Lecture 2: Data Management and Version Control, Git/GitHub

LING 1340/2340: Data Science for Linguists

Na-Rae Han

Objectives

- Tools:
  - Git and GitHub
- To-do #1
  - How was Git?

You should be taking NOTES!

First thing to do every class

1. Open up a Terminal/Git Bash window ("shell" window).
2. Move into your Data_Science directory.

   `cd Documents/Data_Science`

   Hit TAB for auto-completion.

3. Make sure you are in the right directory.

   `pwd`

   "Print Working Directory"

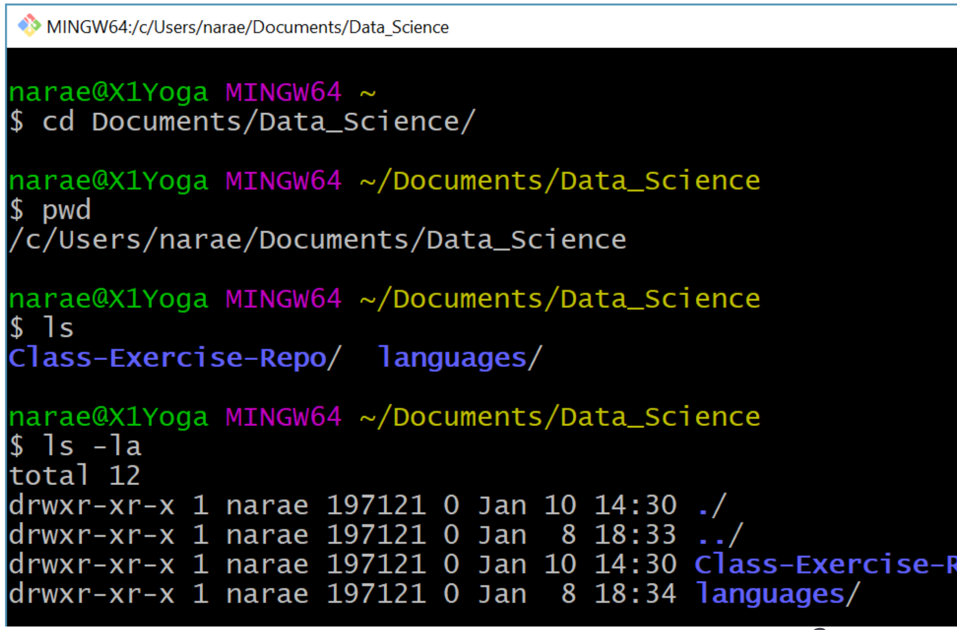
4. Look at what's inside the directory.

   `ls`

   or

   `ls -la`

   `ls` for "list directory".
   `-la` for "long/all". Shows all hidden files in long output.



MINGW64:/c/Users/narae/Documents/Data_Science

```
narae@X1Yoga MINGW64 ~
$ cd Documents/Data_Science/

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ pwd
/c/Users/narae/Documents/Data_Science

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ ls
Class-Exercise-Repo/  languages/

narae@X1Yoga MINGW64 ~/Documents/Data_Science
$ ls -la
total 12
drwxr-xr-x 1 narae 197121 0 Jan 10 14:30 ./
drwxr-xr-x 1 narae 197121 0 Jan  8 18:33 ../
drwxr-xr-x 1 narae 197121 0 Jan 10 14:30 Class-Exercise-R
drwxr-xr-x 1 narae 197121 0 Jan  8 18:34 languages/
```

Your first local repository: getting started (To-do #1)

Follow steps in Tutorial Part 1, Creating a Repository

1. Create a directory called "languages". Move into it.
2. Initiate it as a Git repository:

   `git init`

3. Create a new text file 'zulu.txt', add lines to it
4. Add files to staging area:

   `git add zulu.txt`

5. Commit the change:

   `git commit -m "started zulu"`

6. Edit the text file again
7. Add files to be committed:

   `git add zulu.txt`

8. Commit the change:

   `git commit -m "details on…"`

Check status between steps:
`git status`

Check changes, history:
`git diff`
`git log`

Your first local repository: tracking, history

Steps in Tutorial Part 1: Tracking Changes, A Commit Workflow, and Exploring History.

- To view entire version history:

```
git log
```

- To view changes:

```
git diff
git diff HEAD~1 file.txt
git diff --staged
```

- To view what changed in a particular version:

```
git show HEAD~1
```

If thrown into pagination,
use SPACE to page down, q to quit.

- To scrap new changes since the last commit:

```
git checkout HEAD file.txt
```

- To restore an earlier version:

```
git checkout VERSION file.txt
```

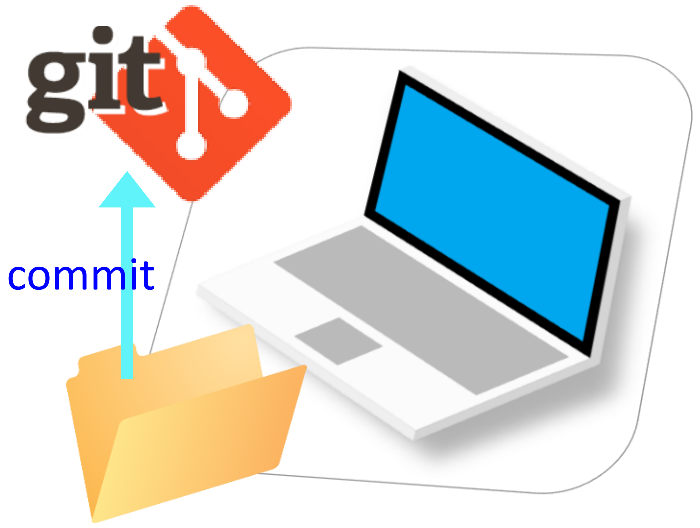
🡸 commit to make this the new HEAD

HEAD: the last committed version
HEAD~1: one before that

To-do #1: Your first local repository

- Your directory `languages/` was set up with a **Git repository**.

- `languages/` is now:
  - tracked by Git
  - all changes will be documented
  - able to revert back to earlier version, if needs be

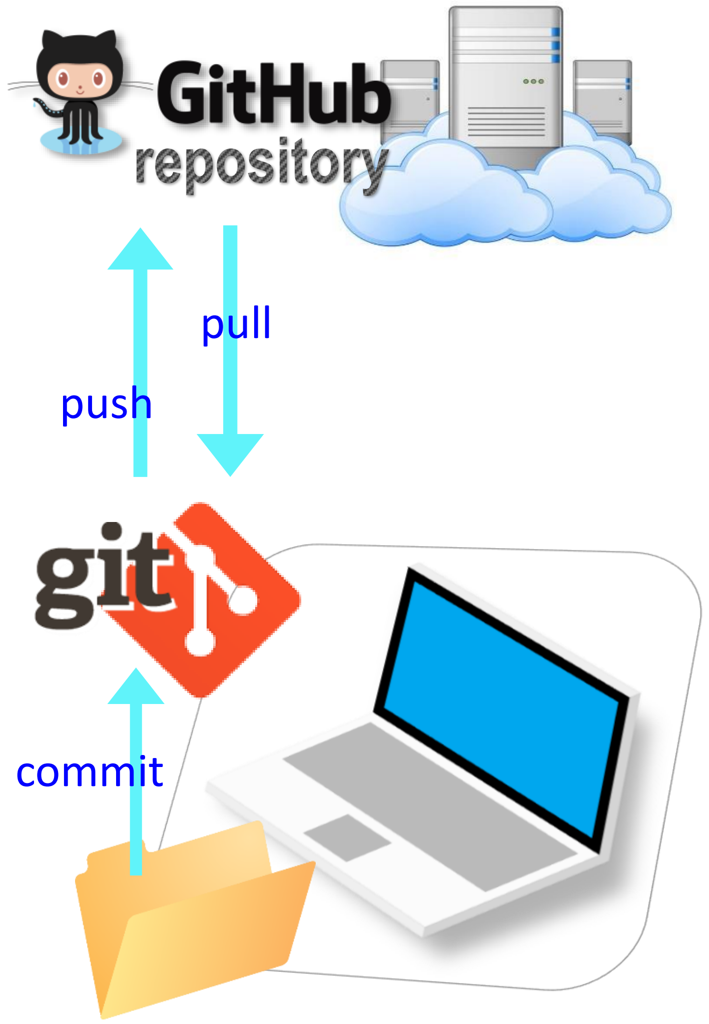


- But is this all?
  - How about backup? collaboration? social?

GitHub: a *remote* repository

- This is where **GitHub** comes in.

- GitHub is a **repository hosting service**.
  - A website where you can keep a copy of your Git repository.
  - REMOTE repository on GitHub, LOCAL repository on your laptop.
  - Great way to backup, and also showcase your work



Setting up GitHub

- Create a GitHub account at https://github.com/
  - Use your **Pitt email address.**
  - If you already have an account with a different email, add your Pitt email to your account.
  - GitHub sends you a verification email. Confirm.

    ← The verification email might go to the SPAM folder. You MUST resolve and verify!

- You get your own profile page. This is mine:
  - https://github.com/naraehan
  - Check your URL!
  - I also have a secondary "student" account: https://github.com/narae-student

Setting up a remote ("GitHub") repo

- There are TWO main methods of setting up a remote GitHub repo.

Scenario 1: Your laptop already has an **existing LOCAL Git repo**. You configure it to link it up to a new, empty repo on GitHub, then push up the content.

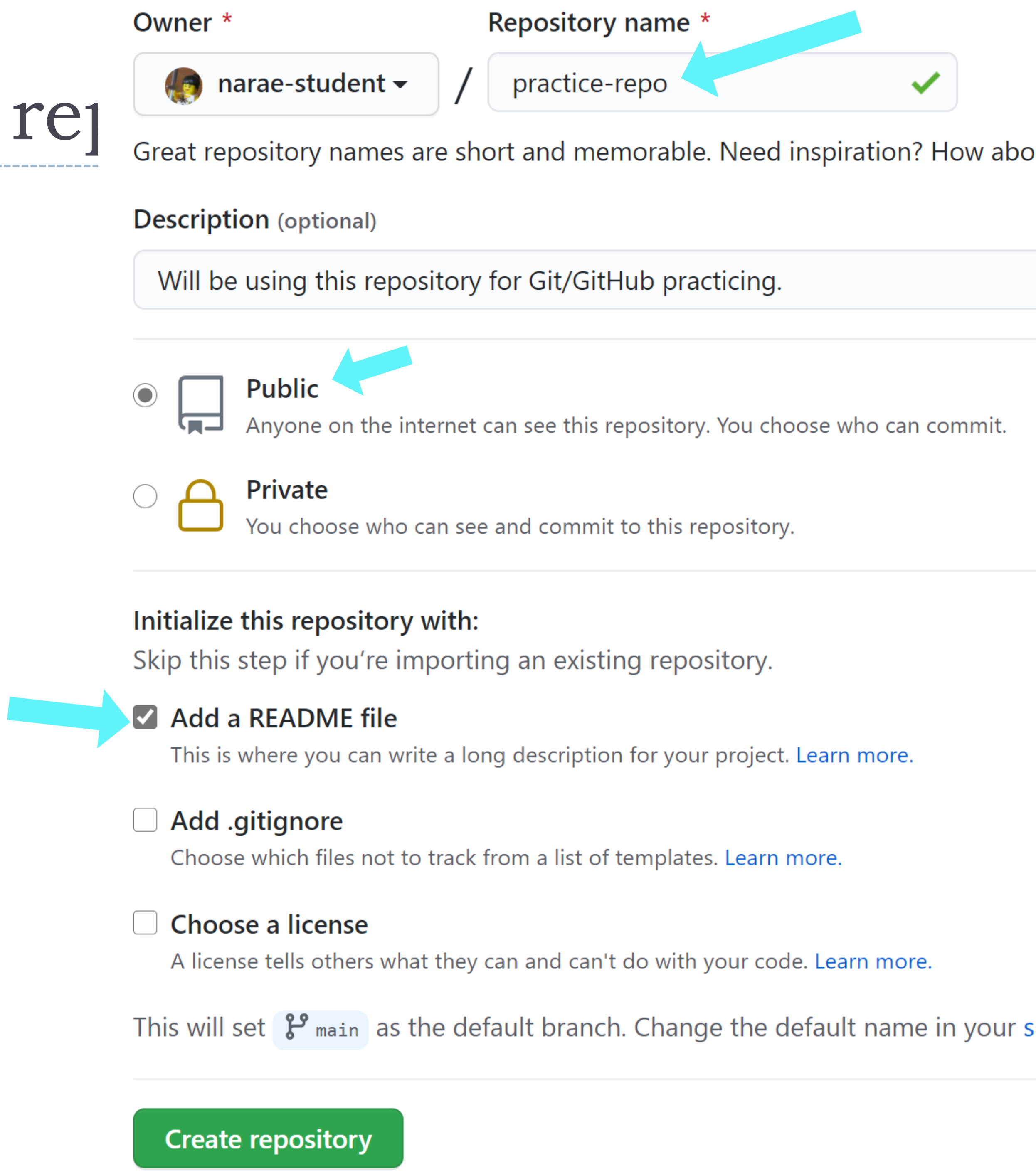
- We can set up our `languages` repo with a GitHub repo this way.
- My LSA tutorial Part 2 Linking Git with GitHub goes this route.

Scenario 2: Start from remote. Create a **new repository on GitHub**, and then **clone it onto your laptop** as a brand-new local repository.

🡸 Let's try this!

Your first GitHub re

- On GitHub, create a new repository called "practice-repo".
  - Provide a short description.
  - Keep it public.
  - Initialize it with a README.



Owner * narae-student / Repository name * practice-repo ✓

Great repository names are short and memorable. Need inspiration? How abo

Description (optional)

Will be using this repository for Git/GitHub practicing.

[● 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:
Skip this step if you're importing an existing repository.

[✓] Add a README file
This is where you can write a long description for your project. Learn more.

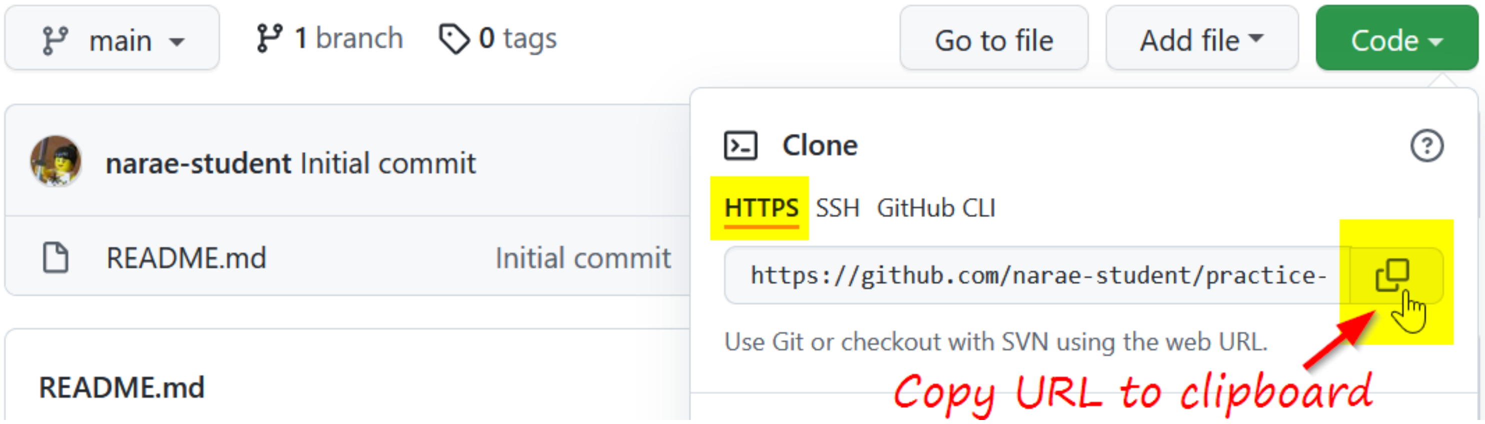
☐ Add .gitignore
Choose which files not to track from a list of templates. Learn more.

☐ Choose a license
A license tells others what they can and can't do with your code. Learn more.

This will set `main` as the default branch. Change the default name in your s

Cloning first GitHub repo

- GitHub shows a URL to use in cloning. Copy to clipboard.



```
https://github.com/narae-student/practice-
```

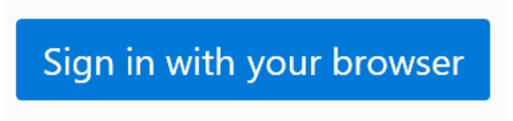
Use Git or checkout with SVN using the web URL.

- In Terminal/Git Bash, move into your Data_Science/ directory (use `cd` command,) then execute (paste copied URL):

```
git clone https://github.com/yourid/practice-repo.git
```

←A "Sign in" window will pop up. Choose "Sign in with your browser" and continue.

←practice-repo directory is cloned as a **local** repository.

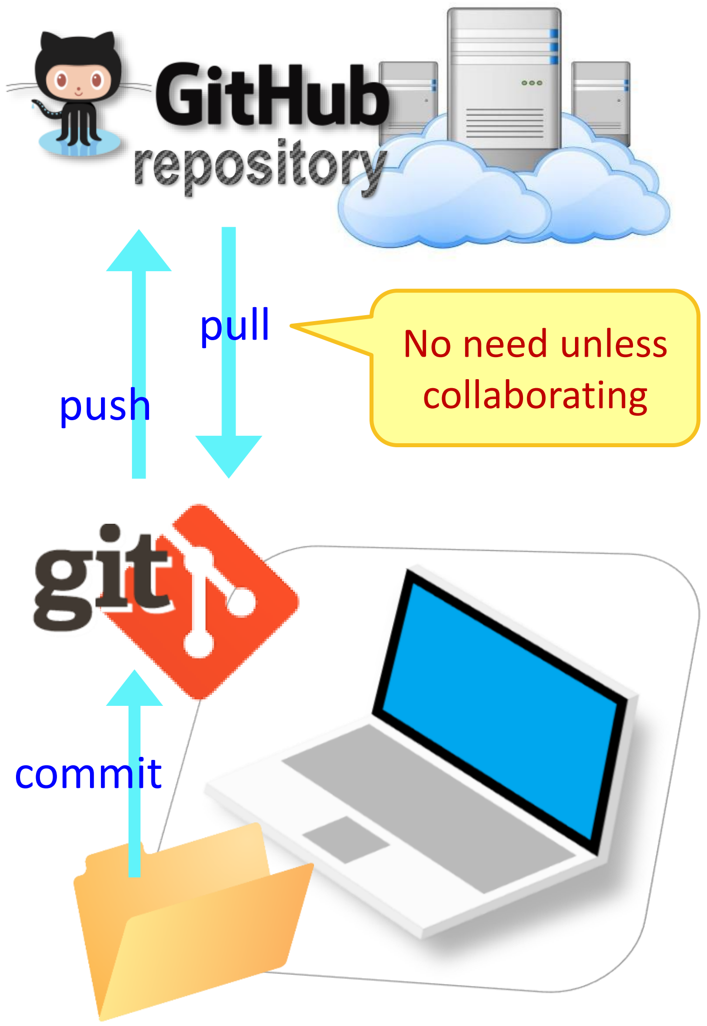


Local repository ↔ remote repository

- After committing, you now need to *push* to remote repo.
  1. Create a new text file 'notes.txt'
  2. Add files to be committed:
     `git add notes.txt`
  3. Commit:
     `git commit -m "first commit"`
  4. **Push change to GitHub: `git push`**
  5. Edit the text file
  6. Add files to be committed:
     `git add notes.txt`
  7. Commit:
     `git commit -m "changed x, y, z"`
  8. **Push change to GitHub: `git push`**

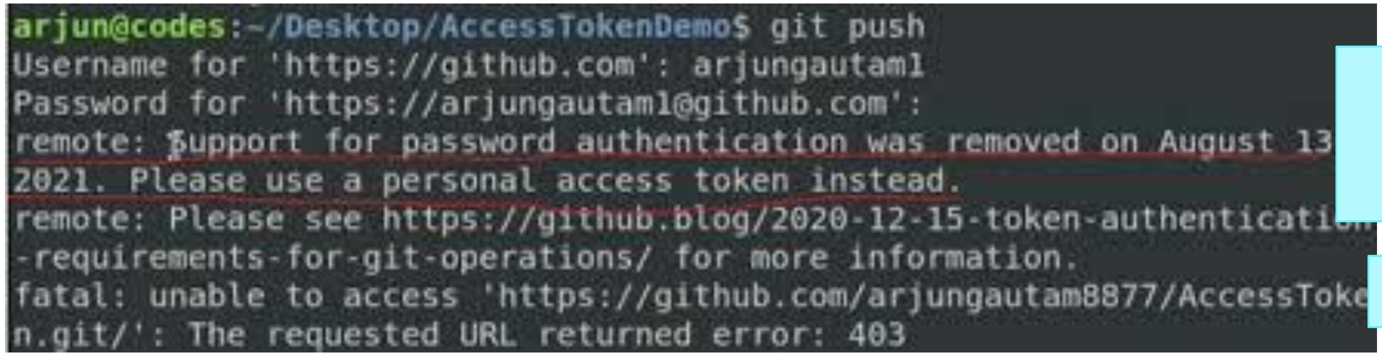
Check frequently:

```
git status
git diff
git log
```



GitHub security vs. you

- If your git push generates an error:

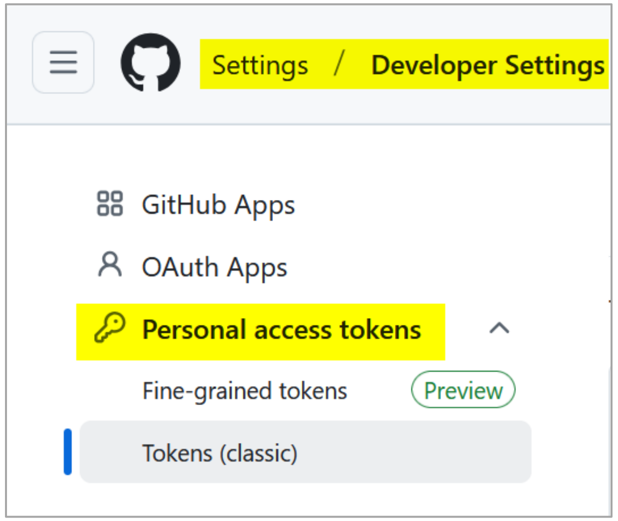


```
arjun@codes:~/Desktop/AccessTokenDemo$ git push
Username for 'https://github.com': arjungautaml
Password for 'https://arjungautaml@github.com':
remote: Support for password authentication was removed on August 13
2021. Please use a personal access token instead.
remote: Please see https://github.blog/2020-12-15-token-authenticati
-requirements-for-git-operations/ for more information.
fatal: unable to access 'https://github.com/arjungautam8877/AccessToke
n.git/': The requested URL returned error: 403
```

"support for password authentication was removed... Please use..."

Happens on Macs.

- You have to use your "**Personal Access Token**" instead of your GitHub password.
  - Go to your settings page: https://github.com/settings/profile
  - Click "< > Developer settings" on the left, all the way at the bottom
  - "Personal access tokens", then "Tokens (classic)"
  - Generate a new personal access token. Select all scope.
  - Copy the token, paste it in instead of your password with git push.
  - Your Personal Access Token will be cached for a while, no need to enter it every time you push.



5 minutes

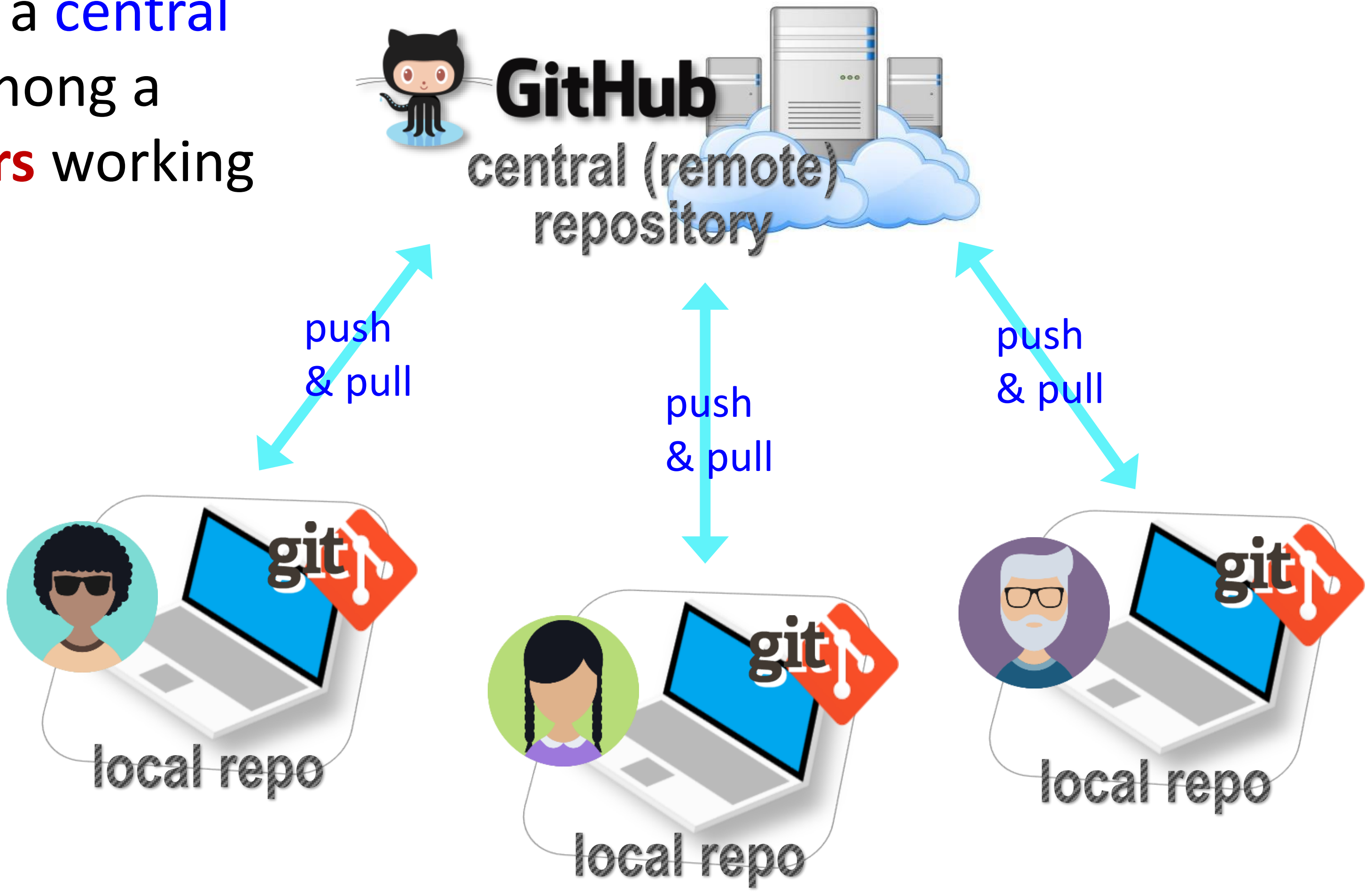
Try it out: Your first git/GitHub repo

- Create "Practice-Repo" on GitHub
- Clone it to your laptop
- Make changes to your local repo
- Local Git operations: git status, git add, git commit
- Remote (= GitHub) operations: git push

*Avatar icons by FLATICON

GitHub: a *social*, remote repository

- GitHub also works as a central remote repository among a group of **collaborators** working on a shared project.
  - Everyone works on their own *local* copy of the repository, making changes.
  - Git is able to keep track and merge changes submitted by everyone.



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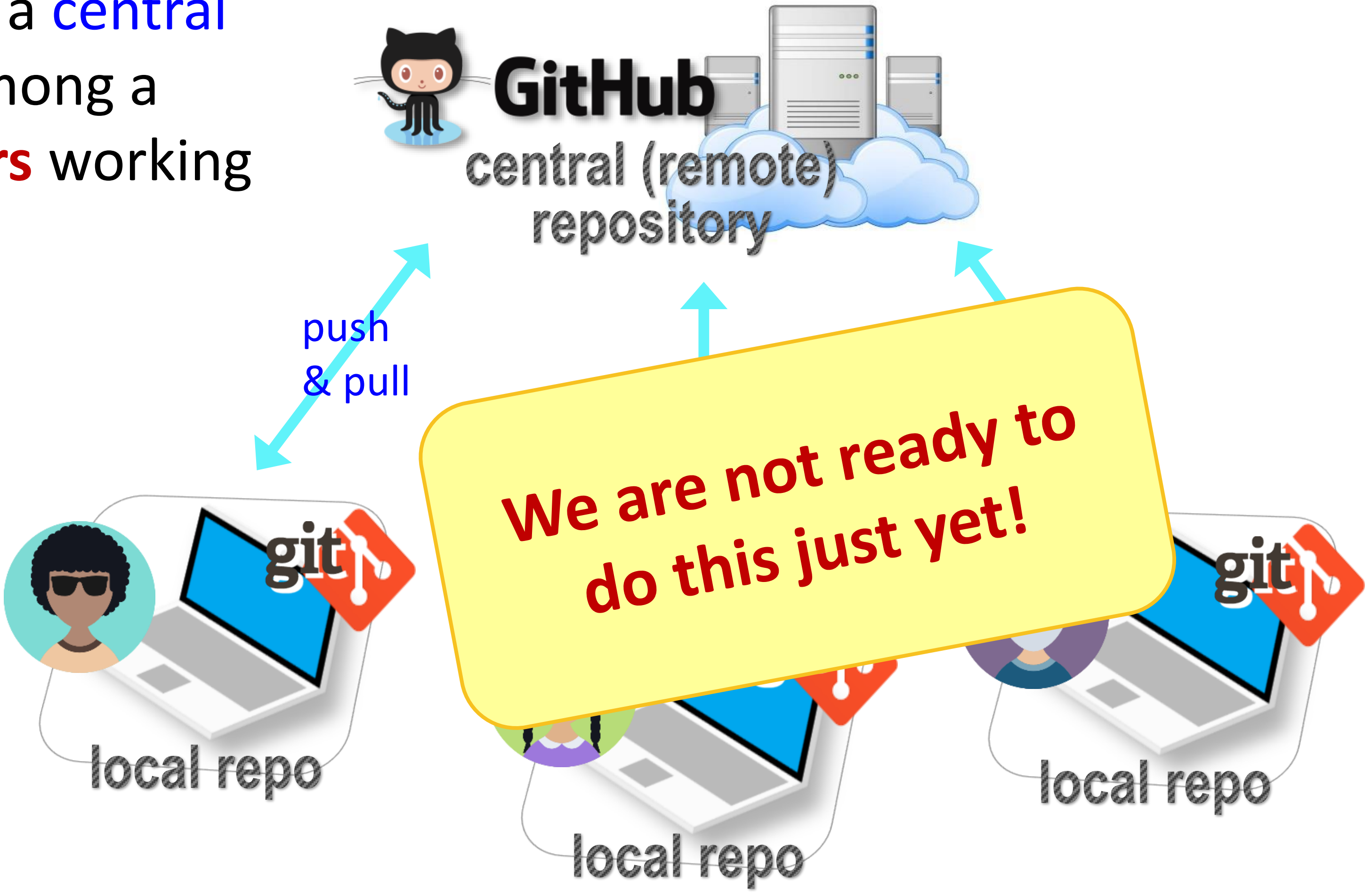
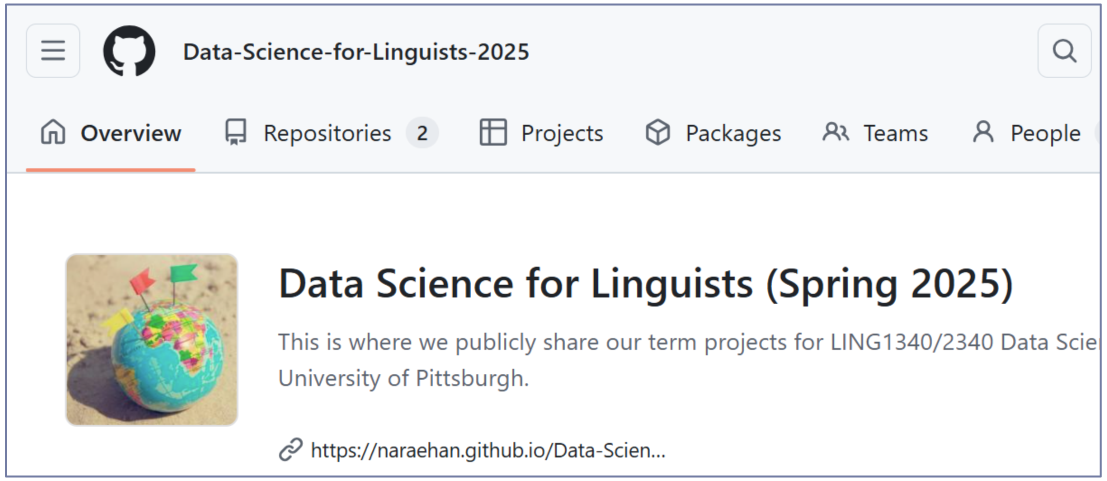
GitHub: a *social*, remote repository

- GitHub also works as a central remote repository among a group of **collaborators** working on a shared project.
  - Everyone works on their own *local* copy of the repository, making changes.
  - Git is able to keep track and merge changes submitted by everyone.
  - Everyone is an **equal collaborator** with push (=write) access.


GitHub
central (remote) repository
push & pull
git
local repo
local repo
local repo
We are not ready to do this just yet!

Introducing… GitHub Class Organization

- https://github.com/Data-Science-for-Linguists-2025


Data-Science-for-Linguists-2025

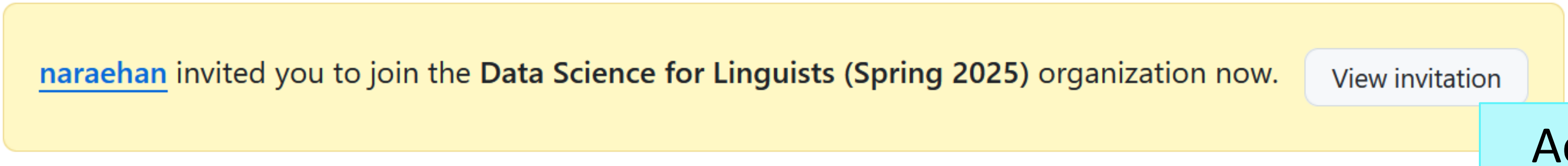
Data Science for Linguists (Spring 2025)

This is where we publicly share our term projects for LING1340/2340 Data Scie
University of Pittsburgh.

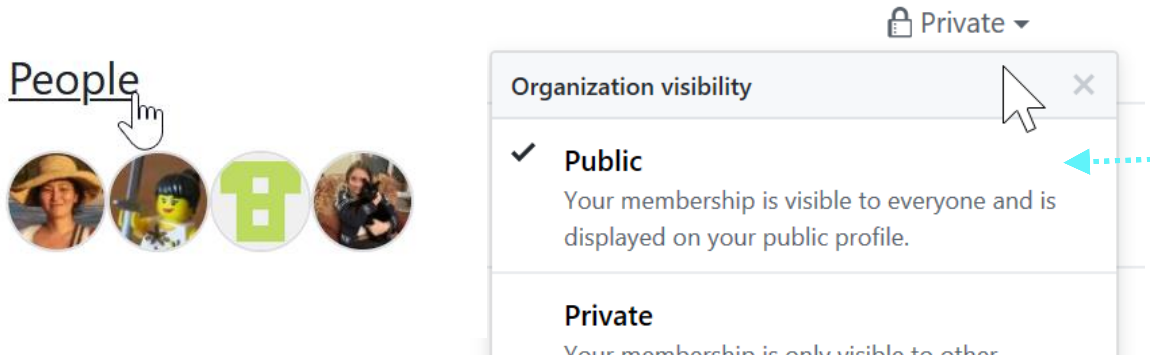
https://naraehan.github.io/Data-Scien...

So we can:

- have everyone in one spot.
- have all class materials in one spot.
- have everyone's term project in one spot.
- share *private* repos as a group.


naraehan invited you to join the **Data Science for Linguists (Spring 2025)** organization now.

Accept invitation



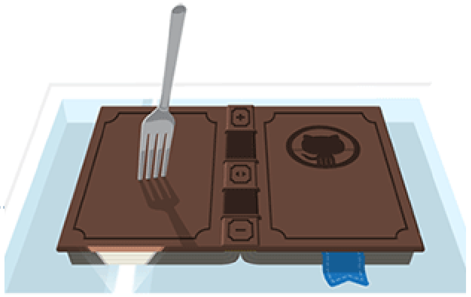
Organization visibility

✓ **Public**
Your membership is visible to everyone and is displayed on your public profile.

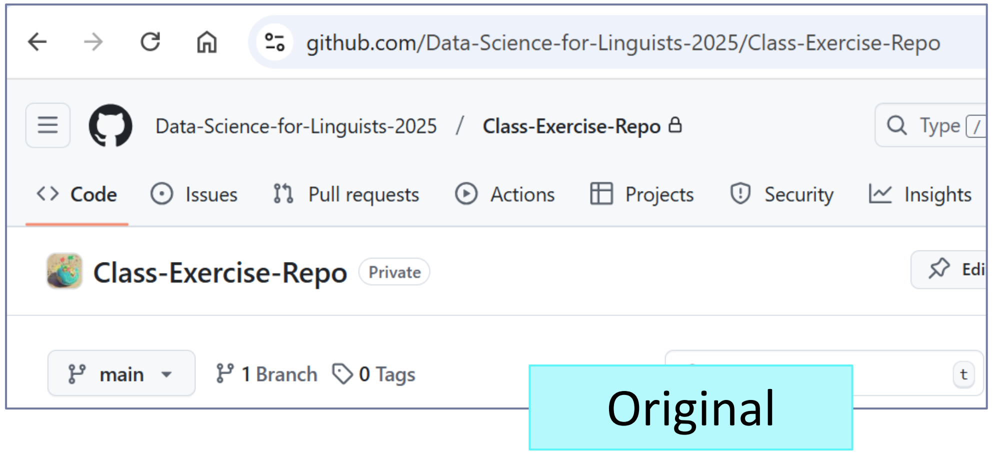
Private
Your membership is only visible to other

Click "People", and make your membership public

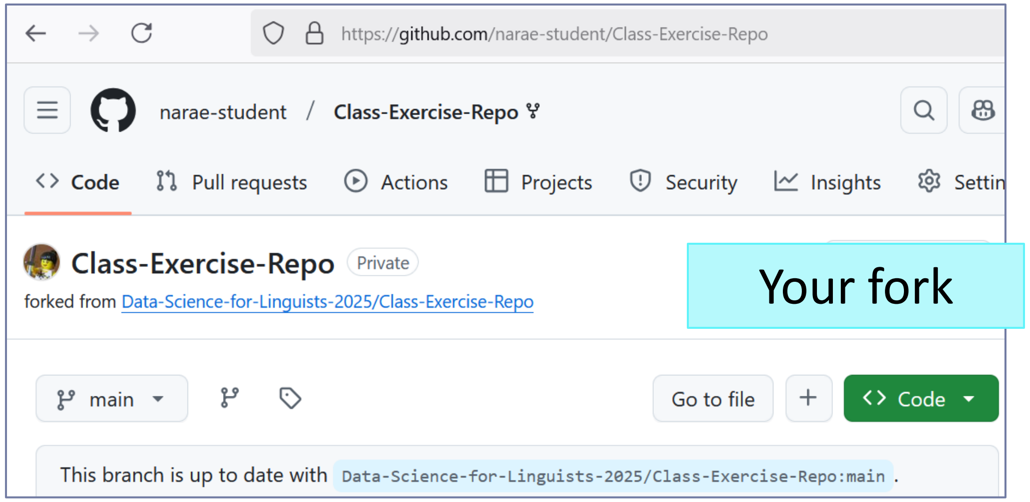
First, forking



- When you **start with someone else's project**.
  - You are *not* a collaborator in their repo. (No push access)
- https://help.github.com/articles/fork-a-repo/
- You **fork** the original repo into your own GitHub account, creating your own "fork".
- You make changes in your own fork. The original repo is not affected!



github.com/Data-Science-for-Linguists-2025/Class-Exercise-Repo



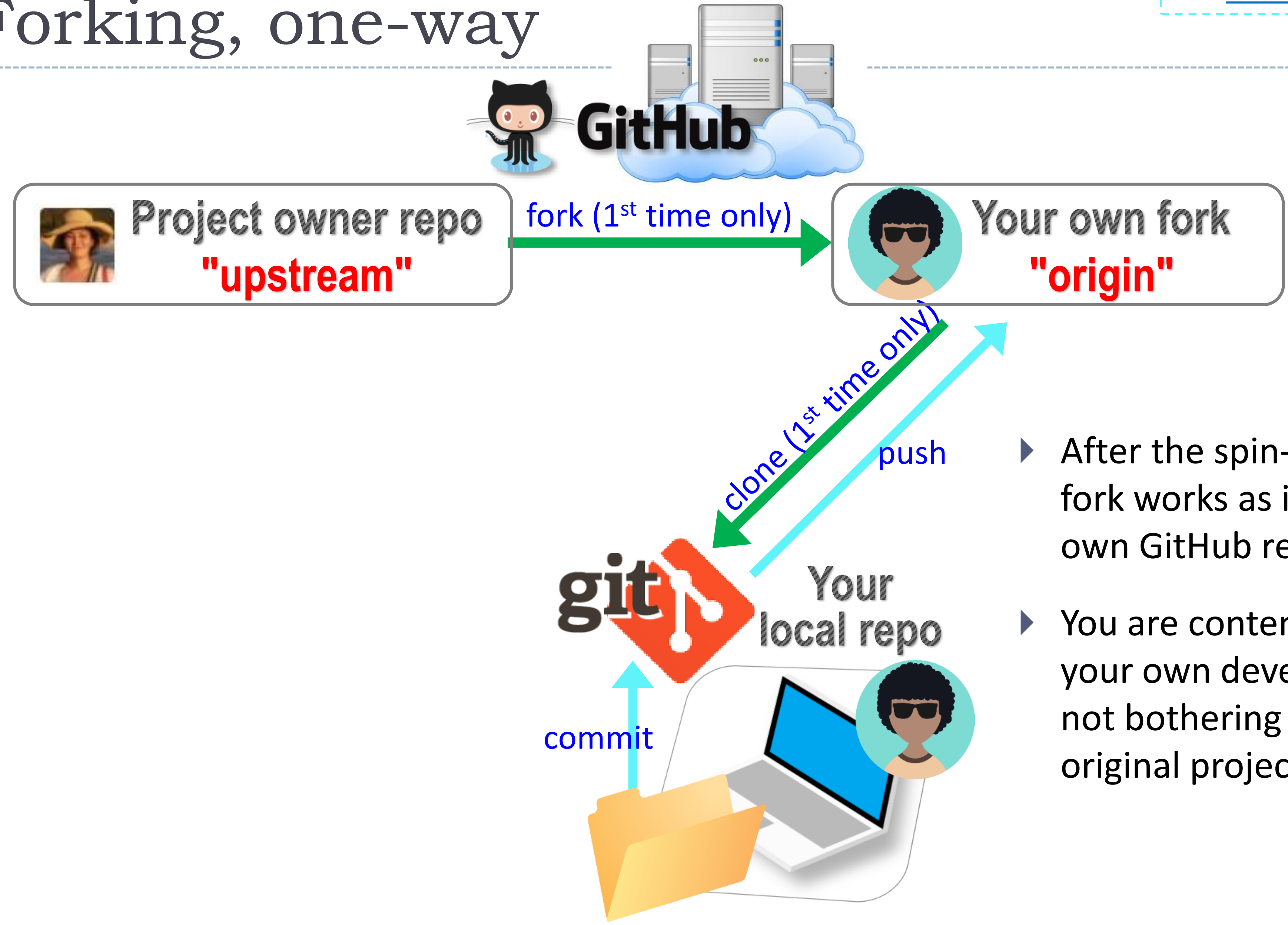
https://github.com/narae-student/Class-Exercise-Repo

forked from Data-Science-for-Linguists-2025/Class-Exercise-Repo

This branch is up to date with `Data-Science-for-Linguists-2025/Class-Exercise-Repo:main`.

*Avatar icons by FLATICON

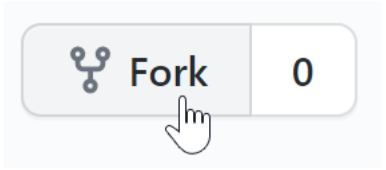
Forking, one-way



- After the spin-off, your fork works as if your own GitHub repo.
- You are content to do your own development, not bothering the original project owner…

Activity1: your first fork

- On **GitHub**:



1. Go to class GitHub org.
2. Fork "Class-Exercise-Repo". You will now have the exact same content in your own GitHub account.

- On your **laptop**:

1. Move into your `Data_Science/` directory. Clone your fork there via git clone URL.
2. In the `activity1/` folder, make a new file test_yourname.txt and then add whatever new line you want. Make sure "yourname" is your actual name!
3. Do Git operations: add, commit, and then push to your fork.

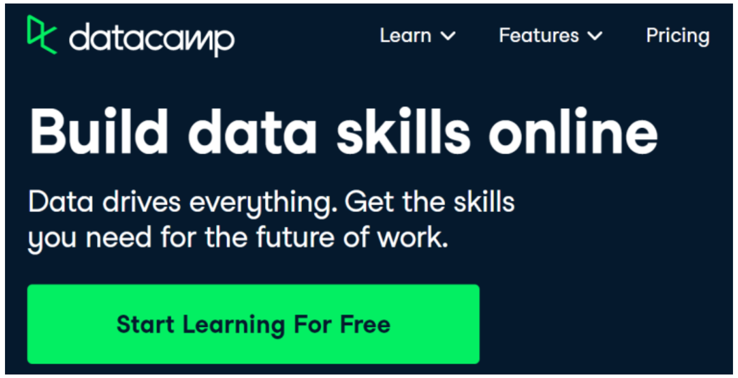
- Back on **GitHub**:

1. Confirm your GitHub fork now has your file.

If you are familiar with GitHub, you might be itching to press "pull request". Don't! We learn about it next class.

Wrapping up

- To-do #2 out: explore two linguistic datasets.
- Homework #1 is also out (due next Wed): process a linguistic dataset of your choice in Python, using Jupyter Notebook
  - Don't be too ambitious! This HW is about taking stock of what you already know and where to go from there. And also new tools.
- Office hours
  - Need help with Git and GitHub set up? Come to our office hours
  - Next week's hours will be announced soon
- I will be sending out DataCamp invitation →



Build data skills online

Data drives everything. Get the skills you need for the future of work.