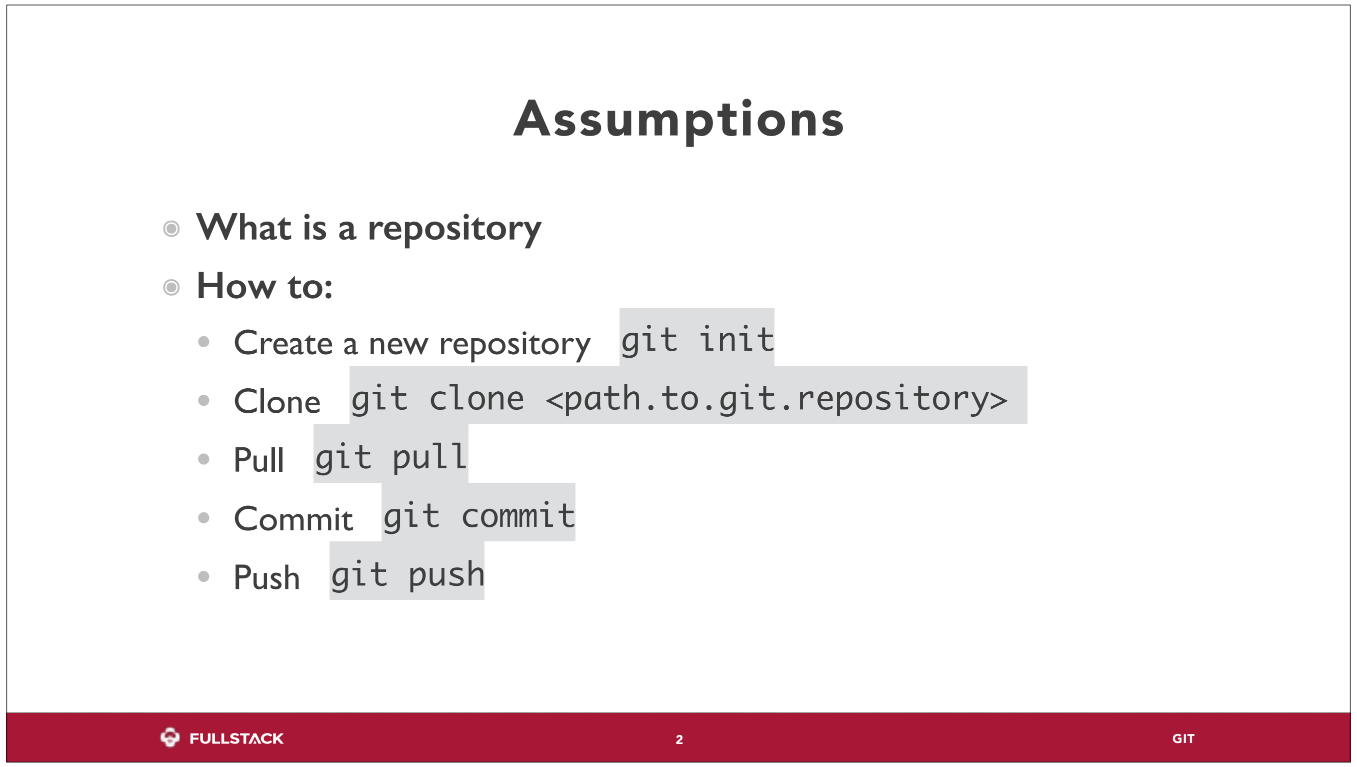
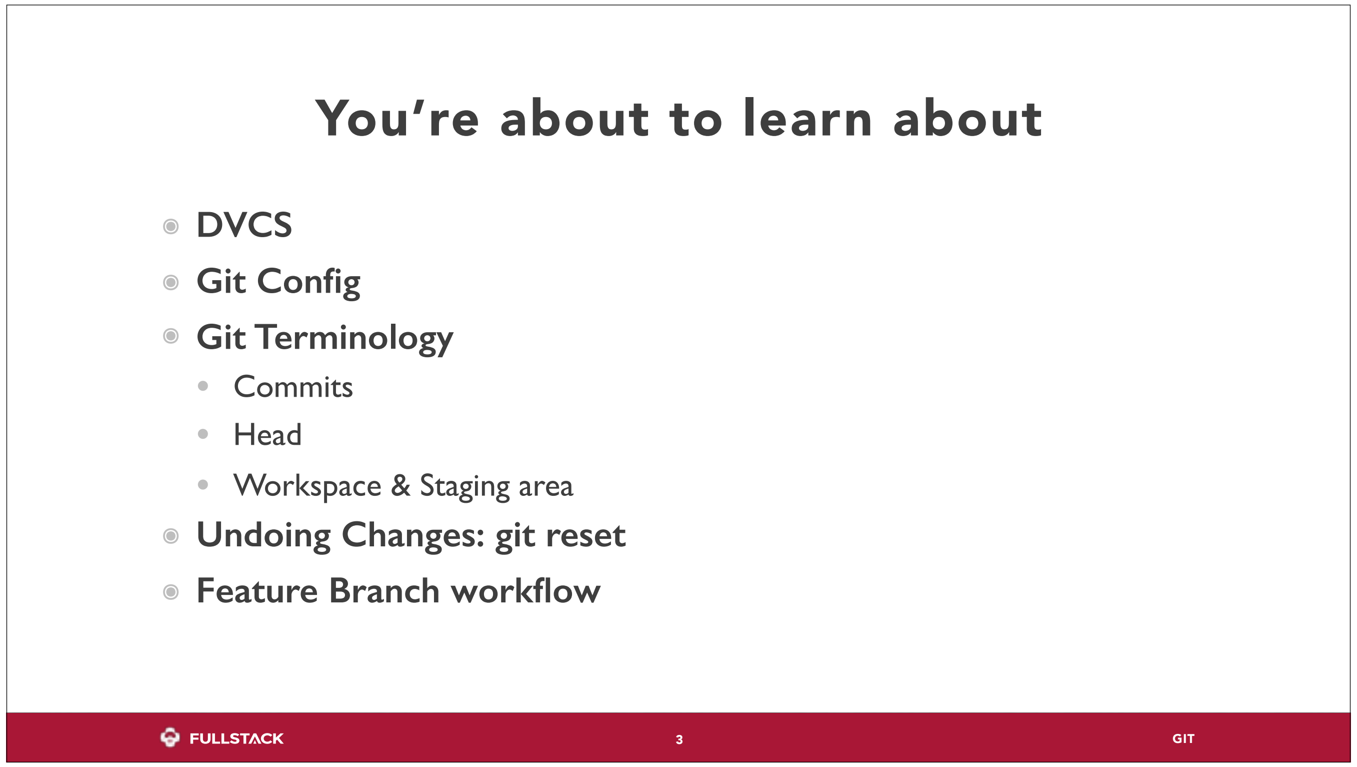
GITting Confident with GIT



Assumptions

- **What is a repository**
- **How to:**
  - Create a new repository `git init`
  - Clone `git clone <path.to.git.repository>`
  - Pull `git pull`
  - Commit `git commit`
  - Push `git push`

We assume you know these commands/operations by now. If you don’t know some of these or have any questions about how they work, now is the perfect time to ask.

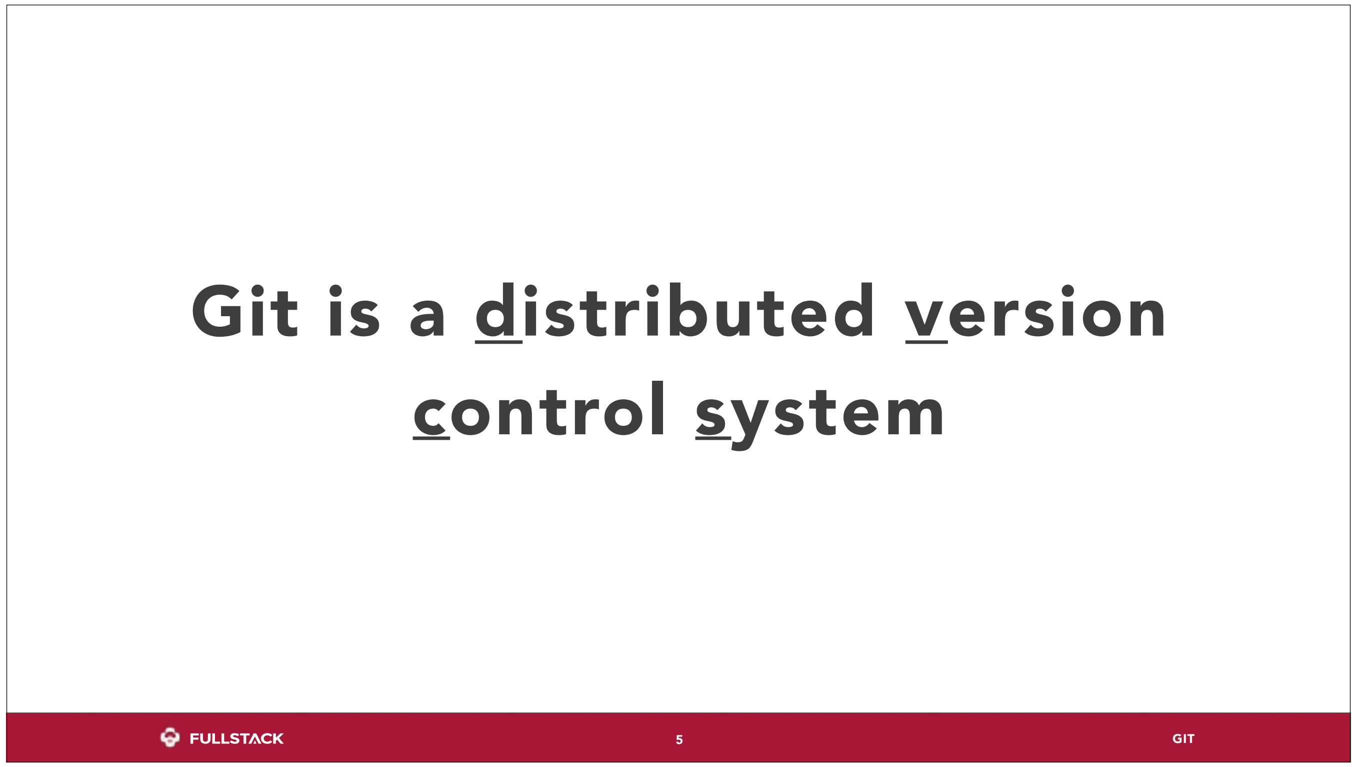


You're about to learn about

- DVCS
- Git Config
- Git Terminology
  - Commits
  - Head
  - Workspace & Staging area
- Undoing Changes: git reset
- Feature Branch workflow

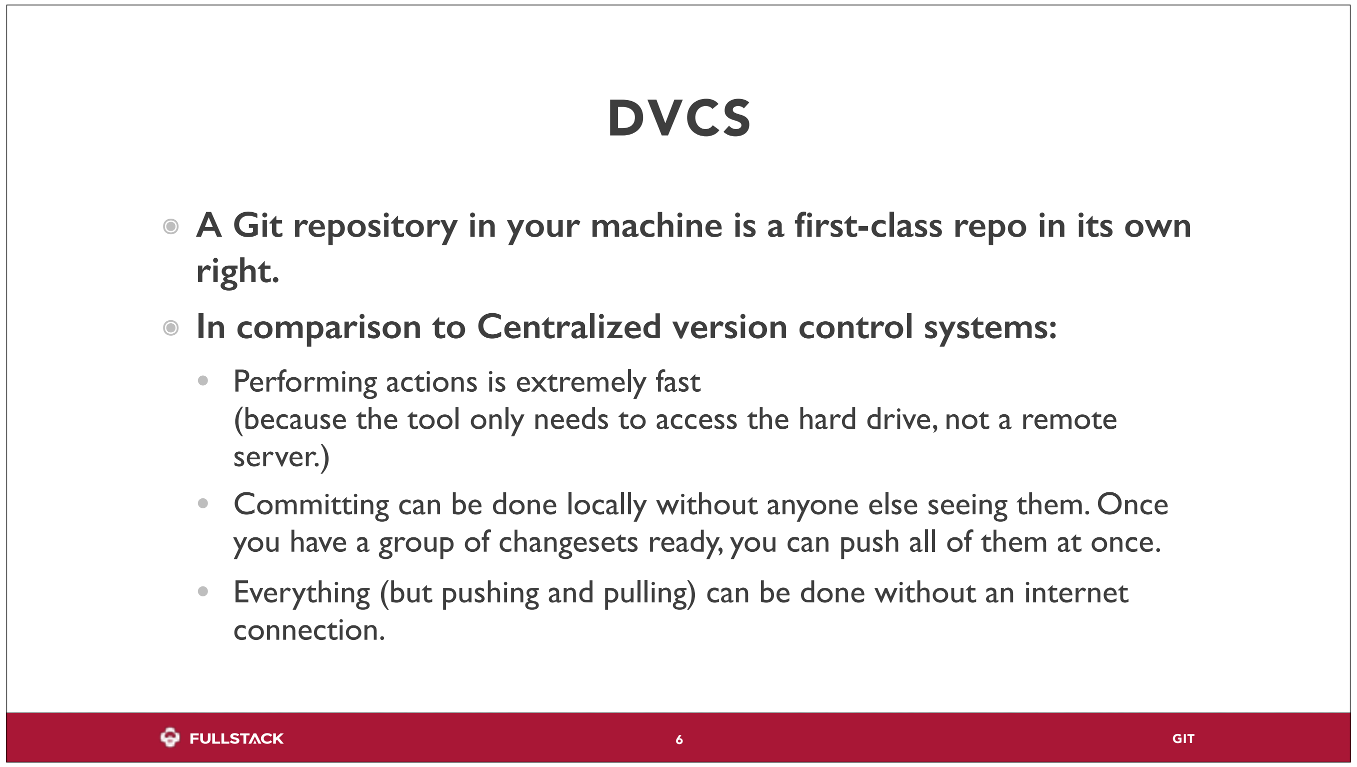
Git is distributed - you learn what that means & why it's good

DVCS



Git is a distributed version control system

Distributed version control system
As opposed to a central version control system
Subversion (SVN), CVS, and Perforce
distributed: git and mercurial



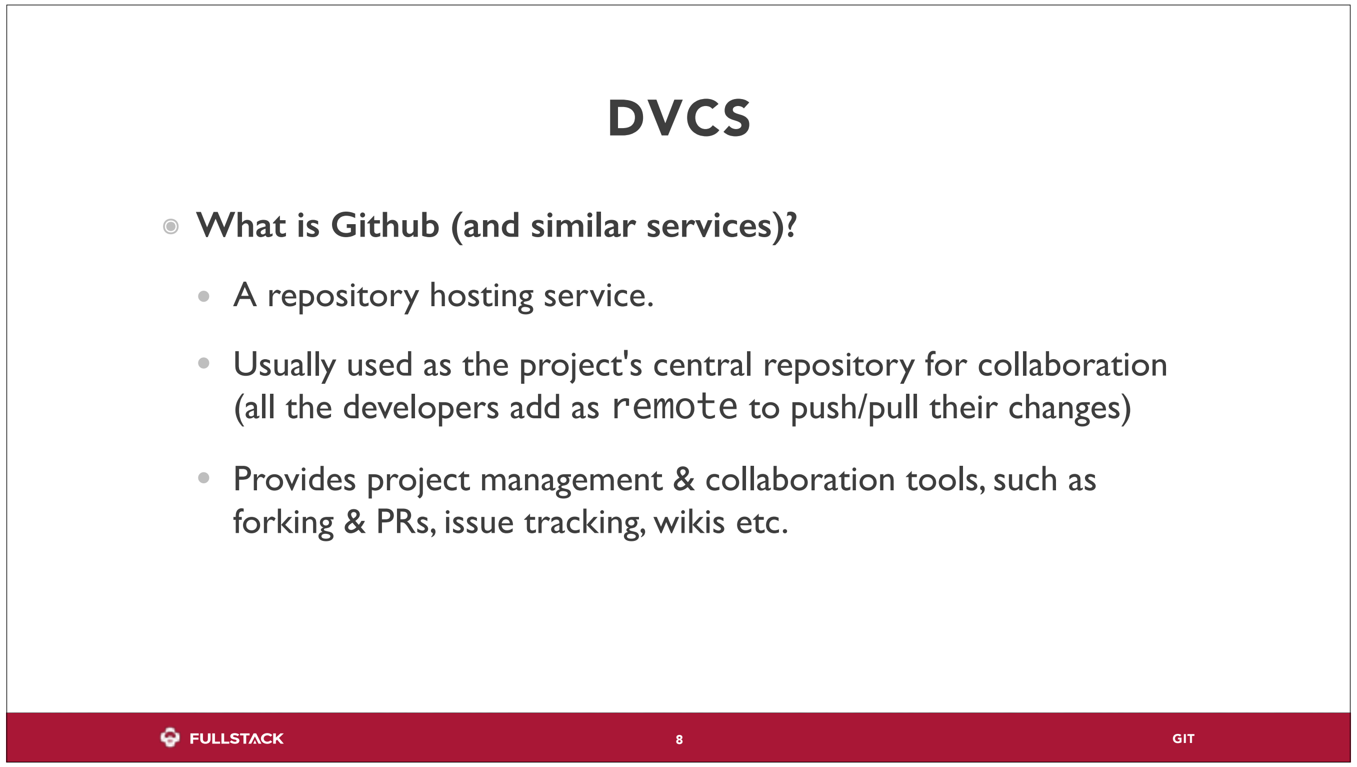
DVCS

- **A Git repository in your machine is a first-class repo in its own right.**
- **In comparison to Centralized version control systems:**
  - Performing actions is extremely fast
    (because the tool only needs to access the hard drive, not a remote server.)
  - Committing can be done locally without anyone else seeing them. Once you have a group of changesets ready, you can push all of them at once.
  - Everything (but pushing and pulling) can be done without an internet connection.

Git repo is a first-class repo in its own right: In opposition to SVN, where your commits are sent to the central repository and not stored locally. The central repository is single-point-of-failure and can make merges trickier.

DVCS

- To be able to collaborate with Git, you need to manage your remote repositories.
- `git remote` allows you to add or remove repositories (other than the one on your local disk) which you can push & pull.



DVCS

- **What is Github (and similar services)?**
  - A repository hosting service.
  - Usually used as the project's central repository for collaboration (all the developers add as `remote` to push/pull their changes)
  - Provides project management & collaboration tools, such as forking & PRs, issue tracking, wikis etc.

Github is not git: Confusing Git for Github is very common, but GitHub is just a service where you can host remote Git repositories. Similar services include gitlab and bitbucket, sourceforge.

Configuring git

Configuring git

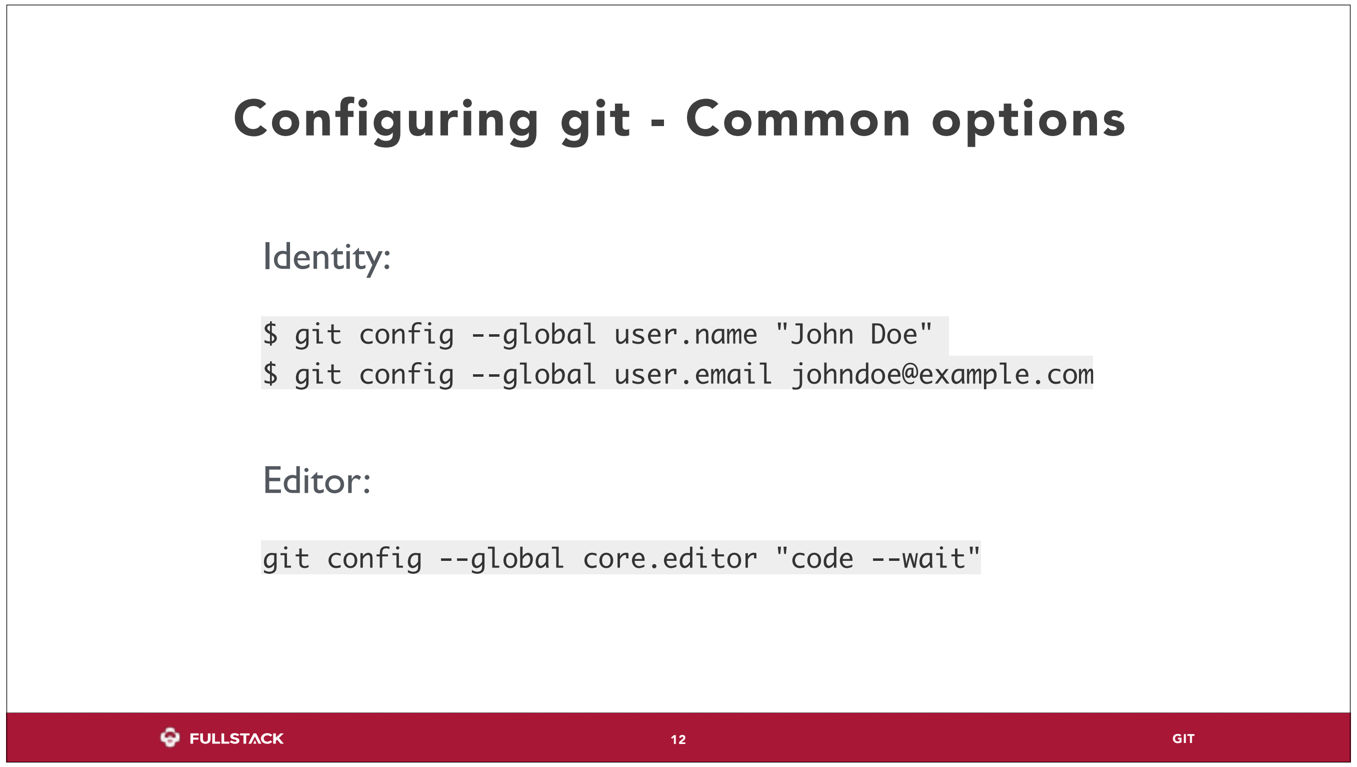
- **Git is configured through `.gitconfig` text files.**
- **The `git config` command is a convenience function to set Git configuration values on a global or local project level.**

```
git config <level> <configuration> <value>
```

Configuring git - Levels

Local	Default option. Local level is applied to the current repository git config gets invoked in. Stored in a file that can be found in the repo's .git directory: `.git/config`
Global	Applied to an user in the operating system user. Stored at `~/.gitconfig` (on unix systems).
System	System-level configuration: covers all users on an operating system. Stored at the system root path. `$(prefix)/etc/gitconfig` (on unix).

Thus the order of priority for configuration levels is: local, global, system. This means when looking for a configuration value, Git will start at the local level and bubble up to the system level.



Configuring git - Common options

Identity:

```
$ git config --global user.name "John Doe"
$ git config --global user.email johndoe@example.com
```

Editor:

```
git config --global core.editor "code --wait"
```

Editor: Commands such as commit and tag that let you edit messages by launching an editor use the value of this variable when it is set, and the environment variable GIT_EDITOR is not set.

Configuring git - Common options

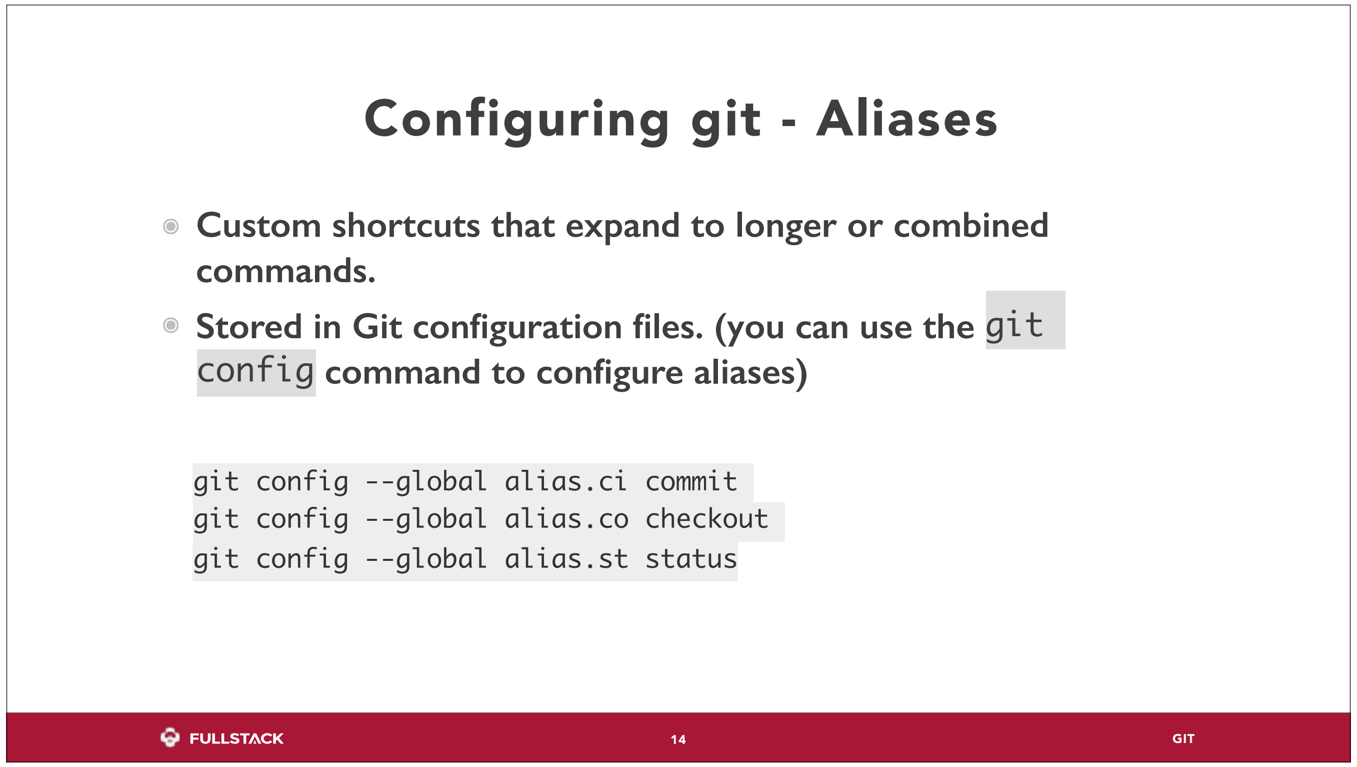
Colors:

```
git config --global color.ui true
```

Autocorrect:

```
$ git config --global help.autocorrect 1
```

Autocorrect: If you mistype a command, git already shows something like “'chekcout' is not a git command. Did you mean ‘checkout’”. This config will make git actually run this suggested command for you. The value is an integer which represents tenths of a second Git will give you before executing the autocorrected command.



Configuring git - Aliases

- Custom shortcuts that expand to longer or combined commands.
- Stored in Git configuration files. (you can use the `git config` command to configure aliases)

```
git config --global alias.ci commit
git config --global alias.co checkout
git config --global alias.st status
```

Aliases saves you the time and energy cost of typing frequently used commands.

Lab

https://gist.github.com/cassiozen/340b664c6b0c4b01d17dd15f835344e4

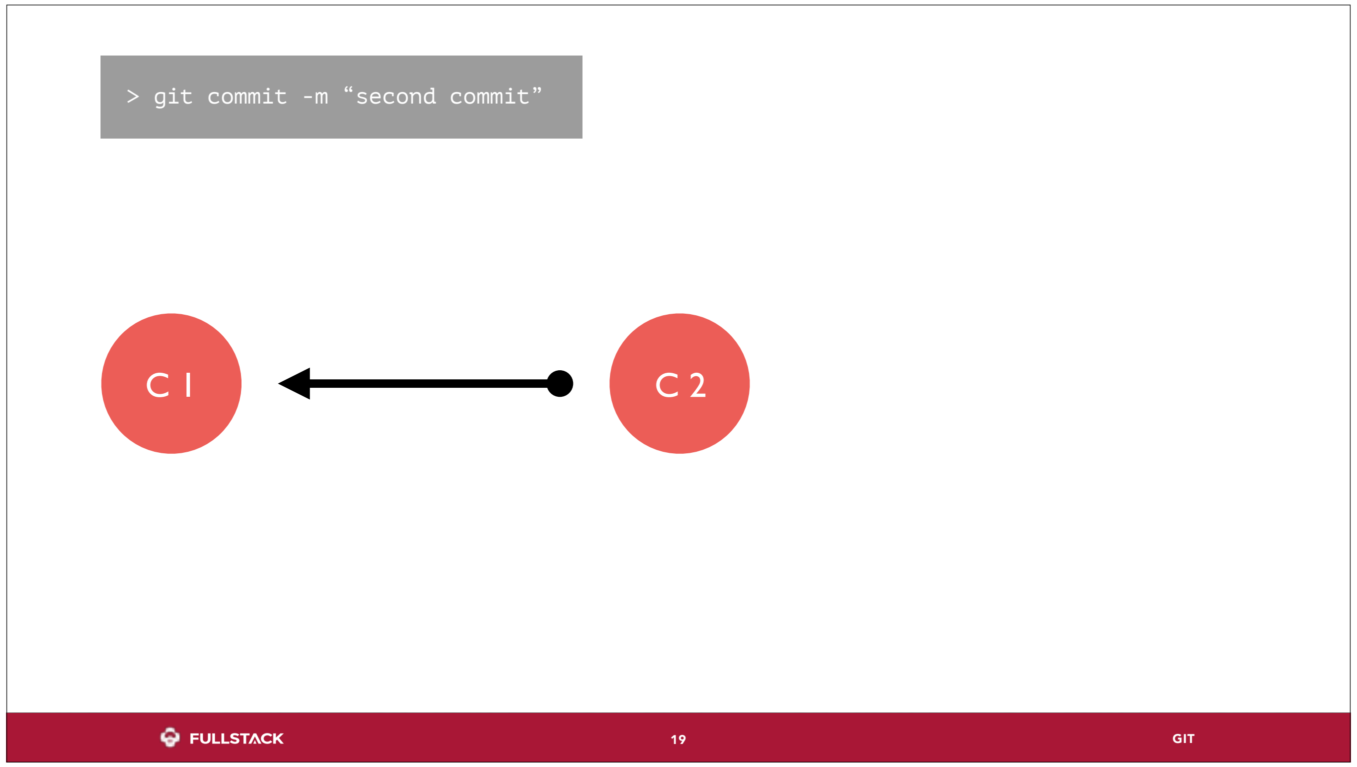
Git Terminology

Commit • Head • Workspace & Staging Area

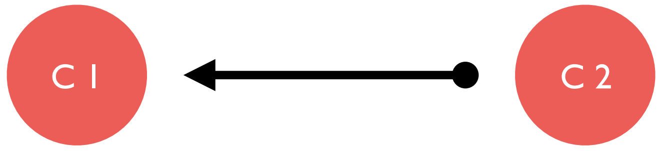
Commits: Git is structured like a “singly” linked list

Though more accurately like DAG (directed acyclic graph)

```
> git commit -m “initial commit”
```

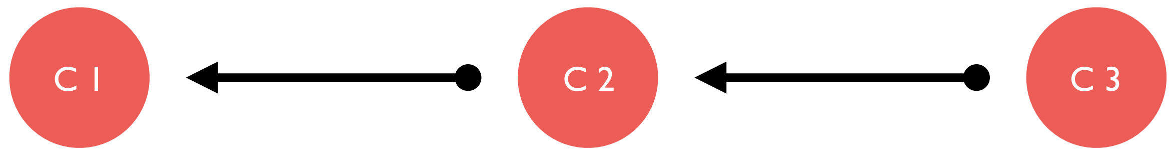


```
> git commit -m “second commit”
```



Each node references its parent, but not the other way around

```
> git commit -m “third commit”
```

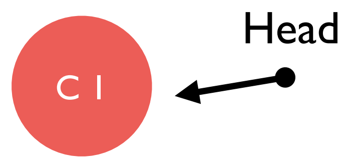


Commits

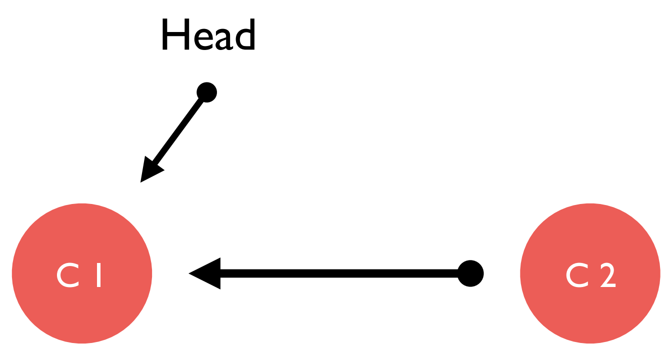
- **Saves the current state of your project at that point in time**
- **Useful because**
  - you can always go back to a previous commit if you mess up
  - documents changes that happen over time
  - organizes changes in such a fashion that makes debugging convenient (i.e. "which commit introduced this bug"?)
- **Commit early and often!**

Head

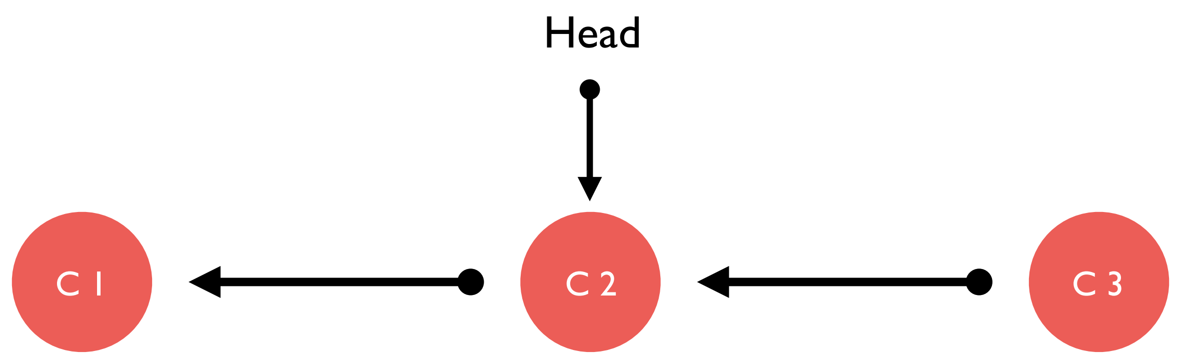
- HEAD is a reference to the last commit in the currently check-out branch.
- We are calling this commit “C1”, but in real life commits are referenced after hashes, for example fed2da64c0efc5293610bdd892f82a58e8cbc5d8. That’s why references like Head are useful.



Head

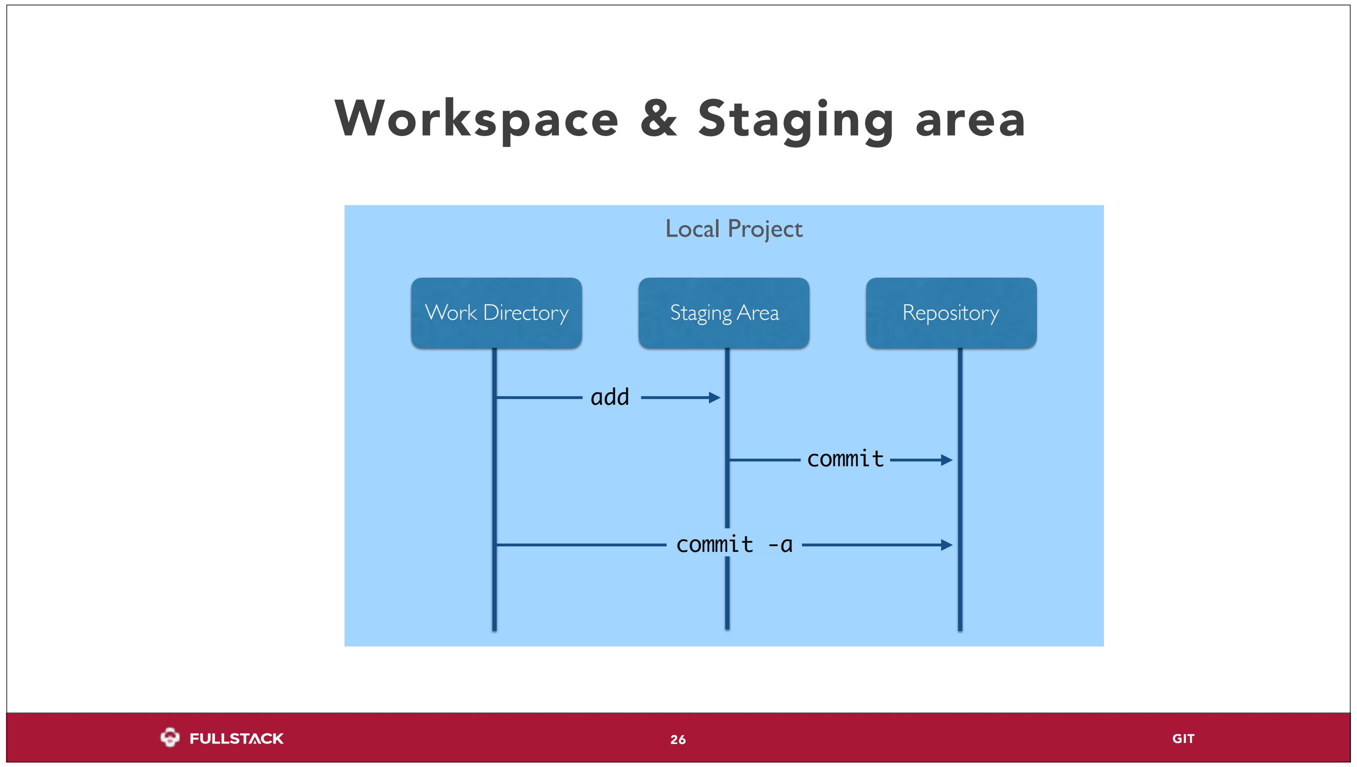


Head

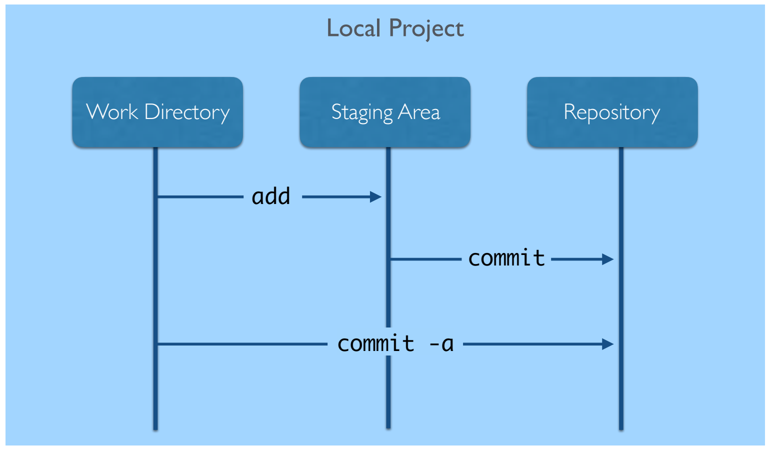


Workspace & Staging area

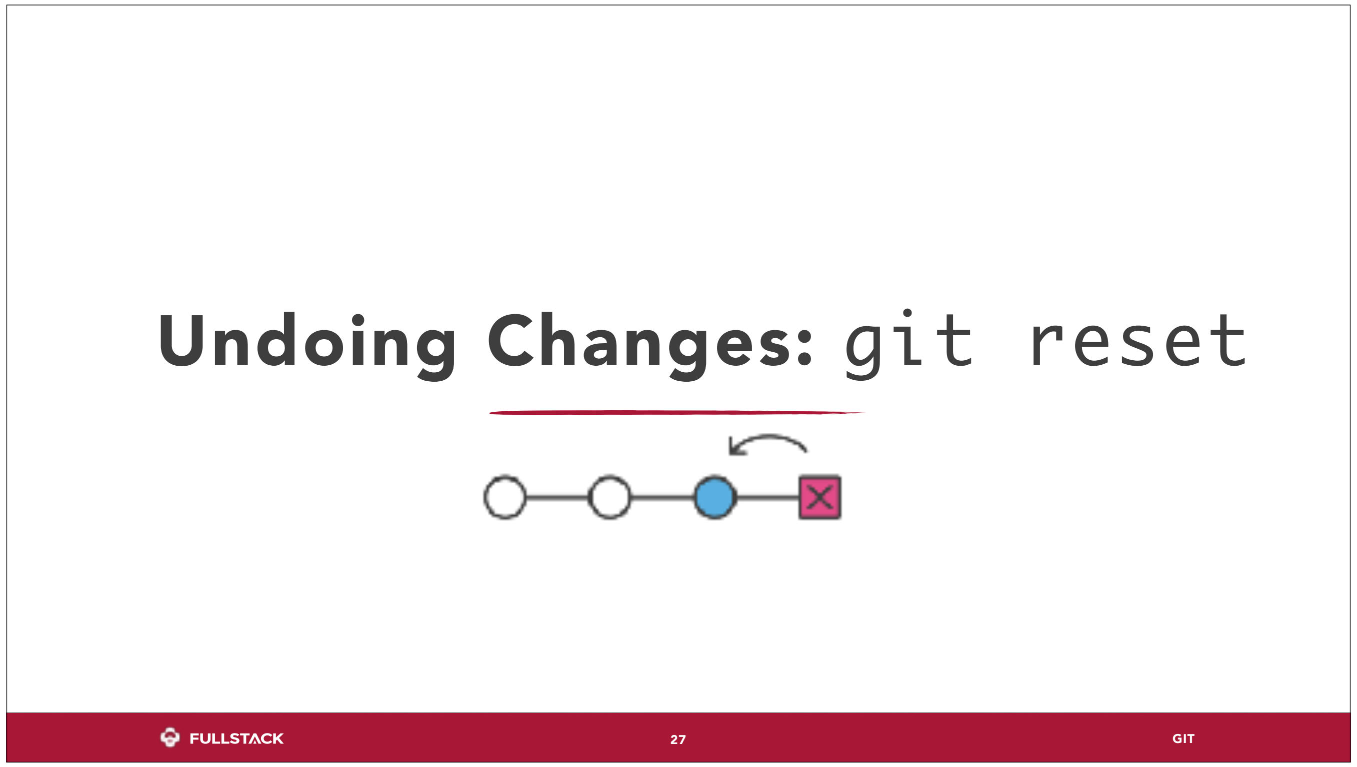
- **Workspace:** Your local working directory (where you do your actual work). It contains tracked files, untracked files and a special directory ".git".
- **Staging area:** Used for preparing commits. You can add files to the next commit.
- The **Repository** itself is the virtual storage of your project. It allows you to save versions of your code, which you can access when needed.



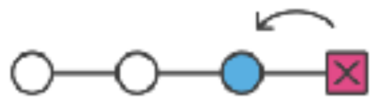
Workspace & Staging area



For example, when you run “git add”, you’re putting a file in staging area. When you commit, the current state in the stage area is saved in the repository.



Undoing Changes: `git reset`

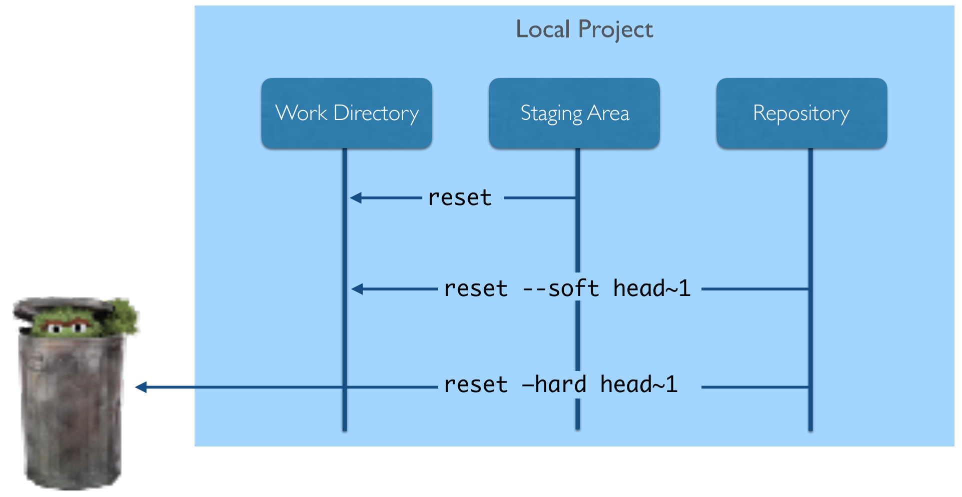


Git add & git commit are pretty basic in the git workflow: They let you move your changes in one direction: From the working directory to staging to the repo. But how to move in the other direction (removing from staging area or undoing a commit)?

git reset

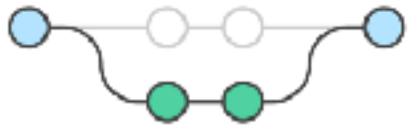
- **A complex and versatile tool for undoing changes:**
  - Undo Staging: `git reset`
  - Undo Commit (or Commits): `git reset <commit>`
    - **soft**: Keep changed files
    - **hard**: Delete changes files

Undoing Changes: git reset



“head~1” meaning the parent of the tip of the master branch. You can travel further back (head~2…head~n)

Branches and Merging

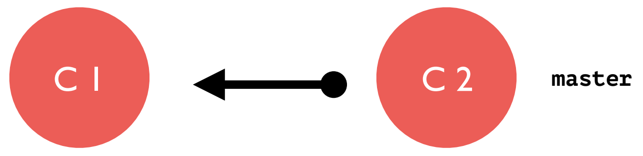


Scenario: two people are working on a project

Problems

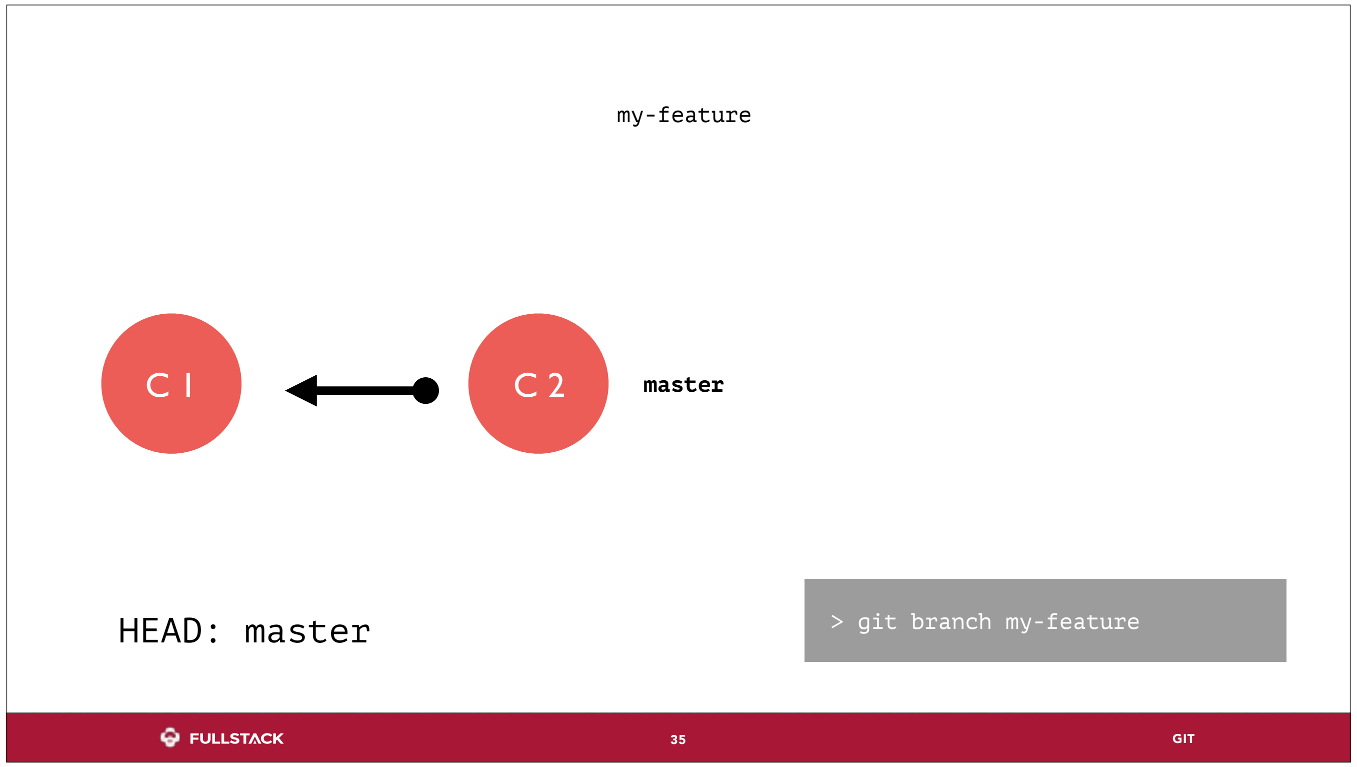
- How can I show what I've done in an efficient manner?
- If we don't like my work, how can I easily get back to where I was?
- If we do like my work, how can I integrate it together with your work?

BRANCHES



```
HEAD: master
```

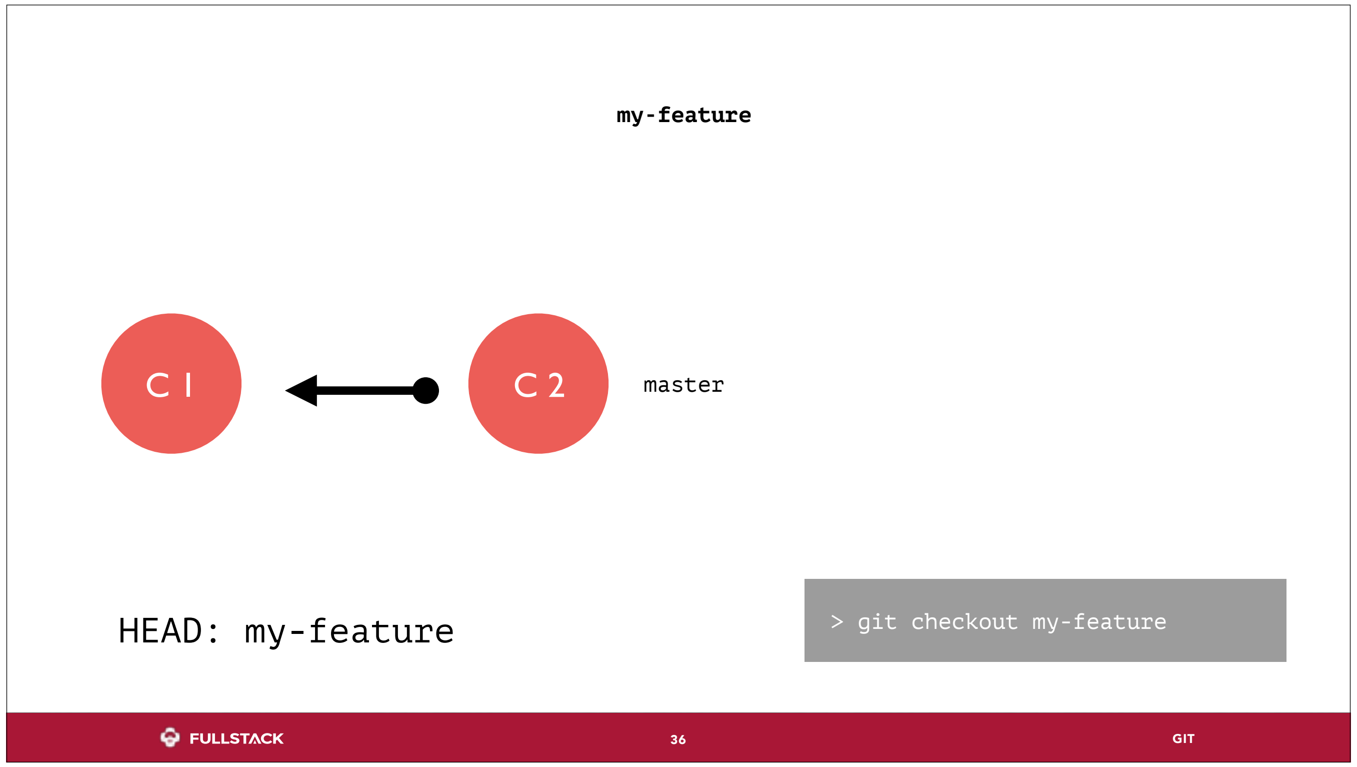
```
>
```



HEAD: master

```
> git branch my-feature
```

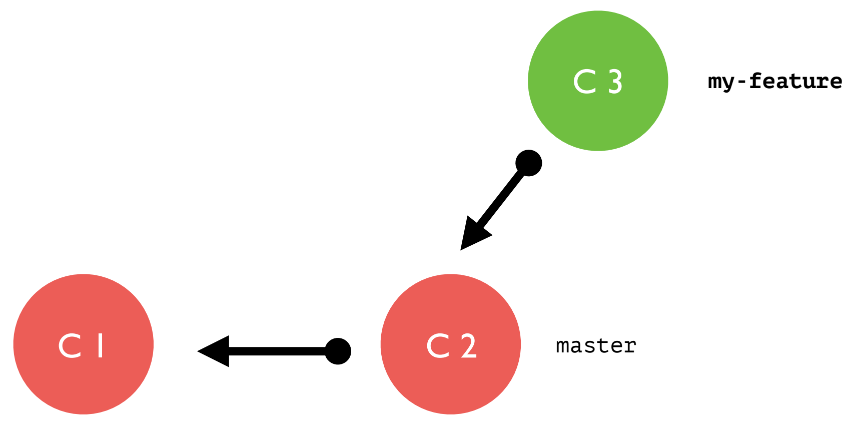
git branch: creates a new branch



HEAD: my-feature

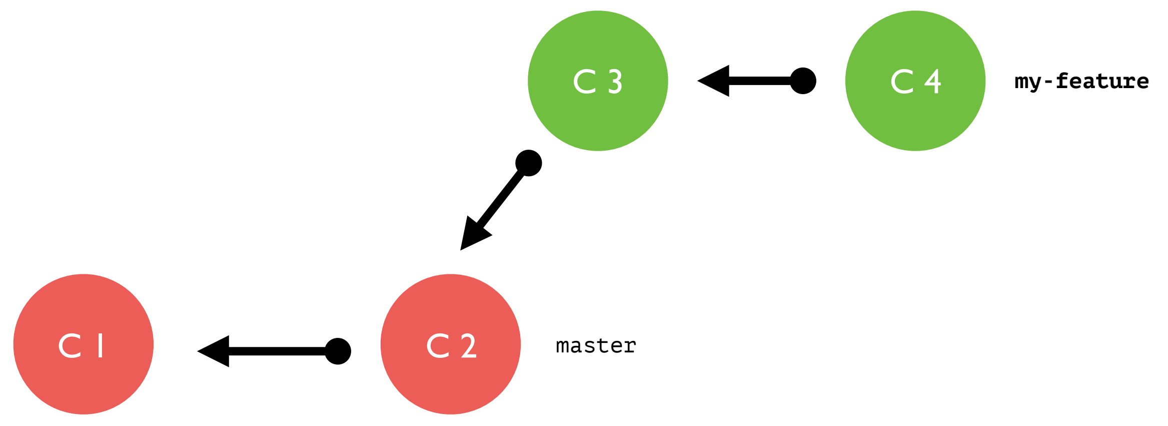
```
> git checkout my-feature
```

git checkout: switch to a branch



```
HEAD: my-feature
```

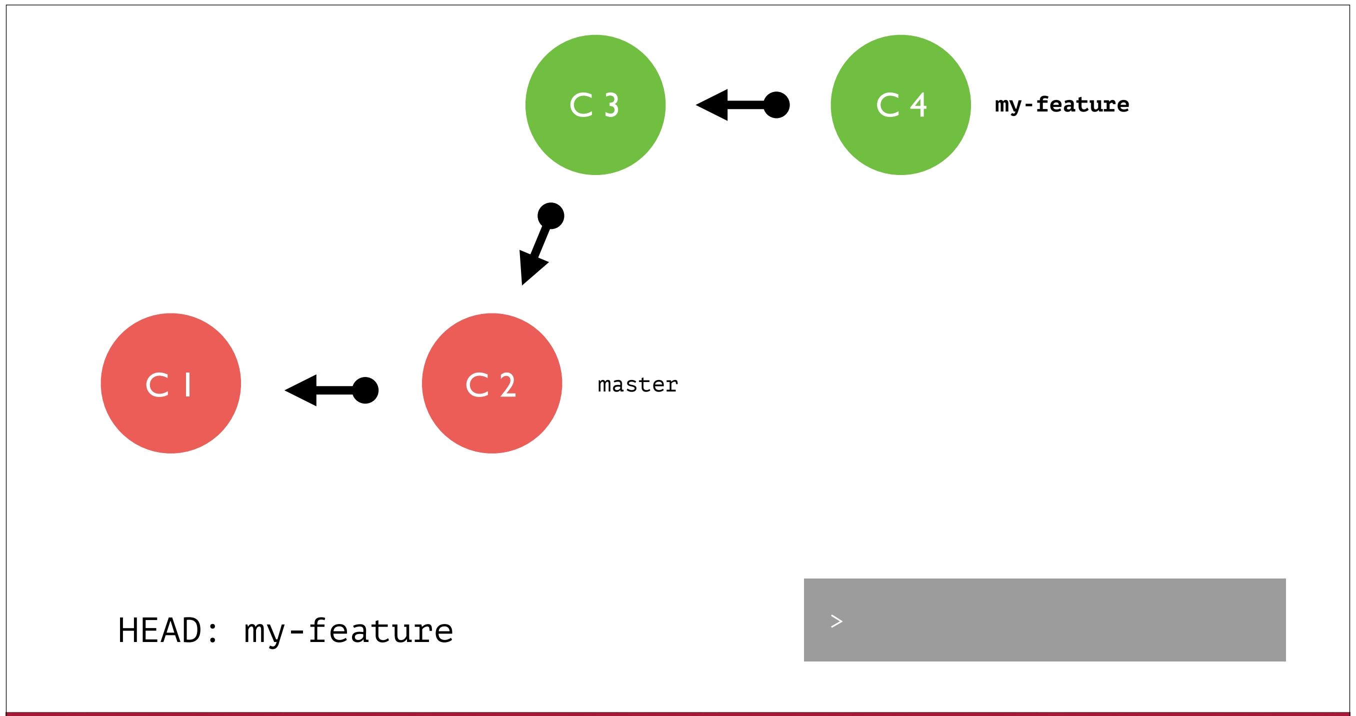
```
> git commit -m “add stuff”
```



HEAD: my-feature

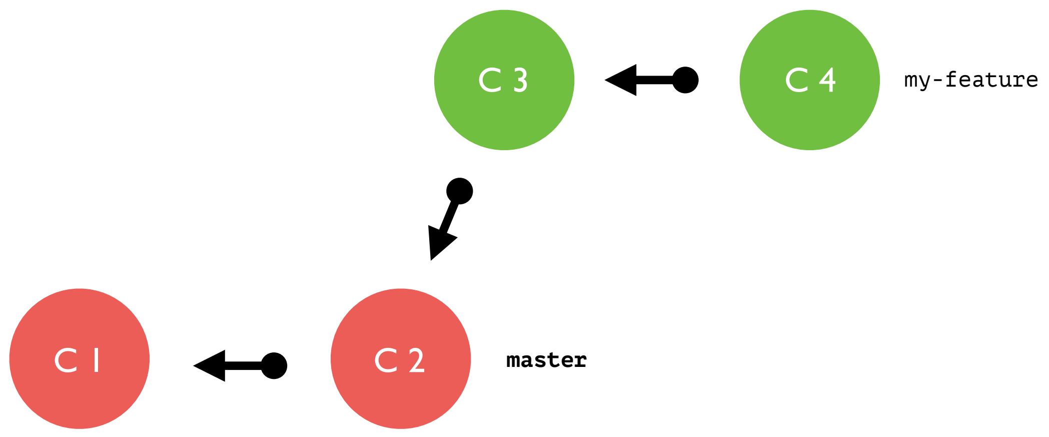
```
> git commit -m “moar stuff”
```

MERGING



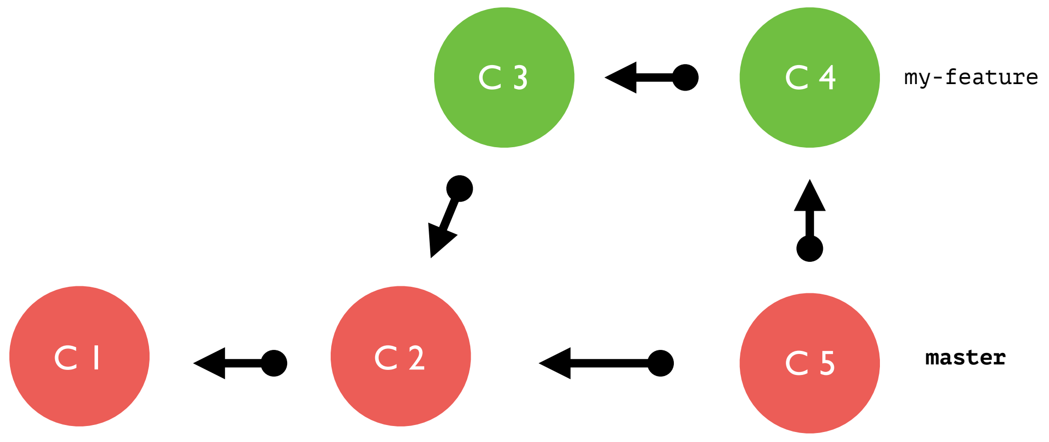
```
HEAD: my-feature
```

```
>
```



HEAD: master

```
> git checkout master
```



HEAD: master

```
> git merge my-feature
```

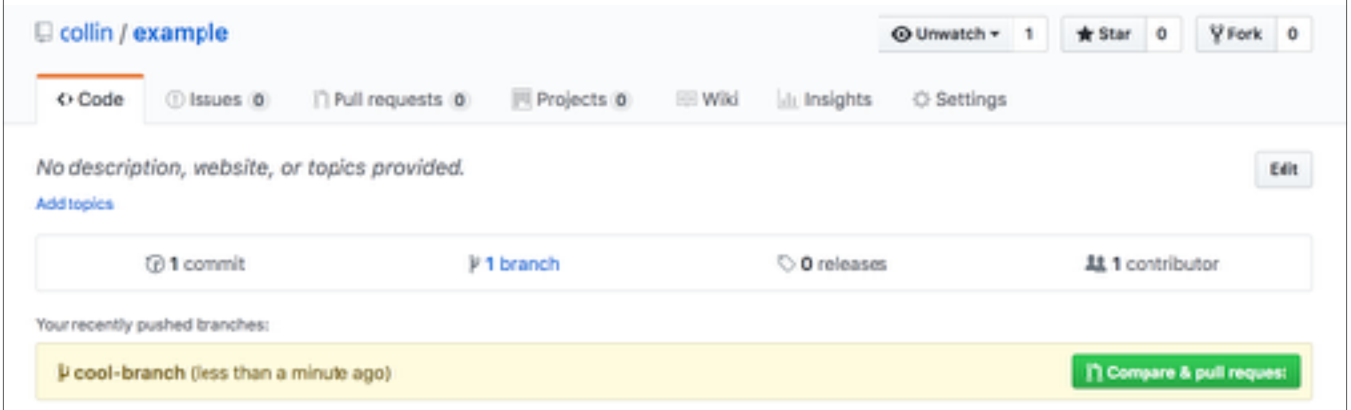
PULL REQUESTS

Pull Requests

- Merging a branch on the remote, plus some ceremony (ex. code review by another team member)
- Feature of Github, not explicitly part of Git

```
> git push origin cool-branch
```

HEAD: cool-branch

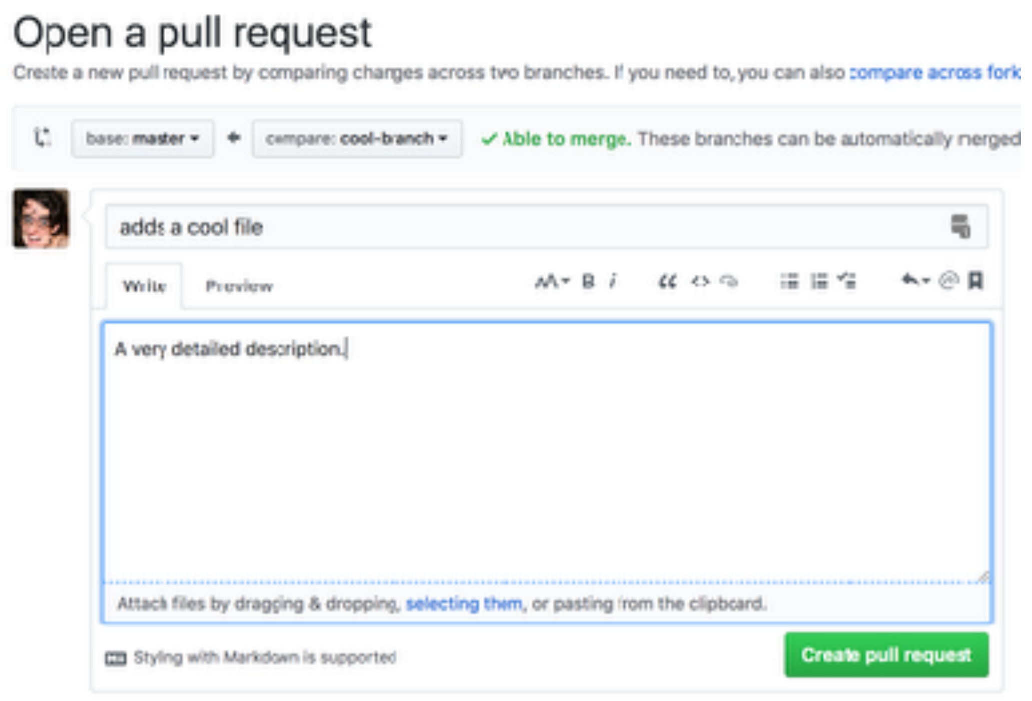


No description, website, or topics provided.

1 commit | 1 branch | 0 releases | 1 contributor

Your recently pushed branches:

cool-branch (less than a minute ago)



Open a pull request

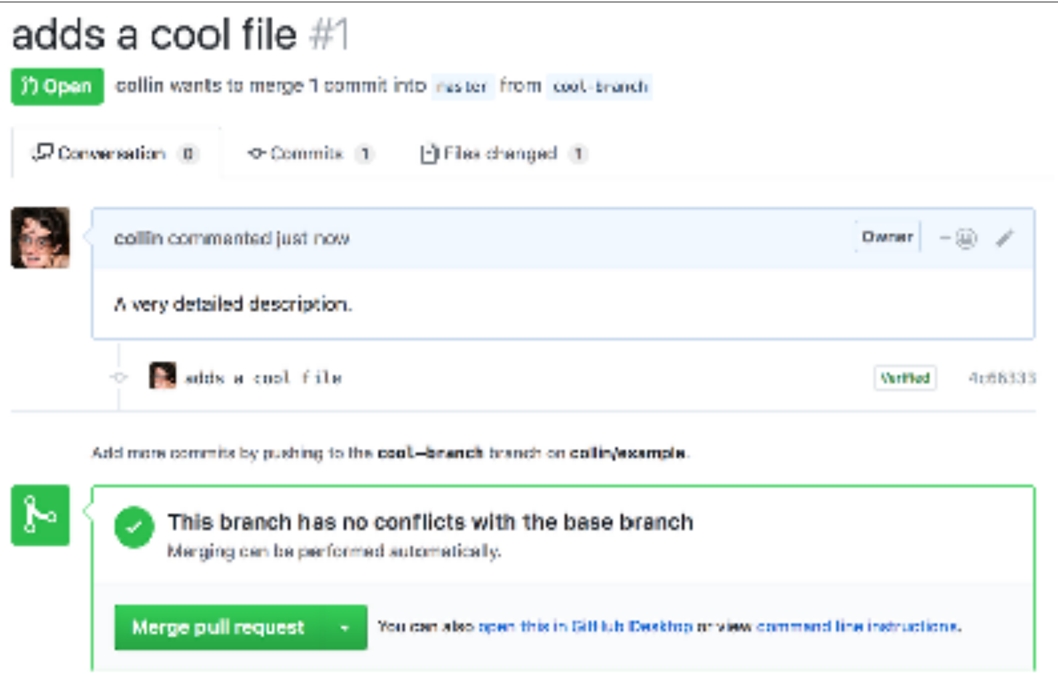
Create a new pull request by comparing changes across two branches. If you need to, you can also compare across fork

base: master ▾ ← compare: cool-branch ▾ ✓ Able to merge. These branches can be automatically merged

adds a cool file

A very detailed description.

Attach files by dragging & dropping, selecting them, or pasting from the clipboard.



adds a cool file #1

Open collin wants to merge 1 commit into master from cool-branch

Conversation 0 · Commits 1 · Files changed 1

collin commented just now — Owner

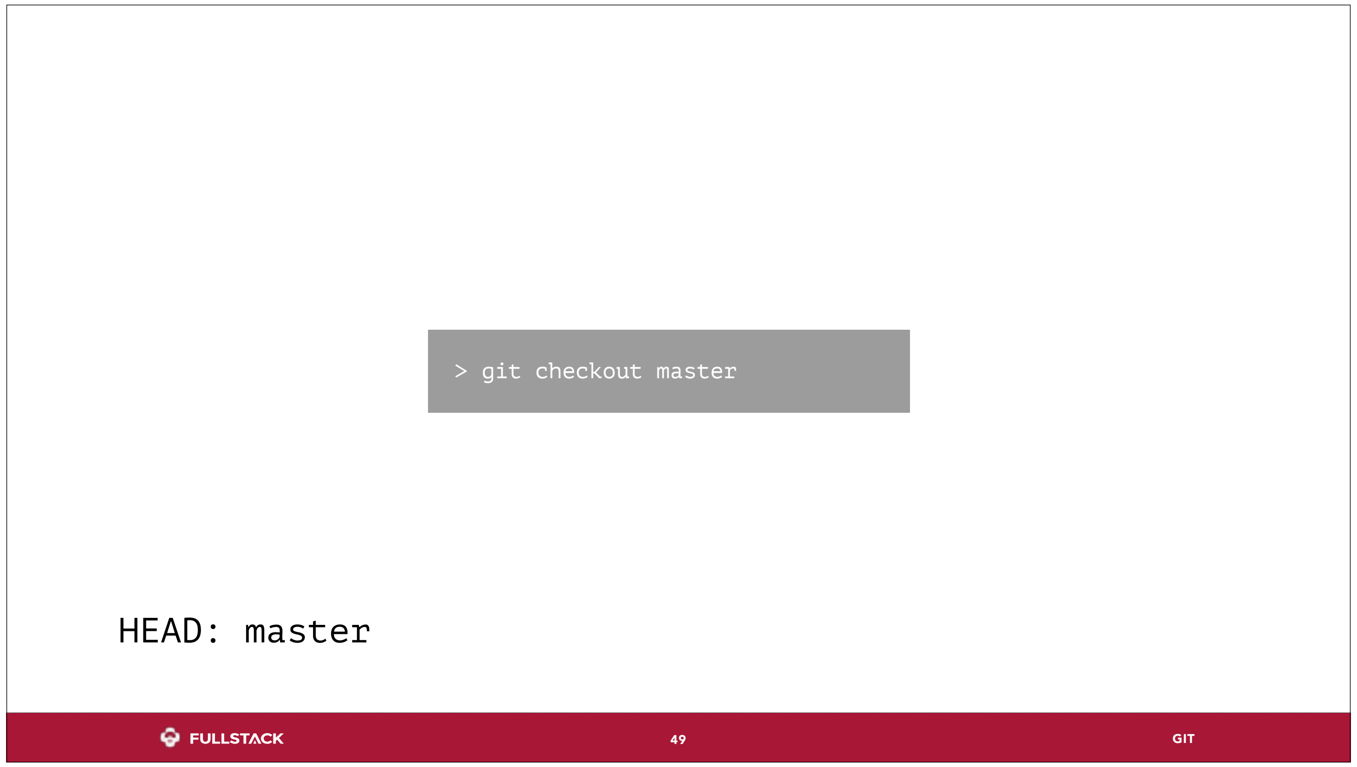
A very detailed description.

adds a cool file — Verified 4c68333

Add more commits by pushing to the **cool-branch** branch on **collin/example**.

This branch has no conflicts with the base branch
Merging can be performed automatically.

Merge pull request — You can also open this in GitHub Desktop or view command line instructions.



```
> git checkout master
```

```
HEAD: master
```

Now to get up to date locally

```
> git pull origin master
```

```
HEAD: master
```

MERGE CONFLICT

Merge conflicts

- Fairly common: not the end of the world
- Happens when Git can’t automatically resolve two commits into one - needs a human to decide what version to keep
- Makes sure someone else’s work doesn’t overwrite another’s unintentionally

script.js - master

```
console.log(‘hello world')
```

script.js - f/howdy

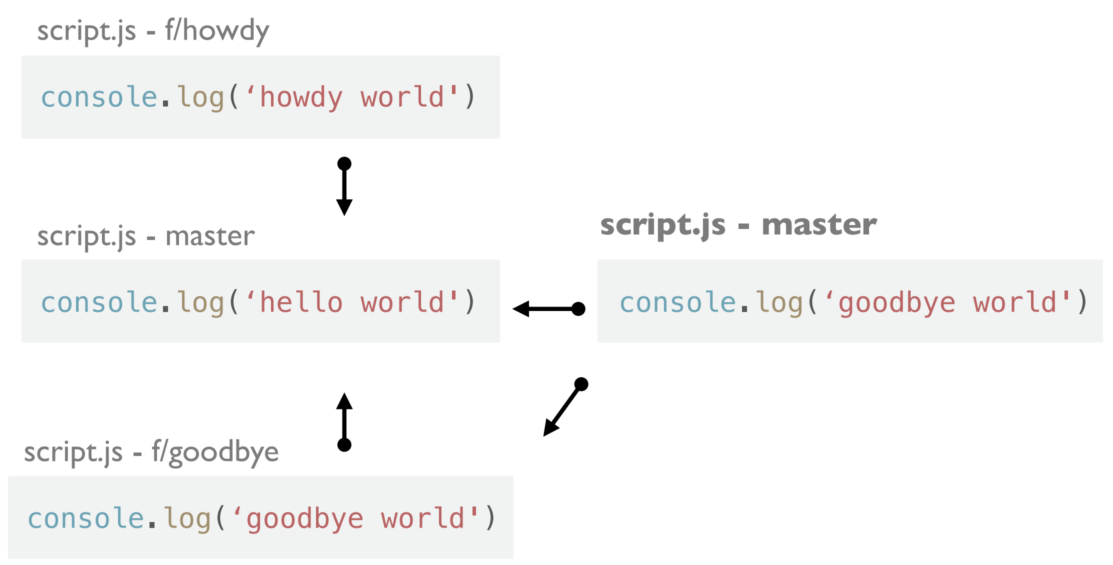
```
console.log(‘howdy world')
```

script.js - master

```
console.log(‘hello world')
```

script.js - f/goodbye

```
console.log(‘goodbye world')
```



script.js - f/howdy

```
console.log(‘howdy world')
```

script.js - master

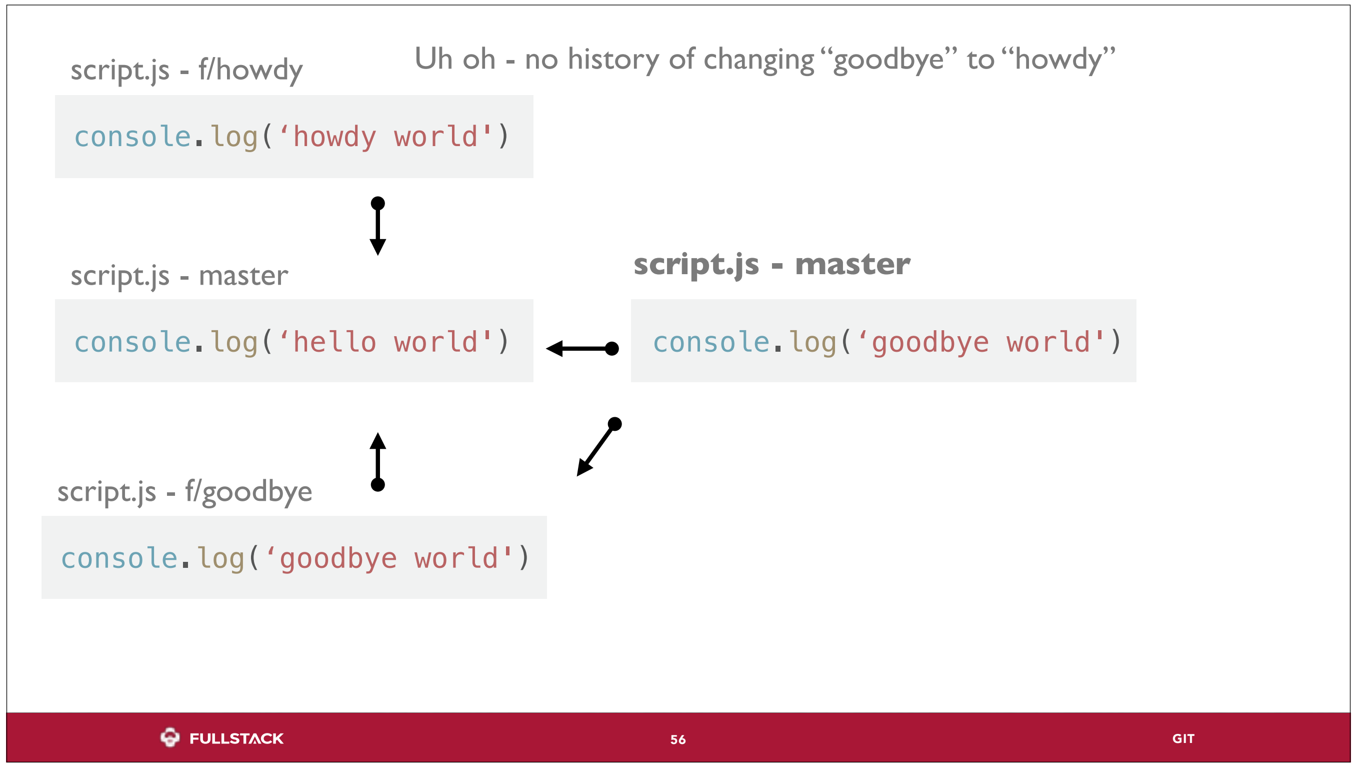
```
console.log(‘hello world')
```

script.js - master

```
console.log(‘goodbye world')
```

script.js - f/goodbye

```
console.log(‘goodbye world')
```



Uh oh - no history of changing "goodbye" to "howdy"

script.js - f/howdy

```
console.log('howdy world')
```

script.js - master

```
console.log('hello world')
```

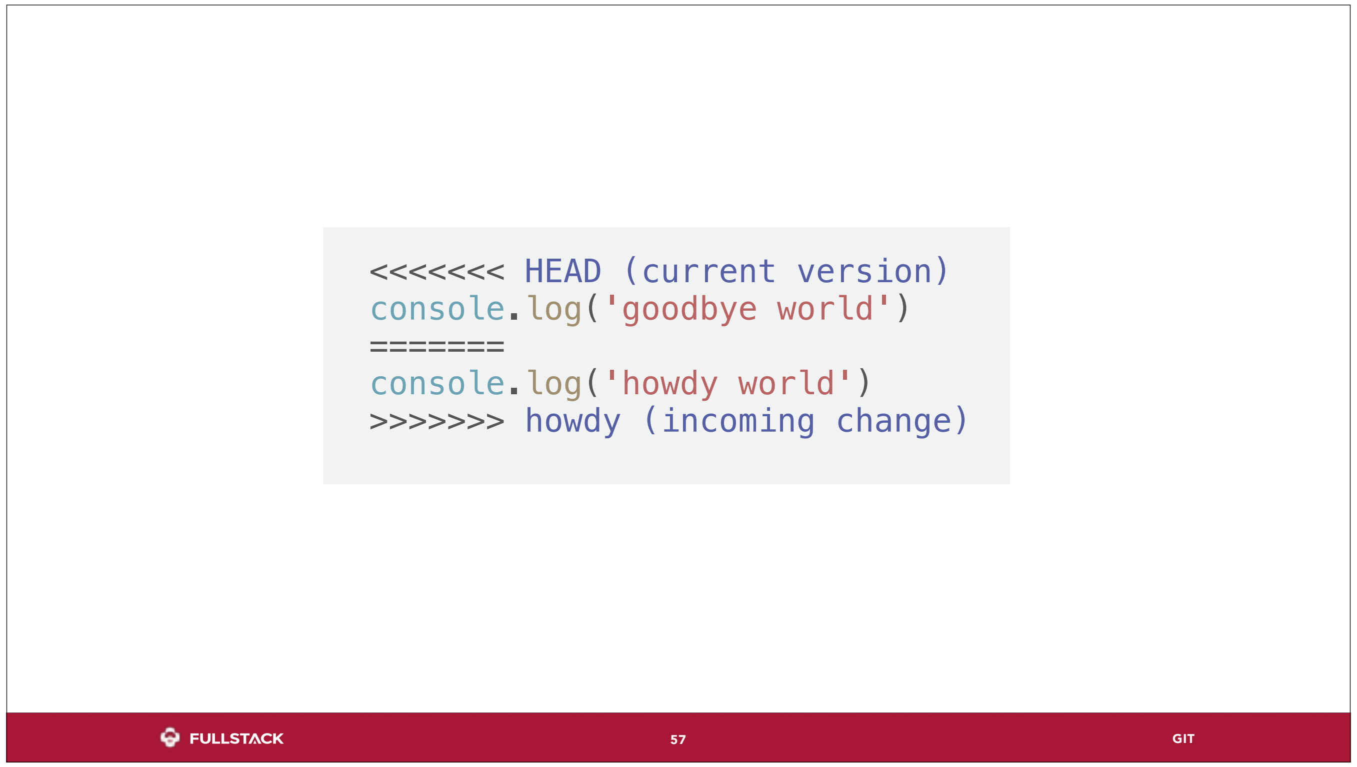
script.js - master

```
console.log('goodbye world')
```

script.js - f/goodbye

```
console.log('goodbye world')
```

Now let's say we want to merge in our howdy branch



```
<<<<<<< HEAD (current version)
console.log('goodbye world')
=======
console.log('howdy world')
>>>>>>> howdy (incoming change)
```

Our job now is to decide which one we want, and then commit