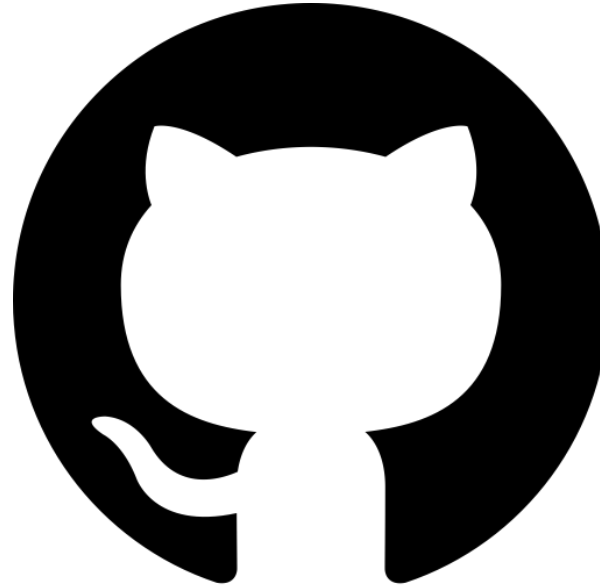

Introduction to Git and GitHub



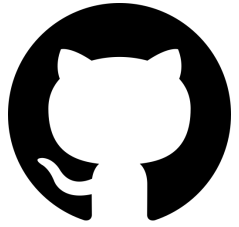
Fondren Library
Digital Scholarship Services



WHAT IS GIT?

- The most widely used version-control system!
 - Remembers entire project history
 - Easily undo changes
 - Track contributions
- Free and Open-Source Software
- Fast & Simple
- Optimized for collaboration
 - Non-linear development

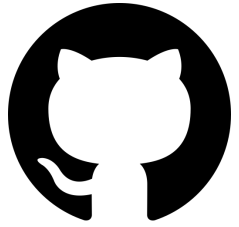




WHAT IS GIT NOT?

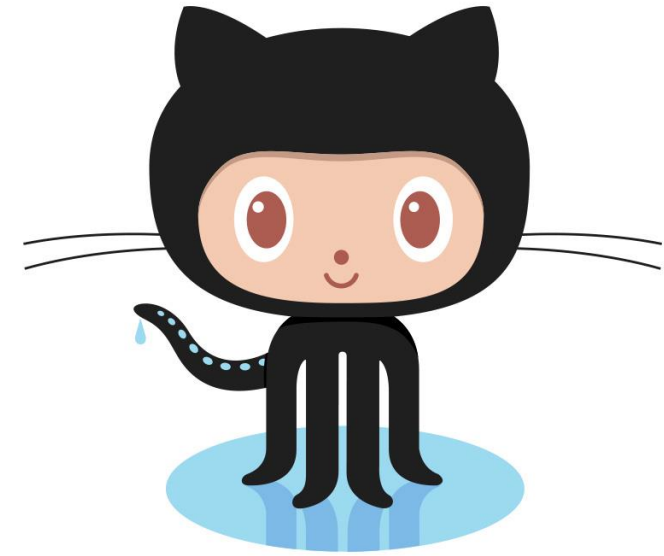
- Affiliated with GitHub (which is owned by Microsoft)
- A file editor
- A graphical user interface
 - Many user interfaces exist
- Proactive
 - Must tell git about everything we do!





WHAT IS GITHUB?

- The largest host for Git repositories
- Free (for public repositories)
- A great place to collaborate
 - Support for unique features
 - Comment sections
 - Organizations
 - Issue tracking
- Extensible!



GitHub



WHAT IS GITHUB NOT?

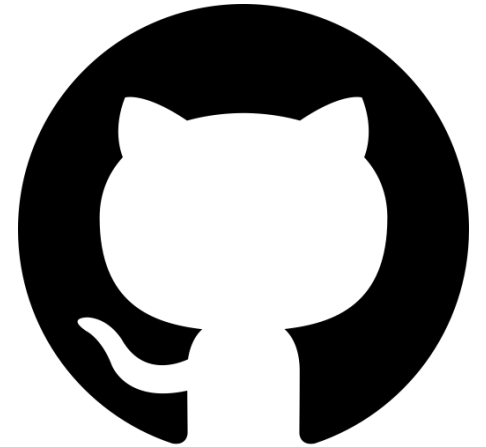
- The only option
 - GitLab, Bitbucket, ...
- A version-control system
 - Everything is on top of git
- Only for source code and programming
- Difficult!

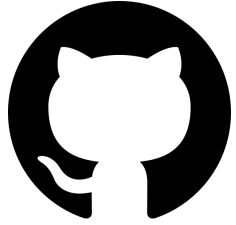


GitHub

GITHUB & GITHUB DESKTOP

A walkthrough of the user interfaces





GETTING OUR BEARINGS: GITHUB.COM



GETTING OUR BEARINGS: USER PAGE



GETTING OUR BEARINGS: REPOSITORY



GETTING OUR BEARINGS: DESKTOP

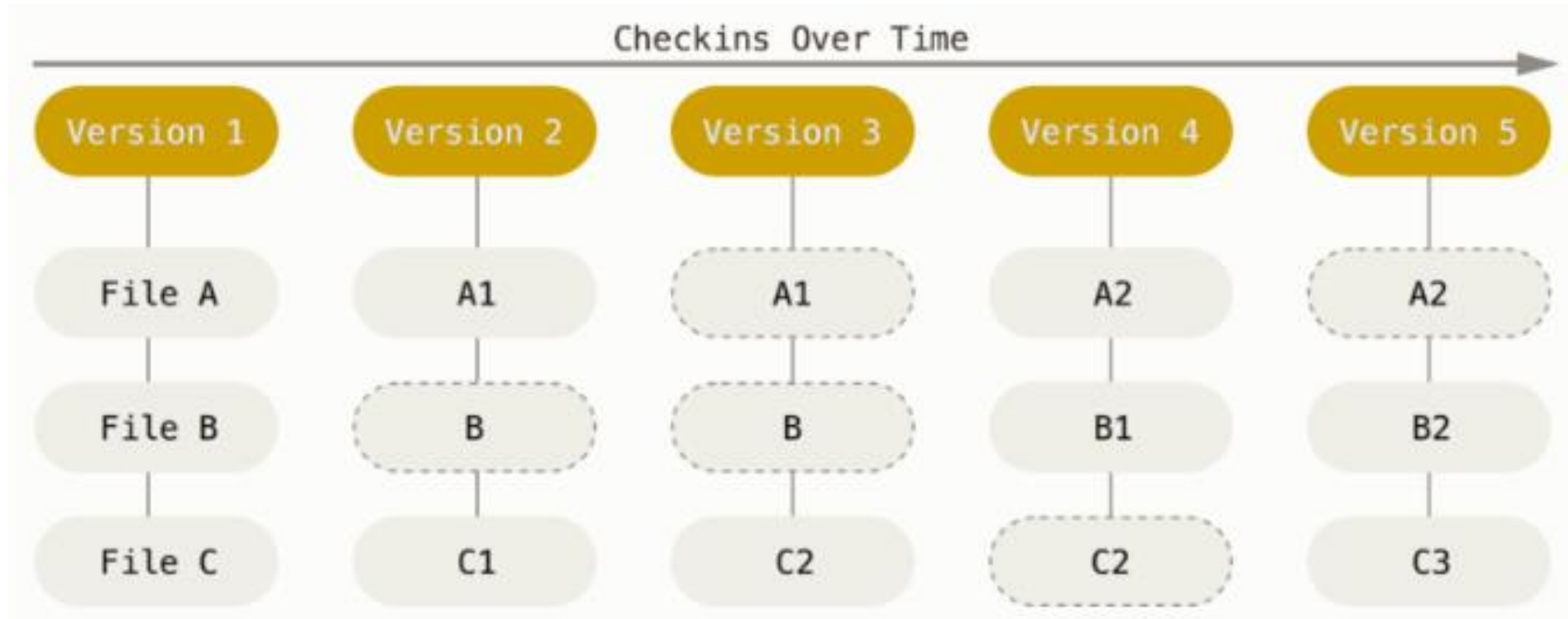
STRUCTURE OF A GIT REPOSITORY

Snapshots, Locality, File States

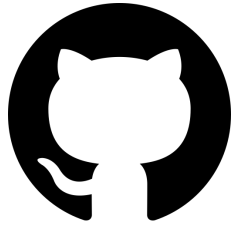




SNAPSHOTS

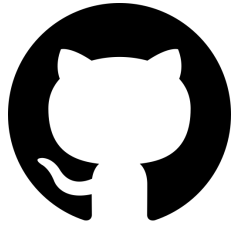


Stores the entire file structure at each snapshot, not a set of changes to one file!









SNAPSHOTS

brharrington try disabling gigahorse (#1062) ...		Latest commit 85a91b3 43 minutes ago
atlas-akka	add binding for materializer (#1050)	5 days ago
atlas-chart/src	sbt-scalafmt 2.0.0	26 days ago
atlas-config/src	update license headers for 2019 (#969)	6 months ago
atlas-core/src	cross build for 2.13.0-RC3 (#1048)	12 days ago
atlas-eval	add binding for materializer (#1050)	5 days ago
atlas-jmh/src/main/scala/com/netfli...	add benchmark for uri handling (#1057)	3 days ago
atlas-json/src	remove jackson-datatype-joda usage (#1045)	25 days ago
atlas-lwcapi/src	add binding for materializer (#1050)	5 days ago
atlas-module-akka/src	add binding for materializer (#1050)	5 days ago
atlas-module-cloudwatch/src	update license headers for 2019 (#969)	6 months ago



SNAPSHOTS

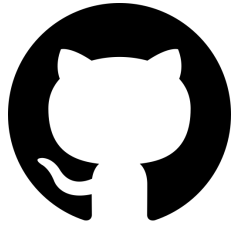
- Sample Snapshot: Caption and Set of Files

devtools: move topbar out of scrollable container (#9077)  Hoten committed 4 days ago ✓	Verified		7671166	
clients(devtools): ignore dark mode media query (#9082)  Hoten authored and brendankenny committed 4 days ago ✓			9a011a5	

- Can see all files present at any of these times!

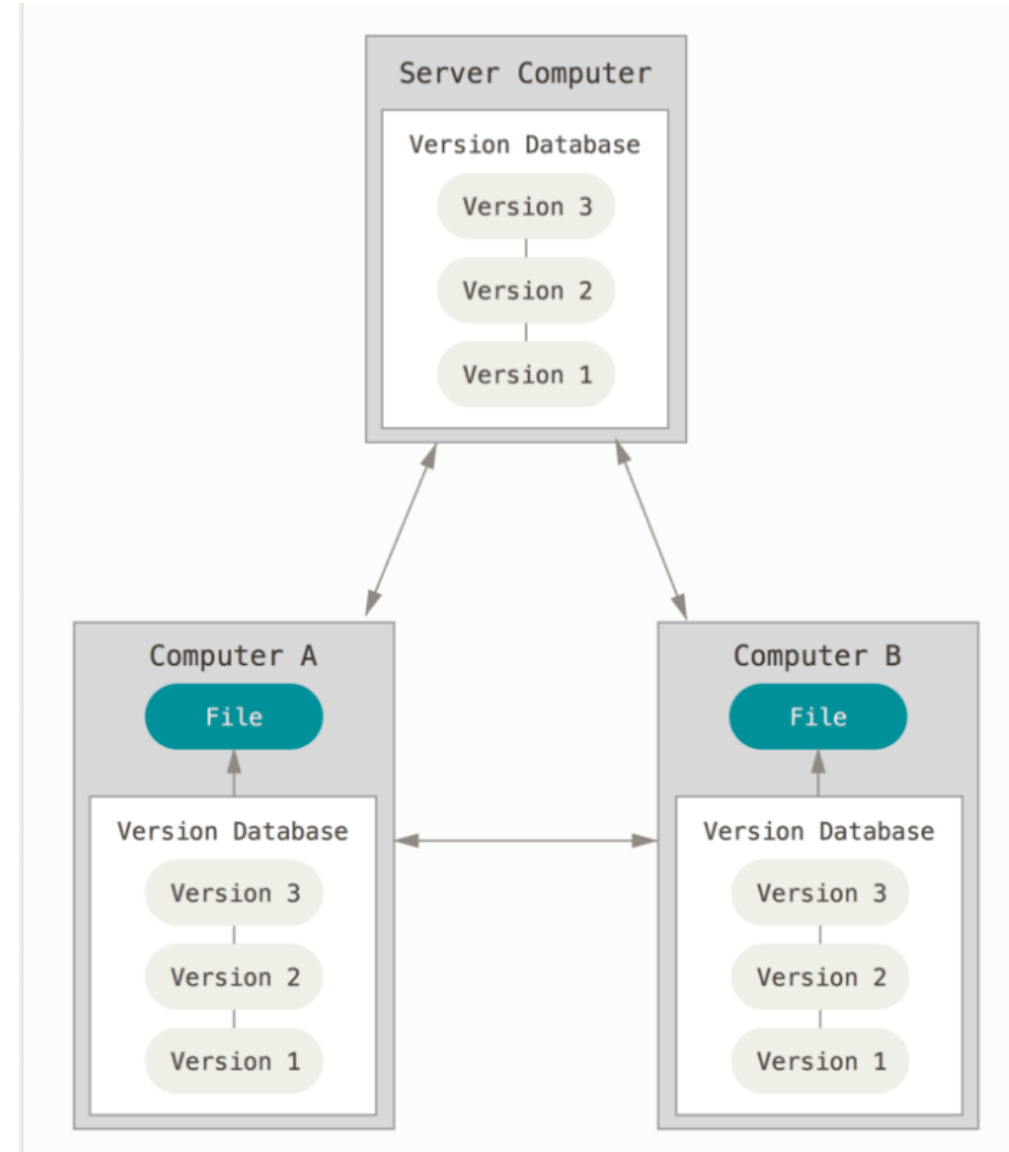
```
let turnOffTheLights = false;  
if (window.matchMedia('(prefers-color-scheme: dark)').matches) {  
  turnOffTheLights = true;  
}
```

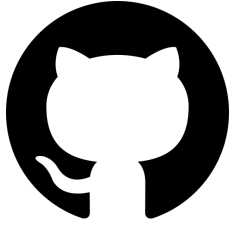
```
let turnOffTheLights = false;  
// Do not query the system preferences for DevTools - DevTools should only apply dark theme  
// if dark is selected in the settings panel.  
if (!this._dom.isDevTools() && window.matchMedia('(prefers-color-scheme: dark)').matches) {  
  turnOffTheLights = true;  
}
```



LOCALITY

- Snapshots stored on your computer, not only on a server!
 - Hidden .git directory
 - Stores entire history of project (compressed!)





SPECIAL FILE: .GITIGNORE

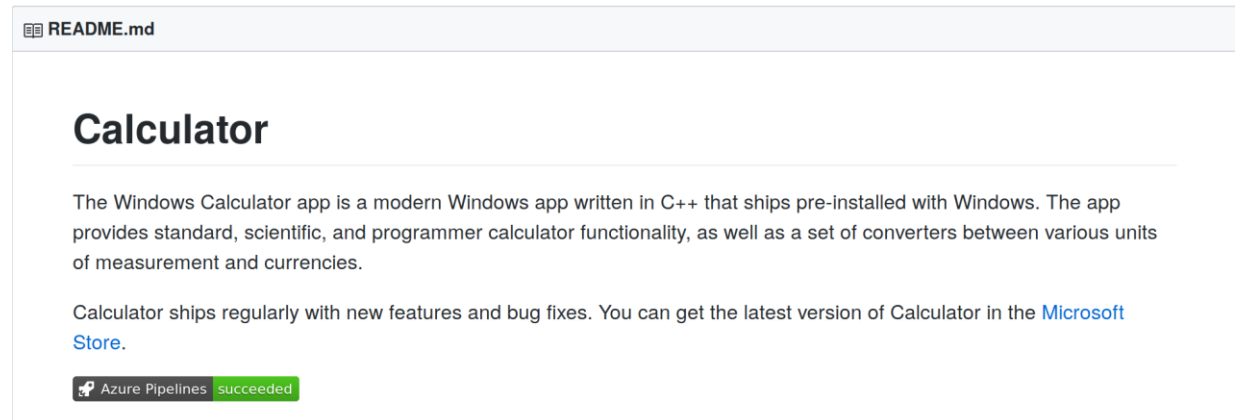
- .gitignore (note the period!)
 - A set of filenames.
 - No file in here will ever be tracked by git
 - Common Uses: backup and temporary files, stored passwords for APIs

```
.gitignore
1
2 github/~$Introduction to Git & Github.pptx
3 github/Introduction to Git & Github.pptx
4 scripts/key.txt
5 github/.~lock.Introduction to Git & GitHub.pptx#
6
```




SPECIAL FILE: README.md

- README.md (note the case!)
 - A text-based description of a directory or project
 - Uses Markdown language.
Coming up next!





MARKDOWN

- Simple formatting and text only
- Many dialects
- Used in a lot of places (Reddit)

<code>_Italic_</code>	<i>Italic</i>
<code>__Bold__</code>	Bold
<code>Heading 1 =====</code>	Heading 1
<code>Heading 2 -----</code>	Heading 2
<code>[Link][1] : [1]: http://b.org</code>	Link

```
# Calculator
The Windows Calculator app is a modern Windows app written in
C++ that ships pre-installed with Windows.
The app provides standard, scientific, and programmer
calculator functionality, as well as a set of converters
between various units of measurement and currencies.

Calculator ships regularly with new features and bug fixes.
You can get the latest version of Calculator in the [Microsoft
Store](https://www.microsoft.com/store/apps/9WZDNCRFHVN5).
```

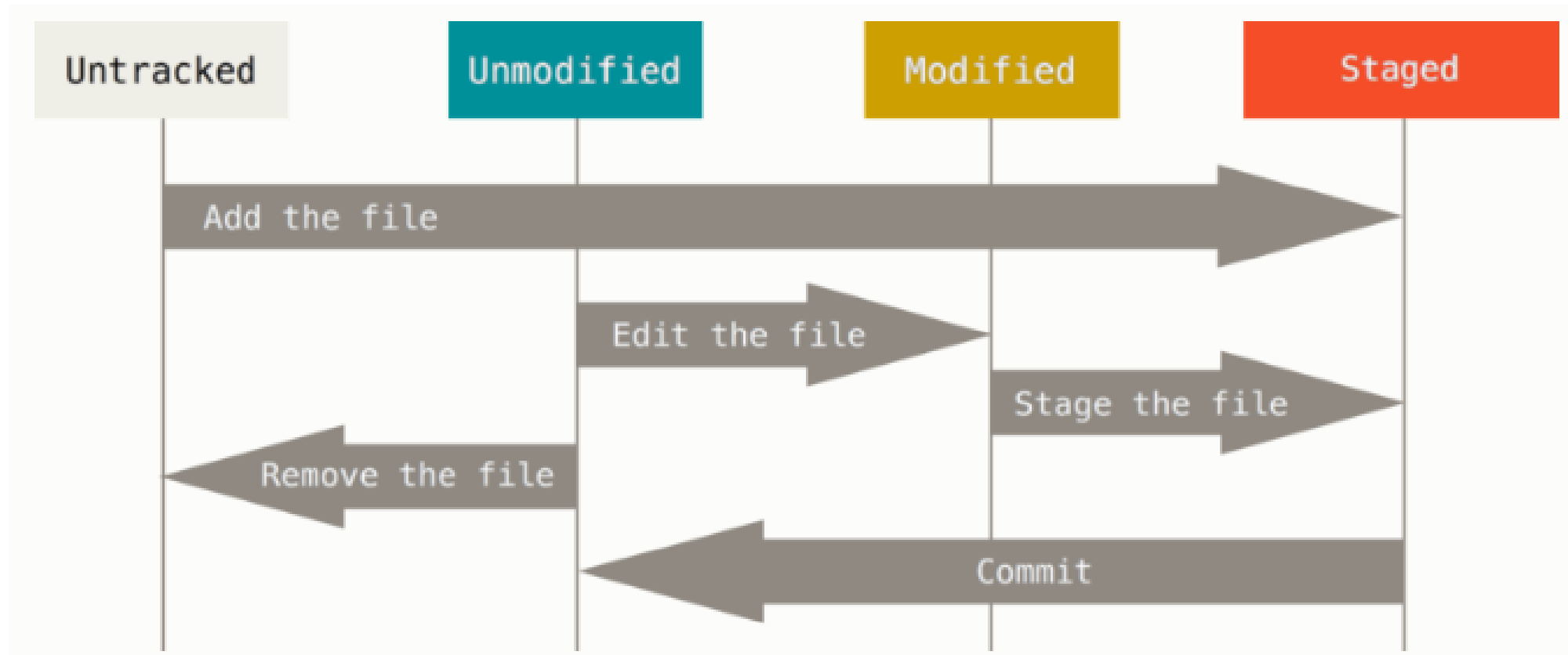


STATES OF FILES IN A REPOSITORY

- **untracked:** git has not been told about this file.
- **modified:** we told git about this file, but we've changed it without telling git to remember our change.
- **staged:** we have told git about this file and told git we will want it to remember our change.
- **committed:** we have made git take a snapshot of our file.

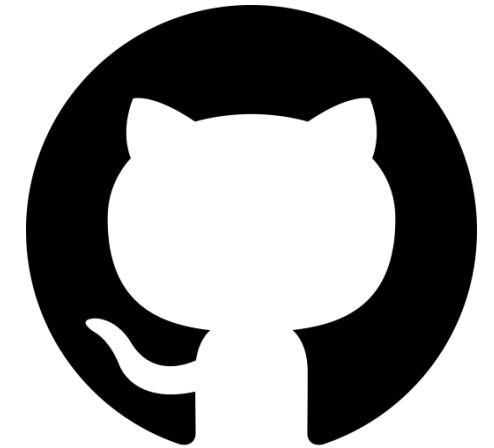


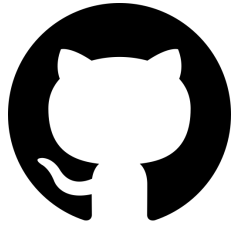
STATES OF FILES IN A REPOSITORY



CREATING & CLONING REPOSITORIES

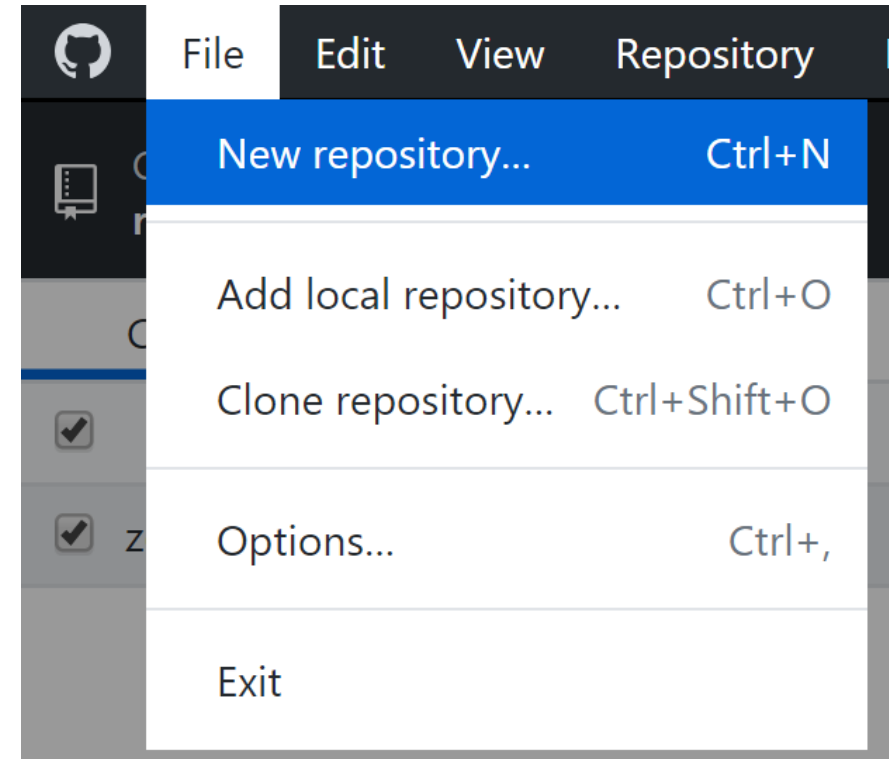
Initialization & Copying from a server

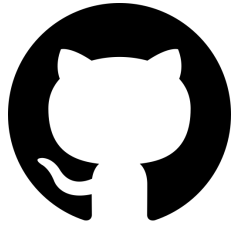




INITIALIZATION



- Create a repository, with a file index and database
- Stored in the hidden directory .git
- Note: No files are added to the repository by default!
 - We'll get to adding files a bit later

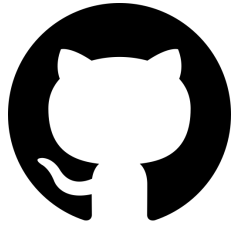




INITIALIZATION

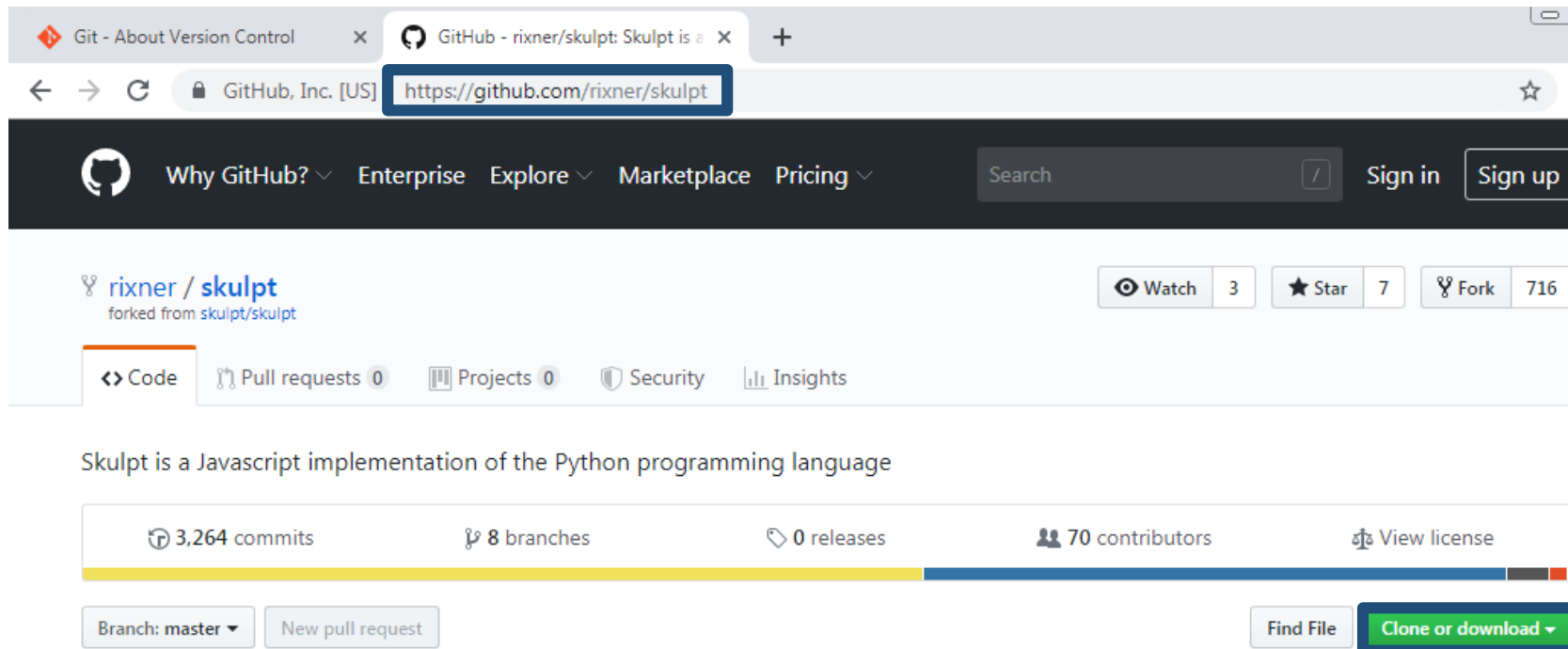
- Create a repository, with a file index and database
- Stored in the hidden directory `.git`
- Note: No files are added to the repository by default!
 - We'll get to adding files a bit later

<input type="checkbox"/>	Name	Date modified	Type
<input checked="" type="checkbox"/>	 <code>.git</code>	6/3/2019 11:11 AM	File folder
	 <code>.gitattributes</code>	6/3/2019 11:11 AM	GITATTRIBUTES File



CLONING

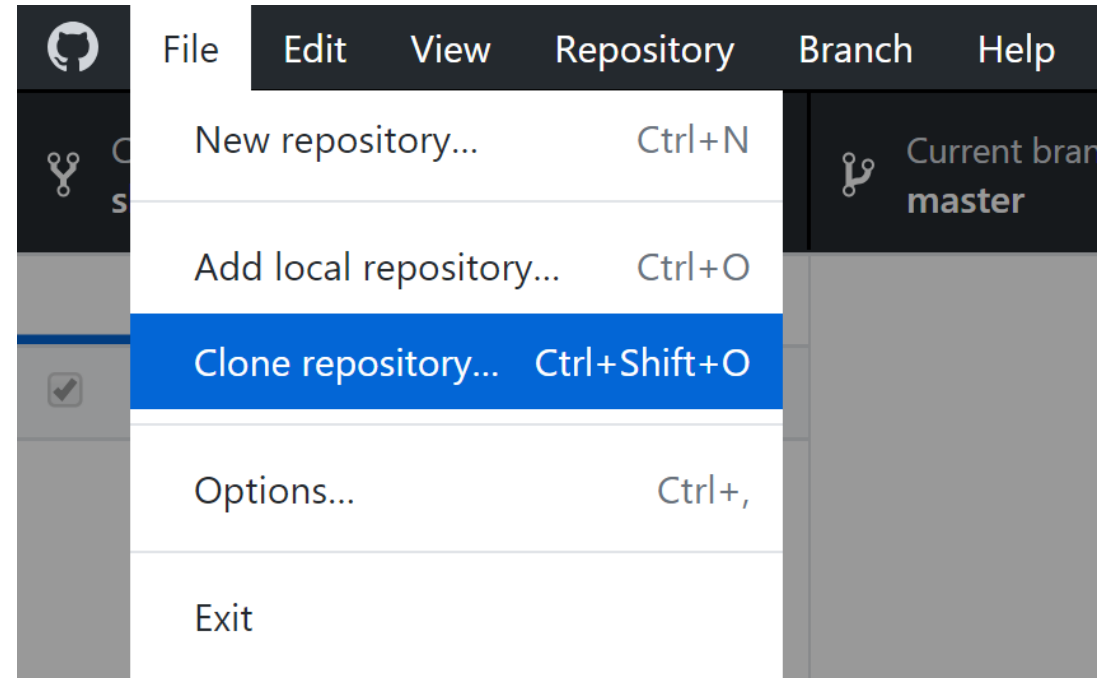
- Downloads entire history of a repository hosted on GitHub
- Two ways to get the URL:

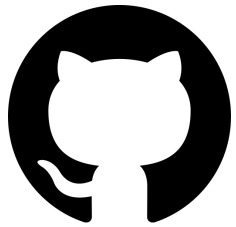




CLONING

- Most recent snapshot immediately available
- Full history needs to be downloaded as well. Takes time & space!





CLONING

Clone a repository

GitHub.com

Enterprise

URL

Repository URL or GitHub username and repository
(hubot/cool-repo)

rixner/skulpt

Local path

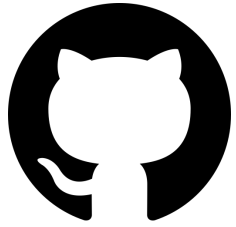
C:\Users\blanqui\Documents\GitHub\rixner

Choose...

Clone

Cancel

Name	Date modified	Type	Size
.git	6/3/2019 11:17 AM	File folder	
debugger	6/3/2019 11:17 AM	File folder	
doc	6/3/2019 11:17 AM	File folder	
example	6/3/2019 11:17 AM	File folder	
gen	6/3/2019 11:17 AM	File folder	
repl	6/3/2019 11:17 AM	File folder	
src	6/3/2019 11:17 AM	File folder	
support	6/3/2019 11:17 AM	File folder	
test	6/3/2019 11:17 AM	File folder	
.bowerrc	6/3/2019 11:17 AM	BOWERRC File	1 KB



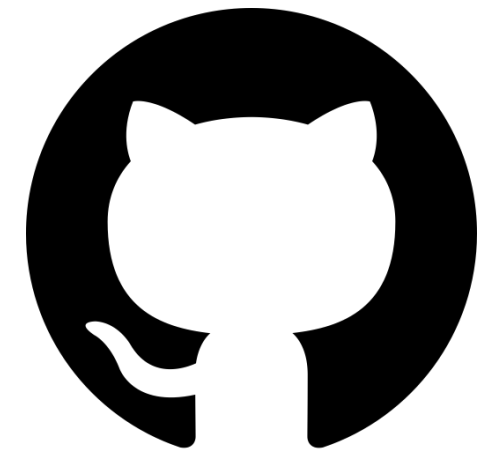
CLONING

Clone this repository from GitHub now!

<https://github.com/bakitybacon/rice-data-and-donuts-github>

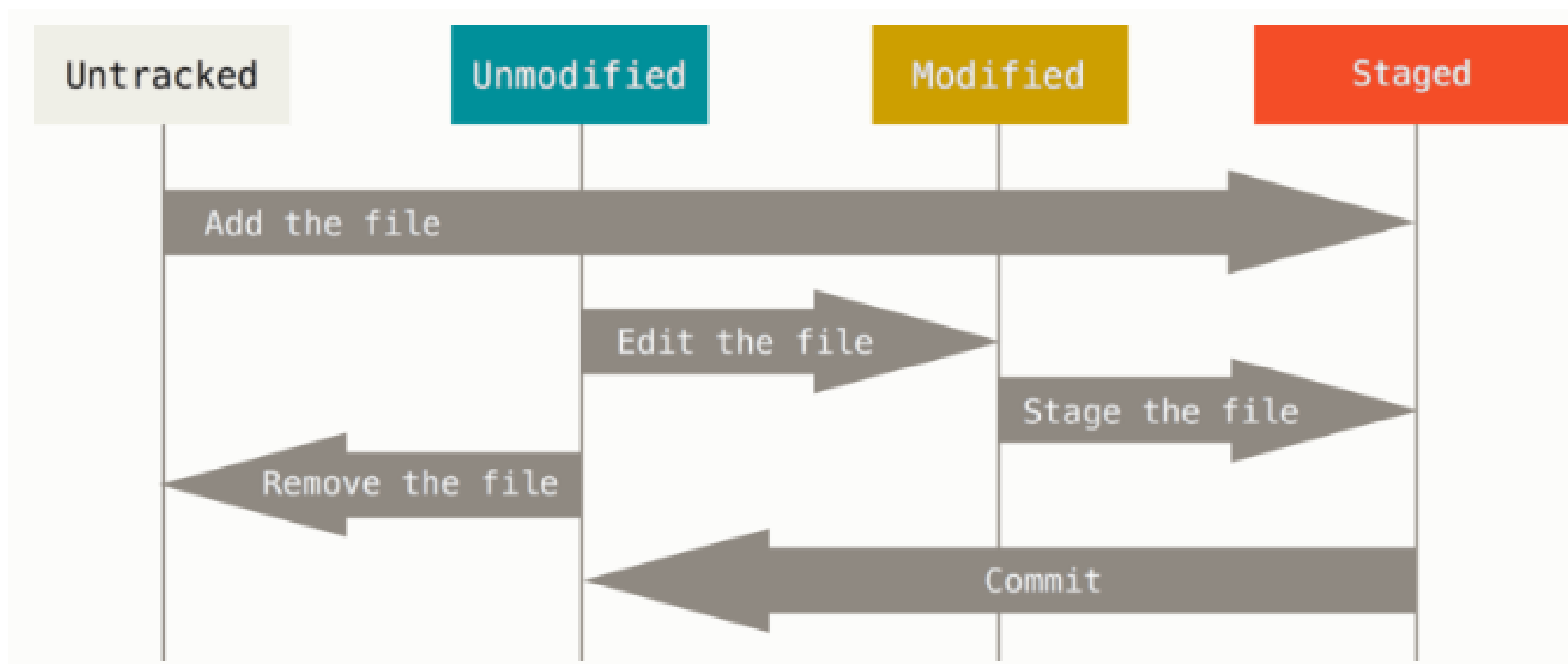
EDITING WORKFLOW

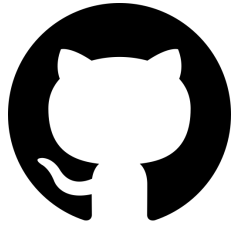
Editing, adding, staging, and committing





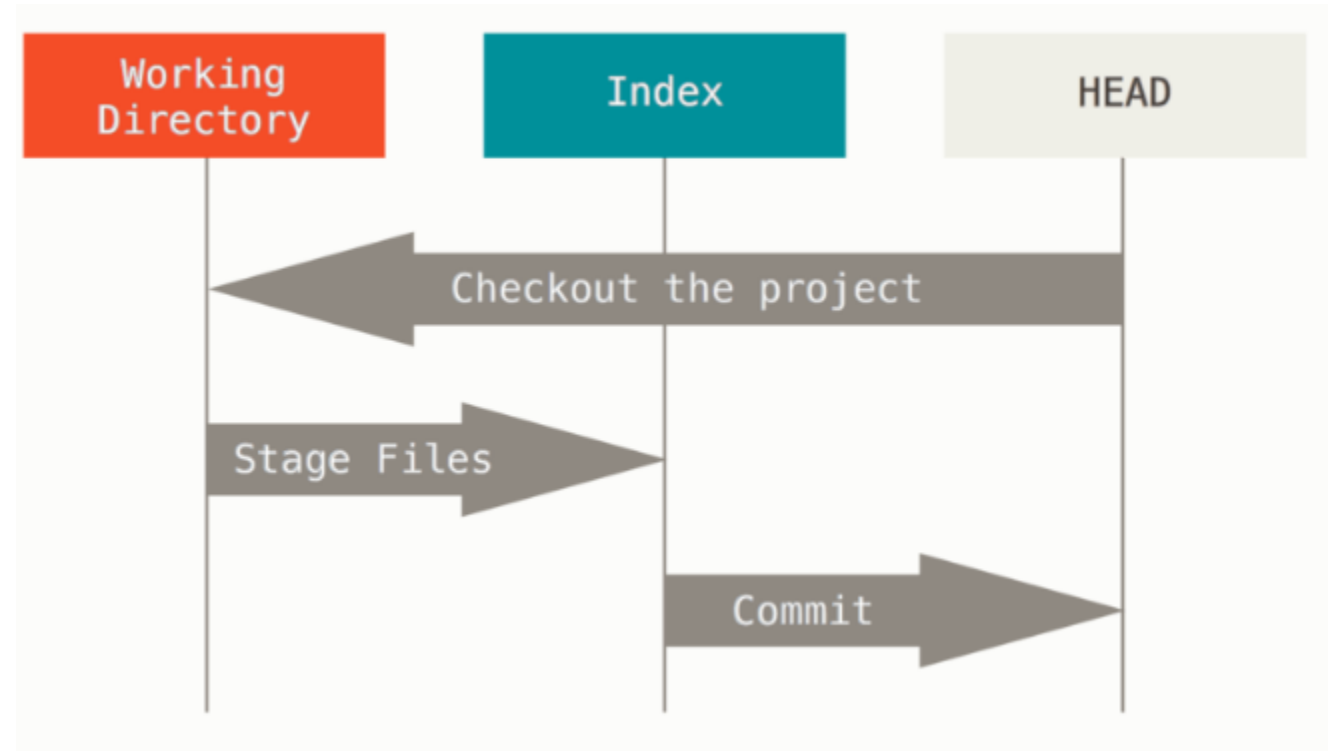
REVIEW OF FILE STATES





WORKFLOW

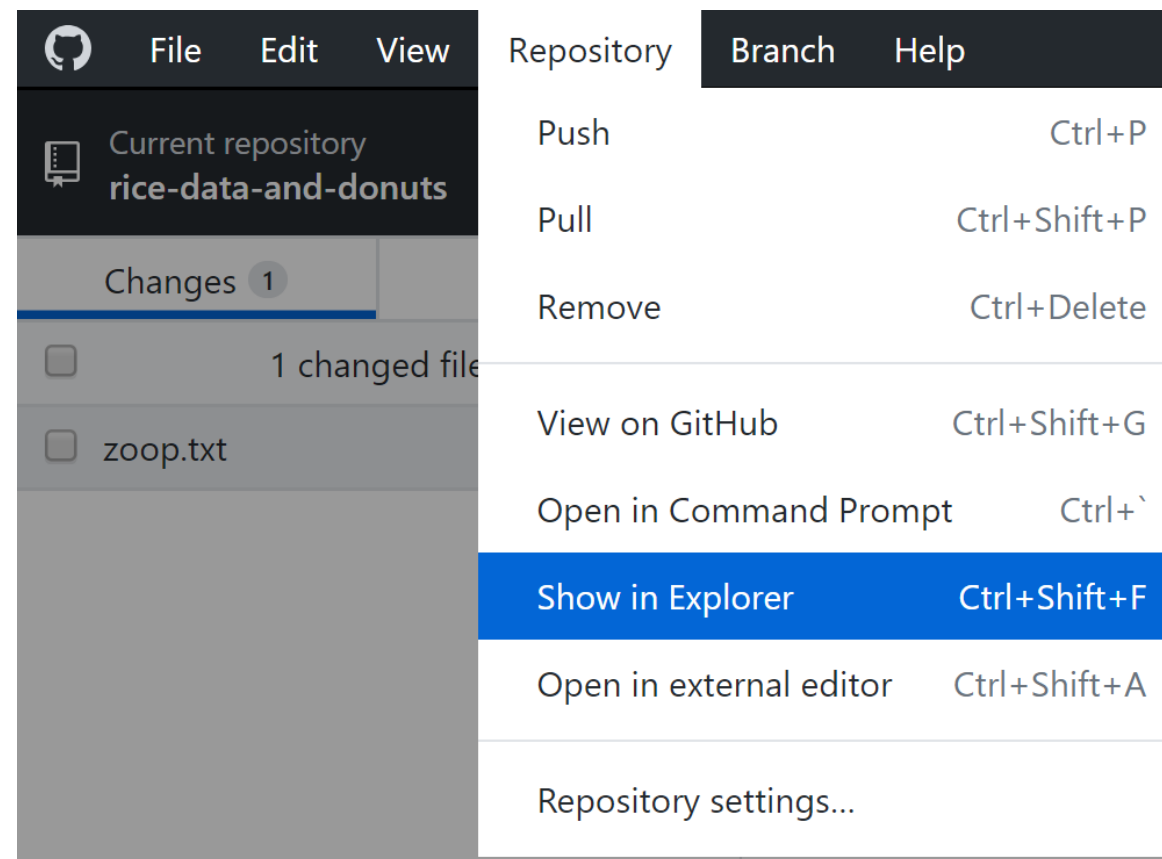
- **Working Directory**
 - Changed files on disk.
- **Index**
 - We've told git to pay attention to these changes.
- **HEAD**
 - This is just the most recent commit (snapshot). You can come back here whenever!





EDITING A FILE LOCALLY

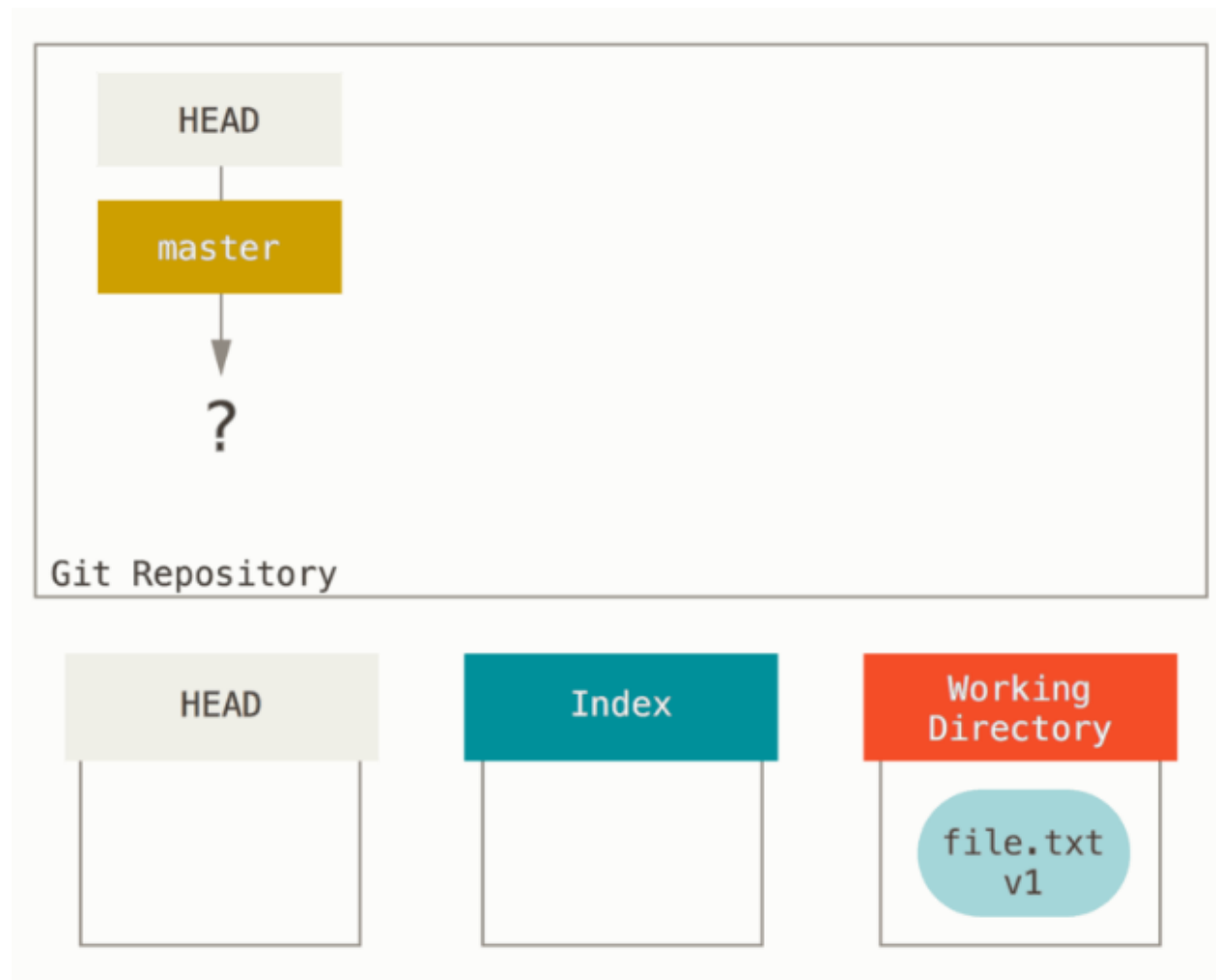
- Open and edit any file using any program
- Use “Show in Explorer” to easily find the most recent files





EDITING A FILE LOCALLY

- Starting from an empty repository
 - How do we know?
 - **HEAD** doesn't point to anything (no snapshots!)
- We have edited a file in the **Working Directory**, but not yet told git to pay attention to it.



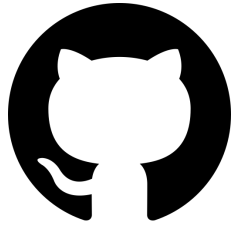


TELLING GIT ABOUT OUR CHANGES

- Git will automatically find what we changed. All we have to do is tell it what we want to save
- Toggle whether we want to add this change using check boxes
- Monitor changes to text files
 - Green: added in
 - Red: taken out
 - White: not changed

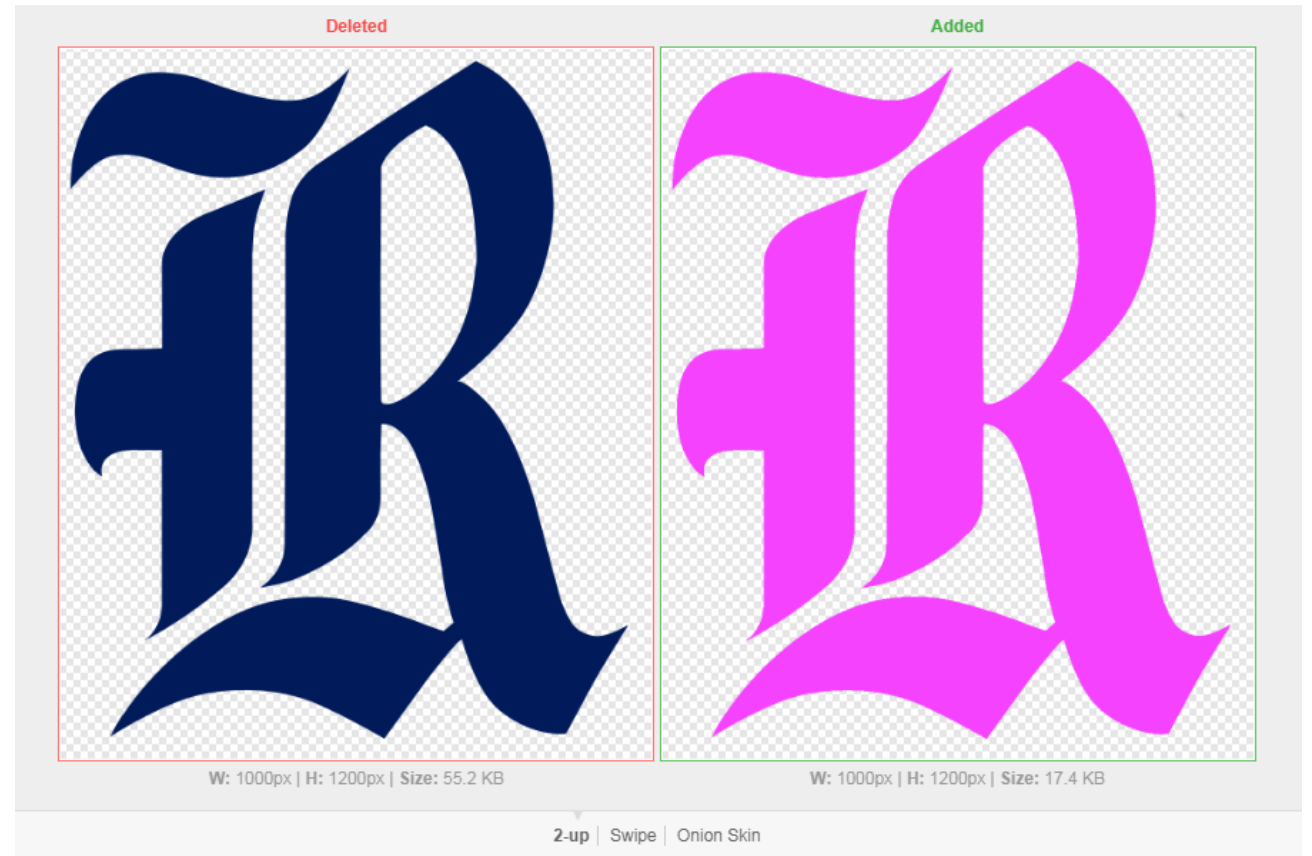
github\greeting.txt		
		@@ -1,6 +1,6 @@
1	1	Hello!
2	2	
3	3	-Hi!
		+Nice to meet you!
4	4	
5	5	Greetings!
6	6	

Changes 2		History
<input checked="" type="checkbox"/> 2 changed files		
<input checked="" type="checkbox"/>	github\editing.PNG	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	github\greeting.txt	<input checked="" type="checkbox"/>



VIEWING CHANGES: IMAGES

- 2-Up: side-by-side
- Swipe: left of divider is first image, right is second image
- Onion Peel: images are overlaid, slider changes transparency setting



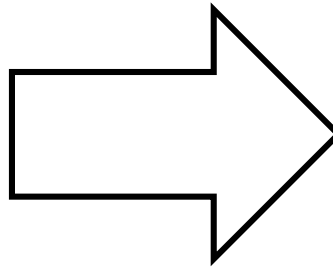


VIEWING CHANGES: DOCUMENTS

- Prose Diff: see word-by-word changes in formatting

```
... @@ -1,5 +1,9 @@
1  -# Rice Data and Donuts
2
3  Welcome to the GitHub workshop!
4
5  We're __so__ glad you could join us today.

1  +# Rice Data & Donuts
2
3  Welcome to the GitHub workshop!
4
5  We're __so__ glad you could join us today.
6  +
7  +We hope to see you again soon!
8  +
9  +:]!
```



```
▼ 6 diff/sample.md
Rice Data and & Donuts

Welcome to the GitHub workshop!

We're so glad you could join us today.

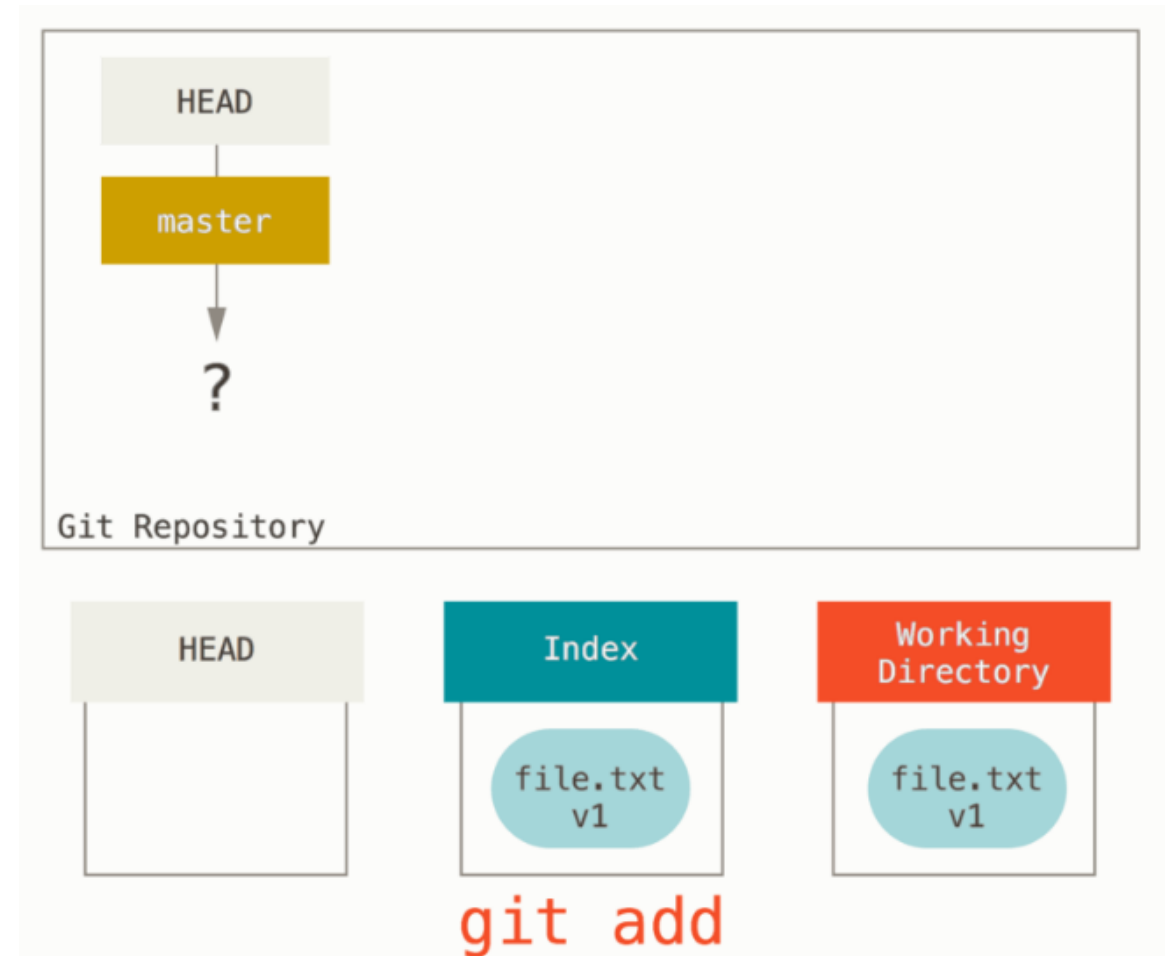
We hope to see you again soon!

:]!
```



TELLING GIT ABOUT OUR CHANGES

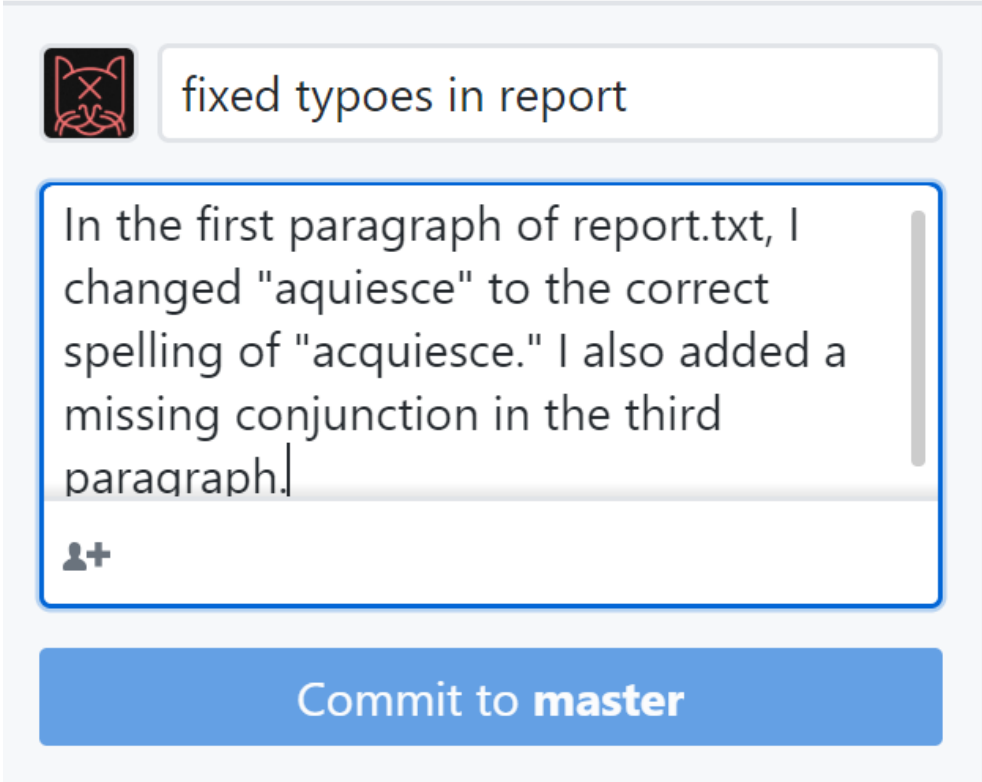
- Now that we have made file.txt, we can tell git to pay attention to the file
 - Transition between which two states for file.txt?
 - Command: `git add`
- Whatever we have added will be changed in the new snapshot. No add means it won't change!





SNAPSHOTS OF OUR CHANGES

- Once we have reached a milestone, or we just want to quickly and reversibly save our changes
- Annotating our Snapshot
 - Short, simple **summary**. A few words
 - Extended **description** of approach. A few sentences
- Only changes locally!

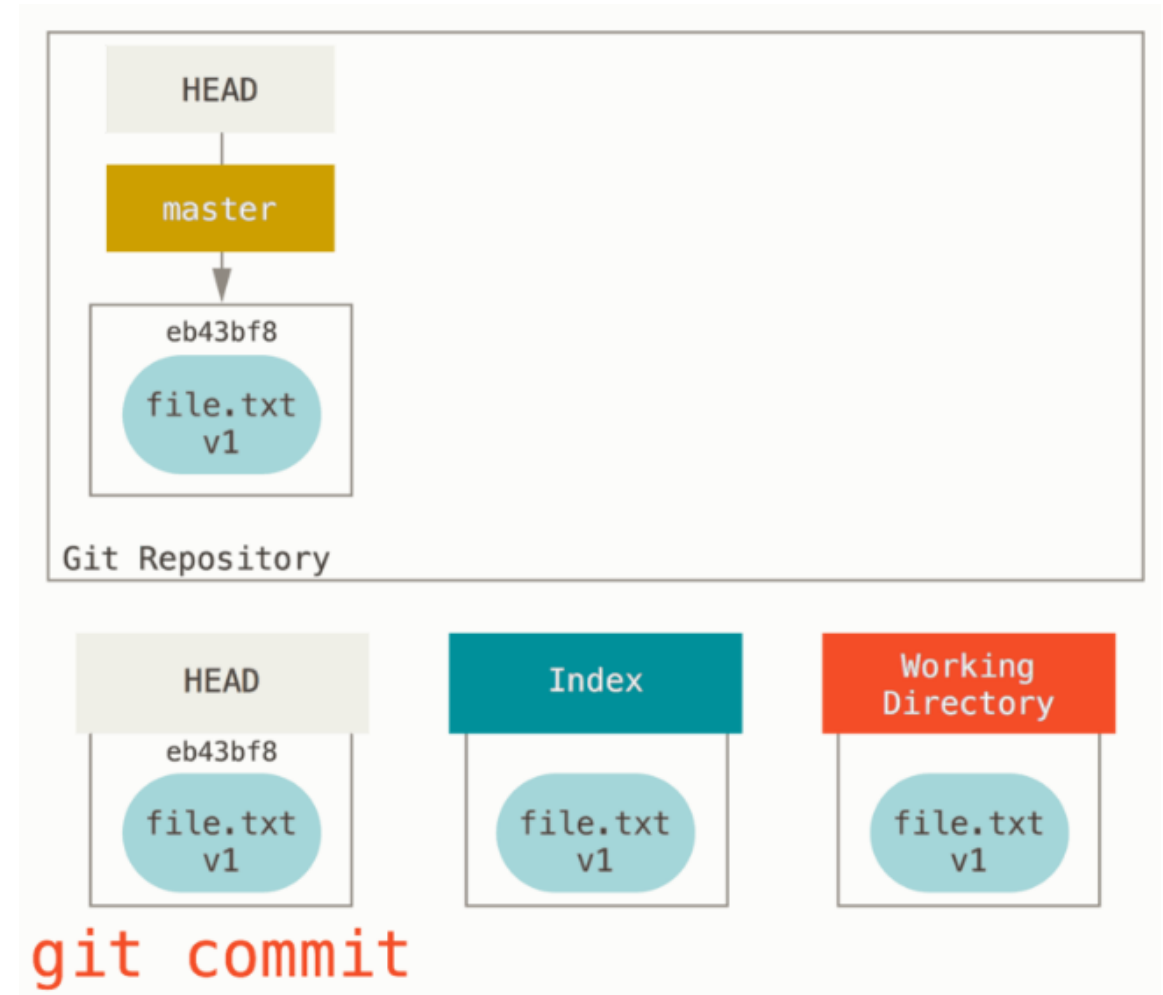


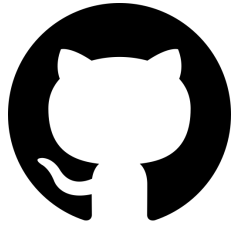
A screenshot of a GitHub commit interface. At the top left is a small Octocat icon. To its right is a text input field containing the commit message "fixed typos in report". Below this is a larger text area containing a detailed description: "In the first paragraph of report.txt, I changed 'acquiesce' to the correct spelling of 'acquiesce.' I also added a missing conjunction in the third paragraph." Below the description is a field for adding reviewers, showing a person icon and a plus sign. At the bottom is a large blue button with the text "Commit to master".



SNAPSHOTS OF OUR CHANGES

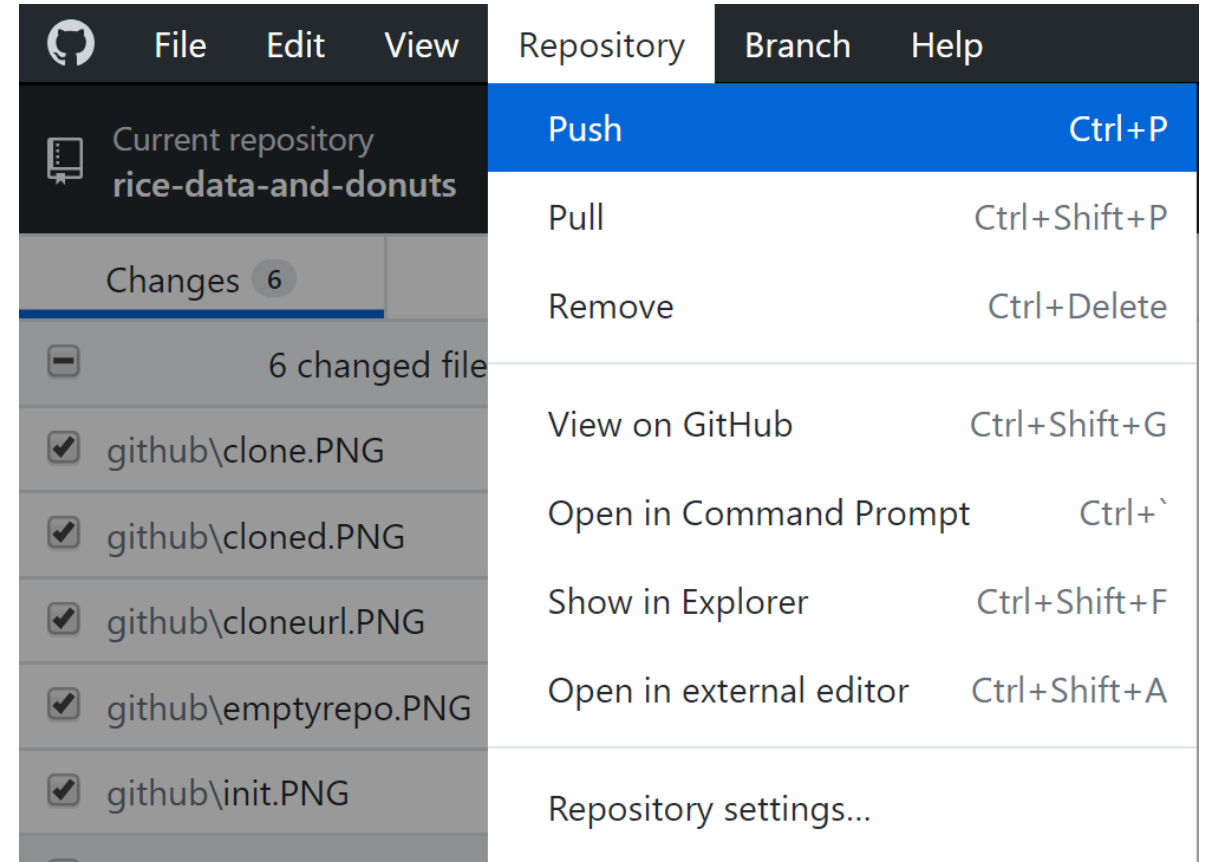
- Tell git to take a snapshot of our files!
 - Transition between which two states for file.txt?
 - Command: `git commit`
- **HEAD** now points to our most recent snapshot!





UPLOADING OUR CHANGES

- Once we have a commit, we can send it to GitHub
- This is called a **push**
- Note: Changes are not sent to the server by default!





UPLOADING OUR CHANGES

- From the repository cloned earlier, upload a file with any message you like!



GOING BACK IN TIME

- What if we accidentally made a change that deleted something we really needed?
- Solution: Revert to a previous commit!
- Note this doesn't delete the changes after the revert

Current repository: **rice-data-and-donuts** | Current branch: **master**

Changes | History

No branches to compare

Commit Message	Author	Time
final revision of ppt for the day	Corrin Foscire	committed a day ago
uncommit?	Corrin Foscire	committed a day ago
swaggalicious	Corrin Foscire	committed a day ago
editing showcase	Corrin Foscire	committed a day ago
more greetings	Corrin Foscire	committed a day ago
another update to greeting	Corrin Foscire	committed a day ago
showcasing adding & monitoring changes	Corrin Foscire	committed a day ago
add screenshots for slides	Corrin Foscire	committed a day ago
add template and rough outline	Corrin Foscire	committed a day ago
powerpoint edits		

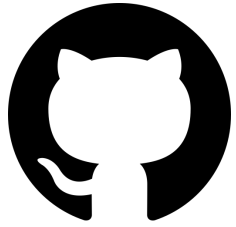
add screenshots for slides

- Revert this commit
- Copy SHA
- View on GitHub



GOING BACK IN TIME

- Revert your message, then commit something different and push again!



MAKING COMMENTS

- GitHub allows us to write comments about a commit
- Aids discussion of changes, hopefully productive arguments
- History → Commits → Right Click → View on GitHub

The screenshot displays a GitHub commit interface. At the top, a light blue header bar contains the text "update with diff options" and a "Browse files" button. Below this, the commit details show the branch "master", the committer "bakitybacon" who committed 4 days ago, and the parent commit "ed41a8c". The commit hash is "c2677838b4d88321544698cee2162a36338bbf13". A summary line indicates "Showing 1 changed file with 0 additions and 0 deletions." Below this, a file entry for "BIN +110 KB (110%) github/Introduction to Git & GitHub.pptx" is shown, with a note that the binary file is not shown. At the bottom, a section titled "1 comment on commit c267783" shows a comment by "bakitybacon" from 2 minutes ago, which reads "Great commit!". The comment box includes fields for "Author" and "Owner", and a "Lock conversation" button.

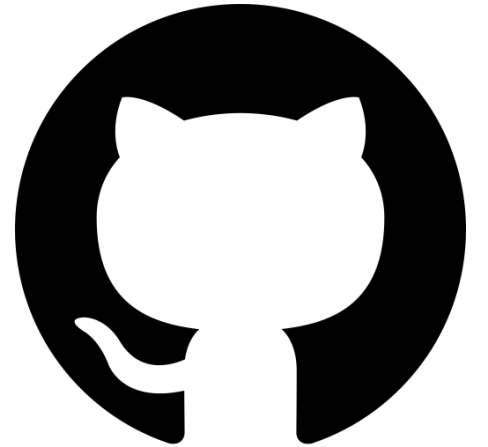


MAKING COMMENTS

- Make a comment on either the revision or the original commit you made!

BRANCHES & MERGING

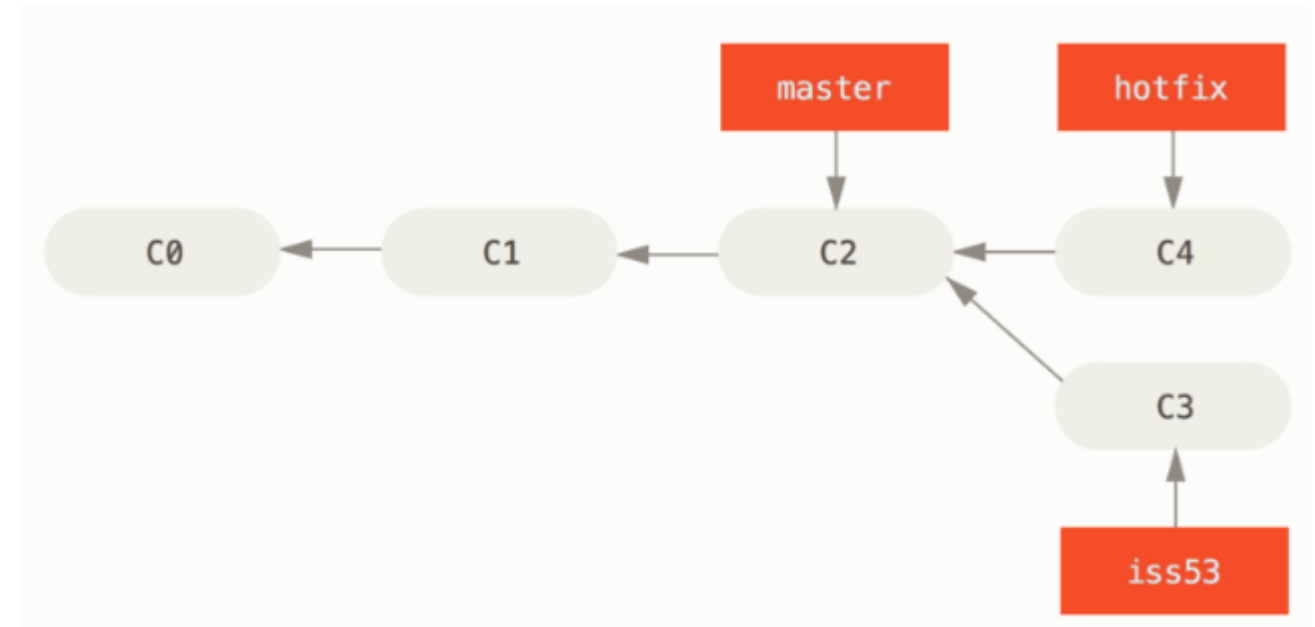
Creating, working on, combining, and switching branches

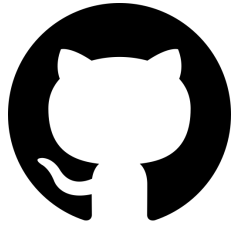




BRANCHES

- If you're working on different features or as part of a larger team
- Divergent history
- Independent files
 - Avoids unintended consequences!
- Easy integration





CREATING & SWITCHING BRANCHES

- Click on the “Current branch” tab
- If a branch isn’t listed, you may have to search for it
- Make sure to publish the branch to GitHub!

The screenshot shows the GitHub web interface. At the top, there's a 'Current branch' section with a dropdown arrow and a 'Fetch origin' button (last fetched Jun 5). Below this is a tabbed interface with 'Branches' selected and 'Pull requests' (0). A search bar labeled 'Filter' and a 'New branch' button are present. Under 'Default branch', 'master' is selected with a checkmark and 'a day ago' timestamp. Under 'Recent branches', 'second' and 'first' are listed, both with 'a day ago' timestamps.

Publish branch
Publish this branch to GitHub



MERGING

- Integrates changes that take place in a different branch
- Usually goes smoothly if branches don't overlap

Branch	Help
New branch...	Ctrl+Shift+N
Rename...	Ctrl+Shift+R
Delete...	Ctrl+Shift+D
Discard all changes...	
Update from master	Ctrl+Shift+U
Compare to branch	Ctrl+Shift+B
Merge into current branch...	Ctrl+Shift+M
Rebase current branch...	Ctrl+Shift+E
Compare on GitHub	Ctrl+Shift+C
Create pull request	Ctrl+R

Merge into **master**

Filter

Default branch

✓ mastera day ago

Recent branches

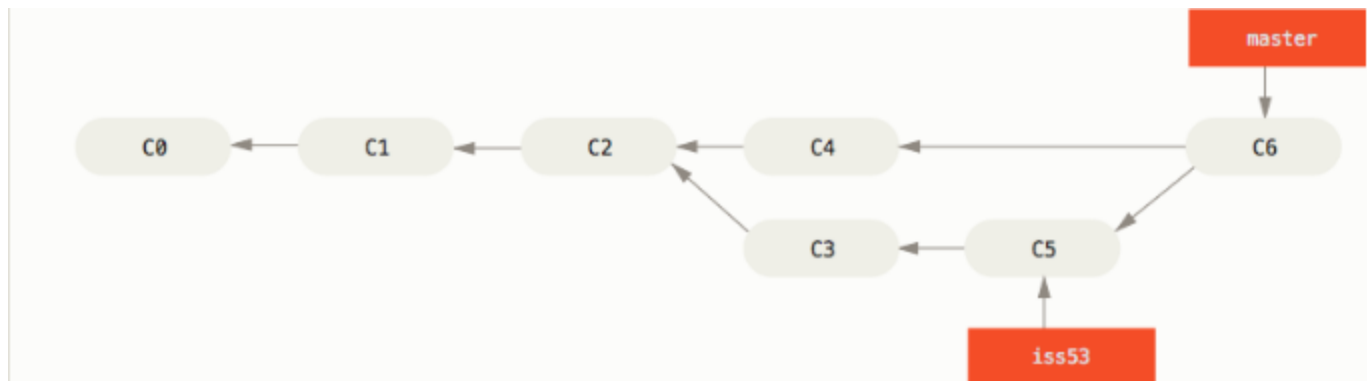
firsta day ago

second26 minutes ago

✓

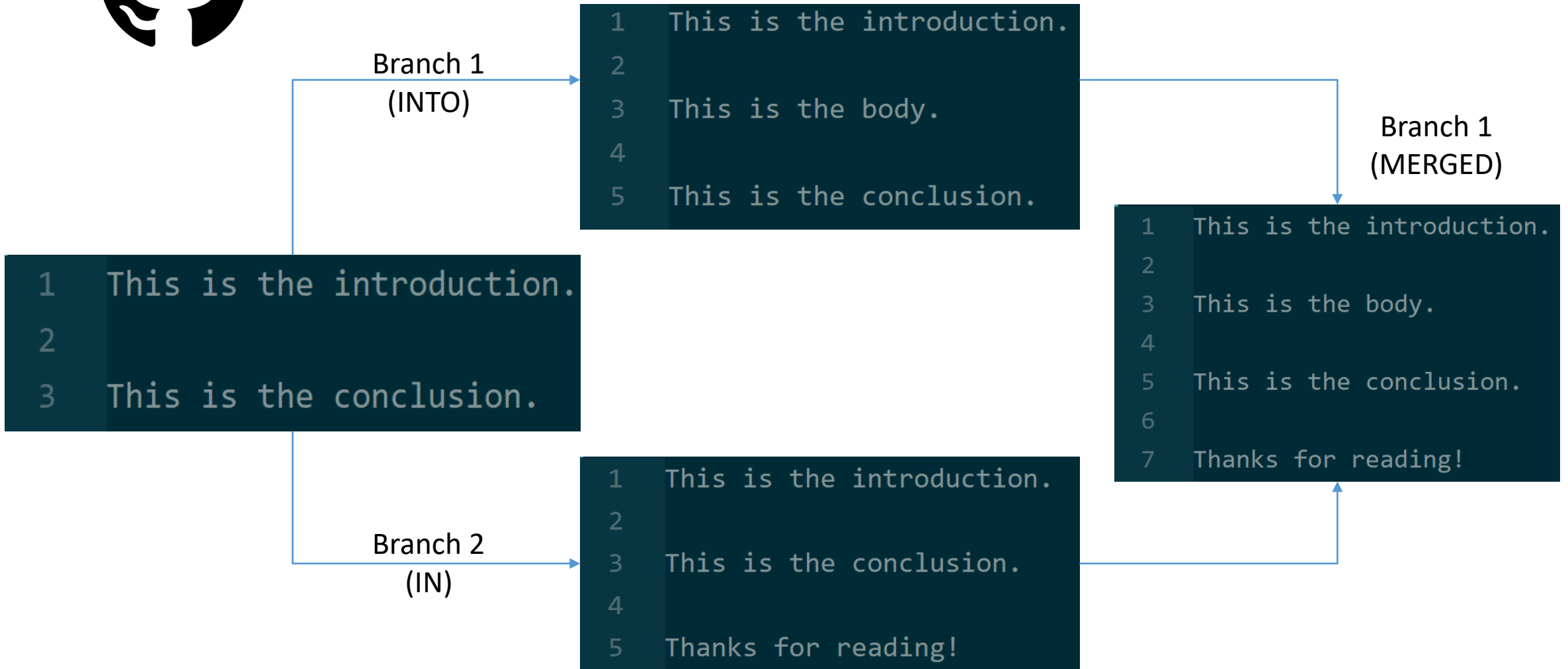
This branch is up to date with **first**

Merge **first** into **master**





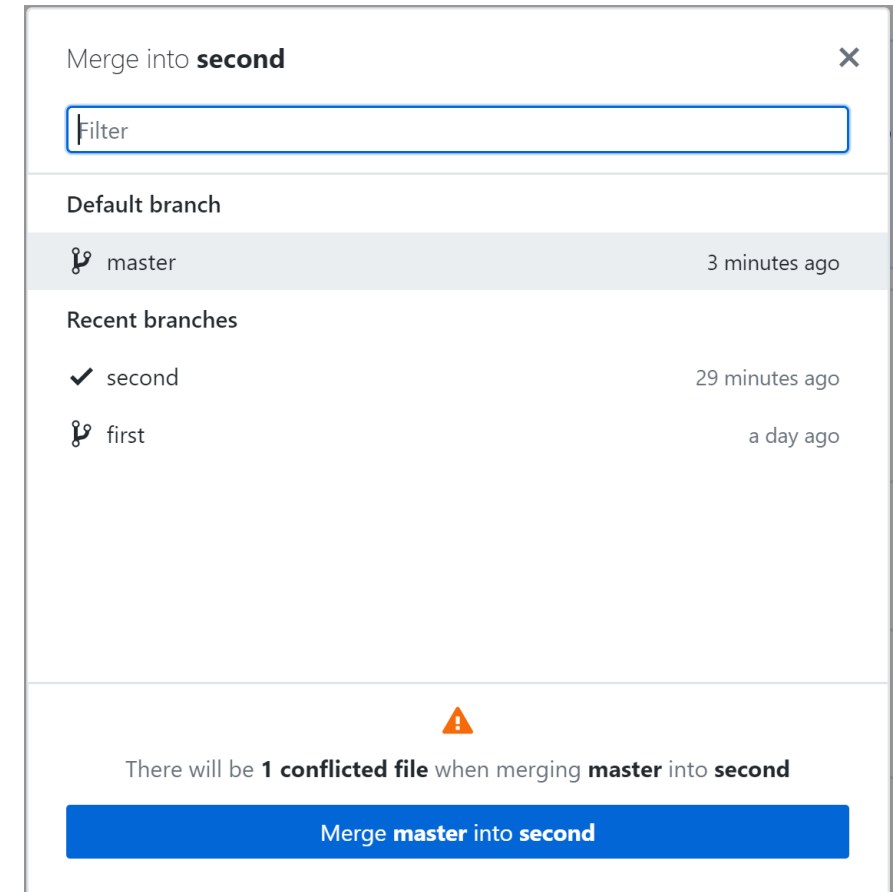
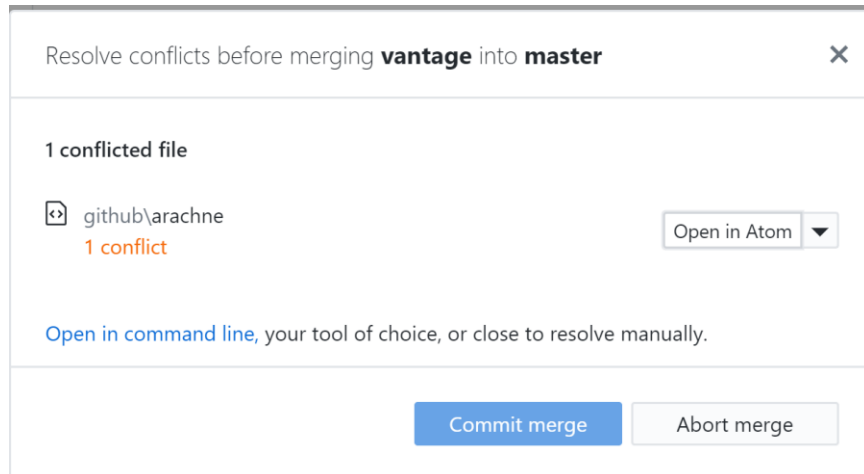
MERGING IN ACTION





CONFLICTS

- Occasionally, two people may have edited the same part of the same file on different branches
- Which version do we take?
- Must manually resolve conflicts





CONFLICTS IN ACTION

```
1 This is the introduction.  
2  
3 This is the body.  
4  
5 This is the conclusion.
```

```
1 This is the introduction.  
2  
3 This is the conclusion.
```

```
1 This is the introduction.  
2  
3 No, THIS is the body!  
4  
5 This is the conclusion.
```

?



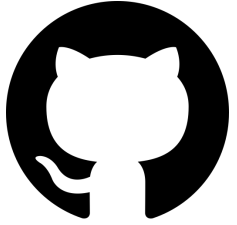
CONFLICTS IN ACTION

```
1 This is the introduction.  
2  
3 This is the body.  
4  
5 This is the conclusion.
```

```
1 This is the introduction.  
2  
3 No, THIS is the body!  
4  
5 This is the conclusion.
```

```
1 This is the introduction.  
2  
3 Use me ...  
4 <<<<<< HEAD  
5 This is the body.  
6 =====  
7 No, THIS is the body!  
8 >>>>>> veck  
9 Use me ...  
10  
11 This is the conclusion.
```

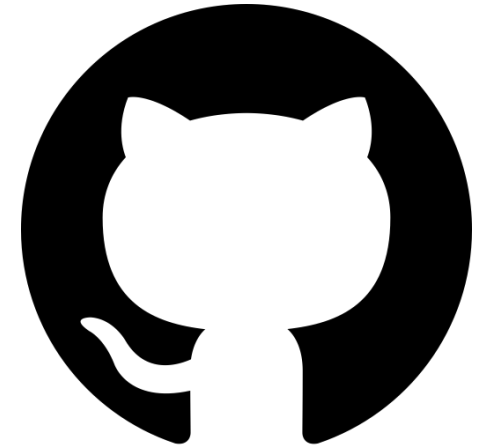
```
1 This is the introduction.  
2  
3 These are both the body.  
4  
5 This is the conclusion.
```



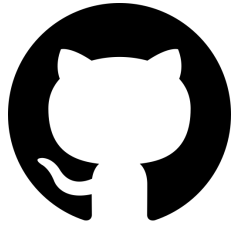
CONFLICTS AND MERGING

- Create a new branch.
- Edit community.txt to include only a one-line message.
- Try to merge it.
- If it fails, merge by combining the two messages. Don't delete anyone else's work!

COLLABORATING ON GITHUB

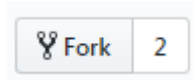


Extensions to collaborate within teams, organizations, and more.



GITHUB EXTENSIONS TO MERGING

- Fork

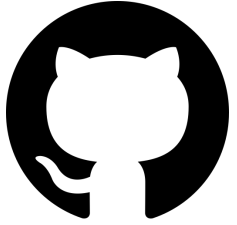


- Copy entire repository to your namespace
- Gives edit privileges

- Pull Request

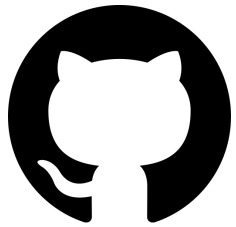


- Ask the repository owner to make a change
- Can comment on and discuss with owner



GITHUB EXTENSIONS TO MERGING

- Fork <https://github.com/bakitybacon/rice-data-and-donuts-github>
- Edit community.txt one more time
- Make a pull request and comment on it!



GISTS

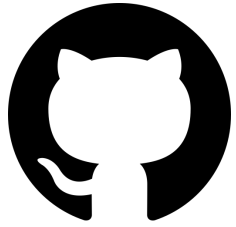
- Snippets of code, text, or anything.
- Linked to your account, not a repository
- Useful if you only have one file!
- Shareable by URL (even in secret mode!)



grej / [enumerate_letters.py](#)

Created 30 seconds ago

```
1  def enumerate_letters(count):
2      """
3      Generates a list of unique capital letter strings accordingly
4      eg. ['A', 'B', ... , 'AA', 'BB', 'CC', ...]
5
6      :param df: number of unique letter strings to return
7      :returns: list <str>: list of capital letter strings
8      """
9
10     lettes_in_alphabet = 26
```



ORGANIZATIONS

- In GitHub, a group of users and projects
- Organizations can make repositories
- Organization owner can manage permissions for all users



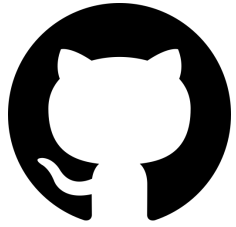
Netflix, Inc.

Netflix Open Source Platform

Los Gatos, California <http://netflix.github.io/>



GoogleChrome



TEAMS

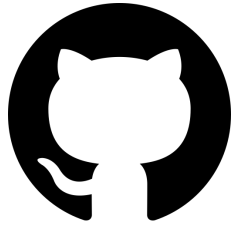
- Subset of an organization
- Generally given an area of expertise (such as design) or a task



[frc461/robot](#)



[frc461/website](#)



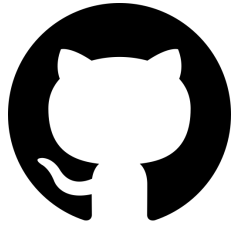
ISSUES

- Pointing out what's wrong
- Hope someone can figure it out!
 - Even if they're not the owner of the repository!
 - The benefit of open source
- Great way to get involved
- Supports discussions, fixes, etc

! Compute metrics on "slices" of the data?
#547 opened 2 days ago by jayleverett

🔥 Want to contribute to pytorch/ignite?

If you have a bug or an idea, read the [contributing guidelines](#) before opening an issue.
If you're ready to tackle some open issues, [we've collected some good first issues for you](#) .



RELEASES

- Basically just a tag for a commit
- Can write a description
 - Markdown, again!
- Link files (pdf of report, for example)

0.23.2

f24c958

0.23.2

bazel-io released this on Mar 11 · 2058 commits to master since this release

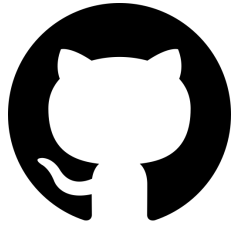
Cherry picks:

- [6ca7763](#) :
Fix a typo
- [2310b1c](#) :
Ignore SIGCHLD in test setup script
- [f9eb1b5](#) :
Complete channel initialization in the event loop
- [f0a1597](#) :
remote: properly reset state when using remote cache. Fixes [#7555](#)
- [56366ee](#) :
Set non-empty values for msvc_env_* when VC not installed

Notice: Bazel installers contain binaries licensed under the GPLv2 with Classpath exception. Those installers should always be redistributed along with the source code.

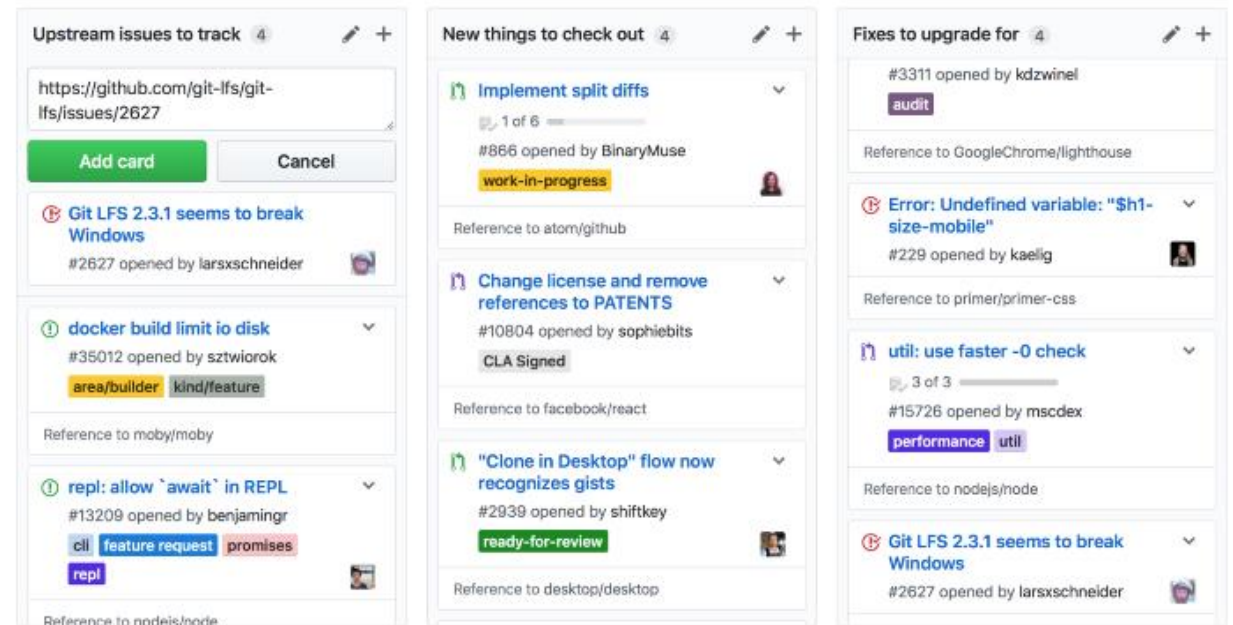
Some versions of Bazel contain a bundled version of OpenJDK. The license of the bundled OpenJDK and other open-source components can be displayed by running the command `bazel license`. The vendor and version information of the bundled OpenJDK can be displayed by running the command `bazel info java-runtime`. The binaries and source-code of the bundled OpenJDK can be [downloaded from our mirror server](#).

Security: All our binaries are signed with our [public key 48457EE0](#).



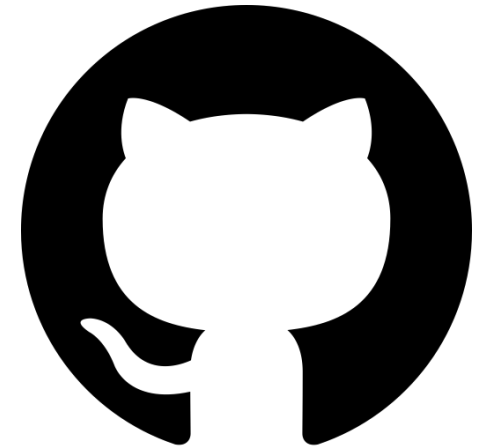
PROJECTS

- Tracking things to do
 - Individual or organizational scale
- Can have issues, pull requests
- Small informational cards



DISTRIBUTED WORK

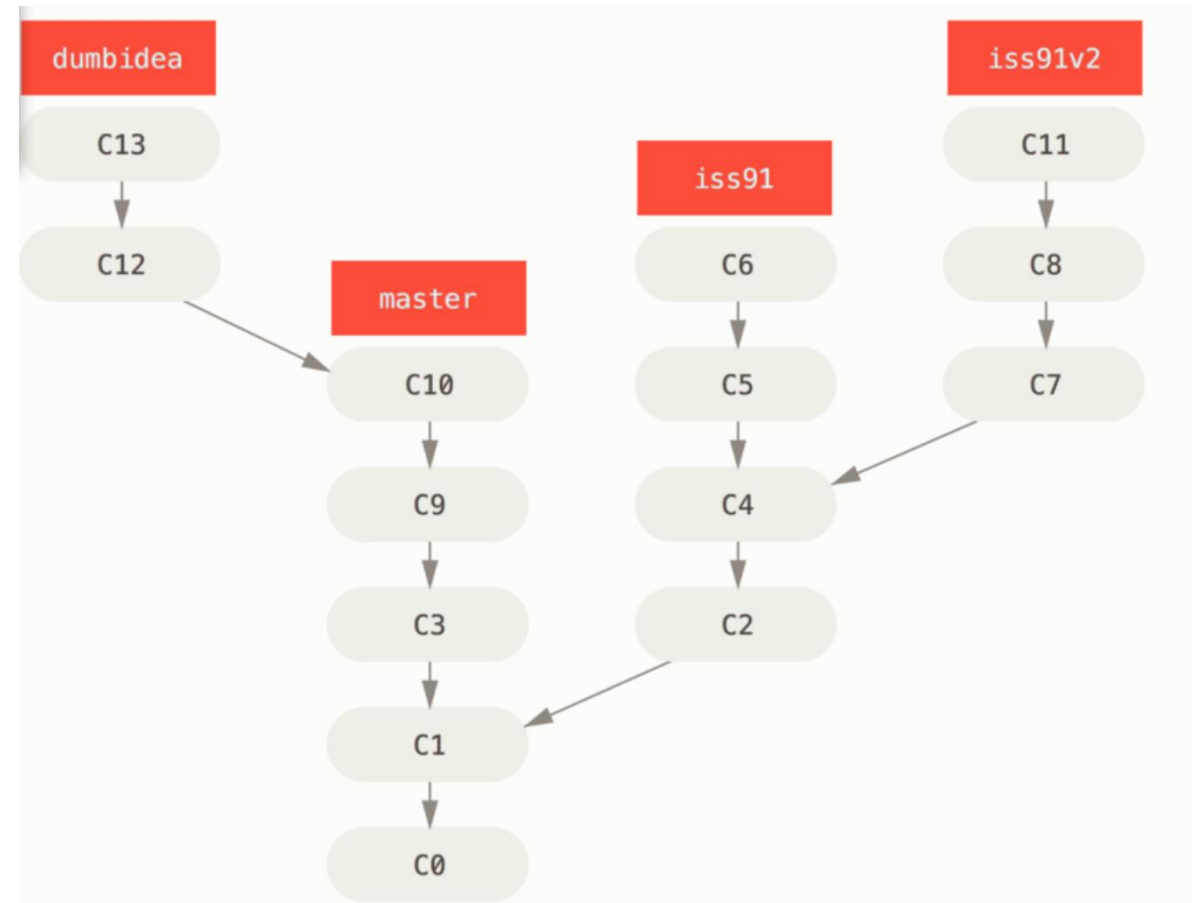
Paradigms for getting the most out of working as a team





BRANCHING WORKFLOWS

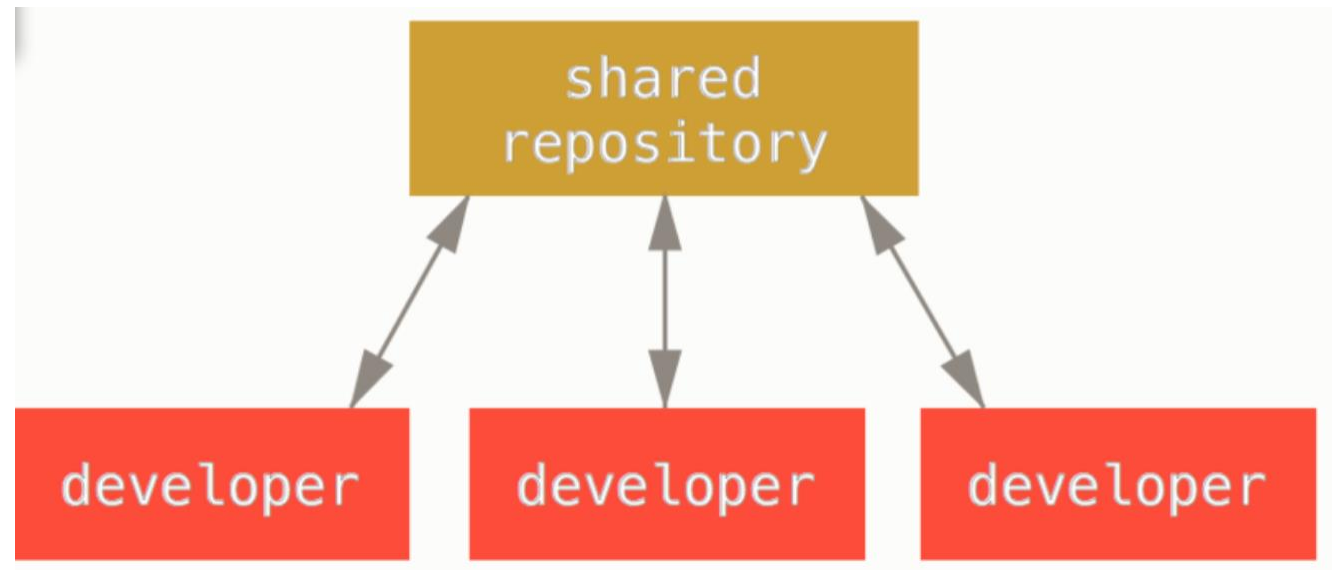
- Not technically distributed
- Try a lot of things out on separate branches & merge!
- Can work on many problems at the same time





CENTRALIZED WORKFLOW

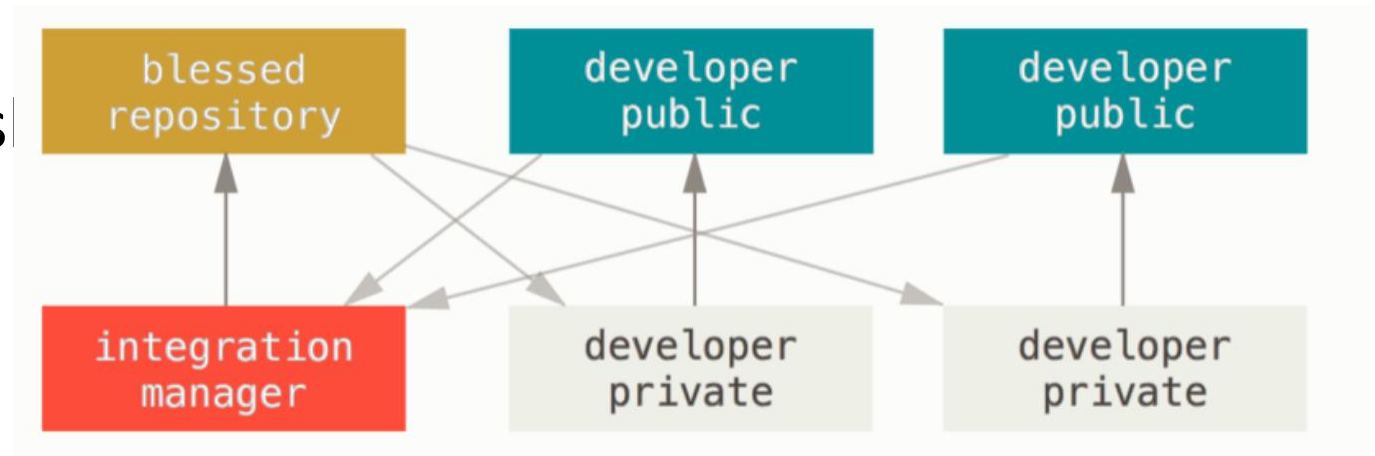
- Everyone is equal
- Leverages branches
- Everyone must merge their own work!
 - What if you don't like how someone else merged?
- No overhead from dedicated integration manager

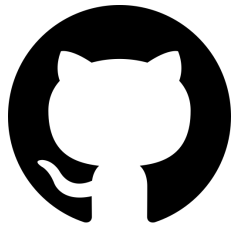




INTEGRATION MANAGER WORKFLOW

- Developers have copies of the “blessed” repository
- They make changes, then ask integration manager to incorporate them
- More overhead
- More accountability





INTEGRATION MANAGER WORKFLOW IN GITHUB

- You can see this workflow in GitHub all the time
- Fork/Merge & Pull Request:
 - Make a copy of a repository
 - Make a change
 - Ask the original repository's owner to “pull” your change into his project

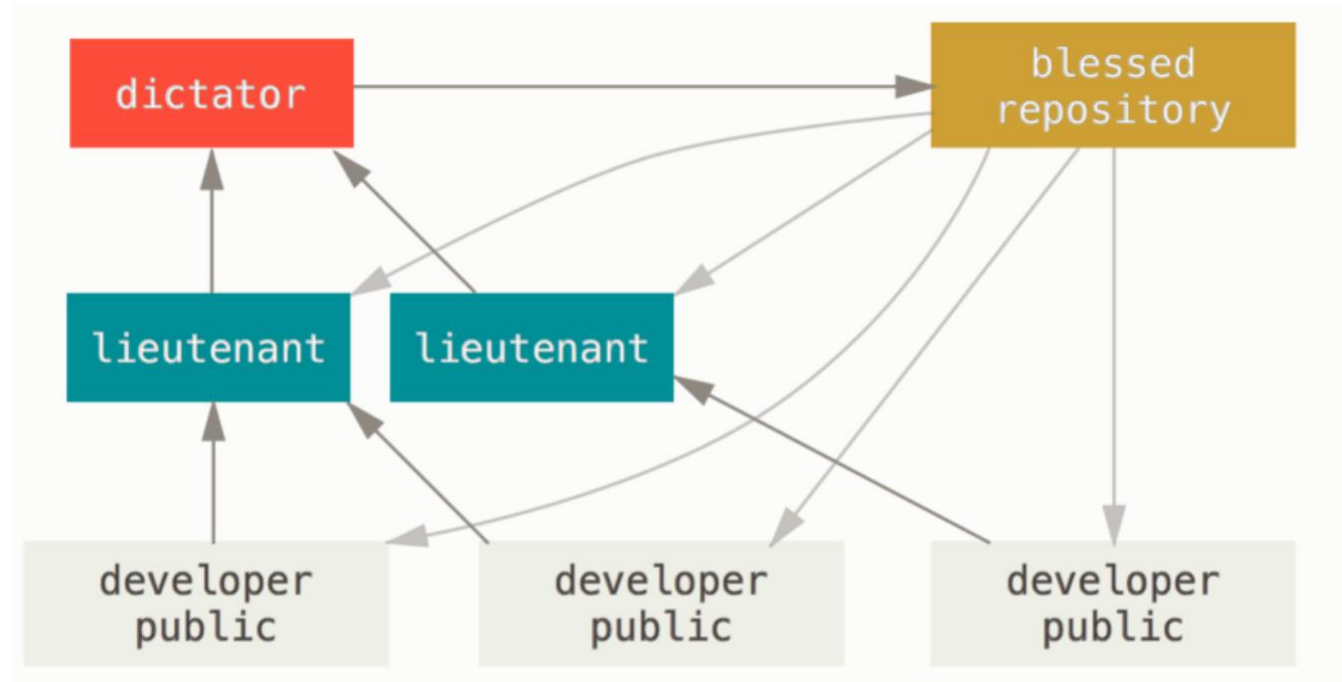
Hwk4 skeleton #7

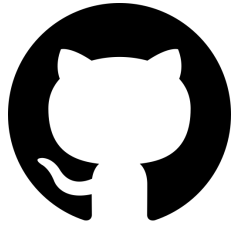
 Open bakitybacon wants to merge 17 commits into `master` from `hwk4_skeleton` 



LIEUTENANT & DICTATOR WORKFLOW

- Essentially the same as integration manager with one more layer to go through
- More overhead, but can use expertise effectively
 - Lieutenant 1 expert in programming, Lieutenant 2 in design, for example





ACKNOWLEDGMENTS

- The figures are taken from Pro Git book, written by Scott Chacon and Ben Straub and published by Apress, used under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
- The GitHub Mark and Octocat are used under their official license (<https://github.com/logos>)
- The Git logo is used under the Creative Commons Attribution 3.0 Unported License.
- Screenshots are taken from GitHub Desktop and Atom.