# GIT AND GITHUB

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## What we will cover

- What is version control and why should we care?
- Basics of git: the essential commands
- GitHub (or, a little git between friends)

## Setup: Setting the default text editor

By default git is set up to use Vim as the text editor.

( **esc** + **:q** or **:q!** to get out of Vim)

To set your default editor to VS Code:

```
$ git config --global core.editor "code -w"
```

Or follow these instructions to change your default text editor to something else.

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## What is version control?

Version control is a tool that allows you to...

### Collaborate

Create anything with other people, from academic papers to entire websites and applications.

### Track and revert changes

Mistakes happen. Wouldn't it be nice if you could see the changes that have been made and go back in time to fix something that went wrong?

## You already manage versions of your work!

Do you have files somewhere that look like this?

```
Resume-September2017.docx
Resume-for-Duke-job.docx
ResumeOLD.docx
ResumeNEW.docx
ResumeREALLYREALLYNEW.docx
```

**You invented your own version control!**

## Brief history of Version Control

1990s — CVS (Concurrent Version Systems)

2000s — SVN (Apache Subversion)

2005 — Git

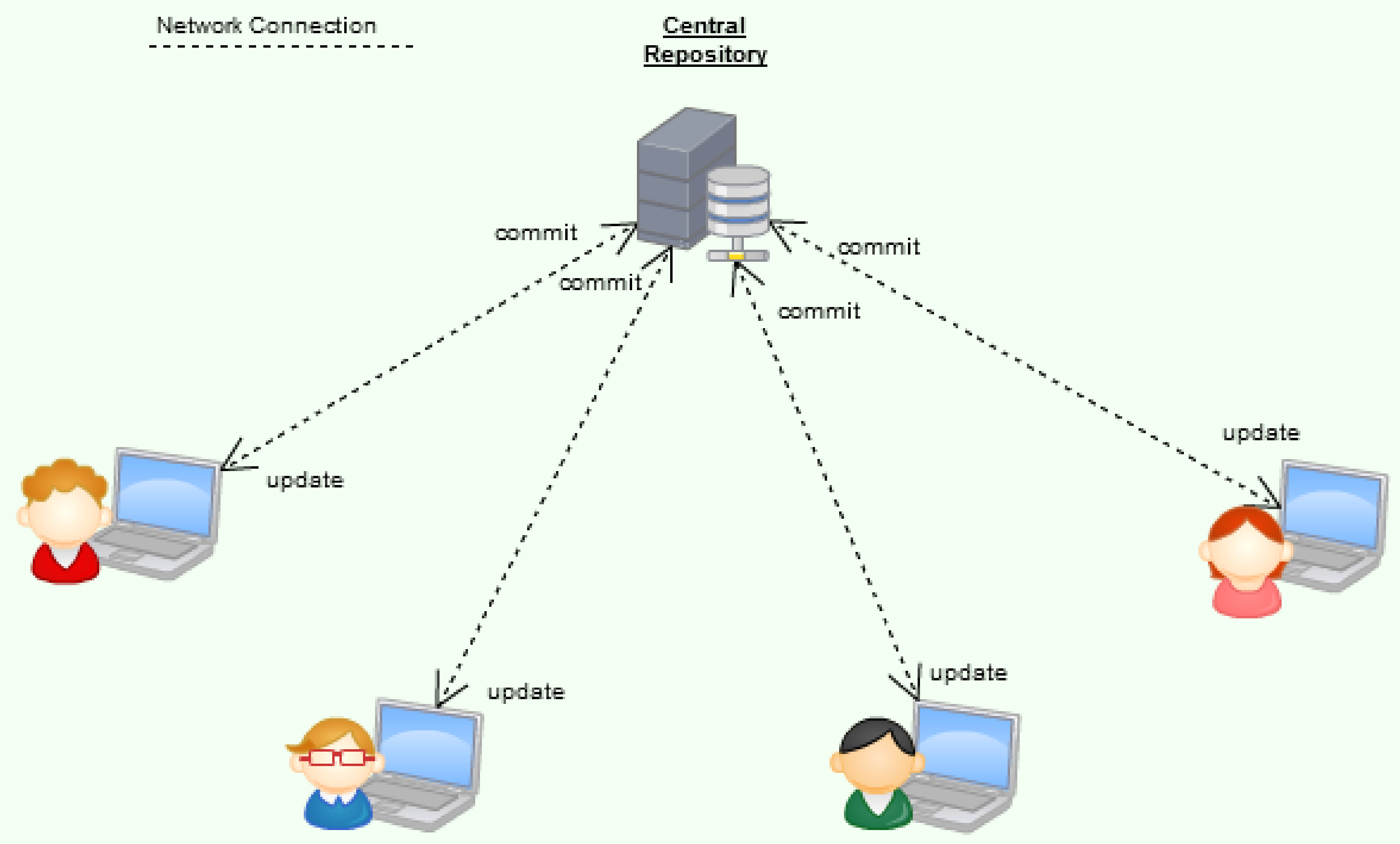
# Chapter 1: Git is Born

The first commit, April 2005

```
commit e83c5163316f89bfbde7d9ab23ca2e25604af29
Author: Linus Torvalds <torvalds@ppc970.osdl.org>
Date: Thu Apr 7 15:13:13 2005 -0700
Initial revision of "git", the information manager from hell
```

## Types of Version Control Systems

# Centralized Version Control



One central server, each client (person) checks out and merges changes to main server

Examples: CVS, Subversion (SVN)

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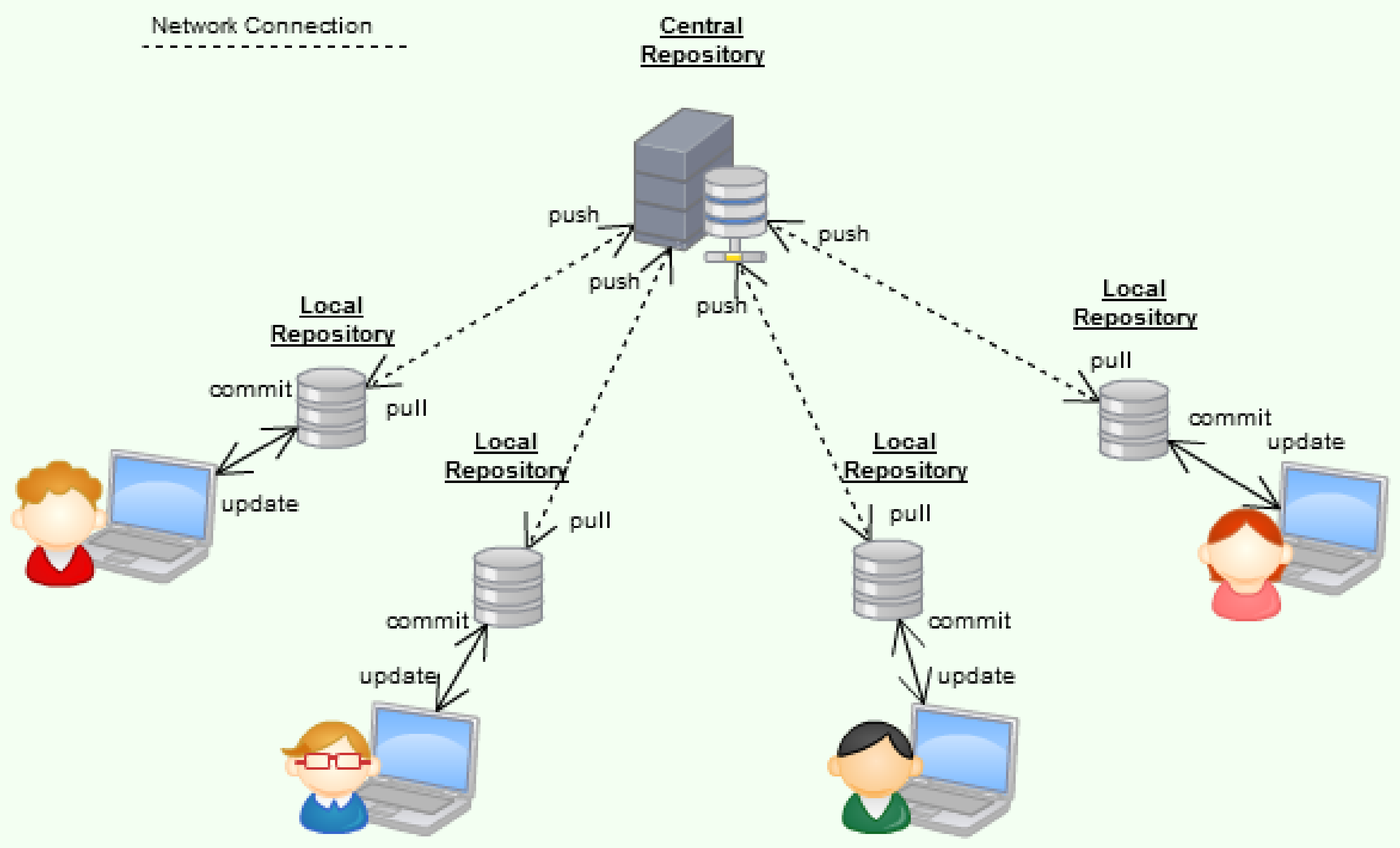
# Distributed Version Control



Each client (person) has a local repository, which they can then reconcile with the main server.

Examples: Git, Mercurial

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## Why Use Git?

- Fast! Access information quickly and efficiently.
- Distributed! Everyone has her own local copy.
- Scalable! Enables potentially thousands (millions!) of developers to work on single project.
- Local! You don't need a network connection to use it. You only need a remote server if you want to share your code with others (e.g., using GitHub).
- Branches! Keep your coding experiments separate from code that is already working.
- Everyone has a local copy of the shared files and the history.

## What should I use version control for?

Anything. But not everything.

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# Gitignore

You decide what goes into version control.You can, and should, leave some things out.

libraries, .dotfiles, api keys...

The .gitignore file at the root of your project directory

Check out gitignore.io for some suggestions.

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## Git has its own vocabulary

- A **repository** is where you keep all the files you want to track.
- A **branch** is the name for a separate line of development, with its own history.
- A **commit** is an object that holds information about a particular change.
- **HEAD** refers to the most recent commit on the current branch.

## Some Basic Git Commands

- `init`
- `add`
- `commit`
- `status`
- `log`
- `branch`
- `checkout`
- `fetch`
- `merge`
- `pull`
- `push`
- `clone`

## Create a Local Repository

1. Go to your home directory

```
$ cd
OR
$ cd Users/username
```

2. Create a new "working directory" and cd into it

```
$ mkdir my-repo
$ cd my-repo
```

3. Initialize it as a local Git repository

```
# make sure you are in the right directory!
$ pwd
$ git init
$ git status
```

## Add files

1. Create a new file in your new folder named **`kitten.txt`**

```
$ touch kitten.txt
```

2. Check the status of your repo with **`git status`**

```
$ git status
```

3. Tell Git to track our new file with **`git add`**

```
$ git add kitten.txt
$ git status
```

**Success!** The file you just added is now tracked by Git

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## Changes and commits

1. Open kitten.txt, add some text, and save it

```
$ git status
```

2. Stage the change and check the status

```
$ git add kitten.txt
$ git status
```

3. Commit the change with a message that explains and describes what you did

```
$ git commit -m "First commit. Added kitten.txt to repositor
```

## Whoa.

## What did we just do??

### How is all this different from just saving a file?

- When we **add** a new file, we tell Git to add the file to the repository to be tracked.
- This is also called **staging** a file. A snapshot of our changes is now in the **staging area** (aka the **index**, aka the **cache**), ready to be saved.
- A **commit** saves the **changes** made to a file, not the file as a whole. The commit will have a unique ID so we can track which changes were committed when and by whom.

## Look at your progress

```
$ git log
```

```
commit 6853adc0b6bc35f1a8ca0a6aa5e59c978148819b
Author: Your name <you@your-email.com>
Date:   Tues May 23 16:01:22 2017 -0700

    First commit. Added kitten.txt to repository.
```

## Congratulations.
## You are now using Git.

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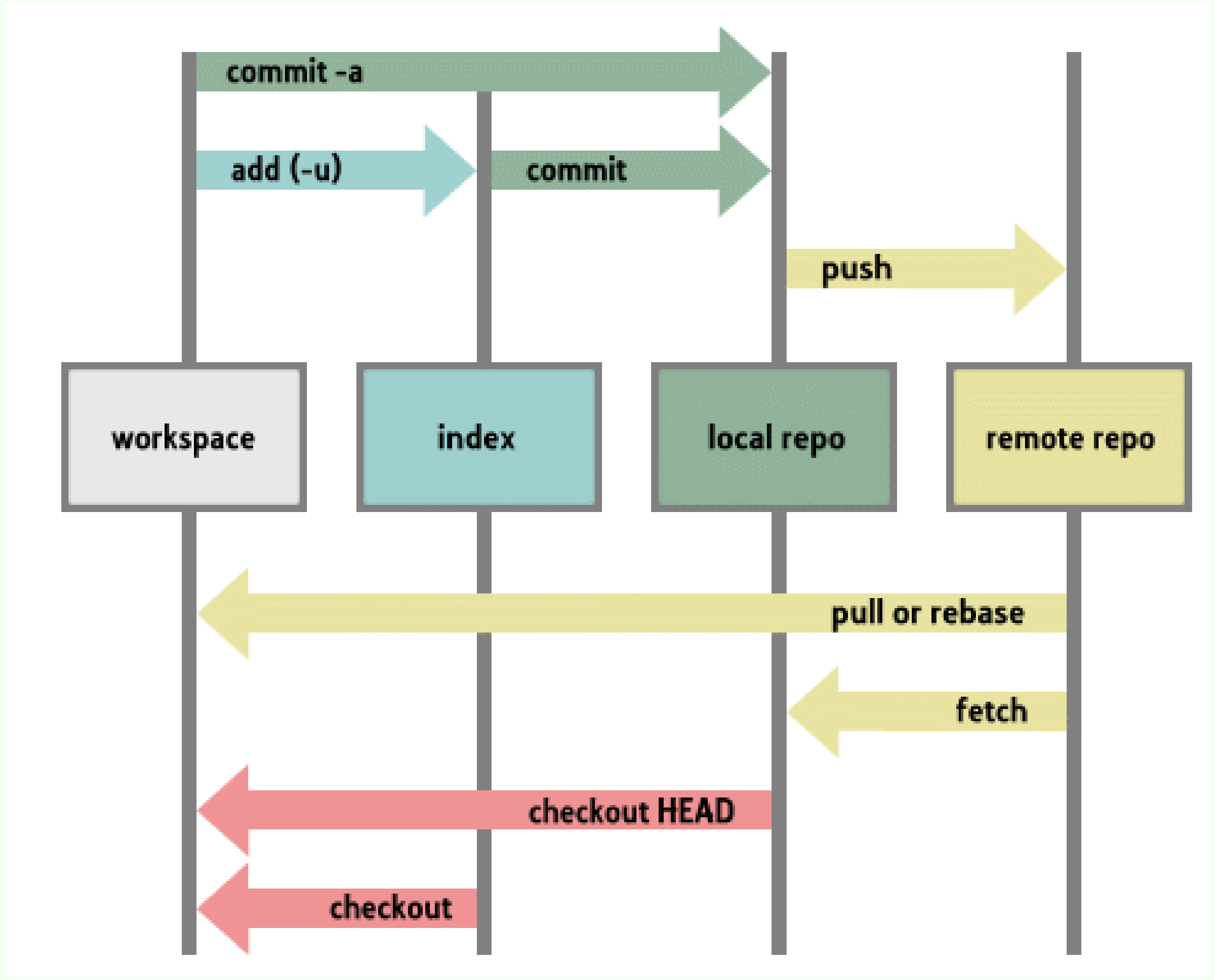
## Now try...

- Make changes to **kitten.txt** and make some more commits.
- Add another file (or image!) to your project and commit that.
- Change more than one file at a time, and practice making commits where you stage only one file, or both files together.
- Try the `git diff` command when you have unstaged changed.
- Look at your history with `git log` as you add more commits (and try adding the `--oneline` option)

**Don't forget to run `git status` regularly so that you can see what is happening at each stage!**

# The Magical Realms of Git



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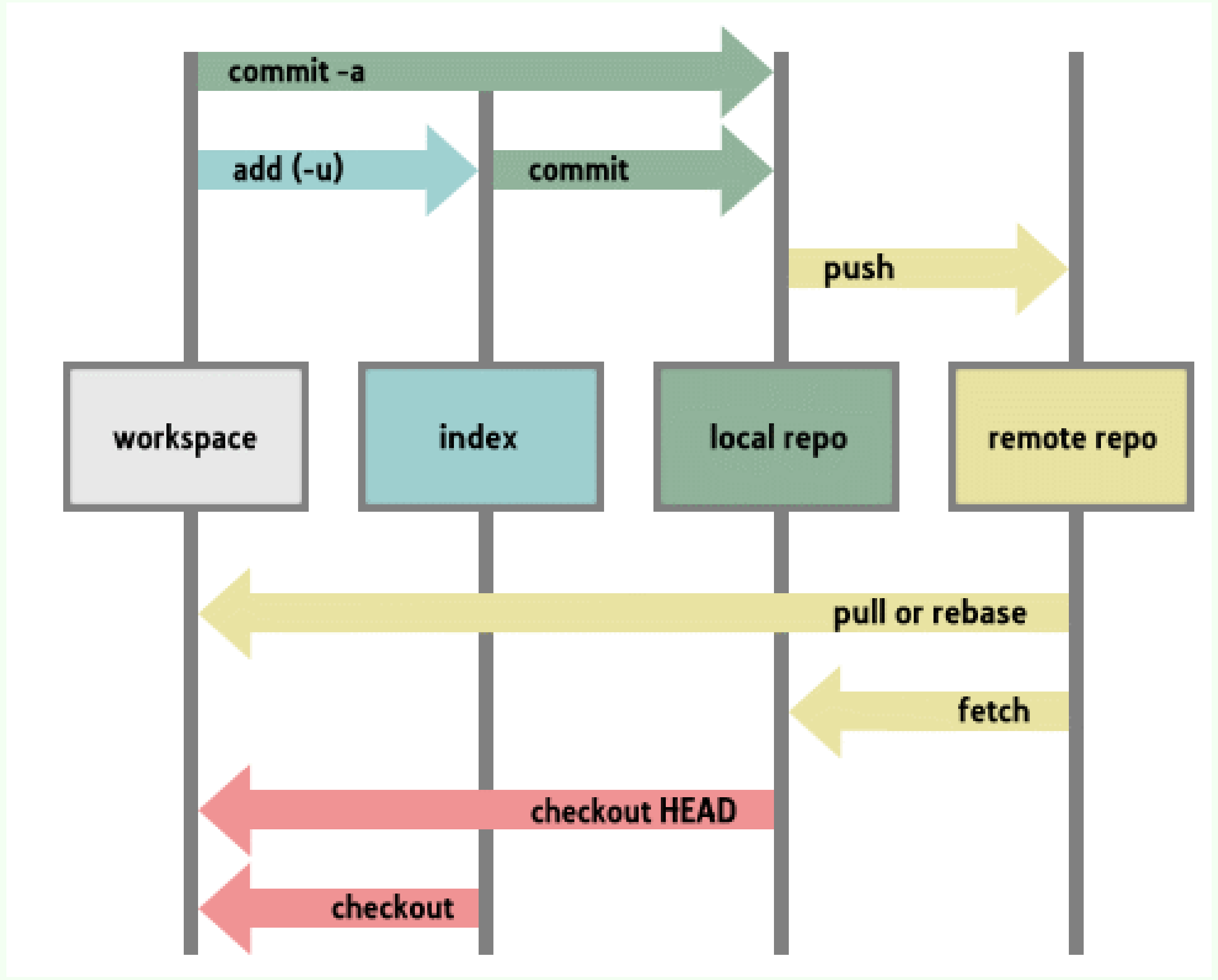
# The Workspace

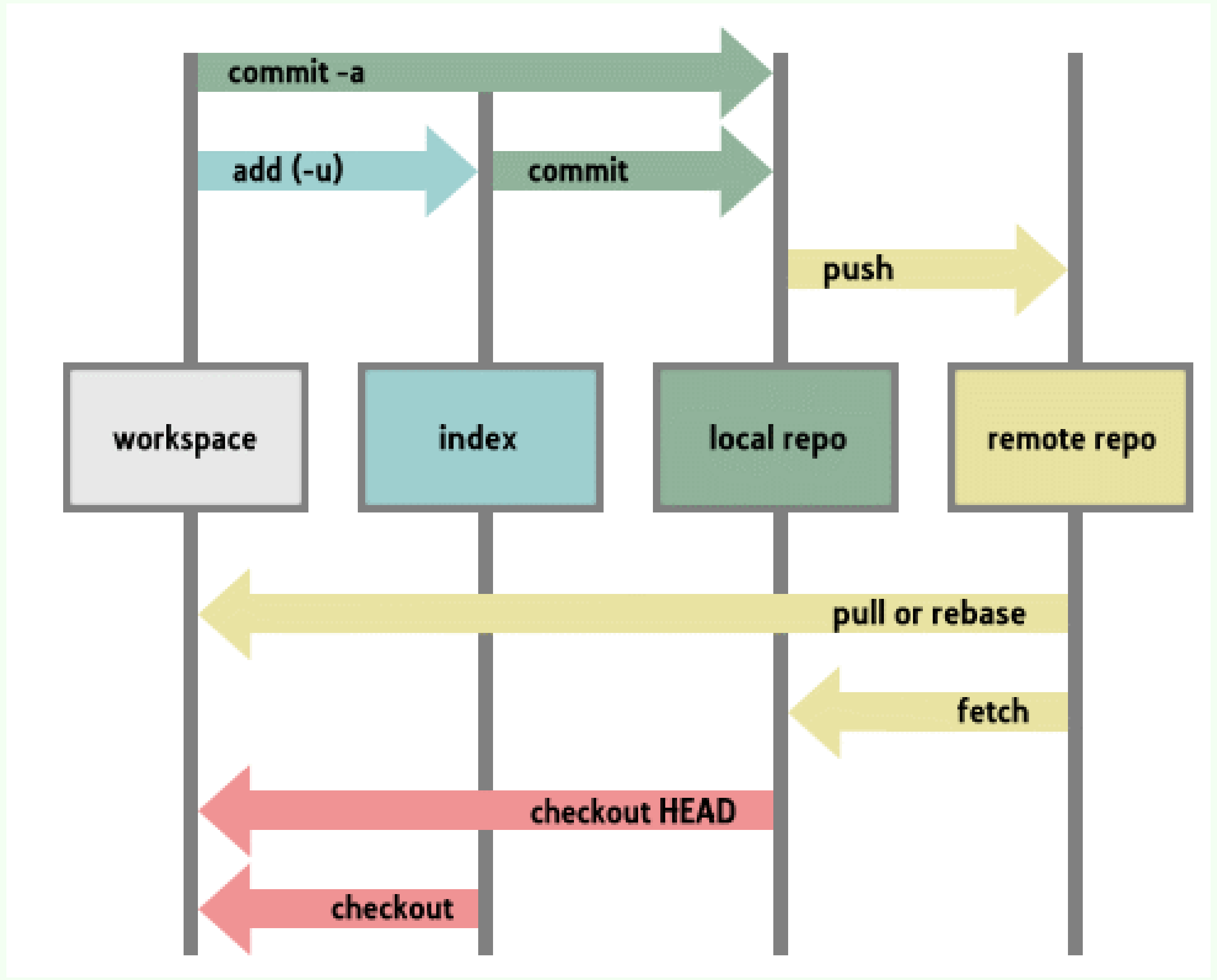
## Working Tree



What you see in your editor and where you make your changes

## The Staging Area

### Index / Cache



A snapshot of your working tree at a particular point in development

lets you gather changes for the next commit

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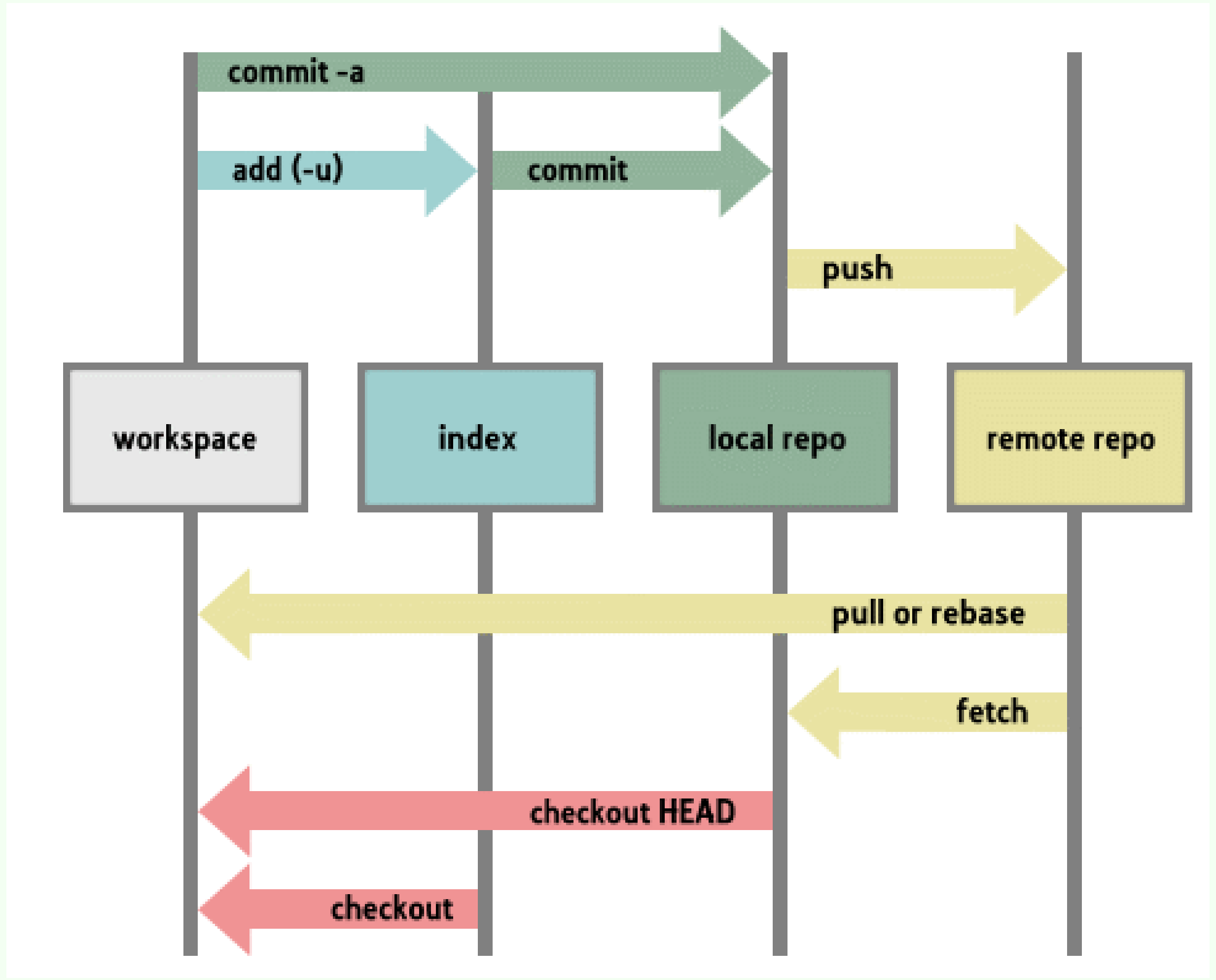
# Your Local Repo



Your copy of a project, initialized as a git repository

(i.e., it has a **.git** directory)

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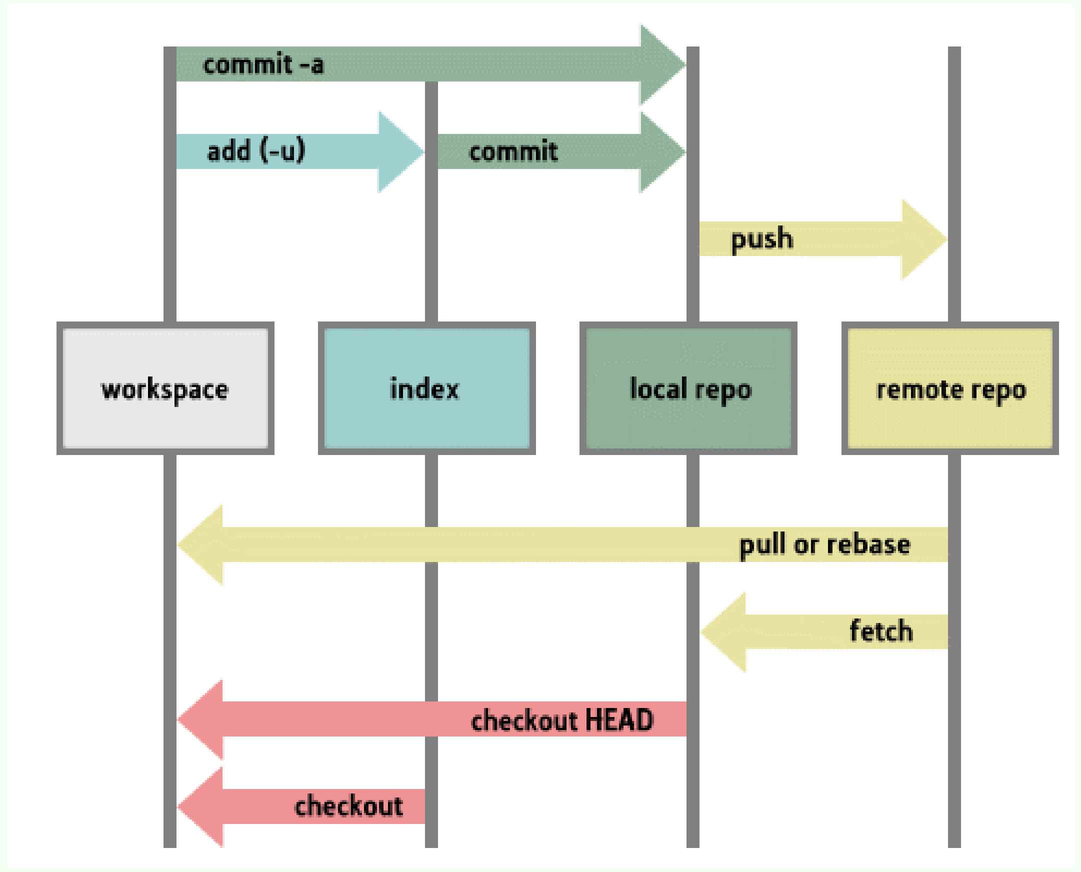
# The Remote Repo

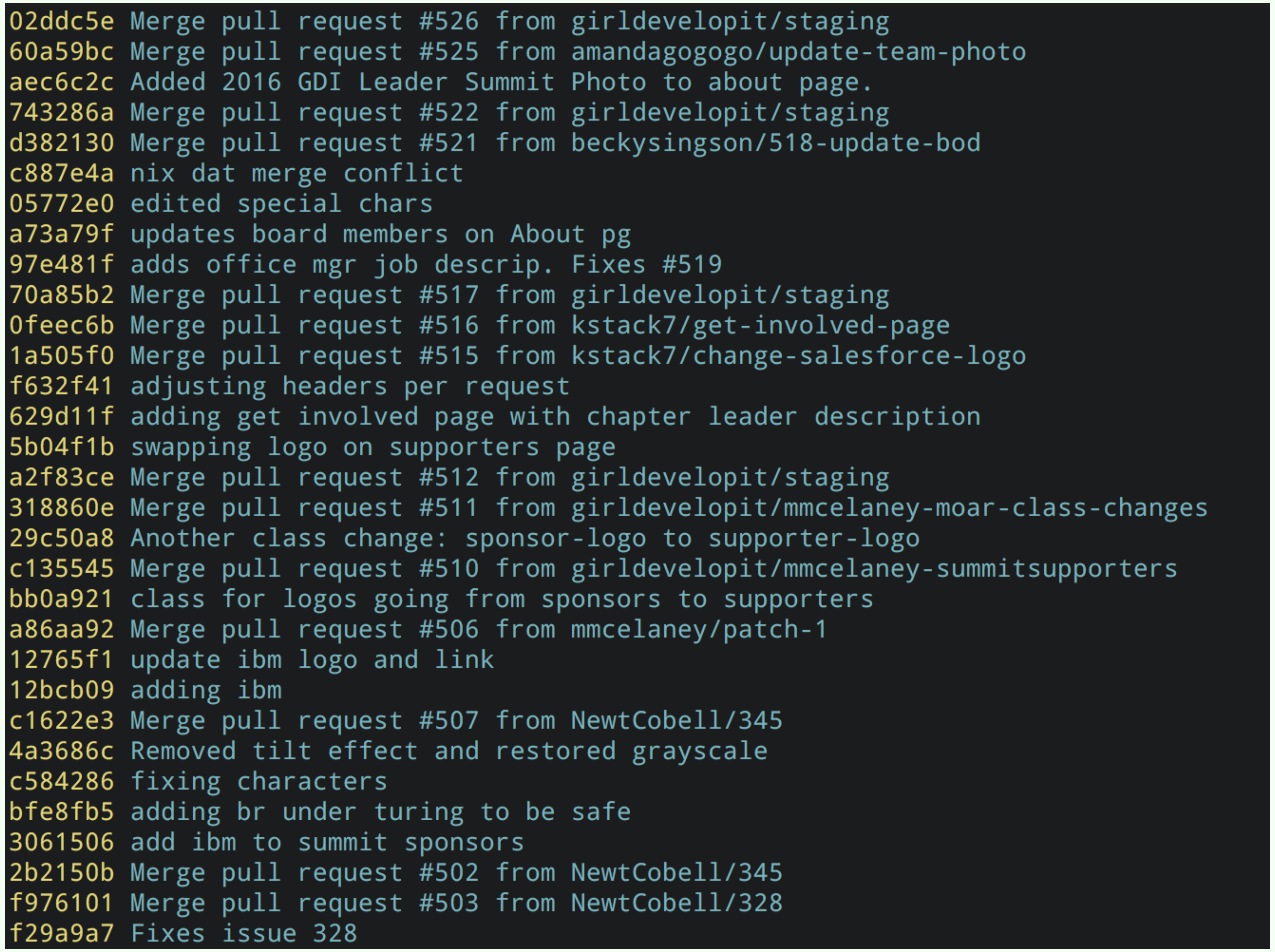


The shared copy of the repo that lives on a remote server

Very often this is GitHub, but it doesn't have to be.

Conventionally named **origin** but doesn't have to be.

# It's all about the history



```
02ddc5e Merge pull request #526 from girldevelopit/staging
60a59bc Merge pull request #525 from amandagogogo/update-team-photo
aec6c2c Added 2016 GDI Leader Summit Photo to about page.
743286a Merge pull request #522 from girldevelopit/staging
d382130 Merge pull request #521 from beckysingson/518-update-bod
c887e4a nix dat merge conflict
05772e0 edited special chars
a73a79f updates board members on About pg
97e481f adds office mgr job descrip. Fixes #519
70a85b2 Merge pull request #517 from girldevelopit/staging
0feec6b Merge pull request #516 from kstack7/get-involved-page
1a505f0 Merge pull request #515 from kstack7/change-salesforce-logo
f632f41 adjusting headers per request
629d11f adding get involved page with chapter leader description
5b04f1b swapping logo on supporters page
a2f83ce Merge pull request #512 from girldevelopit/staging
318860e Merge pull request #511 from girldevelopit/mmcelaney-moar-class-changes
29c50a8 Another class change: sponsor-logo to supporter-logo
c135545 Merge pull request #510 from girldevelopit/mmcelaney-summitsupporters
bb0a921 class for logos going from sponsors to supporters
a86aa92 Merge pull request #506 from mmcelaney/patch-1
12765f1 update ibm logo and link
12bcb09 adding ibm
c1622e3 Merge pull request #507 from NewtCobell/345
4a3686c Removed tilt effect and restored grayscale
c584286 fixing characters
bfe8fb5 adding br under turing to be safe
3061506 add ibm to summit sponsors
2b2150b Merge pull request #502 from NewtCobell/345
f976101 Merge pull request #503 from NewtCobell/328
f29a9a7 Fixes issue 328
```

## We all make mistakes

Don't worry. Git is your friend.

## Undoing changes in your working copy

### If you haven't added/committed yet

Open **`kitten.txt`** and make some changes or add something new. Then:

```
$ git checkout kitten.txt
```

Look at **`kitten.txt`** in your editor: your changes are gone (you've gone back to the previous commit state).

## Un-staging a file

1. In your text editor, create a new file, and name it possum.txt
2. Switch back to your terminal.

```
$ git add possum.txt
$ git status
$ git reset possum.txt
$ git status
```

The file is removed from staging, but your working copy will be unchanged.

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## Undoing changes you've already staged

Open `kitten.txt` in your editor and add some new text.

```
$ git add kitten.txt
$ git reset HEAD kitten.txt
$ git status # the file has been unstaged.
$ git checkout kitten.txt
# resets the working copy to its state at the last commit
```

Now look at the same file in your editor again: your changes are gone, and the file is removed from staging.

## Er, what if I already committed it?

### Undoing committed changes

Git lets you go back to any previous commit.

Open `kitten.txt` and add some new text

```
$ git add kitten.txt
$ git status
$ git commit -m "Make a change I will soon regret making"
$ git log --oneline
  # you should see (at least) two commits here at this point
  # copy the short form of the hash id
```

## Git Revert

### Undoing committed changes

```
$ git revert 53d23c4
  # Your default editor will open here
  # you can just save it and close it as is.
$ git log --oneline
```

Notice that the original, regrettable commit is still there, but now you also have **another commit that undoes the changes** introduced by the original one.

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## Branching

A branch is essentially another copy of your repo that will allow you to isolate changes and leave the original copy untouched. You can later choose to combine these changes in whole or part with the "master" copy, or not.

## Branching

- Develop different code on the **same base**
- Conduct **experimental work** without affecting the work on master branch
- Incorporate changes to your master branch **only if and when you are ready**…or discard them easily

**Branches are cheap!**

## Branching

Create a new branch called feature

```
$ git checkout -b feature
```

Add new lines to `kitten.txt`

```
$ git add kitten.txt
$ git commit -m "Adding changes to feature"
$ git log --oneline
```

# Branching

## Switching branches

See your local branches. Your active branch, the one you're "on," is marked with an *

```
$ git branch
```

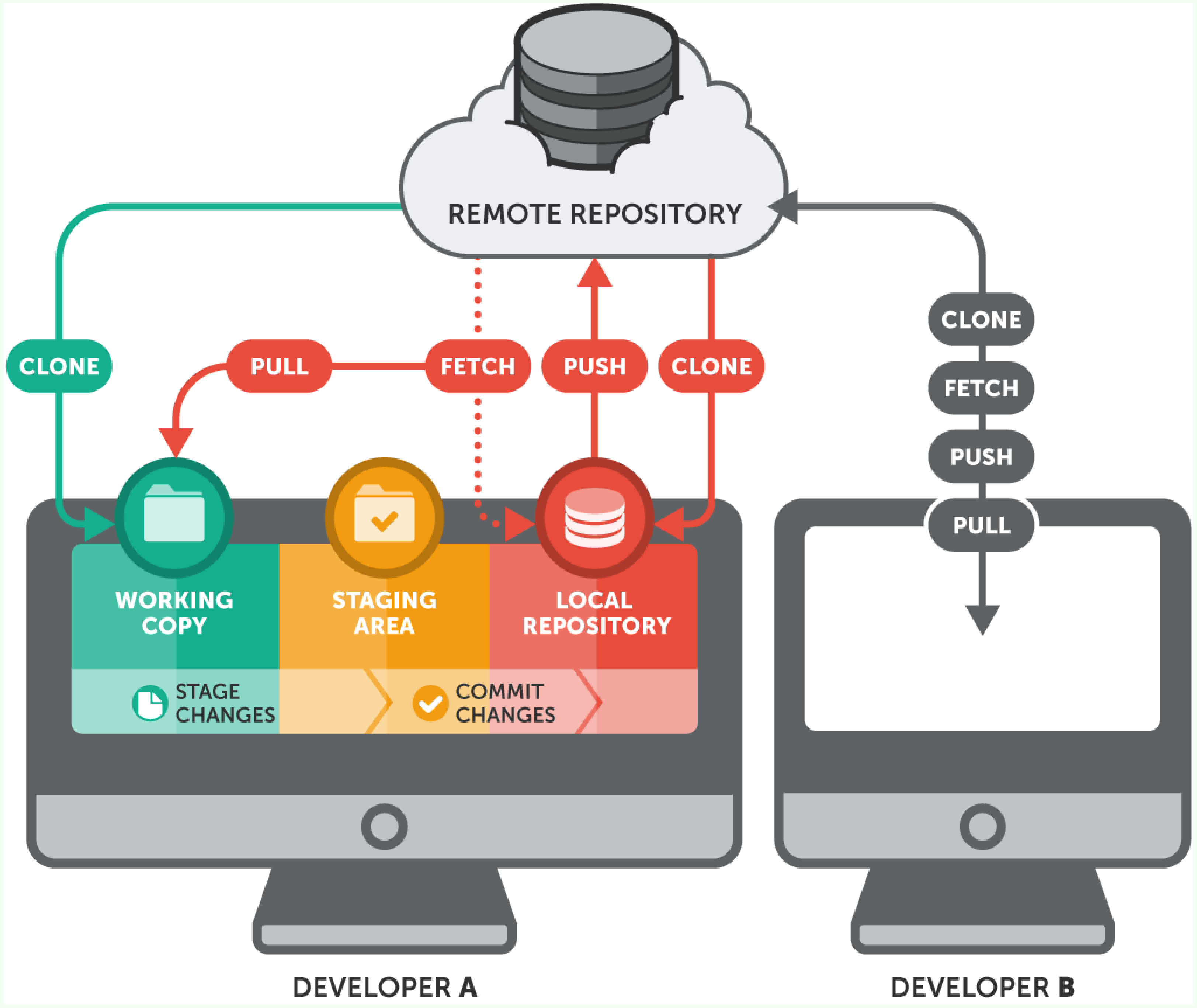
Switch to master branch and look at the commit history

```
$ git checkout master
$ git log --oneline
```

Switch to feature branch and look at the commit history

```
$ git checkout feature
$ git log --oneline
```

# The big picture



## Share Your Code on GitHub

## Git + Friends = GitHub

GitHub has over **24 million users**,
and over **67 million repositories**

Since September 2016, there have been more than **1 billion public commits**.

source

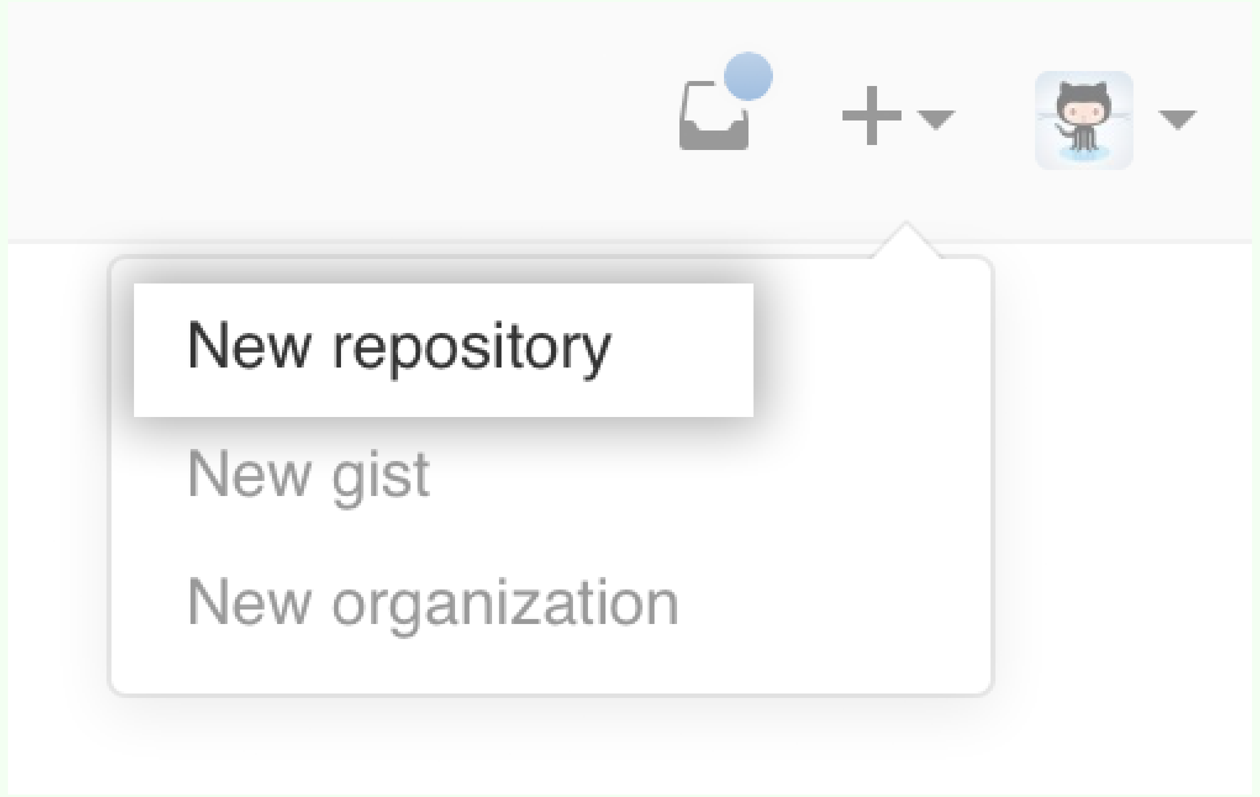
## What is GitHub for?

- GitHub allows users to host Git repositories publicly and privately
- Open source projects host or mirror their repositories on GitHub
- Push your own code up for others to use or contribute to
- Read, copy, and learn from the code in other people's repositories
- Contribute to open source projects

# GitHub

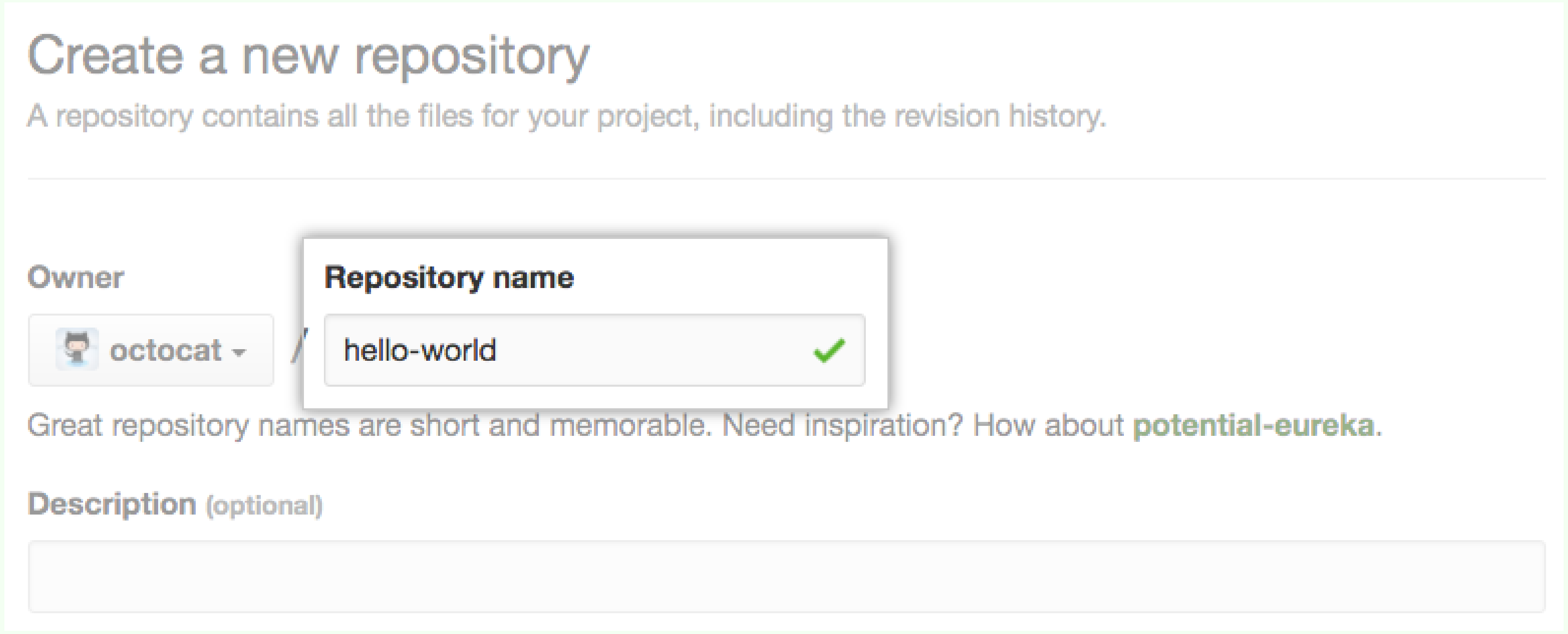
## Create your first remote repository

You will need to be logged into your GitHub account to do this.



## GitHub

### Create your first repository



Create a new repository

A repository contains all the files for your project, including the revision history.

Owner: octocat / Repository name: hello-world ✓

Great repository names are short and memorable. Need inspiration? How about potential-eureka.

Description (optional)

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## GitHub

**Set up remote repo to sync with your local repo**

After you click the big green button to create your repo, follow GitHub's instructions for next steps.

```
$ git remote add origin https://github.com/YOUR-GITHUB-USERN
$ git push -u origin master
  # that -u is an option that signals that you are setting
  # a tracking reference to the remote branch as the default
  # you only need to use this flag the first time
```

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## Push code to the remote repo

```
$ git add .
$ git commit -m "Add login info to the README"
$ git push origin master
```

Now check out your GitHub repo online!

## What can I do with a GitHub Account?

FORK a repo: Find some code you want to use and grab a copy of it.

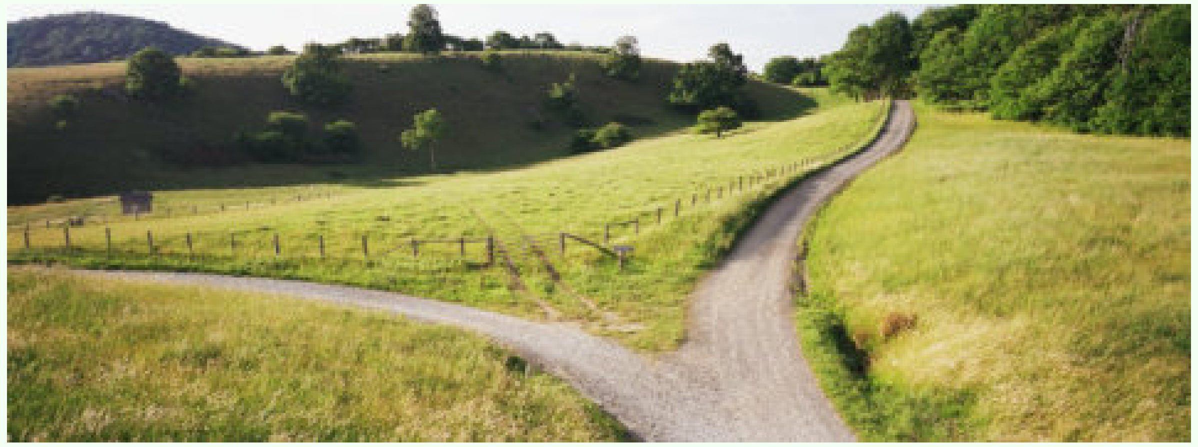
(Then you'll also need to CLONE the repo — that is, make your own local copy of it)

PUSH to a remote repo you own: post some code you want others to see.

submit a PULL REQUEST to the owner of a repo you'd like to contribute to.

## Forking

This



not this

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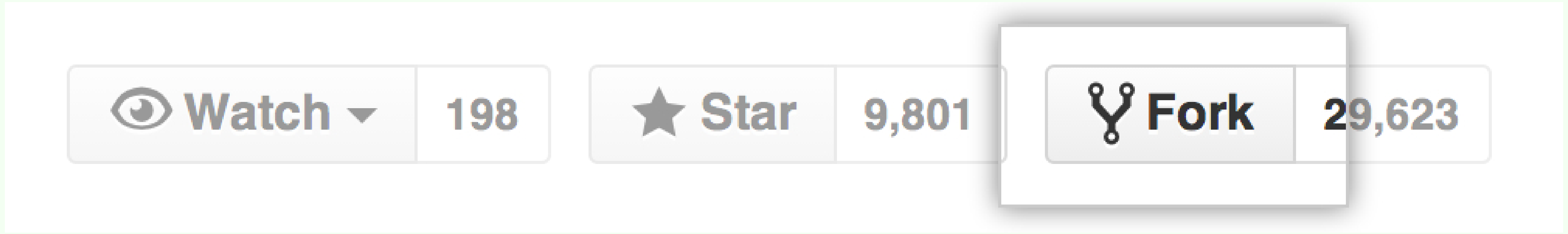
## Forking

If you want to use or contribute to a repository, you can fork it.

A fork is just a copy of a repository on GitHub.

Let's practice forking!



## Cloning

To get a local copy of the fork you just made, use the `git clone` command.

```
$ cd ../

$ git clone https://github.com/your-github-username/mini-repo

$ cd mini-repo
$ git remote -v
```

## Wait...what?

There are now **THREE** copies of this repo that you have access to.

the original (on Github) => **upstream**
your fork (on GitHub) => **origin**
your clone => **your local repo**

## Establishing a connection to an upstream repo

To sync your fork with the original repo, you need to add another remote named upstream

```
$ git remote -v
$ git remote add upstream https://github.com/momentum-cohort
$ git fetch upstream
```

`fetch` retrieves git references not present in your local repository, but does not modify your files (think of it like getting a table of contents rather than the contents themselves)

## Shared Repos

If team members are contributing to a single repo, each member of the team will want to make sure that she has everyone else's changes before pushing her own changes to the GitHub repo.

**Always pull before you push!**

## Pulling

Commit local changes first

```
$ git commit -m "My latest commit"
```

Get changes that have been pushed to the remote repo

```
$ git pull origin master
```

Git may prompt you to fix any conflicts, then commit

```
$ git commit -m "Fixing merging conflicts"
```

Now you are ready to push local changes to GitHub

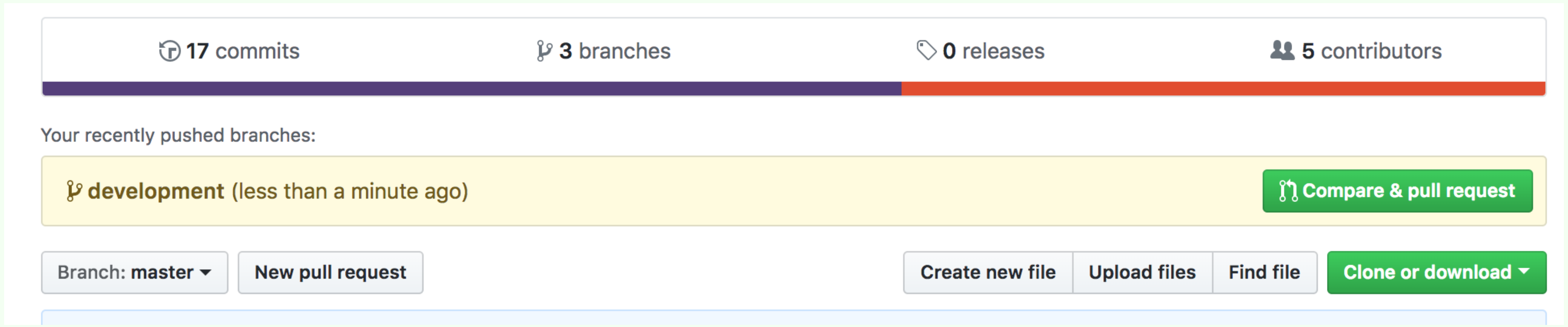
```
$ git push origin master
```

## Pull Requests

- After you fork and clone a repository all pushed changes will go to your fork.
- These changes will not affect the original [upstream] repository!
- If you would like your changes to be incorporated into the original repo, you can submit a pull request.
- A pull request is a GitHub feature that lets you ask the owner of the upstream repo to pull your changes in (since you don't have permission to push)

## Creating a pull request

You need to do this on GitHub, not from the command line.



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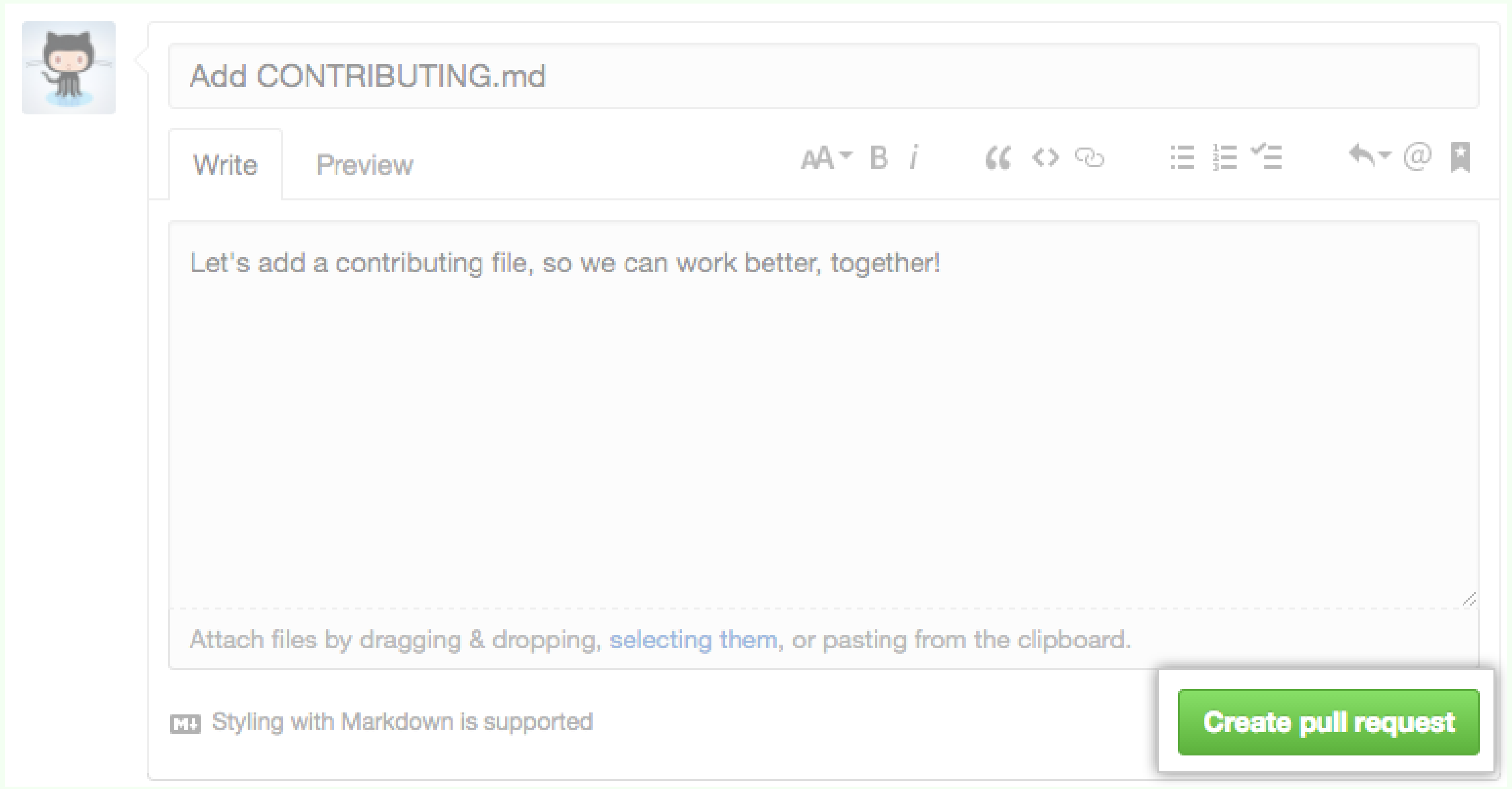
# Submitting a pull request



Add CONTRIBUTING.md

Let's add a contributing file, so we can work better, together!

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

# ASSIGNMENT WORKFLOW

1. Clone the repo

```
$ git clone https://github.com/amygori/tiny-repo.git
```

2. Create a development branch.

```
$ git checkout -b development
```

3. Do some work and make your commits.

```
$ git status
$ git add css/main.css
$ git commit -m "Center main image"
```

4. Push your branch to the remote repo.

```
$ git push origin development
```

5. When you're ready to submit, create a new pull request on GitHub, with notes

## Git Learning Resources

- Try Git from CodeSchool.com
- The Official Docs
- Git Cheatsheet: There are lots of cheatsheets out there, but this one is a visual illustration of git structure and commands.
- Git Immersion: a great in-depth tutorial with hands-on exercises.
- Pro Git: a very thorough reference. If Git can do it, you'll find it here.
- Atlassian's Git Tutorials: from the creator of (among other things) SourceTree, a free visual git tool for Mac & Windows.
- Git Workflows: an overview of different ways that teams can use git.

## Questions?