Version control using Git

https://github.com/nih-fmrif/git-training

Session 3

12/19/2019

Data Science and Sharing Team
NIMH

Logistics

Today:

- Lecture - Review, branching, merging, pulling
- Examples: Branching and merging (non-interactive)
- Discussion - github organizations
- Exercise - merge conflicts and working on the same repo

Please share your GitHub usernames: https://tinyurl.com/tqooqmv

https://github.com/nih-fmrif/git-training

Review: repository

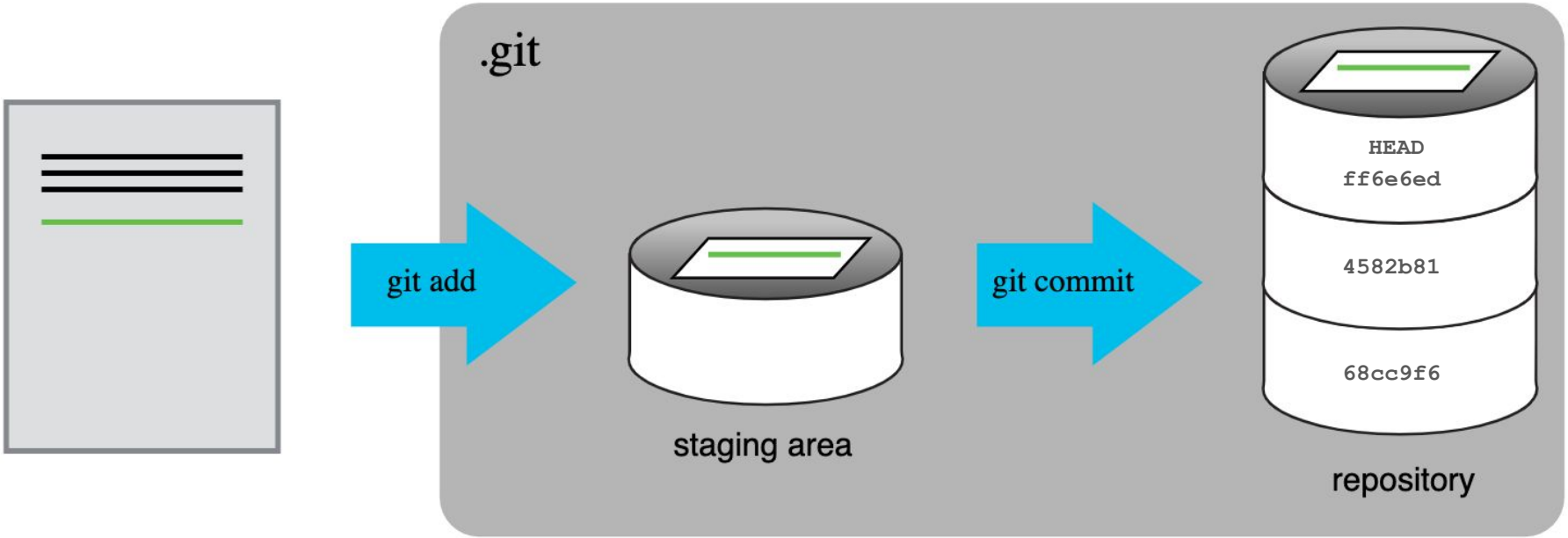
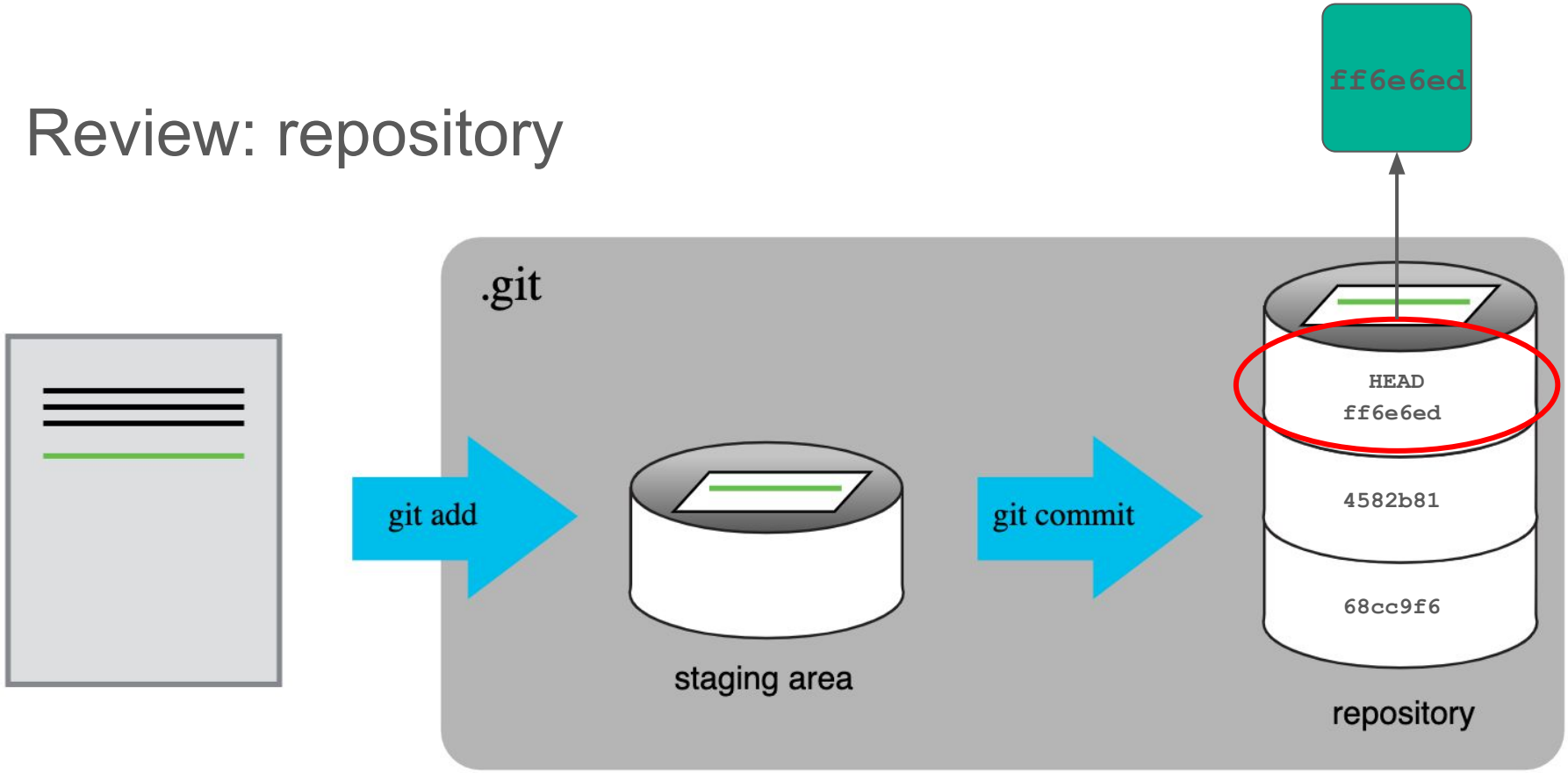


Image from: http://swcarpentry.github.io/git-novice/04-changes/index.html

Review: repository



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Review: repository

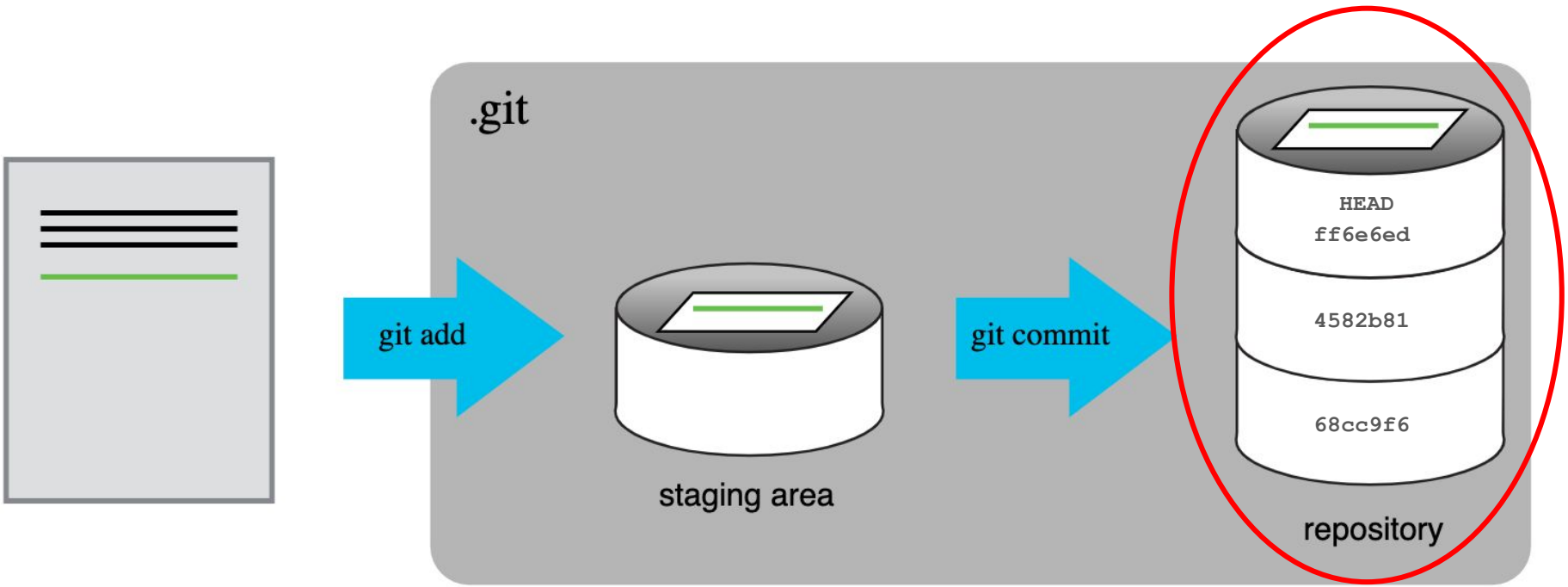
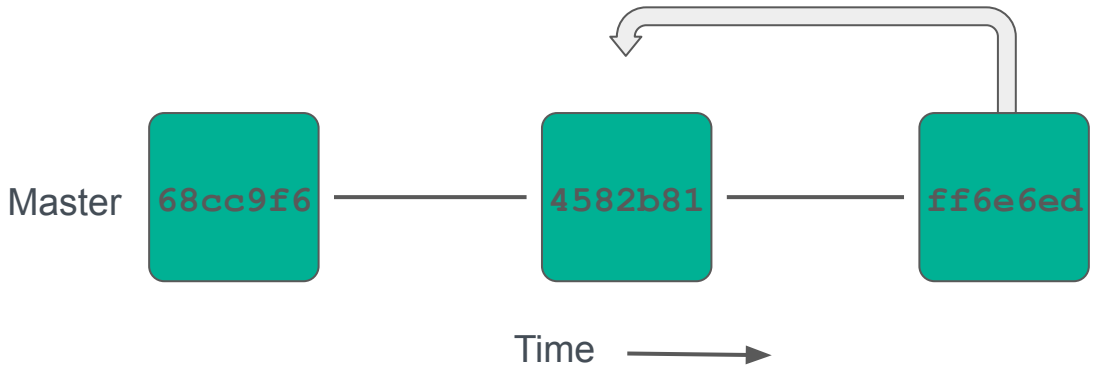
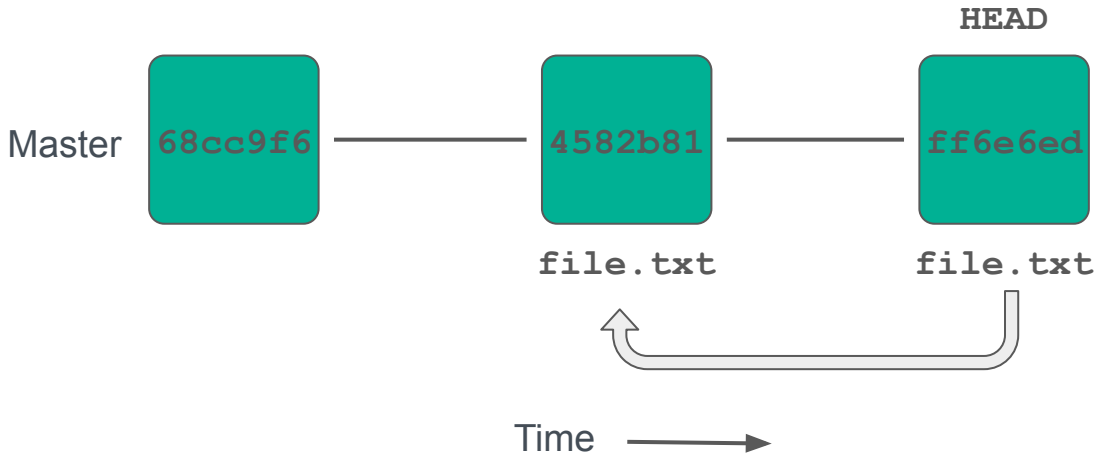


Image from: http://swcarpentry.github.io/git-novice/04-changes/index.html

Review: going back in time

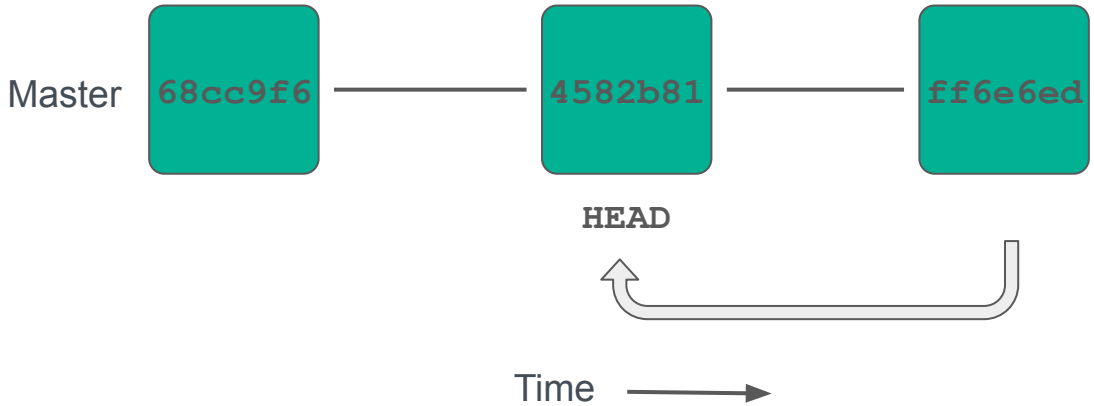


`git checkout 4582b81 <file>`



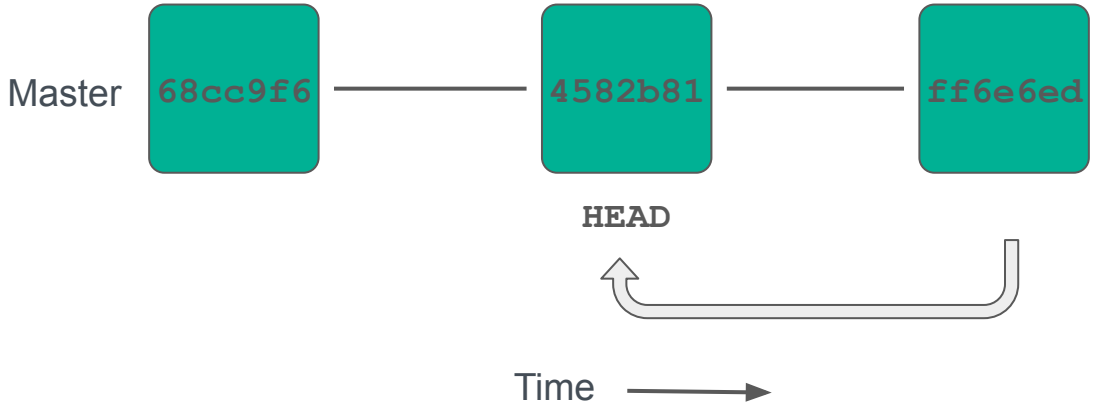
Revert `file.txt` to previous version

`git checkout 4582b81`



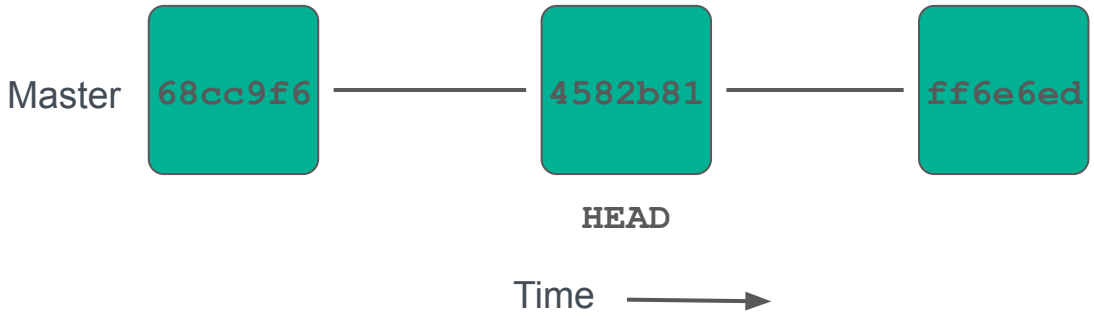
Changes `HEAD` to previous commit

`git checkout 4582b81`

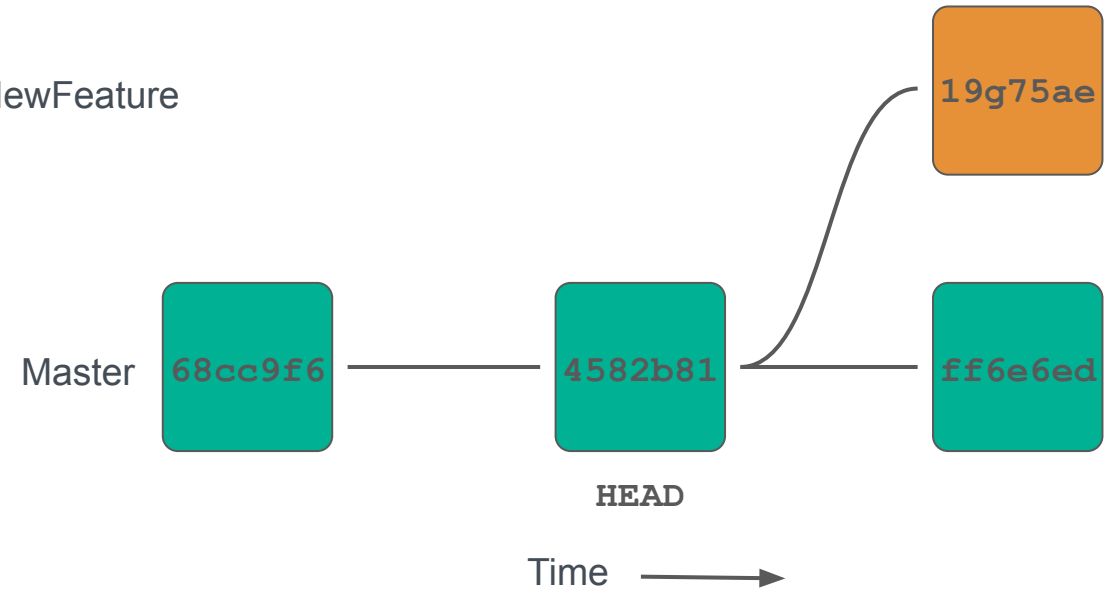


What happens if you want to change the files from a previous commit?

Git command: branch

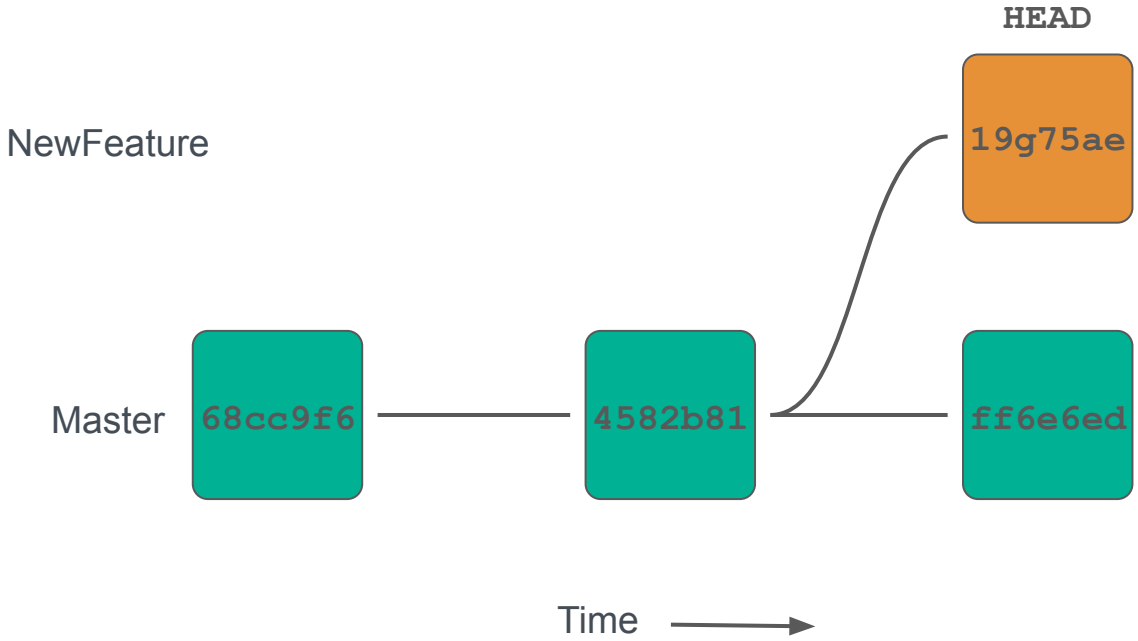


Git command: branch




```
git branch NewFeature
```

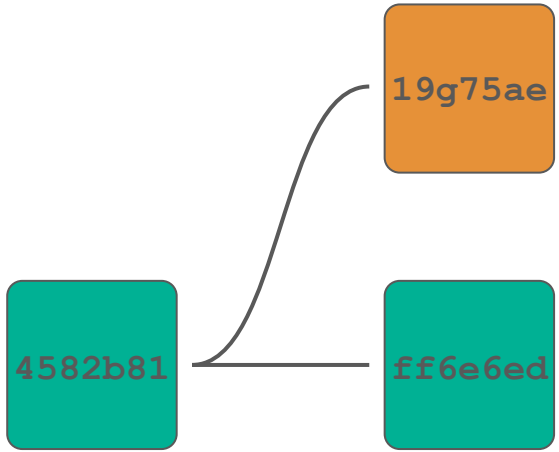
Pointing your HEAD to another branch




```
git checkout NewFeature
```

Best practices: branching

- Master branch only contains deployable code
- New branch for single item of development (eg new feature)
- Once work on branch is complete (and tested!)
  - Merge branch into master
  - Delete development branch



http://practicalseries.com/1002-vcs/02-04-concept.html#js--020402

Example

Branching
(non-interactive)

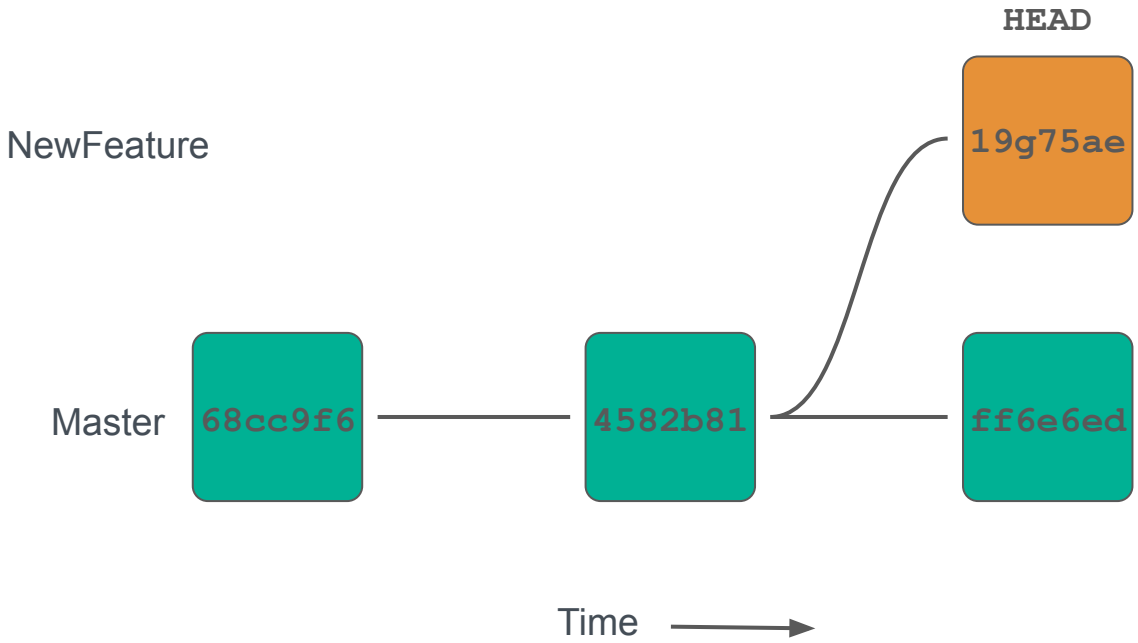
https://github.com/nih-fmrif/git-training/tree/master/session_3#branching-demo

Git command: checkout

- Revert file to different version
- Inspect other commits
- Change branches

Git command: checkout

- Revert file to different version
- Inspect other commits
- Change branches
- Confusing?



How to merge two timelines into one?

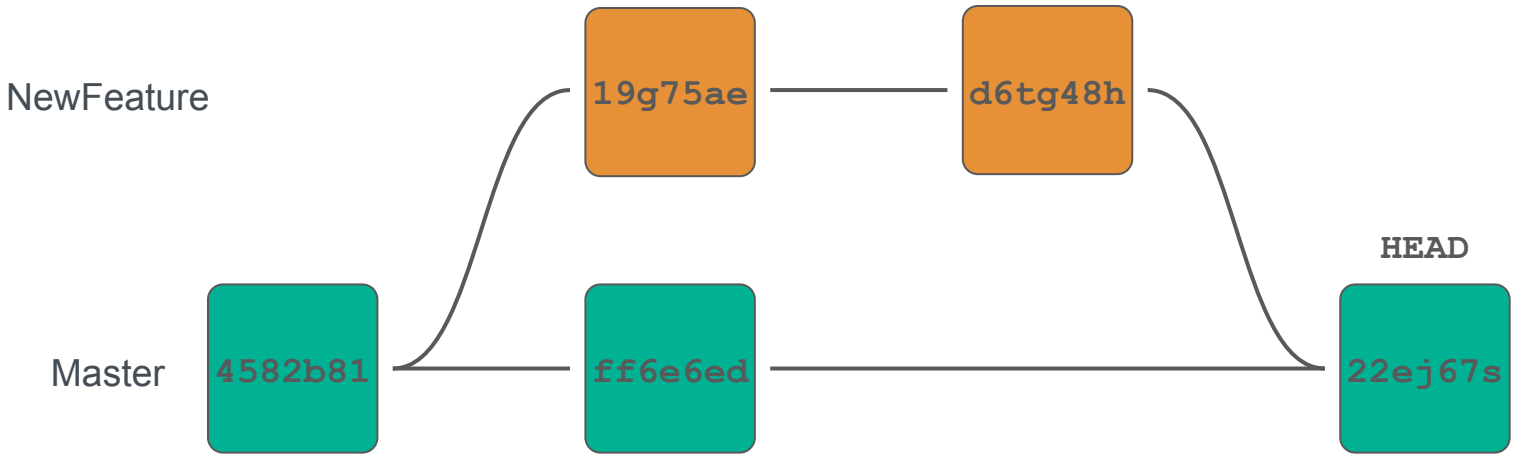
Git command: merge

Integrates independent lines of development created by `git branch` into a single branch

- Merge external branch into current branch
- Combines sequence of commits into one history
- `merge` creates a new commit

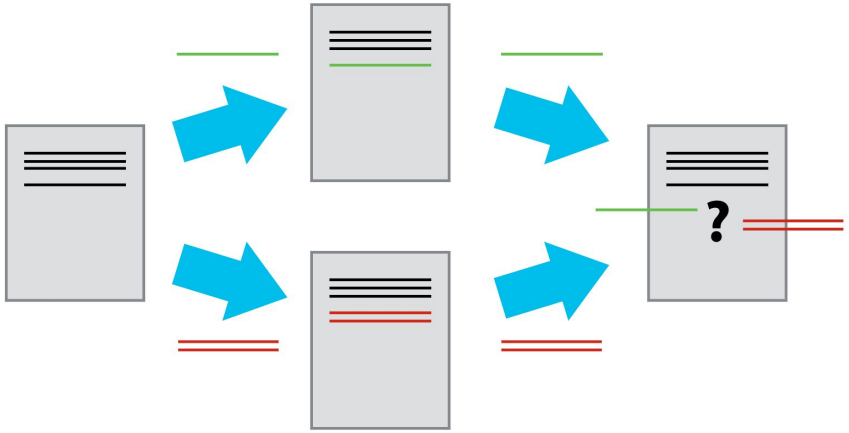
```
git merge NewFeature
```

Git command: merge




```
git checkout master
git merge NewFeature
```

Conflicts and merging



Conflicts can occur:

- Working on your own files
  - Out of sync local and remote
  - Conflicts between branches when trying to merge
- Collaborating on the same remote

Git will try to auto resolve conflicts, however, if the *same line* differs between both changes:

- Git will add conflict markers to the conflicting file
- Decisions have to be made

Image from: https://swcarpentry.github.io/git-novice/09-conflict/index.html

Conflict markers

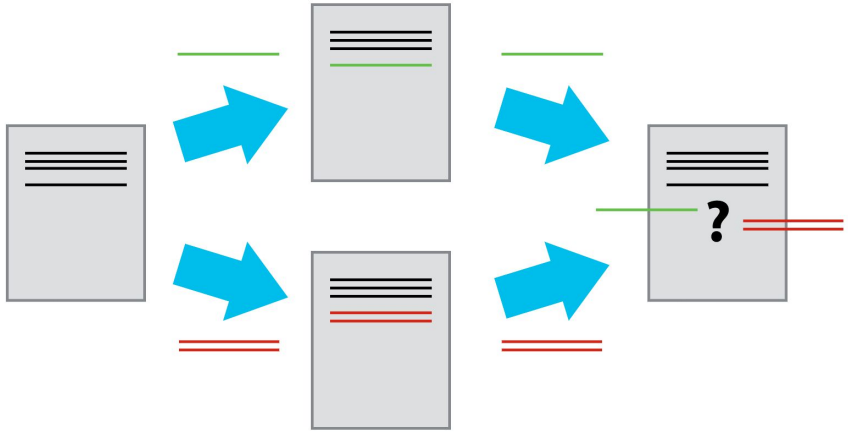
```
<<<<<<< HEAD
```

(lines in HEAD)

```
=======
```

(lines in merging branch)

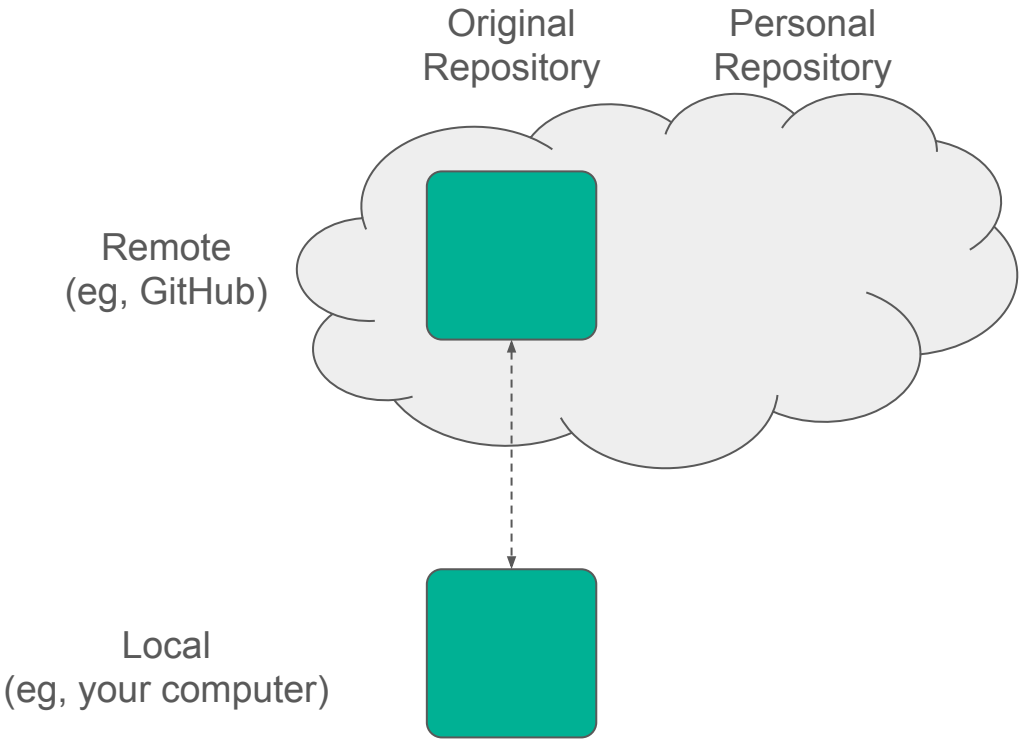
```
>>>>>>> commitID
```



The decision of which changes to keep or how to resolve the conflict must be done manually

Image from: https://swcarpentry.github.io/git-novice/09-conflict/index.html

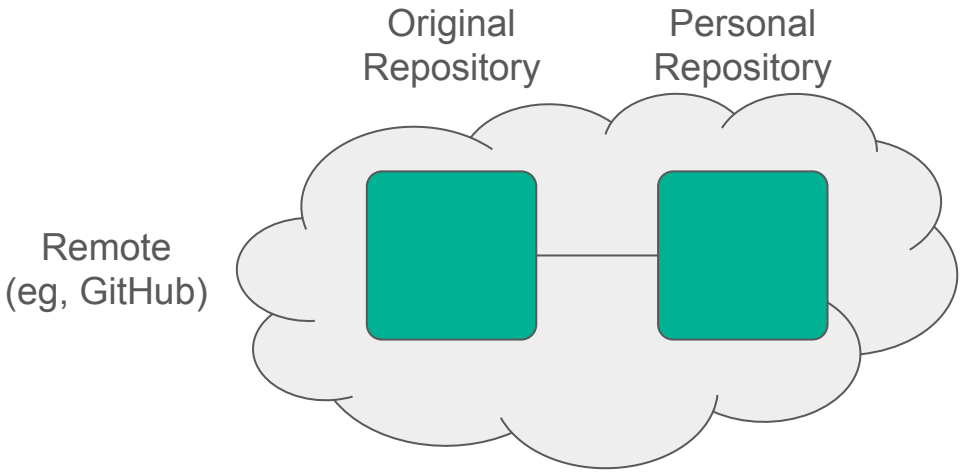
Review: Clone versus Fork



Git operation

Clone

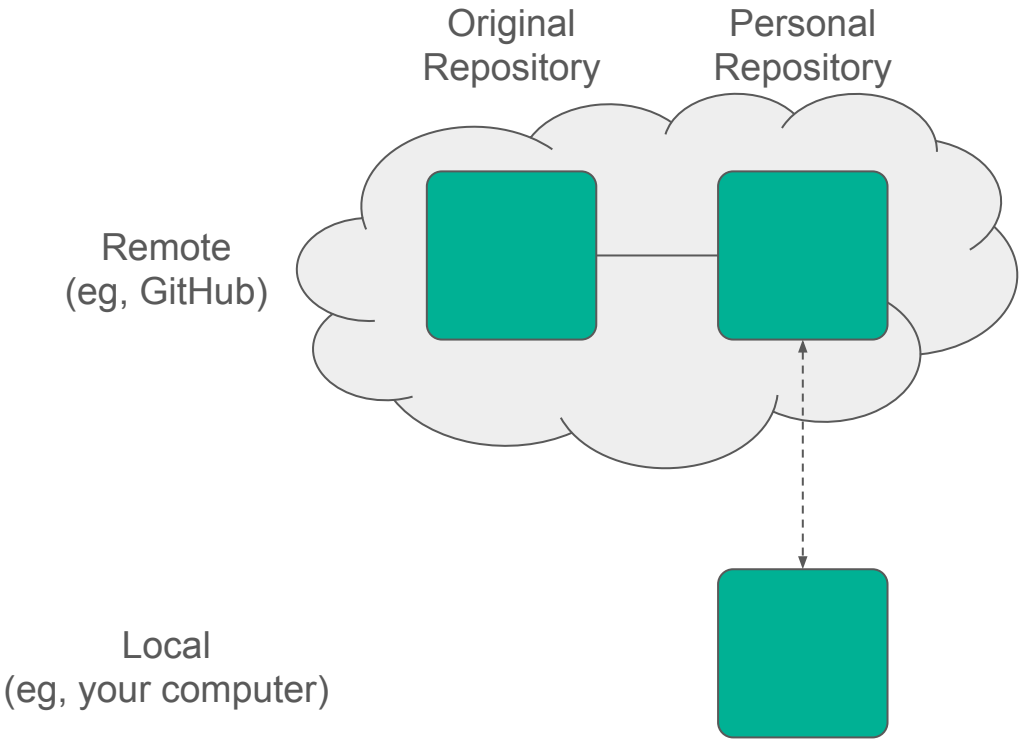
Review: Clone versus Fork



Git operation

Fork

Review: Clone versus Fork

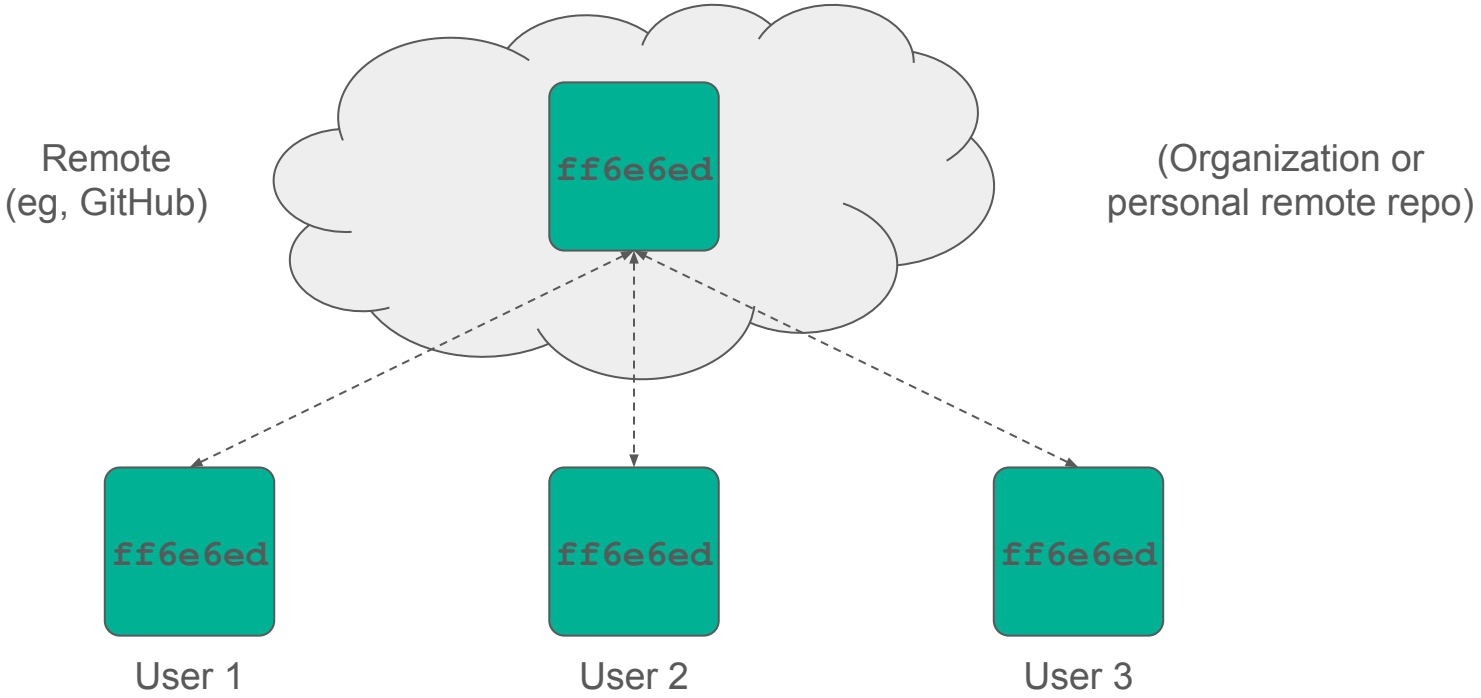


Git operation

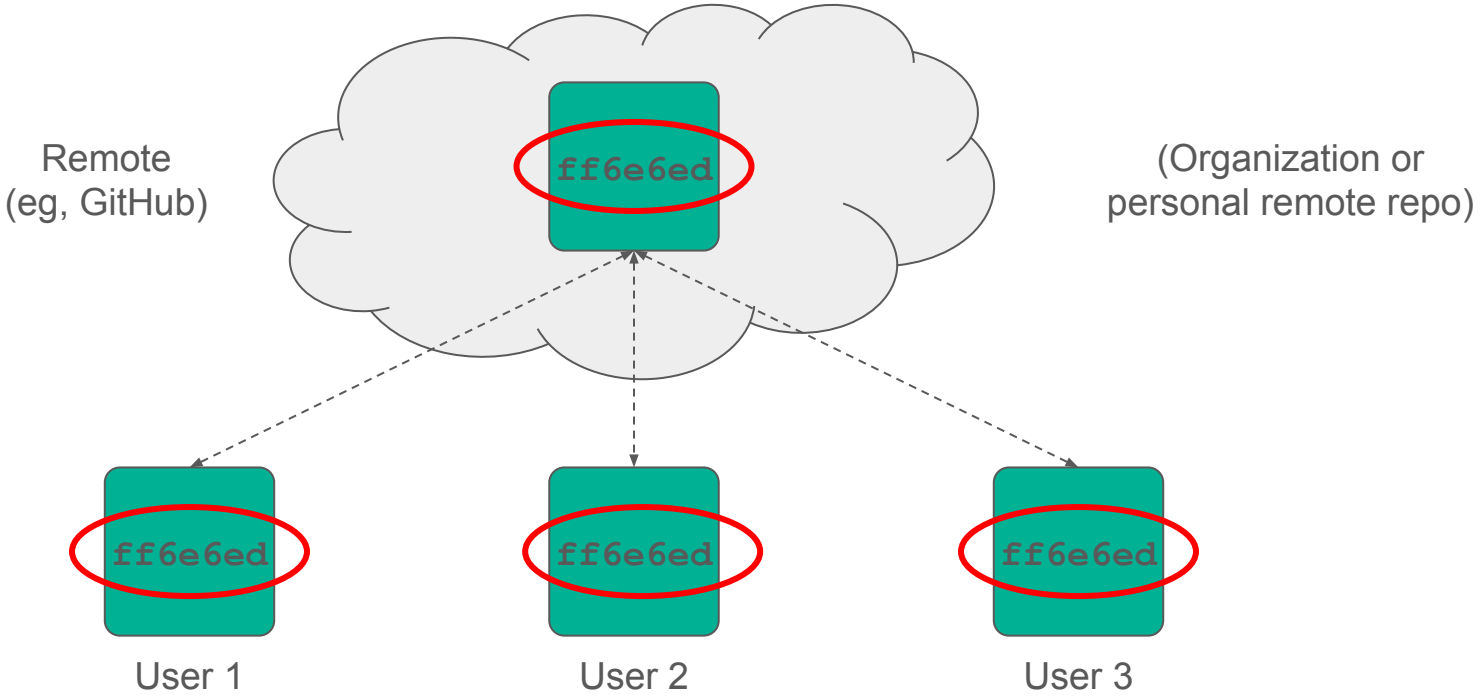
Fork

Clone

Collaboration using same remote repo



Collaboration using same remote repo



*Same commit ID

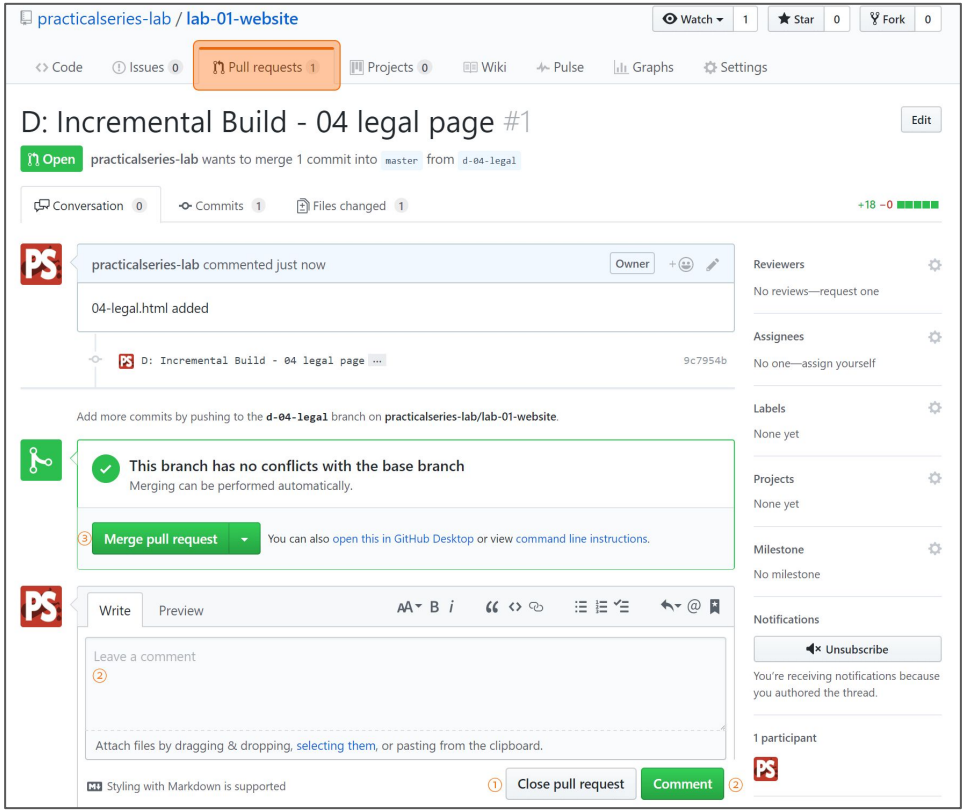
Git concept: pull request

Alerts owner of a repo that someone has made a modification and that they are *requesting* that you *pull* their modification into the repository.

- Nothing happens except the opening of the request
  - No changes to the files
- The owner has options
  - Reject
  - Discuss
  - Accept
- Pull requests can also be used to merge branches

http://practicalseries.com/1002-vcs/09-05-github.html#js--090503

Git concept: pull request



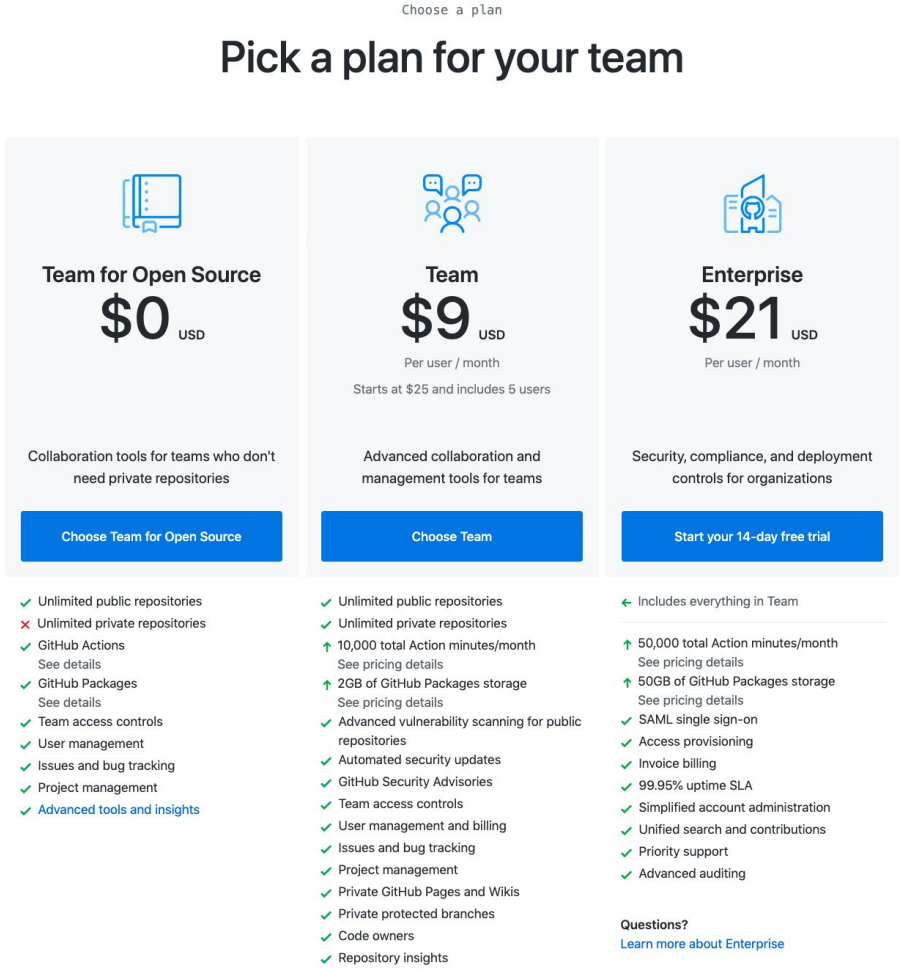
http://practicalseries.com/1002-vcs/09-05-github.html#js--090503

Example

Pull request to merge branches (non-interactive)

https://github.com/nih-fmrif/git-training/tree/master/session_3#pull-request-demo

Organizations on GitHub



Organizations: relevant examples

FMRIF: https://github.com/nih-fmrif

ThomasYeoLab: https://github.com/ThomasYeoLab

BIDS-standard: https://github.com/bids-standard

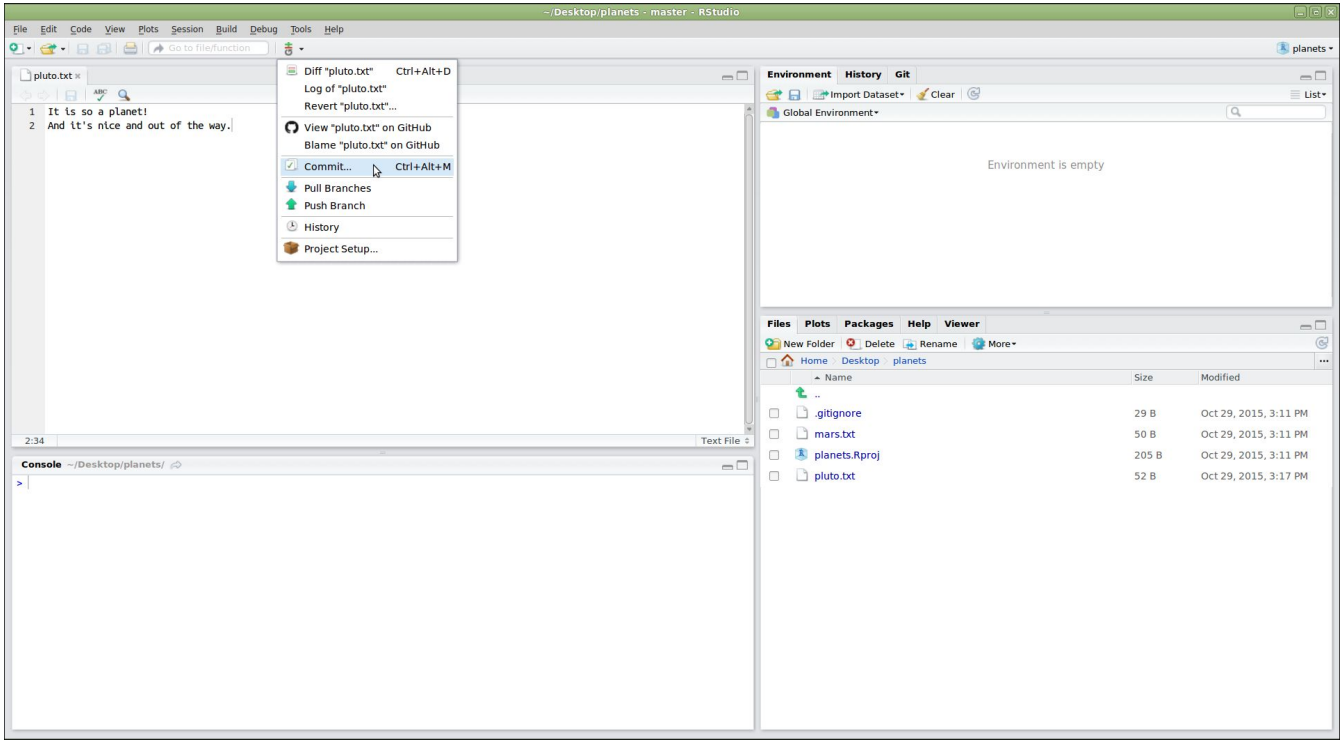
Example

Walk through collaboration and merging (interactive)

https://github.com/nih-fmrif/git-training/tree/master/session_3#merge-conflicts-walkthrough

Supplemental: Using Git from RStudio

Tools > Global Options > Git/SVN



https://swcarpentry.github.io/git-novice/14-supplemental-rstudio/index.html