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

LING 1340/2340: Data Science for Linguists

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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"

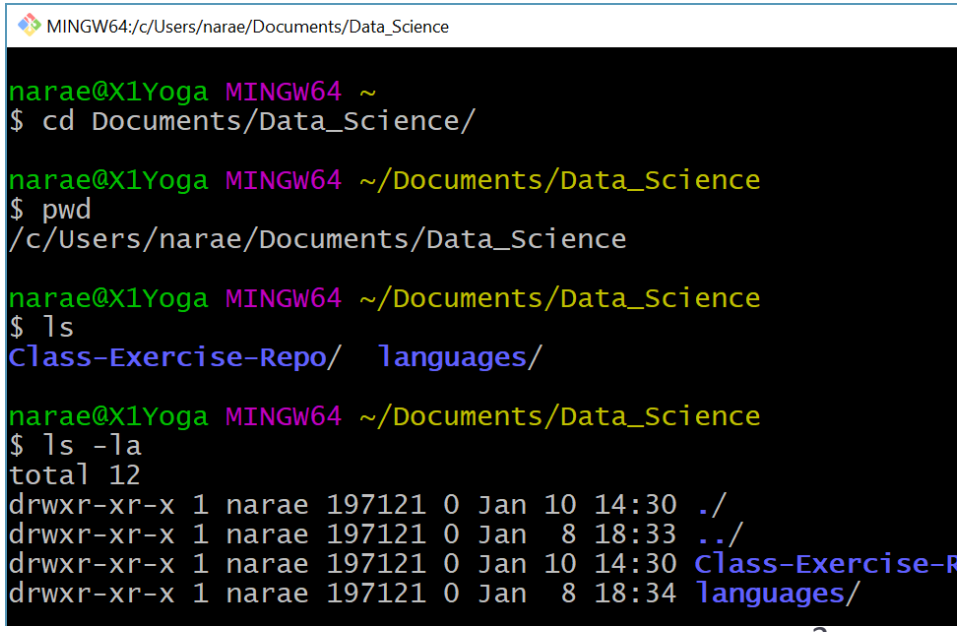
4. Look at what's inside the directory.

```
ls
```

or

```
ls -la
```

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



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`

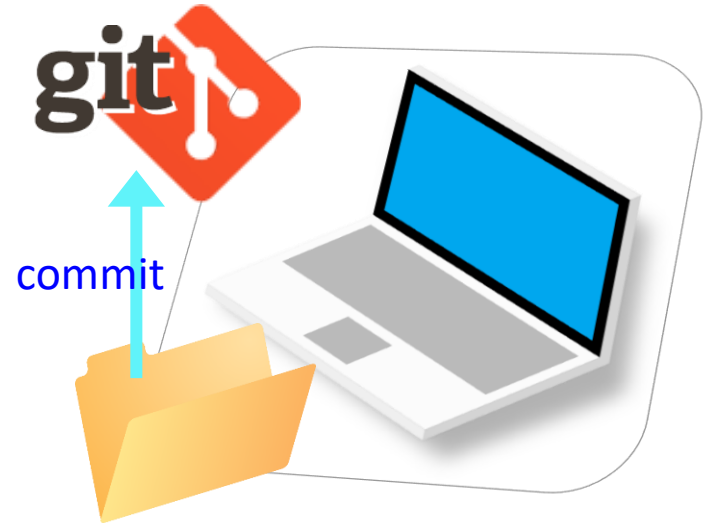
  ← commit to make this the new HEAD

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**.

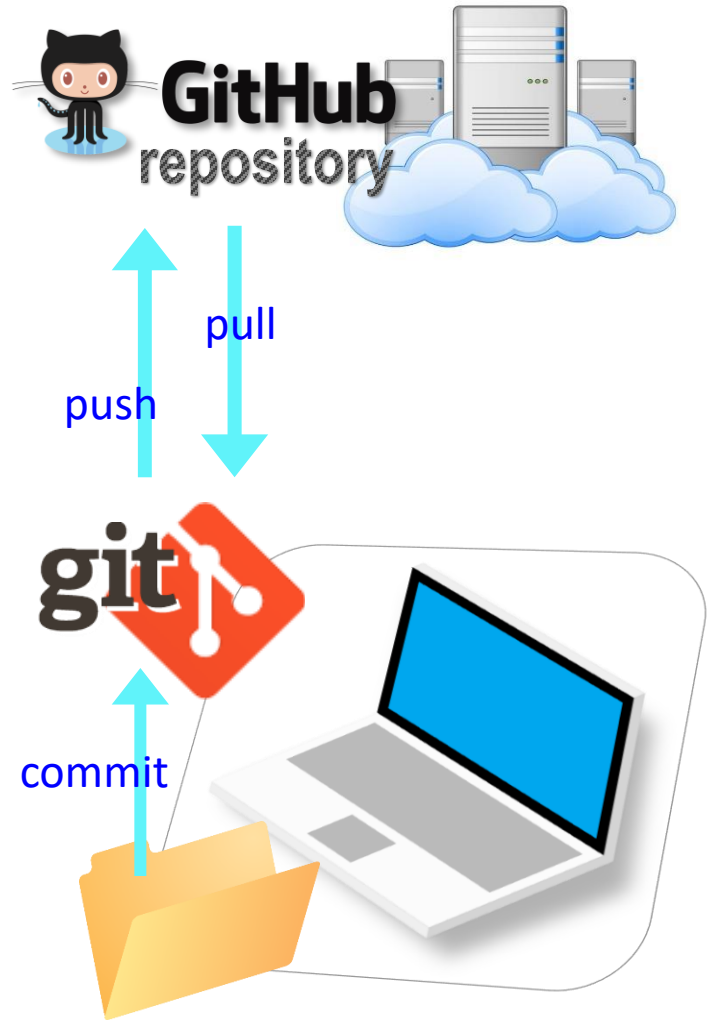
- `languages/` is now:
  - tracked by Git
  - all changes will be documented
  - able to revert back to earlier version, if needs be



- 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.

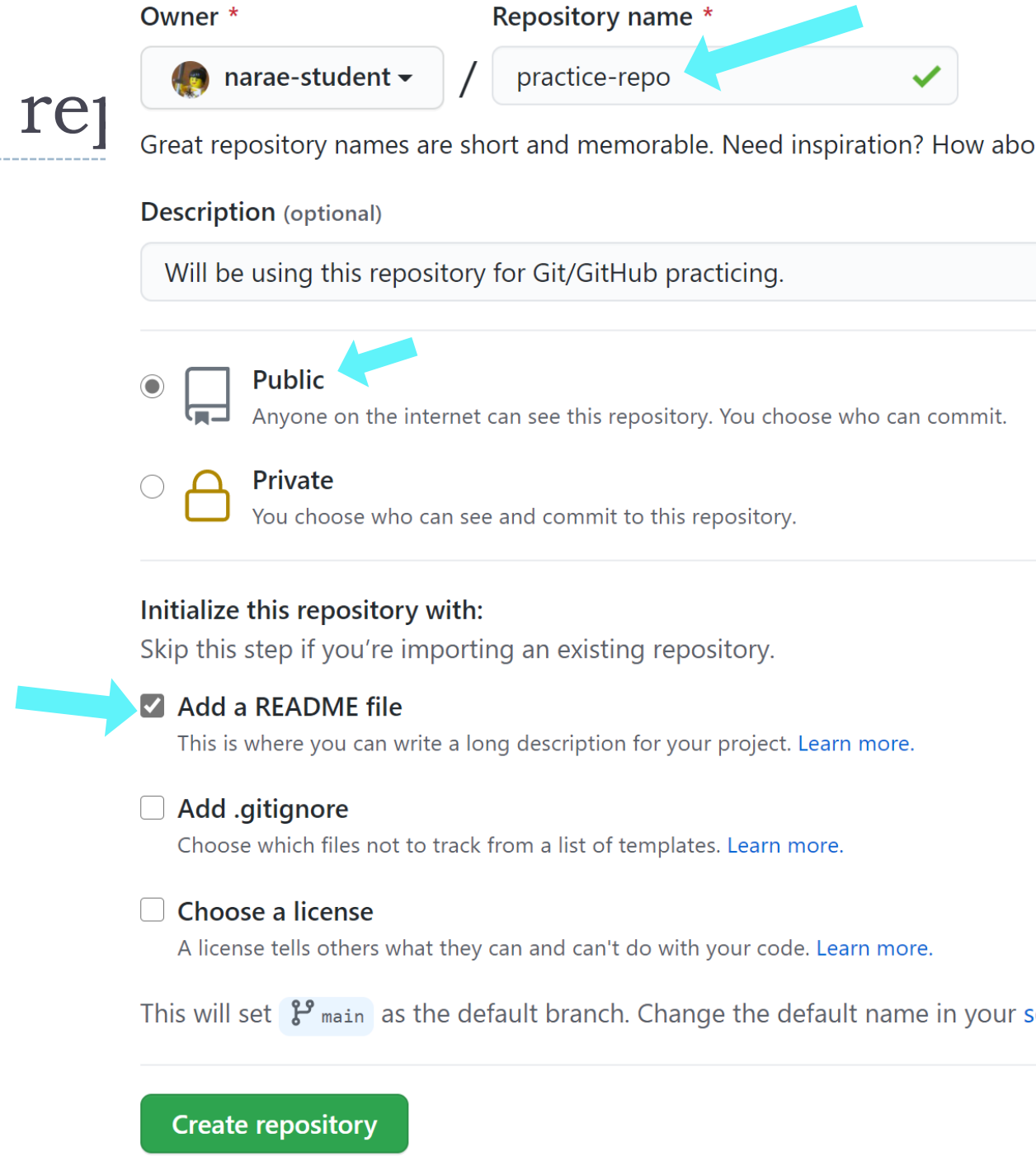
- We can set up our `languages` repo with a GitHub repo this way.
- My LSA tutorial Part 2 Linking Git with GitHub goes this route.

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!

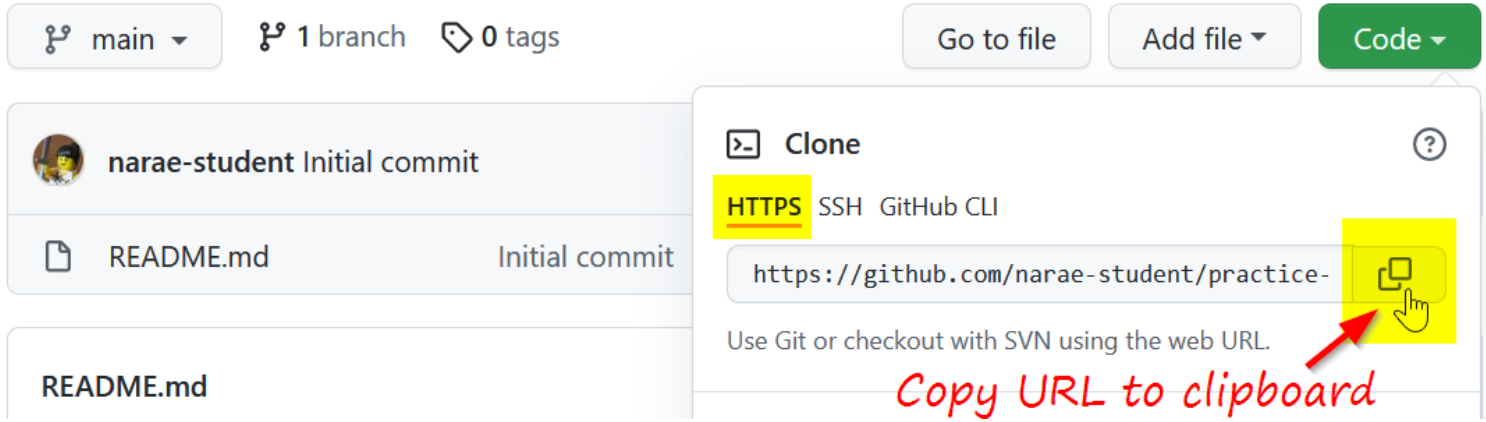
Your first GitHub rep

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



Cloning first GitHub repo

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



- 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
```

Try it out: Your first git/GitHub repo

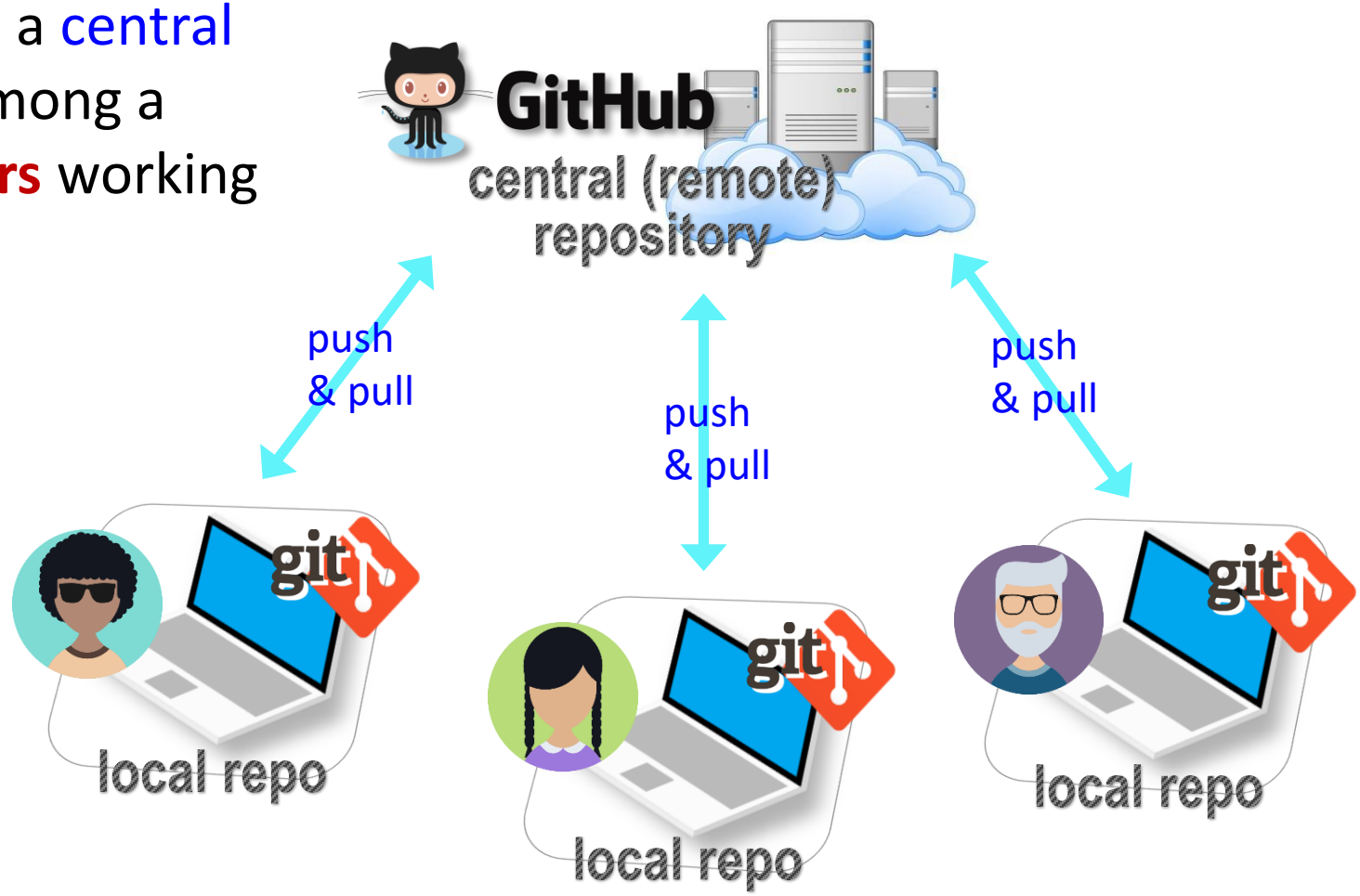
5 minutes

- 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

GitHub: a *social*, remote repository

*Avatar icons by FLATICON

- 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.



GitHub: a *social*, remote repository

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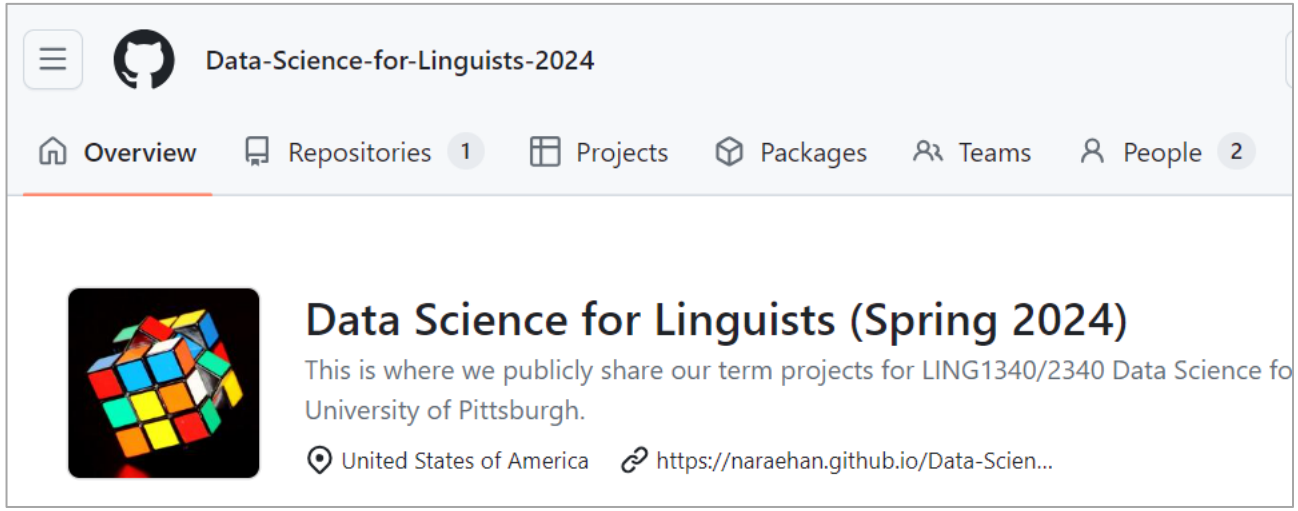
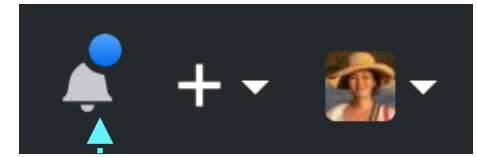
- GitHub also works as a central remote repository among a group of **collaborators** working on a shared project.
  - Everyone works on their own *local* copy of the repository, making changes.
  - Git is able to keep track and merge changes submitted by everyone.
  - Everyone is an **equal collaborator**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

Introducing… GitHub Class Organization

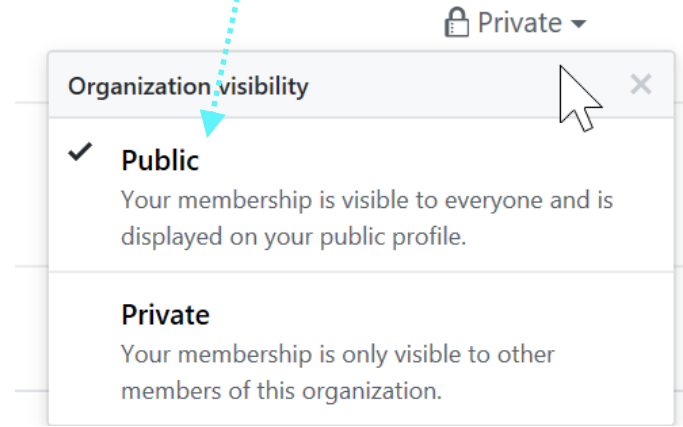
- https://github.com/Data-Science-for-Linguists-2024





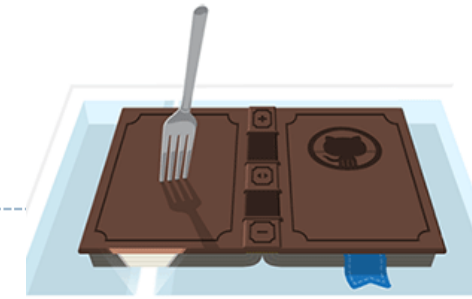
Accept invitation from "notifications" page

Click "People", and make your membership public

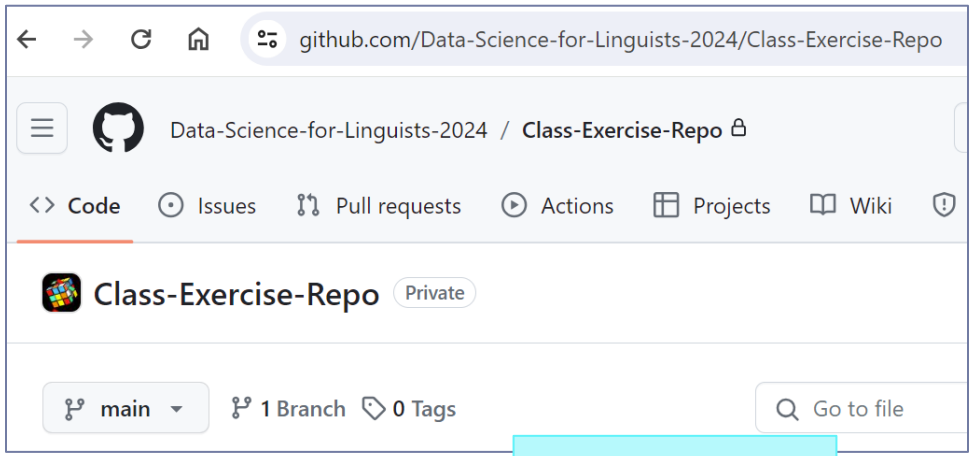


- So we can:
  - have everyone in one spot.
  - have all class materials in one spot.
  - have everyone's term project in one spot.
  - share *private* repos as a group.

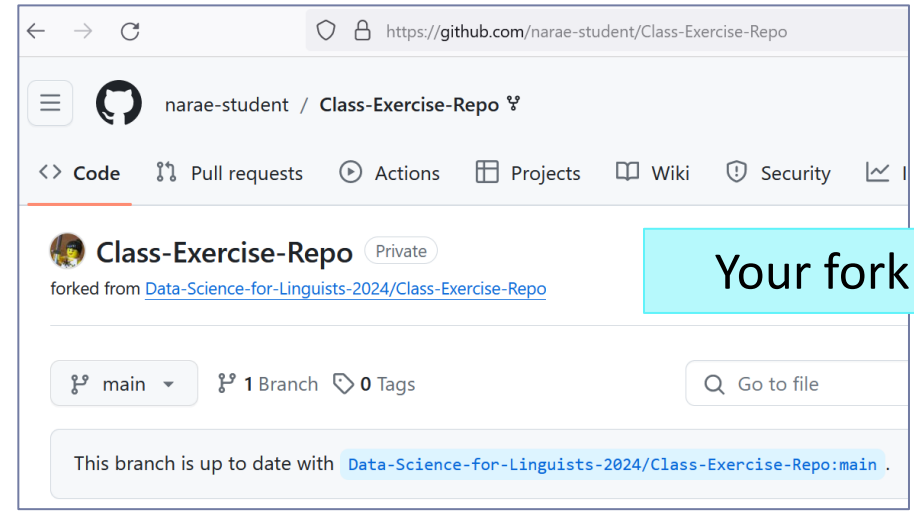
But first, forking



- 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!



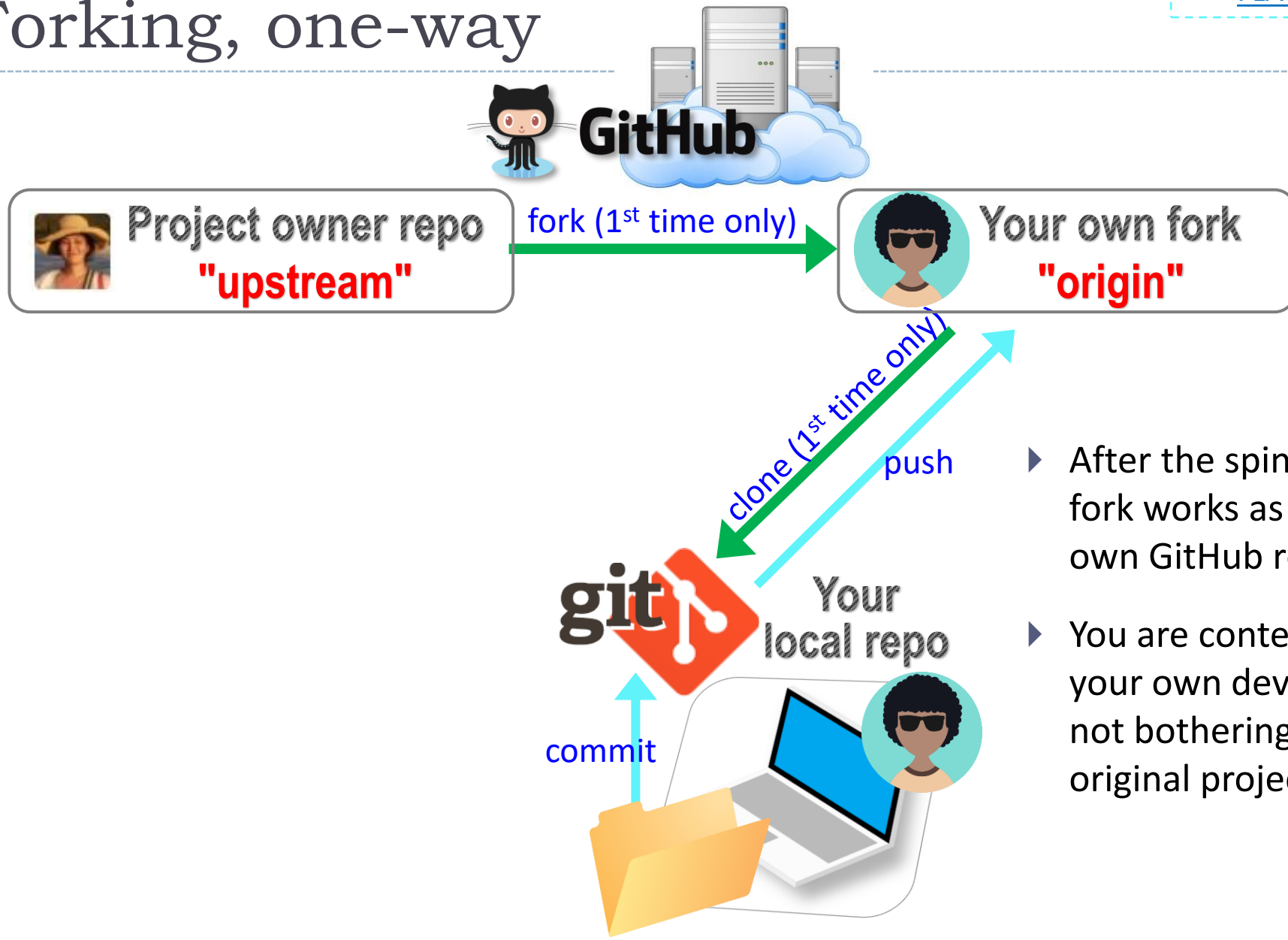
Original



Your fork

Forking, one-way

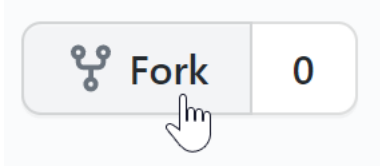
*Avatar icons by FLATICON



- 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…

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.

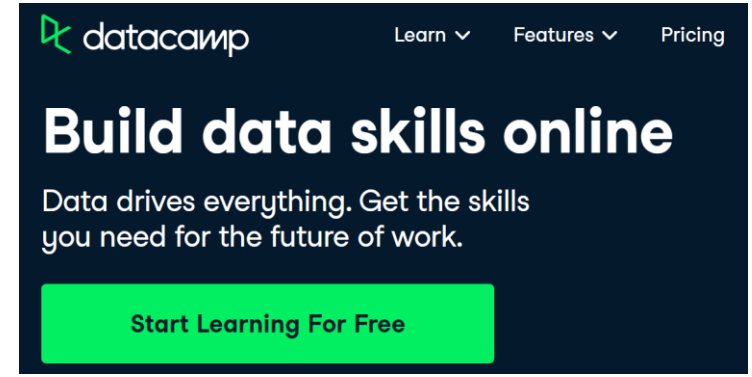


- On your **laptop**:
  1. Move into your `Data_Science/` directory. Clone your fork there via git clone URL.
  2. In the `activity1/` folder, make a new file test_yourname.txt and then add whatever new line you want. Make sure "yourname" is your actual name!
  3. Do Git operations: add, commit, and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

Wrapping up

- To-do #2 out: explore two linguistic datasets.
- Homework #1 is 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
  - Hours posted on course home page
  - Need help with Git and GitHub set up? Come to our office hours
- I will be sending out DataCamp invitation →



Your workflow

1. **Housekeeping**: Take care of YOUR work in your fork.
   - Make sure your local repo is clean: no uncommitted work.
   - Make sure your GIHUB fork is in sync with your local repo: there's nothing to push.
2. **Housekeeping**: Bring in updates from OTHERS.
   - On your GitHub fork, check what updates have accumulated in the upstream repo.
   - Through "Sync fork → Compare", make sure those updates don't have conflicts with your fork. Don't press that green "Update Branch" button!
   - Back on command line, pull from upstream. Now your local repo is synced with the original repo.
   - Finally, sync your GitHub fork by pushing. The universe is in order now!
3. Work on your homework, to-do, etc.
   - Now start your homework. Make some commits along the way.
   - Push to your GitHub fork for one last time.
   - Submission time: Create a **pull request**. Make sure your pull request doesn't have conflicts.

Uh-oh, conflicts!

Don't panic! Take note of which files are conflicting.

Chances are you made changes to someone else's file and committed them by accident.

- Walk back the changes in your fork. That will resolve the conflict.
- If you're unsure, ask for help!

If the problem is on the upstream's end (Na-Rae might have let something slip through…), let me know.

https://xkcd.com/1597