PRECISION HEALTH
ANALYSIS BOOTCAMP

Git(Hub)

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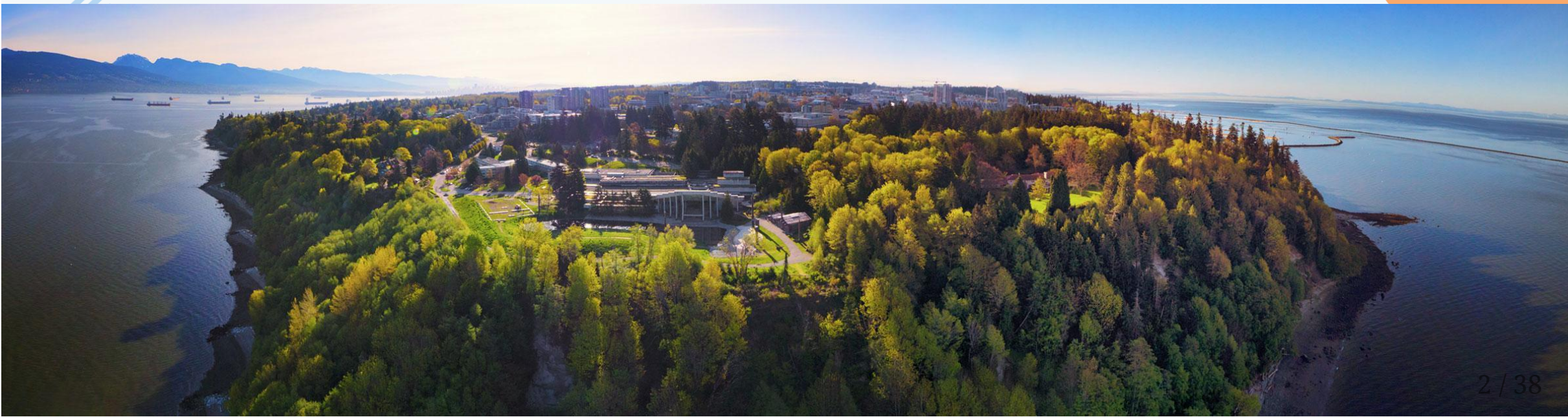
Centre for Heart Lung Innovation

July 26, 2022 | 12:00-14:00

lab (I am hiring!)
workshop material
asingh_22g

PRECISION HEALTH
ANALYSIS BOOTCAMP

We would like to begin by acknowledging that the land on which we gather is the traditional, ancestral, and unceded territory of the xwməθkwəy̓əm (Musqueam) People.



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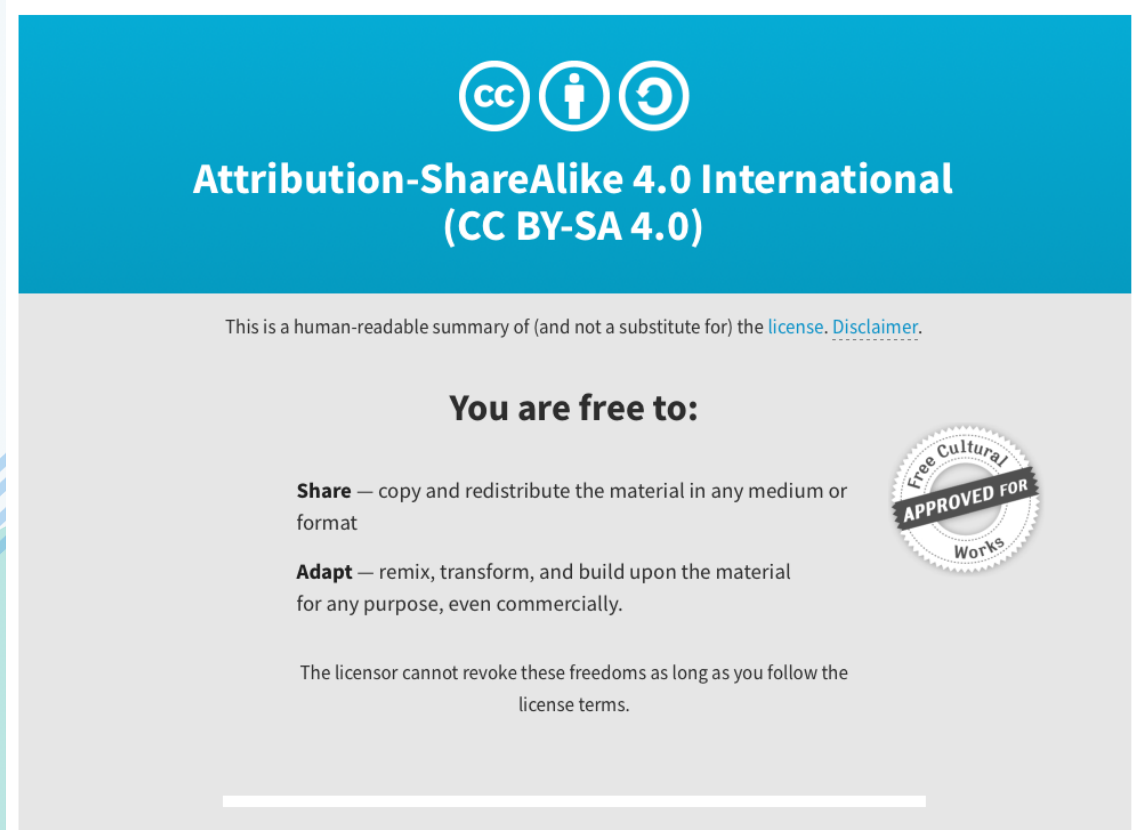

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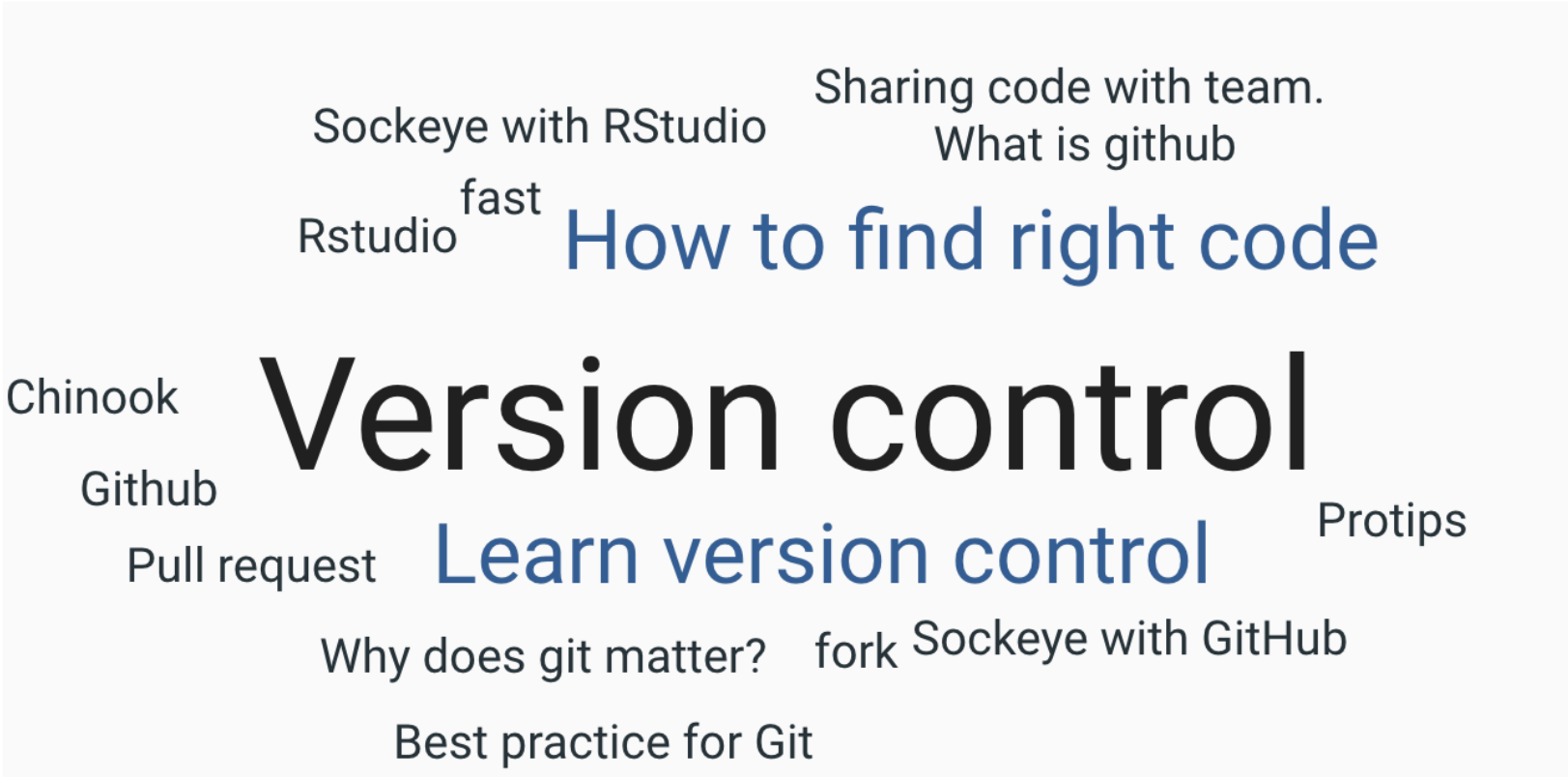
Why are you attending this workshop? What do you hope to learn? 16



Learning outcomes

1. Differentiate between Git and GitHub and be able to setup the connection on sockeye

2. Use git to copy open-source code and test the code locally

3. Make changes and update codebase (including undo)

4. Implement the basics of Git(Hub) Flow

Workshop setup

log into sockeye

- make sure you are connected to vpn
- ARC quickstart

```
ssh <cwl>@sockeye.arc.ubc.ca
```

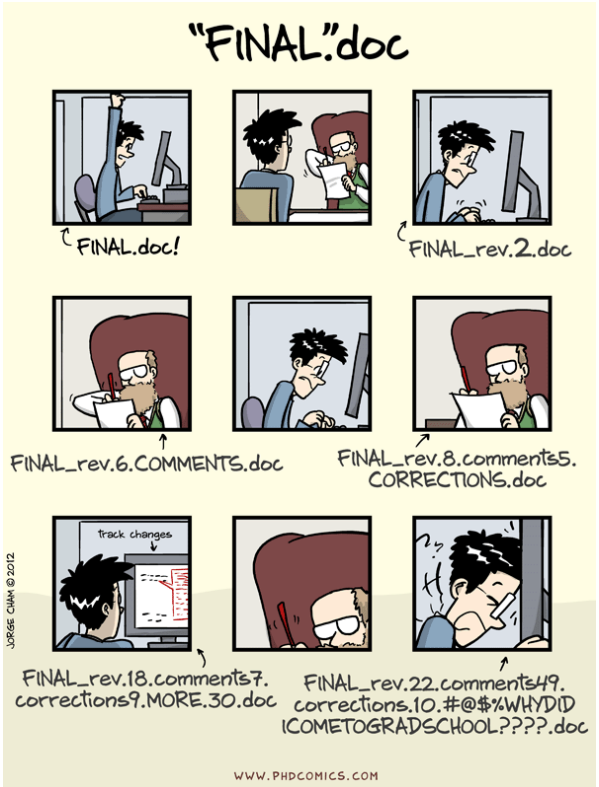
Make your workspace for this workshop

```
mkdir -p /scratch/tr-precisionhealth-1/Workshops/StudentSpaces/$USER/ && cd "$_"
```

Copy starter material for this workshop

```
cp -R /project/tr-precisionhealth-1/PrecisionHealthVirtualEnvironment/Workshops/github/ ./
```

Problem



version control

Solution

git

- distributed version control system

```
module load git
git --version
```

- Git reference
- Git homepage

- code hosting and collaboration platform (website)
- make a GitHub account

GitHub

- use `module avail` to check which software is installed.

Example projects

- React
- PyTorch
- GitHub Pages
- Book
- Manuscript

GitHub features

- README
- issues
- pull requests
- projects
- actions
- wiki
- insights

People behind Git and GitHub

Linus Torvalds

- main developer of the Linux kernel (released in 1991)
- developed Git to maintain the Linux kernel (2005)

Microsoft acquires GitHub

- GitHub: Chris Wanstrath and Tom Preston-Werner
- Microsoft: Satya Nadella

Git configuration

```
git config --global user.name GITHUB_USERNAME
git config --global user.email GITHUB_EMAIL
```

list credentials

```
git config --list
```

git config file location

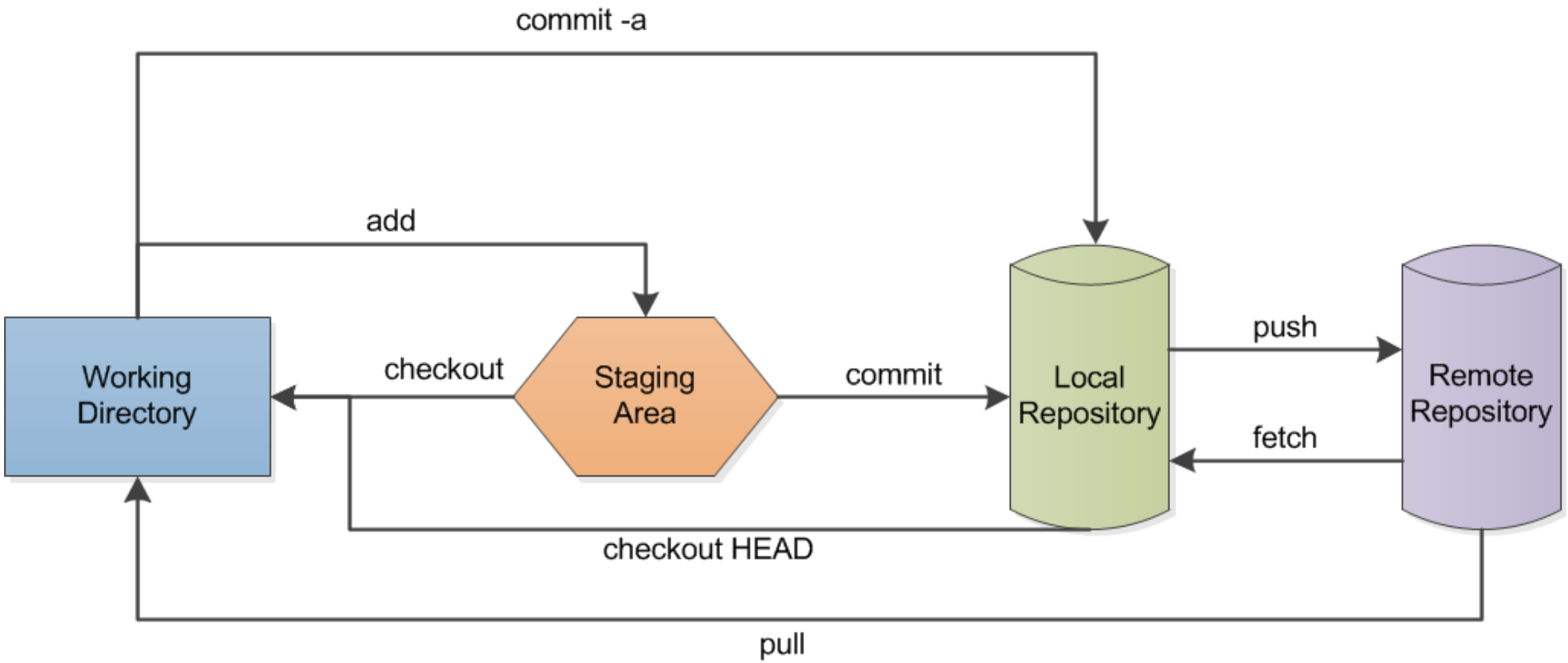
```
git config --show-origin --get credential.helper
```

- manual for every git command

```
git command --help
```

Git Flow

- Git data flow, Lbhtw, and CC-BY-SA-3.0.



Create new or add existing repository (repo) to GitHub

Make remote repo called test

Click here to create new repository.

Create new repo on GitHub

Make local repo

```
mkdir test ## make test folder
cd test ## move into test folder
echo "# test" >> README.md  ## create file
git init  ## initialize git repo
git add README.md  ## move file to staging area
git commit -m "first commit"  ## associate message with change
git branch -M 'main'  ## rename master branch to main
git remote add origin https://github.com/GITHUB_USERNAME/test.git ## add location of remote repo
git push -u origin 'main'  ## update remote repo
git status
```

Username for 'https://github.com': GITHUB_USERNAME Password for 'https://GITHUB_USERNAME@github.com': PERSONAL_ACCESS_TOKEN

- get PERSONAL_ACCESS_TOKEN by going to Profile Pic --> Settings --> Developer Settings on left-side bar --> Personal access tokens --> Generate new token --> Enter name, select repo and hit the Generate token button at the bottom of the page
- Note: Replace remote origin using: git remote set-url origin git://new.url.here
- Try Problem Set 0

Add existing repo to GitHub

Save credentials for future use

```
git config --global credential.helper cache
git config --unset credential.helper  ## unset credentials
```

Add local repo

- delete old repo on Github and locally
- create empty repo on Github named reproducible_analysis_demo
- add a local repo and update remote repo

```
cd reproducible_analysis_demo
git init
git add .
git commit -m "project setup"
git remote add origin https://github.com/GITHUB_USERNAME/reproducible_analysis_demo.git
git branch -M 'main'
git push -u origin 'main'
git status
```

- Try Problem Set 1

Copy remote repo

navigate to working directory

```
cd /scratch/tr-precisionhealth-1/Workshops/StudentSpaces/$USER/github
```

- use `pwd` to check current location

clone remote repository

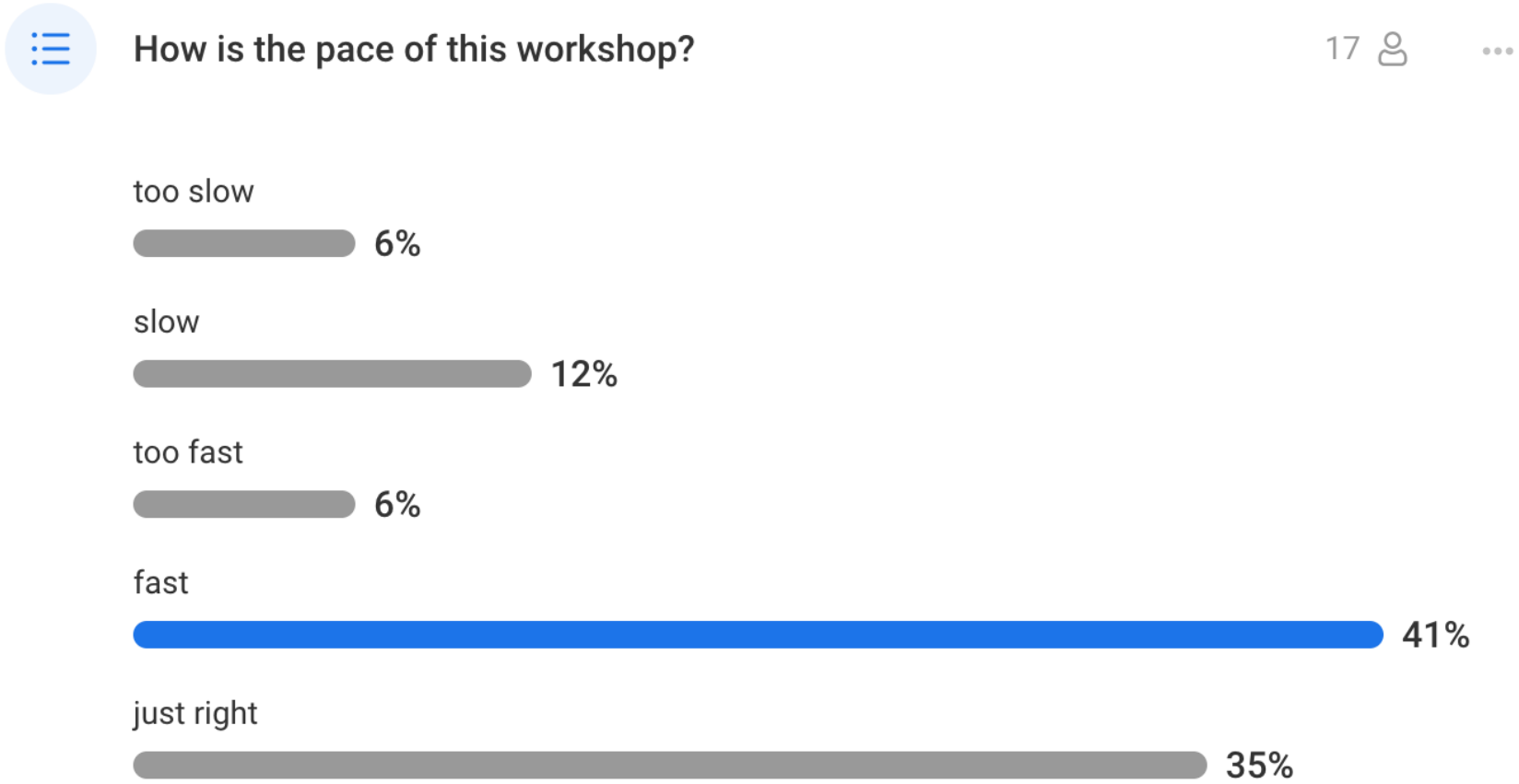
```
git clone https://github.com/GITHUB_USERNAME/REPO_NAME.git
```

- Try Problem Set 2a: clone public repo
- Try Problem Set 2b: clone private repo

Master --> Main

In June 2020, GitHub announced that is was moving the default branch name from `master` to the more neutral name, `main`. GitLab followed suit in a few months later. Tobie Langel makes the salient point on why changing the name is a good thing:

Pulse check


How is the pace of this workshop?
17
too slow
6%
slow
12%
too fast
6%
fast
41%
just right
35%

Scenario 1: Simplest project workflow

1) make Environment file

create a .env file

- make sure you are in reproducible_analysis_demo/

```
vi .env
```

- hit "i" on keyboard then add the following to .env

```
PASSWORD=top_secret_code
```

- hit "Esc" then type ":wq" (write quit) then hit Enter on keyboard

2) ignore large files

add .env to .gitignore

```
ls -la
git status
vi .gitignore
```

- hit "i" on keyboard then add the following to .gitignore

  > .env

- hit "Esc" then type ":wq" (write quit) then hit Enter on keyboard

GitHub size limits

Scenario 1: Simplest project workflow

3) save local repo and update remote repo

save changes locally

```
git status
git add .
git commit -m "add env vars and ignore file"
```

- how to write a good commit message

save changes to remote

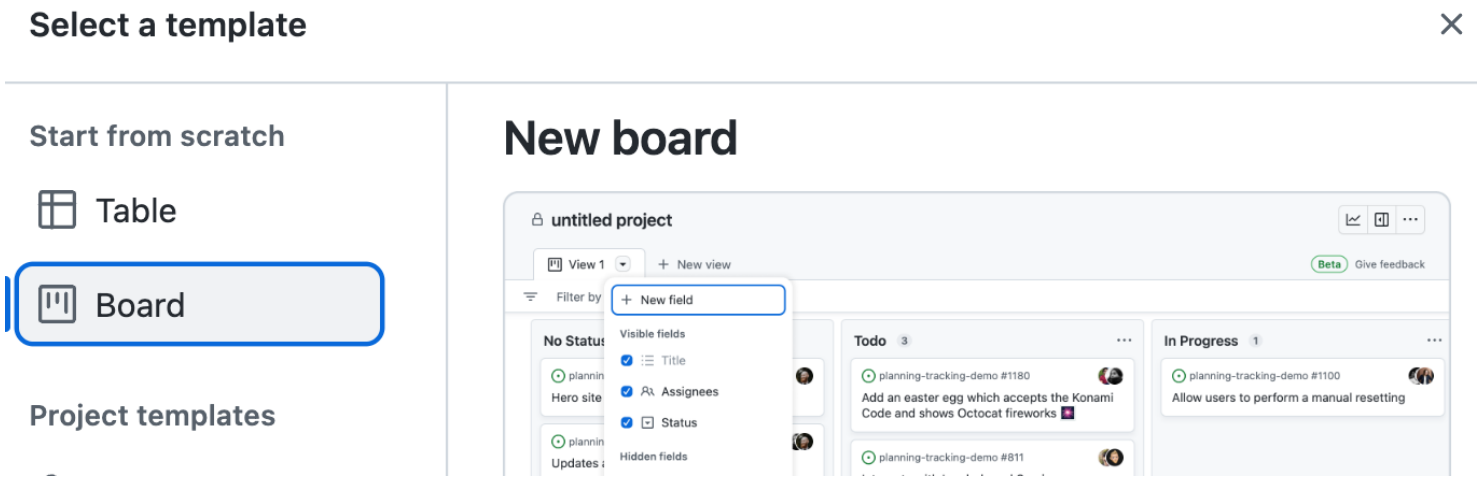
```
git push origin main
```

- undo a commit
- Try Problem Set 3

Scenario 2: Feature development (self/team)

1) use GitHub to manage project

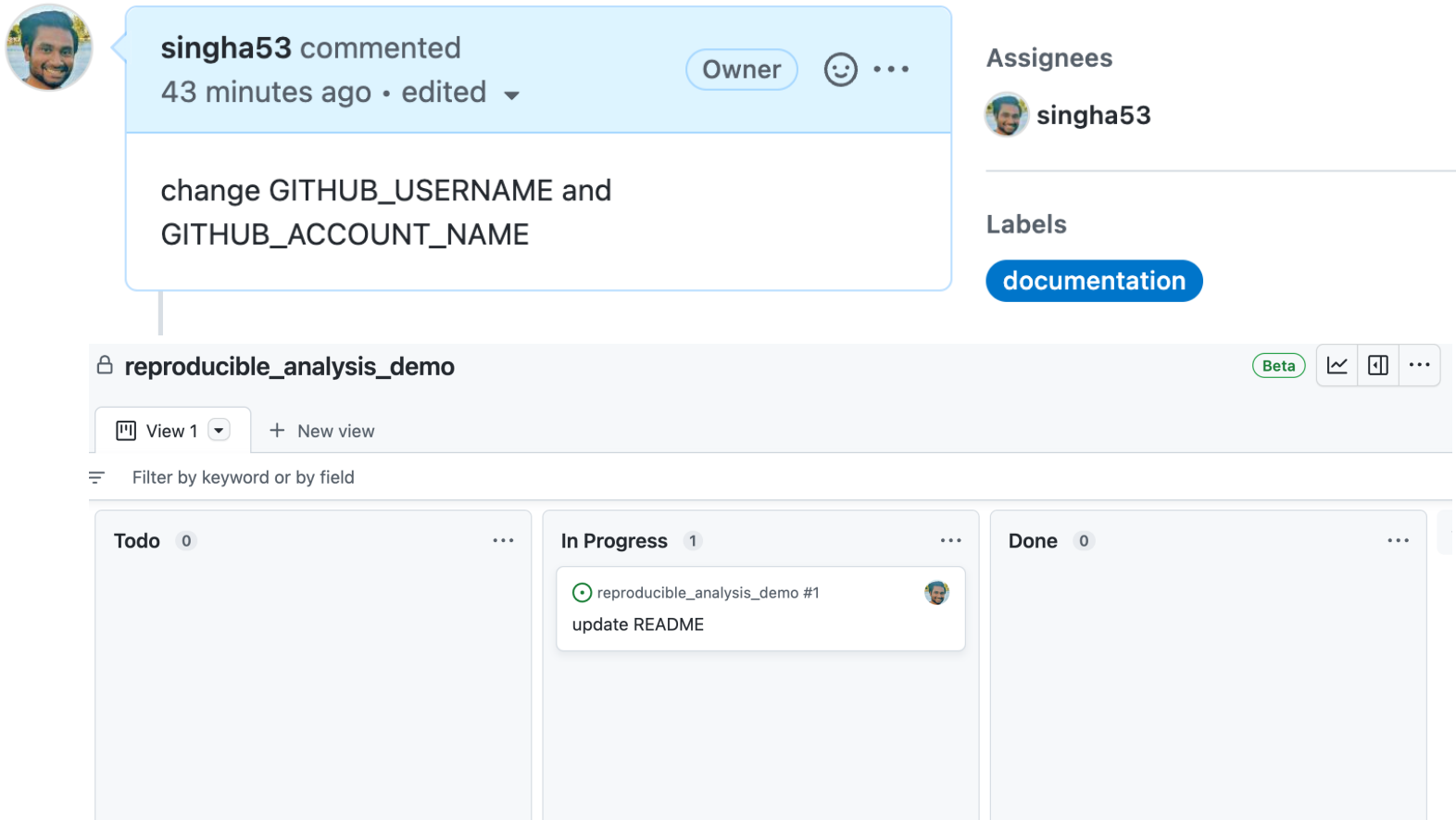
- make a new issue
  - subject: update README
  - description: change GITHUB_USERNAME and GITHUB_ACCOUNT_NAME
- make a new project board



update README #1

Edit | New issue

Open **singha53** opened this issue 43 minutes ago · 0 comments



2) Create a new branch to work on an issue

```
git branch
git checkout -b readme  ## git checkout -b BRANCH_NAME
git branch
```

- Try Problem Set 4

2) Move between branches

```
git checkout main
git checkout readme
```

3) see log of changes

```
git log
```

make changes to repo

```
vi README.md
```

- hit "i" on keyboard and change GITHUB_USERNAME and GITHUB_ACCOUNT_NAME
- hit "Esc"
- type ":wq" (write quit) then hit Enter on keyboard

check which changes were made

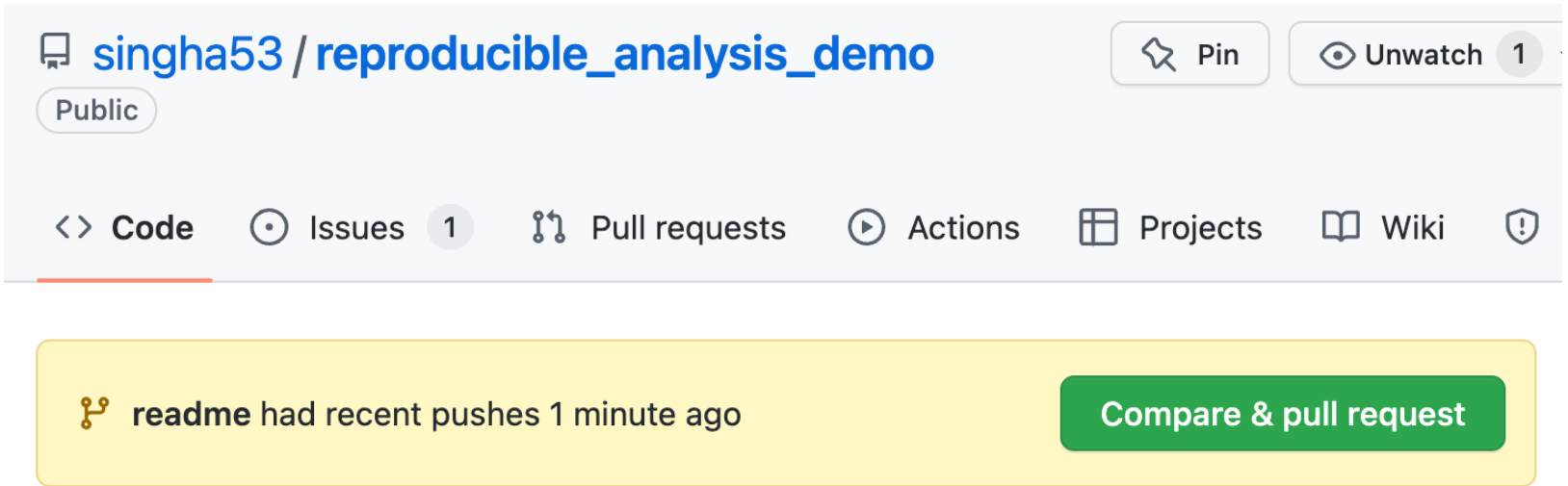
```
git diff
git status
```

Code review prior to merging into main repo (Pull Request)

update local and remote repo

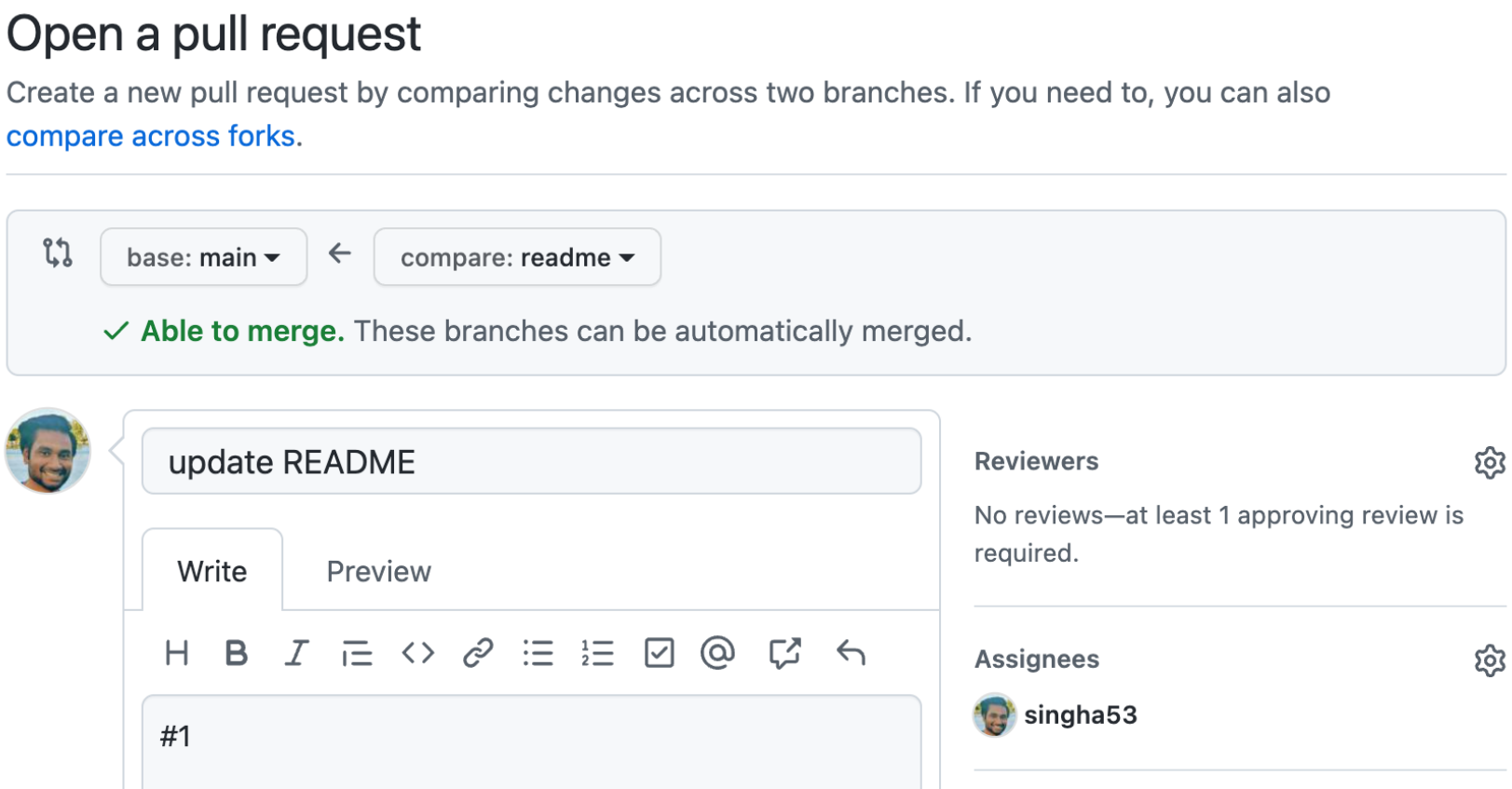
```
git add .
git commit -m "update README"
git push origin readme
```

- Try Problem Set 5



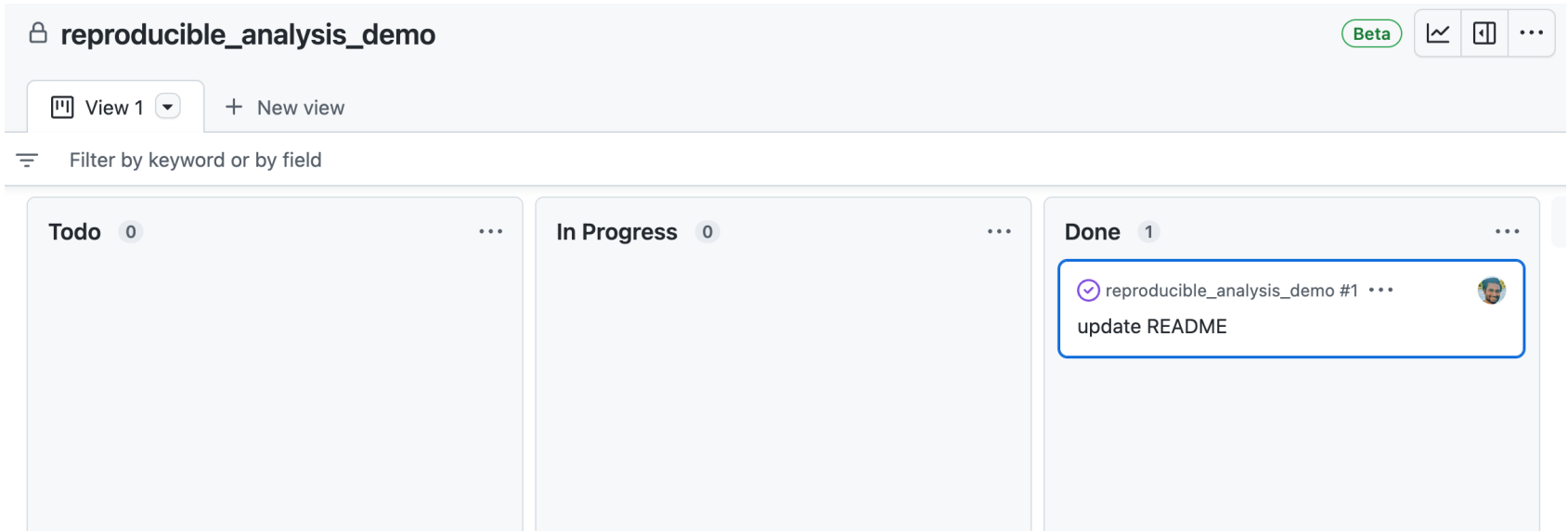
Pull Request (PR)

- write a PR
- reference issue



Pull Request (PR)

- merge PR
- close issue and move to done



- GitHub Flow
- Try Problem Set 6

Reflect remote changes locally

- move to main branch

```
git checkout main
```

- pull changes from remote branch

```
git pull origin main
```

- delete feature branch

```
git branch -d readme
```

Resources

Slides

- xaringan

Git(Hub)

- Get Git!
- Let's Git started
- .gitignore
- GitHub Actions
- Git cheatsheet

Problem Set

PS0) Turn a folder into a git repo (initialize) and then uninitialize. Solution

PS1) Create a Github repo named 'reproducible_analysis_demo' with README.md, .gitignore and MIT License. Create a local repo named 'reproducible_analysis_demo'. Push changes to github. Solution

PS2a) Clone this public repo repo and play hangman. Solution

PS2b) create private repo on github and clone to local machine.Solution

PS3) For a given up-to-date github repo do the following: Solution

- commit a file then undo commit
- commit and file then push to remote then revert to previous commit

PS4) Branching: Solution

- create new branch but stay on existing branch
- make a new branch and move to new branch

PS5) To prevent modifying the main branch directly, add protection. Solution

PS6) Revert a pull request. Solution

Solutions

Solution to PS0: Turn a folder into a git repo (initialize) and then uninitialize.

initialize git repo

```
mkdir test
cd test
git init
git status
ls -la
```

uninitialize git repo

```
rm -rf .git
git status
```

Solution to PS1: Create a Github repo named 'reproducible_analysis_demo' with README.md, .gitignore and MIT License. Create a local repo named 'reproducible_analysis_demo'. Push changes to github.

```
git pull origin main --allow-unrelated-histories
```

- fix merge conflicts in README.md
- open README.md (vi README.md) and remove comments (hit dd on keyboard)

```
<<<<<<< HEAD

>>>>>>> committag
```

- hit ':wq' to write and quit
- commit changes and push to remote

```
git add .
git commit "fix merge conflicts"
git push origin main
```

Solution to PS2a: Clone this public repo repo and play hangman

Clone repo

```
git clone https://github.com/salifm/cli-games.git
cd cli-games
cd Hangman
```

play game

```
module spider node
module load node-js
node hangman.js
```

Solution to PS2b: Clone private repo

- create repo with README on github
- clone repo

Method 1

```
git clone https://github.com/GITHUB_USERNAME/REPO_NAME.git
```

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Method 2

```
git clone https://GITHUB_USERNAME:PERSONAL_ACCESS_TOKEN@github.com/GITHUB_USERNAME/REPO_NAME.git
```

Solution to PS3: Undo commit

commit a file then undo commit

```
mkdir test
cd test
git init
touch README.md
git add README.md
git commit -m "initialize repo"
touch anotherfile.txt
git add anotherfile.txt
git commit -m "add another file"
git log
```

a) revert to previous commit and remove changes

```
git reset --hard HEAD~1
```

b) revert to previous commit and retain changes

```
git add anotherfile.txt
git commit -m "add another file"
git log
git reset --soft HEAD~1
```

Solution to PS4: Branching

create new branch but stay on existing branch

```
git branch BRANCH_NAME
```

make a new branch and move to new branch

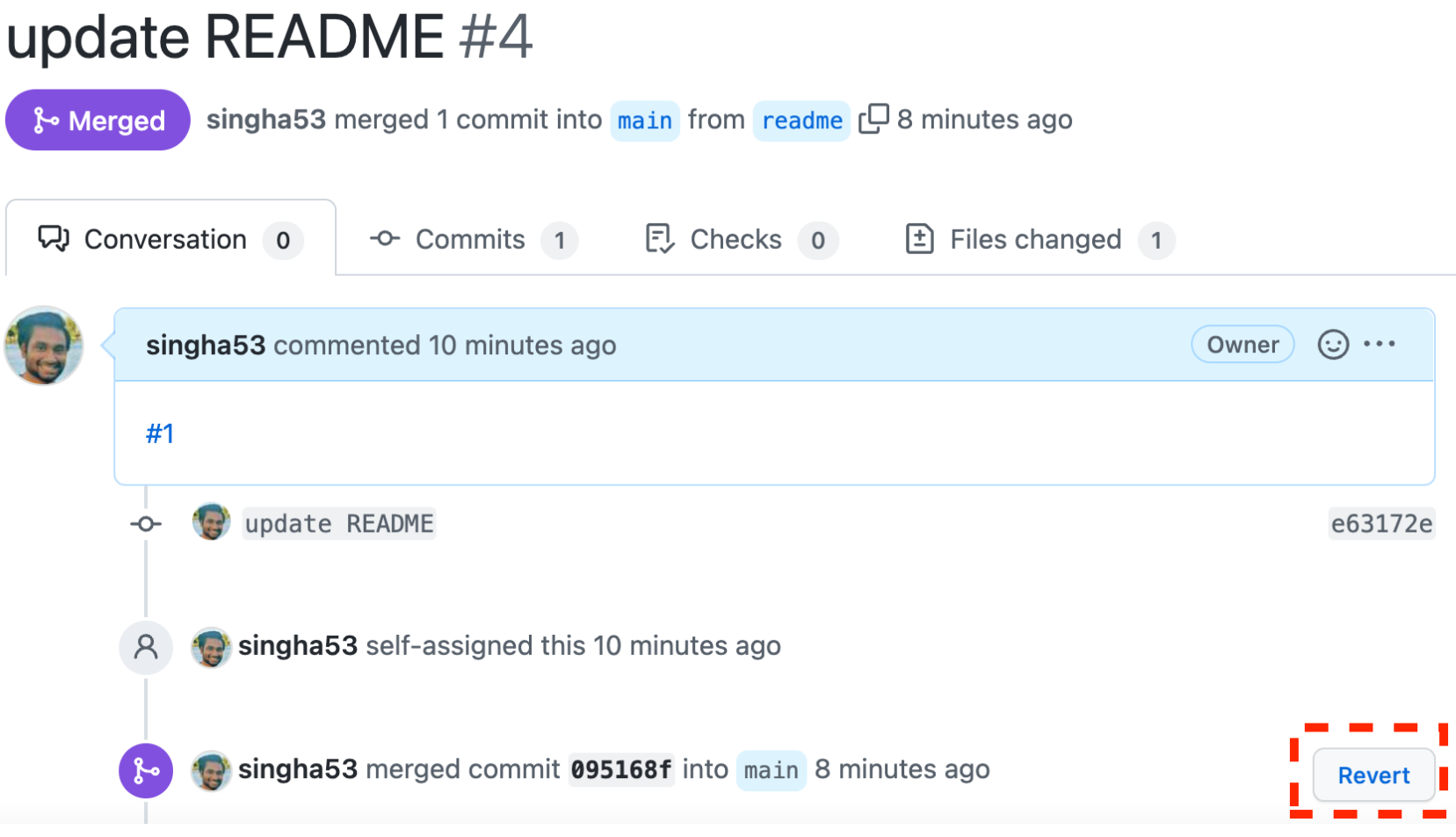
```
git checkout -b BRANCH_NAME
```

Solution to PS5: Protect master branch

- Settings --> Braches (under Code and automation) --> Add branch protection rule
- Branch name pattern: main
- select **Require a pull request before merging**
- caveat: PRs makers can approve their own PRs

Solution to PS6: Revert Pull request

- click on revert button which create another PR to undo changes



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THANK YOU!

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