Git

A mini-lecture series

CSE498 Collaborative Design (W) - Secure and Efficient C++ Software Development

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Git, the version manager

- Keeps track of code (file in general) changes
- Collaborate with other when working on the same files

- Allows you to branch off and work on a different part of the project, remerge with main once you are ready.
- Committing is essentially "saving" a state of your repository, allowing you to revert back to this point
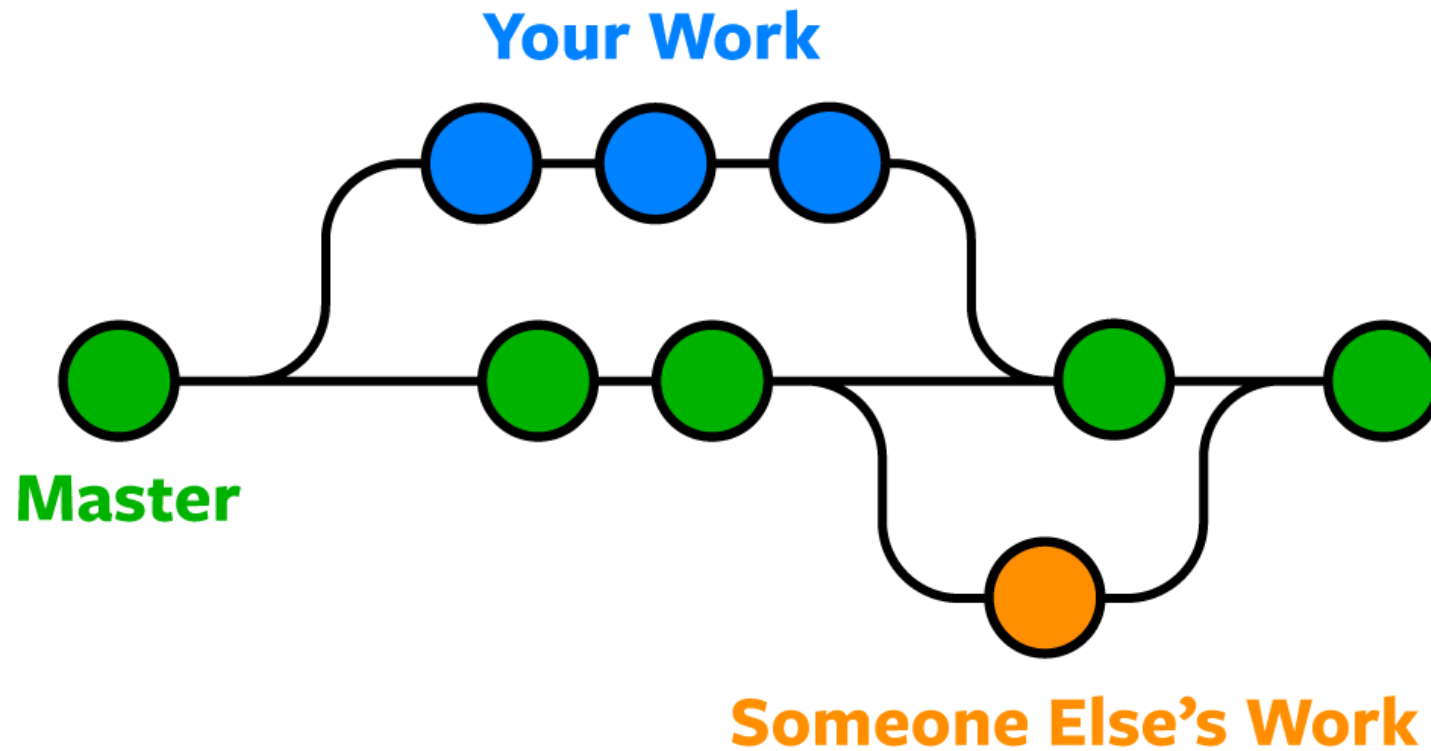
Cloning a repo

- Copies the file from the repository

- Create an empty directory, and use the following command:
    - Git clone https://github.com/CSE498/CSE498-Spring2025.git

- Should download our current empty folders into your local folder

Branching

- Usually, the **Main** repo only contains fully functional code
- **You should never push to main, ever**
  - Seriously, you will get fired
- When you work on a feature, branch off (so that you are not affecting other teams when working)
- Every company might have a different setup, good to check out the branching to see

- Use gitlog to check current branching history

Branching

Your Work

Master

Someone Else's Work

https://www.nobledesktop.com/learn/git/git-branches

Visualisation

- https://stackoverflow.com/questions/1057564/pretty-git-branch-graphs

Creating a new branch

- git checkout –b NEW_BRANCH_NAME
- This is equivalent to doing
    - Git branch NEW_BRANCH_NAME   // creates new branch
    - Git checkout NEW_BRANCH_NAME   // switch to the branch

```
C:\Users\Veda\Documents\cse498\gittest>git checkout –b dev
Switched to a new branch 'dev'
```

- If you do *git status* now, then you should see

```
C:\Users\Veda\Documents\cse498\gittest>git status
On branch dev
nothing to commit, working tree clean
```

Working on local branch

- Let's supposed I have created some content or changed file:


```
C:\Users\Veda\Documents\cse498\gittest>echo "praise" >> LeToucan.txt

C:\Users\Veda\Documents\cse498\gittest>git status
On branch dev
Untracked files:
  (use "git add <file>..." to include in what will be committed)

        LeToucan.txt

nothing added to commit but untracked files present (use "git add" to track)
```

- I would want to *stage* the change
- **Staged** files are those that are ready to be **committed** to the repo

Staging

- Git add . (all local file in the current directory)
- Git add LeToucan.txt
  - Now lit up green

- To unstage, use:
  - Git rm --cached ...

```
C:\Users\Veda\Documents\cse498\gittest>git add LeToucan.txt

C:\Users\Veda\Documents\cse498\gittest>git status
On branch dev
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

        new file:   LeToucan.txt


C:\Users\Veda\Documents\cse498\gittest>
```

Committing

- Once you are ready to commit (finished a function or hit a good save point), you should move from **stage** to **commit**.

- Please always include a descriptive change
    - NOT: "fixed some bugs"
    - NOT: "added some logic"
    - NOT: "changes"
    - GOOD: "implemented logic for calculating Euclidean Distance"

- Git commit –m "initialised the letoucan text file"

Committing

Reverting to a previous state

- I made a bad commit here, can i go back?
- Yes, git checkout 4671d1 (the hash of the commit you want to go back to)

Reattaching a detached head

- I am now in a detached state, and I can reattach it through merge
- Git branch tmp (creates a new branch with this commit)
- Git checkout dev
- Git merge tmp


```
C:\Users\Veda\Documents\cse498\gittest>git checkout 4671d1
Note: checking out '4671d1'.

You are in 'detached HEAD' state. You can look around, make experimental
changes and commit them, and you can discard any commits you make in this
state without impacting any branches by performing another checkout.

If you want to create a new branch to retain commits you create, you may
do so (now or later) by using -b with the checkout command again. Example:

  git checkout -b <new-branch-name>

HEAD is now at 4671d14 initalised the letoucan text file
```

Conflicts

- If you try to merge two branches, you may encounter conflicts
- You must resolve these before merge can continue
    - Select which code segment you want to keep

```
C:\Users\Veda\Documents\cse498\gittest>git merge tmp
Auto-merging LeToucan.txt
CONFLICT (content): Merge conflict in LeToucan.txt
Automatic merge failed; fix conflicts and then commit the result.
```

```
<<<<<<< HEAD
"praise"
OH NO I HAVE CORRUPTED OR SCREWED UP THIS FILE
=======
"praise"
yay we fixed the file!
>>>>>>> tmp
```

What does my branch now look like?

Ready to actually upload to server (git)?

- Once you are ready to share your code

- Git push

- Now other people on your branch (or really anyone on the repo) can use git fetch or git pull to get your pushed code.

```
C:\Users\Veda\Documents\cse498\gittest>git push
Counting objects: 6, done.
Delta compression using up to 32 threads.
Compressing objects: 100% (4/4), done.
Writing objects: 100% (6/6), 636 bytes | 636.00 KiB/s, done.
Total 6 (delta 0), reused 0 (delta 0)
To https://github.com/EvilJuiceBox/testrepo.git
   6131a0b..22e9092  dev -> dev
```

Get updates from main

- Git fetch
- Git pull
- Gets upstream and updates your repo with the new code from your parent branch

Pull request

⚠ Please configure another 2FA method to reduce your risk of permanent account lockout. If you use SMS for 2FA, we strongly recommend against SMS as it is prone to fraud and delivery may be unreliable depending on your region.

Filters ▾   🔍 is:pr is:open   🏷 Labels 9   ⬦ Milestones 0   **New pull request**
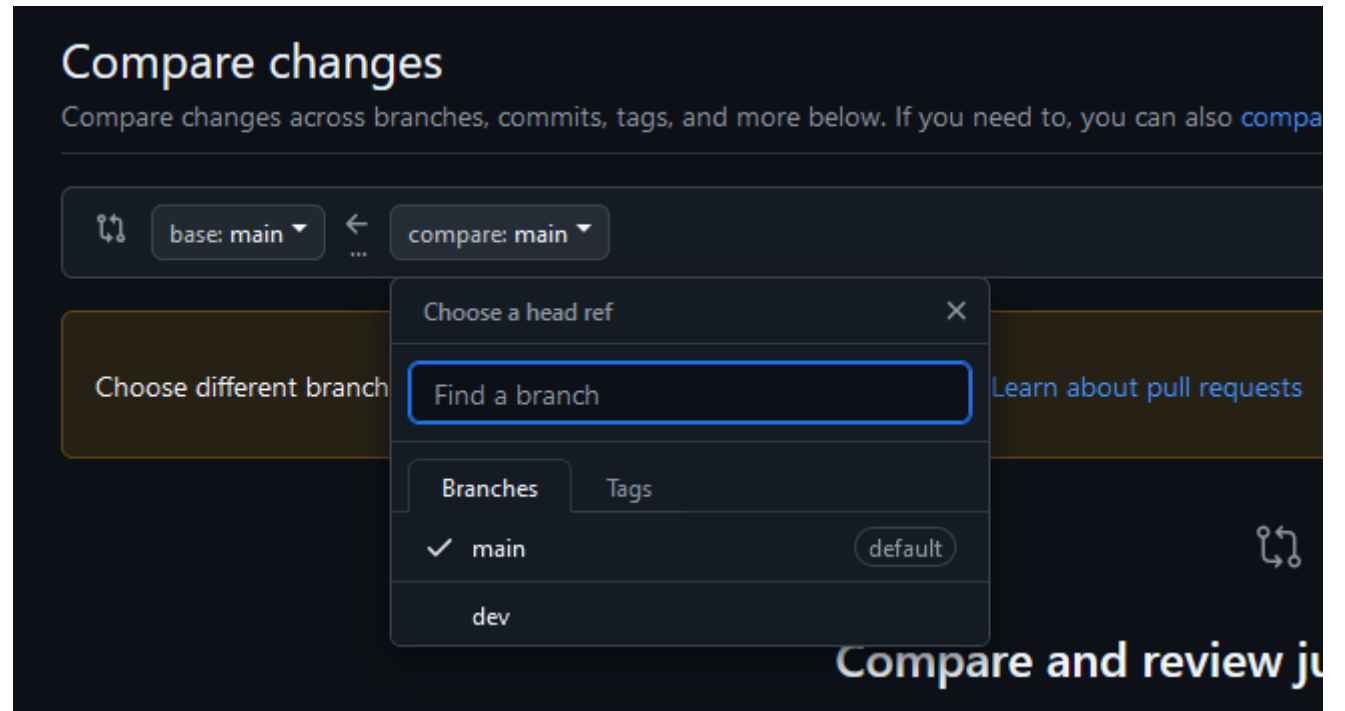
⑴

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.

💡 **ProTip!** no:milestone will show everything without a milestone.

Pull request

- Set your target branch and destination branch

Comparing changes

Choose two branches to see what's changed or to start a new pull request. If you need to, you can also [compare across forks](#) or [learn more about diff comparisons](#).

⇅ base: main ▾ ← compare: dev ▾ ✓ **Able to merge**. These branches can be automatically merged.

Discuss and review the changes in this comparison with others. [Learn about pull requests](#)   **Create pull request**

◦ **4 commits**   ⊡ **1 file changed**   👥 **1 contributor**

Commits on Jan 28, 2025

initalised the letoucan text file
🧑 **EvilJuiceBox** committed 23 minutes ago   ⧉ `4671d14` <>

oh no this commit have bugged out the file
🧑 **EvilJuiceBox** committed 18 minutes ago   ⧉ `6131a0b` <>

fixed letoucan file
🧑 **EvilJuiceBox** committed 6 minutes ago   ⧉ `afc58be` <>

fixed conflicts in toucan file from merging
🧑 **EvilJuiceBox** committed 4 minutes ago   ⧉ `22e9092` <>

⊡ Showing **1 changed file** with **2 additions** and **0 deletions.**   Split | Unified

⌄ 2 ■■□□□ LeToucan.txt ⧉   ...

```
...  ...        @@ -0,0 +1,2 @@
       1    + "praise"
       2    + yay we fixed the file!
```

No one—assign yourself

Labels ⚙

Apply labels to this pull request

Filter labels

This issue or pull request already exists

🔵 enhancement
New feature or request

🟣 good first issue
Good for newcomers

🟢 help wanted
Extra attention is needed

🟡 invalid
This doesn't seem right

🟣 question
Further information is requested

✓ 🟢 READY FOR MERGE   ✕
Ready to be merged to parent branch

⚪ wontfix
This will not be worked on

✏ Edit labels

💬 Conversation 0   ◦ Commits 4   ▣ Checks 0   ⊡ Files changed 1   +2 −0 ■■□□□

EvilJuiceBox commented now   ...

Ready for merge to main.

Code reviewers @EvilJuiceBox

☺

EvilJuiceBox added 4 commits 27 minutes ago

◦— ⊙ initalised the letoucan text file   4671d14

◦— ⊙ oh no this commit have bugged out the file   6131a0b

◦— ⊙ fixed letoucan file   afc58be

◦— ⊙ fixed conflicts in toucan file from merging   22e9092

🏷 ⊙ **EvilJuiceBox** added the READY FOR MERGE label now

⑂   **Require approval from specific reviewers before merging**   [Add rule] ✕
    Rulesets ensure specific people approve pull requests before they're merged.

    🤖 **Continuous integration has not been set up**
        GitHub Actions and **several other apps** can be used to automatically catch bugs and enforce style.

    ✓ **This branch has no conflicts with the base branch**
        Merging can be performed automatically.
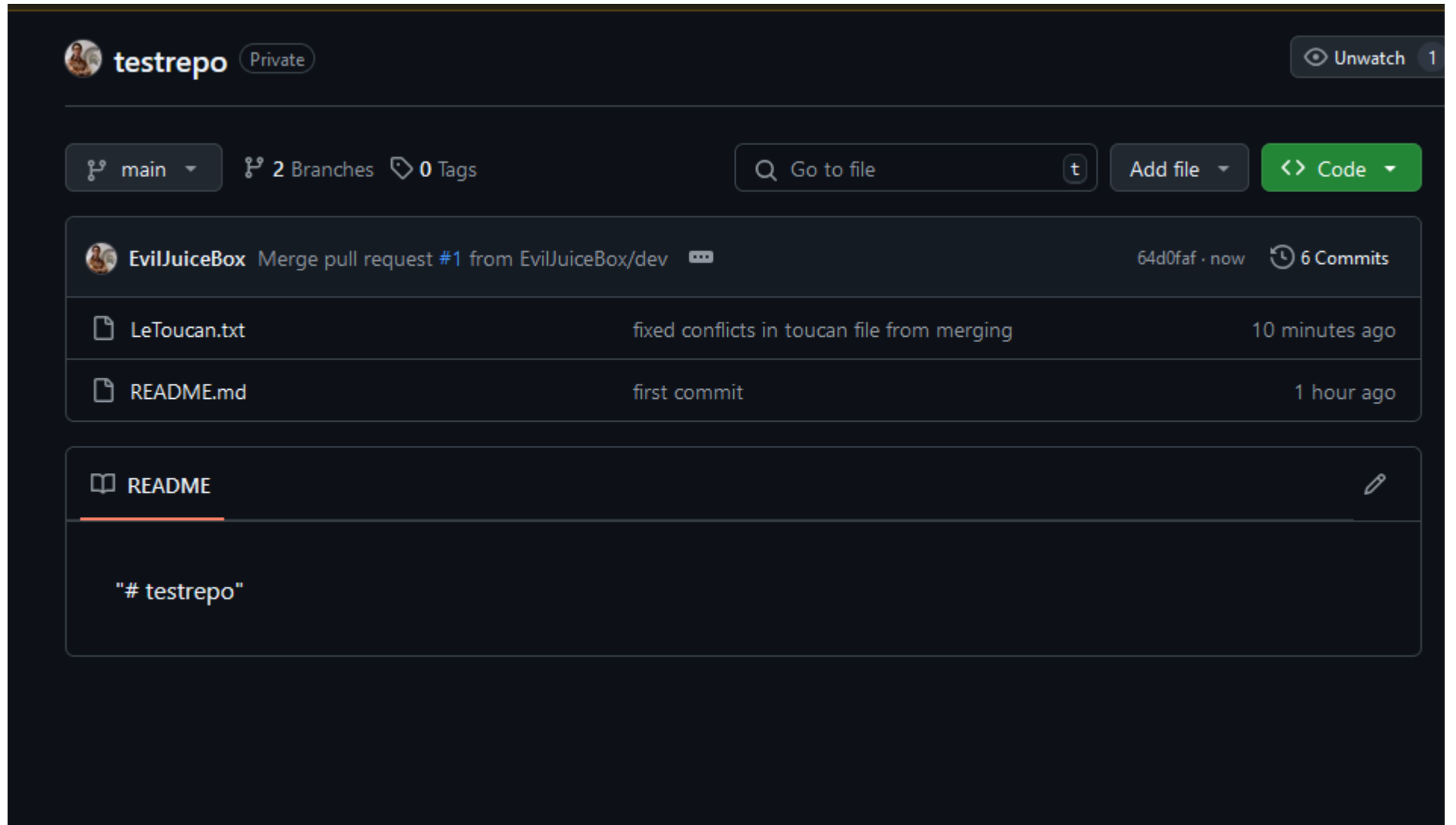
[Merge pull request ▾]   You can also **open this in GitHub Desktop** or view **command line instructions**.
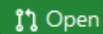
Reviewers   ⚙
No reviews

Still in progress? Learn about draft PRs   ⓘ

Assignees   ⚙
No one—assign yourself

Labels   ⚙
 READY FOR MERGE

Projects   ⚙
None yet

Milestone   ⚙
No milestone

Development   ⚙
Successfully merging this pull request may close these issues.

None yet

Notifications   Customize
[🔕 Unsubscribe]

You're receiving notifications because you're watching this repository.

1 participant

🙍

✨ Try the new merge experience

Shows up on main, yay!

By the way, you can see all the current branches here as well
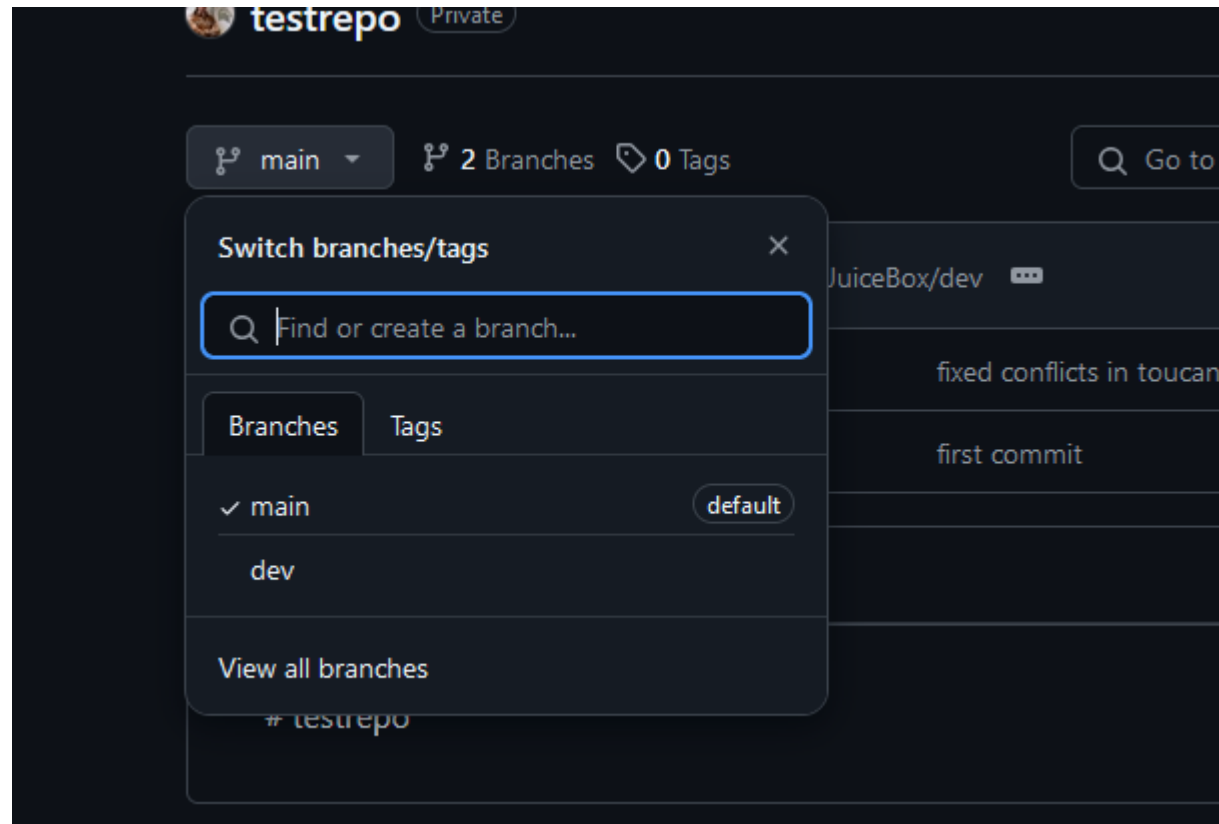
Comments

- 1) Create your team branch, create a pull request
    - Please name it [TEAMNAME] … (e.g., [Stroustrup] Random Class)
- 2) Immediately tag it as NOT READY TO MERGE
- 3) Make sure everyone switches to this branch before you work on it (so you do not work on another team's branch or main)
- 4) Mark it as READY TO MERGE and @eviljuicebox or Dr. Ofria when you are ready. Feel free to DM us on discord if we do not reply

Resources if you are not comfortable

- https://git-scm.com/docs/gittutorial
- https://www.w3schools.com/git/
- https://learngitbranching.js.org/   << Very good
- https://gitimmersion.com/

Person of the day Linus Torvalds

- Creator of Linux operating system
- GNU
- Also created Git
- "I'm an egotistical bastard, and I name all my projects after myself. First Linux, now git."

Yes, this is the first version of git's readme

- I choose to believe its so people can type "git gud"

```
 1              GIT - the stupid content tracker
 2
 3  "git" can mean anything, depending on your mood.
 4
 5   - random three-letter combination that is pronounceable, and not
 6     actually used by any common UNIX command.  The fact that it is a
 7     mispronounciation of "get" may or may not be relevant.
 8   - stupid. contemptible and despicable. simple. Take your pick from the
 9     dictionary of slang.
10   - "global information tracker": you're in a good mood, and it actually
11     works for you. Angels sing, and a light suddenly fills the room.
12   - "goddamn idiotic truckload of sh*t": when it breaks
13
14  This is a stupid (but extremely fast) directory content manager.  It
15  doesn't do a whole lot, but what it _does_ do is track directory
16  contents efficiently.
```