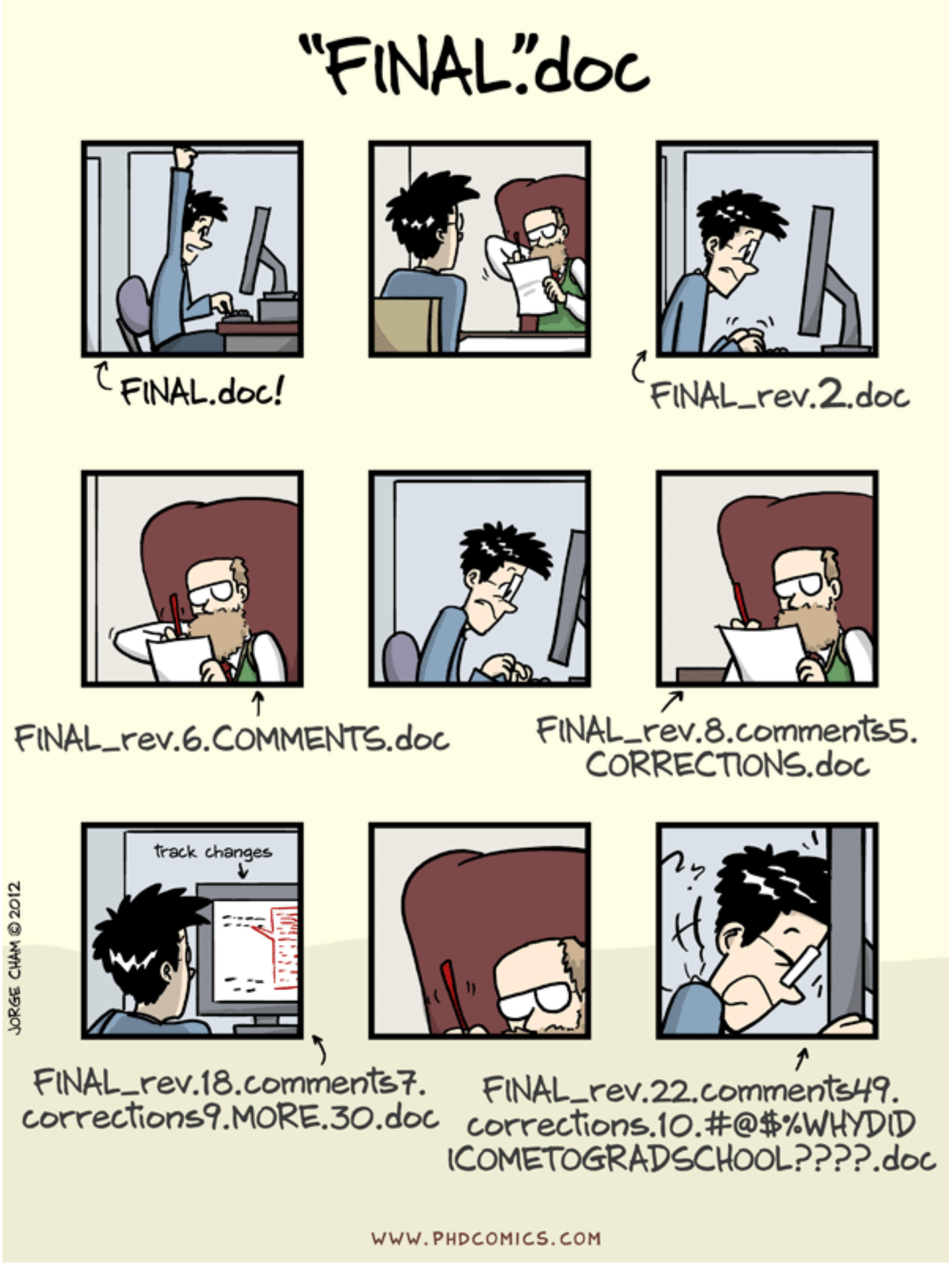
Week 1- Version control with git and Introduction to Github

30 Mar 2019

We'll start by exploring how version control can be used to keep track of what one person did and when. But even if you aren't collaborating with other people, automated version control can help you to keep track of changes you make on a report for your class, a manuscript for publication or even some scripts for your research; many journals ask you to have your codes available when submiting your manuscript.



"Piled Higher and Deeper" by Jorge Cham, http://www.phdcomics.com

Setting up git in hoffman

First you will need to launch a terminal and login into your hoffman account. On the command above, change `c177-t0` with your username. You will be ask to enter your password.

```
$ ssh c177-t0@hoffman2.idre.ucla.edu
```

```
[c177-t0@login1 ~]$
```

Once login, make sure you are in your home directory. To get your current working directory type from the terminal:

```
[c177-t0@login2 ~]$ pwd
```

```
/u/home/class/c177/c177-t0
```

*Note: your path should be similar; instead of `c177-t0` you should have your username.

Let's start an interactive session.

```
[c177-t0@login1 ~]$ qrsh
```

```
JSV: No h_data is set; setting default h_data=1G (if this value is too sm
[c177-t0@n2188 ~]$
```

Notice that the identifier next yo your username change from `[c177-t0@login1 ~]$` to `[c177-t0@n2188 ~]$`. This indicates that you requested a node of 1G of memory for a couple of hours. Remember you can request more memory and time by typying `qrsh -l h_data=3G,h_rt:12:00:00`.
IMPORTANT: Do not run things from your login node `[username@login1 ~]$`.

The great thing about hoffman is that we don't need to worrie about installing things. Almost everything you will need for this class is alredy there. Also, by runing things in hoffman you avoid issues related with compatiblity of miscellaneous softwares to specific operation systems (MacOS, Windows,etc.).

To get a list of modules/programs available in hoffman type:

```
[c177-t0@n2188 ~]$ module av
```

The module we need is called `git`. Let's load this program in our enviroment:

```
[c177-t0@n2188 ~]$ module load git
```

Nice! You have sucesfully load git.

When using Git for the first time, you need to provide a user name and email address. This information will be associated with your Git activity. Therefore, any changes pushed to GitHub will include your user name and email address.

Also, whenever you use git in the terminal, Git commands will be written as `git verb options`. But what is this? `verb` is what you want to do and `options` refers to additional optional information that could be needed for `verb`. With this in mind, here is how you will set up your name and email adress in the terminal:

```
[c177-t0@n2188 ~]$ git config --global user.name "YOUR NAME"
[c177-t0@n2188 ~]$ git config --global user.email "YOUR EMAIL ADDRESS"
```

Check that everything worked fine

```
[c177-t0@n2188 ~]$ git config --list
```

```
user.name=dechavezv
user.email=dechavezv@ucla.edu
```

Once Git has been configurated, we can start using it.

To start using Git. Create a new folder called "eeb-177" and navigate to it.

```
[c177-t0@n2188 ~]$ mkdir eeb-177
[c177-t0@n2188 ~]$ cd eeb-177
```

Note: some of you may have done this step already if you were following along in lecture:

Make sure you're in the `eeb-177` directory.

```
[c177-t0@n2188 ~]$ pwd
```

```
/u/home/class/c177/c177-t0/eeb-177
```

If you are not in `eeb-177`, navigate to this directory with `cd`. *Remember*: `c177-t0` is Daniel's user name you should navigate to a path with your own username.

Before we do anything, we need to tell Git to make the eeb-177 folder a repository. This will be the place were Git will store all changes we make.

```
[c177-t0@n2188 ~]$ git init
```

This will created a hidden directory within eeb-177 called .git:

```
ls -a
```

```
. .. .git
```

Note:It is important that you use `ls` couple with `-a`. Otherwise, you will not see the hidden directory that was just created.

Now that we have sucesfully initialized Git, we can start adding things into our directory.
It is good practice to initialize each git folder with a README file.

```
[c177-t0@n2188 ~]$ touch README.txt
```

Verify that your file was created

```
[c177-t0@n2188 ~]$ ls
```

```
README.txt
```

We'll use `nano` to edit the README file; you can use whatever editor you like. For a more options on text editors, check out this "site".

```
[c177-t0@n2188 ~]$ nano README.txt
```

Type the text below into the `README.txt` file:

```
In-class exercise and HW for eeb-177
```

Verify that the above information was store into the README file.

```
[c177-t0@n2188 ~]$ cat README.txt
```

```
In-class exercise and HW for eeb-177
```

Now, let's create a file called `Favorite_animal.txt` that contains some notes about your favorite animal.

```
[c177-t0@n2188 ~]$ touch Favorite_animal.txt
```

Use `nano` to edit the file you just created.

```
[c177-t0@n2188 ~]$ nano Favorite_animal.txt
```

Type the text below into the Favorite_animal file. Change "African wild dog" with the name of your favorite animal:

```
My favorite animal is the African wild dog
```

`Favorite_animal.txt` now contains a single line, which we can see by running:

```
[c177-t0@n2188 ~]$ cat Favorite_animal.txt
```

```
My favorite animal is the African wild dog
```

Git alredy notice that we created some files called "favorite_animal" and "README". However, you will notice some information that tells you that git isn't keeping track of our files ("nothing added to commit but..").

```
[c177-t0@n2188 ~]$ git status
```

```
On branch master

Initial commit

Untracked files:
   (use "git add <file>..." to include in what will be committed)

        Favorite_animal.txt
        README.txt
nothing added to commit but untracked files present (use "git add" to tra
```

We use `git add` to tell Git about the files we want to keep track of:

```
[c177-t0@n2188 ~]$ git add Favorite_animal.txt
[c177-t0@n2188 ~]$ git add README.txt
```

Note: Instead of typing git add twices for each file, you can type `git add .` to tell Git to keep track of everyithing inside the eeb-177/ folder.

Now we can use `git status` again to verify that git is keeping track of things.

```
[c177-t0@n2188 ~]$ git status
```

```
On branch master

Initial commit

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
```

```
        new file:   Favorite_animal.txt
        new file:   README.txt
```

Git now knows that has to keep track of `Favorite_animal.txt` and README.txt, but it hasn't recorded these changes to our local repository `.git`. To save our changes as a commit we need to run one more command:

```
[c177-t0@n2188 ~]$ git commit -m "My favorite animal"
```

```
[master (root-commit) b9ca9a3] My favorite animal
 2 files changed, 2 insertions(+)
 create mode 100644 Favorite_animal.txt
 create mode 100644 README.txt
```

When we run `git add` before, we told Git about the files we created within the eeb-177 directory. Now when using `git commit -m` Git will store a copy of those files permanently inside the special `.git` directory.
The option -m stands for "message" and should be a short comment that will help us remember later on what we did and why.

Now suppose your partner (e.g student sitting next to you) adds more information to the Favorite_animal file. (Again, we'll edit with `nano` and then `cat` the file to show its contents)

```
[c177-t0@n2188 ~]$ nano Favorite_animal.txt
```

Add the text below into the `Favorite_animal.txt` file. Change "Bush dog" with the name of your partner's favorite animal:

```
My partner's favorite animal is the bush dog.
```

Verify that the text was added to the file.

```
[c177-t0@n2188 ~]$ cat Favorite_animal.txt
```

```
My favorite animal is the African wild dog.
My partner's favorite animal is the bush dog.
```

Now we have to use `git add` to tell Git that we would like to save the new line and
`git commit -m` to save this change permanently into our local repository `.git`. But before doing this it's a good idea to review our changes:

```
[c177-t0@n2188 ~]$ git diff
```

```
diff --git a/Favorite_animal.txt b/Favorite_animal.txt
index b9c0669..c48b2ee 100644
--- a/Favorite_animal.txt
+++ b/Favorite_animal.txt
@@ -1 +1,2 @@
 My favorite animal is the African wild dog
+My partner's favorite animal is the bush dog
```

The + sing in the last line shows the line we added

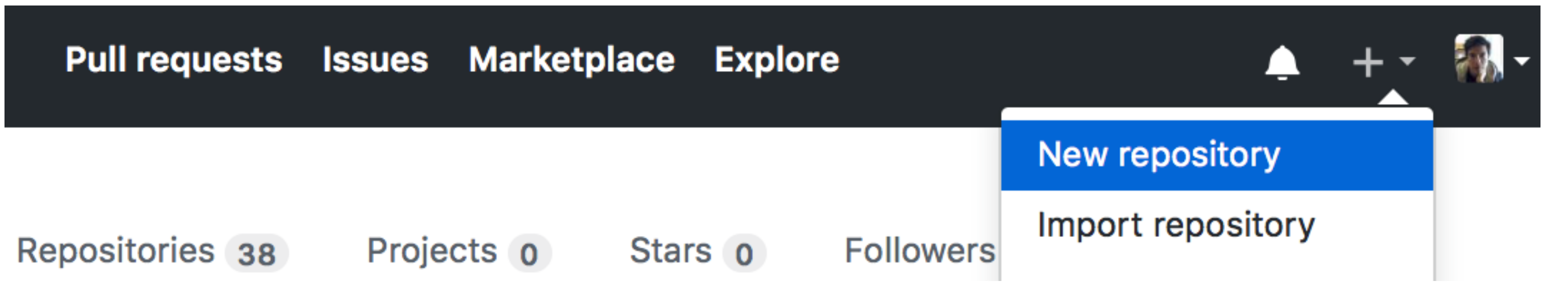
Now that we have reviewed our change, it's time to add it and commit it:

```
[c177-t0@n2188 ~]$ git add Favorite_animal.txt
[c177-t0@n2188 ~]$ git commit -m "Partner's favorite animal"
```

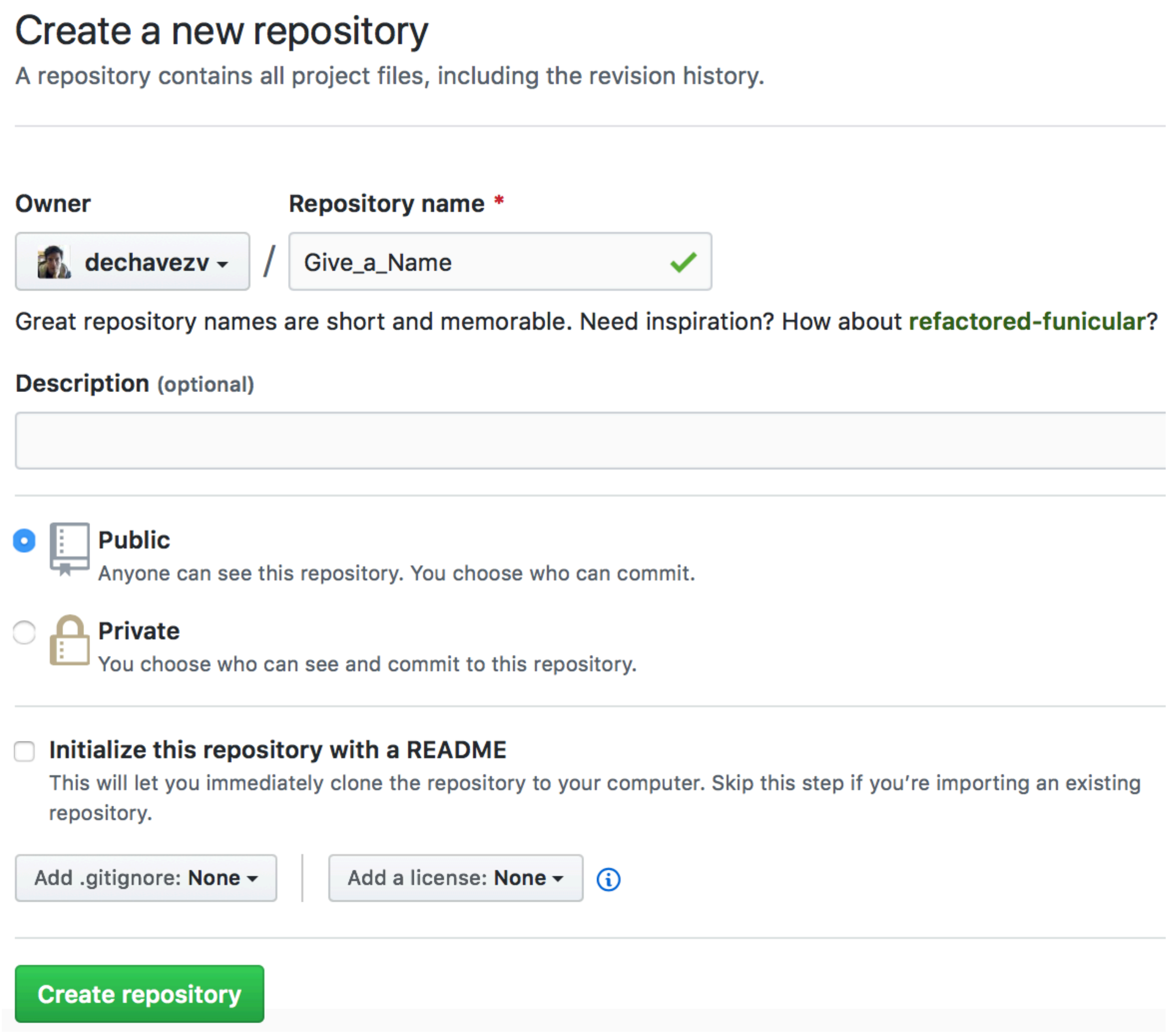
```
[master 5984149] Partner's favorite animal
 1 file changed, 1 insertion(+)
```

Congrats! You have created your first verstion control!!

Now, Let's pretend you want to share this document with the world, so more people can add their favorite animal. Log in to GitHub, then click on the icon in the top right corner to create a new repository:



Give your repository an apropiate name ('DO NOT called it Give_a_name') for this course and then click "Create Repository":


Create a new repository

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

Owner: dechavezv / Repository name *: Give_a_Name

Great repository names are short and memorable. Need inspiration? How about refactored-funicular?

Description (optional)

[✓ Public] Anyone can see this repository. You choose who can commit.

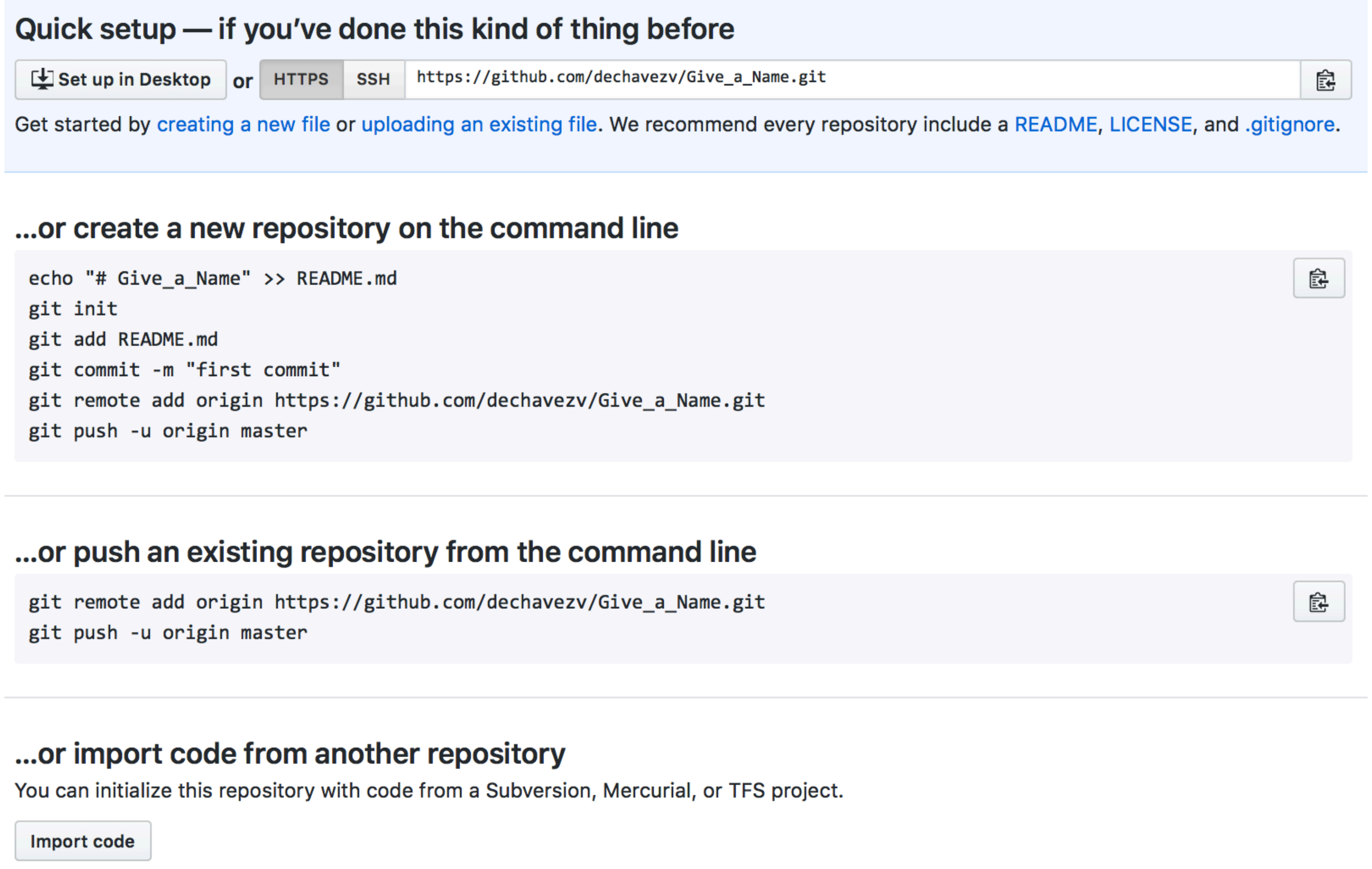
Private: You choose who can see and commit to this repository.

Initialize this repository with a README: This will let you immediately clone the repository to your computer. Skip this step if you're importing an existing repository.

Add .gitignore: None | Add a license: None

As soon as the repository is created, GitHub displays a page with a URL and some information on how to configure your local repository. Here is an an exmaple of Daniel's repository:

!



https://github.com/dechavezv/Give_a_Name.git

Get started by creating a new file or uploading an existing file. We recommend every repository include a README, LICENSE, and .gitignore.

...or create a new repository on the command line

```
echo "# Give_a_Name" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin https://github.com/dechavezv/Give_a_Name.git
git push -u origin master
```

...or push an existing repository from the command line

```
git remote add origin https://github.com/dechavezv/Give_a_Name.git
git push -u origin master
```

...or import code from another repository

You can initialize this repository with code from a Subversion, Mercurial, or TFS project.

On the top under "Quick setup", make sure that "HTTPS" is selected- *not* "SSH". Copy the code under **"...or push an existing repository from the command line"**, return to the terminal, and paste in the two lines.
Note: We use HTTPS here because it does not require additional configuration. After this class you may want to set up SSH access, which is a bit more secure. You can find information on how to do this here.

Your terminal should have something like this. Please, **DO NOT** paste the code above, it's from Daniel's repository and wornt work for you.

```
[c177-t0@n2188 ~]$ git remote add origin https://github.com/dechavezv/Giv
[c177-t0@n2188 ~]$ git push -u origin master
```

You will be ask for your user name and password.

```
Username for 'https://github.com': dechavezv
Password for 'https://dechavezv@github.com':
Counting objects: 7, done.
Delta compression using up to 8 threads.
Compressing objects: 100% (5/5), done.
Writing objects: 100% (7/7), 650 bytes | 0 bytes/s, done.
```

```
Total 7 (delta 0), reused 0 (delta 0)
To https://github.com/dechavezv/Give_a_Name.git
 * [new branch]      master -> master
Branch master set up to track remote branch master from origin.
```

Go to your repository on github. It should contain the folder your create with the Favorite_animal and README files. Congratulations!!!

Optional: You will notice that every time you type `git push`. You are being ask for your user name and password. To avoid this, you can store your credentials temprarely temporarily. Let store to store your credentials for one hour.

Run the following two commands in your terminal to store your credentials for one hour (i.e. you will have to enter your username/pwd once every hour):

Set git to use the credential memory cache:

```
[c177-t0@n2188 ~]$ git config --global credential.helper cache
```

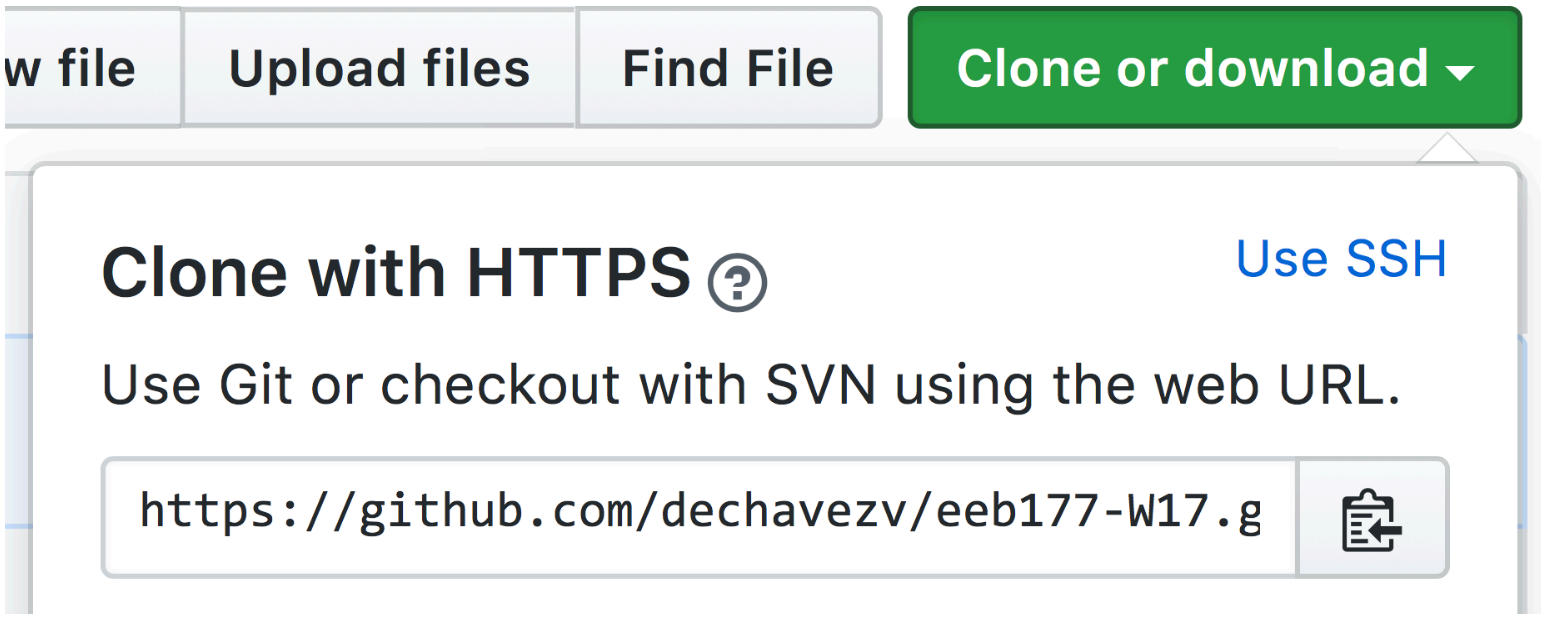
Set the cache to timeout after 1 hour (setting is in seconds):

```
[c177-t0@n2188 ~]$ git config --global credential.helper 'cache --timeout
```

Lastly, we will clone a repository into your eeb-177 directory in hoffman.

In your browser, navigate to Daniel's repository `https://github.com/dechavezv/eeb-177-Discussion`

Once on the main page of the repository, click on **Clone or download**. Then,under the Clone with HTTPs section, copy the URL for the repository.



Clone with HTTPS

Use Git or checkout with SVN using the web URL.

```
https://github.com/dechavezv/eeb177-W17.g
```

Go back to the terminal and make sure that you are in you eeb-177 directory with `pwd`. Then, type git clone, and then paste the URL you copied in the previous step.

```
[c177-t0@n2188 ~]$ git clone https://github.com/dechavezv/eeb-177-Discuss
```

Press **Enter**. Your local clone will be created.

```
Cloning into 'eeb-177-Discussion'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Compressing objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 3 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), done.
Checking connectivity... done.
```

Copy the document within eeb-177-Discussion called **W1-Discussion-In-class** into your current directory and with `nano` answer the questions of the document.

```
[c177-t0@n2188 ~] $ cp eeb-177-Discussion/W1-Discussion-In-class.txt ./
[c177-t0@n2188 ~] $ nano W1-Discussion-In-class.txt
```

To avoid confusion in future when cloning things, we will erase the folder eeb-177-Discussion for now.

```
[c177-t0@n2188 ~] $ rm -rf eeb-177-Discussion
```

Once, you have answerd the questions of the W1-Discussion-In-class.txt document `add`, `commit` and push the changes to your repository.

```
$ git add W1-Discussion-In-class.txt
$ git commit -m 'In-class-activity-W1'
$ git push -u origin master
```

Go to your repository on github. It should contain the new file W1-Discussion-In-class with your answers.

Finally, copy the URL for your repository and email it to Daniel at `dechavezv@ucla.edu`.