



# CS 106S Week 6

## Open Source & Web Software



Ben Yan, Spring 2025



# It's Week 6!

**Wellness check – how are you doing?**



**Spring**



Start of Spring

Add/Drop Deadline



Weather machine:  
OFF  

CS106B/  
107/109  
Midterm

Midterms over!  
unless Math,  
Chem, Bio,  
Psych, CS, ... :(



**Summer!**



# Agenda for Today

1

## What is this all about?

*What is open-source software and how is it relevant to web applications?*

2

## How do I do it?

*Tooling and technicalities. Your first pull request. Code review & merging.*

3

## How should I do it?

*Conventions and etiquette. Open source licensing. Licensing case studies.*

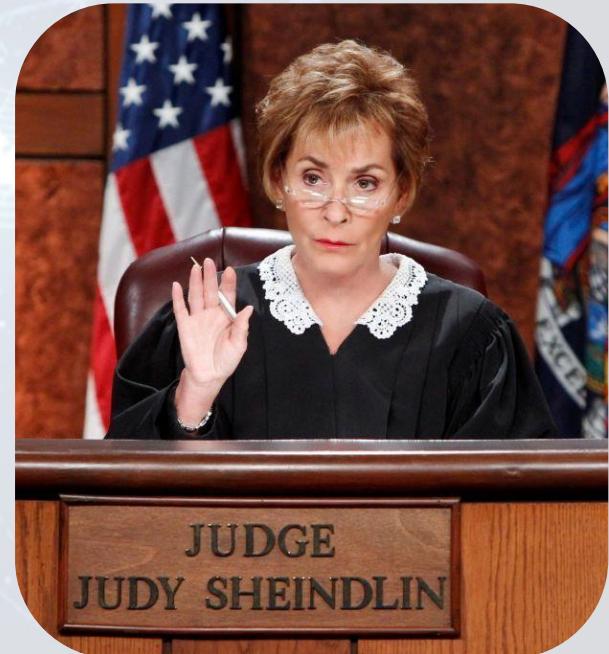




# **What is this all about?**

# What is Open Source Software?

"Open-source software (OSS) is computer software that is released under a license in which the copyright holder grants users the **rights to use, study, change, and distribute the software and its source code** to anyone and for any purpose. Open-source software may be developed in a collaborative public manner."



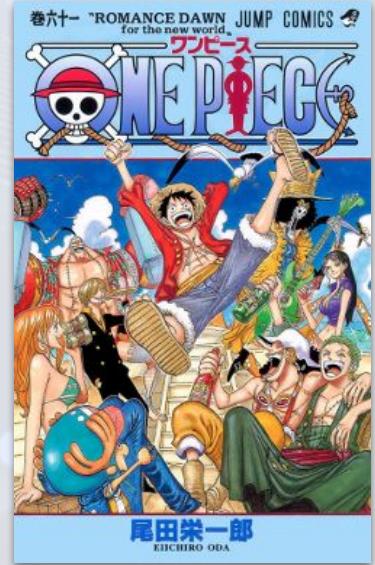
## Is this all just about copyright?

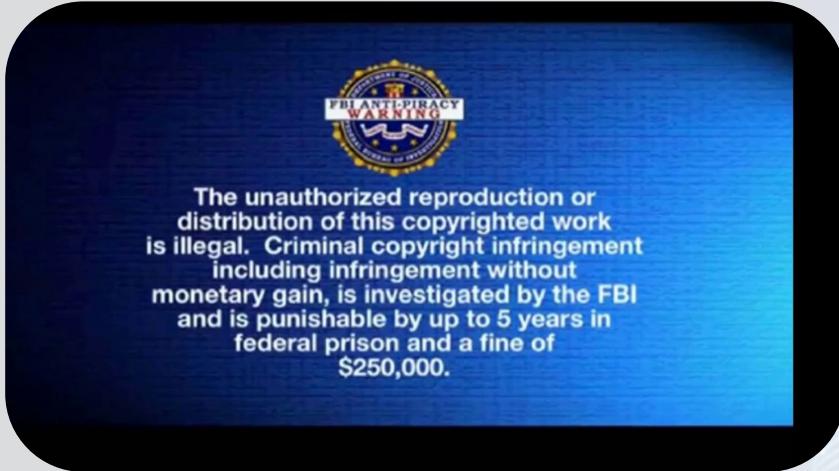
# Freedom to...

1. **run it**
2. **inspect it**
3. **change it**
4. **share it**

Usually that's piracy!

(Modified version of the FSF's "four freedoms.")





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TechCrunch+  
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Venture  
Security  
Crypto  
Apps  
Events  
Advertise  
More

Security

## UK police arrest teenager suspected of Uber, GTA 6 hacks

Carly Page @carlypage\_ / 7:28 AM PDT • September 26, 2022 Comment

A photograph of a white London Police van with "CITY OF LONDON POLICE" and a red and white checkered stripe on its side. The van is parked in front of a stone building with a doorway and a small lamp post.

ARTIFICIAL INTELLIGENCE / TECH / REPORT

## Meta's powerful AI language model has leaked online – what happens now?

A large blue infinity symbol centered on a dark blue background with glowing blue energy-like rays emanating from behind it.

/ Meta's LLaMA model was created to help researchers but leaked on 4chan a week after it was announced. Some worry the technology will be used for harm; others say greater access will improve AI safety.

By James Vincent, a senior reporter who has covered AI, robotics, and more for eight years at The Verge.

Mar 8, 2023, 8:15 AM PST

| 4 Comments (4 New)

If you buy something from a Verge link, Vox Media may earn a commission. [See our ethics statement.](#)

# A Brief History of Open-Source

- Software used to be included with hardware
- Expectation of “**knowledge sharing**” in academia (**sharing is caring**).
- First example: A-2 system by UNIVAC (1953)
  - Compiler-related tool (program linker) for converting subroutines → executable machine code.
- 1960s: **free software in decline**



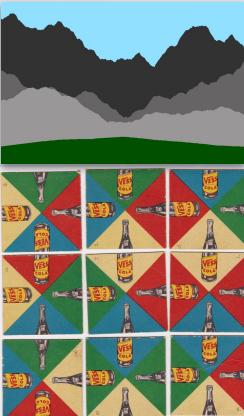
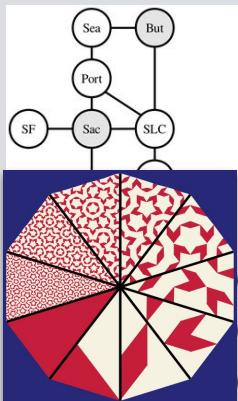
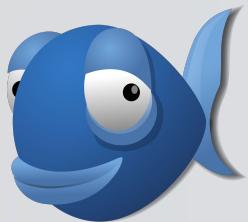
# A Briefer History of Open-Source

- “Illegal” sharing of **proprietary** software in the 80’s.
- **GNU Project** to write completely free operating system launches (1983)
  - **GNU’s Not Unix!**
- Linux initially released (1991)
- **“Open source”** becomes a term (1998)
- Git created for Linux (2005)

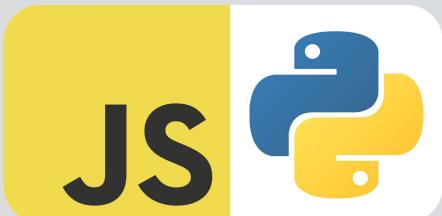


Latest messages	
Borislav Petkov	<a href="#">Re: [PATCH 1/5] x86/mce/inject: Check if a bank is...</a>
Christophe JAILLET	<a href="#">[PATCH] media: mtk-vpu: Remove redundant 'flush wo...</a>
Rob Herring	<a href="#">Re: [PATCH 1/2] Add ADV7610 support for adv7604 dr...</a>
Dmitry Torokhov	<a href="#">Re: [PATCH] input&amp;tty: Fix the keyboard led light ...</a>
Florian Weimer	<a href="#">Re: [RFC PATCH] LKMM: Add ctrl_dep() macro for con...</a>
Fox Chen	<a href="#">RE: [PATCH 5.10 00/22] 5.10.74-rc1 review</a>
"Darrick J. Wong"	<a href="#">Re: [PATCH v7 5/8] fsdax: Introduce dax_lock_mappi...</a>
Rob Herring	<a href="#">Re: [PATCH v2 2/3] dt-bindings: phy: phy-stm32-usb...</a>
Christophe JAILLET	<a href="#">[PATCH] media: mtk-vcodec: Remove redundant 'flush...</a>
Shuah Khan	<a href="#">[PATCH] module: fix elf_validity_check() warns see...</a>
"Gustavo A. R. Silva"	<a href="#">Re: [gustavoars:for-next/cast-function 1/3] kernel...</a>
Prasad Malisetty	<a href="#">Re: [PATCH v1] arm64: dts: qcom: sc7280: Add pcie ...</a>
Christophe JAILLET	<a href="#">[PATCH] mtip32xx: Remove redundant 'flush' workque...</a>
Mark Rutland	<a href="#">Re: [PATCH 6/7] arch: __get_wchan    STACKTRACE SU...</a>
Prasad Malisetty	<a href="#">[PATCH v2] arm64: dts: qcom: sc7280: Add pcie cloc...</a>

# Open Source Software Today



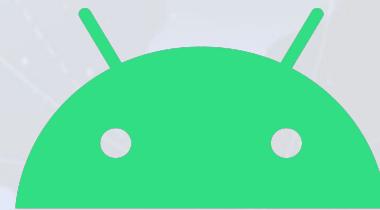
Most Stanford CS  
assignments ...



(\*Chromium, not  
Google Chrome)



WIKIPEDIA  
The Free Encyclopedia



android





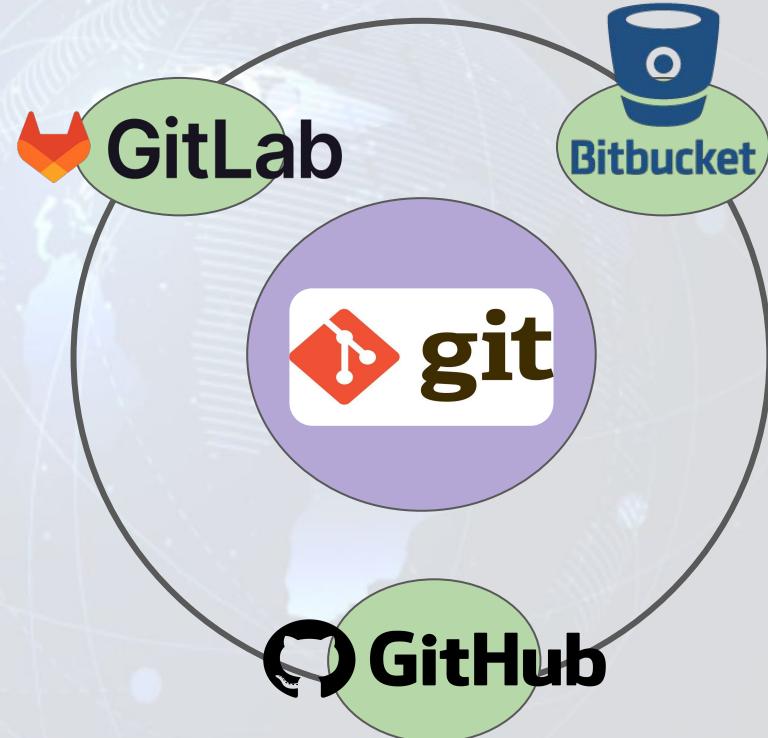
# **Why is open source *good*?**



# **How can I do it?**

# Git

- **Version control** software
  - **Tracking and handling changes** across users and time.
- Everyone\* uses it
- Created by Linus Torvalds to develop Linux.
- It's also open source
- **Streamlines collaboration** (but not quite like Google Docs)



# Git: Tracking Changes

Oct 7-10

commit 9c200dfde4dcaa39a6ab6b2a42effd15960a9560 (HEAD -> main, origin/main, origin/HEAD)

Author: R. Miles McCain <oci@sendmiles.email>

Date: Sun Oct 10 05:24:44 2021 +0000

Introduce typo

commit 0bde9be30c0609a67c4abb28240c8937961306e4

Author: R. Miles McCain <oci@sendmiles.email>

Date: Thu Oct 7 23:43:21 2021 +0000

Post new solutions

commit 6e022f9aca6b600c70602fe0ed8c9861a40a4473

Author: R. Miles McCain <oci@sendmiles.email>

Date: Thu Oct 7 04:45:16 2021 +0000

Respond to AMAs

→ cs106s git:(main) git commit -m "Test commit"

On branch main

Your branch is up to date with 'origin/main'.

nothing to commit, working tree clean

→ cs106s git:(main) git push

Everything up-to-date

→ cs106s git:(main) git pull

Already up to date.

→ cs106s git:(main) █

# Git Blame: Whodunit

Code    Blame    466 lines (450 loc) · 29.2 KB

Older    Newer

2 years ago     Add initial content

```
1  <!doctype html>
2  <html lang=en>
3  <head>
4      <title>CS106S: Coding for Social Good</title>
5      <meta charset=utf-8>
6      <meta http-equiv=x-ua-compatible content="IE=edge">
7      <meta name=viewport content="width=device-width,initial-scale=1">
8      <meta name=description
9
```

last year     Update for spring

```
10     content="CS 106S is a survey course on the applications of fundamental computer science concepts and tools to solving problems in computer science and other disciplines.">
11 <meta property="og:description"
```

2 years ago     Add initial content

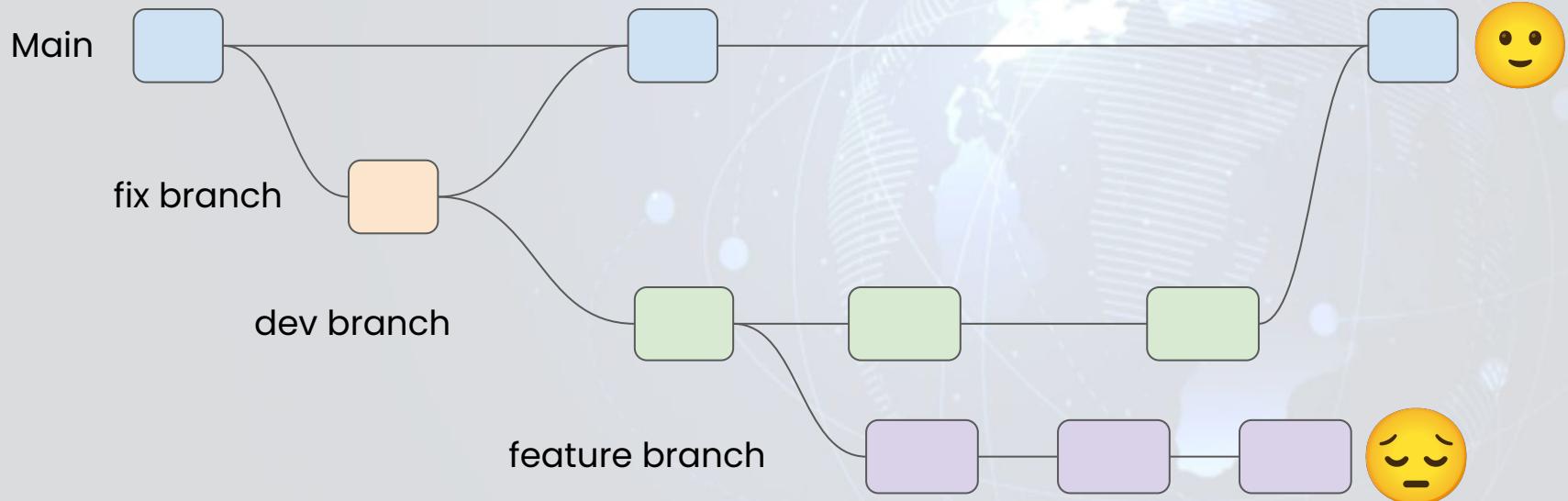
last year     Update for spring

```
12     content="CS 106S is a survey course on the applications of fundamental computer science concepts and tools to solving problems in computer science and other disciplines.">
13 <meta property="og:site_name" content="CS106S">
14 <meta property="og:type" content="website">
```

Raw    

 Contributors 7

# Git Version Control



# Git Version Control

Main



# Git Version Control

Main

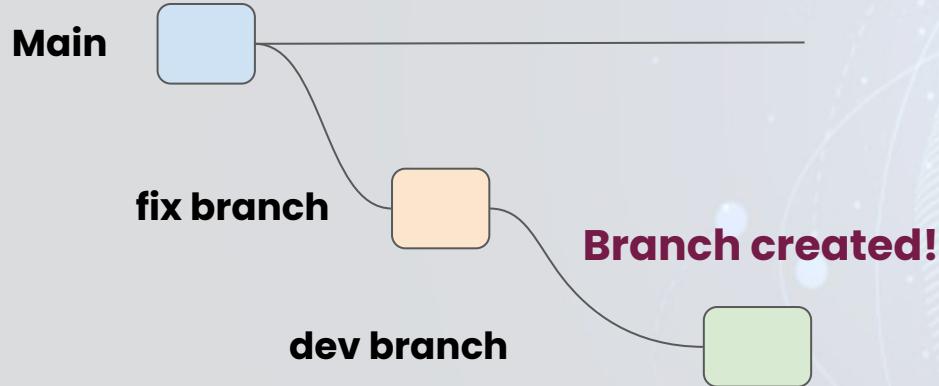


**Branch created!**

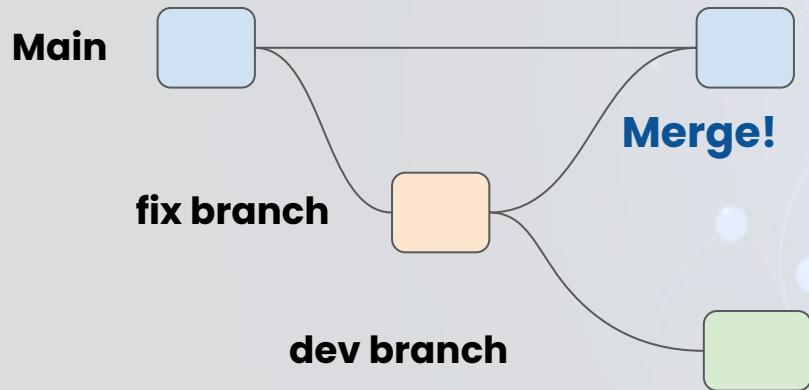
fix branch



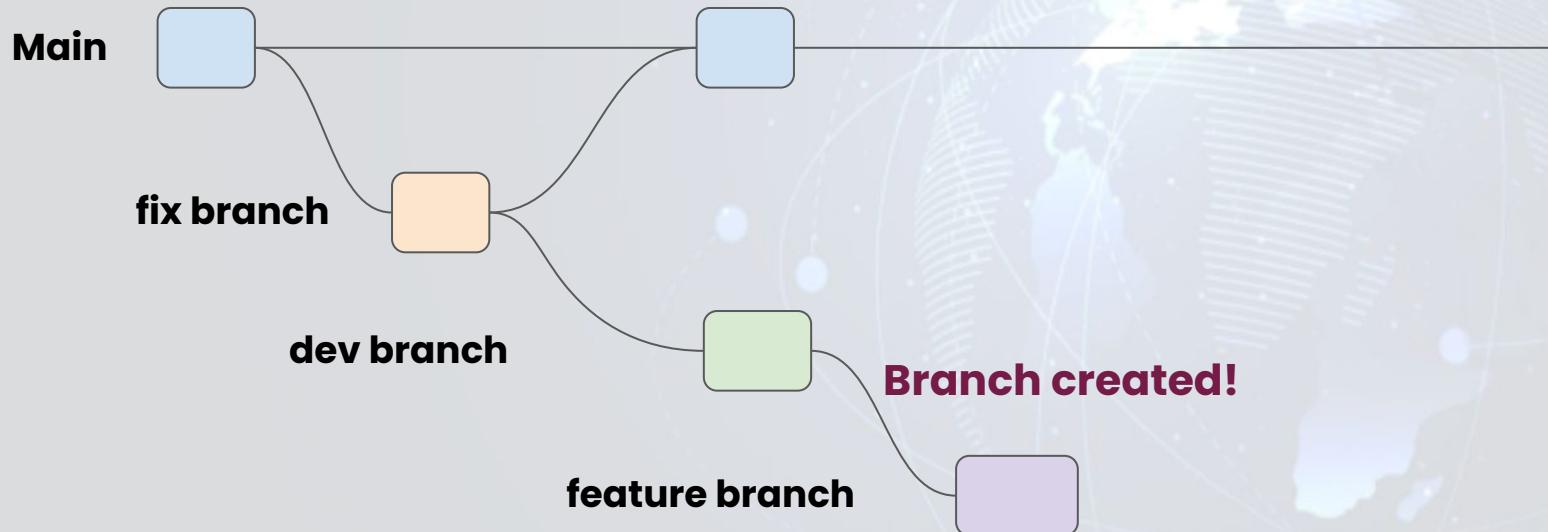
# Git Version Control



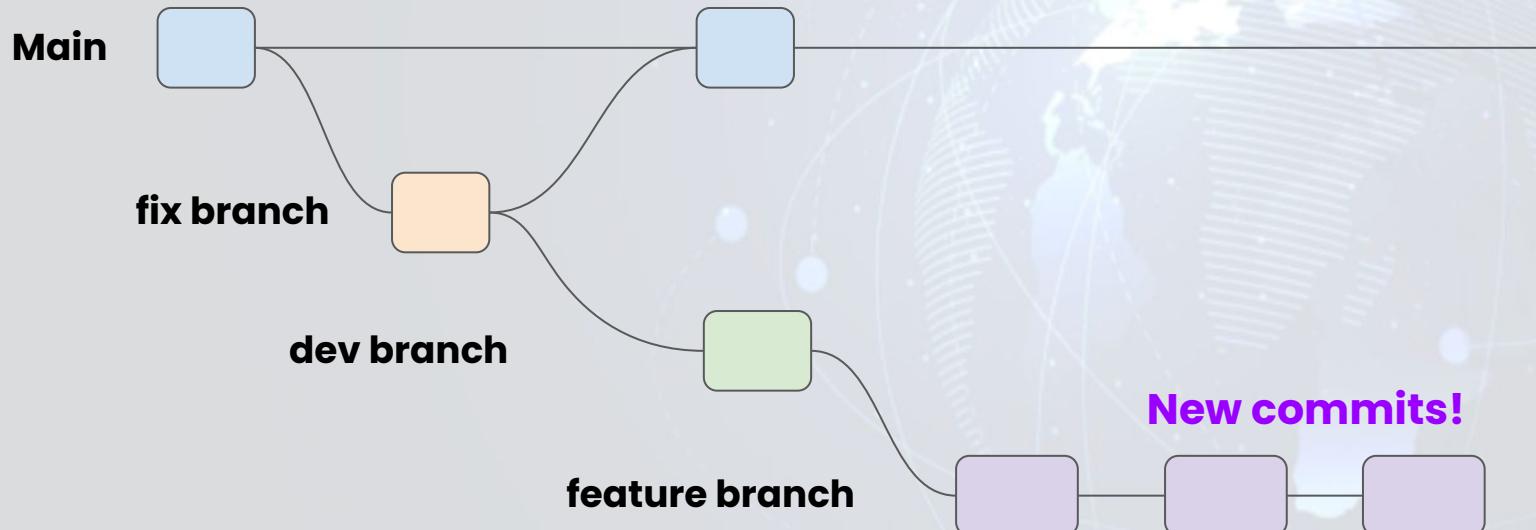
# Git Version Control



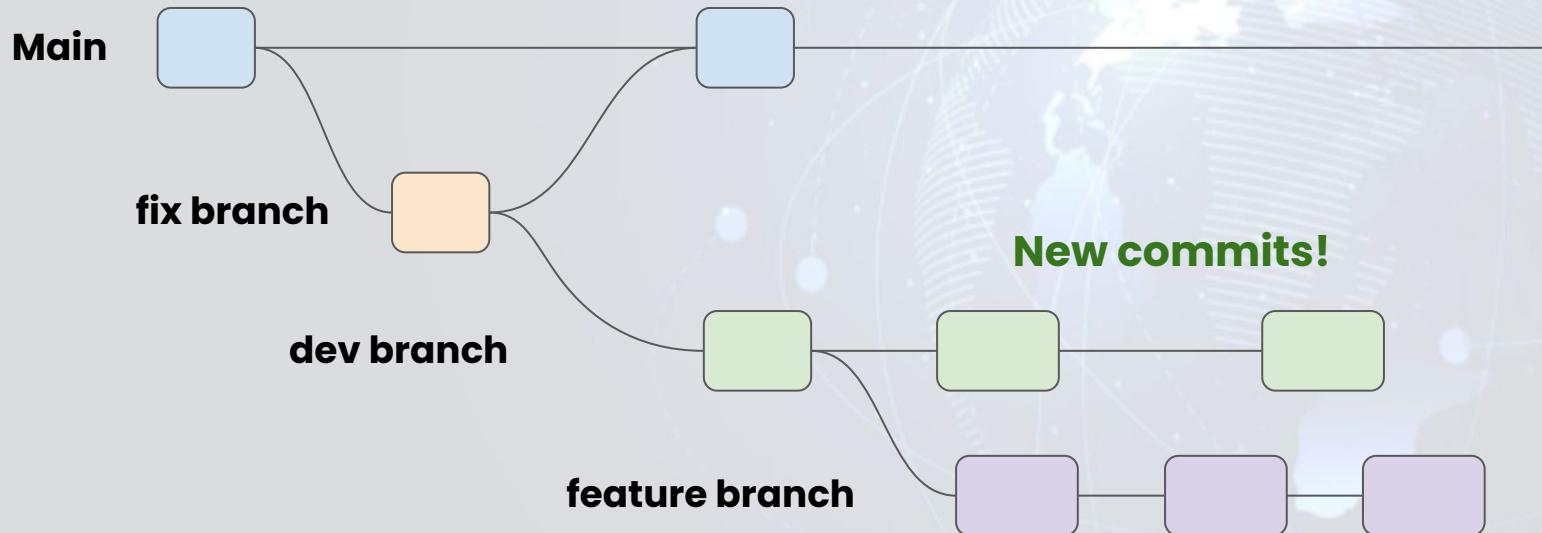
# Git Version Control



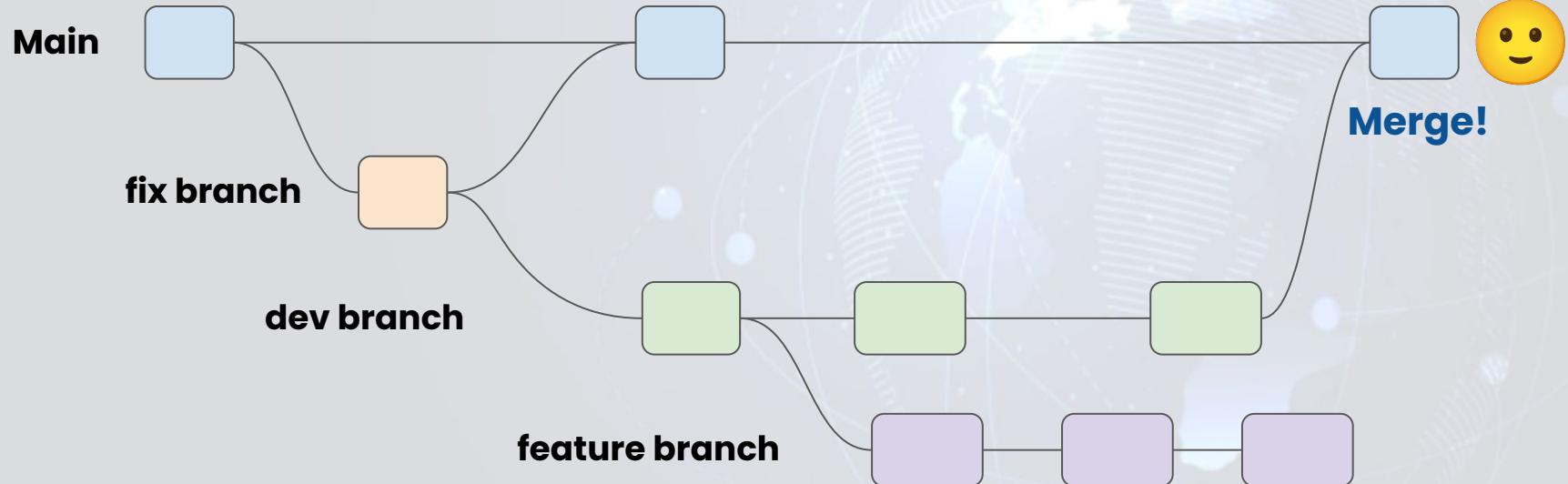
# Git Version Control



# Git Version Control

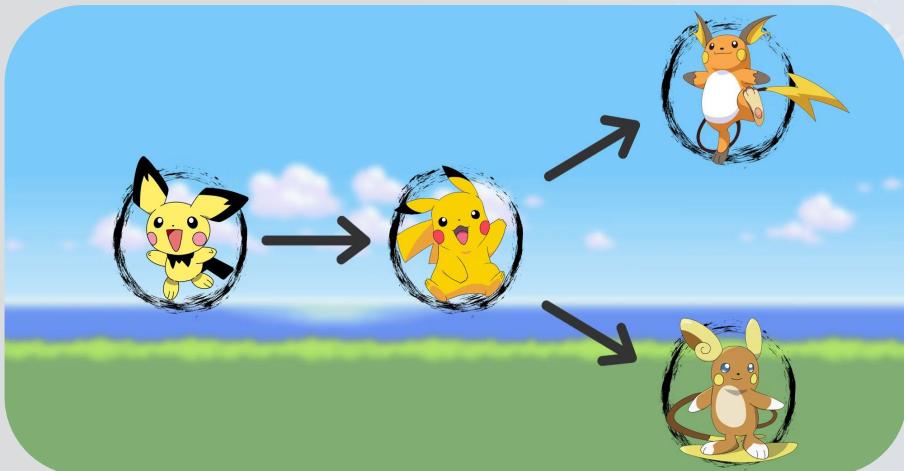


# Git Version Control



# Version Control Metaphors

## Branches + Commits



# Version Control Metaphors

Merge (Fusion) Request!



This doesn't actually exist but ...

# GitHub

- Website that hosts Git repositories
  - Public or private folders (with hidden **Git** files).
- Has additional features like *pull requests* and *issues*
- Not open source itself lol :(



 Search or jump to...  Pull requests Issues Marketplace Explore

 + 

 [facebook / react](#) Public

Watch 6.7k Star 176k Fork 35.5k

Code Issues 631 Pull requests 220 Actions Projects Wiki Security Insights

main ▾ 112 branches 138 tags Go to file Add file ▾ Code ▾

jstejada [DevTools] Update Fiber logic in backend render... afcb9cd yesterday 14,557 commits

.circleci	Scrape warning messages in CI (#22393)	18 days ago
.codesandbox	Update Node.js to latest v14.17.6 LTS (#22401)	16 days ago
.github	Update PULL_REQUEST_TEMPLATE.md	last month
fixtures	[Fizz/Flight] pipeToNodeWritable(..., writable).startWritin...	4 days ago
packages	[DevTools] Update Fiber logic in backend renderer to m...	yesterday
scripts	[Fizz/Flight] pipeToNodeWritable(..., writable).startWritin...	4 days ago
.editorconfig	https link to editorconfig.org (#18421)	2 years ago
.eslintignore	Delete all but one build2 reference (#22391)	18 days ago

About

A declarative, efficient, and flexible JavaScript library for building user interfaces.

 [reactjs.org](#)

react javascript library ui frontend declarative

Readme MIT License

Releases 96

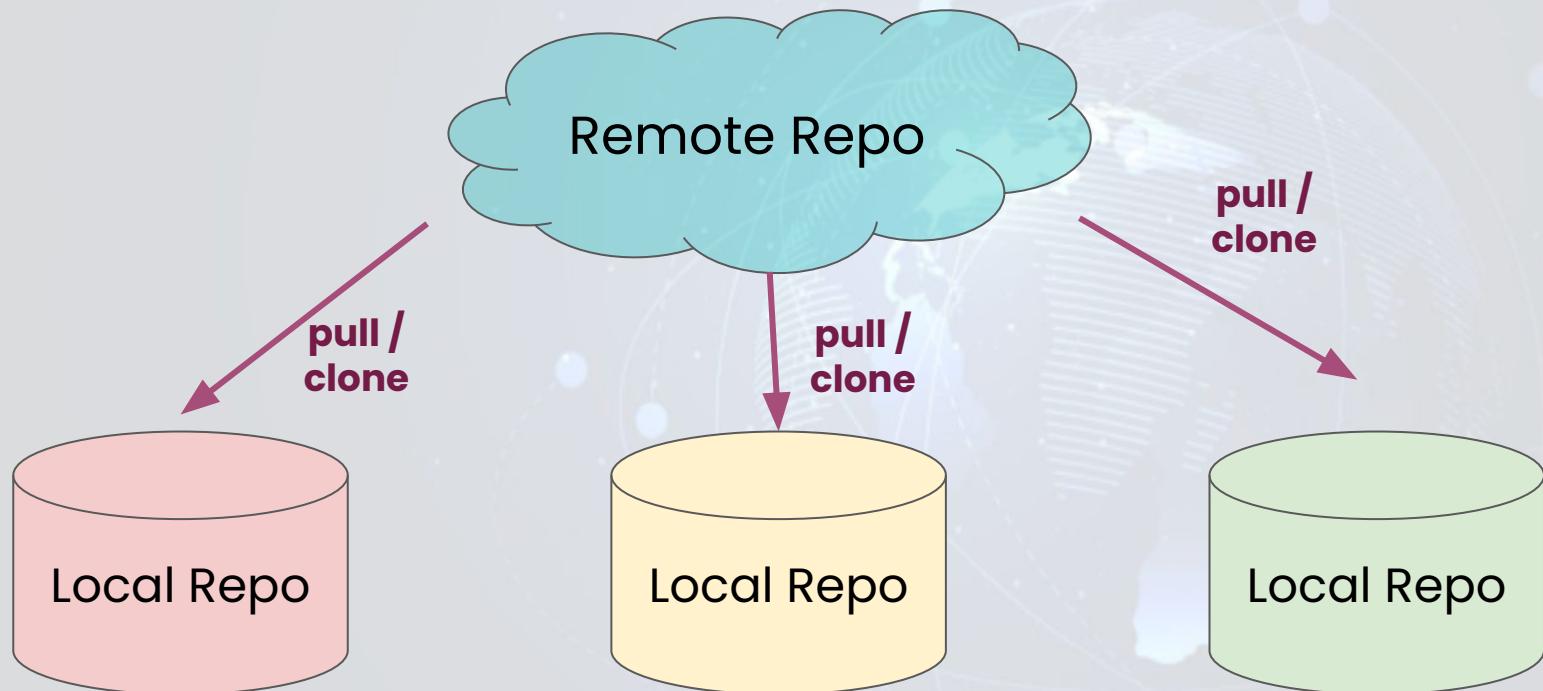
17.0.2 (March 22, 20... Latest)

<https://github.com/facebook/react>

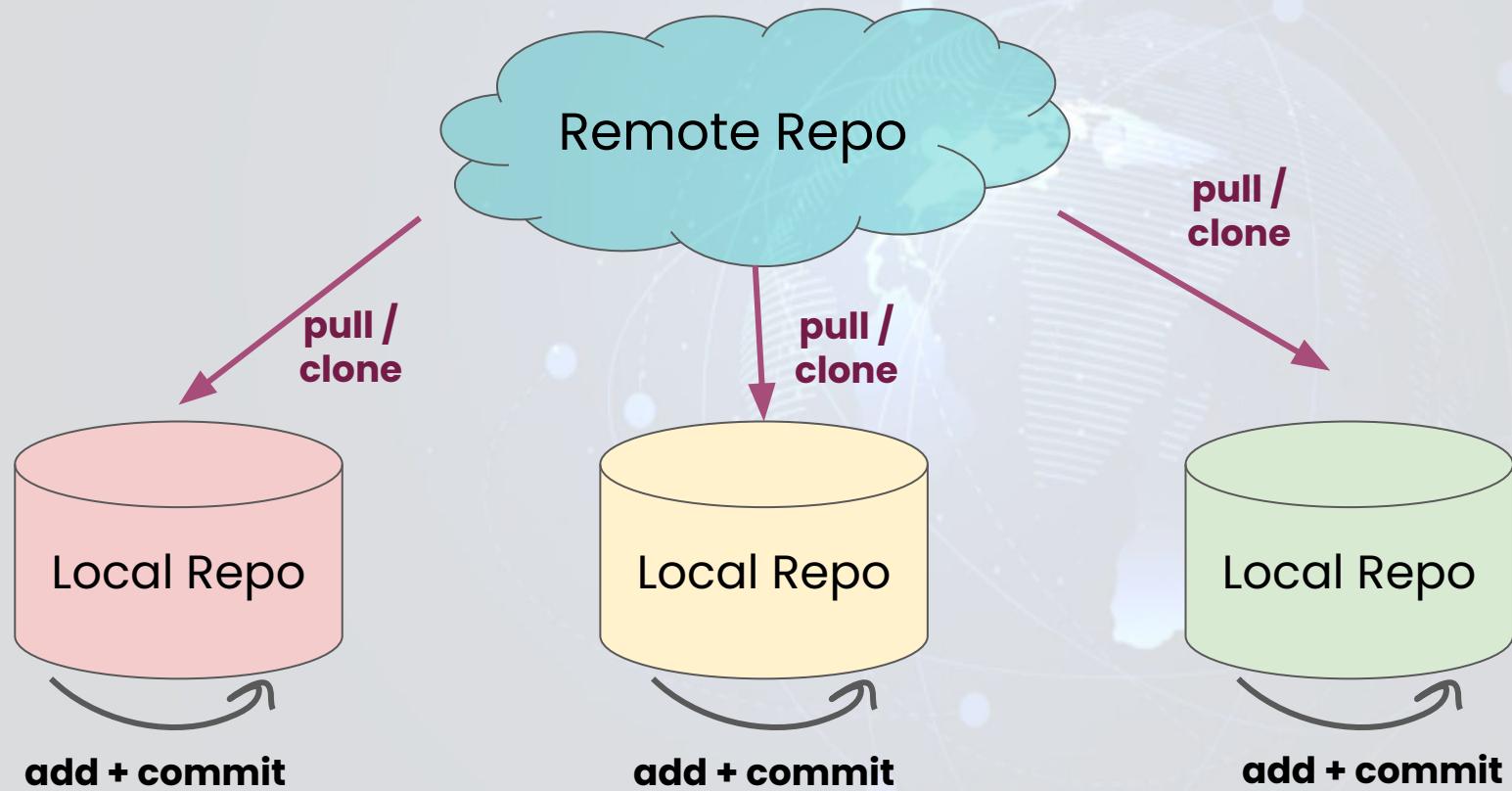
# Managing Local and Remote Repos



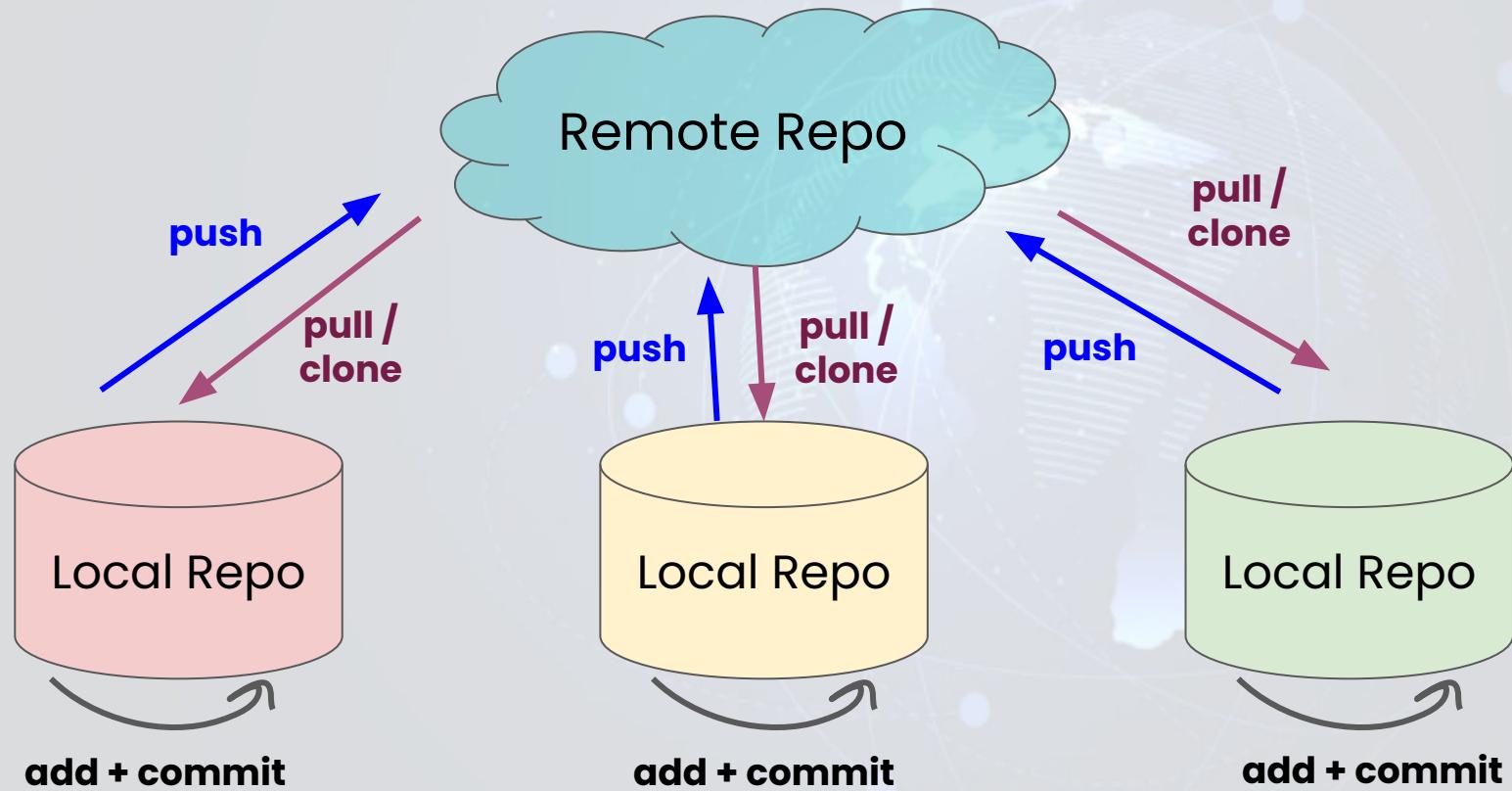
# Managing Local and Remote Repos



# Managing Local and Remote Repos



# Managing Local and Remote Repos



# CS 106S Website

Our website is open source!  
Let's look at the code...



## CS 106S

### Coding for Social Good

Spring 2025   Lathrop 180   Thursday 4:30-6:20pm

[News](#)

[Schedule](#)

[Syllabus](#)

CS 106S is a survey course on the applications of fundamental computer science concepts from CS 106B to problems in the social good space (such as health, environment, cybersecurity, trust & safety). Some of the topics we will cover include satellite imagery, tumor classification with basic machine learning, sentiment analysis of tweets on refugees, and the ethical obligation of good security. We introduce JavaScript and the groundwork of web development, with no expectation of prior experience in these areas. The course ends, by tradition, with a bubble tea party on the last day. Recommended prerequisite/corequisite: CS 106B.

#### News

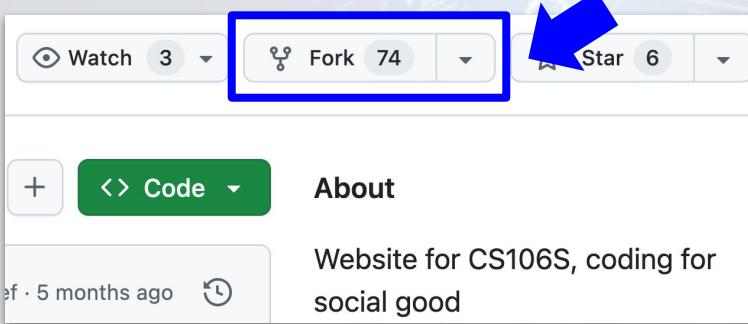
03/29/25 Welcome to CS106S! Sooooo excited for a fun quarter together 🎉. Our first class will be Thursday, April 3rd 2025, at 4:30 PM PT in [Lathrop 180](#).

Lathrop Library   Toyon Grove  
[View larger map](#)

# Your First Task



- Create a **GitHub account**, if you don't already have one
- Find our course website's GitHub page (link on previous slide), and make a fork (i.e. your own copy) of it.



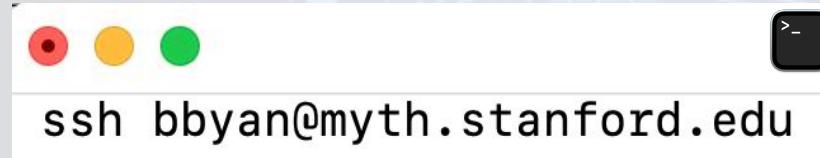
- Do your best to fix the issues in the **index.html** file
  - **Use the editor on GitHub** (click file, then pencil symbol)
- Submit a **pull request**





# Stanford WWW

- **Everyone with a SUNET has a Stanford webpage** at **[https://stanford.edu/~\[SUNET\]](https://stanford.edu/~[SUNET])**, though you may not have configured it yet.
- To access it, you can use your computer's **Terminal**, and log into the myth machine (used in CS 107/111!)



- There's a folder inside named **WWW**, which can store an **index.html** for your webpage, along with any ancillary HTML / CSS / JavaScript files.



# Stanford WWW

**Optional Demo:** To access, use your computer's Terminal, and log into the myth machine



```
$ ssh [SUNET]@myth.stanford.edu
```

Duo 2-factor authentication for [SUNET]  
... Success – you've been logged in!

```
bbyan@myth$ cd WWW
```

```
bbyan@myth$ ls
```

index.html

website\_img.jpg

Open Terminal! 🚀 (usually in Applications folder)

Login into myth ... may have to authenticate! 🔒

Via Unix commands ([more here!](#)), enter **WWW** folder

I recommend making the website files locally first, then copying them here.

This **index.html** file displays directly at **stanford.edu/~[SUNET]**!

benjaminyan — bbyan@myth61: ~/WW...

```
1 <!DOCTYPE html>
2 <html>
3 <body>
4 <h1>Hello World</h1>
5 <p>Hi! My name is Ben, and graphic
design is my passion.</p>
6 <img src = "that_was_fun.jpg" width
= 400>
7 </body>
8 </html>
```

An example `index.html` file 🎉🔥

stanford.edu/~bbyan/

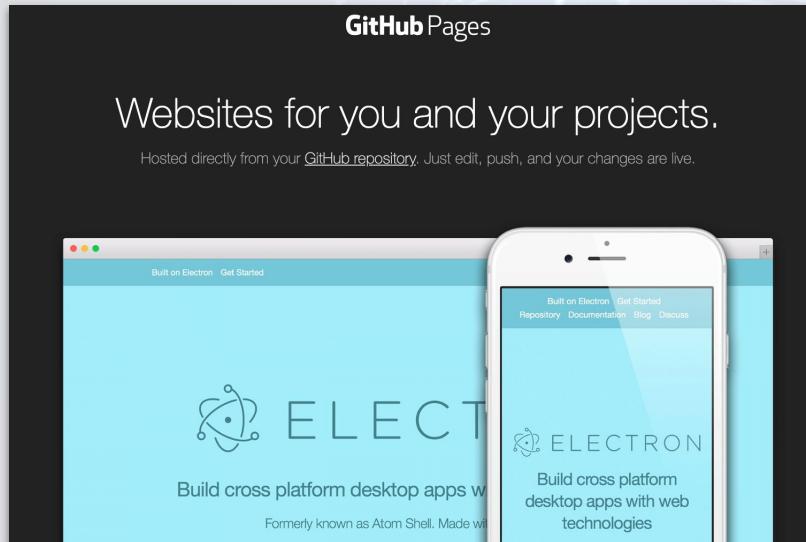
## Hello World

Hi! My name is Ben, and graphic design is my passion.



# GitHub Pages

- Another way (non-Stanford) to **deploy a web-page or mini web app directly from a GitHub repository** is through **GitHub Pages**. [\*\*Link here\*\*](#) for more details if you're interested!



# **Code Review & Merge**

 Search or jump to... 

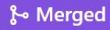
Pulls Issues Marketplace Explore

 + 

 Watch 2.5k Unstar 49.2k Fork 19.8k

Code Issues 356 Pull requests 293 Actions Projects 2 Security 2 Insights

# Remove broken responsive-tables JS, improving mobile readability & accessibility [ci skip] #39782

 rafaelfranca merged 1 commit into `rails:master` from `milesmcc:master`  on Jul 6, 2020

Conversation 10 Commits 1 Checks 1 Files changed 4 

 milesmcc commented on Jul 2, 2020 • edited   

### Summary

Currently, tables in the guides are broken on mobile. The first column (usually the label of the row) is removed by the `responsive-tables.js` script, making them impossible to read. Here's a screenshot of the first table in the getting started guide in Chromium/Chrome/Edge (I've also replicated this issue in iOS Safari):

Happens in the `app` folder, but here's a basic rundown:

**Reviewers**  
 jonathanhefner 

**Assignees**  
No one assigned

**Labels** 

<https://github.com/rails/rails/pull/39782>

# Benji #56

[Edit](#)[Code](#)

[Open](#) yanbenjamin wants to merge 3 commits into [main](#) from [benji](#) [diff](#)

[Conversation](#) 0[Commits](#) 3[Checks](#) 0[Files changed](#) 2

+1 -1

[Changes from 1 commit](#)[File filter](#)[Conversations](#)[Jump to](#)[Review changes](#)**added ben profile to index.html**[◀ Prev](#) [Next ▶](#)99 [benji](#) (#56)

Benjamin Yan authored and Benjamin Yan committed 2 minutes ago

commit 2e1e94923ac194d6060e2d148a2756bc6ec4d079

... 2 index.html [diff](#)

...

...	@@ -321,7 +321,7 @@ <h2 id="instructors">Instructors</h2>
321	321 <p class="font-semibold">Theo Baker</p>
322	322 </div>
323	323 <div class="text-center">
324	-
324	+
325	325 <p class="font-semibold">Ben Yan</p>
326	326 </div>
327	327 </div>

...

<https://github.com/milesmcc/cs106s/pull/56>



# **How should I do open-source code?**

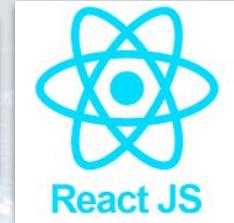
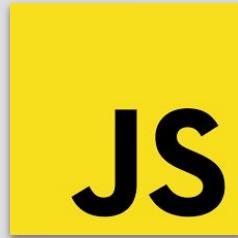
# Conventions / Etiquette

- **Be respectful!** You're dealing with real people!
- **Maintainers are volunteers.** They don't owe us anything.
- **Ask before you do.** Before making a big PR, check with the maintainers.
- **Report bugs!** But be descriptive and understanding in your bug reports.
- **Respect the license.** Licensing is a core part of open source software.



# Licenses!

The MIT License



GPL v2/v3

```
(defsubst hash-table-empty-p (hash-table)
  "Check whether HASH-TABLE is empty (has 0 elements)."
  (zerop (hash-table-count hash-table)))

(defsubst hash-table-keys (hash-table)
  "Return a list of keys in HASH-TABLE."
  (let ((keys '()))
    (maphash (lambda (k v) (push k keys)) hash-table)
    keys))

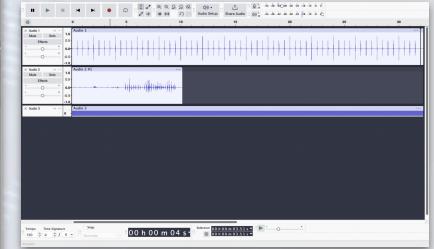
(defsubst hash-table-values (hash-table)
  "Return a list of values in HASH-TABLE."
  (let ((values '())))
    (maphash (lambda (k v) (push v values)) hash-table)
    values))

Next: Distrub., Up: [dir]
[emacs]Top
[emacs]Top
```

**The Emacs Editor**  
Emacs is the extensible, customizable, self-documenting real-time display editor. This manual describes how to edit with Emacs and some of the ways to customize it; It corresponds to Gnu Emacs version 26.0.50.

If you are reading this in Emacs, type 'h' to read a basic introduction to the Info documentation system.

0.0%: \*info\* [emacs] Top - Top L9 [Info Narrow]



Apache 2.0



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# Comparison of Major Licenses

License	Use allowed in closed-source projects?	Explicit patent grant?	Liability protection?	Commercial use allowed?
MIT				
GPL v2/v3				
Apache 2.0				

# Case Study #1

You're building an **open source note taking app** designed for people with visual impairments.

You want to make sure that your project is free to everyone. No one should be make their own version of it that isn't open source.

**Which license do you choose?  
Discuss!**

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GPL v2/v3

Apache 2.0

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MIT / Apache

# **Before Departure: Check-Off Form**

Fill out this week's  
attendance form on  
the website! (Week 6)



**Tysm!! And best wishes for your midterms!**