UNIVERSITY of WASHINGTON

DATA 515A

Version Control II

Joseph Hellerstein[1,2], **Bernease Herman[1,2]**, David Beck[1,2,3], Sam Gao[2]

[1]eScience Institute
[2]Computer Science
[3]Chemical Engineering

April 30, 2019

Agenda

1. Version control II (1.75 hours)
2. Clarification on testing and homework (.25 hours)
3. Software design (1 hour)
4. Student in-class development of use cases (1 hour)

Review from first version control lecture

Time to remember your GitHub logins

Introduction To Git
*(and some GitHub)

0. Set up
> git config [options]
> git init
> .gitignore

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.)

Introduction To Git
*(and some GitHub)

0. Set up
> git config [options]
> git init
> .gitignore

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.)

5. Add remote
> git remote add [name][url]
> git remote -v

Introduction To Git
*(and some GitHub)

0. Set up
> git config [options]
> git init
> .gitignore

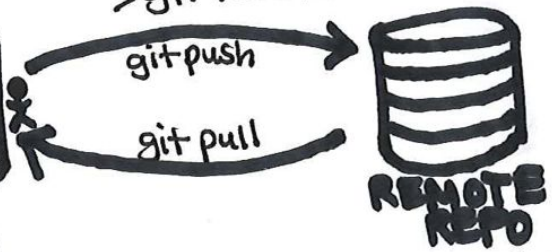
1. Make changes

(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]

(Repeat 1-4 as desired.)

6. Pull from remote
> git fetch [remote] [branch]
> git pull [remote] [branch]

7. Push to remote
> git push [remote] [branch]

Introduction To Git
*(and some GitHub)

0. Set up
> git config [options]
> git init
> .gitignore

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.)

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]

BONUS: Conflicts
TIP: pull before commit to minimize conflicts!

> git merge

Done with review, on to new material

Introduction To Git
*(and some GitHub)

0. Set up
>git config [options]
>git init
>.gitignore

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.)

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]

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

11. Branches
>git branch [options]
>git checkout

>git merge

12. Forks and PRs
(Done on GitHub website.)

13. Workflows and Tags and More
>git tag [options]

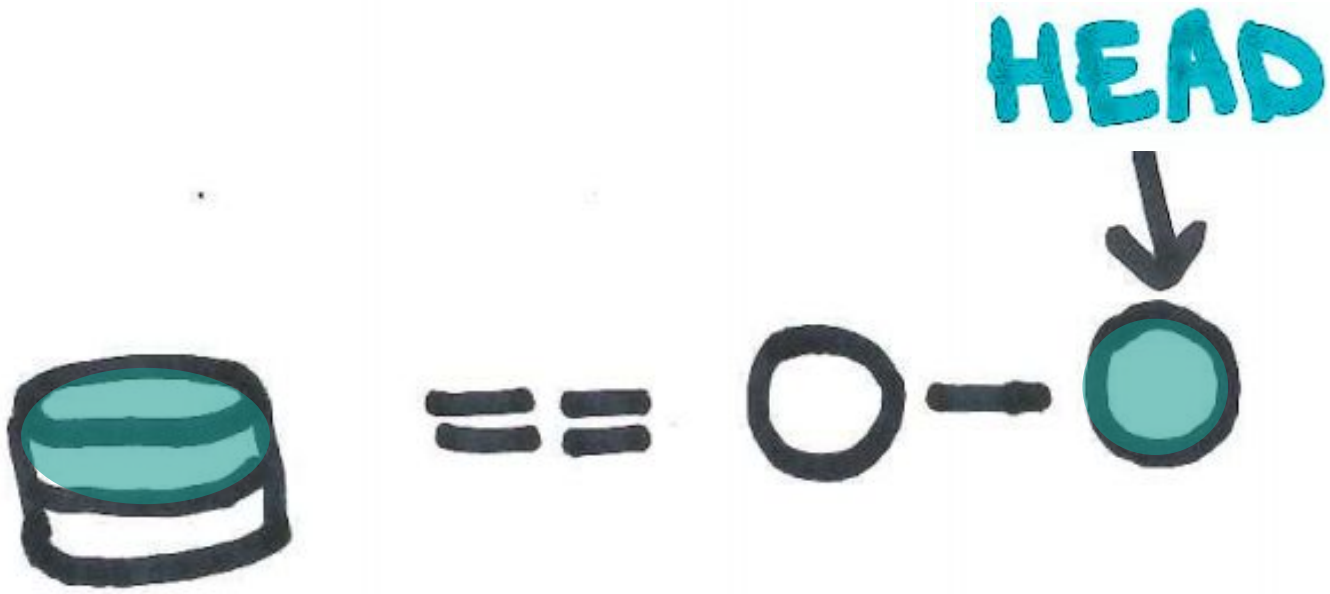
Bernease Herman 10/4/18

A single commit

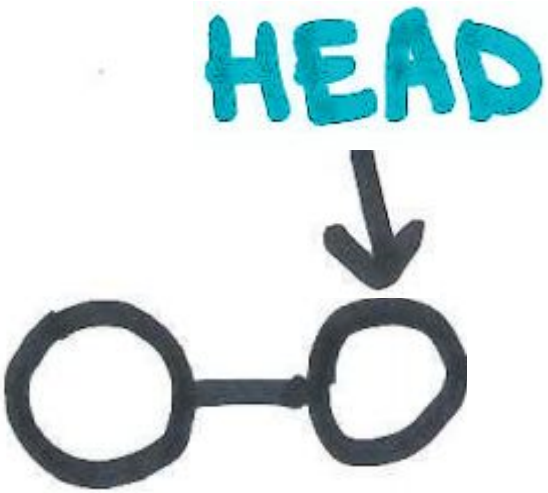
In tree representation

Multiple commits represented

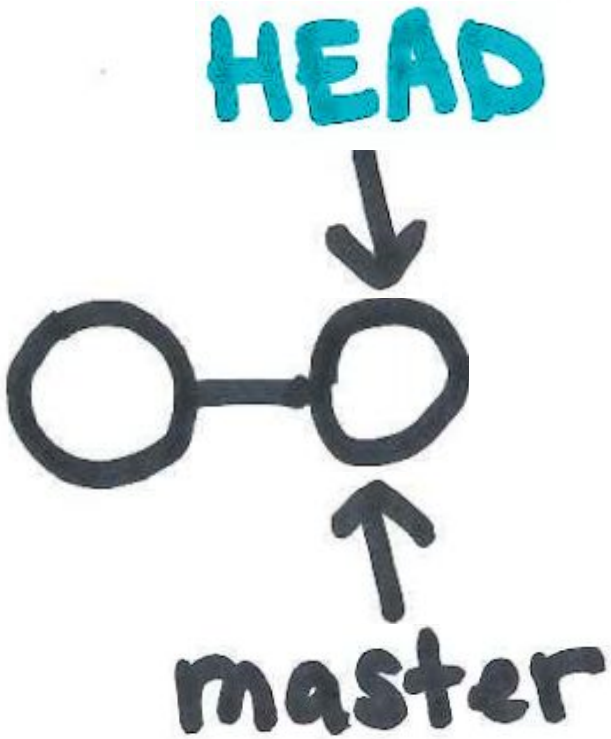
Your working directory and files



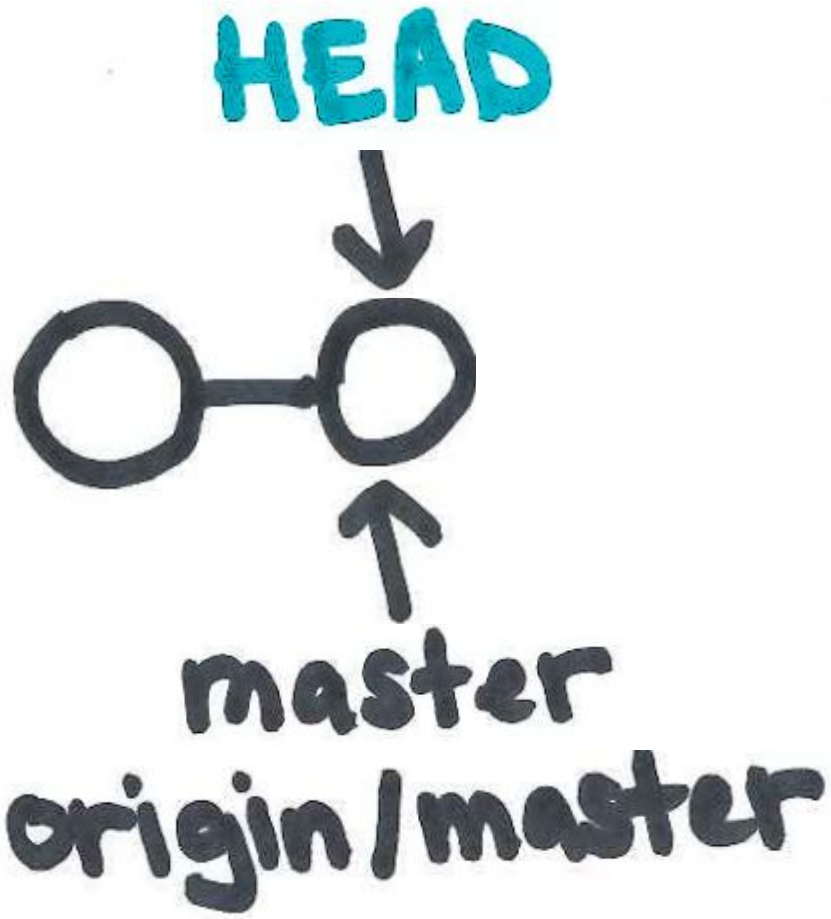
HEAD pointer on our tree



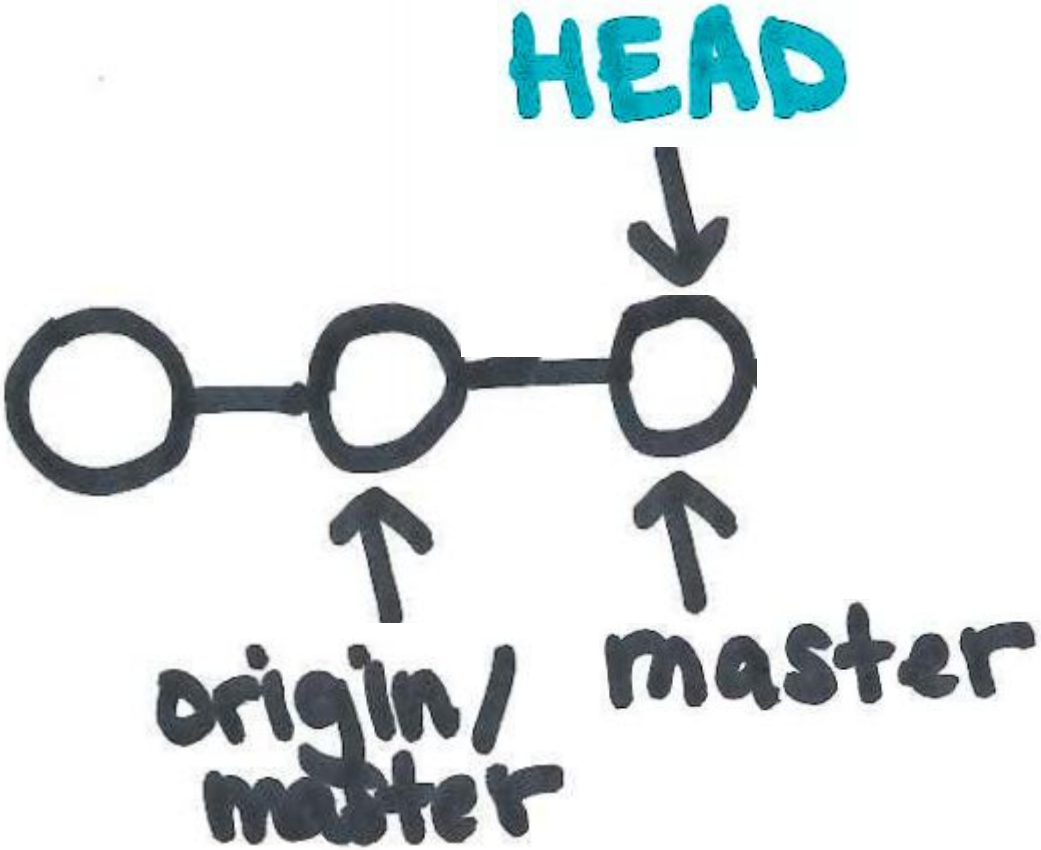
Think of branches as a pointer, as well



Remote branches are included



Local commit, before pushing to remote



Editing and Deleting Commits

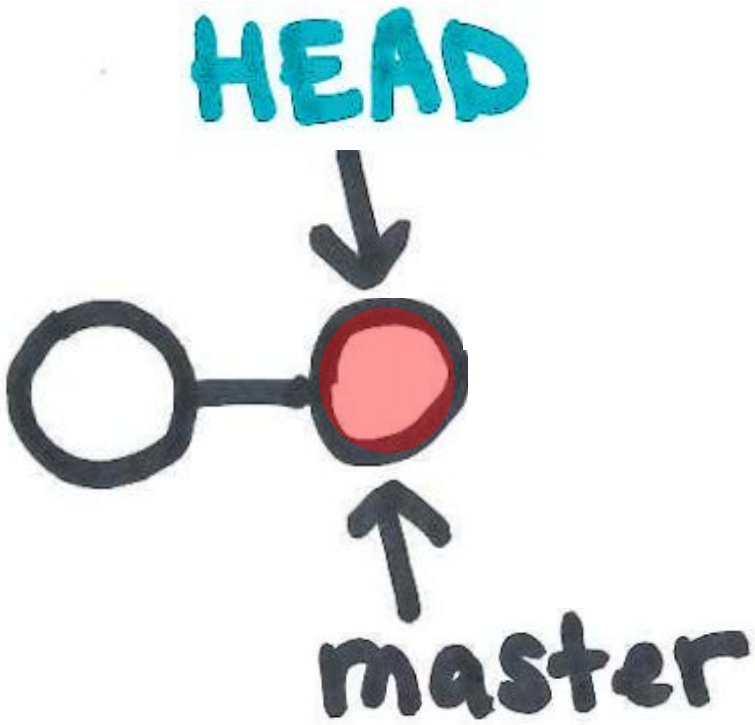
`git amend`: Allows you to add new changes to the last commit. More options with rebase.

`git rebase [-i]`: Allows you to rename, squash, delete commits.

`git reset`: Removes a commit, staged changes, and working directory changes to delete history.

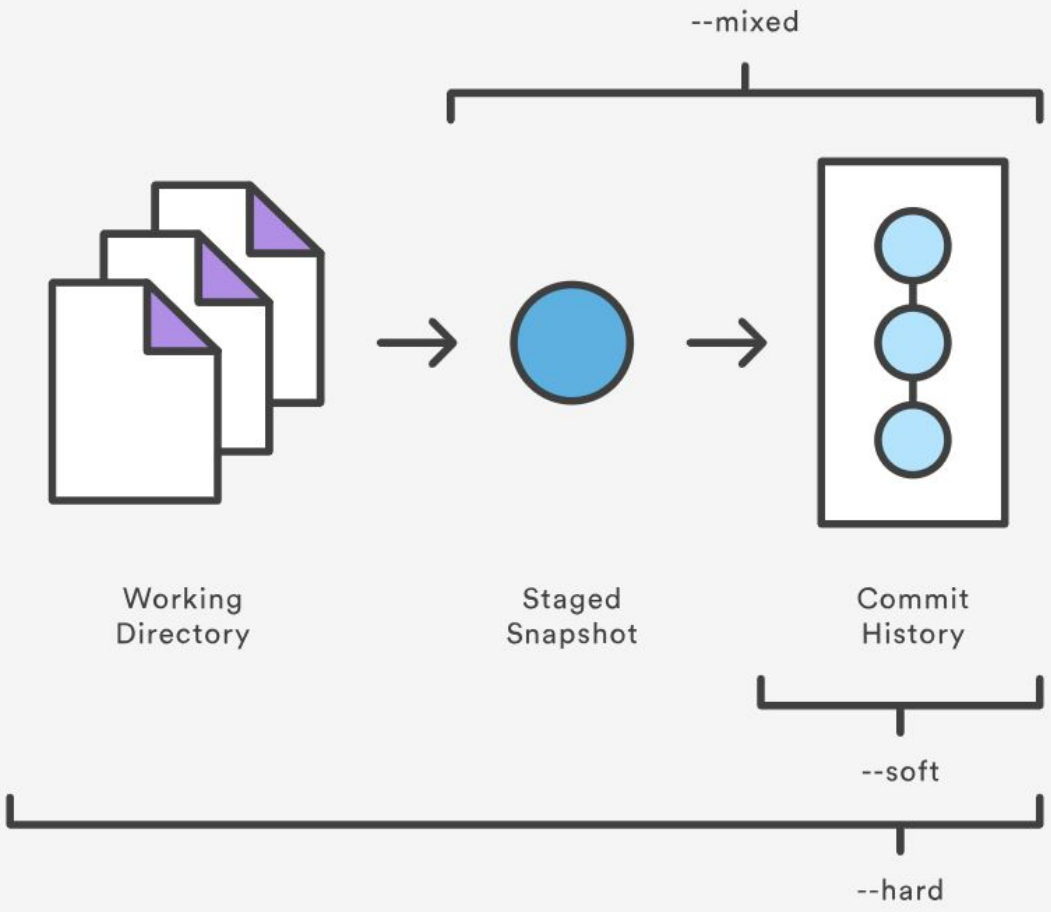
`git revert`: Creates an additional commit that reverses changes for specified commits. Good for public repos.

You've committed an unwanted change (hiding `origin/master` for simplicity)

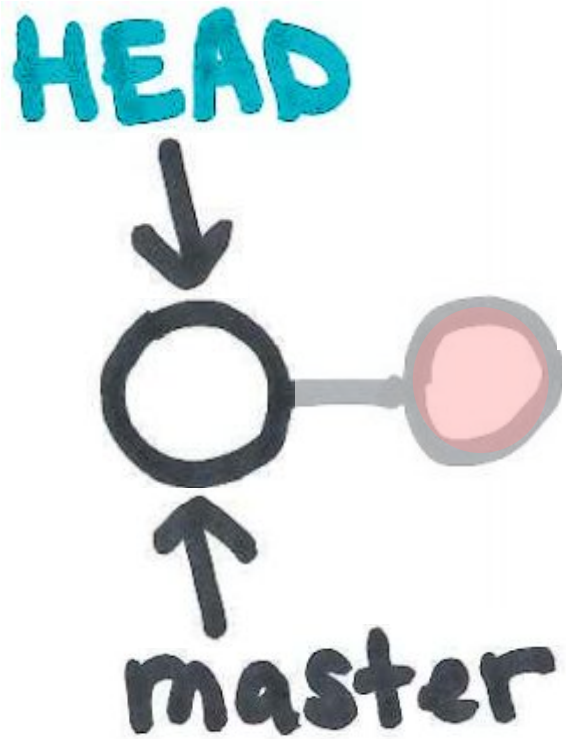


If not public, reset your commit

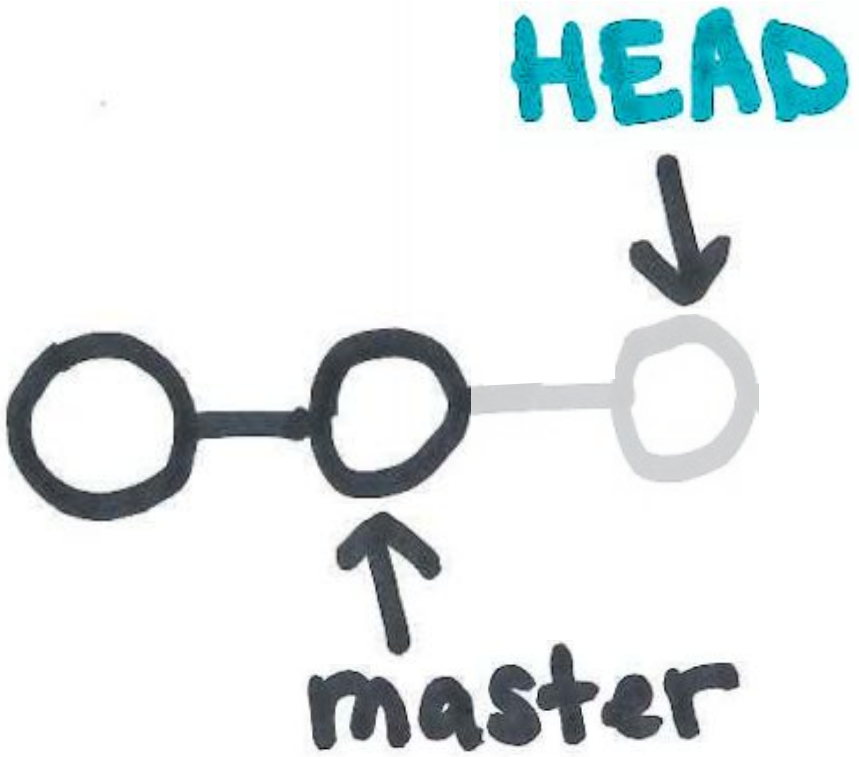
Differing levels of reset



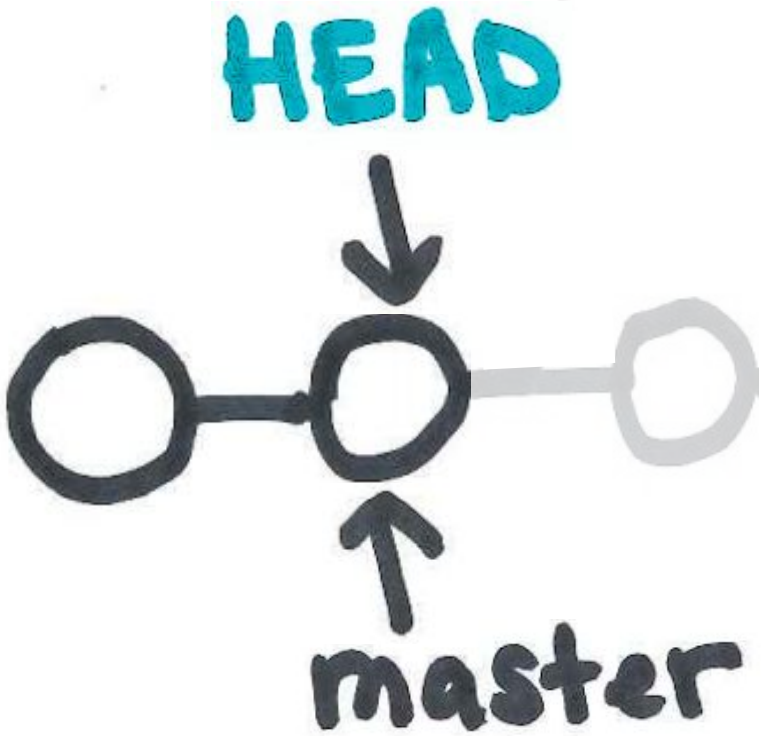
Directory is unchanged for `git reset --hard` and `--mixed`, but not `--soft`.



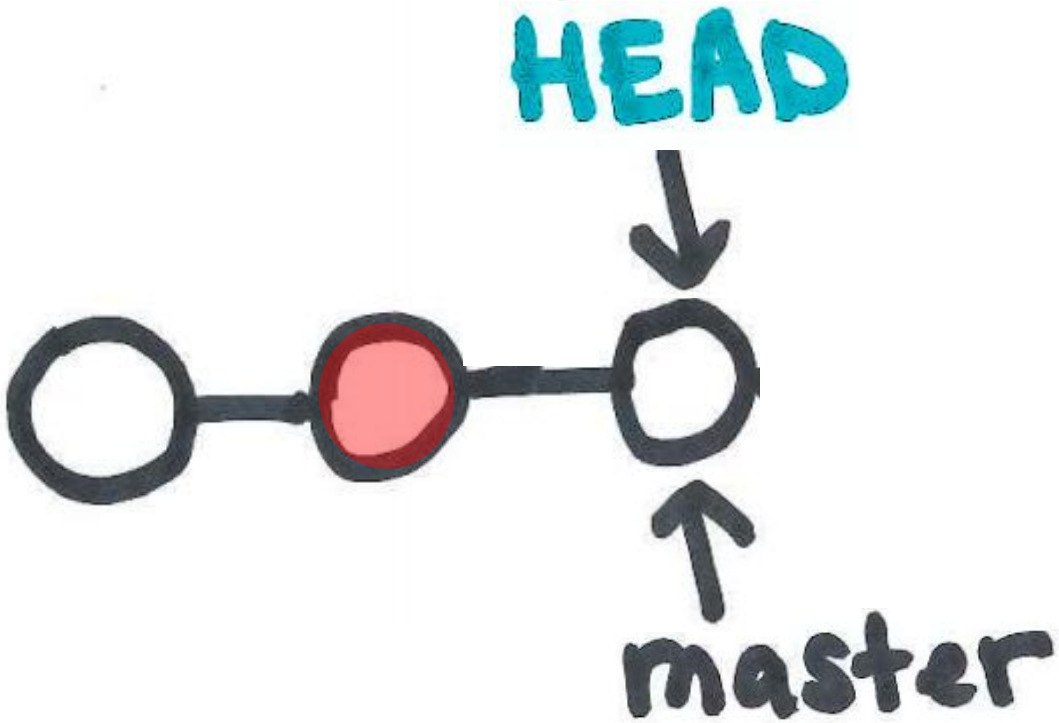
git reset --soft/--mixed



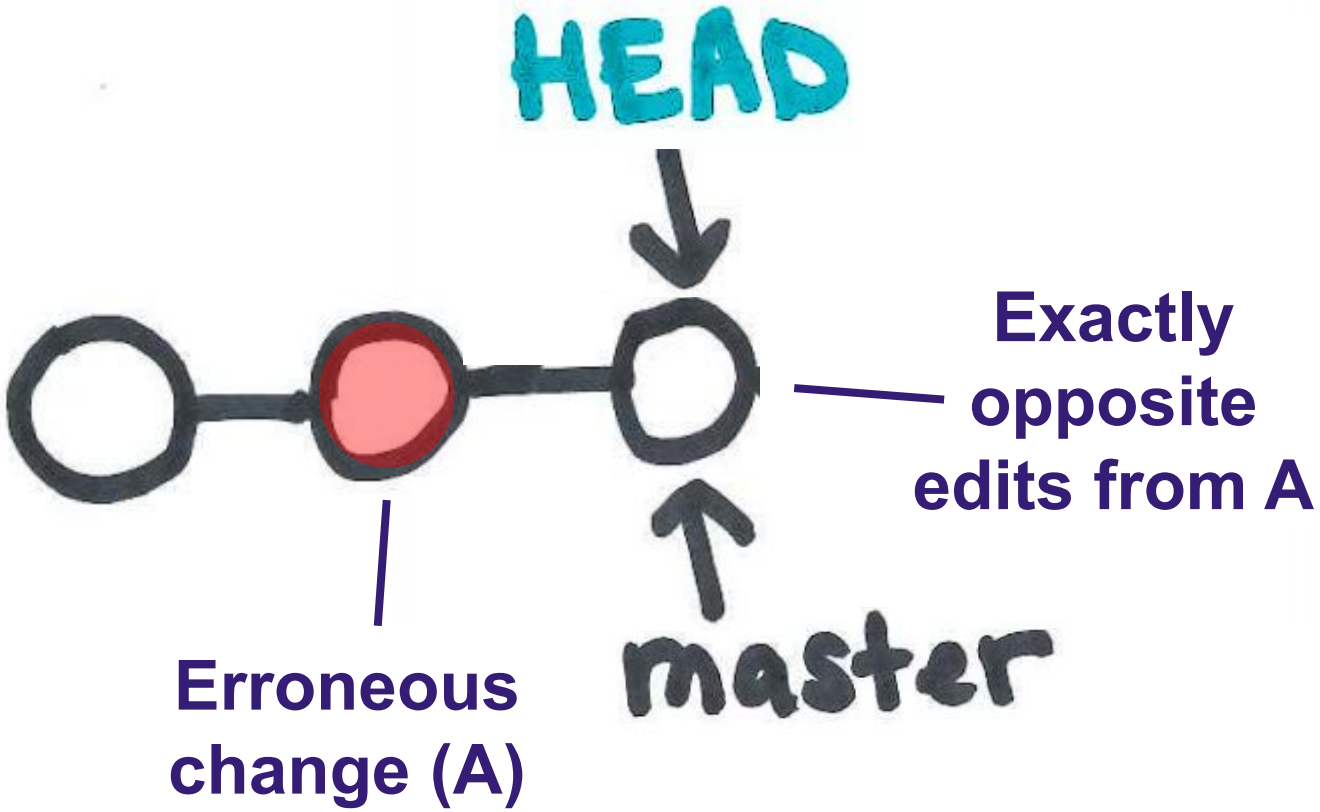
git reset --hard



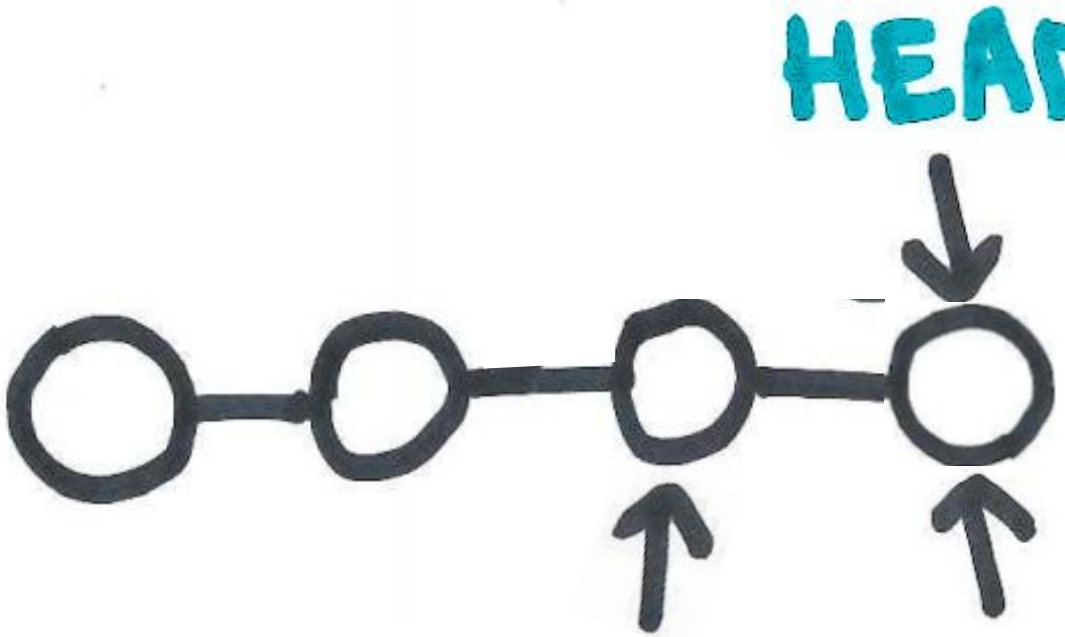
If public, use git revert to add a new commit that fixes the issue.



If public, use git revert to add a new commit that fixes the issue.



Reverting a change when public



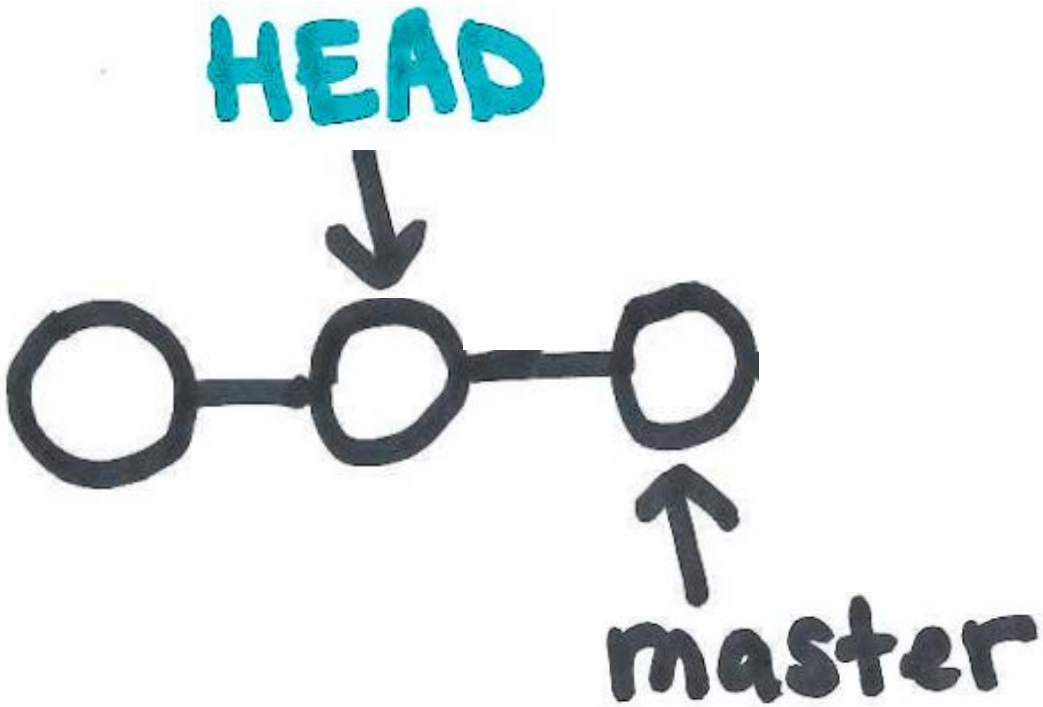
Erroneous change (A)

Exactly opposite edits from A

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 uncommited 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)

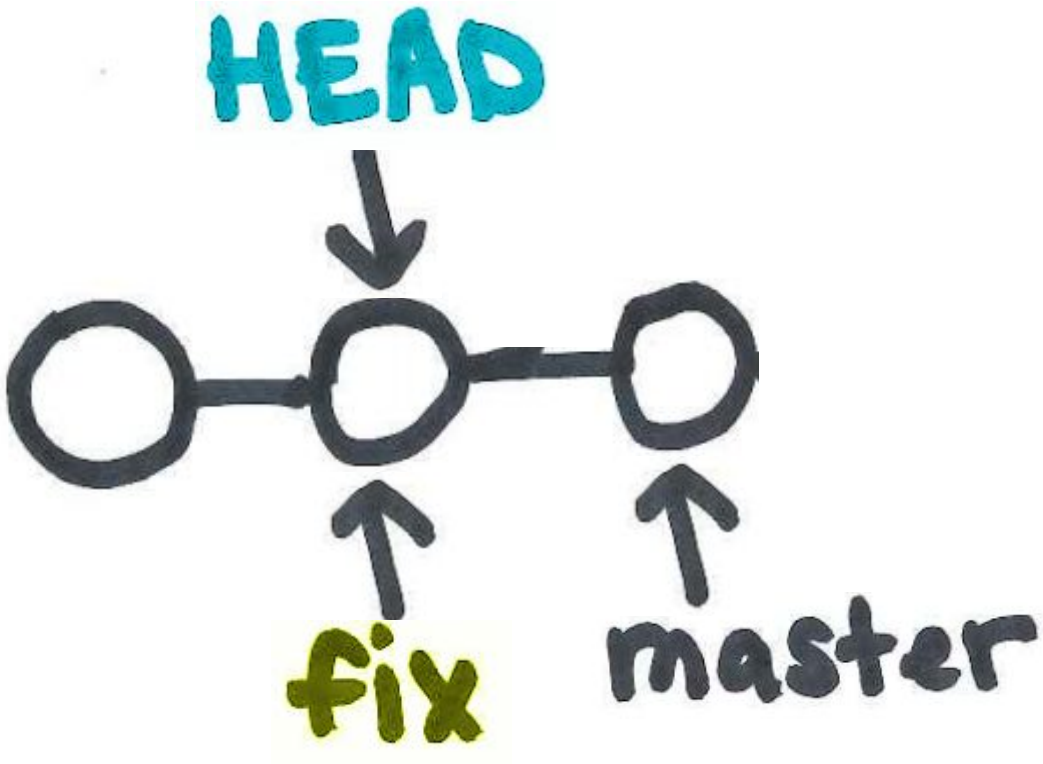
Checkout an earlier commit (hiding `origin/master` for simplicity)



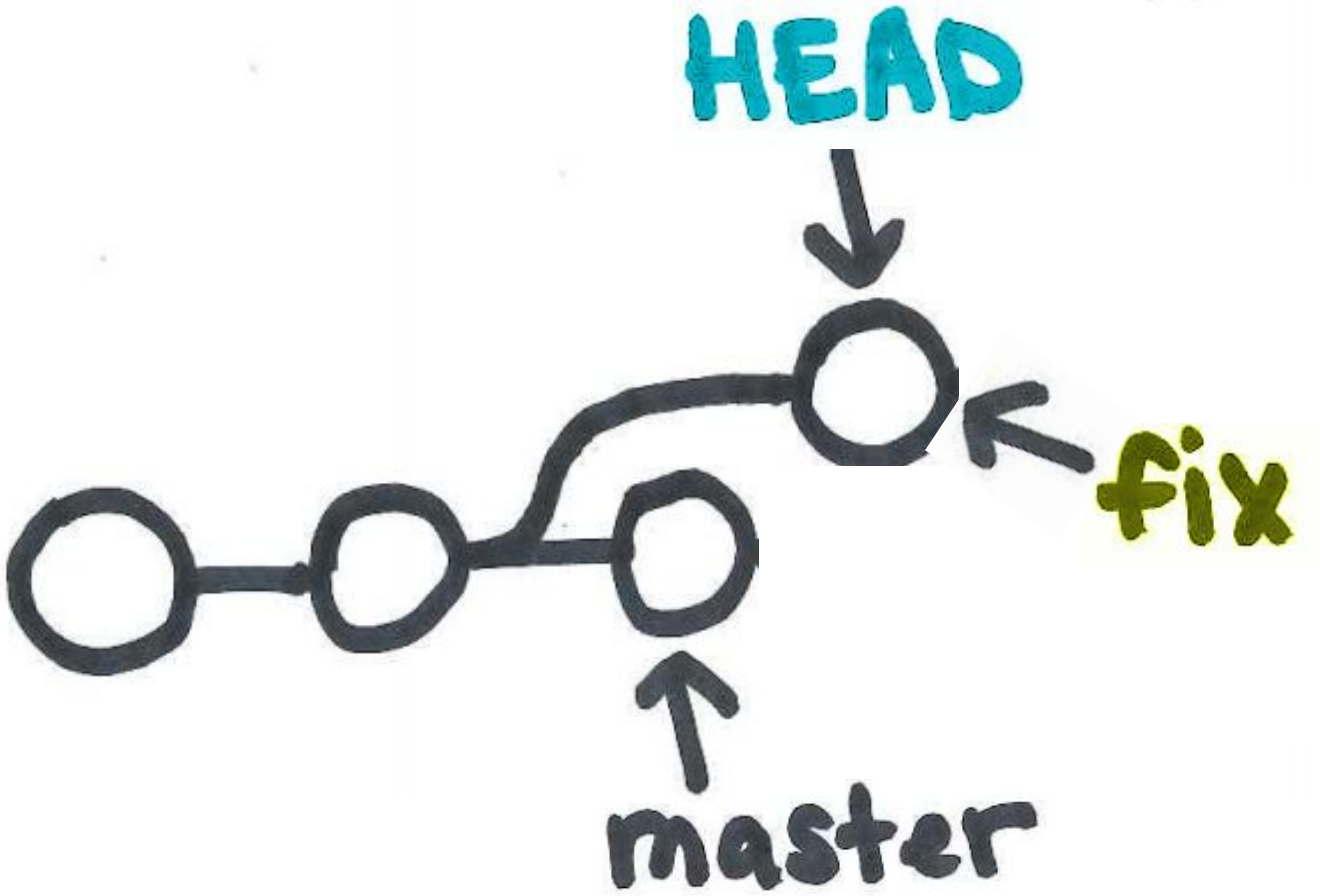
Checking out a specific file

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

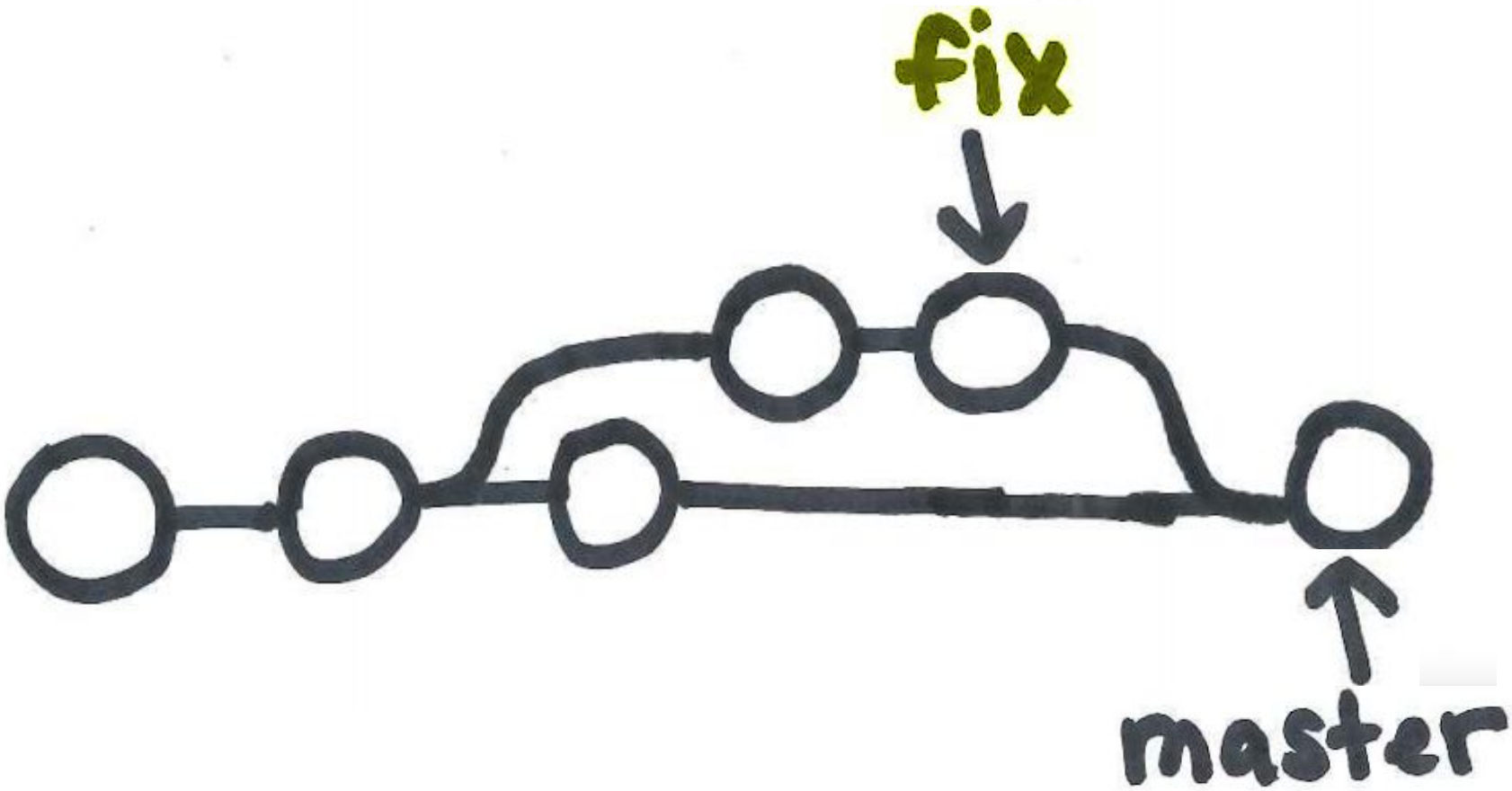
Creating a new branch



Making changes along this branch



Merging commits to another branch



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/*).

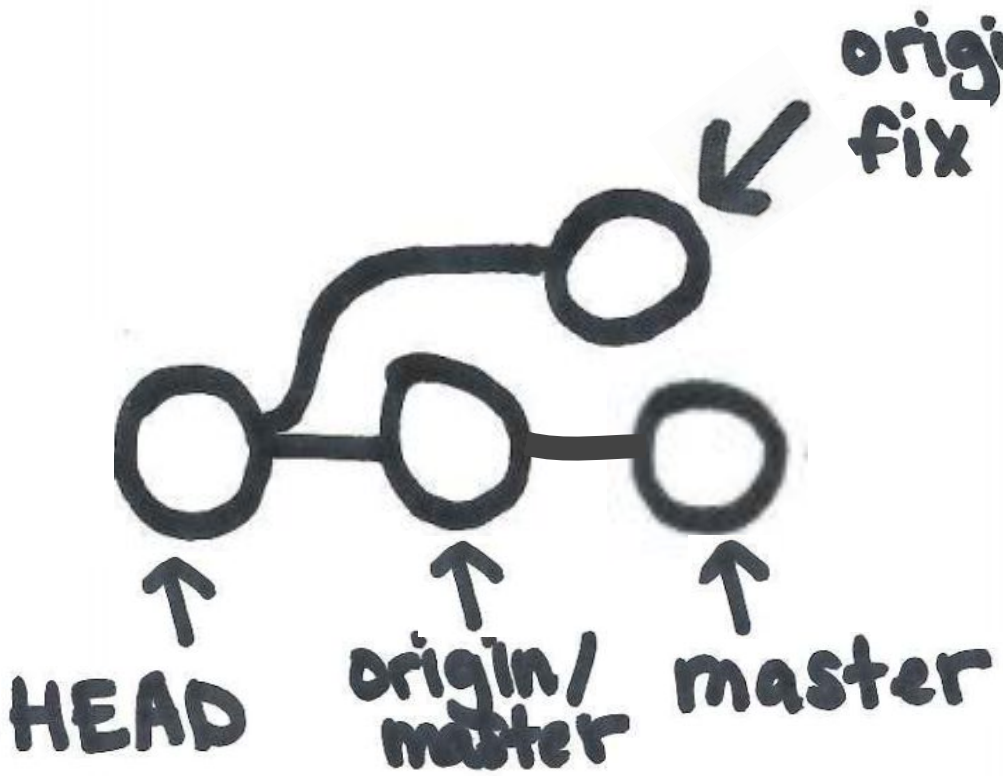
Assume that all add/commit combinations has changes and creates a commit.

```
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



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?

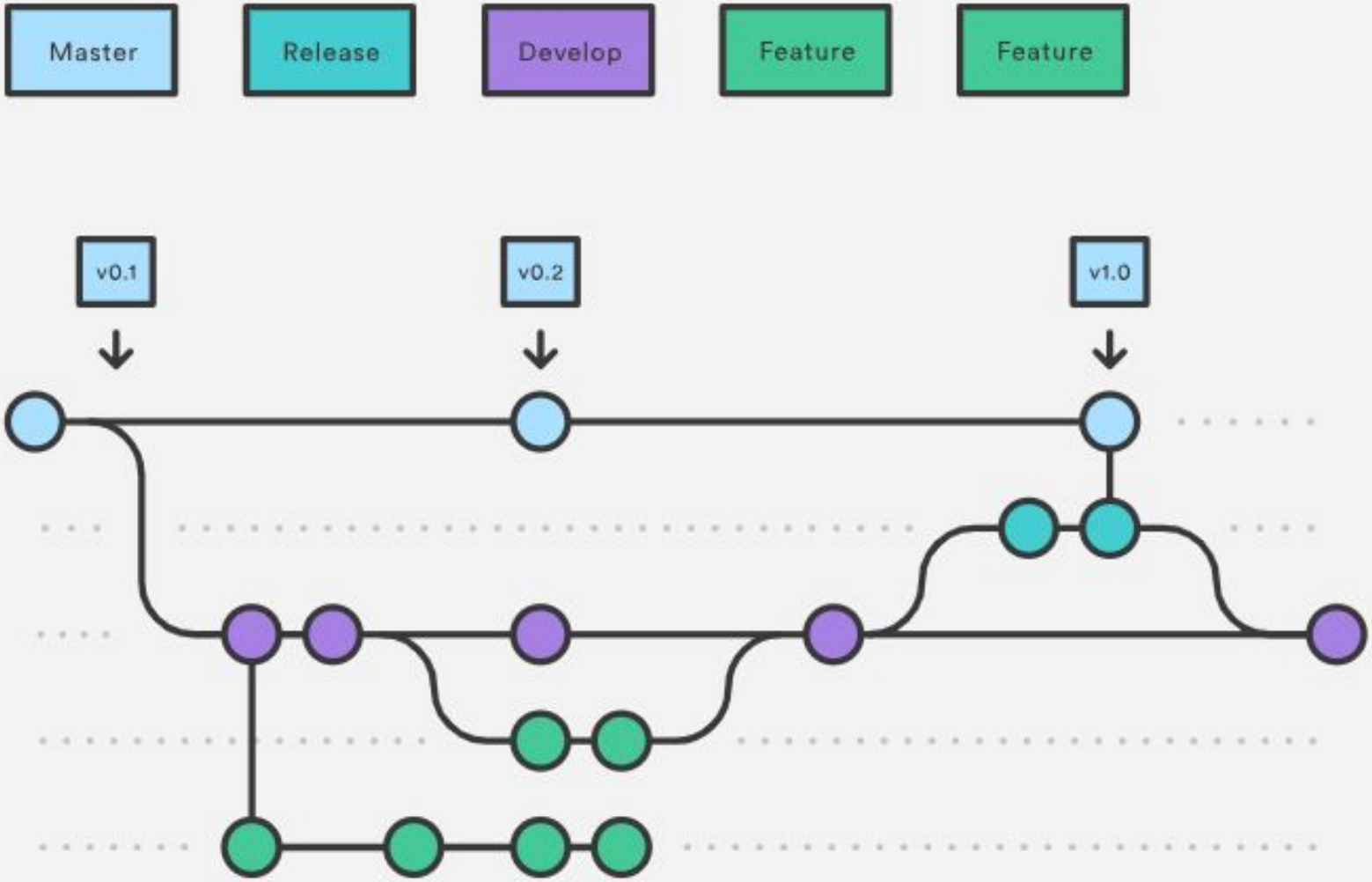
Simple (forking) workflow

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?