

Github/Git Primer

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Why Use Github?

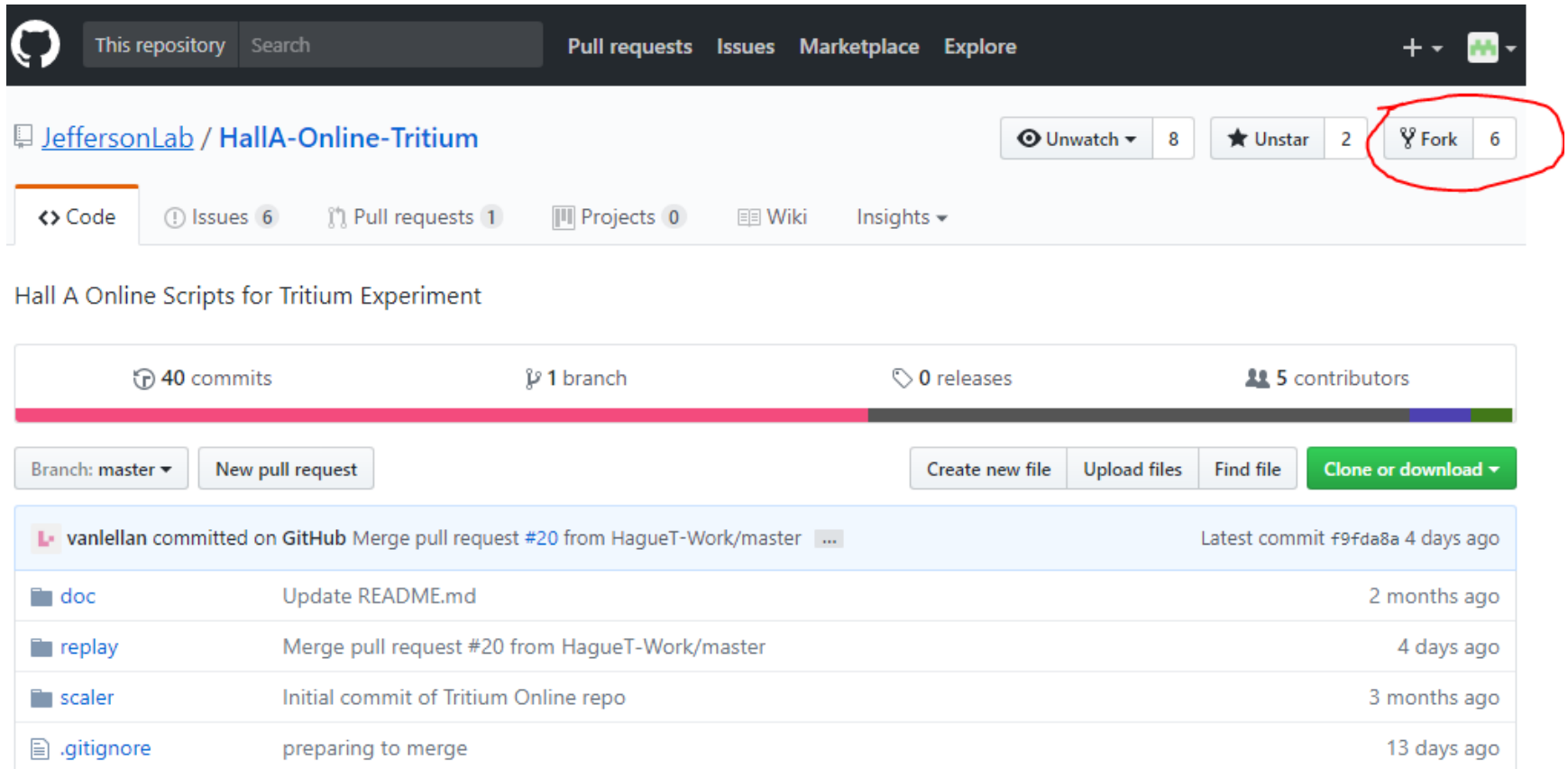
- Github keeps all of our code up to date in one place
- Github tracks changes so we can see what is being worked on
- Github has issue tracking for keeping up with what needs work
- Github has collaborative tools for conflict prevention

What workflow should we follow?

- The master repository is our “official” code. This is where we keep working code and should not be used for any tests.
- To work on the code, make a fork and work there.
- For ‘tests’, create branches to avoid affecting your functional code. These can later be merged into the master code.
- When the work you set out to do is complete, create a pull request to put it in the master repository.

How do I do this?!

<https://github.com/JeffersonLab/HallA-Online-Tritium>

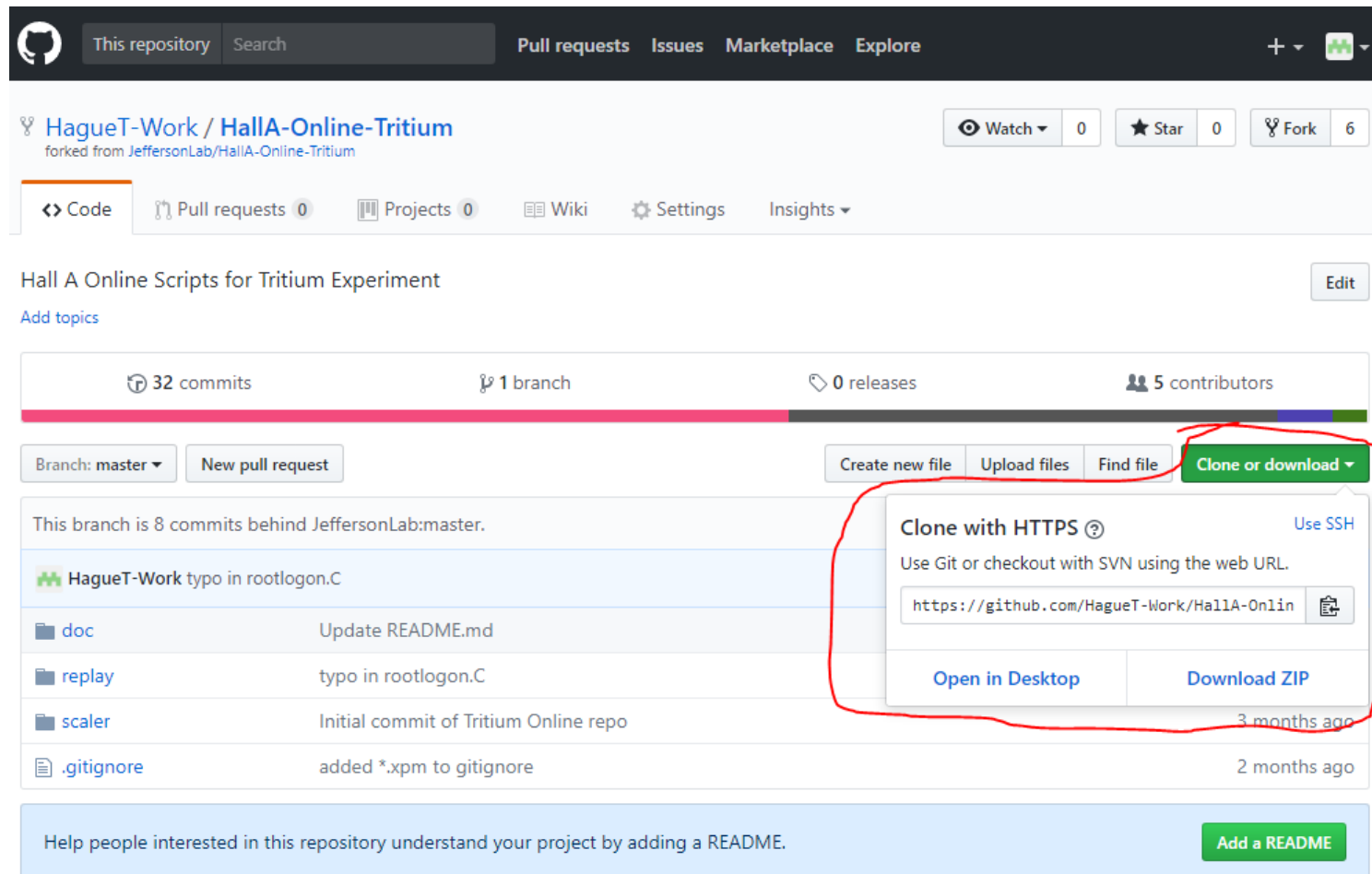


The screenshot shows the GitHub interface for the repository `JeffersonLab / HallA-Online-Tritium`. The repository name is displayed in the top left. In the top right, there are navigation links for `Pull requests`, `Issues`, `Marketplace`, and `Explore`. Below these, the repository name is repeated, followed by interaction buttons: `Unwatch` (8), `Unstar` (2), and `Fork` (6). The `Fork` button is circled in red. Below the repository name, there are tabs for `Code`, `Issues` (6), `Pull requests` (1), `Projects` (0), `Wiki`, and `Insights`. The repository title is `Hall A Online Scripts for Tritium Experiment`. Below the title, there are statistics: `40 commits`, `1 branch`, `0 releases`, and `5 contributors`. A horizontal progress bar is shown below these statistics. Below the progress bar, there are buttons for `Branch: master`, `New pull request`, `Create new file`, `Upload files`, `Find file`, and `Clone or download`. Below these buttons, there is a commit history table.

Commit	Message	Time
vanlellan	committed on GitHub Merge pull request #20 from HagueT-Work/master	Latest commit f9fda8a 4 days ago
doc	Update README.md	2 months ago
replay	Merge pull request #20 from HagueT-Work/master	4 days ago
scaler	Initial commit of Tritium Online repo	3 months ago
.gitignore	preparing to merge	13 days ago

Download your fork

Use the command: “git clone <YOUR_GIT_URL>”



The screenshot shows the GitHub interface for a repository named 'HagueT-Work / HallA-Online-Tritium'. The repository is forked from 'JeffersonLab/HallA-Online-Tritium'. The page displays 32 commits, 1 branch, 0 releases, and 5 contributors. A red circle highlights the 'Clone or download' dropdown menu, which is open and shows the following options:

- Clone with HTTPS (selected)
- Use SSH
- Use Git or checkout with SVN using the web URL.
- https://github.com/HagueT-Work/HallA-Onlin (with a copy icon)
- Open in Desktop
- Download ZIP

The repository content is listed below the dropdown menu:

File/Folder	Commit Message	Time Ago
HagueT-Work typo in rootlogon.C		
doc	Update README.md	
replay	typo in rootlogon.C	
scaler	Initial commit of Tritium Online repo	3 months ago
.gitignore	added *.xpm to gitignore	2 months ago

At the bottom of the page, there is a blue banner with the text: 'Help people interested in this repository understand your project by adding a README.' and a green button labeled 'Add a README'.

What do I do when I've made changes I want to keep?

- Commit your work
 - “git add” – select the individual files that you would like to have included in the next commit (or use “--all”)
 - “git commit” optional flag “--all”
 - This will open a text editor to provide a commit message
 - First line should be a brief overall description of what you did
 - On the next line you can begin a detailed description of the work if necessary
 - This creates a local commit that you can reference and track
- Use “git push” to move your local commits to your github fork
 - You will be prompted for your github login info

I'm ready to move my code to the master repository. Now what?

The screenshot shows the GitHub interface for a repository named 'HagueT-Work / HallA-Online-Tritium', which is a fork of 'JeffersonLab/HallA-Online-Tritium'. The repository has 32 commits, 1 branch, 0 releases, and 5 contributors. The 'master' branch is selected, and a 'New pull request' button is highlighted with a red circle. Below the repository information, there is a table of recent commits. At the bottom, there is a prompt to 'Add a README'.

This repository Search Pull requests Issues Marketplace Explore

HagueT-Work / HallA-Online-Tritium
forked from JeffersonLab/HallA-Online-Tritium

Watch 0 Star 0 Fork 6

Code Pull requests 0 Projects 0 Wiki Settings Insights

Hall A Online Scripts for Tritium Experiment Edit

Add topics

32 commits 1 branch 0 releases 5 contributors

Branch: master New pull request Create new file Upload files Find file Clone or download

This branch is 8 commits behind JeffersonLab:master. Pull request Compare

HagueT-Work	typo in rootlogon.C	Latest commit 7f9ede5 5 days ago
doc	Update README.md	2 months ago
replay	typo in rootlogon.C	5 days ago
scaler	Initial commit of Tritium Online repo	3 months ago
.gitignore	added *.xpm to gitignore	2 months ago

Help people interested in this repository understand your project by adding a README. Add a README

I'm ready to move my code to the master repository. Now what?

Lower on the screen it will show the differences between the current code and your code

The screenshot shows the GitHub interface for a pull request. At the top, there's a navigation bar with the GitHub logo, a search bar, and links for 'Pull requests', 'Issues', 'Marketplace', and 'Explore'. Below this, the repository name 'JeffersonLab / HallA-Online-Tritium' is displayed, along with statistics for 'Unwatch' (8), 'Unstar' (2), and 'Fork' (6). A secondary navigation bar shows 'Code', 'Issues' (6), 'Pull requests' (1), 'Projects' (0), 'Wiki', and 'Insights'. The main heading is 'Comparing changes', followed by a sub-heading: '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](#).' Below this, a comparison bar shows 'base fork: JeffersonLab/HallA-Online-Tritium', 'base: master', 'head fork: HagueT-Work/HallA-Online-Tritium', and 'compare: master'. A green checkmark indicates 'Able to merge. These branches can be automatically merged.' A prominent green button labeled 'Create pull request' is circled in red, with the text 'Discuss and review the changes in this comparison with others.' to its right. At the bottom, a summary bar shows '1 commit', '1 file changed', '0 commit comments', and '1 contributor'.

This repository Search Pull requests Issues Marketplace Explore

JeffersonLab / HallA-Online-Tritium Unwatch 8 Unstar 2 Fork 6

Code Issues 6 Pull requests 1 Projects 0 Wiki Insights

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](#).

base fork: JeffersonLab/HallA-Online-Tritium base: master head fork: HagueT-Work/HallA-Online-Tritium compare: master

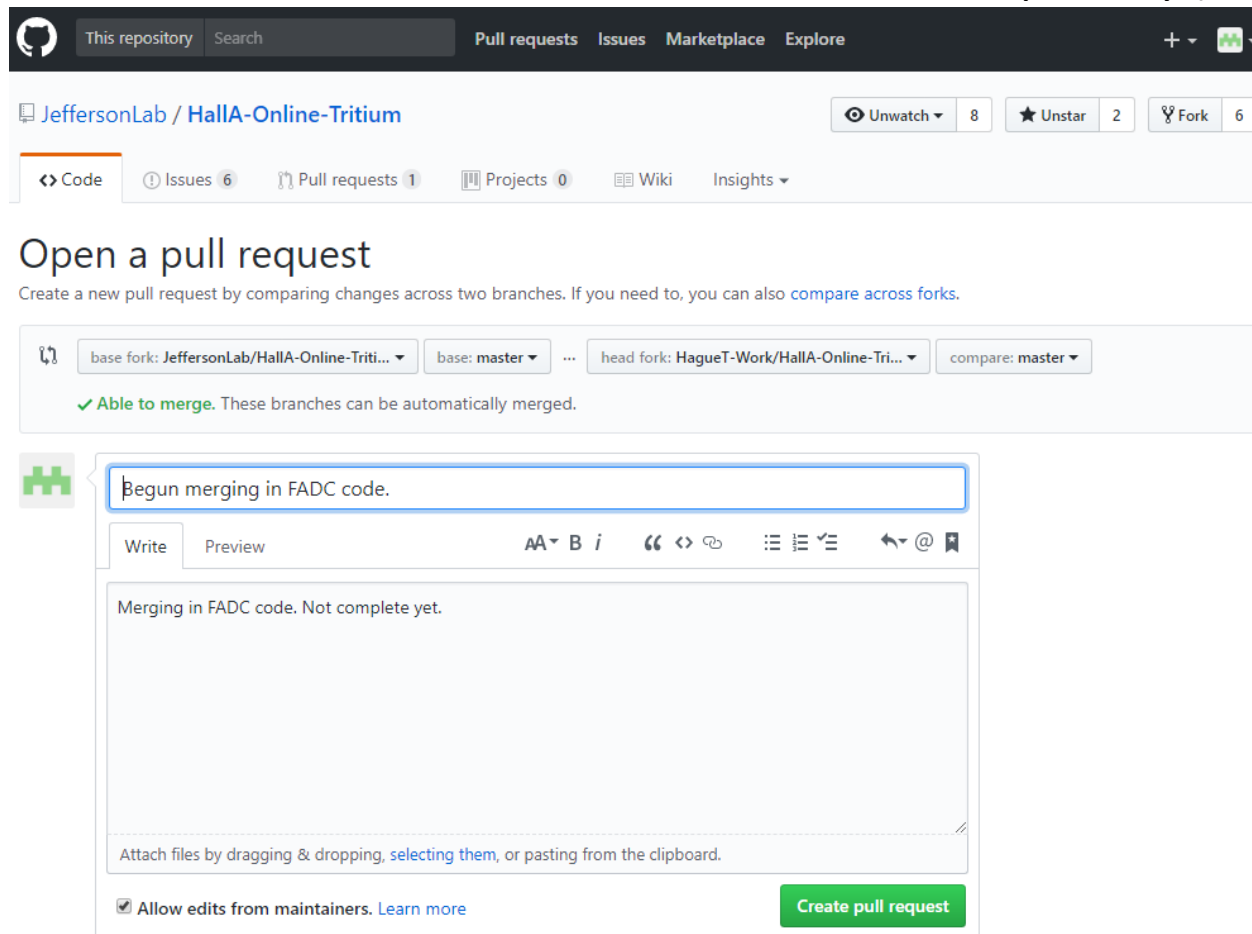
✓ Able to merge. These branches can be automatically merged.

Create pull request Discuss and review the changes in this comparison with others.

1 commit 1 file changed 0 commit comments 1 contributor

I'm ready to move my code to the master repository. Now what?

It will ask you for a pull request message. This should describe what your changes accomplish. This will then be sent off to the maintainer of the repository (Evan) for approval.



The screenshot shows the GitHub interface for a repository named 'JeffersonLab / HallA-Online-Tritium'. The navigation bar includes 'Pull requests', 'Issues', 'Marketplace', and 'Explore'. Below the repository name, there are buttons for 'Unwatch' (8), 'Unstar' (2), and 'Fork' (6). The main content area is titled 'Open a pull request' and includes a sub-header 'Create a new pull request by comparing changes across two branches. If you need to, you can also [compare across forks](#).' Below this, there are dropdown menus for 'base fork: JeffersonLab/HallA-Online-Tritium', 'base: master', 'head fork: HagueT-Work/HallA-Online-Tritium', and 'compare: master'. A green checkmark indicates 'Able to merge. These branches can be automatically merged.' The main form area has a text input field with the placeholder text 'Begin merging in FADC code.' and a rich text editor with a 'Write' tab selected. The editor contains the text 'Merging in FADC code. Not complete yet.' At the bottom of the form, there is a checkbox for 'Allow edits from maintainers. [Learn more](#)' and a green 'Create pull request' button.

*Note that I'm not actually making this pull request. As stated in the message, this work is not complete. Don't put incomplete code in the main repository.

If I'm working outside of the main repository, how do I keep my code up to date?

- Must connect your local (downloaded) code to the upstream (master) repository.
 1. “git remote add upstream <URL_OF_MASTER_REPO>”
 2. “git fetch upstream”
 3. “git checkout master”
 4. “git merge upstream/master”
 5. “git commit --all”
 6. “git push”

What if I want to work on a side-project or test?

- Create a branch!
- A branch allows you to create a set of tracked changes separate from the master branch. The branches exist within your fork of the repository.
- Relevant commands:
 - “git branch” – shows a list of branches available on your machine
 - “git branch <name_of_branch>” – creates a branch with the name specified
 - “git checkout <name_of_branch>” – begin working on code in the specified branch. “-b” flag will create the branch if it doesn’t exist.
- If you decide that the branch is something that should be merged into the master branch:
 - “git checkout master”
 - “git merge <name_of_branch>”

What if there are conflicts in the merge?

- Your code will enter merge mode.
- The merge failure message will tell you which files have conflicts.
- When you edit these files, you will see extra lines indicating where the conflicts are. You must manually decide which code should be kept and which should be deleted.
- After you do this, you can commit the changes and the conflict resolution is complete.

Merge Mode Example

Person1 and Person2 have been working independently on scaler code. Person1 decided to merge Person2's code with theirs. This has led to a conflict.

```
[me@centos7 replay]$ git checkout person1
Switched to branch 'person1'
[me@centos7 replay]$ git merge person2
Auto-merging replay/replay_tritium.C
CONFLICT (content): Merge conflict in replay/replay_tritium.C
Automatic merge failed; fix conflicts and then commit the result.
[me@centos7 replay]$
```

This message tells us which files have conflicts. In this case, we should look at “replay/replay_tritium.C” to fix what is happening. Then, the changes can be committed.

Merge Mode Example

When we look at “replay/replay_tritium.C” we see that both person1’s code and person2’s code is shown. Since we are in branch “person1” that is the “HEAD” branch. The conflicting code is shown after the “=====”. Person1 must now choose what code to keep and commit the changes.

```
//=====
//  scalers
//=====
if(bScaler){
<<<<<< HEAD
    THaScalerEvtHandler* rscaler = new THaScalerEvtHandler("Right ", "HA scaler event type 140 on R-HRS");
    gHaEvtHandlers->Add(rscaler);

    //Hi, I'm person1 and I'm working on some scaler stuff
    scalerstuff->DoPerson1Things();
=====
    //Hi, I'm person2 and I'm also changing some scaler stuff. Person1 and I did not communicate
    //about our work so we are going to have some merge conflicts. Let's see what happens.

    //THaScalerEvtHandler* rscaler = new THaScalerEvtHandler("Right ", "HA scaler event type 140 on R-HRS");
    //gHaEvtHandlers->Add(rscaler);

    newscalerstuff->DoPerson2Things();
>>>>>> person2
}
```

*Merge conflicts will happen when many people are working on the code. The comments here are not meant to imply that communication breakdown is the only cause of merge conflicts. However, when a conflict happens those who wrote the conflicting code should communicate in order to reach an agreeable solution. Don't simply delete the other persons code without good reason.

Merge Mode Example

After the discussing the problem with Person 2, a solution was found. Person1 made the made the changes and completed the merge by committing them to their repository.

```
//=====
//  Scalers
//=====
if(bScaler){
    THaScalerEvtHandler* rscaler = new THaScalerEvtHandler("Right ", "HA scaler event type 140 on R-HRS");
    gHaEvtHandlers->Add(rscaler);

    //Hi, I'm person1 and I'm working on some scaler stuff
    scalerstuff->DoPerson1Things();
    //Hi person2. I'm uncommenting the original scaler stuff because it's critical for my code.
    //I'm leaving in your scaler things because we discussed why it's necessary.
    //The merge is now complete and I can commit this to my branch.

    newscalerstuff->DoPerson2Things();
}

```

```
[me@centos7 replay]$ git commit --all
[person1 c1f0bcc] Merge branch 'person2' into person1
[me@centos7 replay]$ █
```

When in doubt, ask an expert!

- Sometimes that's me.
- A lot of times that's Evan.
- If we don't know, we'll do our best to help you figure it out so that we can all better use this tool.

Questions?