UNIVERSITY of WASHINGTON

DATA 515A

Version Control II

Bernease Herman[1,2]

[1]eScience Institute
[2]Computer Science

January 12, 2021

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

Introduction To Git
#(and some GitHub)

0. Set up

> git config [options]
> git init
> .gitignore

1. Make Changes

(use your preferred editor and tools.)

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]
```

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]
```

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]"
```

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.)

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)

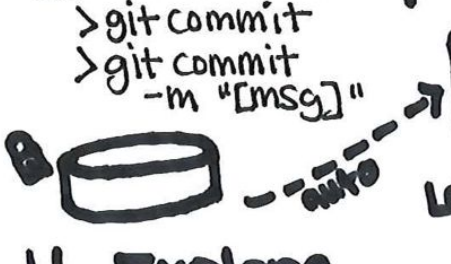
0. Set up
> git config [options]
> git init
> .gitignore

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.)

Introduction To Git
*(and some GitHub)

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

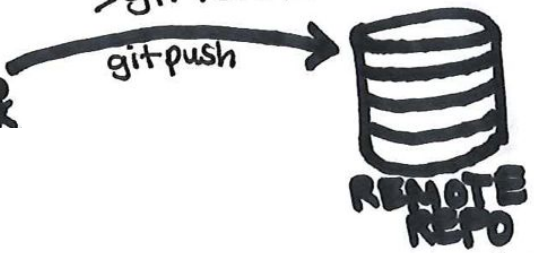
1. Make changes

(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]

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

(Repeat 1-4 as desired.)

Introduction To Git
*(and some GitHub)

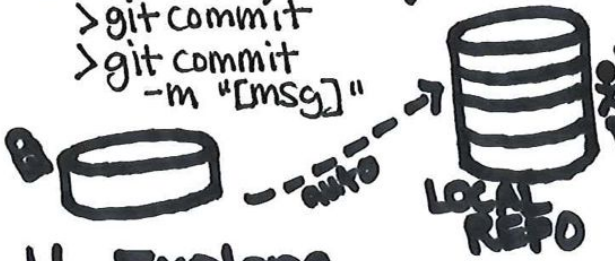
0. Set up
>git config [options]
>git init
>.gitignore

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]"



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]

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]

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]

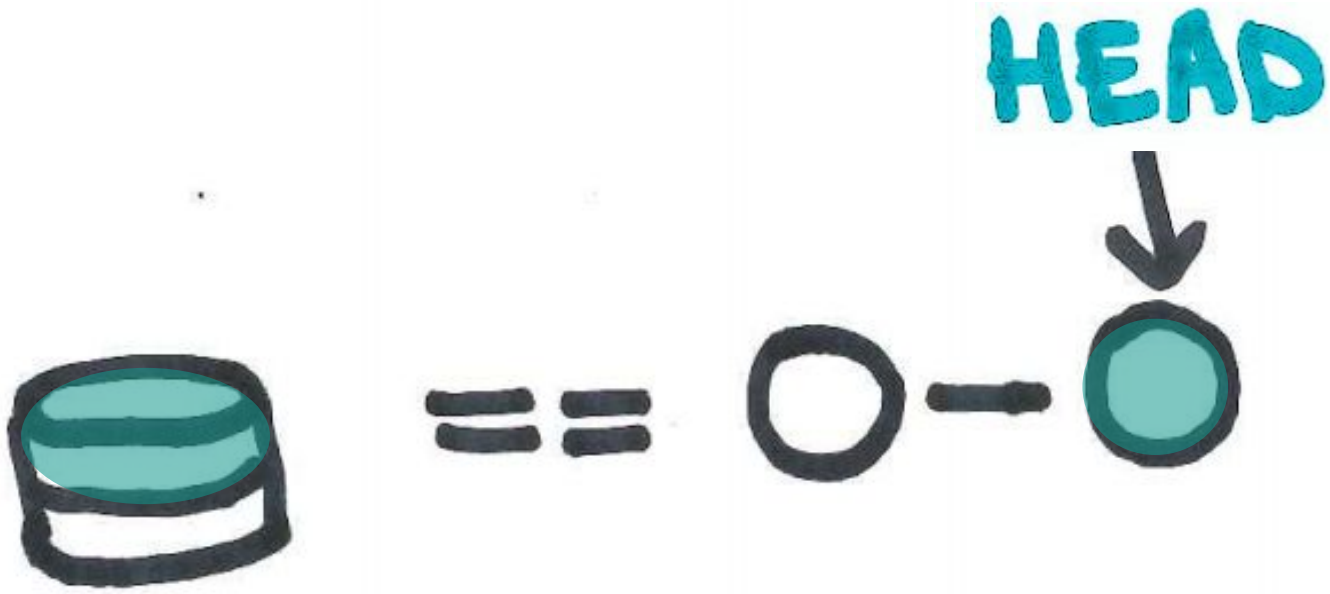
Bernease Herman 10/4/18

A single commit

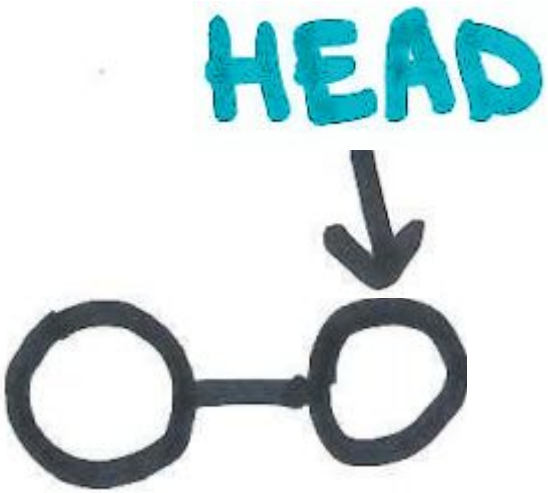
In tree representation

Multiple commits represented

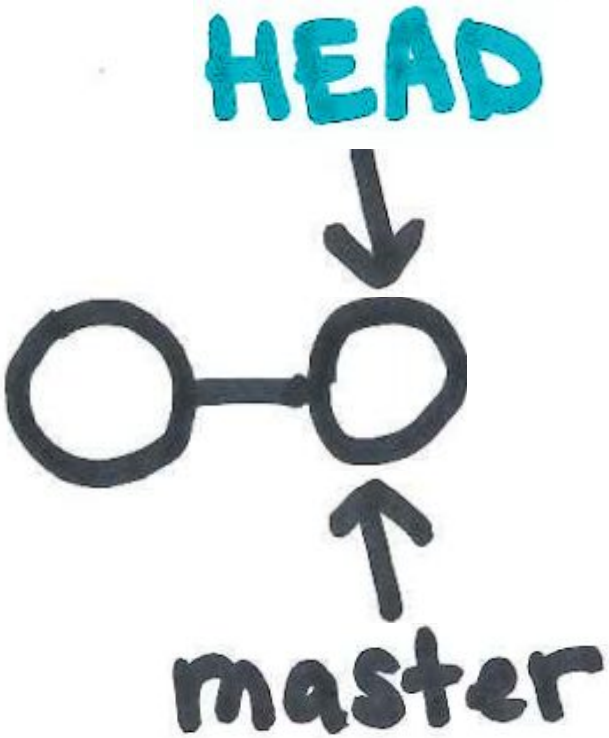
Your working directory and files



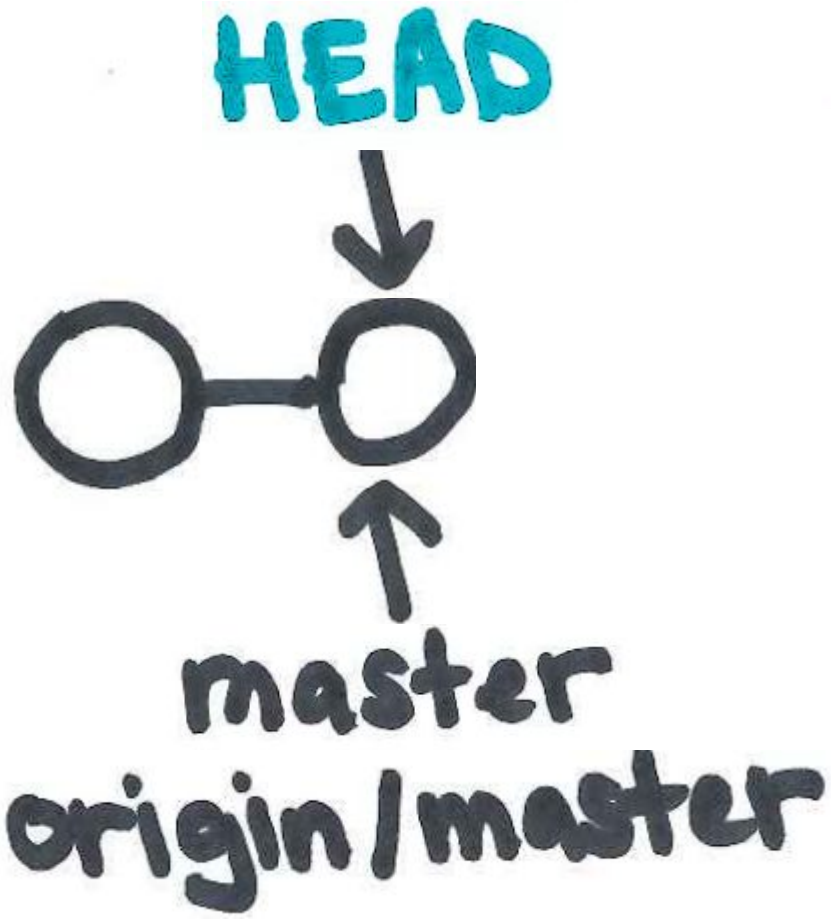
HEAD pointer on our tree



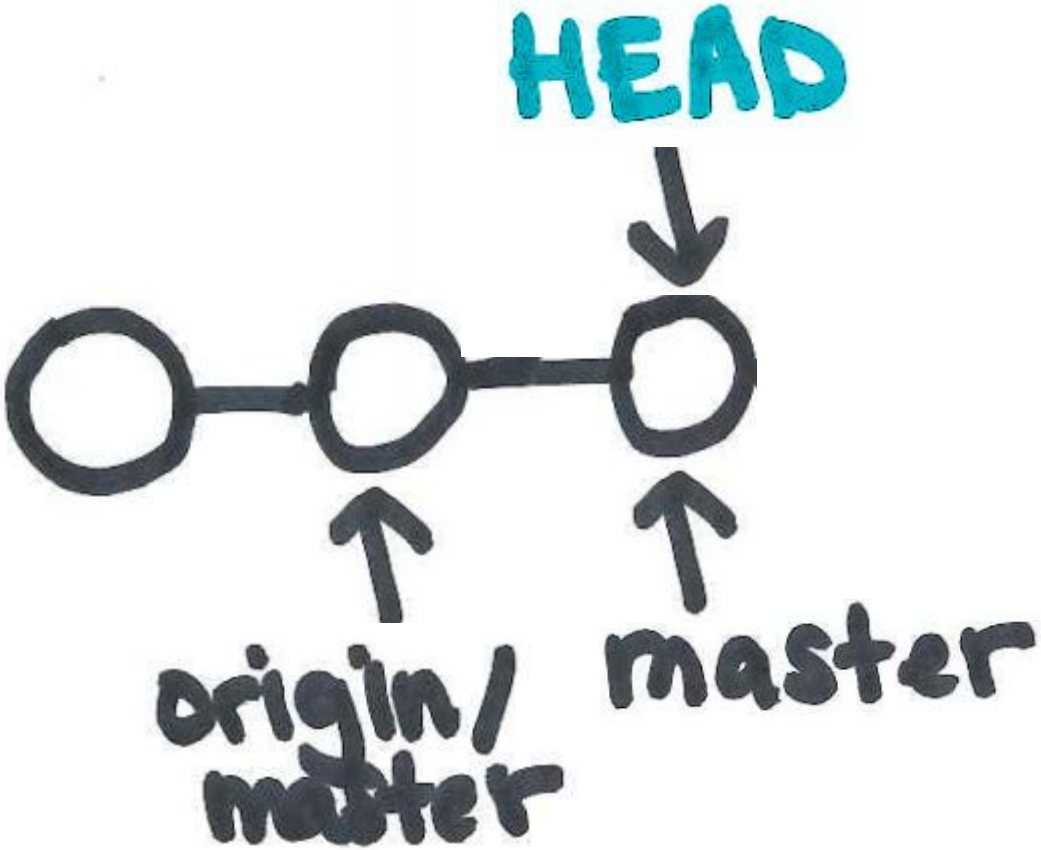
Think of branches as a pointer, as well



Remote branches are included



Local commit, before pushing to remote



Editing and Deleting Commits

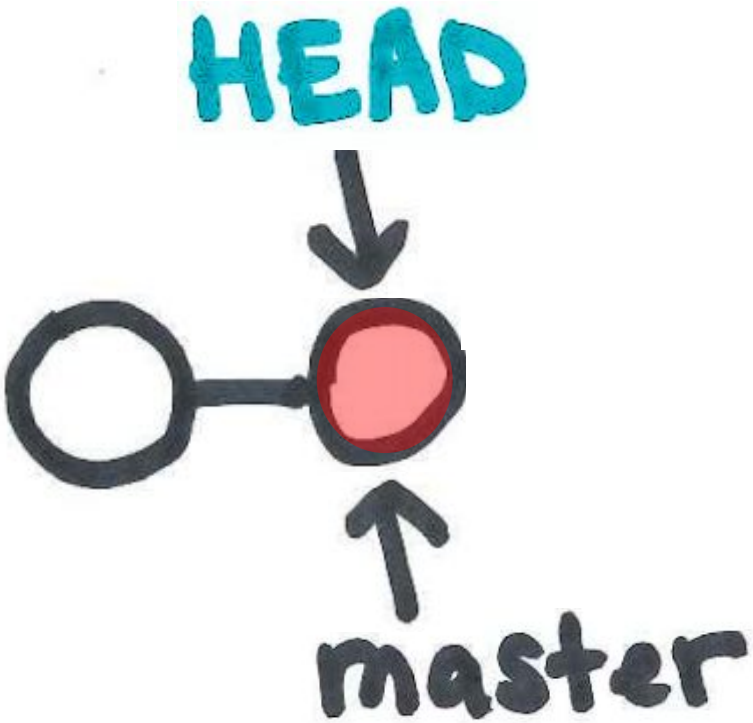
`git amend`: Allows you to add new changes to the last commit. More options with rebase.

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

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

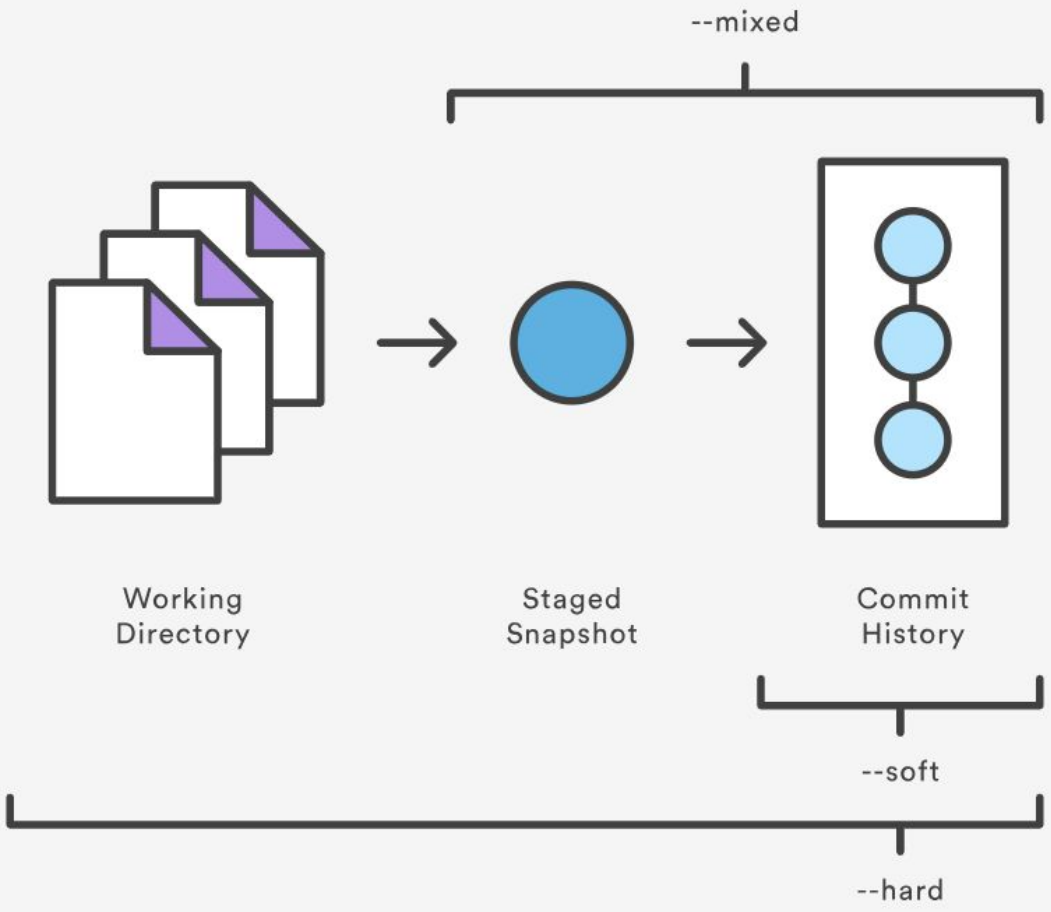
`git revert`: Creates an additional commit that reverses changes for specified commits. Good for public repos.

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

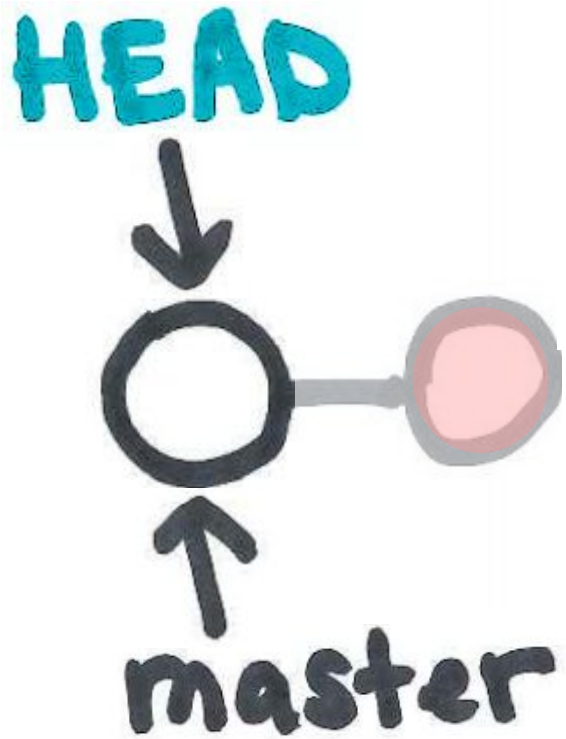


If not public, reset your commit

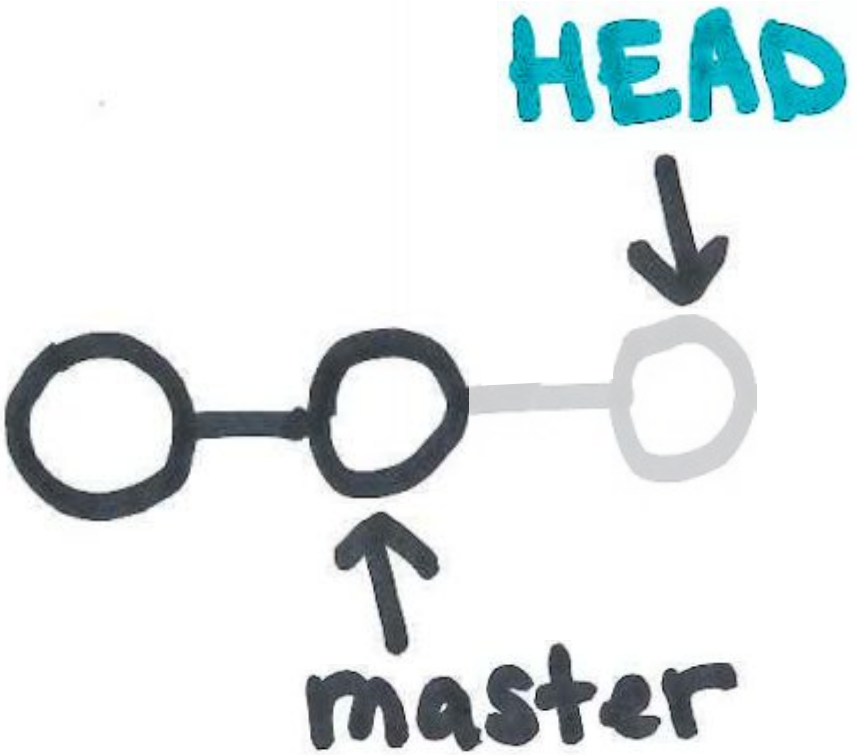
Differing levels of reset



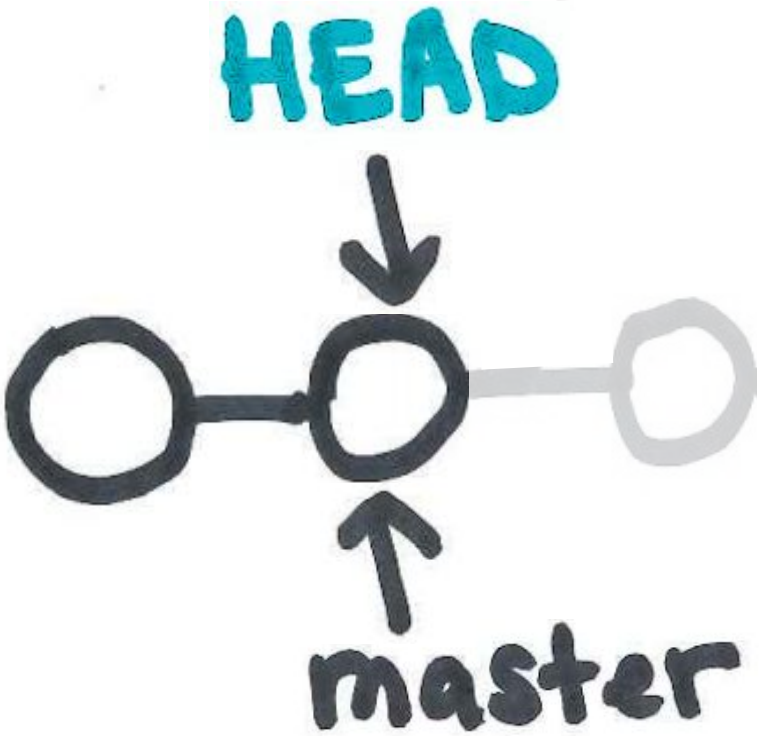
Directory is unchanged for `git reset --hard` and `--mixed`, but not `--soft`.



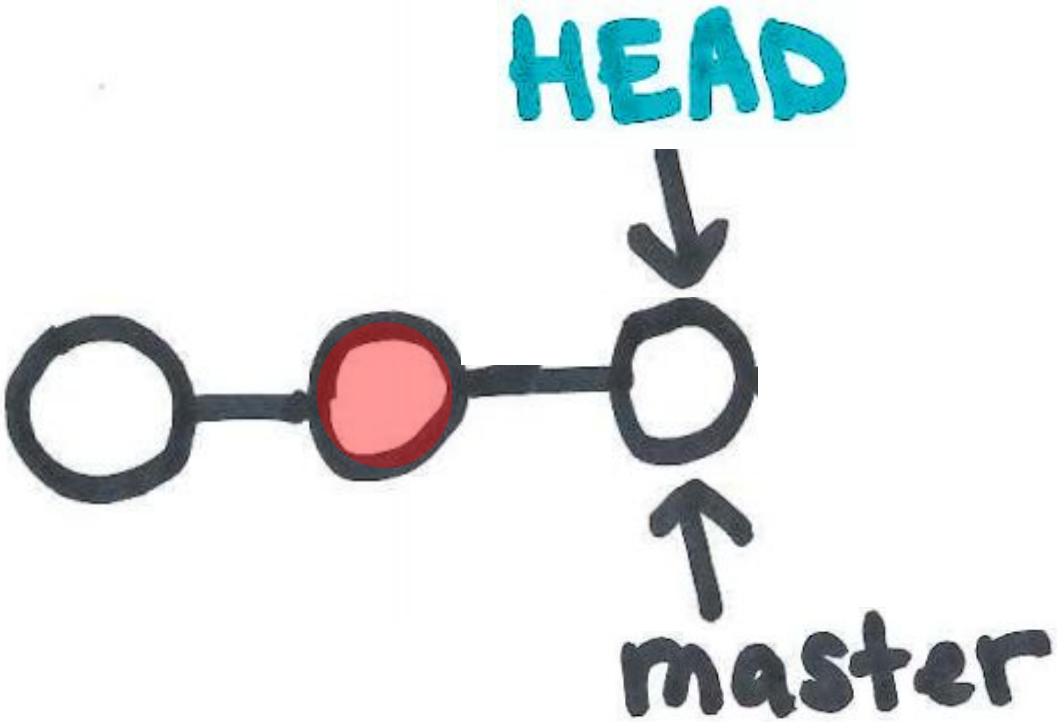
git reset --soft/--mixed



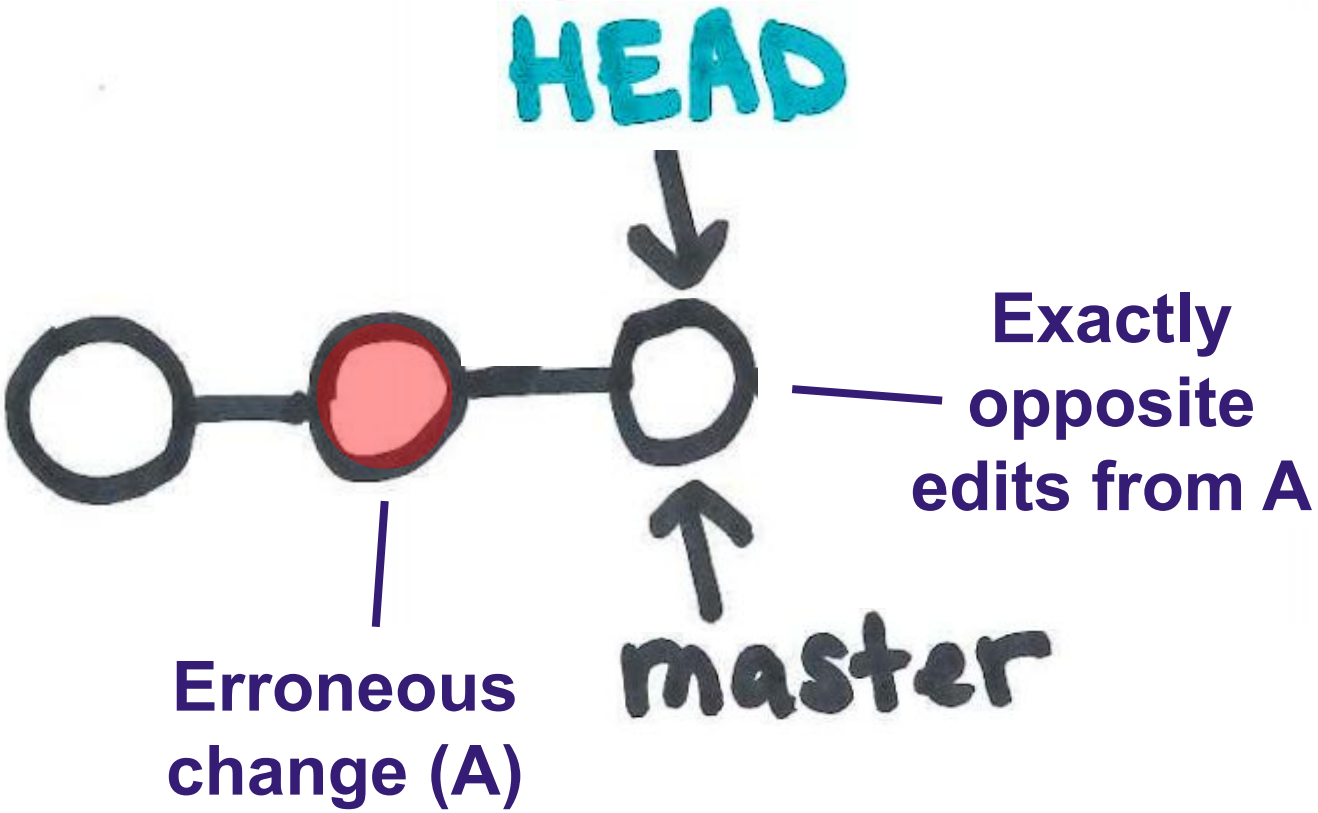
git reset --hard



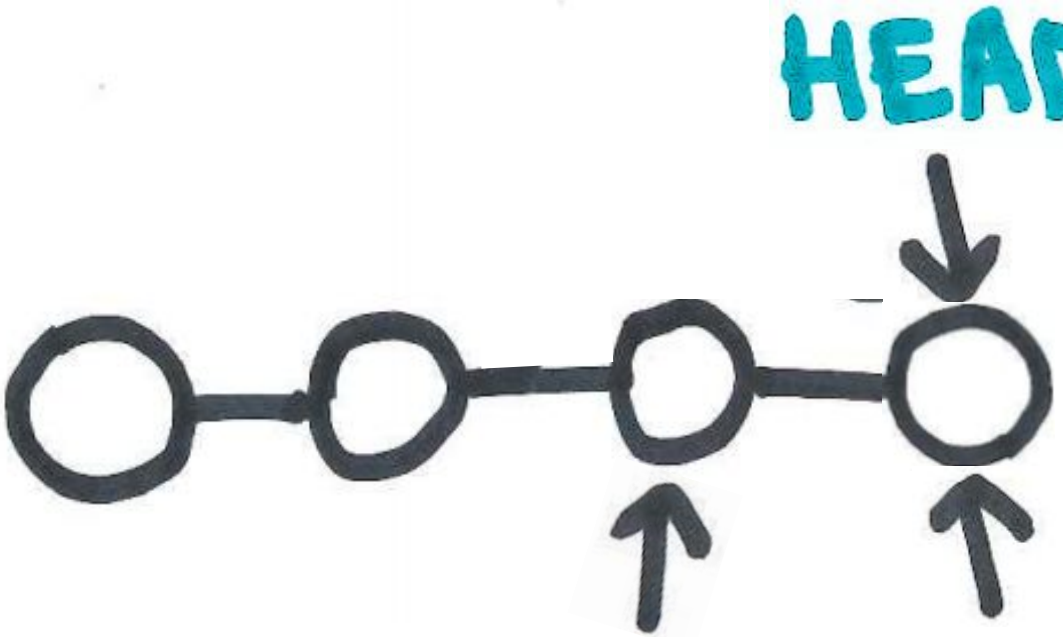
If public, use git revert to add a new commit that fixes the issue.



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



Reverting a change when public



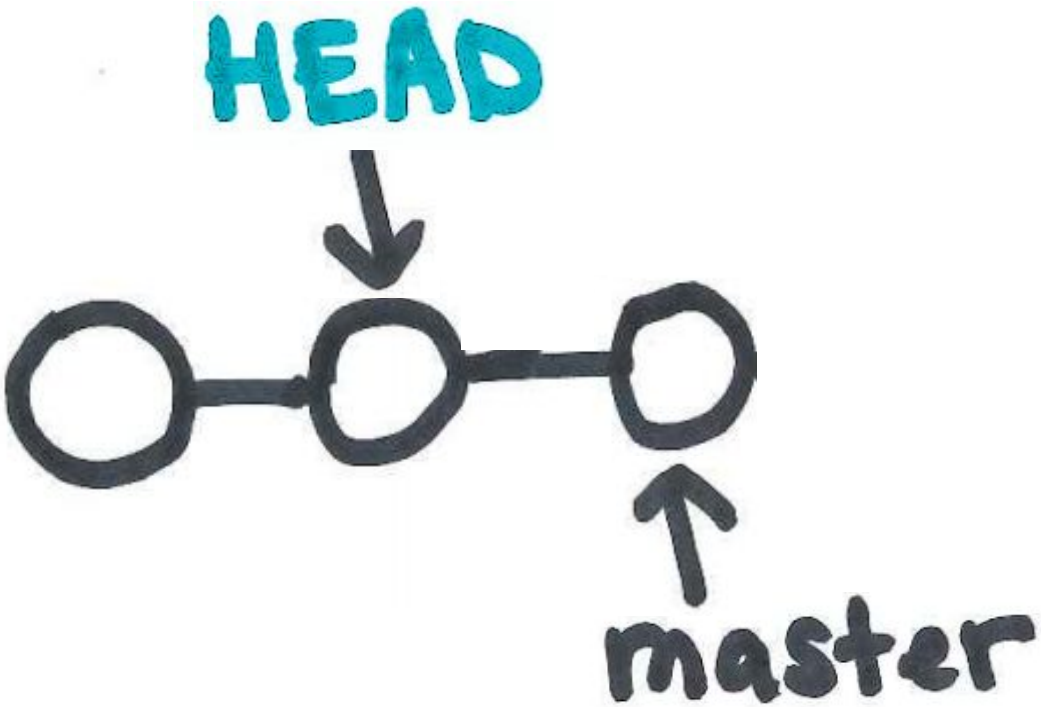
Erroneous change (A)

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)

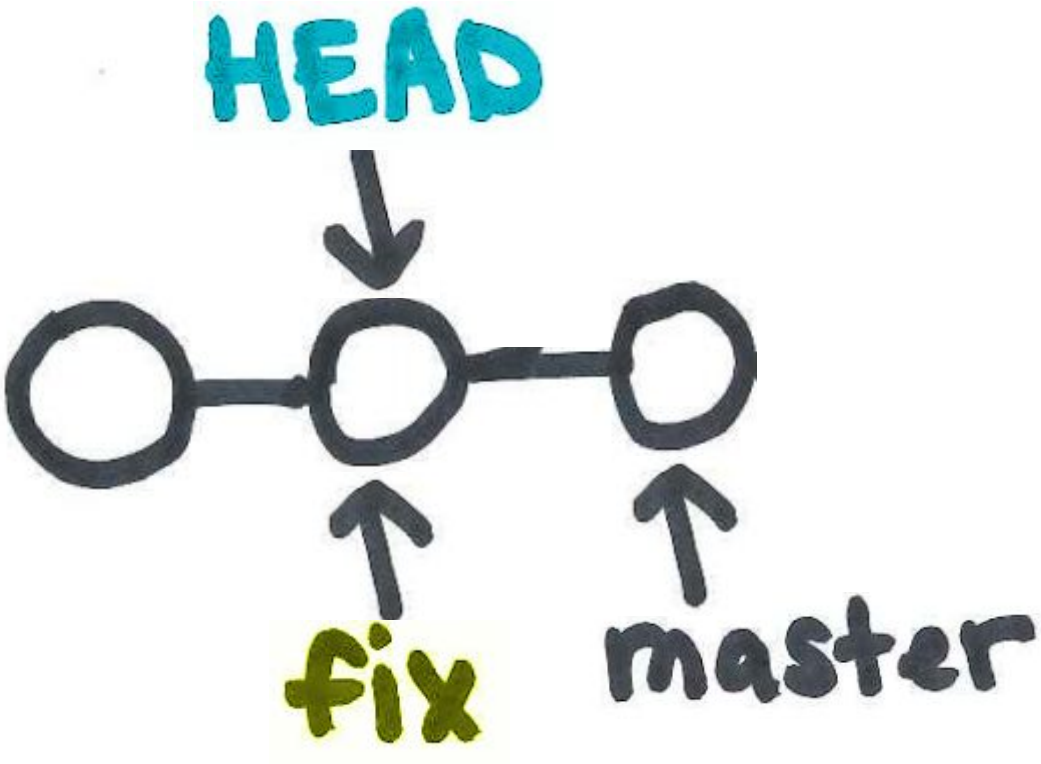
Checkout an earlier commit (hiding `origin/master` for simplicity)



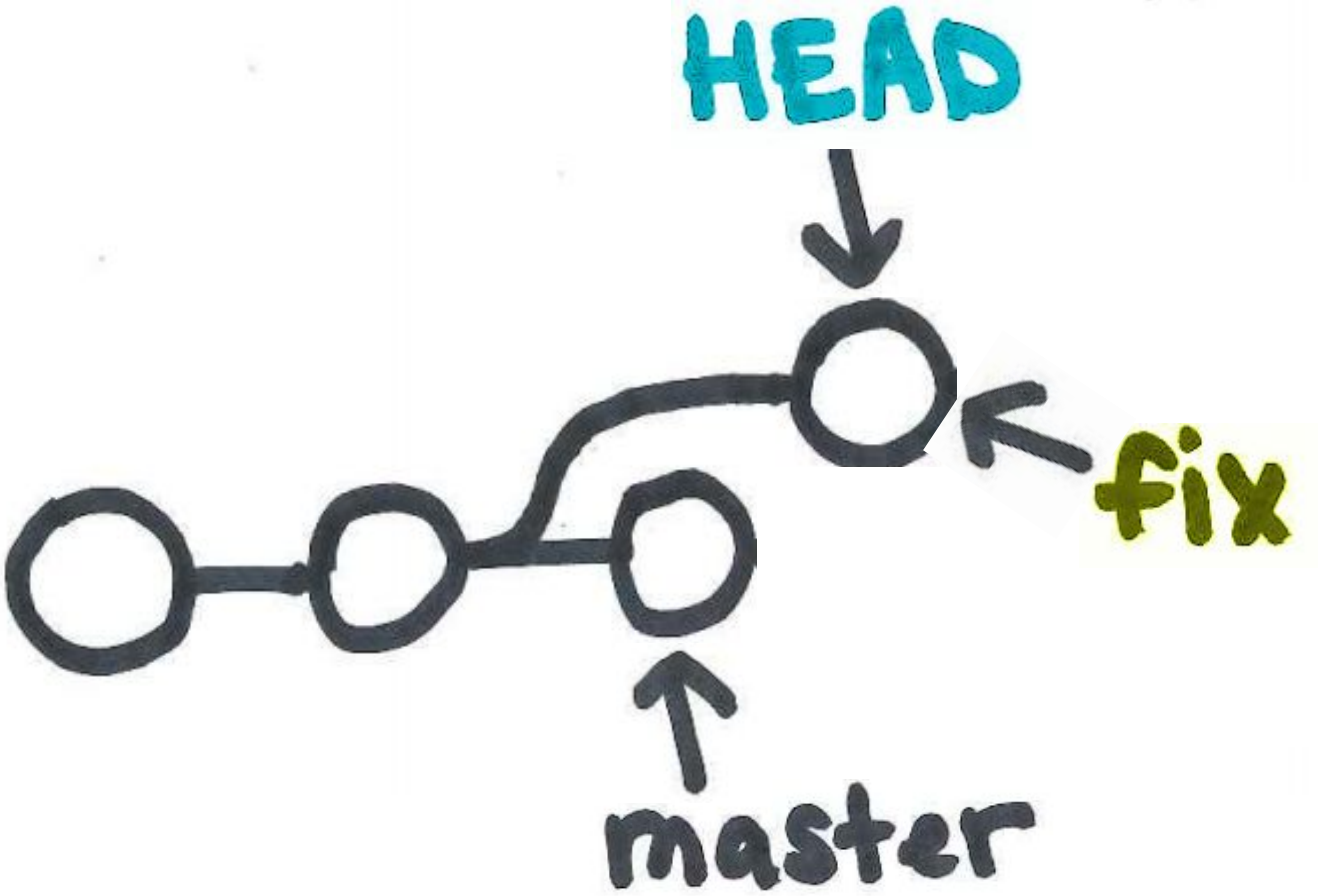
Checking out a specific file

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

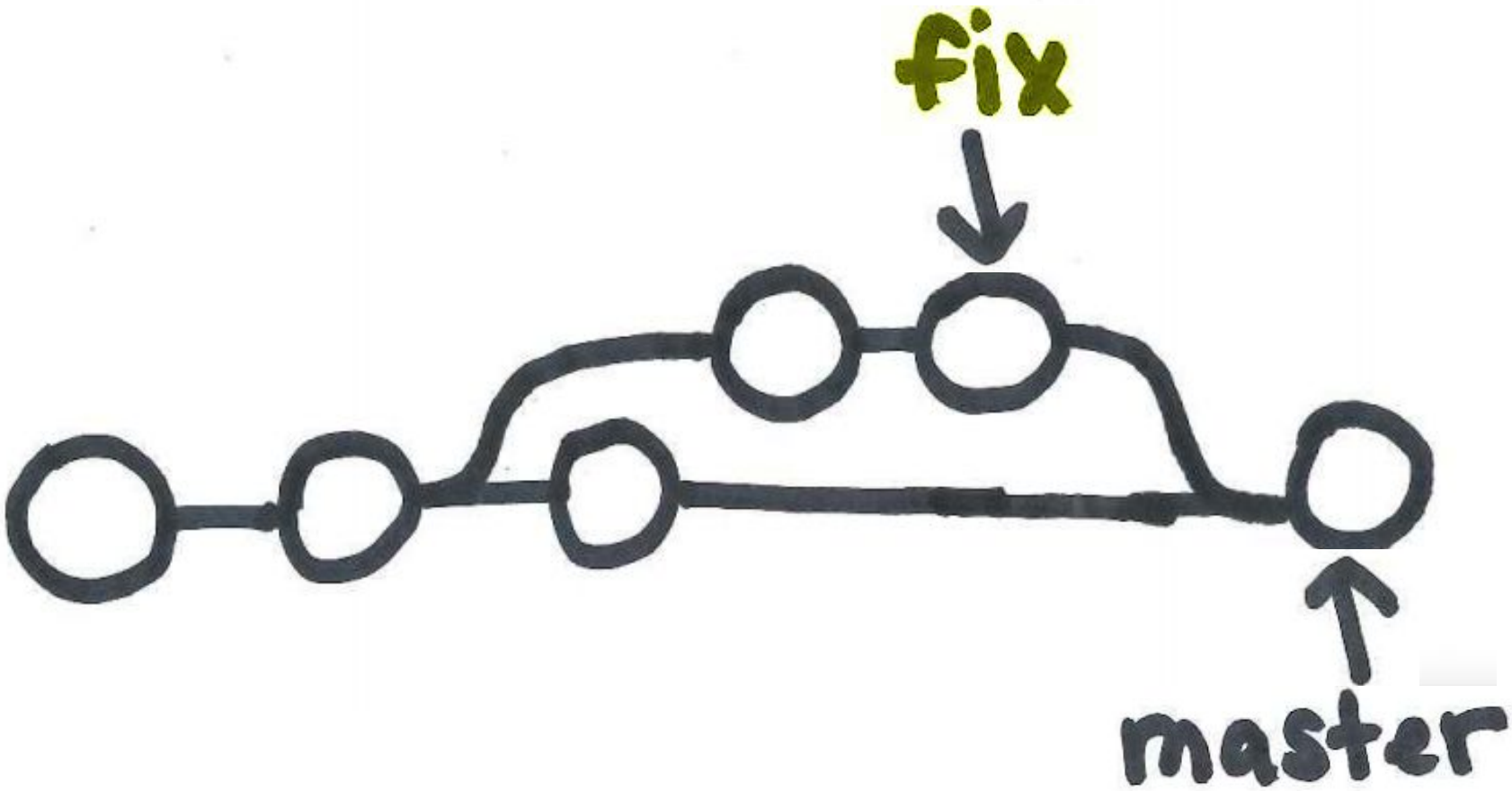
Creating a new branch



Making changes along this branch



Merging commits to another branch



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?

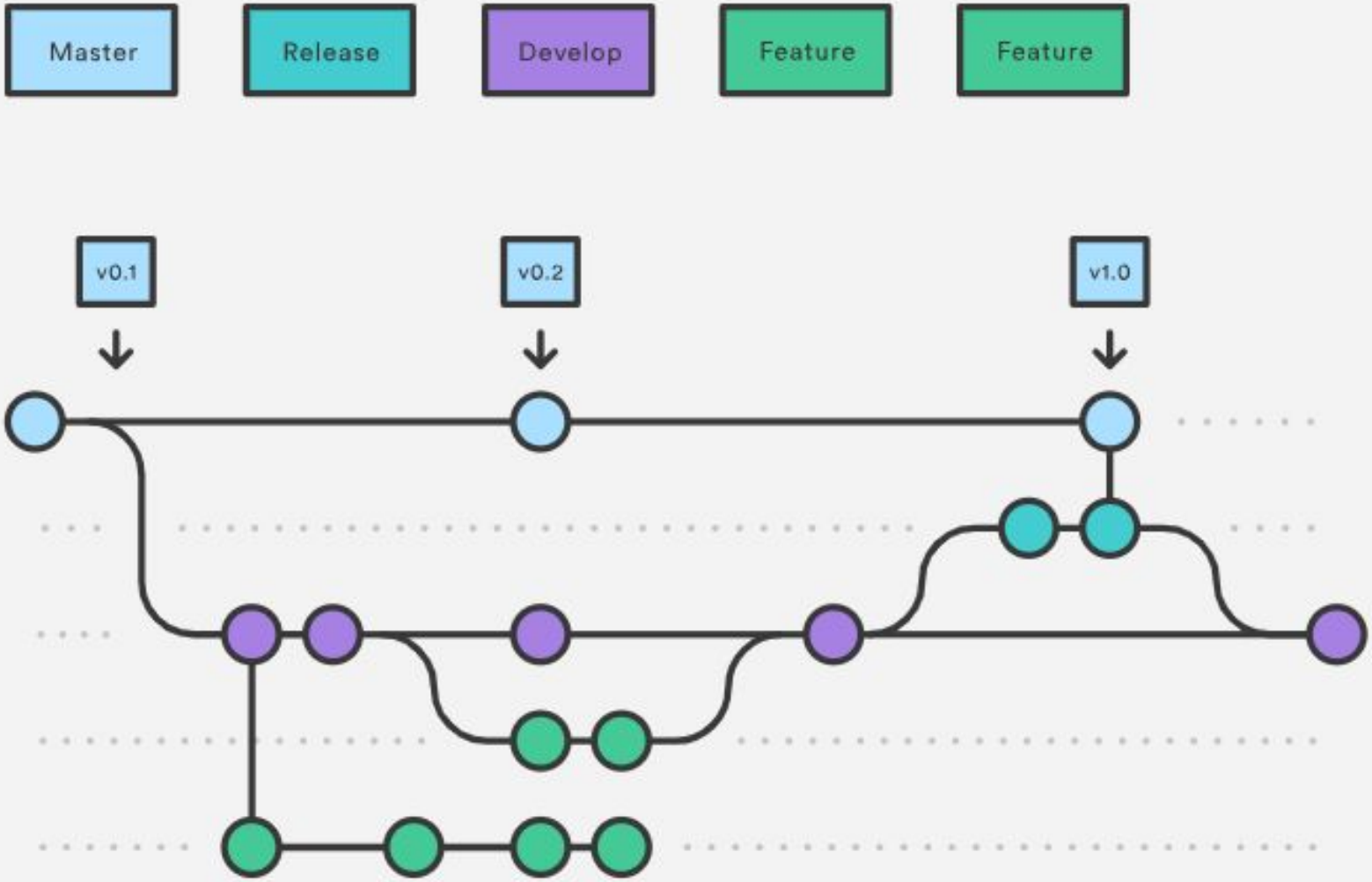
Simple (forking) workflow

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?

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/*).

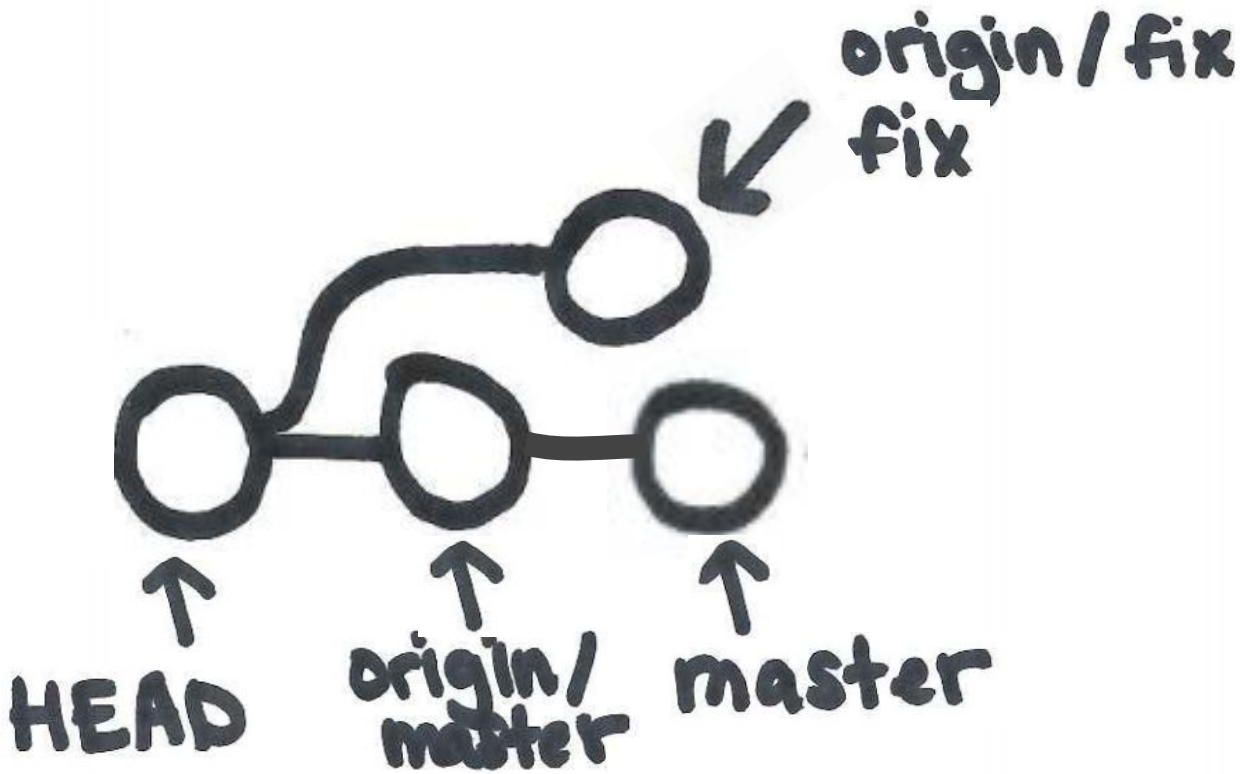
Assume that all add/commit combinations has changes and creates a commit.

```
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



origin/fix

origin/master

origin/fix

origin/master

fix

origin/master

master

HEAD