

Git and using GitHub

Unless you don't like being able to work with other people and see the changes you made in the past

FIRST THING'S FIRST!

- Git \neq GitHub



- Git is **Form** of Version Control Software
 - AKA source control
 - Many other forms
- GitHub is a place to host your Git Repositories online
 - Other websites offer this too like BitBucket

Ways to use Git

- There are pretty much two main ways to use Git
 - Command Lines
 - **Pros:** You are really forced to understand Git
 - **Cons:** You are really forced to understand Git
 - GUI Tools (GitHub Desktop, Git Extensions, etc)
 - **Pros:** Way easier to use and manage code
 - **Cons:** This is how you look to some people

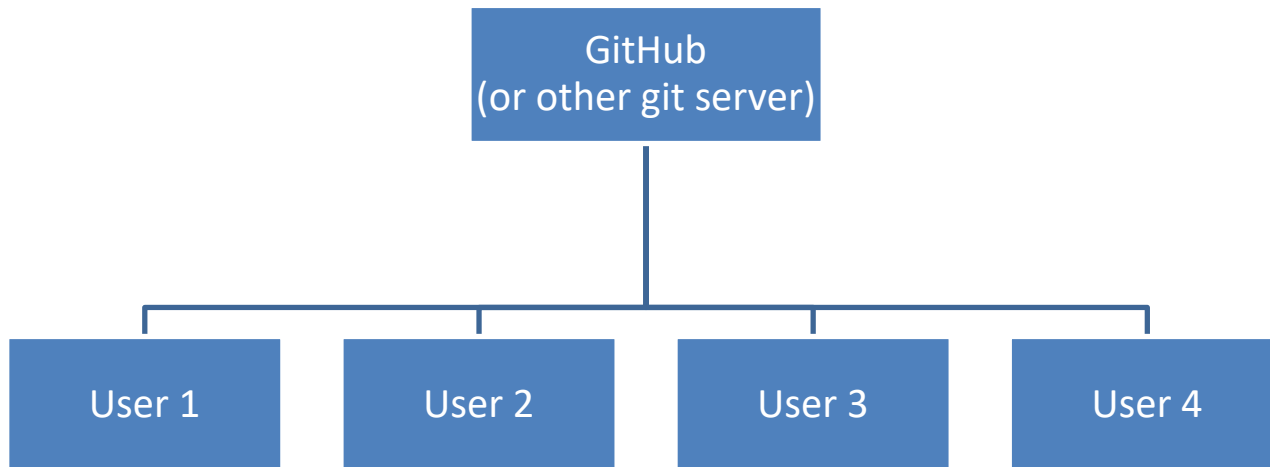


Gotta Get Git

- Command Line
 - <https://git-scm.com/downloads>
 - Git Bash is just a Windows side application that opens a command prompt with Git
- GitHub Desktop GUI (what I recommend at first)
 - <https://desktop.github.com/>

Git 101- What happens to code

- Repository (the code) is saved on local computer
- Repositories can then be **Pushed** to a remote server where other people can push too



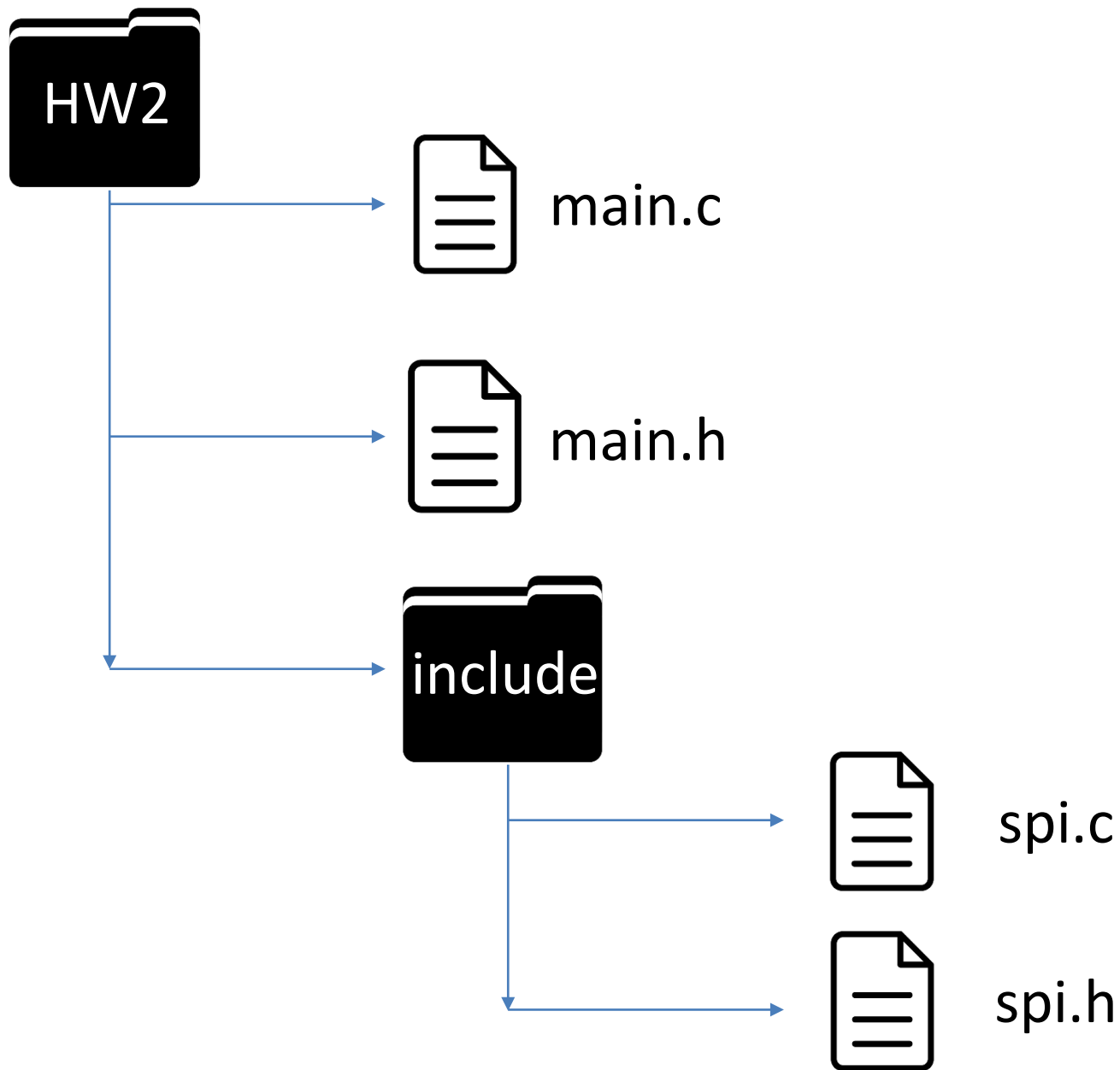
How Git Works

- Keeps tracks of difference in lines of files



The screenshot displays a code diff tool interface with two panels. The top panel shows the file 'demo/demo.cpp' with a diff range of @@ -18,13 +18,18 @@. The bottom panel shows the file 'server/server.c' with a diff range of @@ -19,7 +19,7 @@. Both panels use a color-coded system: red for deletions, green for additions, and blue for context lines. The diff tool highlights the changes in the code, such as the addition of a main function in demo.cpp and the removal of a MAX_MESSAGE_KEYS definition in server.c.

```
9 demo/demo.cpp
@@ -18,13 +18,18 @@ void on_new_test(char* body) {
18 void onJoin(int uid){ printf("Join: %d\n", uid); }
19 void onLeave(int uid){ printf("Leave: %d\n", uid); }
20
21 -int main() {
22
23     WebSocket client_socket;
24     cout << "START" << endl;
25
26     - client_socket.connectSocket("192.168.1.105", 5000);
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28     client_socket.setEvent(1, on_new_type);
29     client_socket.setEvent(2, on_new_color);
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```



HW2

main.c

main.h

Include

spi.c

spi.h

BASE

● HW2

main.c

Change file

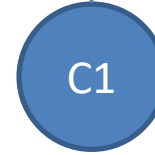
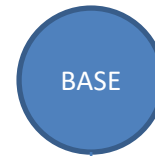
main.h

Change file

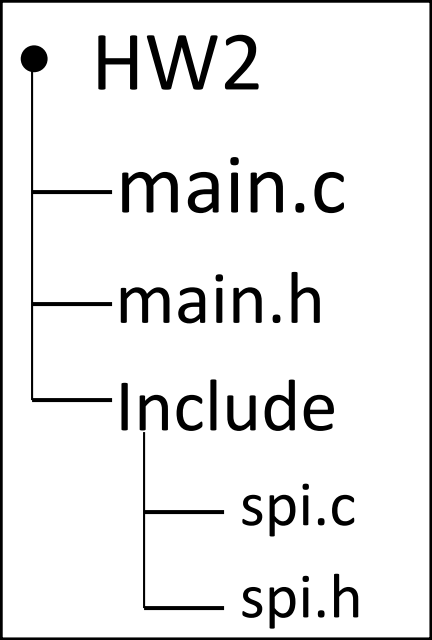
Include

spi.c

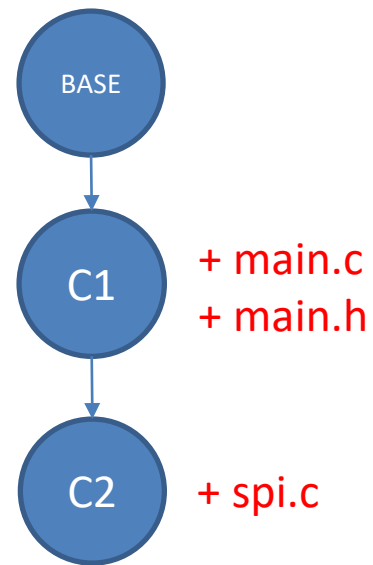
spi.h

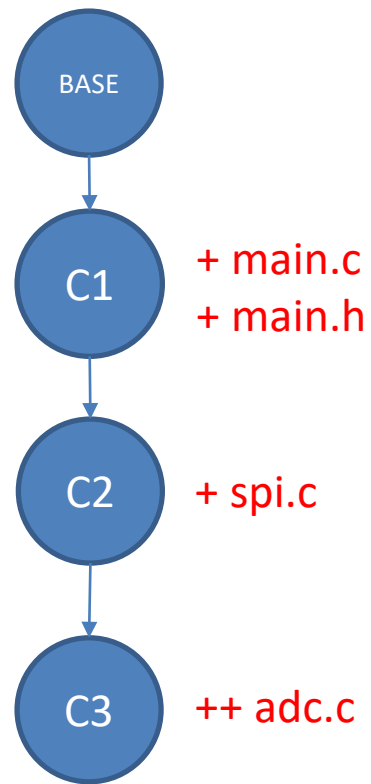
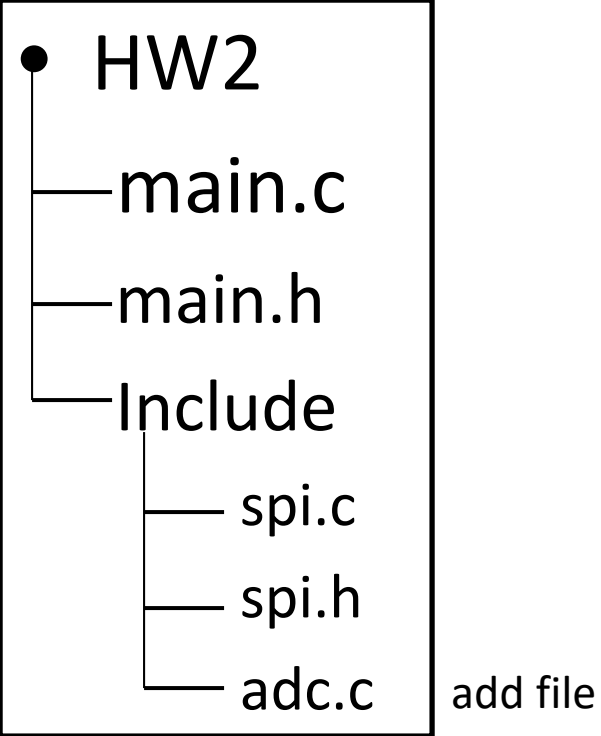


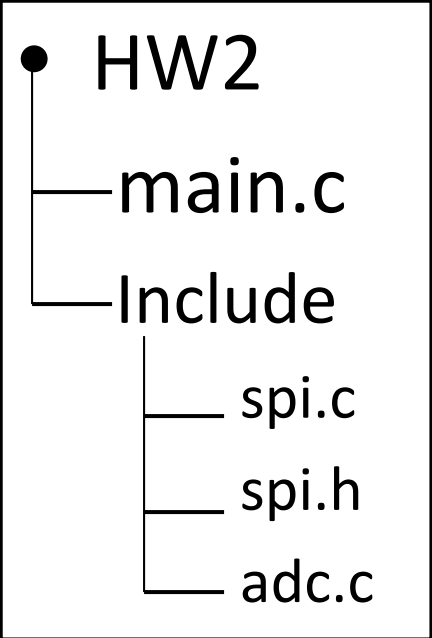
+ main.c
+ main.h



Change file

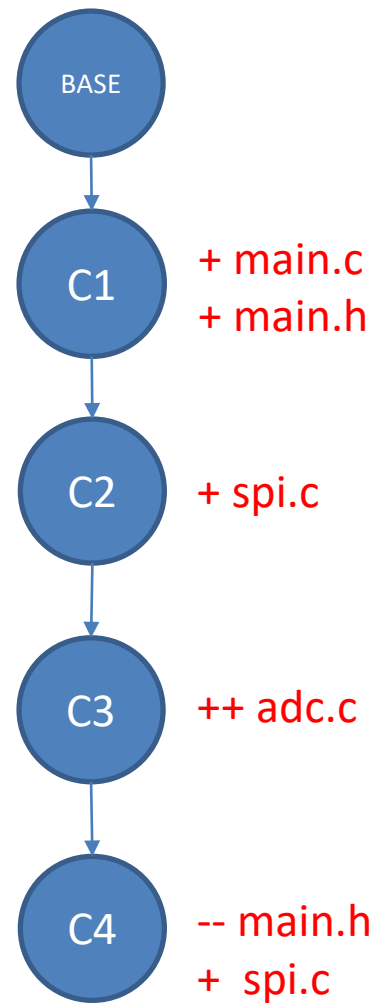


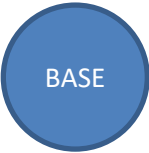




Removed file

Change file





main.c

v0

v1

v1

v1

v1

main.h

v0

v1

v1

v1

Include/spi.c

v0

v0

v1

v1

v2

Include/spi.h

v0

v0

v0

v0

v0

Include/adc.c

v0

v0

It Remembers

...so you don't have too

- Git saves all past **Committed** saves in a .git file in the repository
- New people can go back to ANY old **Commit** made during life of repository

You can even “blame” others

- Git’s blame feature allows you to see each line last change

Commit	Author	Time	Code
fscrypt: factor out bio specific functions	3 months ago	46	<code>struct workqueue_struct *fscrypt_read_workqueue;</code>
fs crypto: move per-file encryption from..	2 years ago	47	<code>static DEFINE_MUTEX(fscrypt_init_mutex);</code>
		48	
		49	<code>static struct kmem_cache *fscrypt_ctx_cache;</code>
		50	<code>struct kmem_cache *fscrypt_info_cache;</code>
		51	
		52	<code>/**</code>
		53	<code> * fscrypt_release_ctx() - Releases an encryption context</code>
		54	<code> * @ctx: The encryption context to release.</code>
		55	<code> *</code>
		56	<code> * If the encryption context was allocated from the pre-allocated pool, returns</code>
		57	<code> * it to that pool. Else, frees it.</code>
		58	<code> *</code>
		59	<code> * If there's a bounce page in the context, this frees that.</code>
		60	<code> */</code>
		61	<code>void fscrypt_release_ctx(struct fscrypt_ctx *ctx)</code>
		62	<code>{</code>
		63	<code> unsigned long flags;</code>
		64	
fscrypt: Rename FS_WRITE_PATH_FL to ...	4 months ago	65	<code>if (ctx->flags & FS_CTX_HAS_BOUNCE_BUFFER_FL && ctx->w.bounce_page) {</code>
fs crypto: move per-file encryption from..	2 years ago	66	<code> mempool_free(ctx->w.bounce_page, fscrypt_bounce_page_pool);</code>
		67	<code> ctx->w.bounce_page = NULL;</code>
		68	<code>}</code>

Git 101 - Branches

- Branches let you work on the code in your own crazy direction and **Merge** it back later
- Example: Make a “New-Feature” branch and when it is ready, **Merge** back to the Master Branch



Git 101 – Workflow

- **Fetch/Pull**
- Make your edits
- **Stage** your changes
- **Commit** your work
- **Push**

Git 101 – Workflow - Fetch

- If you have not cloned the repo
 - `git clone https://the.git.repo.git`
- Get the latest updates before working
 - `git pull`

Git 101 – Workflow - Edit

- Add, remove, edit all the files you want

Git 101 – Workflow - Stage

- Add the files you want to commit
- This allows you to choice **what** to commit
- `git add -A`
 - Will add all difference
- `git add main.c`
 - Just adds main.c

Git 101 – Workflow – Commit

- Take the “snapshot” of the folder
- Add a commit title
 - Optionally add a comment
- `git commit -m “Best commit EVA”`

Git 101 – Workflow - Push

- When ready, push changes to server
- `git push`

GitHub Permissions

- For a project you can always just download the code and do what you want.
- If you want to make changes, either **Clone** or **Fork** the Repository
 - You can then send a **Pull Request** that will let someone in charge of Repo check your changes and **Merge** it
- If you set someone as a **Collaborator** they can **Push** code without having to submit a **Pull Request**

Almost Forgot about .gitignore

- Git is not the best with Binary files (.mp3, .pdf, .exe, .FileTypeCannotReadInNotepad)
- List all the folders and files that git will not recognize
- Almost all types of projects have a standard .gitignore template found on GitHub

Merge Conflicts

- Not that scary
- Happens when same lines are altered in two different commits
- Debunking the myth that merge conflicts are hard

Commit from User 1

```
1  #include <stdio.h>
2  #include <stdlib.h>
3
4  #define VALUE 40
5
6  int main(int argc, char* argv[]) {
7
8      int a = 5;
9
10     if ( a > 6 ) {
11         printf("a is big");
12     }
13
14     return 0;
15
16 }
```

Commit from User 2

```
1  #include <stdio.h>
2  #include <stdlib.h>
3
4  #define VALUE 40
5
6  int main(int argc, char* argv[]) {
7
8      int a = 5;
9
10     if ( a > 4 ) {
11         printf("a is small");
12     }
13
14     return 0;
15
16 }
```

Merge Conflict will need to be resolved before able to merge

Just open the file in text editor

The Merge Conflict File

```
1  #include <stdio.h>
2  #include <stdlib.h>
3
4  #define VALUE 40
5
6  int main(int argc, char* argv[]) {
7
8      int a = 5;
9
10     <<<<<< commit/user1
11     if ( a > 4 ) {
12         printf("a is small");
13         |||||
14     if ( a > 6 ) {
15         printf("a is big");
16     >>>>>> Commit/user2
17     }
18
19     return 0;
20 }
21 }
```

Change file to look the way you want and save

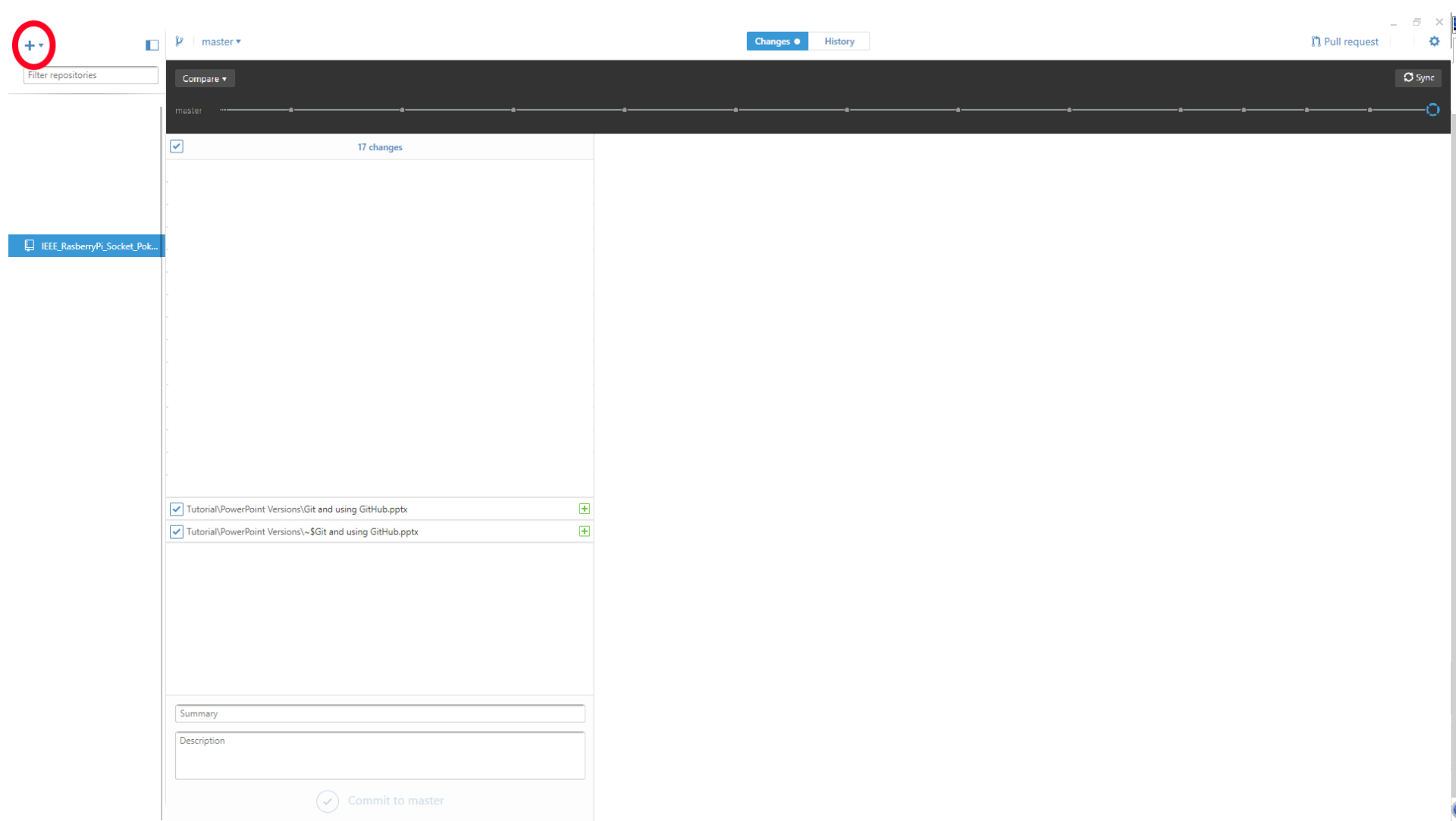
...simple, I know

GitHub GUI – Make new repo

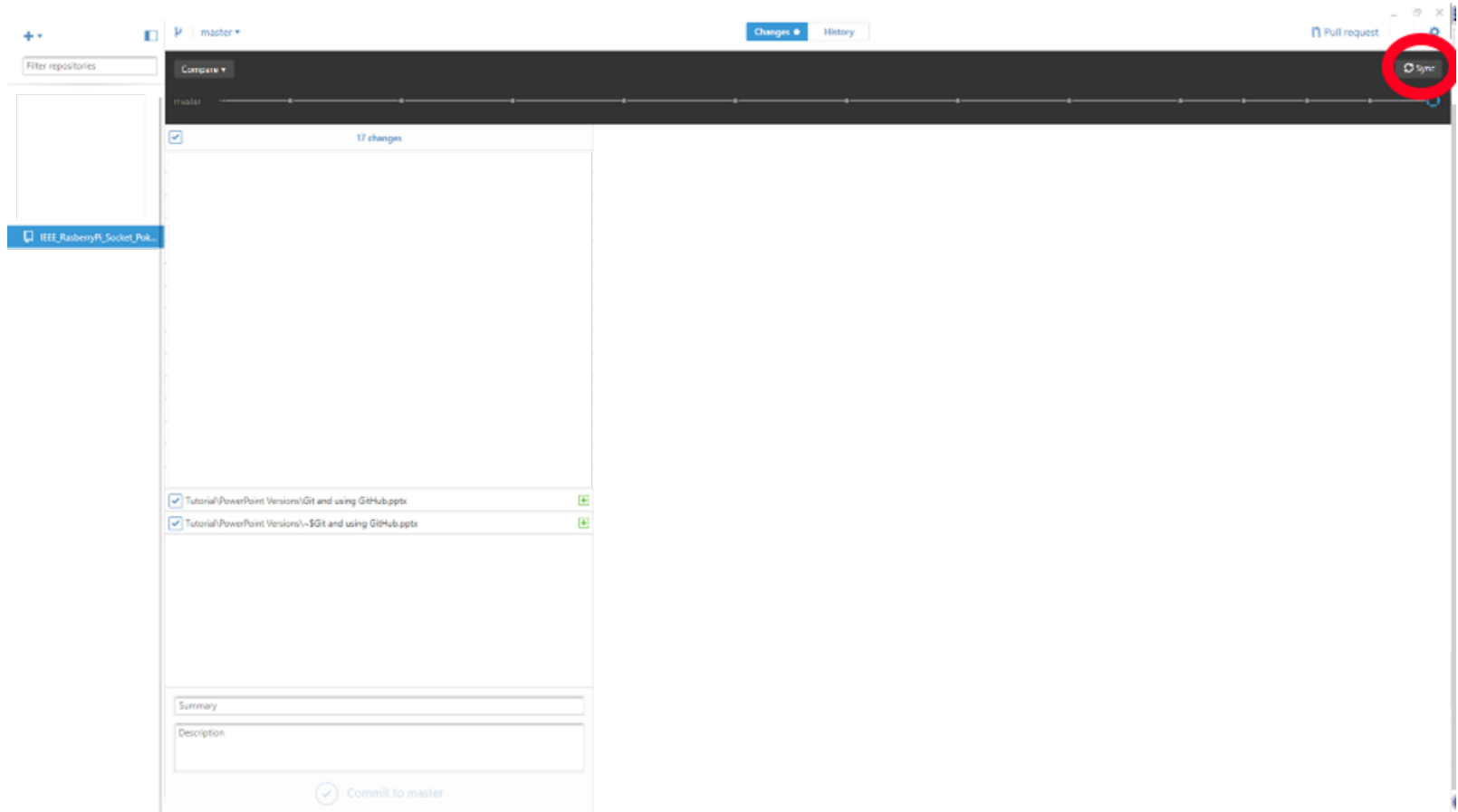
- Can either create online or bring it to local computer
- Start new repository and push to GitHub when ready (If using a private repo, why wait)
 - HUGE SIDE NOTE: Go here if you haven't before <https://education.github.com/pack/offers> and get your free private repositories
- Can take a current set of code and make it into a Git repo
 - Will have no history prior to initialization of git

How to use GUI

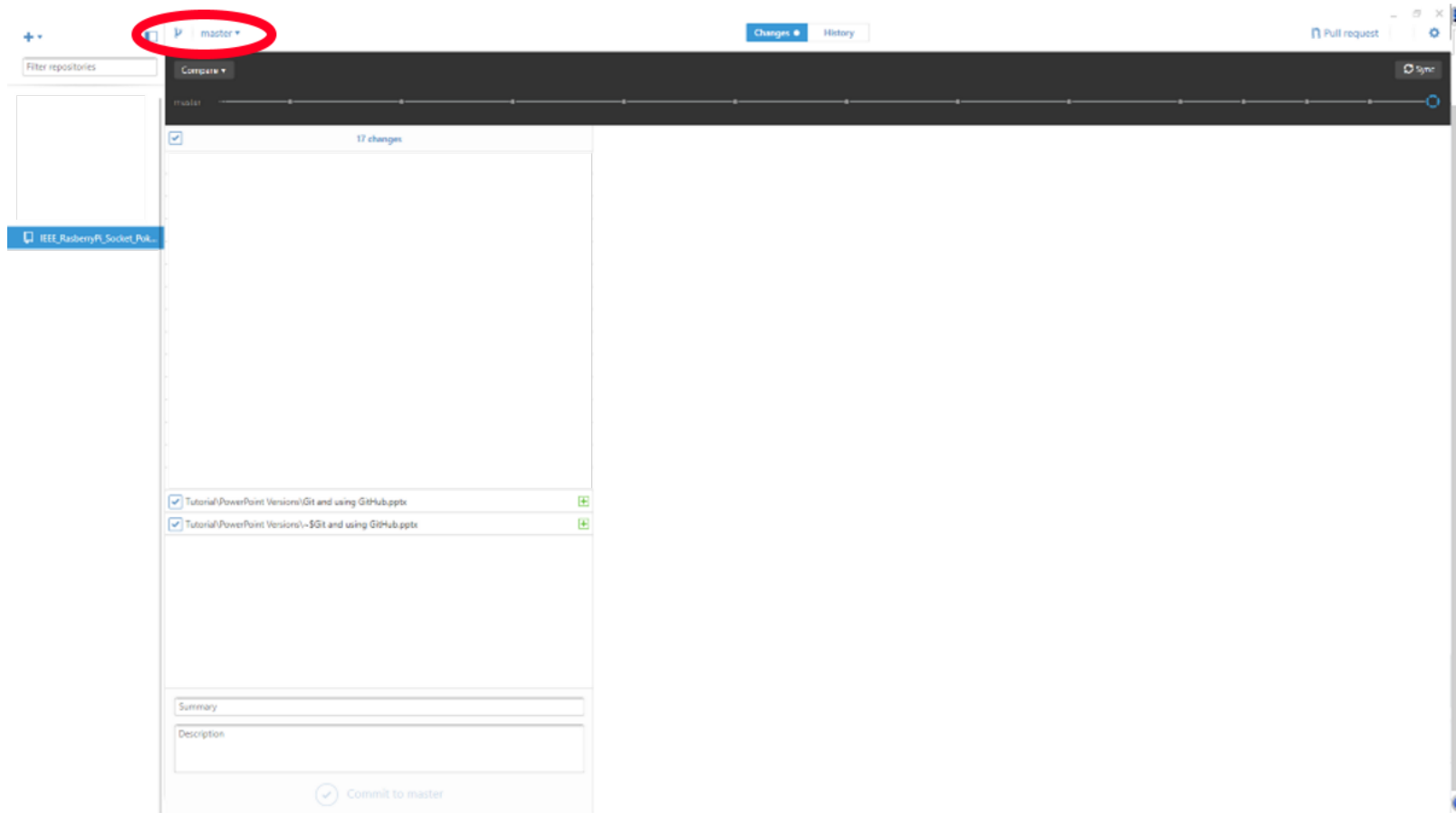
- If you want to learn more go here:
<https://guides.github.com/>
- If you want to get this repo go here
- https://github.com/sjfricke/IEEE_RaspberryPi_Socket_Pokemon
- Click the “Clone or Download” button and Clone it to your desktop (will open Desktop GUI for you)



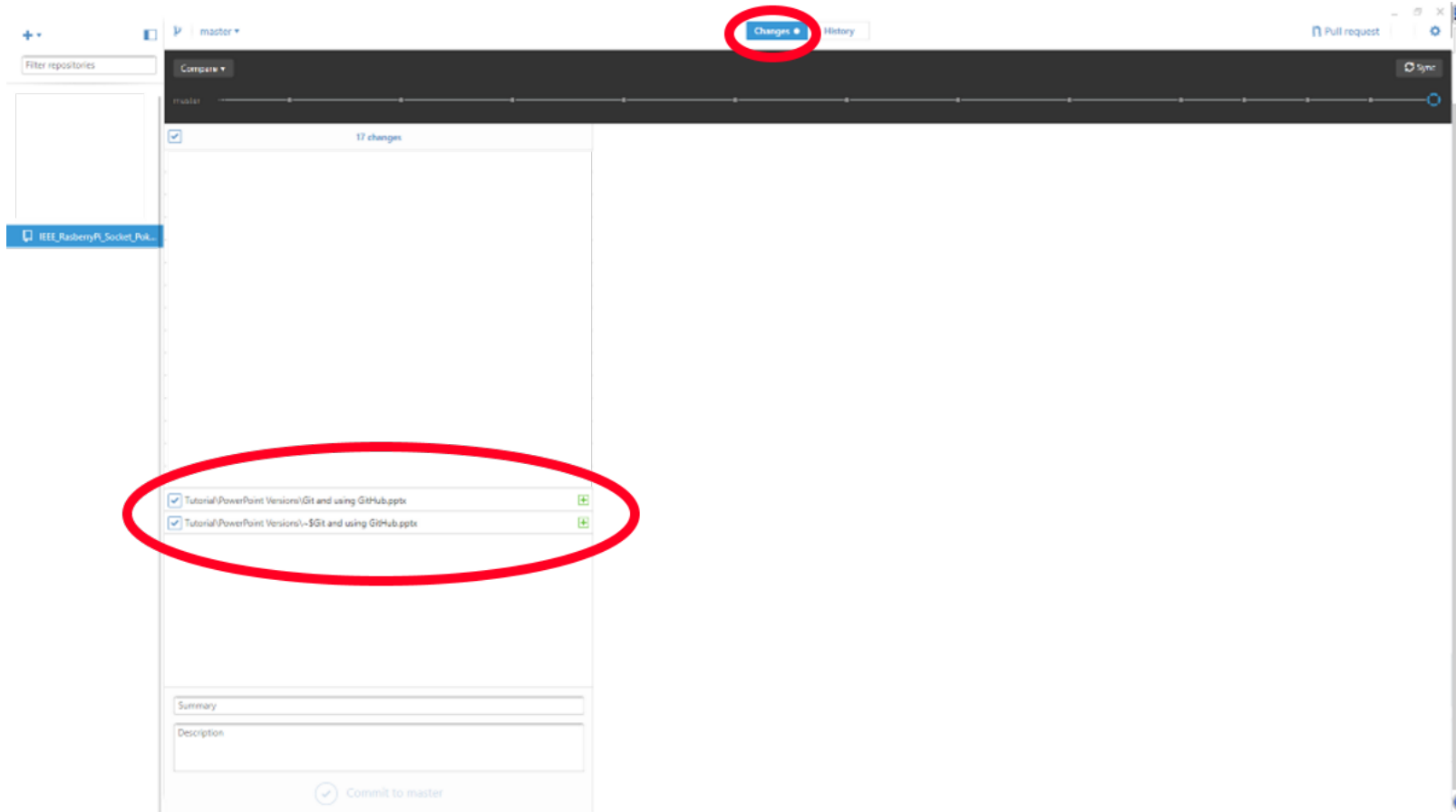
- Click here to add the Repo



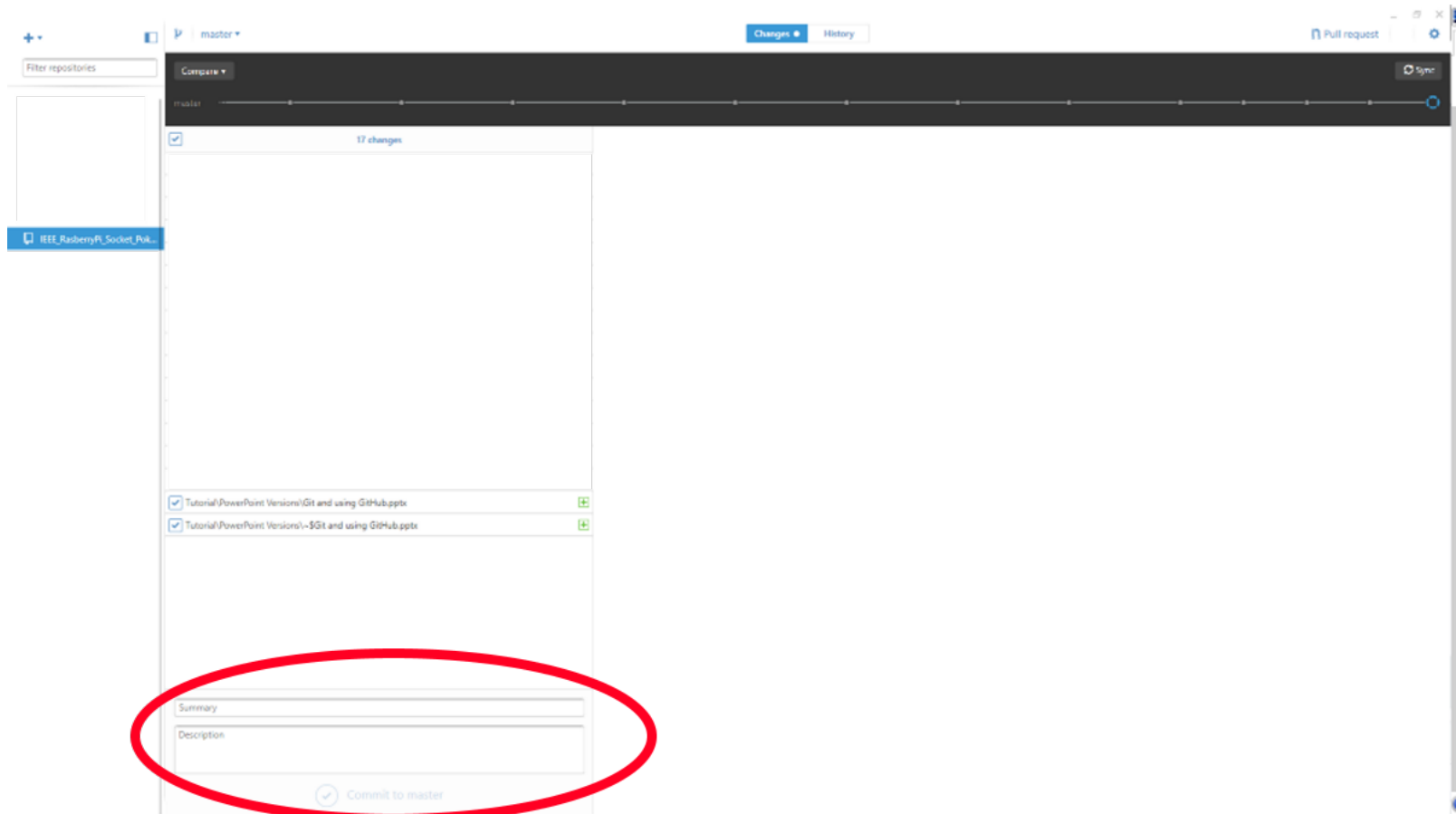
- Click here to sync with Repo
 - Use to get the latest version (ALWAYS Do this before you start!)
 - If you are a Collaborator you can use this to push to Server



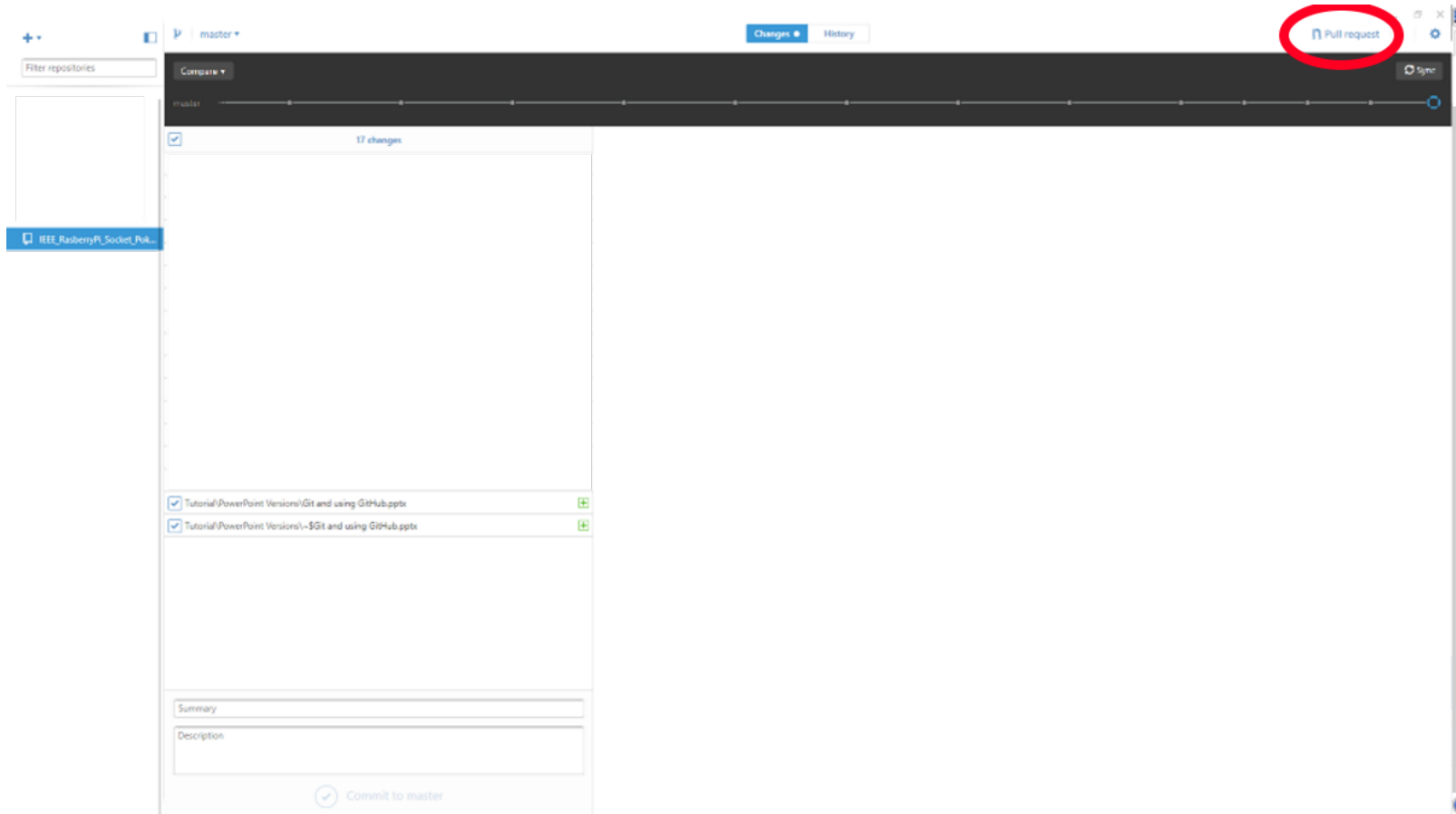
- Either Add a new branch or switch between branches of the project



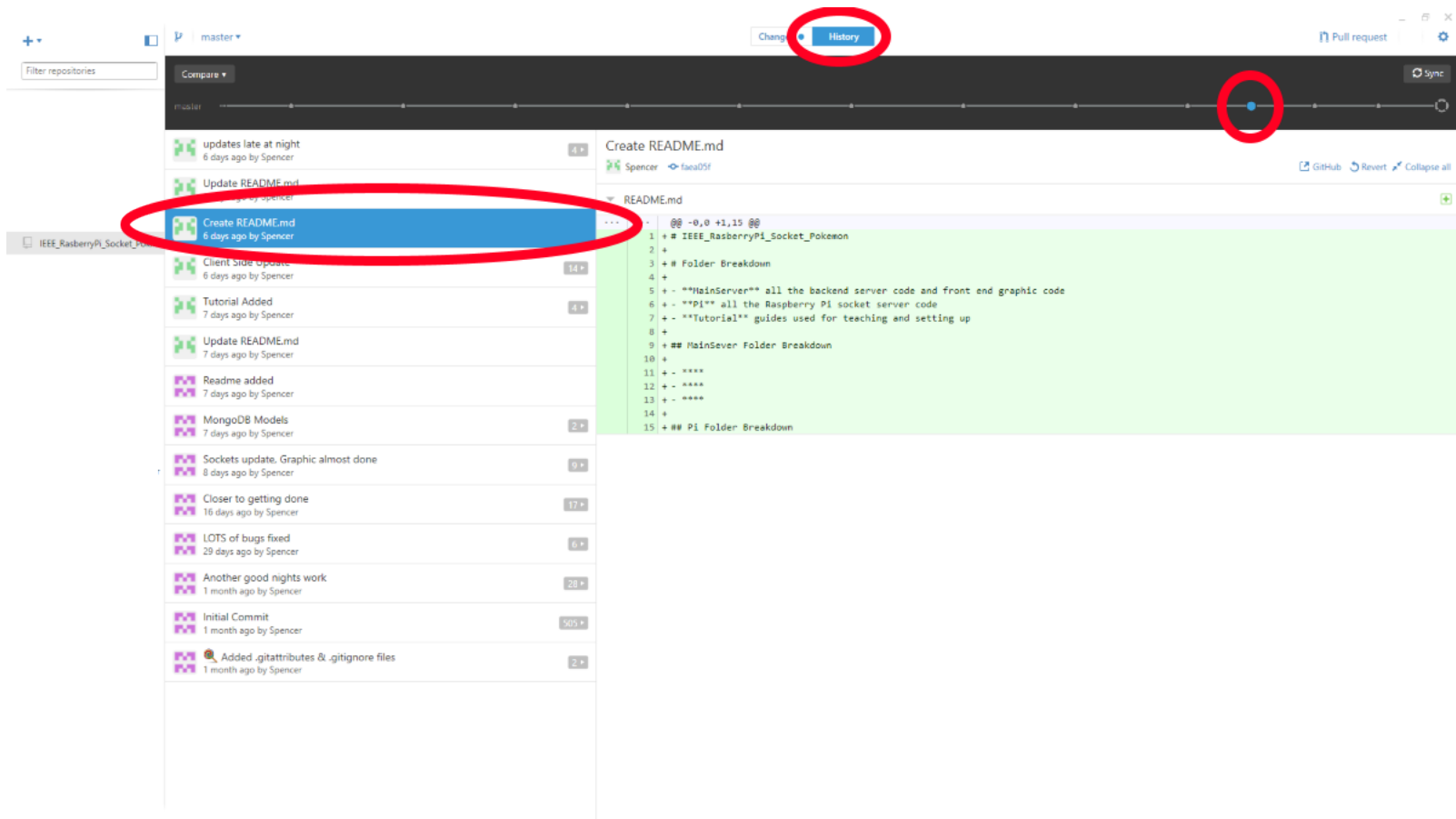
- When in “Change” screen you can select which files you are **Staging** and want to add to the new changes



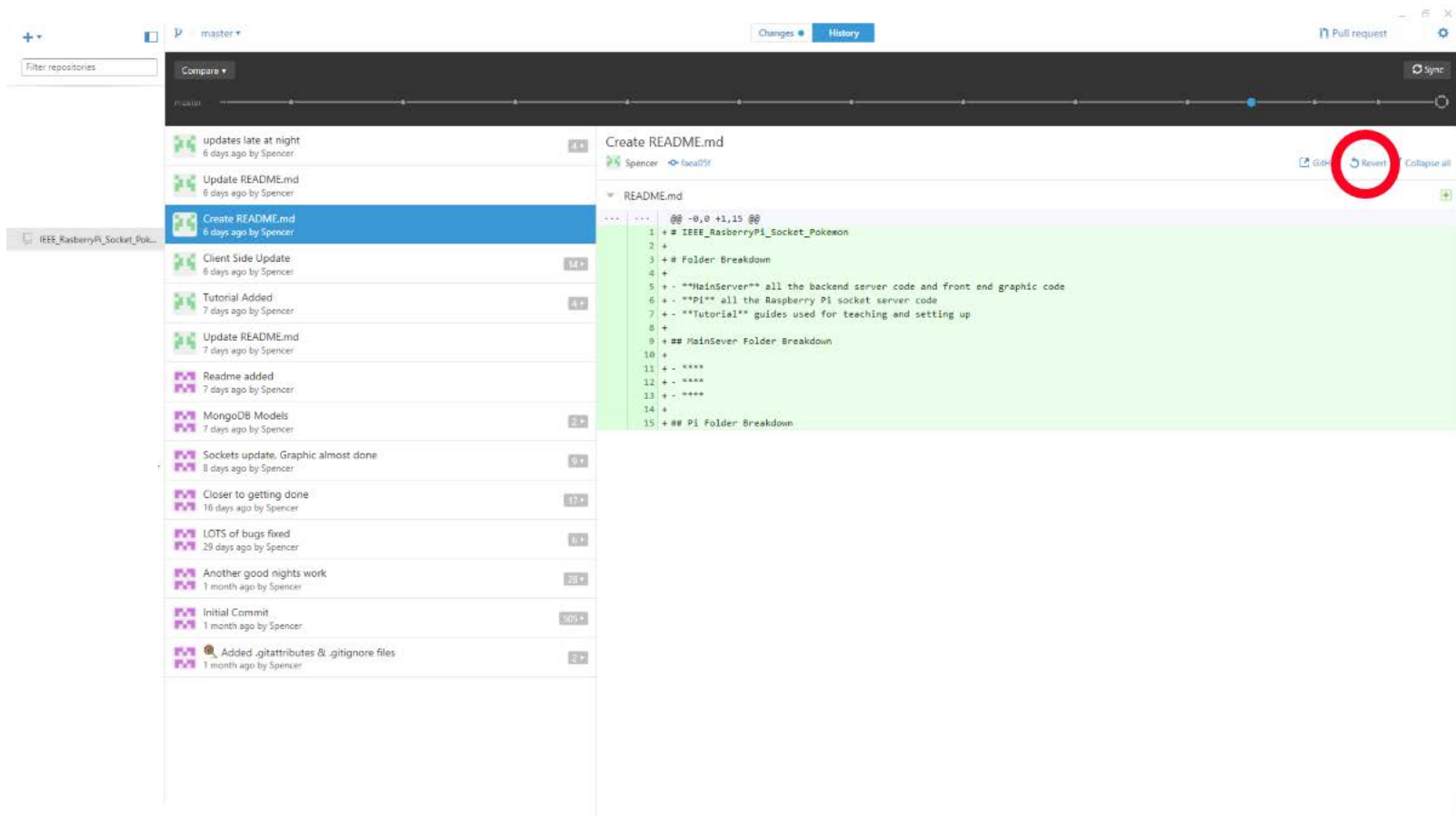
- Add a Summary and Description to your **Commit** and **Commit** the changes
 - Remember, this is only committed on your local machine until you push the changes to the server



- If your code is ready, you can send the **Pull Request** from here



- In the “History” screen you can see all the past **Commits** of the repository



- You can then **Revert** back to that point in the project... maybe start a new branch or see what you did or changed... this is **WHY** you use Version Control in the first place

Recap

- Get Repository (**Clone**) or Sync it (**Fetch**)
- Know which **Branch** you are in
- Make your changes
- Set which changes you are **Staging**
- **Commit** the changes
- When ready, Sync or send a Pull Request
- Think how awesome it is you can now work on code projects with someone else, granted they probably didn't comment it correctly, but that's a different slide show I am not writing

Best Practice

- These are the best two sites to practice with
 - <https://try.github.io/levels/1/challenges/1>
 - <http://learngitbranching.js.org/>
- Here is a repo you can mess with
https://github.com/sjfricke/IEEE_Practice_Git