

Version Control III

David Beck^{1,2,3}, Joseph Hellerstein^{1,3}, Bernease Herman¹,
Colin Lockard³

¹eScience Institute

²Chemical Engineering

³Computer Science

November 6, 2018



Agenda

1. Reminder and correction to last week's tree exercise
2. Undoing changes and rewriting history in `git`
3. Hands-on merge conflict practice in `git`
4. Collaboration workflows in `git` + GitHub
5. Team standups



Reminder: Team technology reviews start on Thursday this week!

This involves a 10 minute presentation (plus few minutes of questions) of the software packages you're considering, including trade-offs and considerations for your project.



Let's choose the order for presentations now.

Spreadsheet



Exercise: Tracing the Git Tree

With a partner (or groups of 3), walk through how the following commands would change your git tree. Draw a diagram with the final tree that includes labels for HEAD, all local branches, and all remote branches (origin/*).

Assume that all add/commit combinations has changes and creates a commit.

```
git init
```

```
git commit -a -m "First  
commit"
```

```
git commit -a -m "Second  
commit"
```

```
git remote add origin <url>  
(Assume remote has an empty repository.)
```

```
git push origin master
```

```
git checkout HEAD~1
```

```
git branch fix
```

```
git checkout fix
```

```
git commit -a -m "Third  
commit"
```

```
git push origin fix
```

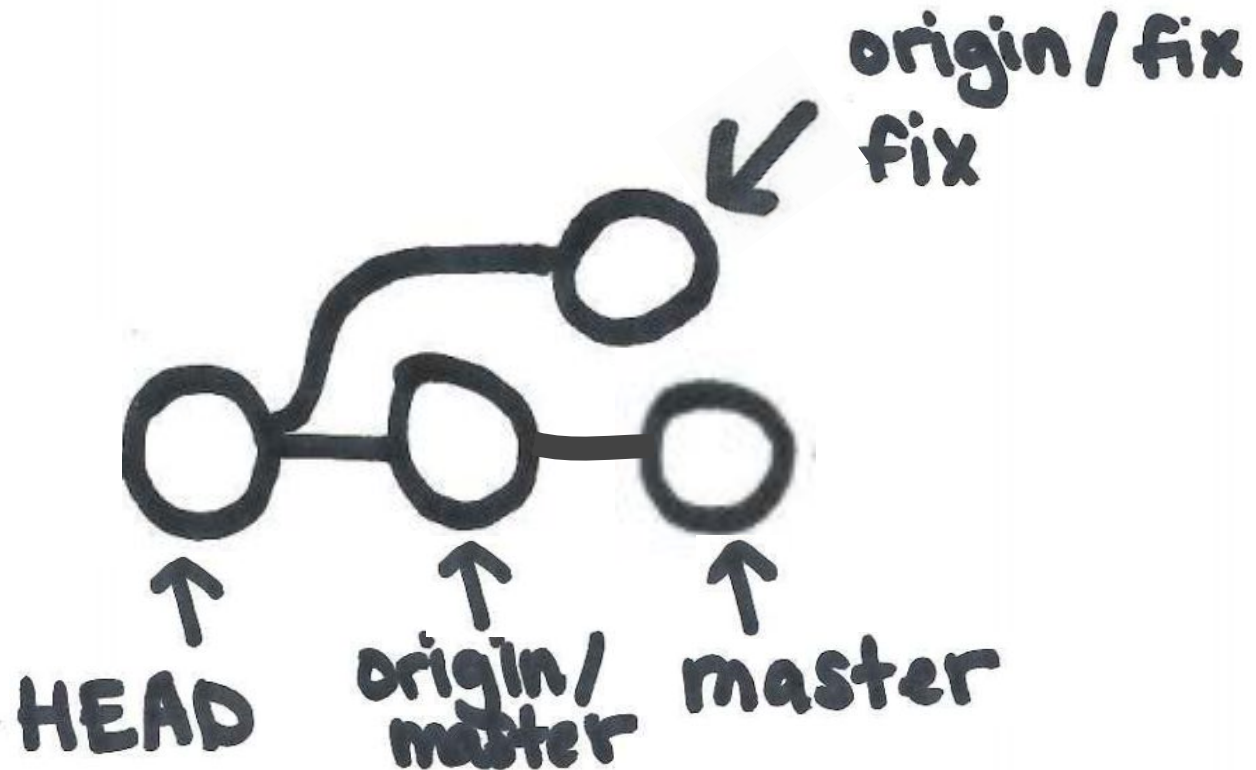
```
git checkout master
```

```
git commit -a -m "Fourth  
commit"
```

```
git checkout HEAD~2
```



Exercise answer (amended from video)



INTRODUCTION TO GIT

*(and some GitHub)

INTRODUCTION TO GIT

*(and some GitHub)

0. Set up

- > git config [options]
- > git init
- > git ignore

1. Make changes



(use your preferred editor and tools.)

2. Stage changed files

- > git add
- > git add -A
- > git rm [path]



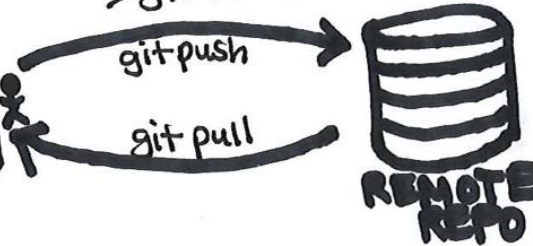
3. Create snapshot

- > git commit
- > git commit -m "[msg]"



5. Add remote

- > git remote add [name][url]
- > git remote -v



4. Explore

- > git status
- > git log [options]
- > git show [sha1]

6. Pull from remote

- > git fetch [remote][branch]
- > git pull [remote][branch]

7. Push to remote

- > git push [remote][branch]

(Repeat 1-4 as desired.)

INTRODUCTION TO GIT

*(and some GitHub)

0. Set up

- > git config [options]
- > git init
- > git ignore

1. Make changes



(use your preferred editor and tools.)

2. Stage changed files

- > git add
- > git add -A
- > git rm [path]



3. Create Snapshot

- > git commit
- > git commit -m "[msg]"



auto

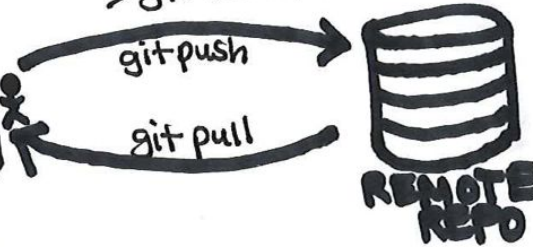


4. Explore

- > git status
- > git log [options]
- > git show [sha1]

5. Add remote

- > git remote add [name][url]
- > git remote -v



6. Pull from remote

- > git fetch [remote][branch]
- > git pull [remote][branch]

7. Push to remote

- > git push [remote][branch]

10. Climbing the Git tree

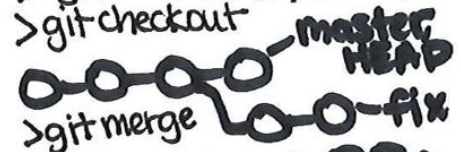


- > git checkout

Detached HEAD state!

11. Branches

- > git branch [options]
- > git checkout



12. Forks and PRs



(Repeat 1-4 as desired.)

INTRODUCTION TO GIT

#(and some GitHub)

0. Set up

- > git config [options]
- > git init
- > git ignore

1. Make changes



(use your preferred editor and tools.)

2. Stage changed files

- > git add
- > git add -A
- > git rm [path]



3. Create Snapshot

- > git commit
- > git commit -m "[msg]"



4. Explore

- > git status
- > git log [options]
- > git show [sha1]

(Repeat 1-4 as desired.)

8. Undoing changes

- > git reset [options]
- > git revert [sha1]

9. Rewriting history

(Not to be used on public commits!)

- > git commit --amend
- > git rebase [-i]
- > git reflog

TIP: pull before commit to minimize conflicts!

10. Climbing the Git tree



- > git checkout

Detached HEAD state!

BONUS: Conflicts

- > git merge
- > git rebase

5. Add remote

- > git remote add [name][url]
- > git remote -v



6. Pull from remote

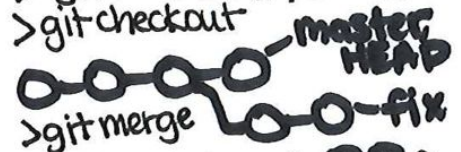
- > git fetch [remote][branch]
- > git pull [remote][branch]

7. Push to remote

- > git push [remote][branch]

11. Branches

- > git branch [options]
- > git checkout



12. Forks and PRs



13. Workflows and Tags and More

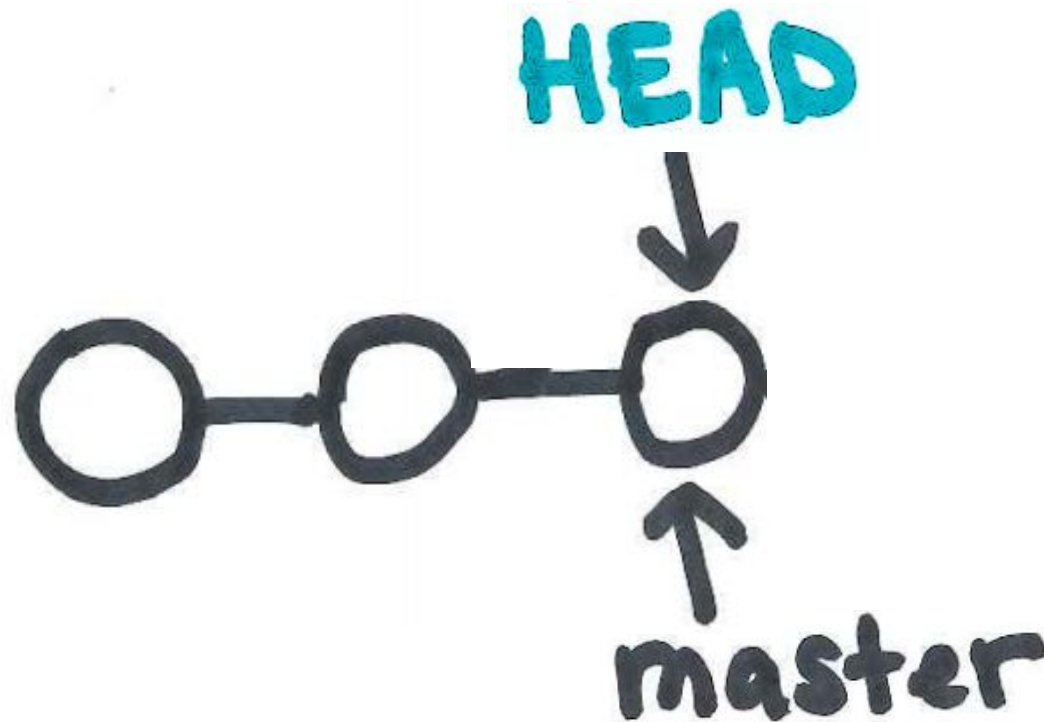
- > git tag [options]

Bernease Herman 10/4/18

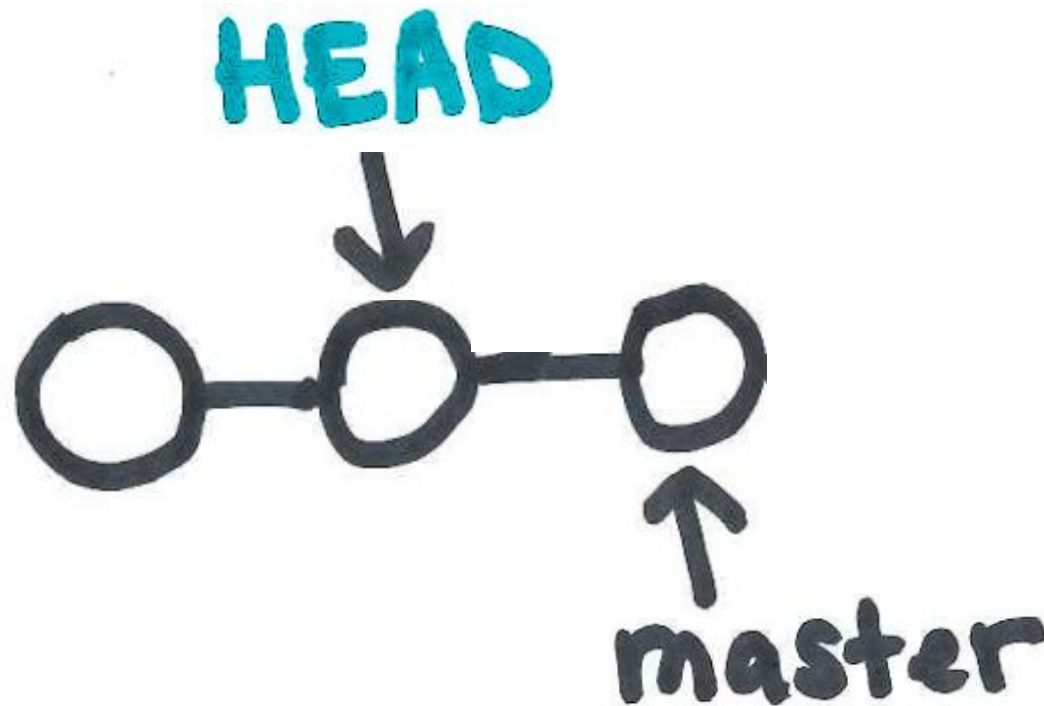
Amending to your most recent commit

```
$ git commit --amend
```

Assume we have three commits



**Checkout an earlier commit
(hiding origin/master for simplicity)**

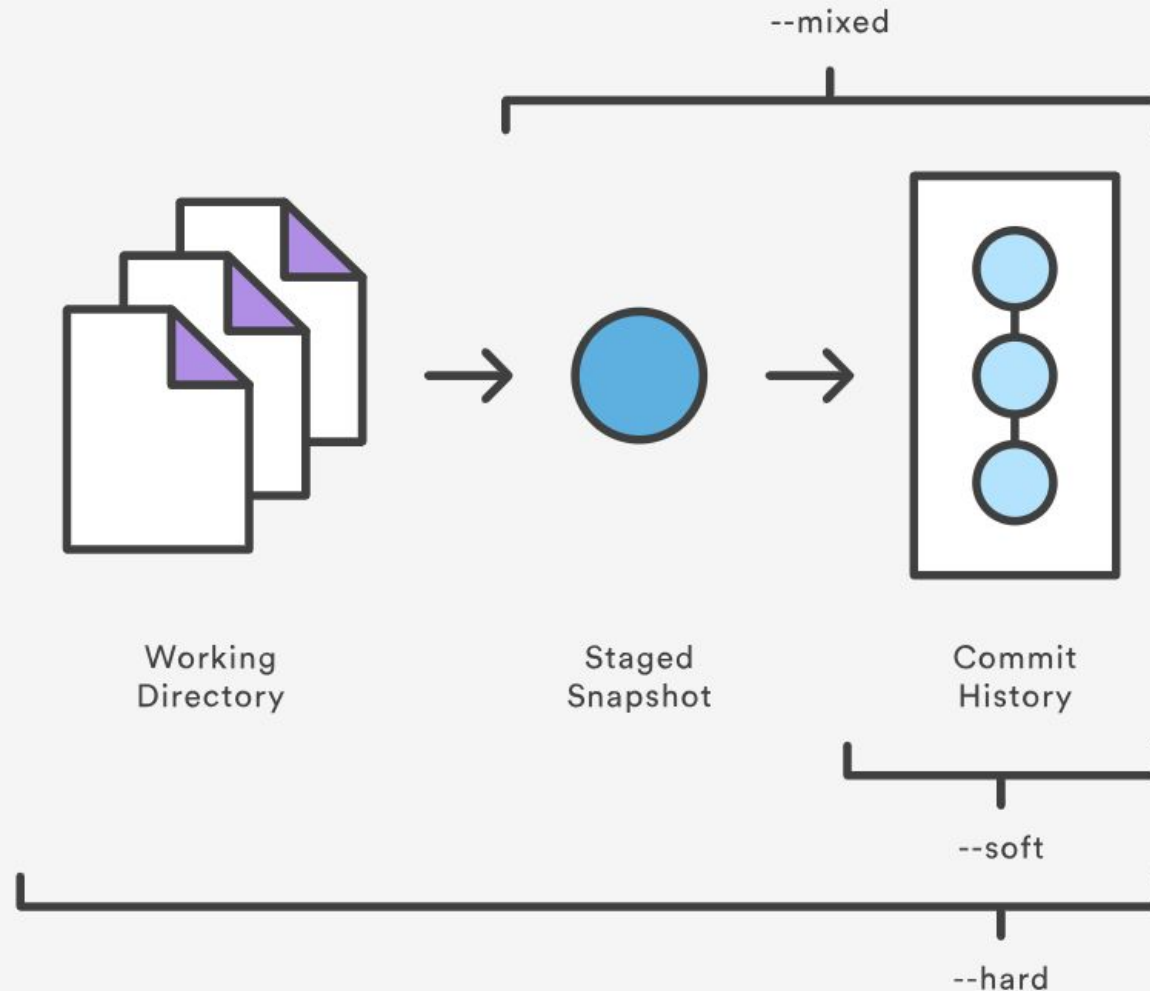


Checking out a specific file

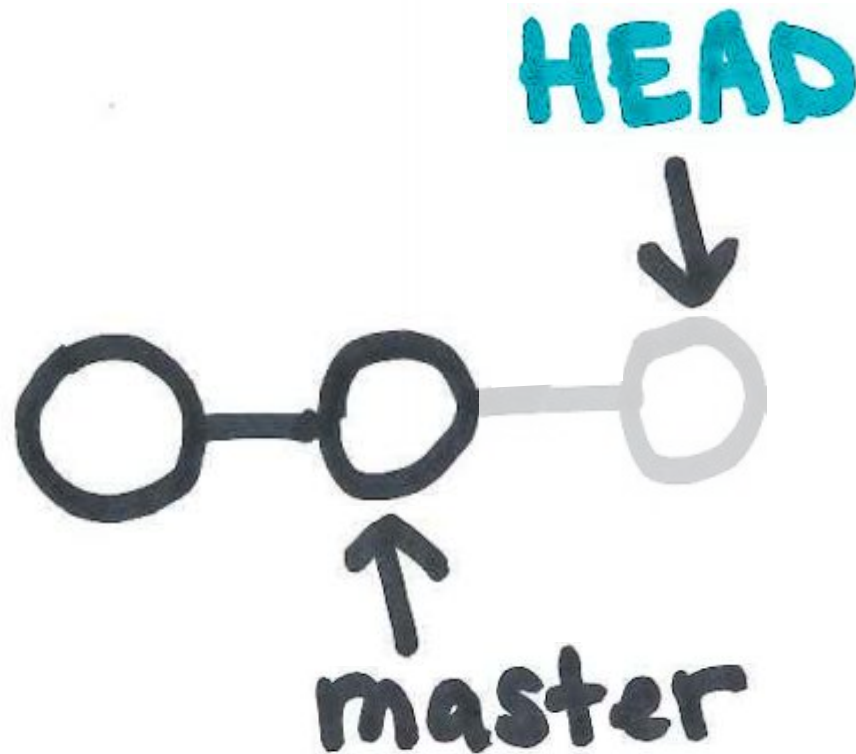
```
$ git checkout -- myfile.txt
```

Resetting when changes are still private

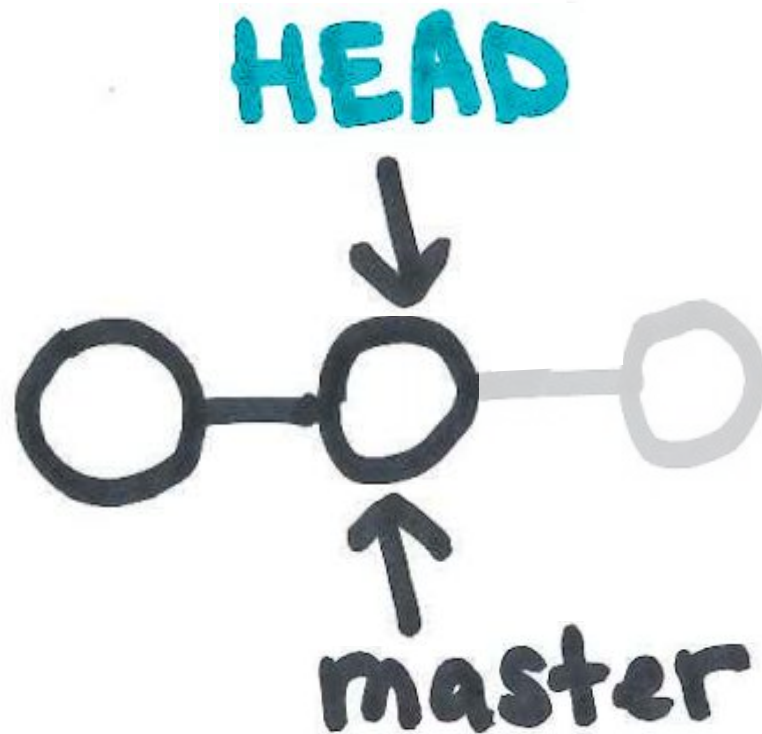
(image from Atlassian's online `git` tutorials)



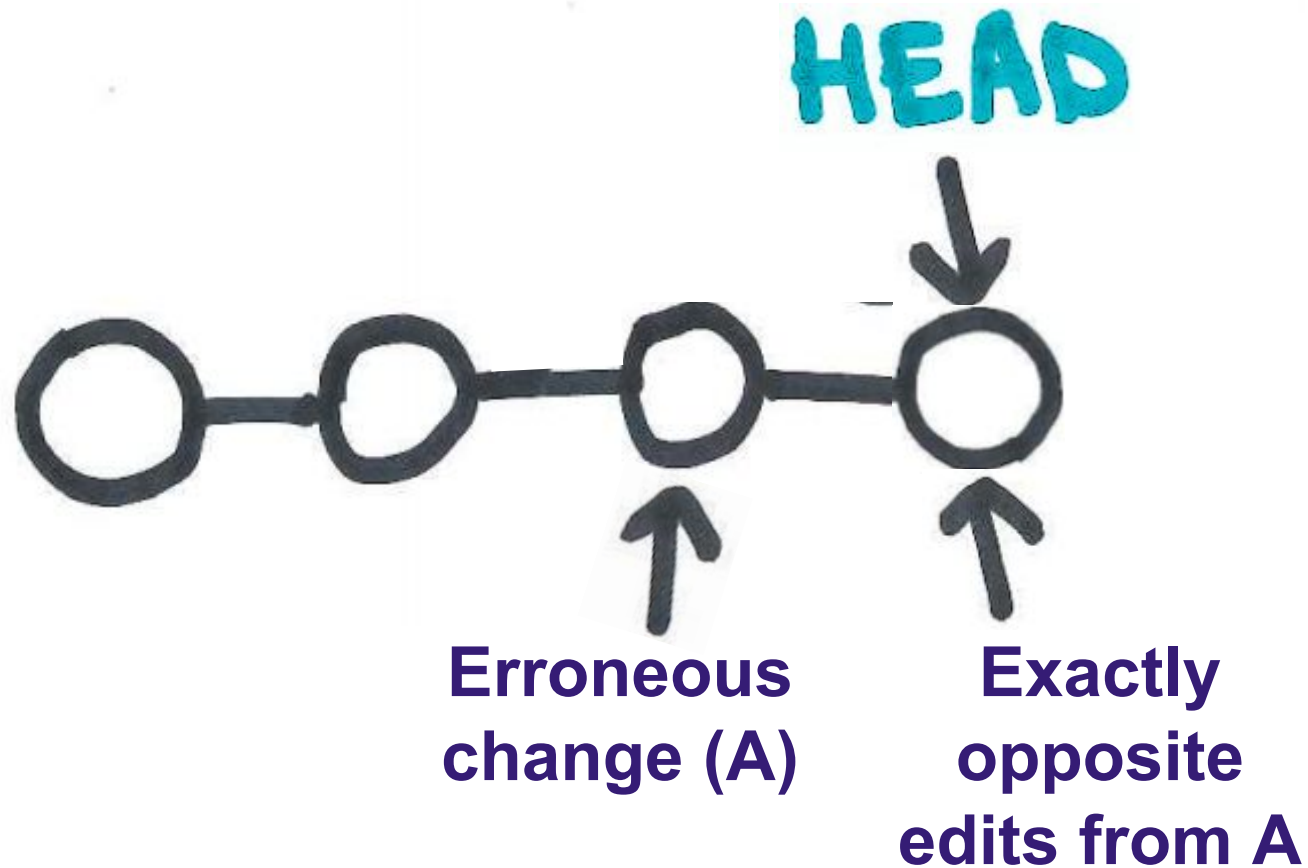
`git reset --soft/--mixed`



`git reset --hard`



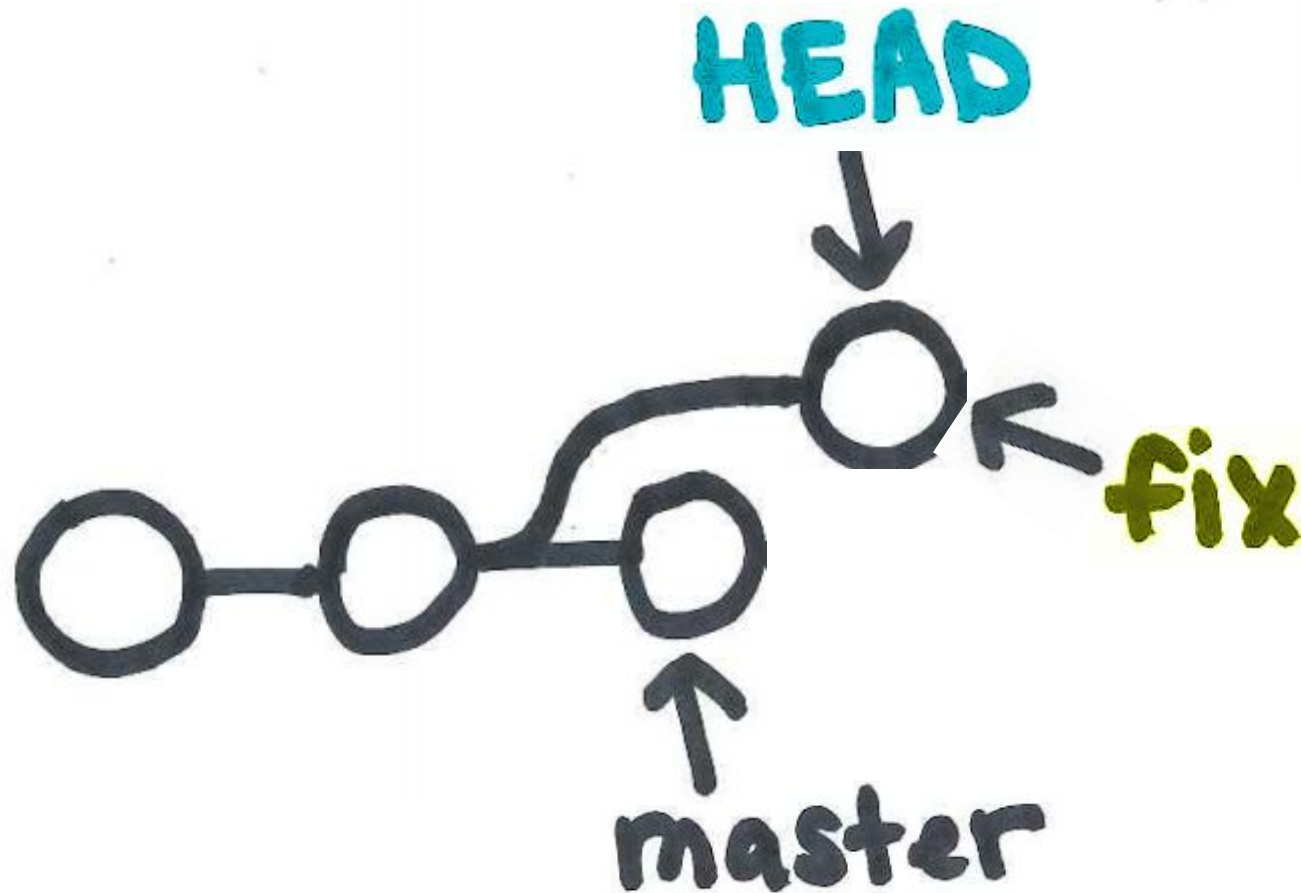
Reverting a change when public



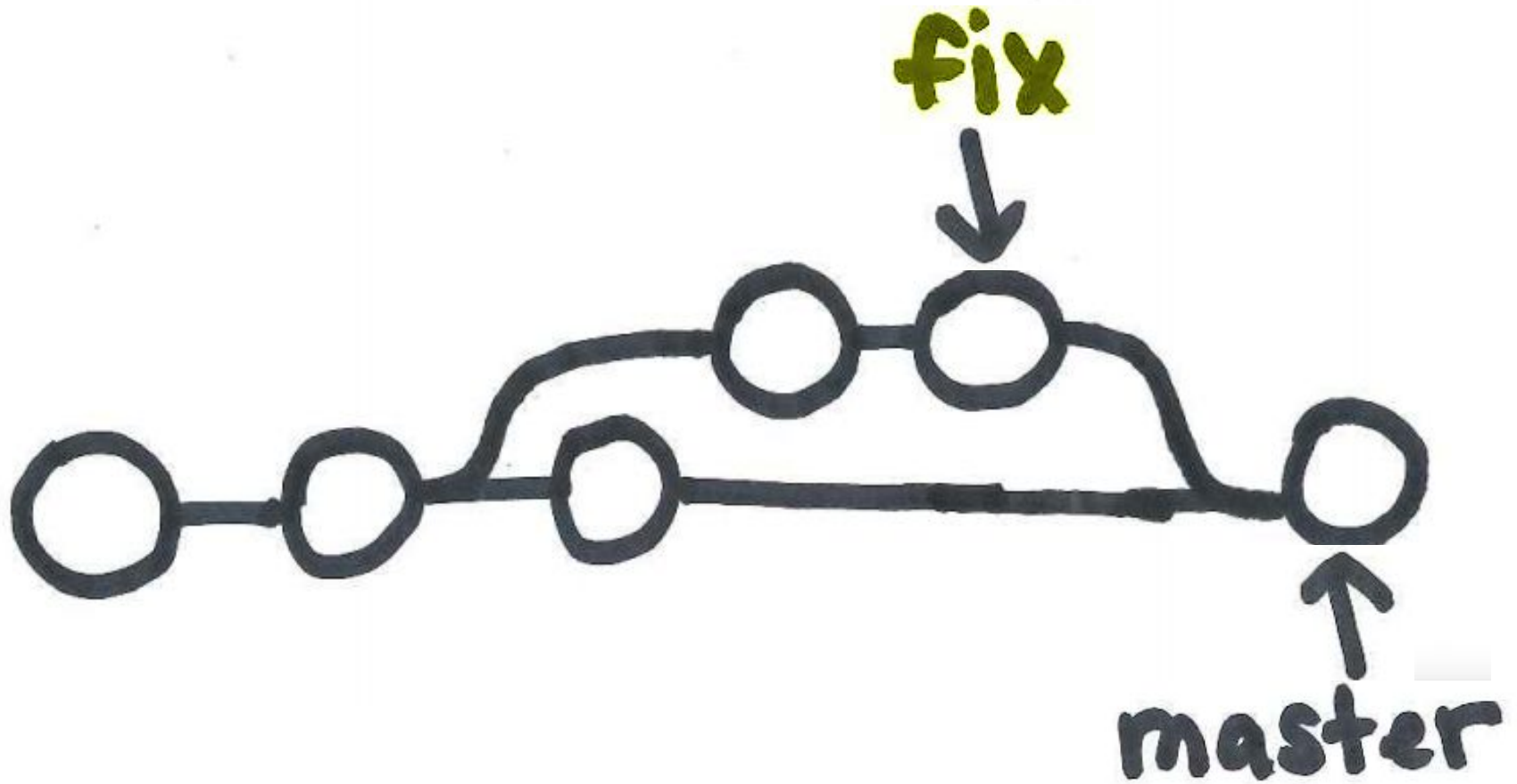
A review of commands to fix changes

Command	Scope	Common use cases
git reset	Commit-level	Discard commits in a private branch or throw away uncommitted changes
git reset	File-level	Unstage a file
git checkout	Commit-level	Switch between branches or inspect old snapshots
git checkout	File-level	Discard changes in the working directory
git revert	Commit-level	Undo commits in a public branch
git revert	File-level	(N/A)

Making changes along this branch



Merging commits to another branch



Collaboration workflows

Who should have permissions to push, pull, create repositories? Do we trust equally?

Centralized workflow

Forking permissions workflow

<https://www.atlassian.com/git/tutorials/comparing-workflows>



Collaboration workflows

How complex are changes? Could they break the production system? How complex is the release schedule?

Simple (forking) workflow

Feature branch workflow

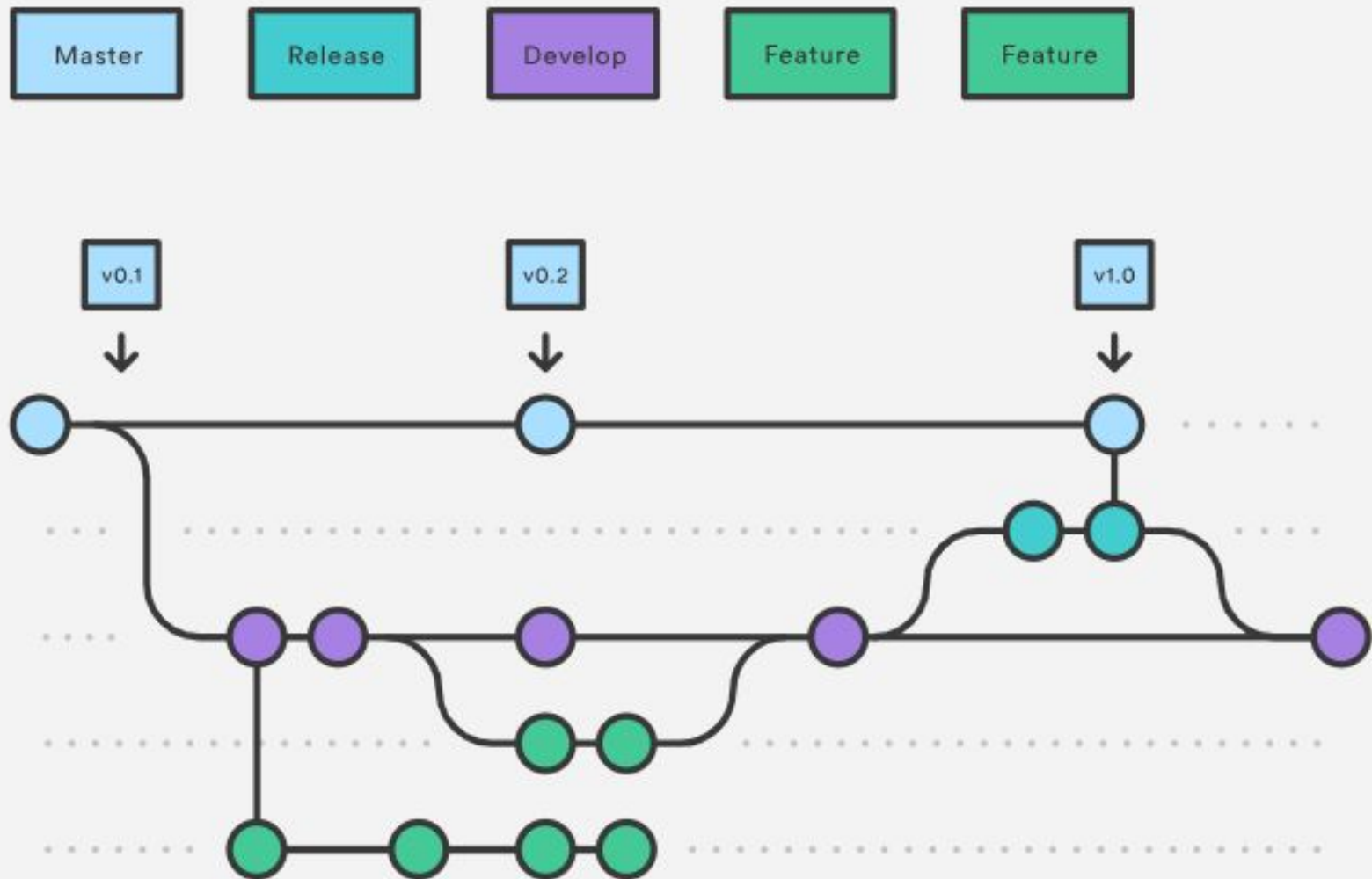
Git flow workflow

<https://www.atlassian.com/git/tutorials/comparing-workflows>



Git flow workflow for larger projects

(image from Atlassian's online `git` tutorials)



Questions?



origin /
fix

origin / fix



origin /
master

origin / master

origin / master

fix



master ↓

HEAD