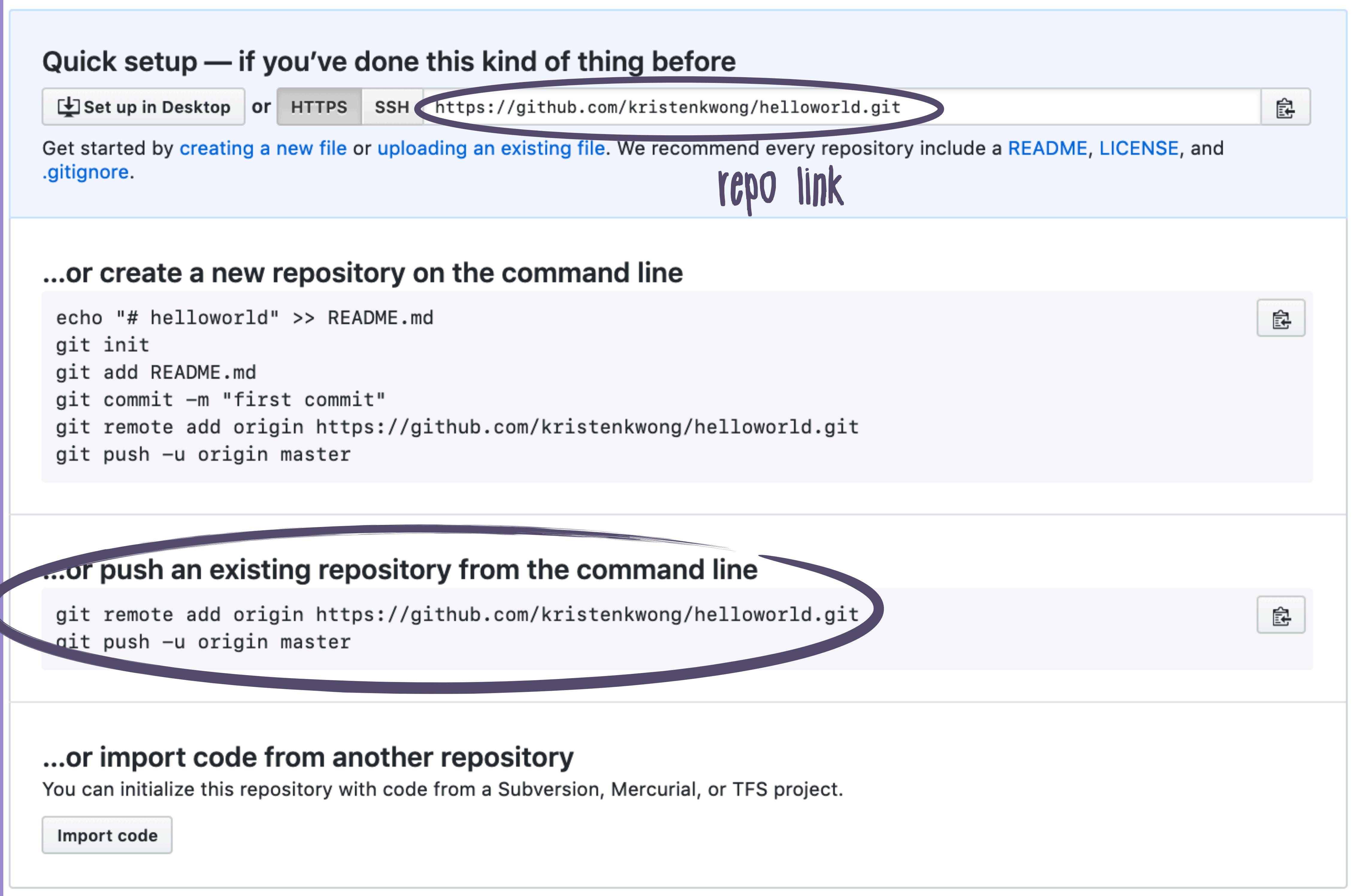

Quick setup — if you've done this kind of thing before

```
https://github.com/kristenkwong/helloworld.git
```

repo link

Get started by creating a new file or uploading an existing file. We recommend every repository include a README, LICENSE, and .gitignore.

...or create a new repository on the command line

```
echo "# helloworld" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin https://github.com/kristenkwong/helloworld.git
git push -u origin master
```

...or push an existing repository from the command line

```
git remote add origin https://github.com/kristenkwong/helloworld.git
git push -u origin master
```

...or import code from another repository

You can initialize this repository with code from a Subversion, Mercurial, or TFS project.

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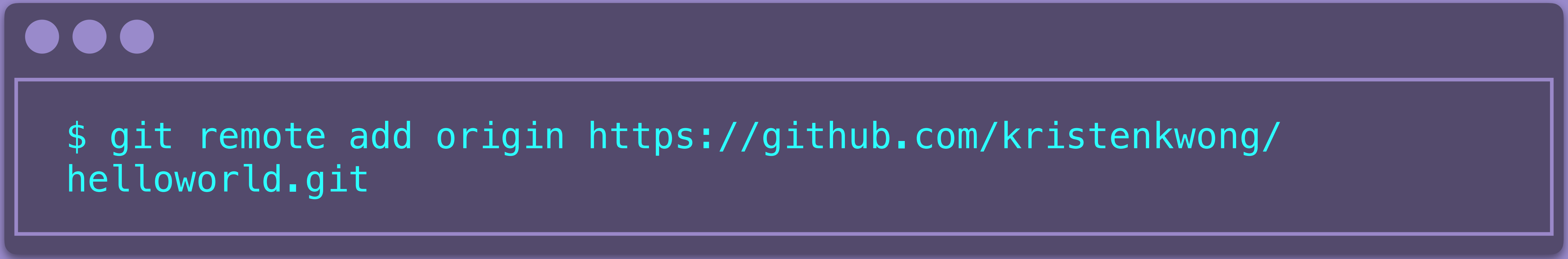
Adding a remote repo

short name

`git remote add origin <server>` connects your local repo with a remote server

repo link goes here



```
$ git remote add origin https://github.com/kristenkwong/
helloworld.git
```

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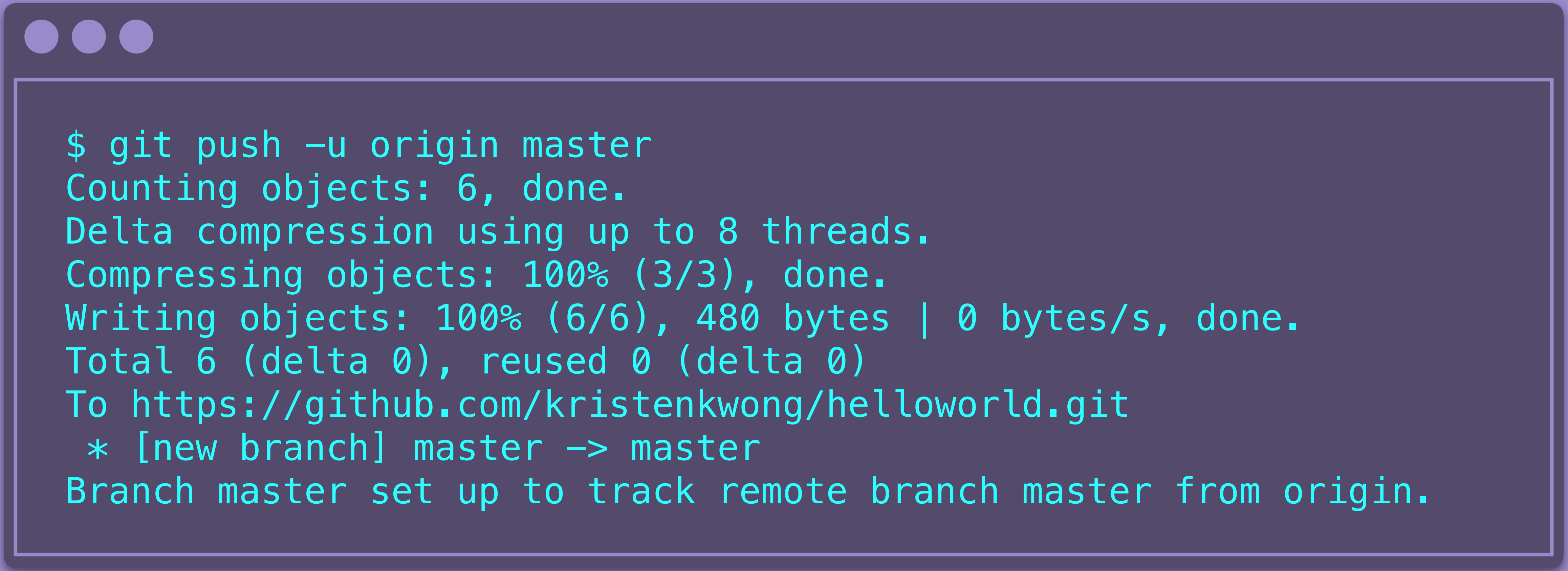
Pushing Code Changes

`git push -u origin master` copies code from the master branch in local to the remote.



```
$ git push -u origin master
Counting objects: 6, done.
Delta compression using up to 8 threads.
Compressing objects: 100% (3/3), done.
Writing objects: 100% (6/6), 480 bytes | 0 bytes/s, done.
Total 6 (delta 0), reused 0 (delta 0)
To https://github.com/kristenkwong/helloworld.git
 * [new branch] master -> master
Branch master set up to track remote branch master from origin.
```

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Pushing Code Changes

set upstream tracking

```
git push -u origin master
```

`-u` makes sure that a tracking connection between the local and remote branch is established.

You can use `git push` to push changes on all upstream branches to the remote.

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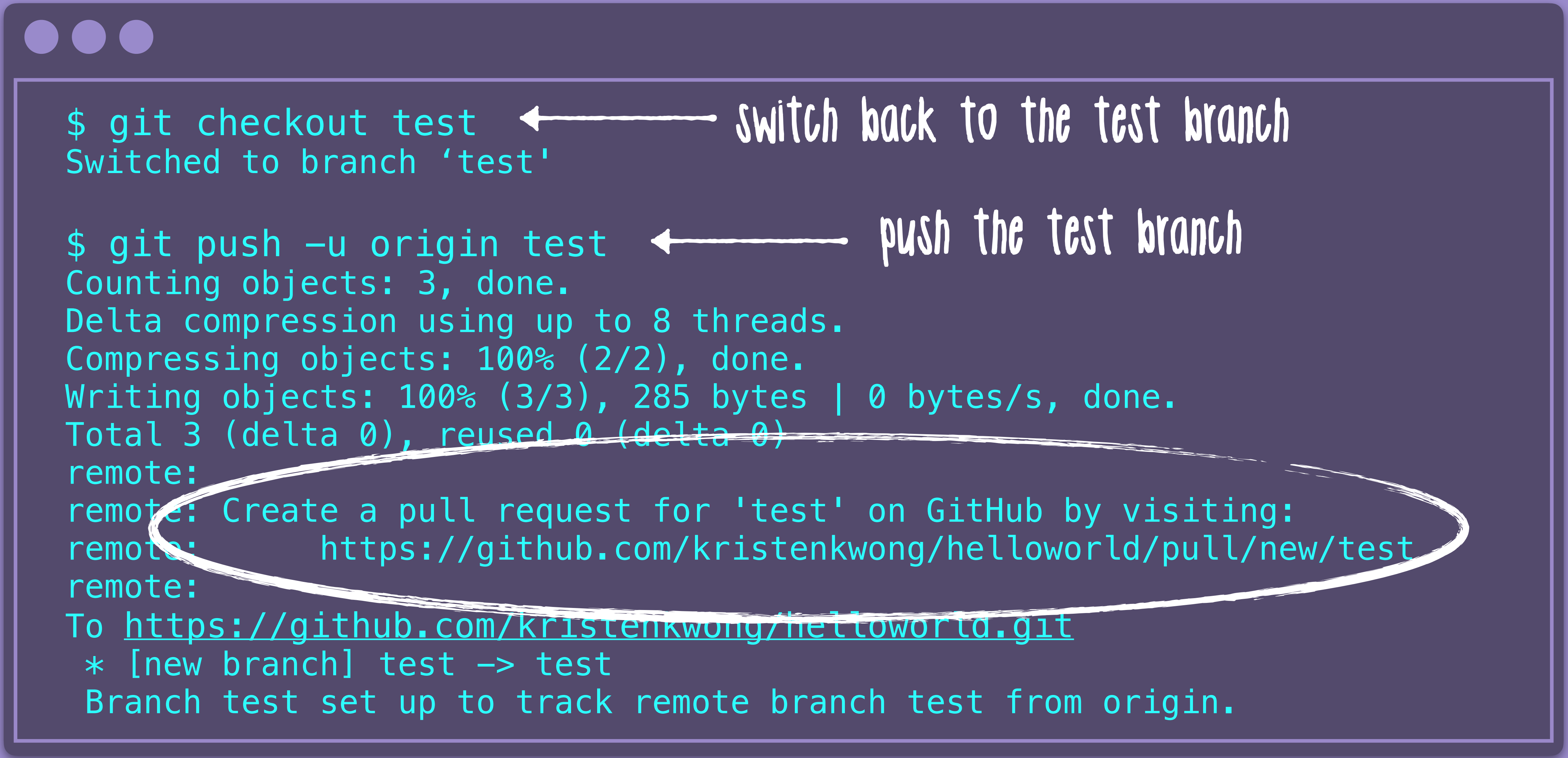
Pushing Branches

Local branches are also not visible on the remote repo unless you use `git push -u origin <branch>`



```
$ git checkout test
Switched to branch ‘test'

$ git push -u origin test
Counting objects: 3, done.
Delta compression using up to 8 threads.
Compressing objects: 100% (2/2), done.
Writing objects: 100% (3/3), 285 bytes | 0 bytes/s, done.
Total 3 (delta 0), reused 0 (delta 0)
remote:
remote: Create a pull request for 'test' on GitHub by visiting:
remote:      https://github.com/kristenkwong/helloworld/pull/new/test
remote:
To https://github.com/kristenkwong/helloworld.git
 * [new branch] test -> test
 Branch test set up to track remote branch test from origin.
```

switch back to the test branch

push the test branch

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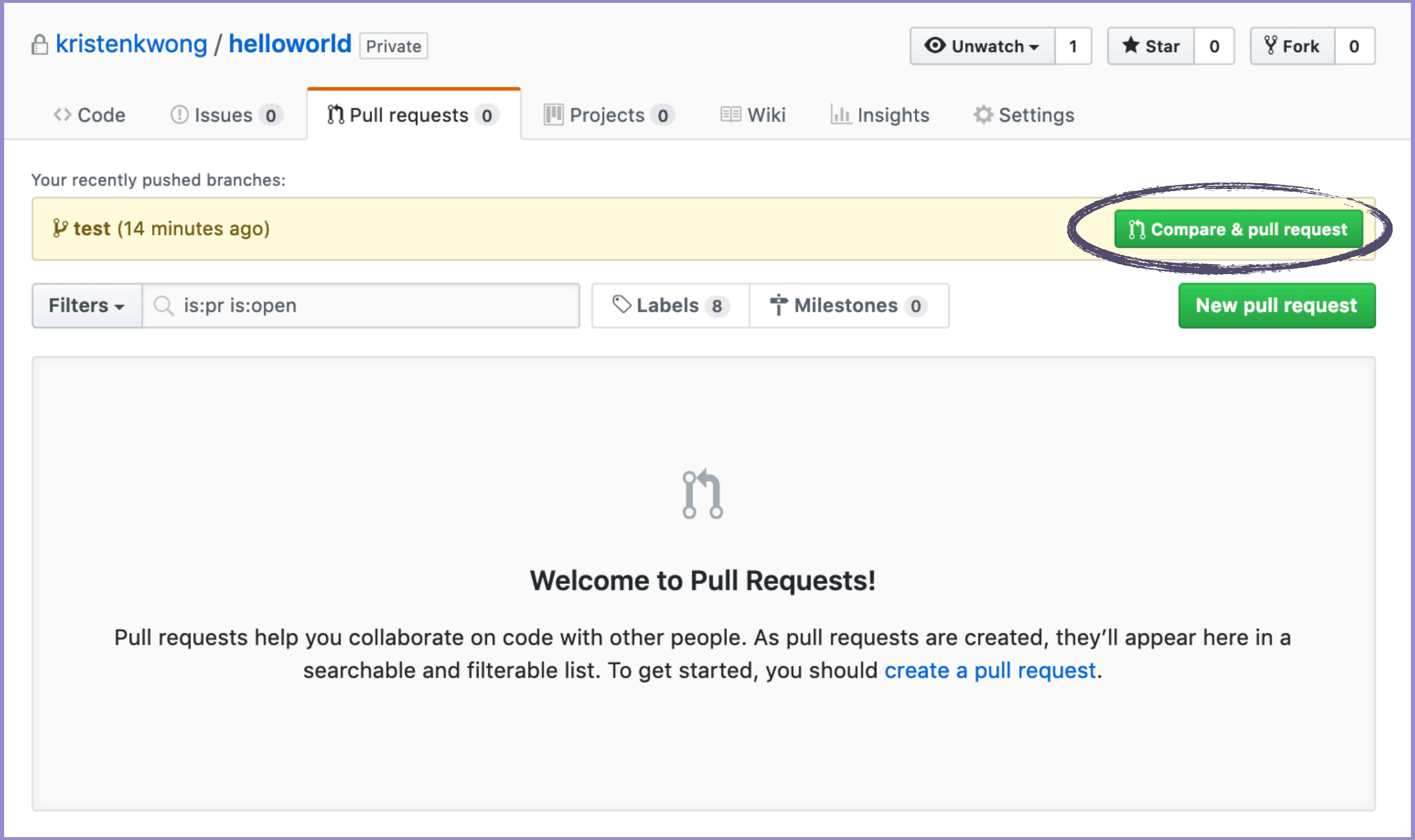
Pull Requests

- ✨ you might want others to review your code before you push to master
- ✨ you might want to share code that’s incomplete
- ✨ it’s also not that great to push to master - might break other people’s code

Pushing Branches

After pushing branch, you can create a pull request to merge it with master.

Making a Pull Request



kristenkwong / helloworld Private

Unwatch 1 | Star 0 | Fork 0

Code | Issues 0 | Pull requests 0 | Projects 0 | Wiki | Insights | Settings

Your recently pushed branches:

test (14 minutes ago)

Welcome to Pull Requests!

Pull requests help you collaborate on code with other people. As pull requests are created, they'll appear here in a searchable and filterable list. To get started, you should create a pull request.

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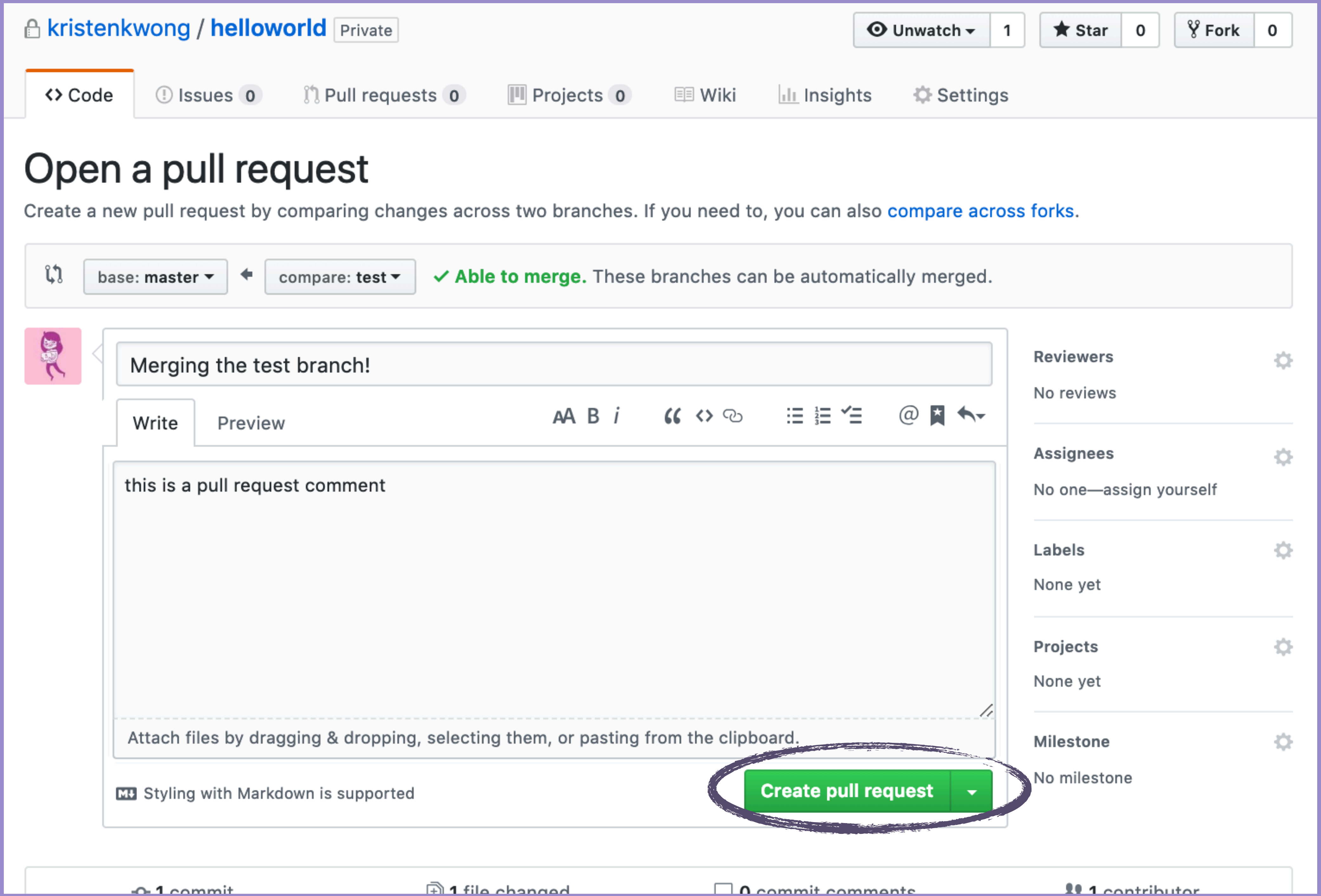
Making a Pull Request



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.

base: master ← compare: test ✓ Able to merge. These branches can be automatically merged.

Merging the test branch!

this is a pull request comment

Attach files by dragging & dropping, selecting them, or pasting from the clipboard.

Styling with Markdown is supported

Reviewers
No reviews

Assignees
No one—assign yourself

Labels
None yet

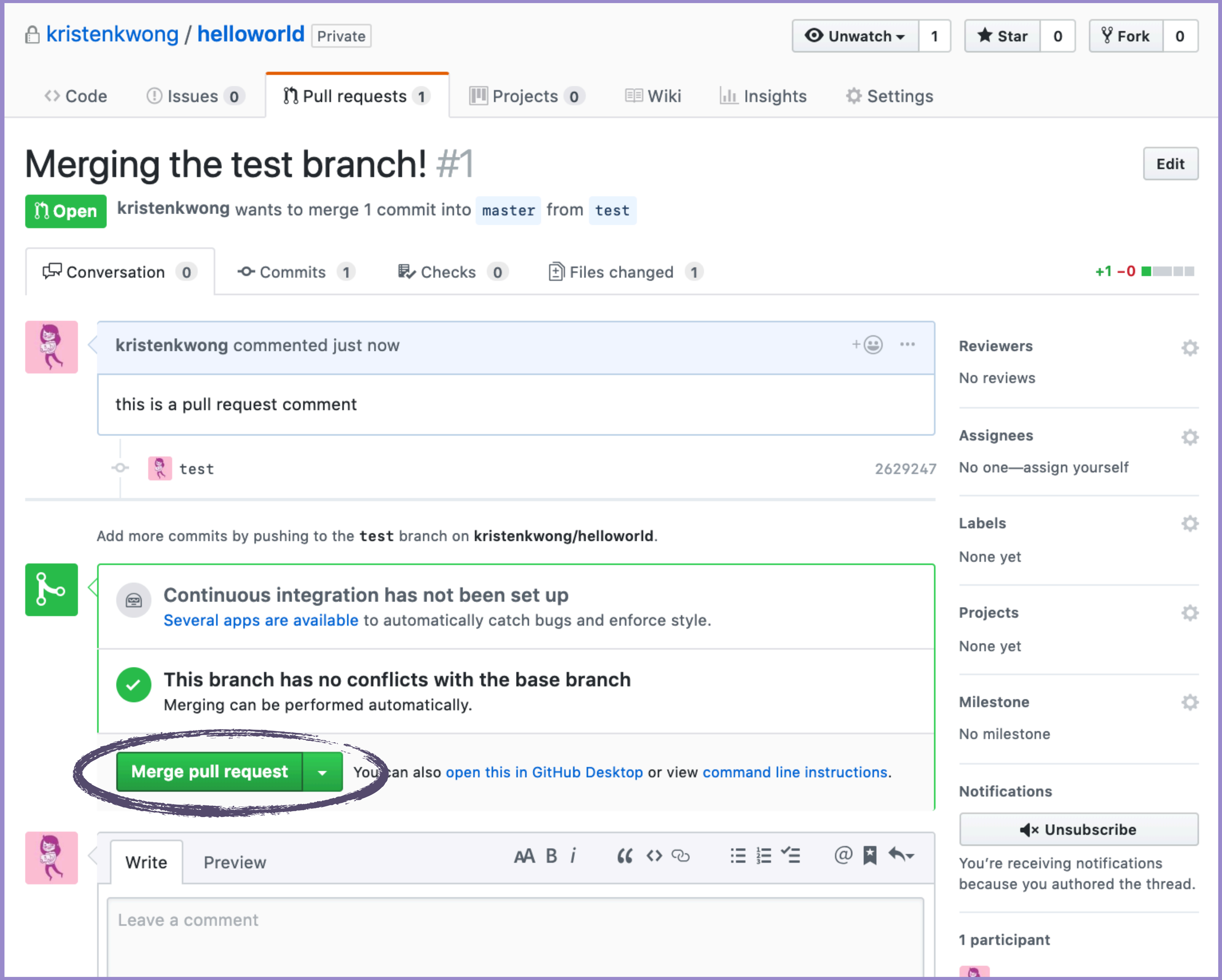
Projects
None yet

Milestone
No milestone

1 commit 1 file changed 0 commit comments 1 contributor

Kristen Kwong, 2020

Merging the Pull Request



kristenkwong / helloworld Private

Unwatch 1 | Star 0 | Fork 0

Code | Issues 0 | Pull requests 1 | Projects 0 | Wiki | Insights | Settings

Merging the test branch! #1

Edit

Open kristenkwong wants to merge 1 commit into `master` from `test`

Conversation 0 | Commits 1 | Checks 0 | Files changed 1 | +1 −0

kristenkwong commented just now

this is a pull request comment

test 2629247

Add more commits by pushing to the **test** branch on **kristenkwong/helloworld**.

Continuous integration has not been set up
Several apps are available to automatically catch bugs and enforce style.

This branch has no conflicts with the base branch
Merging can be performed automatically.

Merge pull request ▾ You can also open this in GitHub Desktop or view command line instructions.

Write | Preview

Leave a comment

Reviewers
No reviews

Assignees
No one—assign yourself

Labels
None yet

Projects
None yet

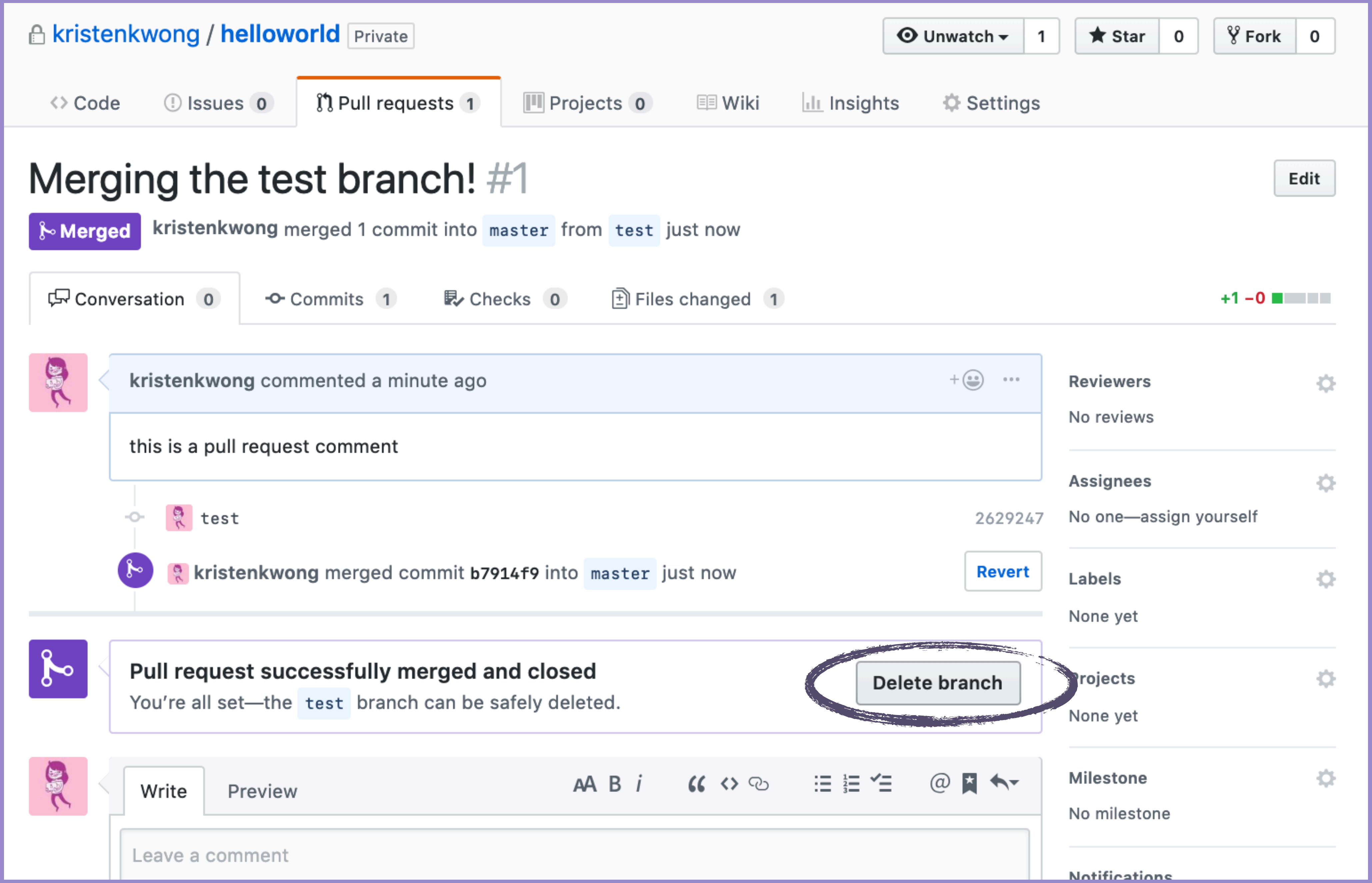
Milestone
No milestone

Notifications
Unsubscribe
You're receiving notifications because you authored the thread.

1 participant

Kristen Kwong, 2020

Merged Pull Request!



kristenkwong / helloworld Private

Merging the test branch! #1

Merged kristenkwong merged 1 commit into `master` from `test` just now

kristenkwong commented a minute ago

this is a pull request comment

test 2629247

kristenkwong merged commit b7914f9 into `master` just now

Pull request successfully merged and closed

You're all set—the `test` branch can be safely deleted.

Reviewers
No reviews

Assignees
No one—assign yourself

Labels
None yet

Projects
None yet

Milestone
No milestone

Notifications

Kristen Kwong, 2020

Getting changes

`git pull origin master` grabs code from the remote master branch to the local. The remote is updated by developers, so pulling is important!

`git pull` will pull code from all upstream branches.

Kristen Kwong, 2020

Onwards!

Foundations ✅

👉🏻 Shortcuts!

Shortcuts & Basic Team Workflow

1. Make a repo right on GitHub. Share link with team.
2. Team members will use `git clone <link>`
3. Someone works on stuff. They push with `git push -u origin <branch>` to the remote.
4. They will make and merge the pull request.
5. Everyone else uses `git pull` to get the changes.
6. Repeat Steps 3 - 5 until project is done ✨

Kristen Kwong, 2020

That's it!

Kristen Kwong, 2020

Where to find me!

✨ Twitter: @kristenkwng

✨ LinkedIn: Kristen Kwong

✨ kristen.dev

✨ Slides: kristen.dev/blog/git