

CIS-444

Lecture 03 GitHub

Today

- What is git?
- How does git work?
- What is GitHub
- Install git and create a Github account
- Setup git, Github accounts, and push a change

1. What is git?

What is git?

- **Distributed Version Control System**
- Created In 2005
- Created by Linus Torvald to avoid in Linux kernel development

What is version control?

- A system what keeps records of your changes
- Allows for collaborative development
- Allows you to know who made what changes and when
- ****allows you to revert any changes and go back to a previous state****

What is git?

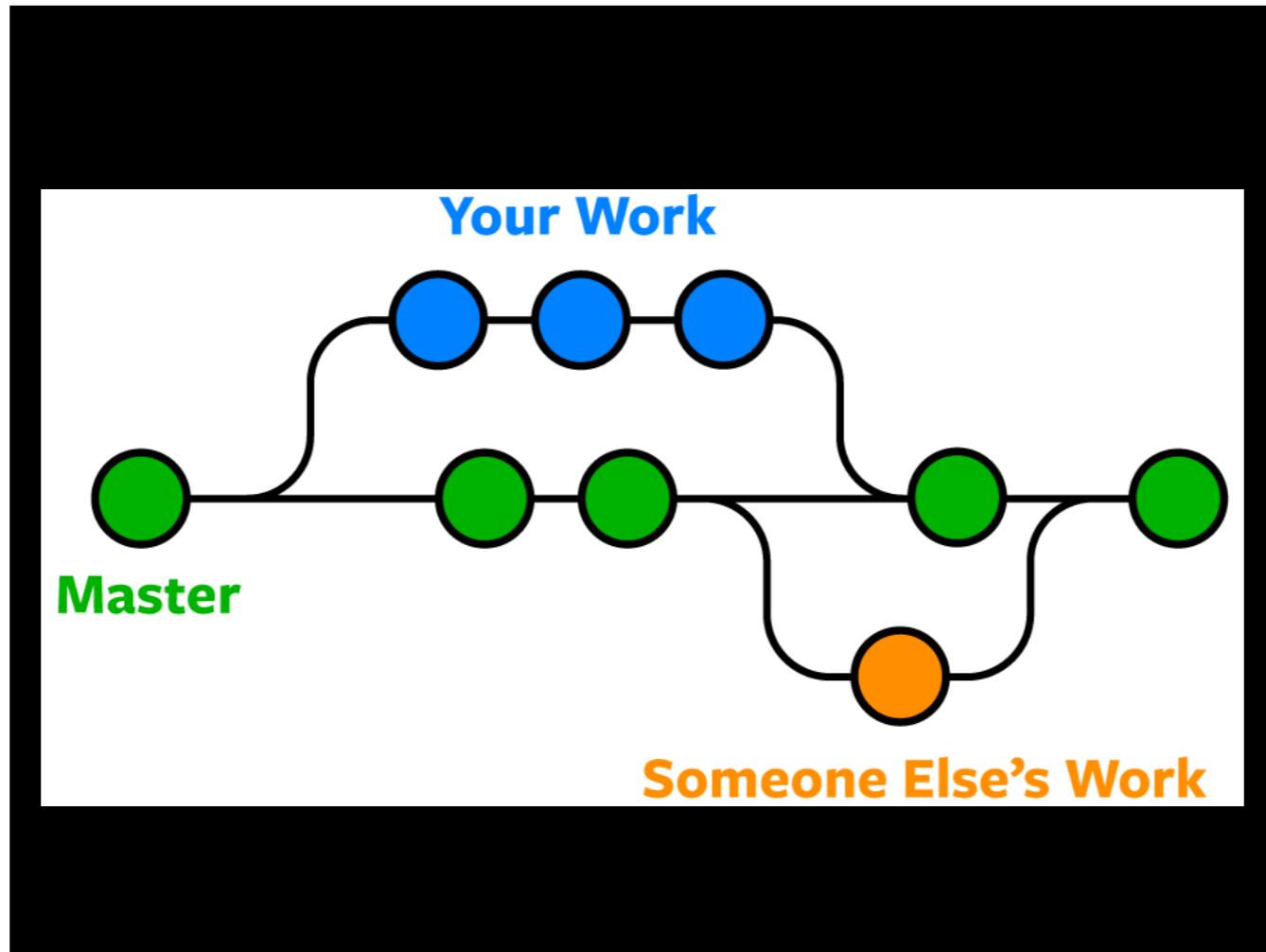
- Distributed version control
- Users keep entire code and history on their location and machines
 - Users can make any changes without internet access
 - Except for pushing and pulling changes from a remote server

- **Distributed Version Control System:** The code which is stored in Git keeps changing as more code is added. Also, many developers can add code in parallel. So Version Control System helps in handling this by maintaining a history of what changes have happened. Also, Git provides features like branches and merges, which I will be covering later.

What is git

- Git isn't the only version control system
- But (for now) it is the best (this slide may not age well)
- More than 70 percent of developers use Git, making it the most-used VCS in the world. Git is commonly used for both open source and commercial software development, with significant benefits for individuals, teams and businesses.

Ok, cool, but why do
we need git? 🤔



Real life projects generally have multiple developers working in parallel. So a version control system like Git is needed to ensure there are no code conflicts between the developers.

Additionally, the requirements in such projects change often. So a version control system allows developers to revert and go back to an older version of the code.

Sometimes several projects which are being run in parallel involve the same codebase. In such a case, the concept of branching in Git is very important.

3. How does git work?

How does git work?

- Can be complicated at first but there are a few key concepts
- Important git terms in the following slides are in **BLUE**

Snapshots

- Snapshots, in git, are synonymous with “commits”
- Every time you commit to a git repo, you are saving a snapshot of all the files in your repo
- The way git keeps track of your code history
- Essentially records what our files look like at a given point in time
- You decide when to take a snapshot and of what files
- You have the ability to go back to visit any snapshot

Commit

- The act of creating a snapshot
- Can be a noun or a verb
 - “I just committed code”
 - “I just made a new commit”
- Essentially, a project is made up of a bunch of commits

A **commit** contains 3 pieces of information:

1. Information about how the files changed from previously
2. A reference to the commit that came before it (called the **parent commit**)
3. A hash code name (ex:
`b237ff0225567a6feabf84158d7aa7b44abf38b8`)

A **commit** contains 3 pieces of information:

The screenshot shows a GitHub commit details page for a commit made on January 17, 2020, at 1:08:06 PM EST. The commit message is "Updating outgoing messages to use the new encrypted message structure". The commit metadata includes the commit hash (b237ff02), parents (3ca2b3a3cb), author (Jeffrey Decker <deckerjeffreyr@gmail.com>), date (January 17, 2020 at 1:08:06 PM EST), and commit date (January 20, 2020 at 1:09:05 PM EST). The commit has 3 additions and 0 deletions across 5 files.

Sorted by path ▾ ⚙ ▾

apps/appliance-manager/appliance-api/src/messages/appliance_message.rs
apps/appliance-manager/appliance-api/src/messages/companion_session.rs
apps/appliance-manager/appliance-api/src/messages/message_out.rs
apps/appliance-manager/appliance-api/src/networking/bluetooth.rs
apps/appliance-manager/appliance-api/src/networking/mod.rs

1. I...
2. A...
3. A...

Updating outgoing messages to use the new encrypted message structure

Commit: b237ff0225567a6feabf84158d7aa7b44abf38b8 [b237ff02]
Parents: 3ca2b3a3cb
Author: Jeffrey Decker <deckerjeffreyr@gmail.com>
Date: January 17, 2020 at 1:08:06 PM EST
Commit Date: January 20, 2020 at 1:09:05 PM EST

Repositories

- Often shortened to **repo**
- A collection of all the files and the history of those files
 - Consists of all your commits
 - Place where all your work is stored

- A Git repository (or repo for short) contains all of the project files and the entire revision history. You'll take an ordinary folder of files (such as a website's root folder), and tell Git to make it a repository. This creates a .git subfolder, which contains all of the Git metadata for tracking changes.

- On Unix-based operating systems such as macOS, files and folders that start with a period (.) are hidden, so you will not see the .git folder in the macOS Finder unless you show hidden files, but it's there! You might be able to see it in some code editors.

(sidebar) How to see hidden files and folders on a Mac (option #1):

The Quickest Way to Show/Hide Hidden Files

Since the release of macOS Sierra, when in Finder, it is now possible to use the shortcut:

CMD + SHIFT + .

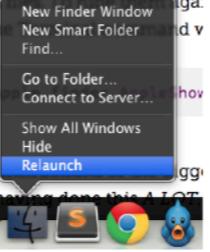
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(sidebar) How to see hidden files and folders on a Mac (option #2):

Show/Hide Hidden Files the Long Way

The long way to show hidden Mac OS X files is as follows:

1. Open Terminal found in Finder > Applications > Utilities
2. In Terminal, paste the following: `defaults write com.apple.finder AppleShowAllFiles YES`
3. Press return
4. Hold the 'Option/alt' key, then right click on the Finder icon in the dock and click Relaunch.



Relaunch Finder by right clicking the Finder Icon whilst holding the 'Option/alt' key

This will show all hidden files. To hide them again, follow the same steps but replace the Terminal command with:

```
defaults write com.apple.finder AppleShowAllFiles NO
```

- A Git repository (or repo for short) contains all of the project files and the entire revision history. You'll take an ordinary folder of files (such as a website's root folder), and tell Git to make it a repository. This creates a .git subfolder, which contains all of the Git metadata for tracking changes.
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Repositories

- Can live on a local machine or on a remote server (Like **GitHub!**)
- The act of copying a repository from a remote server is called **cloning**
- **Cloning** from a remote server allows teams to work together

Repositories

- The process of downloading commits that don't exist on your machine from a remote repository is called **pulling** changes
- The process of adding your local changes to the remote repository is called **pushing** changes

Branches

- All commits in git live on some branch
- But there are usually many, many, many branches
- The main branch in a project is called the **master** branch

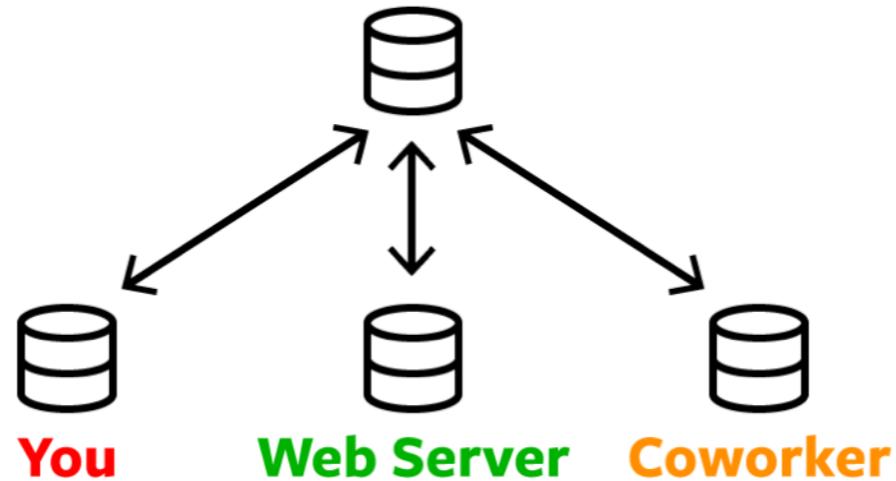
What is GitHub?

What is GitHub?

- An online host that stores a copy of your Git repository (repo)
- Gives you a centrally located place where you can upload your changes and download changes from others
- Allows you to collaborate more easily with other developers

What is GitHub?

GitHub, Bitbucket, etc.



**3. Install git, git GUI, and
create GitHub account**

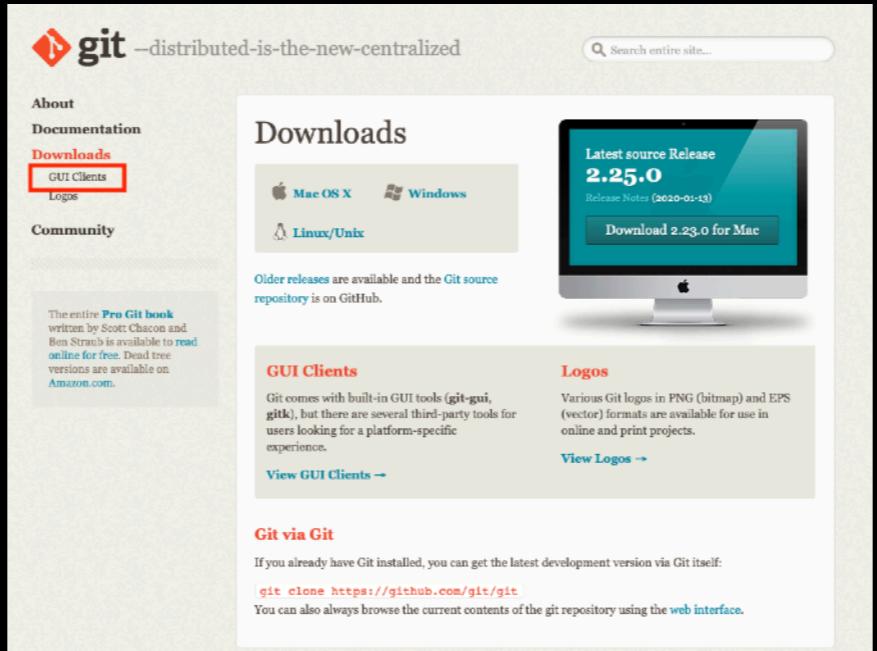
Install Git

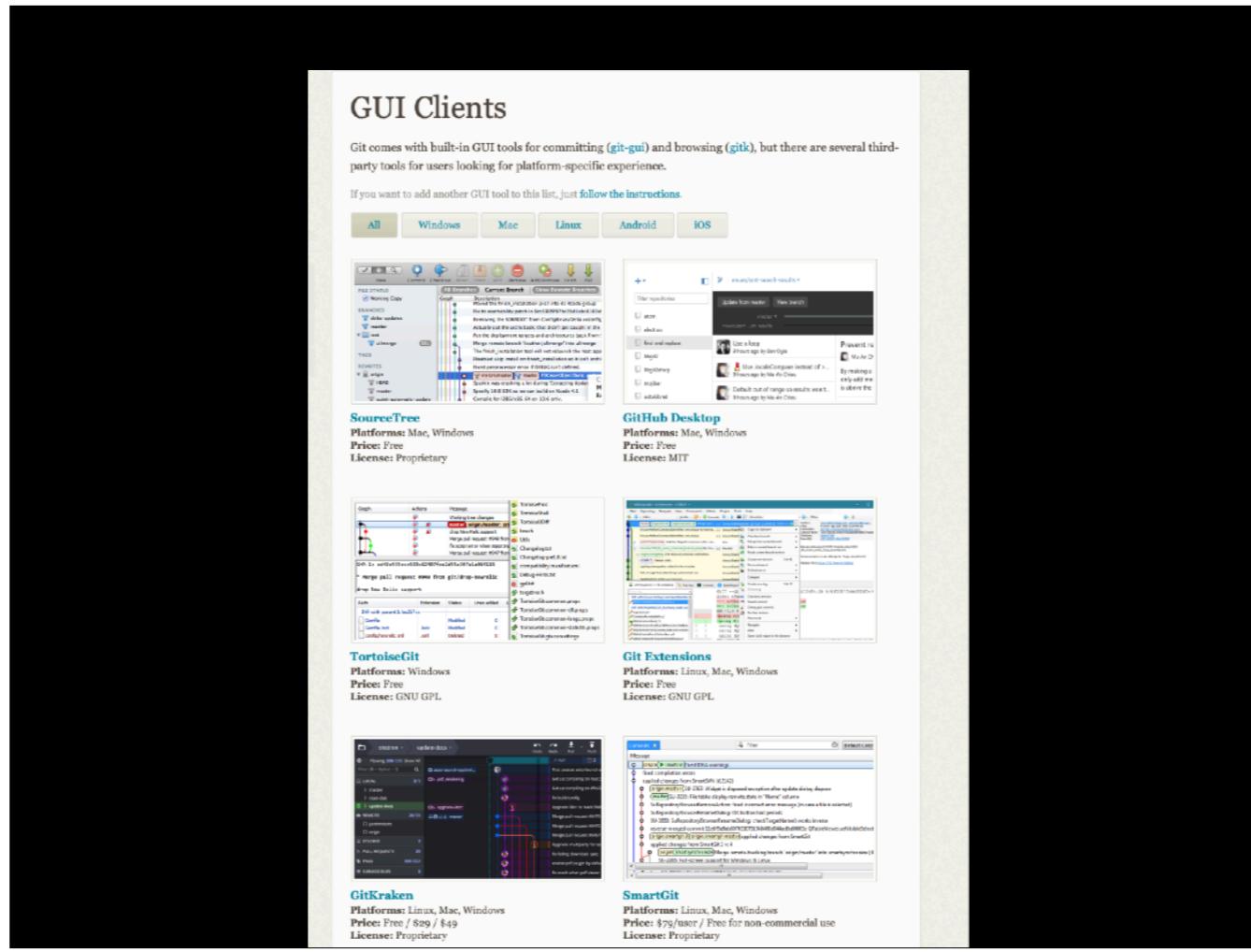
[https://git-scm.com/
downloads](https://git-scm.com/downloads)

Install Git

The screenshot shows the official Git website's "Downloads" page. At the top, there's a navigation bar with links for "About", "Documentation", "Downloads", and "Community". Below the navigation, there's a sidebar with information about the "Pro Git book" and links for "GUI Clients" and "Logos". The main content area features a large image of a computer monitor displaying the latest source release version 2.25.0. Below the monitor, there are sections for "GUI Clients" (with a link to "View GUI Clients") and "Logos" (with a link to "View Logos"). At the bottom, there's a section for "Git via Git" with a command-line link to "git clone https://github.com/git/git".

Install Git GUI





Create Github Account

- www.github.com
- Free for public repositories



**Setup your Name and
Email**

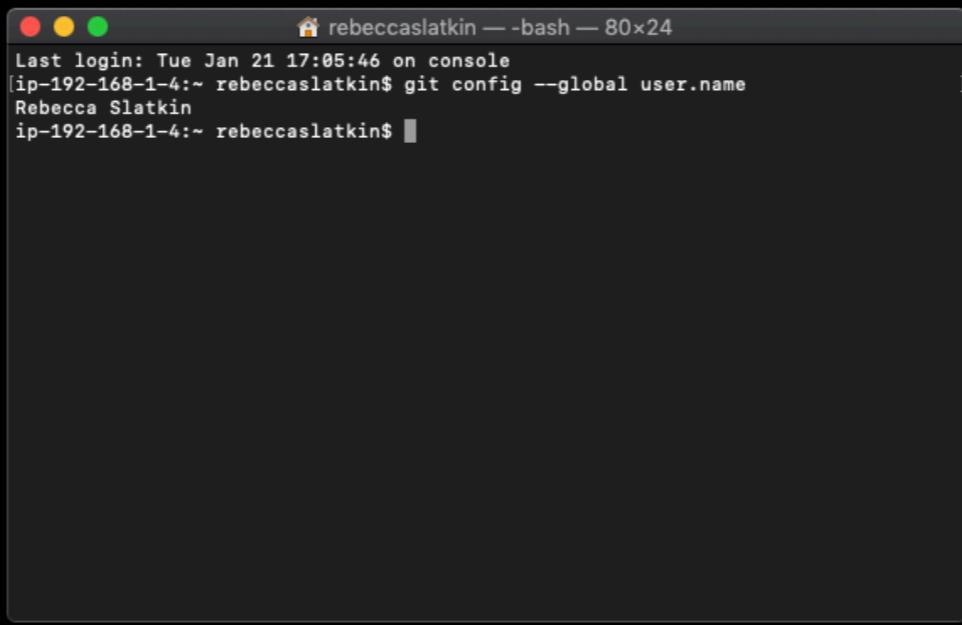
Set your Name

- ★ Git uses a username to associate commits with an identity. The Git username is not the same as your GitHub username.

1. Open terminal
2. Set a Git username:

- ★ `git config --global user.name "Rebecca Slatkin"`

Set your Name

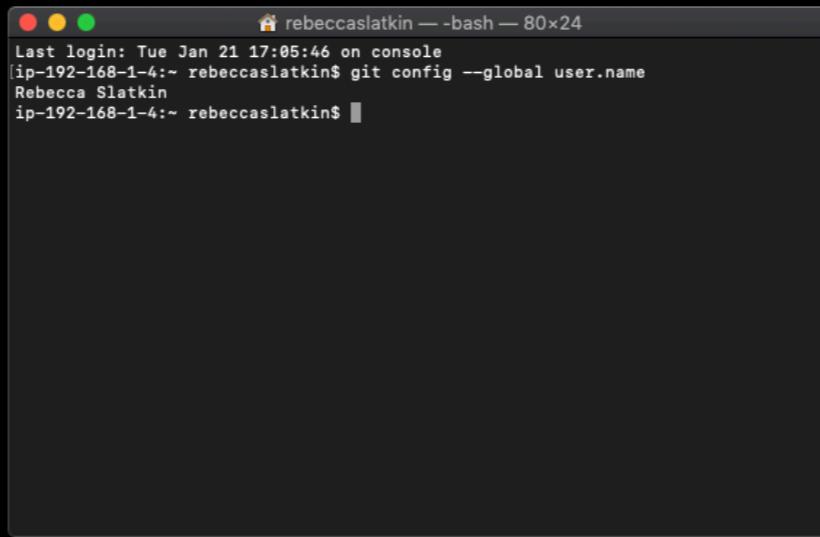


```
rebeccaslatkin — bash — 80x24
Last login: Tue Jan 21 17:05:46 on console
[ip-192-168-1-4:~ rebeccaslatkin$ git config --global user.name
Rebecca Slatkin
ip-192-168-1-4:~ rebeccaslatkin$ ]
```

Confirm your Name

- ★ Confirm that you have set the git username correctly:

- ★ **Git config — global user.name**



```
Last login: Tue Jan 21 17:05:46 on console  
[ip-192-168-1-4:~ rebeccaslatkin$ git config --global user.name  
Rebecca Slatkin  
ip-192-168-1-4:~ rebeccaslatkin$ ]
```

Set your Email

- To make your life easier, use the email you setup your GitHub with:

```
git config --global user.email "your_email@whatever.com"
```

Confirm your email


```
rebeccaslatkin — bash — 80x24
[ip-192-168-1-4:~ rebeccaslatkin$ git config --global user.email
rslatkin@junelife.com
ip-192-168-1-4:~ rebeccaslatkin$ ]
```

Authenticate with GitHub from Git

- When you connect to a GitHub repository from Git, you'll need to authenticate using either HTTPS or SSH

Connecting over HTTPS (for now)

- Not ideal but if you're switching computers frequently, this is best.
- If you clone with HTTPS, you can cache your GitHub password in Git using a credential helper

What is Forking?

What is Forking?

- Creating a “fork” is producing a personal copy of someone else’s project
- Forks act as a sort of bridge between the original repo and your personal copy
- You can submit Pull Requests to help make other people’s projects better by offering your changes up to the original project

**Navigate to our GitHub
Organization:**

**[https://github.com/
SyracuseUniversity-CIS444](https://github.com/SyracuseUniversity-CIS444)**

Select Coding-Assignment-01

Syracuse University CIS 444
RCSlatki@syr.edu

Repositories 2 Packages People 1 Teams Projects Settings

Find a repository... Type: All Language: All Customize pins New

Coding-Assignment-01
Test Coding Assignment
Swift 0 ★1 ①0 0 Updated 16 minutes ago

CIS-444
CIS-444
1 ★6 ①0 0 Updated 6 days ago

Top languages
Swift

People 1 >
Invite someone

Fork Coding-Assignment-01

The screenshot shows a GitHub repository page. At the top, there is a green button labeled "Read the guide". Below the header, the repository name is "SyracuseUniversity-CIS444 / Coding-Assignment-01". To the right of the repository name are buttons for "Watch" (0), "Unstar" (1), and "Fork" (0), with the "Fork" button highlighted by a red box. Below these buttons is a navigation bar with links for "Code", "Issues (0)", "Pull requests (0)", "Actions", "Projects (0)", "Wiki", "Security", "Insights", and "Settings".

The main content area displays the repository details: "Test Coding Assignment", "Manage topics", and a summary bar showing "2 commits", "1 branch", "0 packages", "0 releases", and "1 contributor". Below this is a commit list:

RebeccaStakin03	init commit	Latest commit 7818ff17 18 minutes ago
Test-444-1	init commit	18 minutes ago
README.md	Initial commit	30 minutes ago

Below the commit list is a file viewer for "README.md" containing the text "Coding-Assignment-01". At the bottom of the page, there is a footer section with the text "Test Coding Assignment".

Post Fork State:

The screenshot shows a GitHub repository page for a forked repository. The repository is named `RebeccaSlatkin03 / Coding-Assignment-01`, which is a fork from `SyracuseUniversity-CIS444/Coding-Assignment-01`. The page displays the following statistics:

- Code: 2 commits
- Pull requests: 0
- Actions: 0
- Projects: 0
- Wiki: 0
- Security: 0
- Insights: 0
- Settings: 0

Branch: master

Test Coding Assignment

Manage topics

2 commits | 1 branch | 0 packages | 0 releases | 1 contributor

This branch is even with SyracuseUniversity-CIS444:master.

RebeccaSlatkin03 init commit | Latest commit 7818ff7 25 minutes ago

Test-444-1 | init commit | 25 minutes ago

README.md | Initial commit | 37 minutes ago

README.md

Coding-Assignment-01

Test Coding Assignment

Clone or download

The repository contains two commits: "init commit" by `RebeccaSlatkin03` and "Initial commit" by `Test-444-1`. The README.md file is present with its initial commit.

**Clone the repo to your
repository via terminal or
SourceTree**

How to clone via SourceTree

RebeccaSlatkin03 / Coding-Assignment-01
forked from SyracuseUniversity-CIS444/Coding-Assignment-01

Code Pull requests 0 Actions Projects 0 Wiki Security Insights Settings

Test Coding Assignment Edit

Manage topics

2 commits 1 branch 0 packages 0 releases 1 contributor

Branch: master New pull request Create new file Upload files Find file Clone or download

This branch is even with SyracuseUniversity-CIS444:master.

RebeccaSlatkin03 init commit

Test-444-1 init commit

README.md Initial commit

README.md

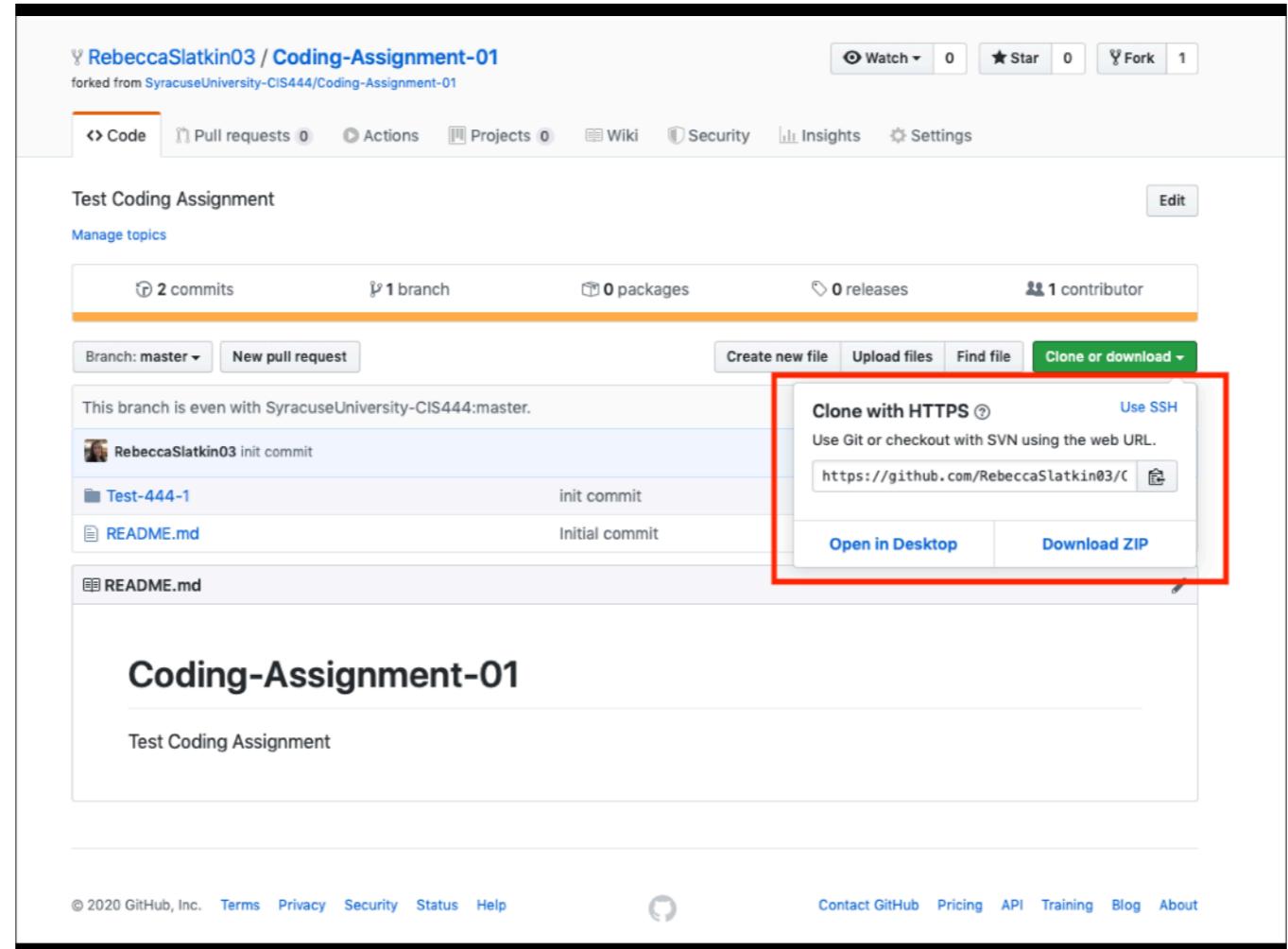
Clone with HTTPS Use SSH
Use Git or checkout with SVN using the web URL.
<https://github.com/RebeccaSlatkin03/Coding-Assignment-01>

Open in Desktop Download ZIP

Coding-Assignment-01

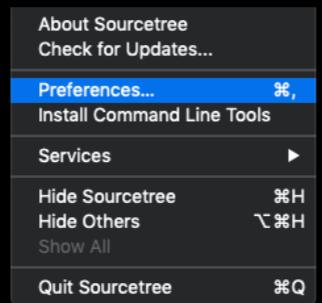
Test Coding Assignment

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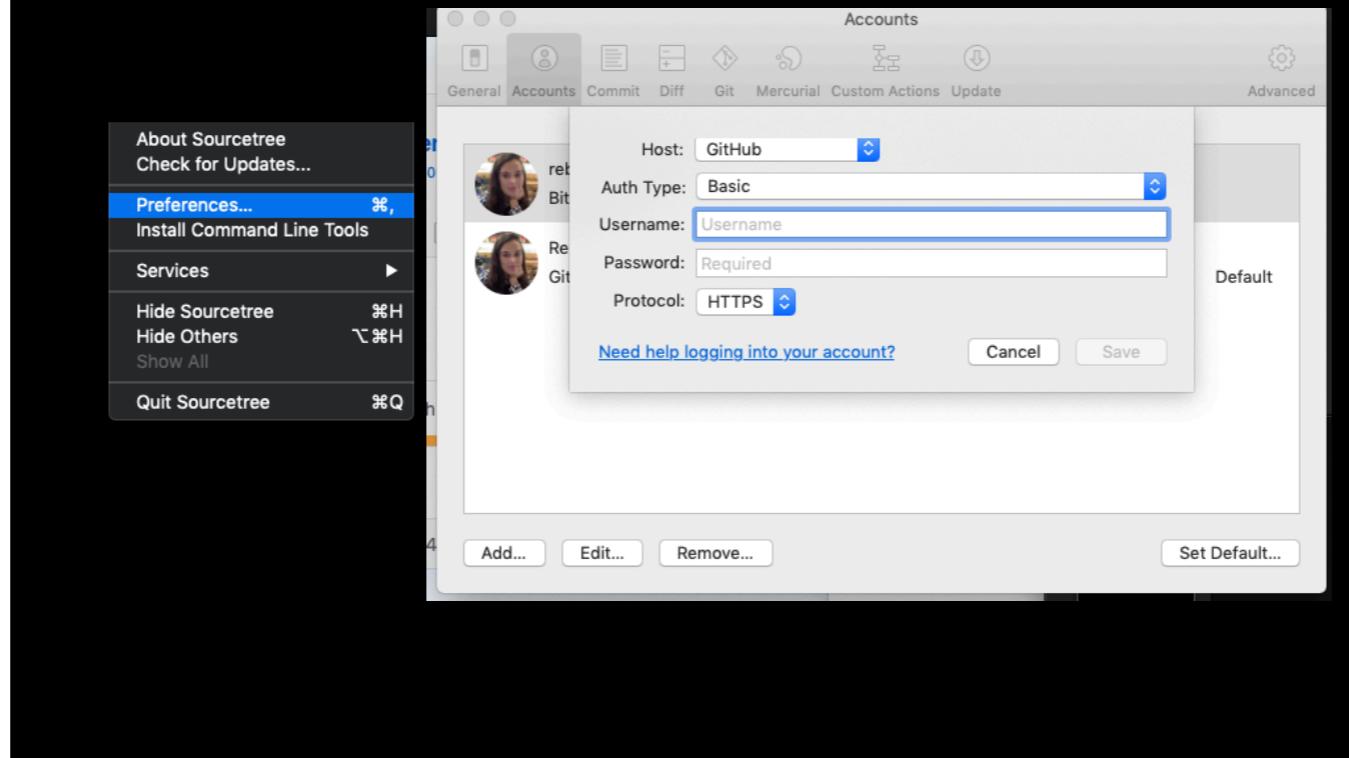


**Navigate to
SourceTree**

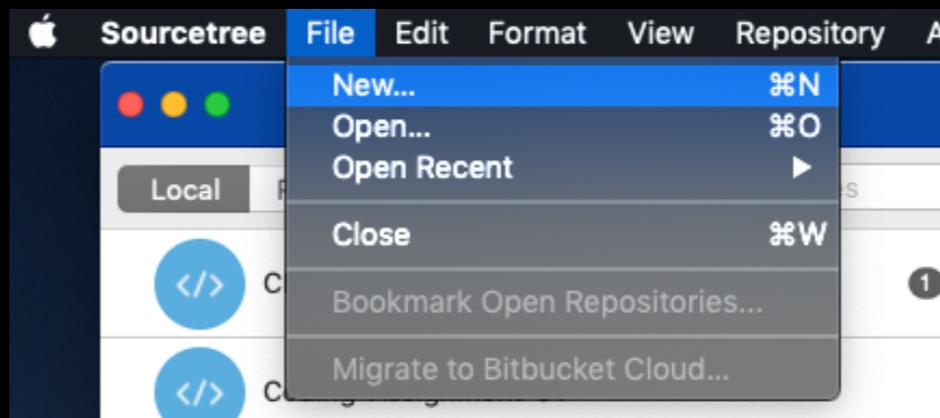
SourceTree > Preferences



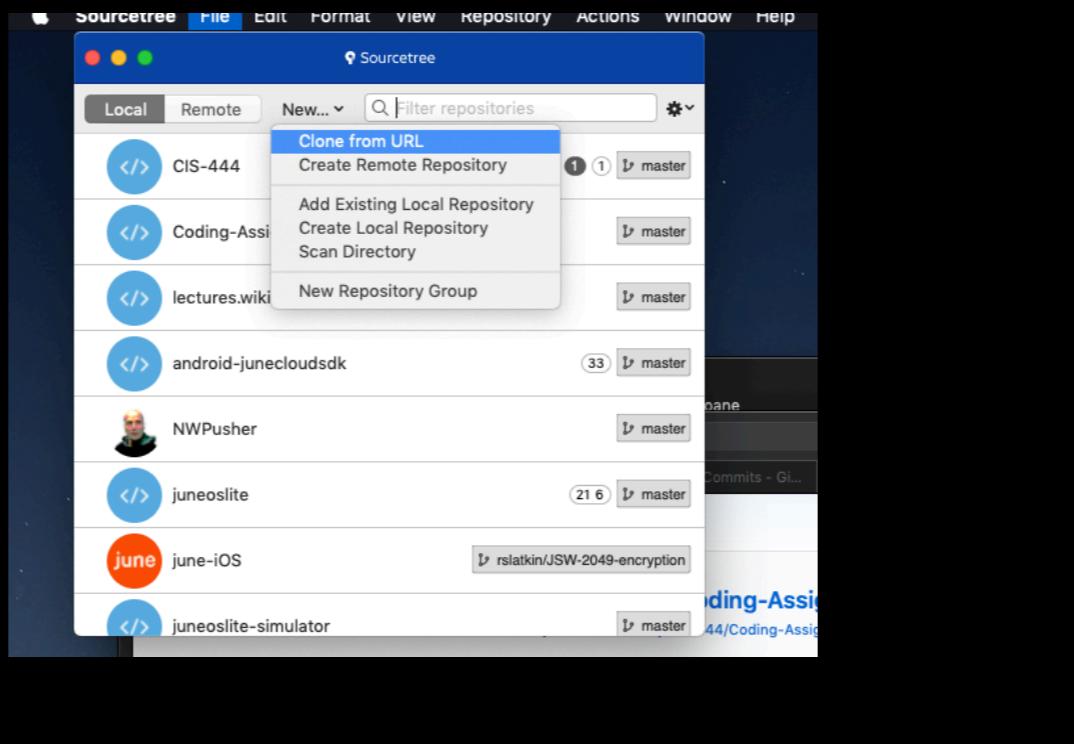
SourceTree > Preferences



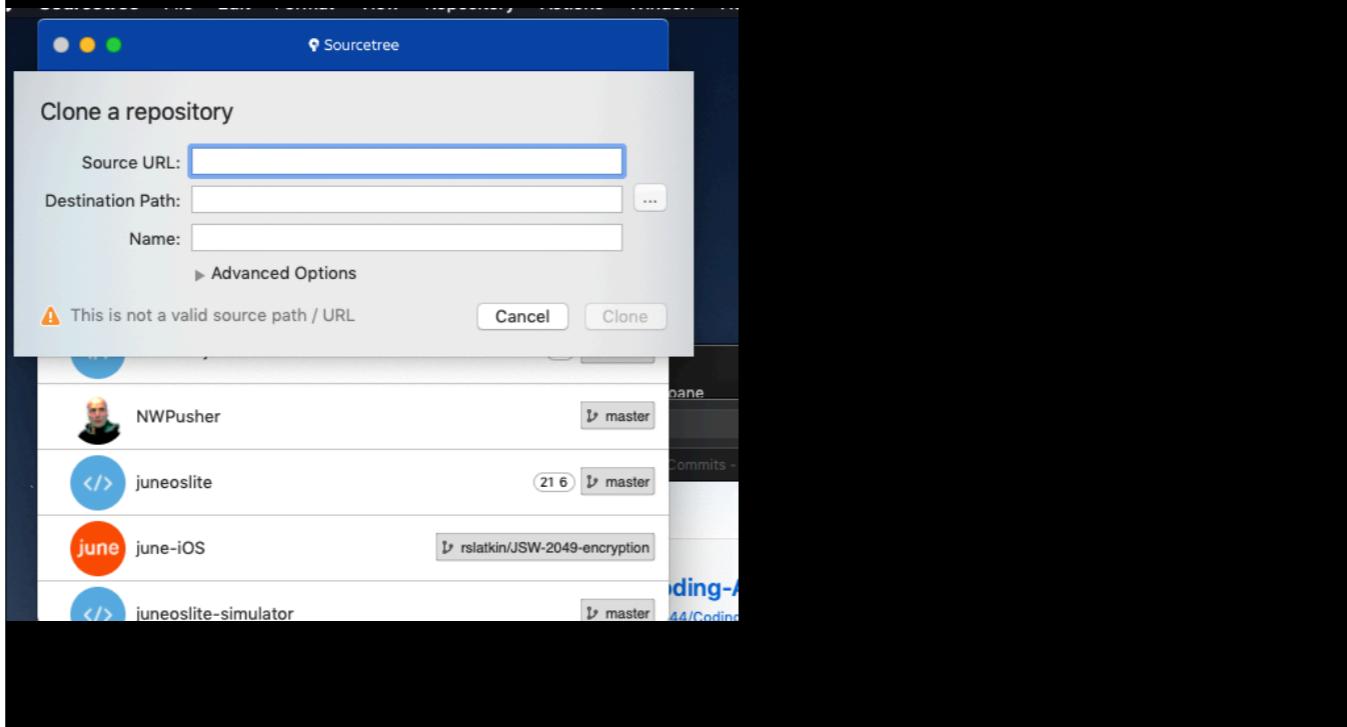
Clone your Repository:



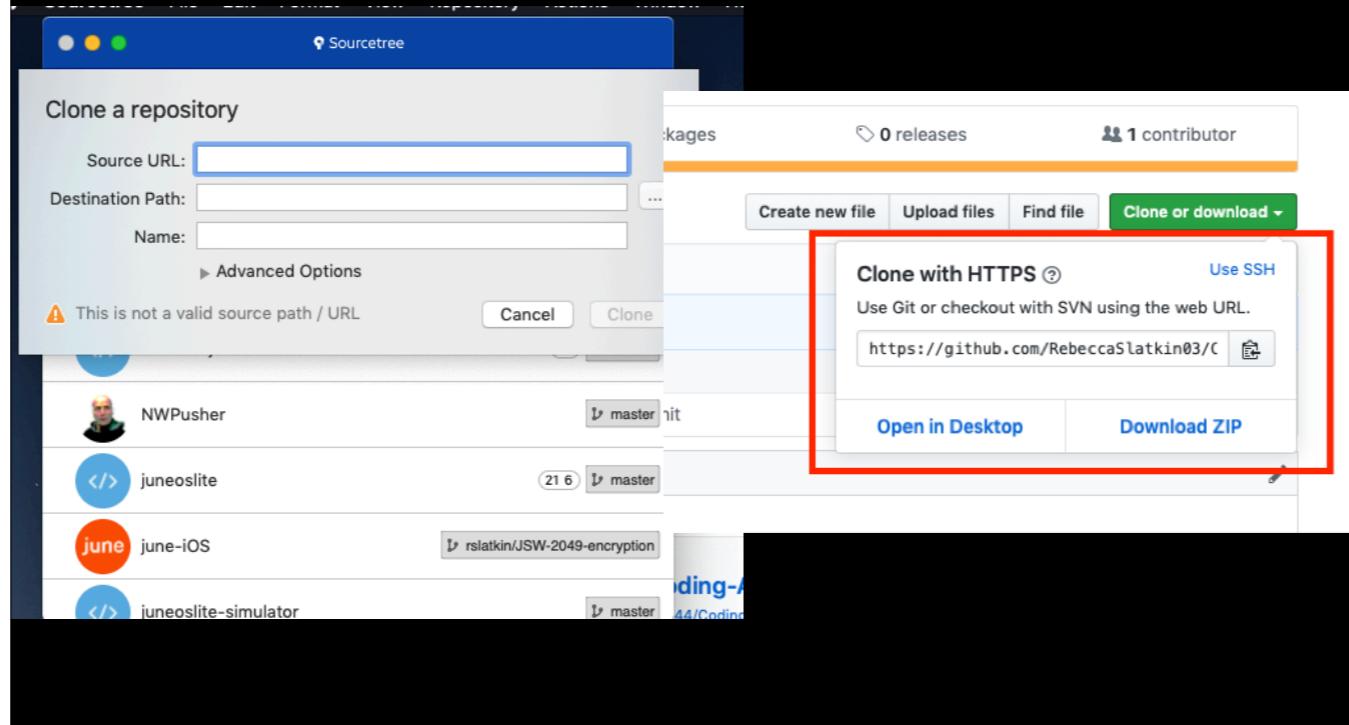
Select: Clone from URL



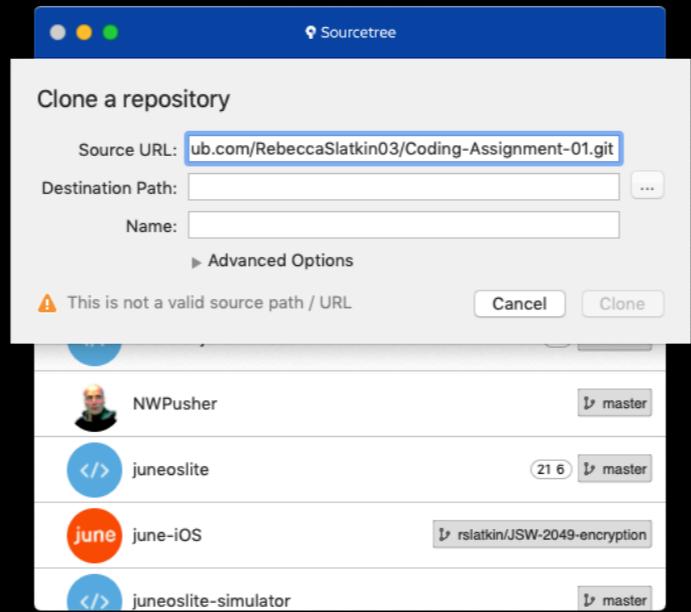
Repository Settings:



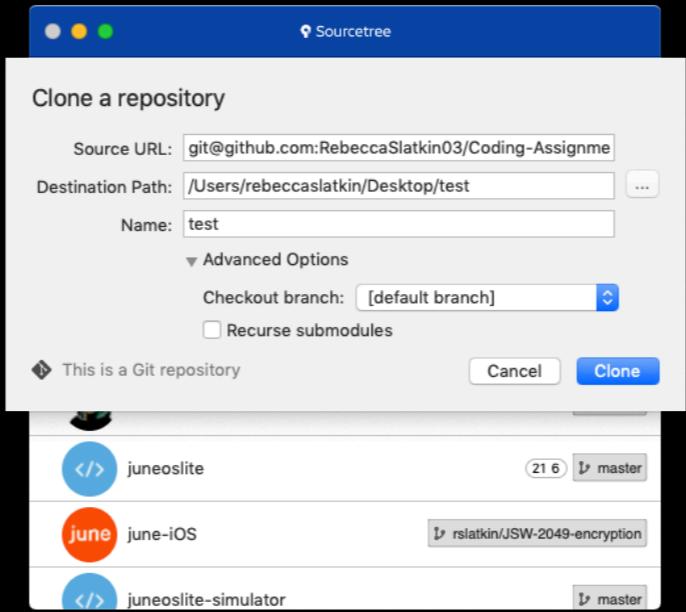
Repository settings:



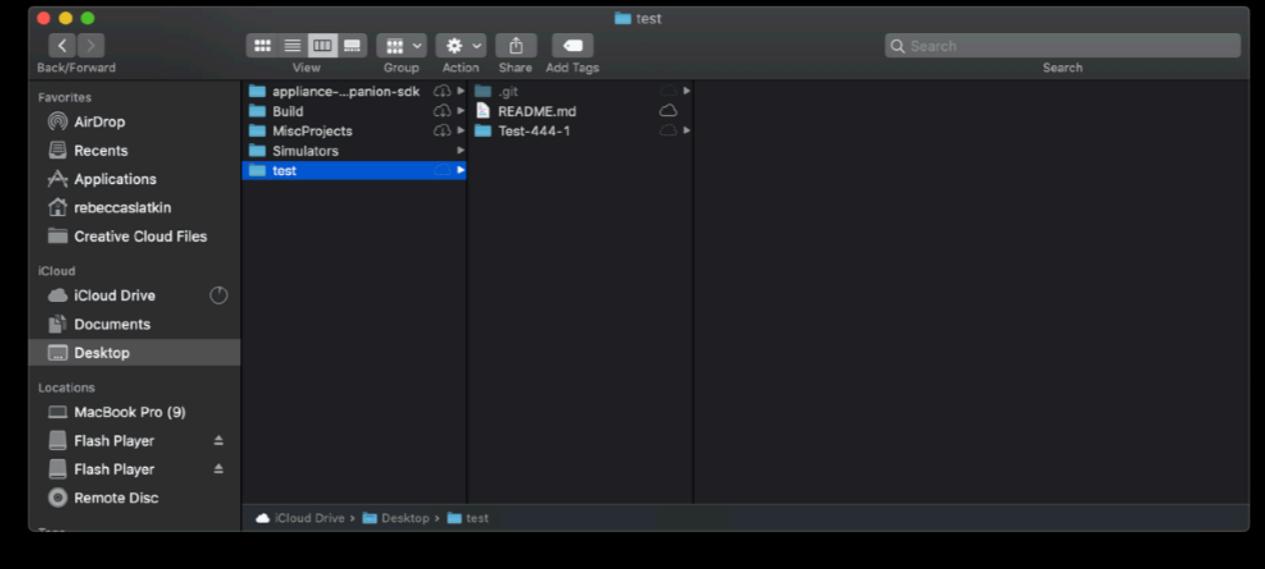
Repository Settings:



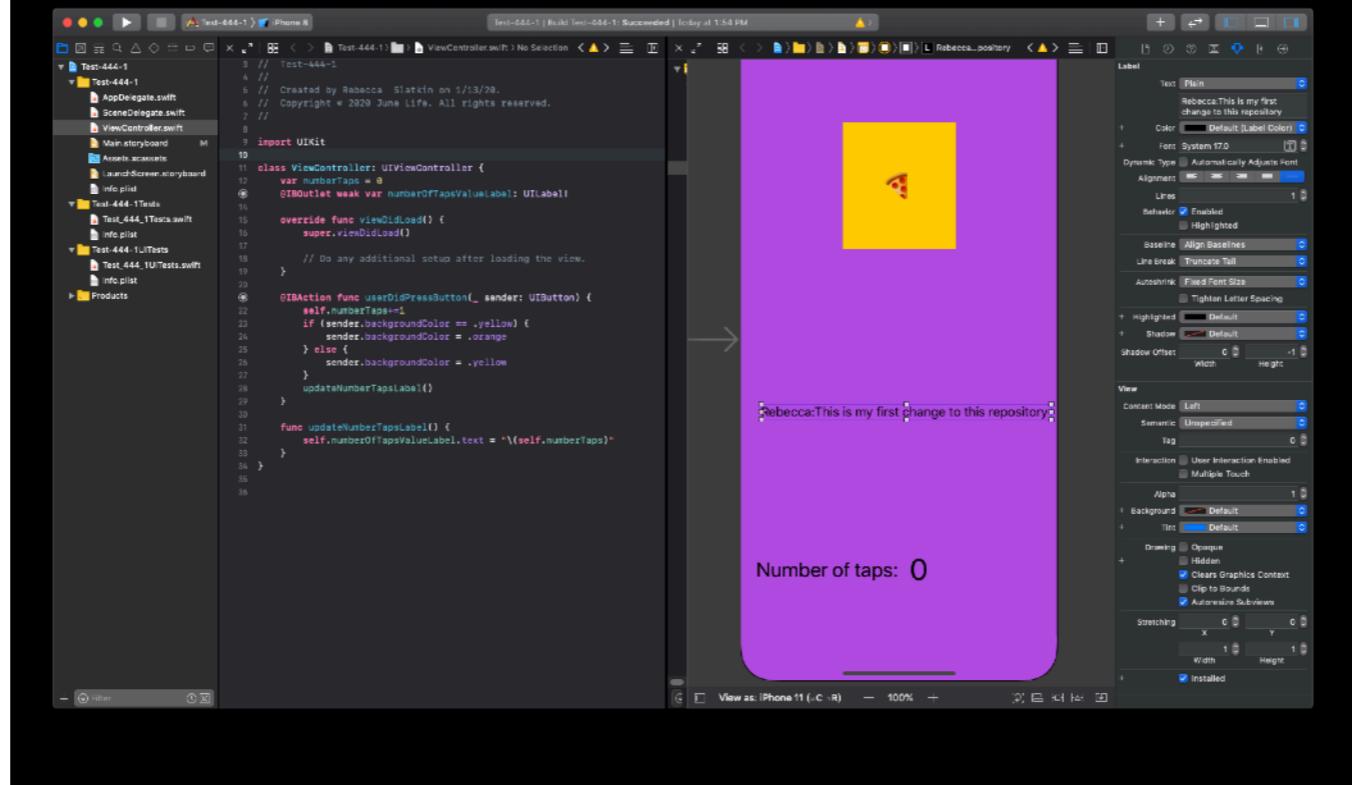
Clone Repo:



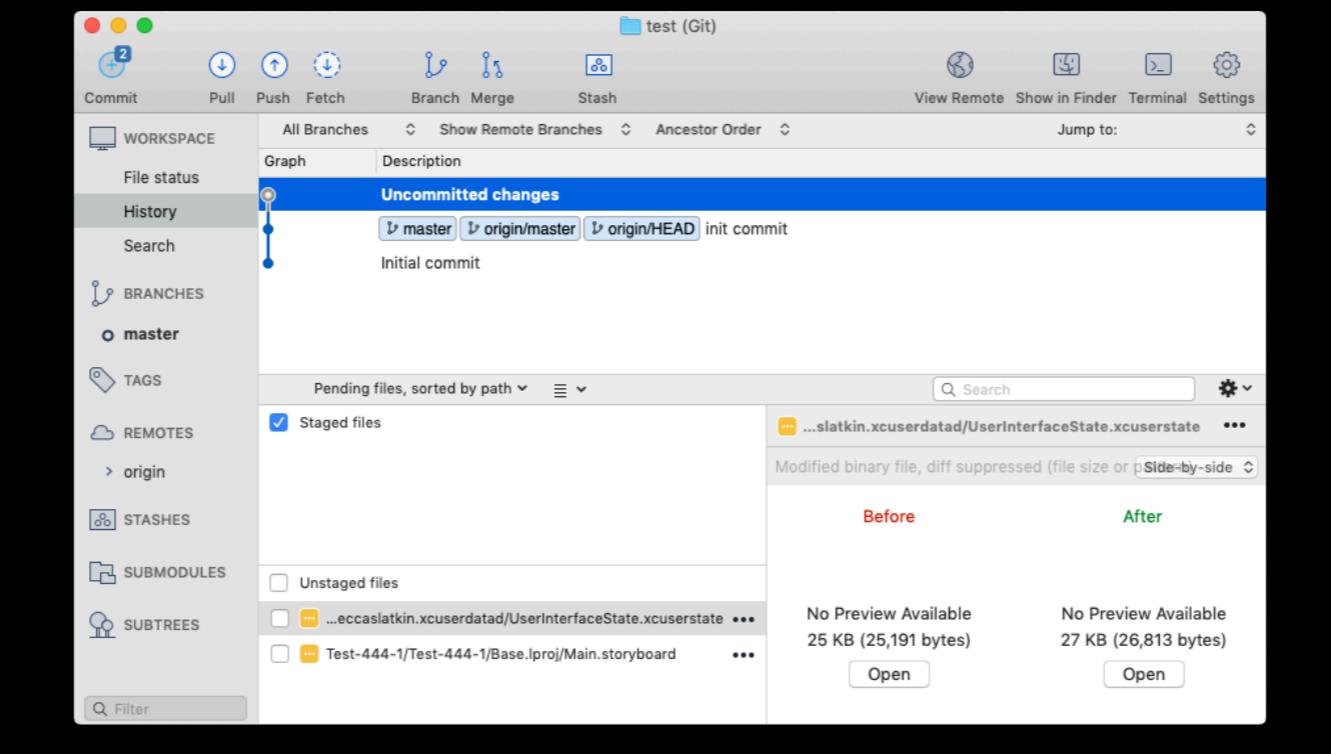
Navigate to the project locally:



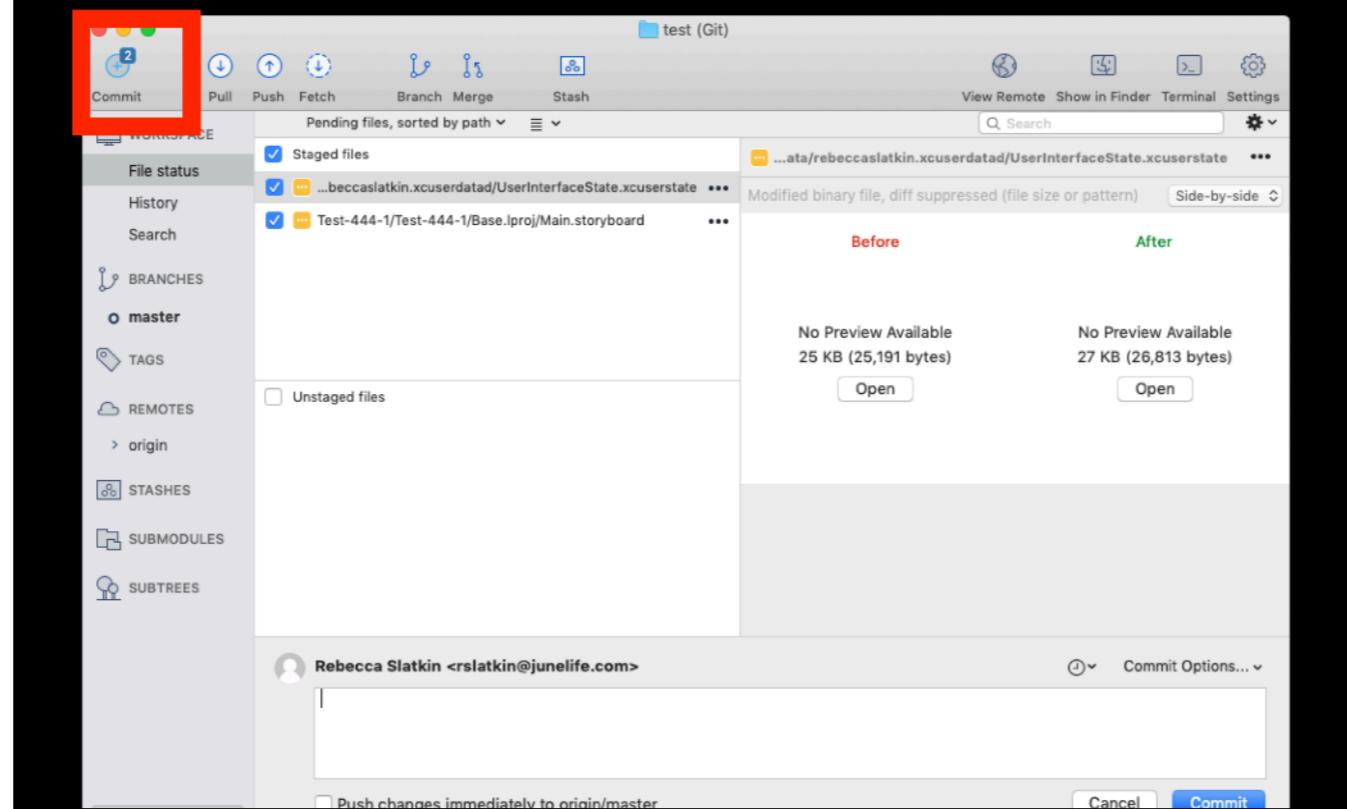
Modify Project:



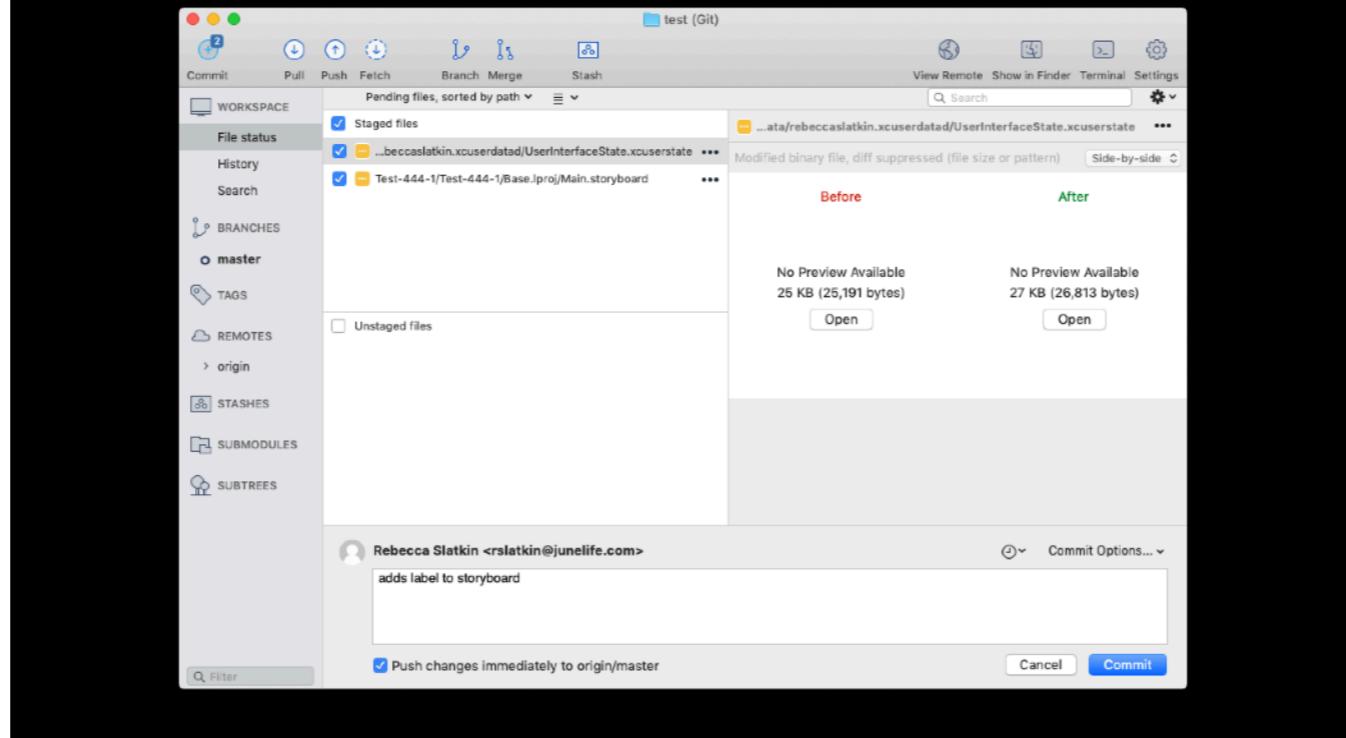
View changes in SourceTree:



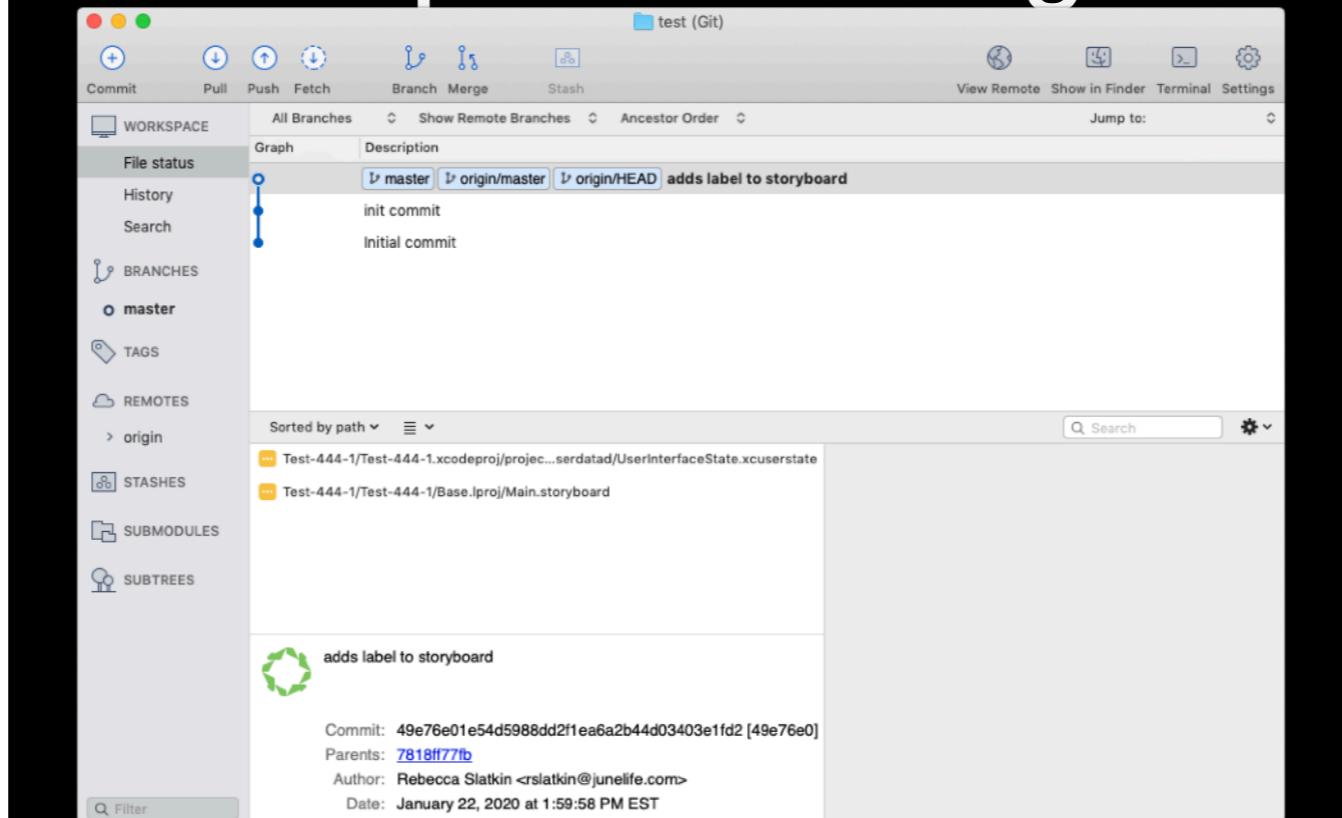
Select changed to commit:



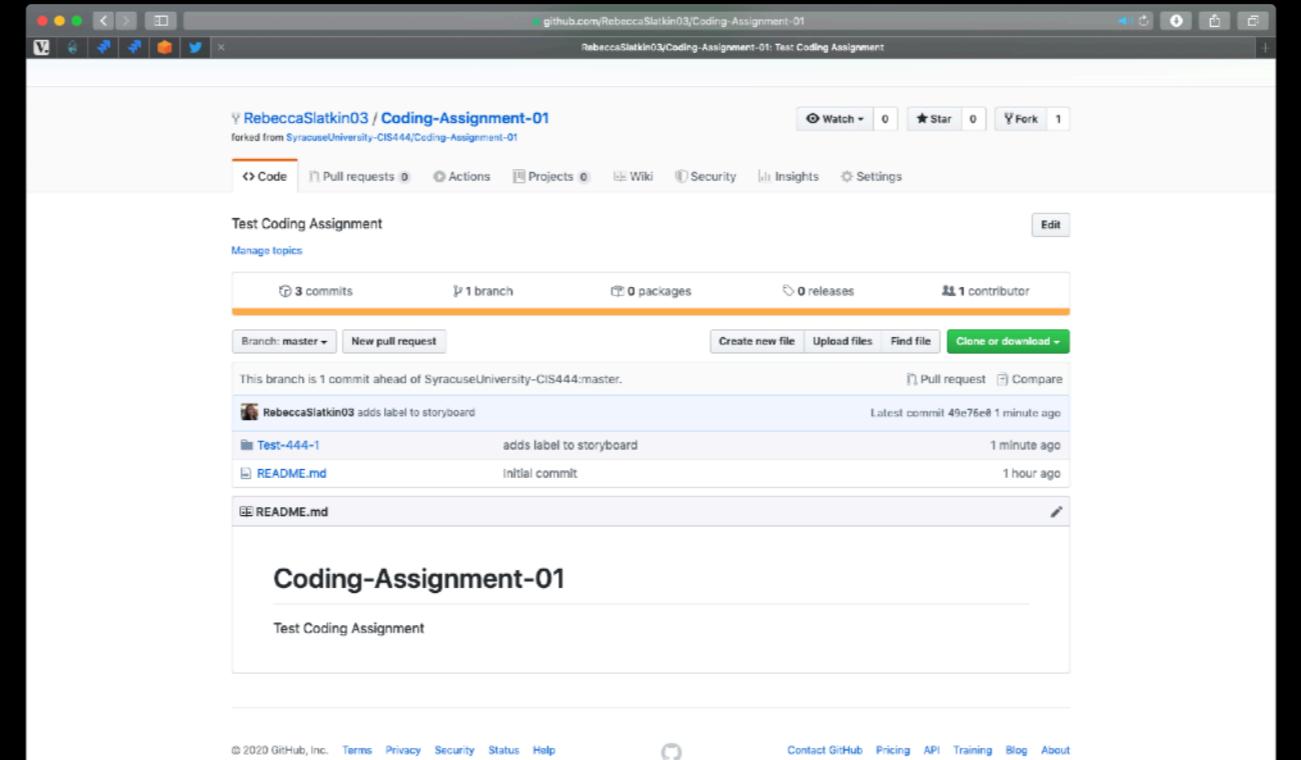
Write your commit message & click commit:



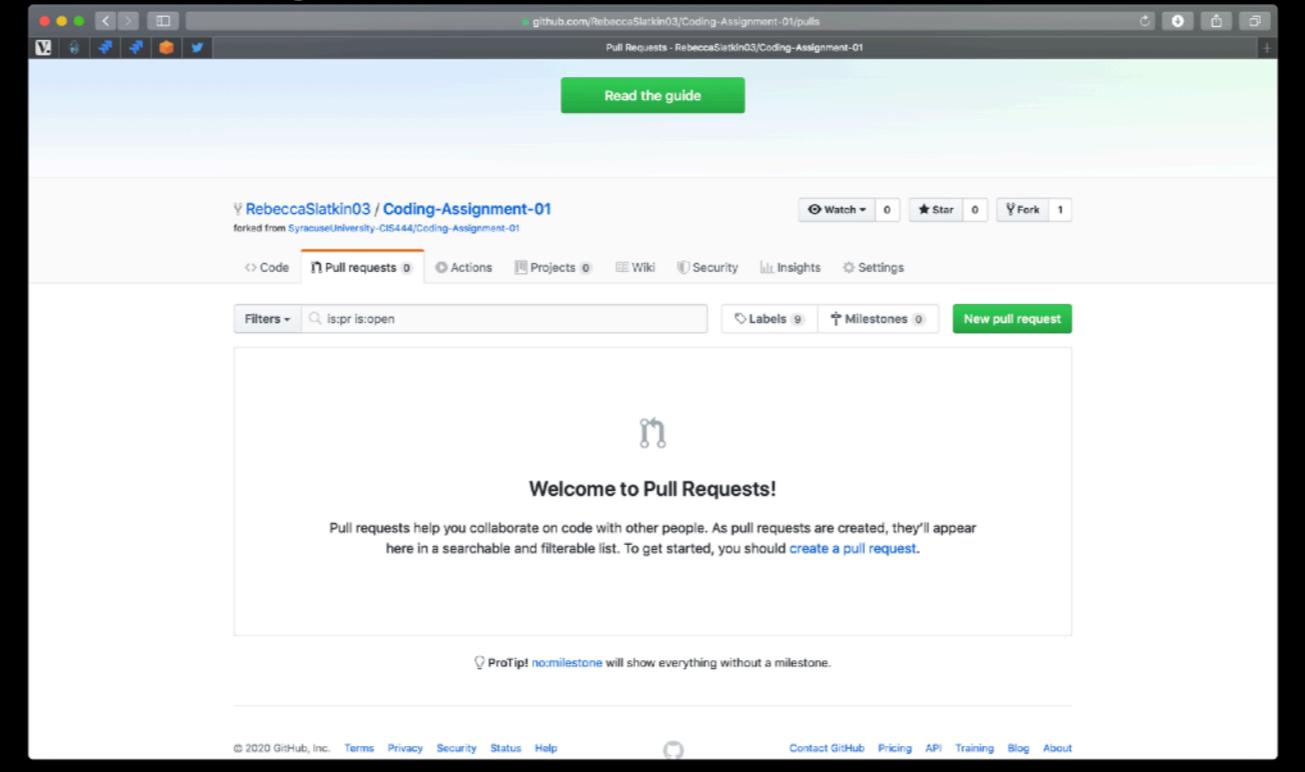
See updated changes:



Navigate back Forked repo on GitHub:



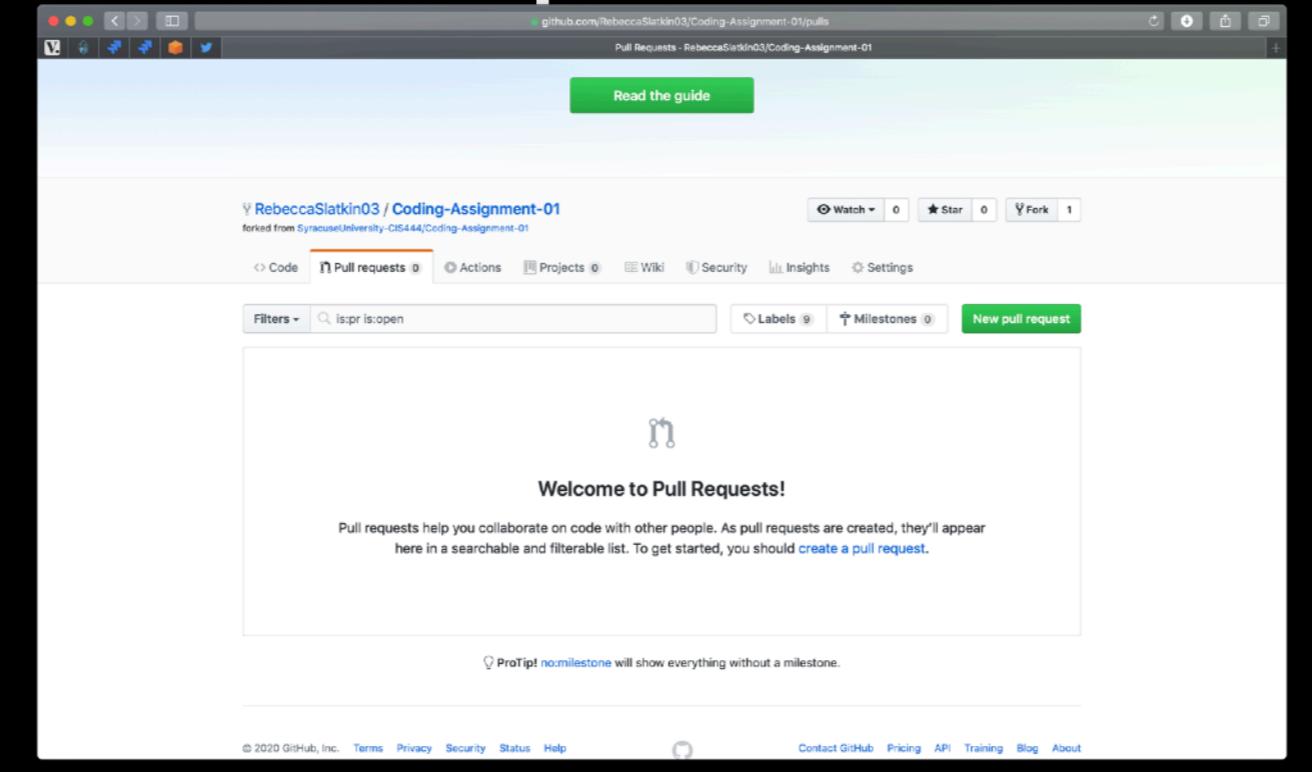
When you're pleased with your changes, open a Pull Request



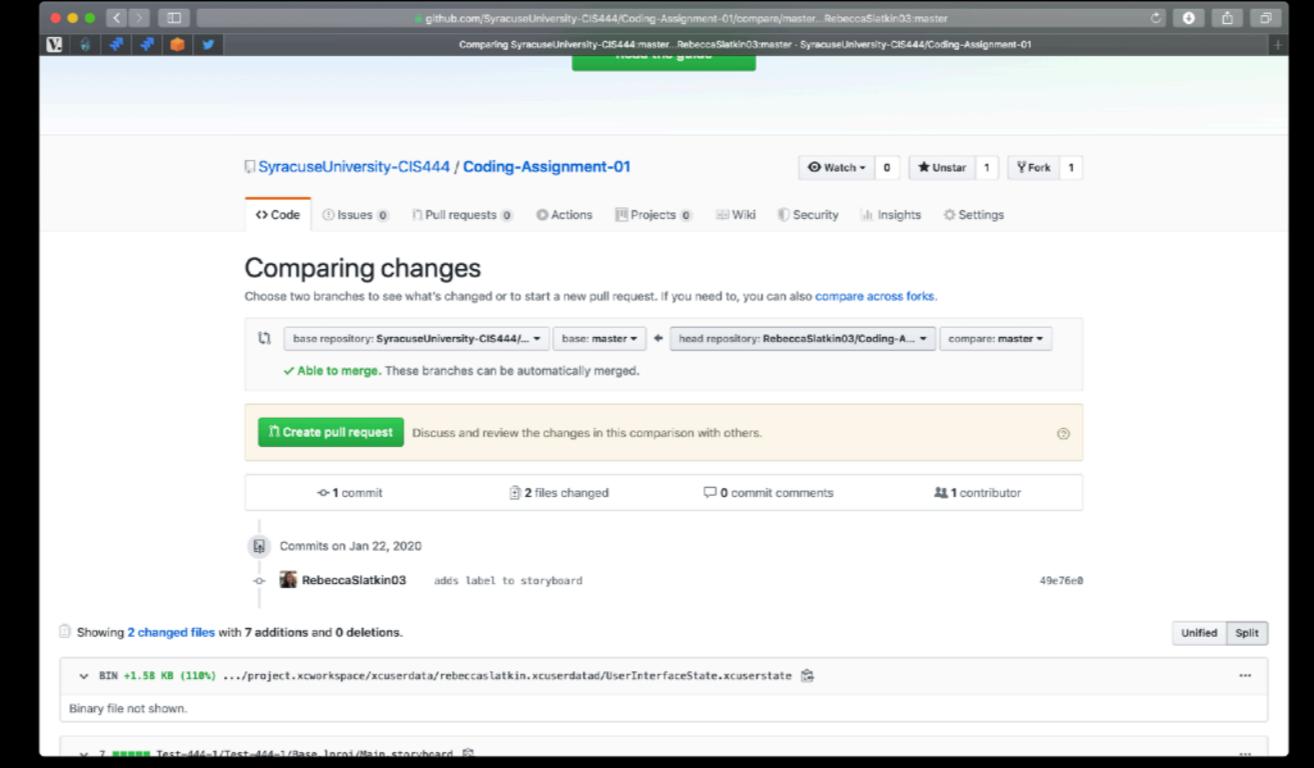
Pull Requests

- The heart of the collaboration on GitHub
- When you open a pull request you are proposing your changes and requesting that someone review and pull in your contribution and merge them into your branch
- Pull requests show differences (diffs), of the content from both branches. The changes, additions, and subtractions are shown in green and red

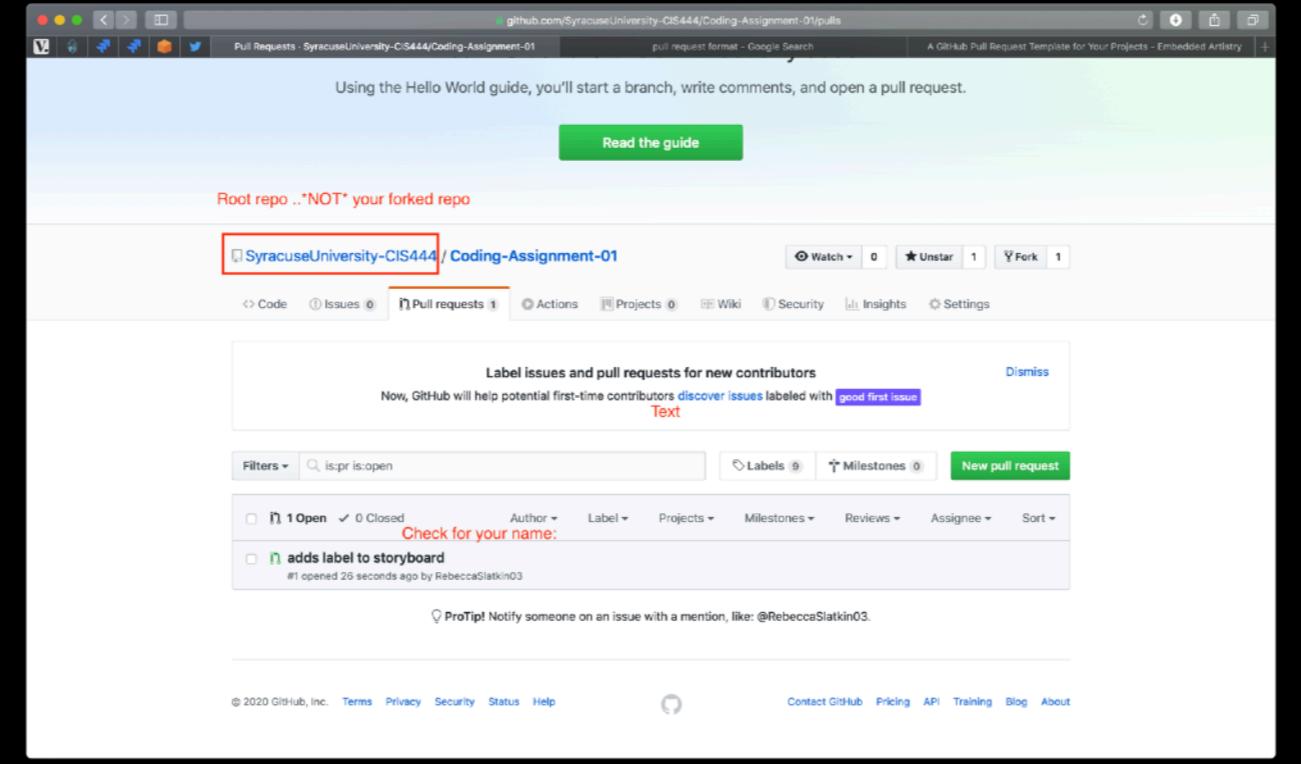
Navigate to the Pull Requests tab



When you're pleased with your changes, open a Pull Request



Confirm your Pull Request opened successfully:



Forking & How to Pull Down/Submit Assignments

Helpful Resources

- <https://ohshitgit.com>
- <http://gitimmersion.com>
-