Course Reminders

- Survey due *this* Fri 4/5 (11:59 PM) : http://bit.ly/cogs108_survey
- A1 - due *next* Sunday 4/14 (11:59 PM)

Note: Projects can be put on GitHub. Please do <u>not</u> put assignments on GitHub.

Section Info

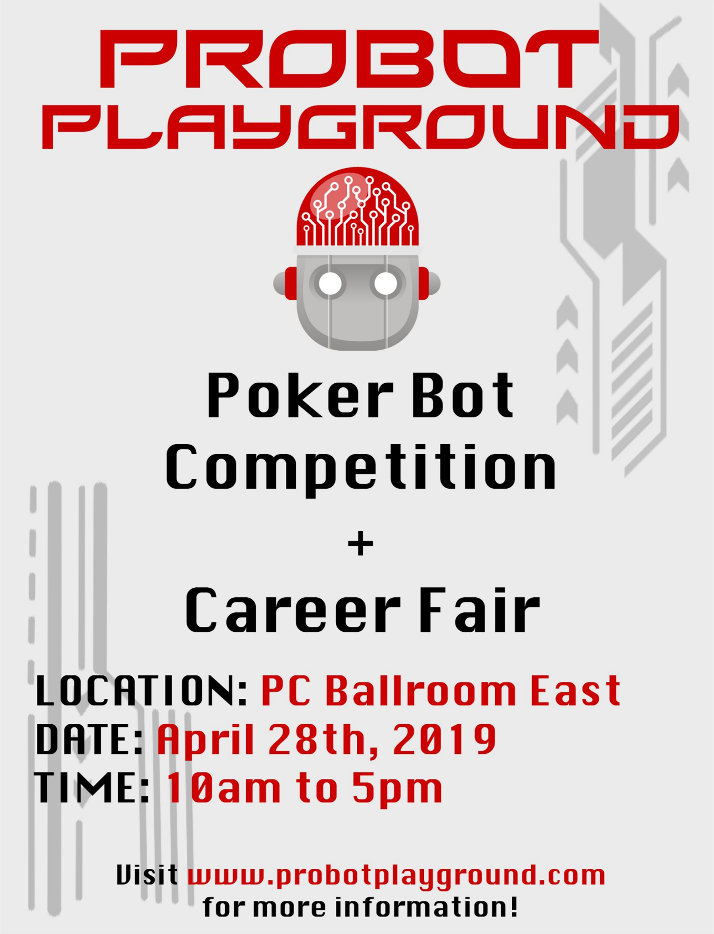
	Day	Time	Location	TA/IA
B01	Mon	9 AM	CENTR 222	Mayank
A02	Mon	12 PM	CENTR 222	Yinhe
B02	Mon	4 PM	MANDEB-150	Ashlesha
A04	Wed	9 AM	CENTR 222	Chris
B03	Wed	10 AM	PETER 102	Qiuli
A03	Wed	1 PM	PCYNH 121	Emily
B04	Wed	2 PM	PETER 102	Devendra
B05	Wed	3 PM	PETER 102	Alkin
A01	Wed	4 PM	PCYNH 121	Alkin
B06	Fri	3 PM	MANDEB-150	Phillip
A05	Fri	3 PM	PCYNH 121	John
B07	Fri	4 PM	MANDEB-150	Akshansh
B08	Fri	5 PM	MANDEB-150	Yanyi

This information has been added to the syllabus.

Office Hours

Date & Time	**Location**	**Instructional Staff**
M 3-5PM & W 3-5PM	CSB 243	Professor Ellis
M 2PM-3PM	CSB 114	Akshansh Chalal
Tu 11AM-12PM	CSB 114	Mayank Rajoria
W 11AM-12PM	PC Theater Lounge	Phillip Lagoc
F 1-2PM	CSB 114	Chris Chen

This information has been added to the syllabus and Piazza. Any changes will be posted to Piazza and announced in class.



PROBOT PLAYGROUND

Poker Bot Competition

+

Career Fair

LOCATION: PC Ballroom East
DATE: April 28th, 2019
TIME: 10am to 5pm

Visit www.probotplayground.com
for more information!

1. THE QUESTION
2. THE IMPLICATIONS
3. THE DATA
4. INFORMED CONSENT
5. PRIVACY
6. EVALUATION

NINE THINGS TO CONSIDER TO NOT RUIN PEOPLE'S LIVES WITH DATA SCIENCE

adapted from Thomas Donoghue

7. ANALYSIS

- Do your analyses reflect spurious correlations?
    a. Can you tease apart causation?
- What kind of covariates might you be tracking?
    a. Are you inferring latent variables from proxies?

adapted from Thomas Donoghue

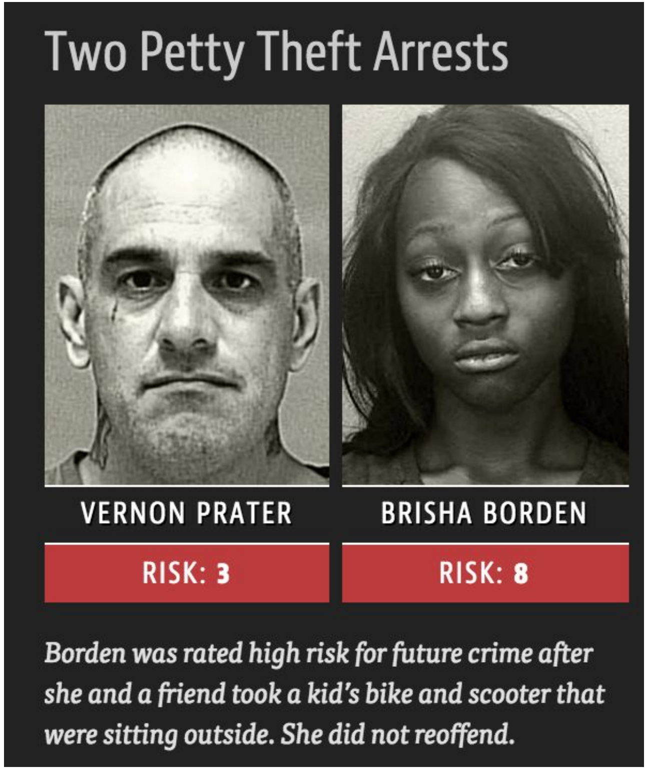
8. TRANSPARENCY & APPEAL

- Is your model a black box?
    a. Is it interpretable as to how it came to any particular decision?
- Is there a way to appeal a model decision?
    a. What kind of evidence would you need to refute a decision?

adapted from Thomas Donoghue

Case Study: Predictive Policing

- Predictive policing uses algorithms to predict crime, and recidivism
- Input data can be highly correlated [link] with race & SES, reflecting spurious correlations and leading to discriminatory decisions.
- These algorithms and decisions are often opaque and un-appealable.



Two Petty Theft Arrests

VERNON PRATER	BRISHA BORDEN
RISK: 3	RISK: 8

Borden was rated high risk for future crime after she and a friend took a kid's bike and scooter that were sitting outside. She did not reoffend.

adapted from Thomas Donoghue

9. CONTINUOUS MONITORING

- Healthy models maintain a back and forth with the thing(s) in the world they are trying to understand.
- Are you tracking for changes related to your data, assumptions, and evaluation metrics?
- Are you proactively looking for potential unintended side effects of your model itself or harmful outputs?
- Do you have a mechanism to fix and update your models/algorithm?

adapted from Thomas Donoghue

Case Study: NEWS SHARING

- Facebook is continuously making predictions about what you are going to do, which it uses to try to influence behaviour and then update its models based on the results
- Models optimize for engagement and sharing - can promote the spreading of misinformation

adapted from Thomas Donoghue

PUTTING IT ALL TOGETHER (GOOD)

- well-posed question that you know something about
- have considered implications of work
- adequate data, covering population of interest, with known and manageable biases
- allowed to use the data
- have de-identified data, stored securely
- defined metrics for success, objectively measured
- if suggesting causality, have actually established causality
- model is understandable, has procedure for appeal
- will monitor system for changes, have way & plan to update

adapted from Thomas Donoghue

HOW TO BE BAD WITH DATA SCIENCE

- ill-posed question you know nothing about
- don’t consider implications
- haphazardly collected biased data
- didn’t check or are not allowed to use data for this purpose
- un-anonymized, identifiable data, stored insecurely
- no clear metric for success (meh, it ‘seems to work’)
- present spurious correlations as meaningful
- model is a black box, no method for appeal in place
- no monitoring, no way to identify biases or update model

adapted from Thomas Donoghue

COGS9 Examples

- Ashley Madison Hack [link]
- OKCupid Data Published [link]
- Equifax Hack [link]
- Google & Pentagon Team Up on Drones [link]
- Cambridge Analytica Data Breach To Influence US Elections [link]
- Amazon and Police Team Up on Facial Recognition & Surveillance [link]
- Amazon scraps secret AI recruiting tool biased against women [link]

Python, Jupyter, & Version Control

Shannon E. Ellis, Ph.D
UC San Diego

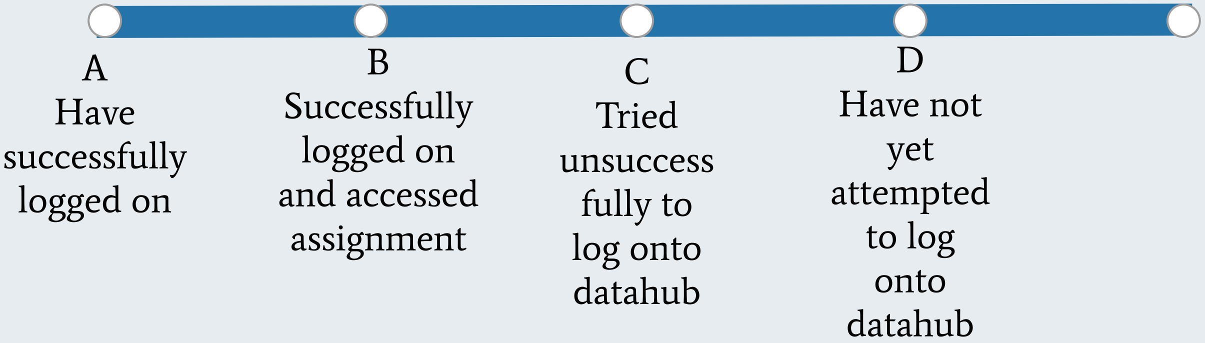
Department of Cognitive Science
sellis@ucsd.edu

GitHub Course Materials:
www.github.com/COGS108

Course Assignments:
http://datahub.ucsd.edu

First iclicker question!

What’s your current datahub status?



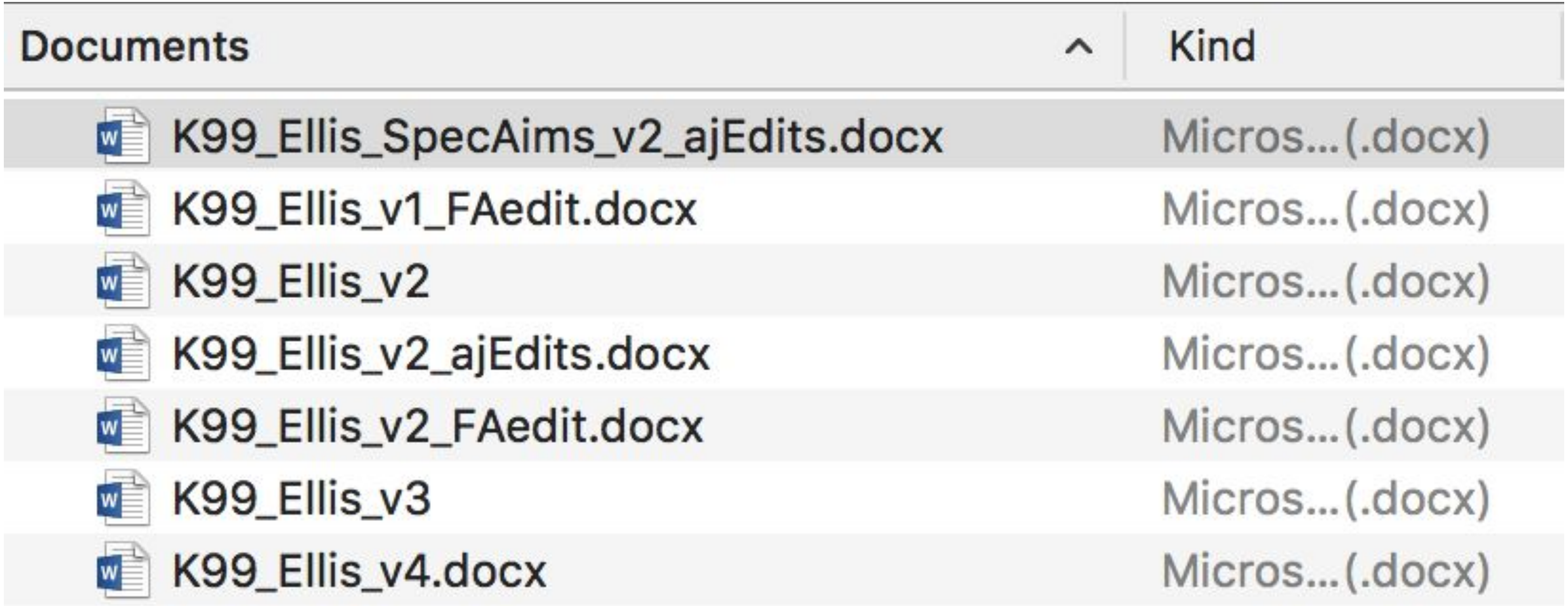
A
Have successfully logged on

B
Successfully logged on and accessed assignment

C
Tried unsuccessfully to log onto datahub

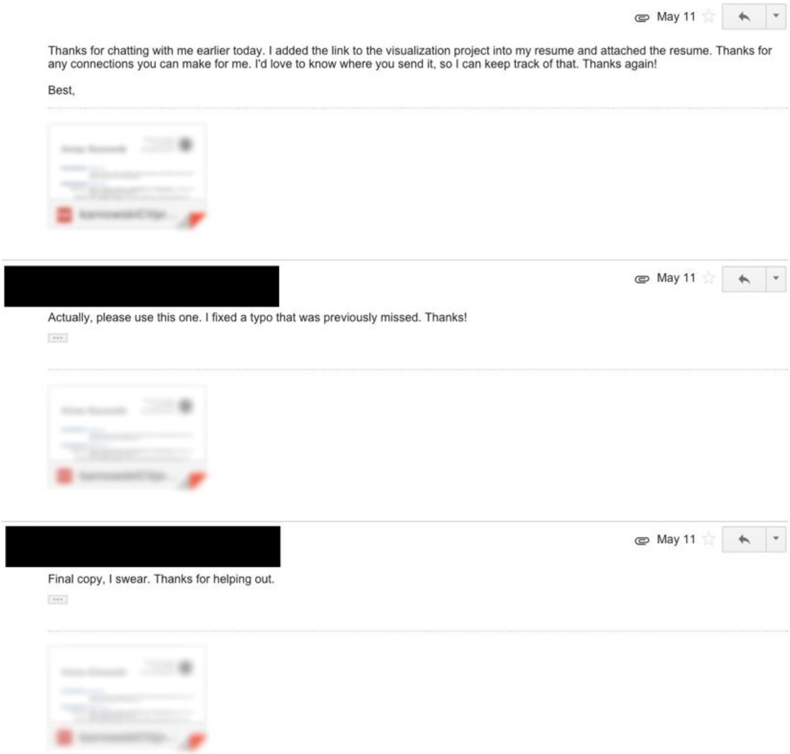
D
Have not yet attempted to log onto datahub

This sucks



Documents	Kind
K99_Ellis_SpecAims_v2_ajEdits.docx	Micros...(.docx)
K99_Ellis_v1_FAedit.docx	Micros...(.docx)
K99_Ellis_v2	Micros...(.docx)
K99_Ellis_v2_ajEdits.docx	Micros...(.docx)
K99_Ellis_v2_FAedit.docx	Micros...(.docx)
K99_Ellis_v3	Micros...(.docx)
K99_Ellis_v4.docx	Micros...(.docx)

Yup, this sucks too.



May 11

Thanks for chatting with me earlier today. I added the link to the visualization project into my resume and attached the resume. Thanks for any connections you can make for me. I'd love to know where you send it, so I can keep track of that. Thanks again!

Best,

[redacted]

May 11

Actually, please use this one. I fixed a typo that was previously missed. Thanks!

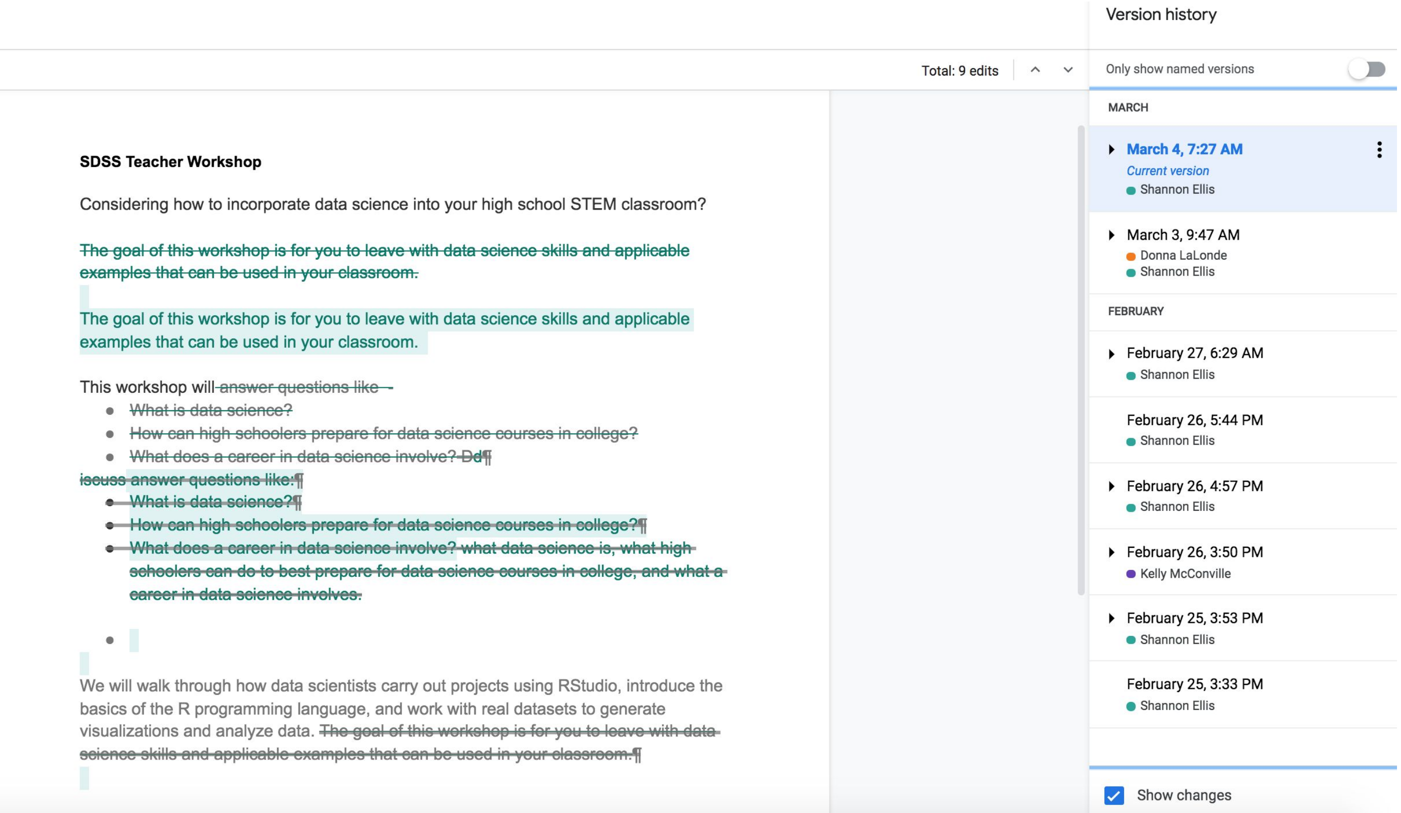
[redacted]

May 11

Final copy, I swear. Thanks for helping out.

adapted from Brad Voytek

This is a step in the right direction



Total: 9 edits

SDSS Teacher Workshop

Considering how to incorporate data science into your high school STEM classroom?

~~The goal of this workshop is for you to leave with data science skills and applicable examples that can be used in your classroom.~~

The goal of this workshop is for you to leave with data science skills and applicable examples that can be used in your classroom.

This workshop will ~~answer questions like -~~

- ~~What is data science?~~
- ~~How can high schoolers prepare for data science courses in college?~~
- ~~What does a career in data science involve? Dd¶~~

~~iscuss answer questions like:¶~~

- ~~What is data science?¶~~
- ~~How can high schoolers prepare for data science courses in college?¶~~
- ~~What does a career in data science involve? what data science is, what high schoolers can do to best prepare for data science courses in college, and what a career in data science involves.~~
-

We will walk through how data scientists carry out projects using RStudio, introduce the basics of the R programming language, and work with real datasets to generate visualizations and analyze data. ~~The goal of this workshop is for you to leave with data science skills and applicable examples that can be used in your classroom.¶~~

Version history

Only show named versions

MARCH

March 4, 7:27 AM
Current version
Shannon Ellis

March 3, 9:47 AM
Donna LaLonde
Shannon Ellis

FEBRUARY

February 27, 6:29 AM
Shannon Ellis

February 26, 5:44 PM
Shannon Ellis

February 26, 4:57 PM
Shannon Ellis

February 26, 3:50 PM
Kelly McConville

February 25, 3:53 PM
Shannon Ellis

February 25, 3:33 PM
Shannon Ellis

☑ Show changes

Version Control

- Enables multiple people to simultaneously work on a single project.

- Each person edits their own copy of the files and chooses when to share those changes with the rest of the team.

- Thus, temporary or partial edits by one person do not interfere with another person's work

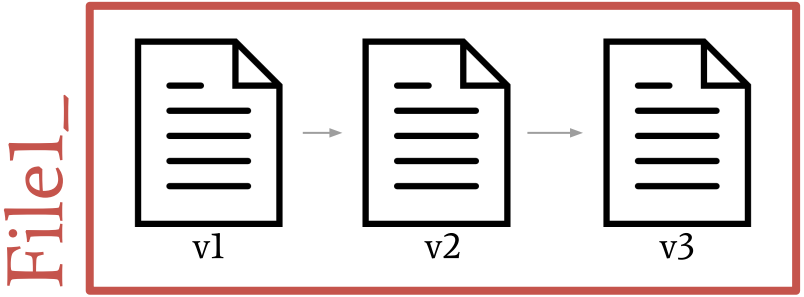
adapted from Brad Voytek

What is version control?

A way to manage the evolution of a set of files

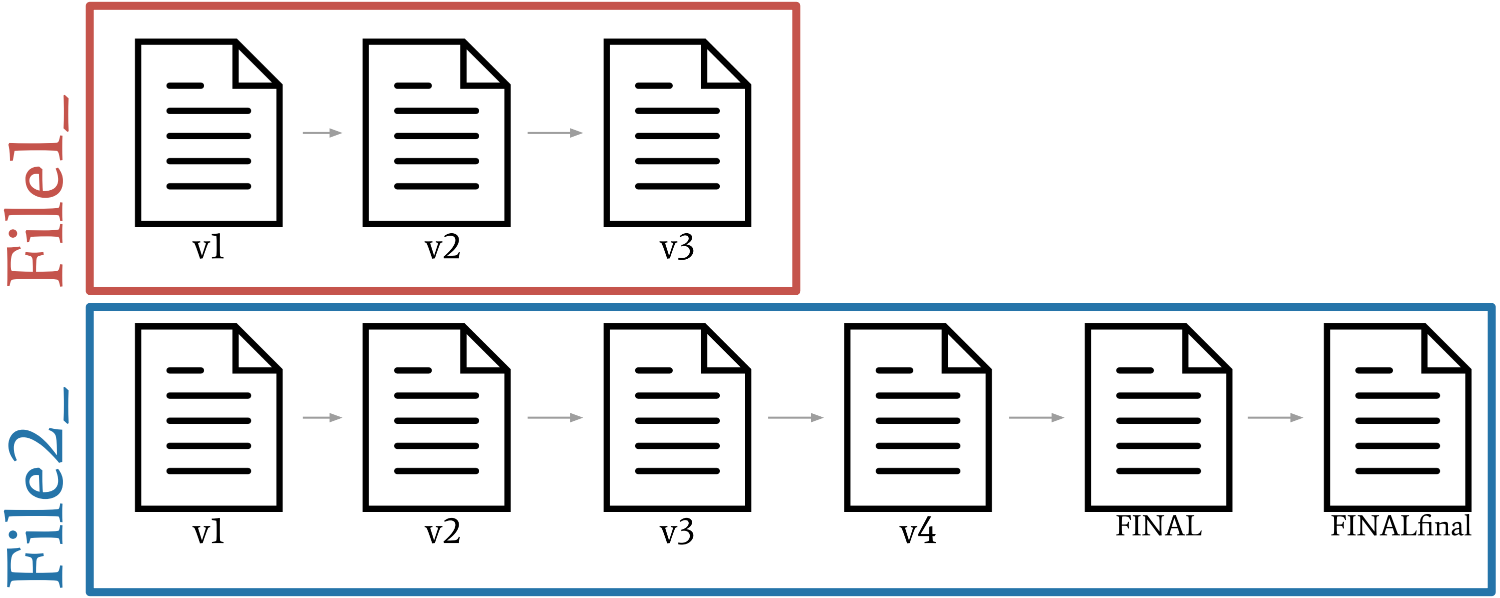
What is version control?

A way to manage the evolution of a set of files



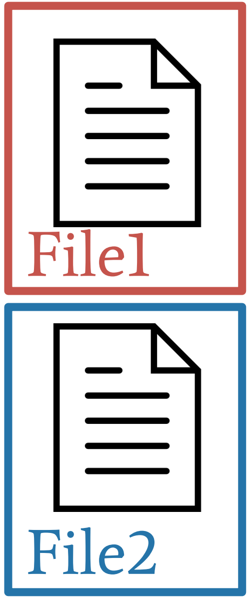
What is version control?

A way to manage the evolution of a set of files



What is version control?

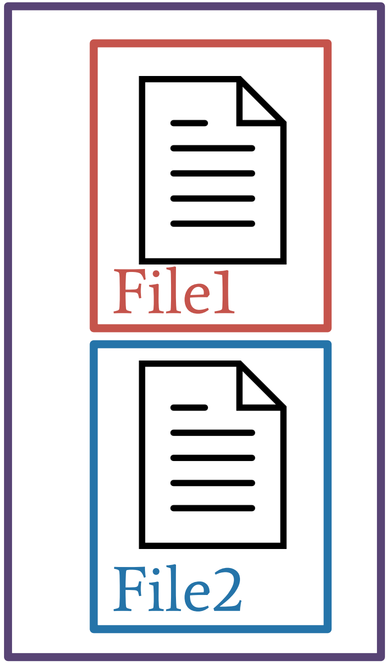
A way to manage the evolution of a set of files



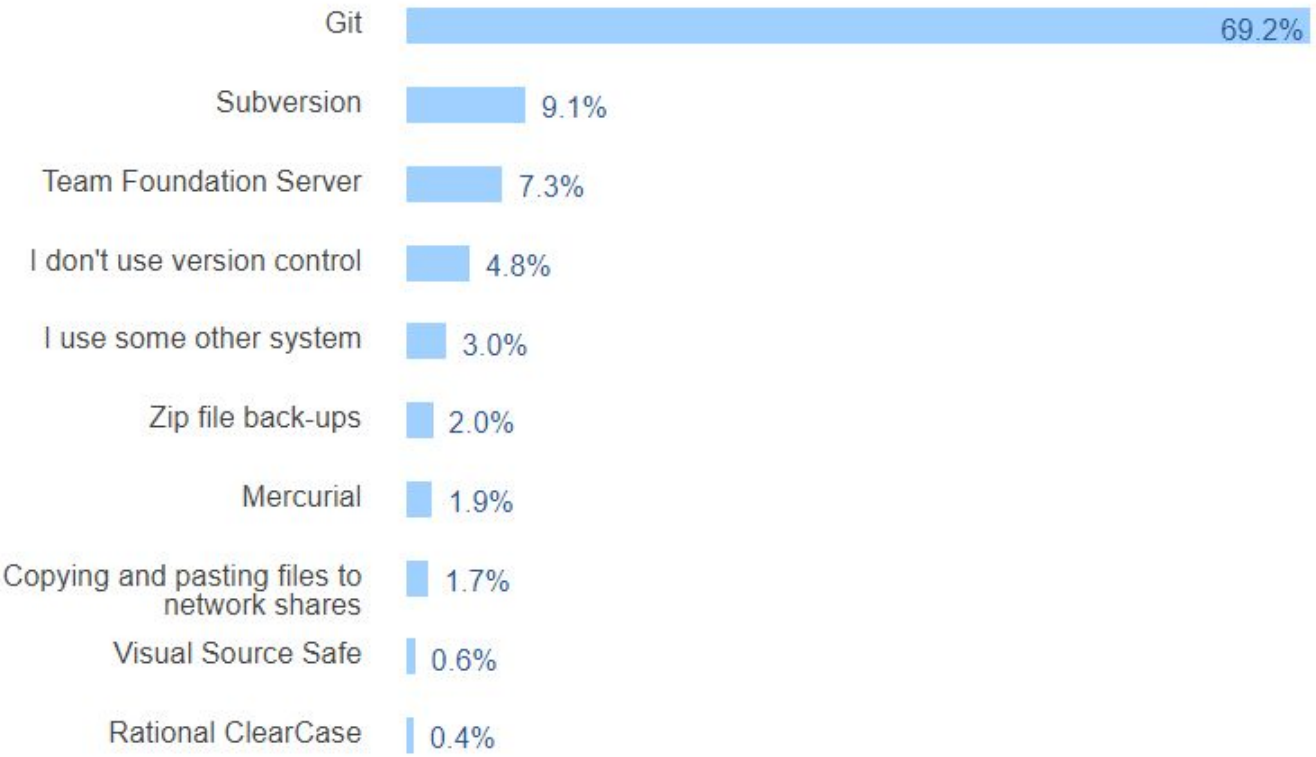
When using a version control system, you have **one copy of each file** and the *version control system tracks the changes* that have occurred over time

What is version control?

A way to manage the evolution of a set of files



The set of files is referred to as a **repository (repo)**



https://insights.stackoverflow.com/survey/2017#work-version-control

git & GitHub

the version control system

GitHub (or Bitbucket or GitLab) is the home **where your git-based projects live** on the Internet.

git & GitHub

git

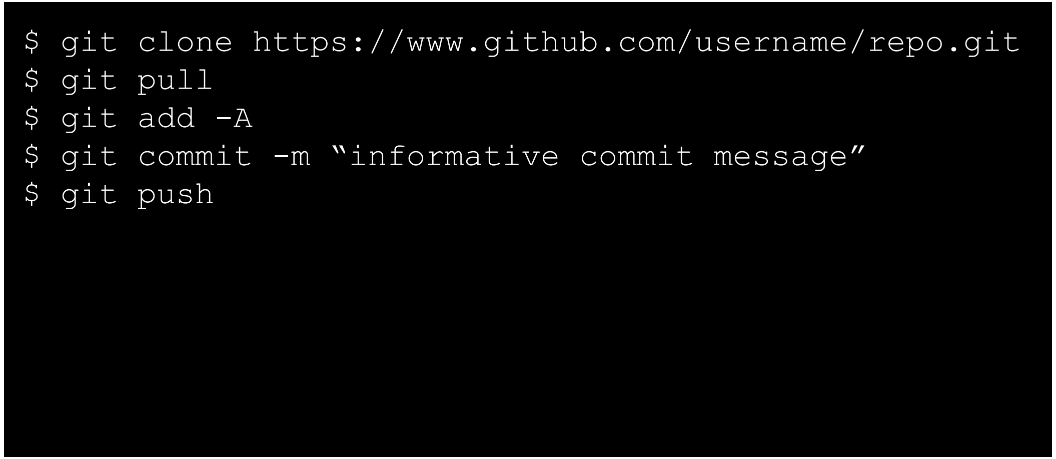
the version control system

~ Track Changes from Microsoft Word....on steroids

GitHub (or Bitbucket or GitLab) is the home **where your git-based projects live** on the Internet.

~ Dropbox....but way better

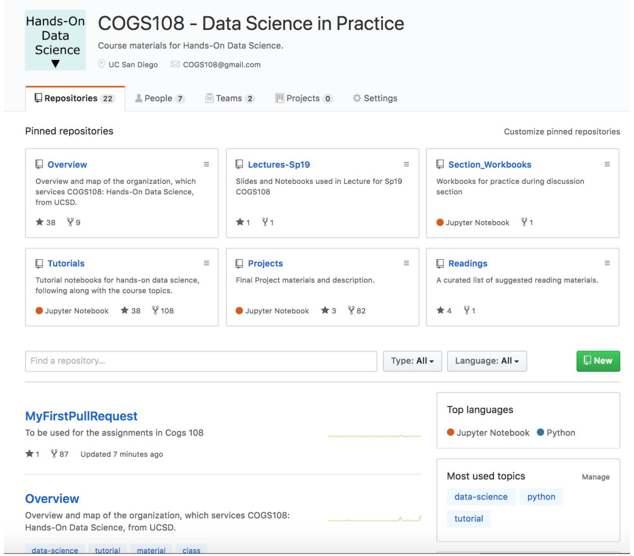
What version control looks like



```
$ git clone https://www.github.com/username/repo.git
$ git pull
$ git add -A
$ git commit -m “informative commit message”
$ git push
```

Terminal

git



COGS108 - Data Science in Practice

Course materials for Hands-On Data Science.

UC San Diego COGS108@gmail.com

Pinned repositories

Overview
Overview and map of the organization, which services COGS108: Hands-On Data Science, from UCSD.
★ 38 9

Lectures-Sp19
Slides and Notebooks used in Lecture for Sp19 COGS108
★ 1 1

Section_Workbooks
Workbooks for practice during discussion section
● Jupyter Notebook 1

Tutorials
Tutorial notebooks for hands-on data science, following along with the course topics.
● Jupyter Notebook ★ 38 108

Projects
Final Project materials and description.
● Jupyter Notebook ★ 3 82

Readings
A curated list of suggested reading materials.
★ 4 1

MyFirstPullRequest
To be used for the assignments in Cogs 108
★ 1 87 Updated 7 minutes ago

Overview
Overview and map of the organization, which services COGS108: Hands-On Data Science, from UCSD.
data-science tutorial material class

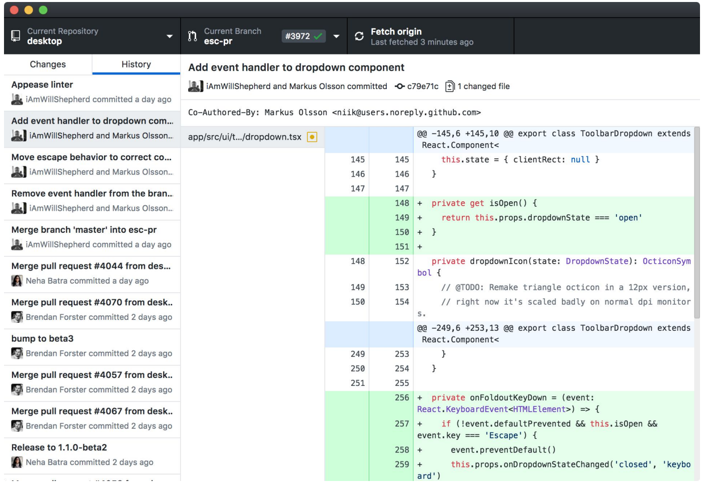
Top languages
● Jupyter Notebook ● Python

Most used topics

data-science python tutorial

GitHub

GUIs can be helpful when working with version control



Appease linter
iAmWillShepherd committed a day ago

Add event handler to dropdown com...
iAmWillShepherd and Markus Olsson...

Move escape behavior to correct co...
iAmWillShepherd and Markus Olsson...

Remove event handler from the bran...
iAmWillShepherd and Markus Olsson...

Merge branch 'master' into esc-pr
iAmWillShepherd committed a day ago

Merge pull request #4044 from des...
Neha Batra committed a day ago

Merge pull request #4070 from desk..
Brendan Forster committed 2 days ago

bump to beta3
Brendan Forster committed 2 days ago

Merge pull request #4057 from desk..
Brendan Forster committed 2 days ago

Merge pull request #4067 from desk..
Brendan Forster committed 2 days ago

Release to 1.1.0-beta2
Neha Batra committed 2 days ago

Add event handler to dropdown component

iAmWillShepherd and Markus Olsson committed c79e71c 1 changed file

```
Co-Authored-By: Markus Olsson <niik@users.noreply.github.com>
```

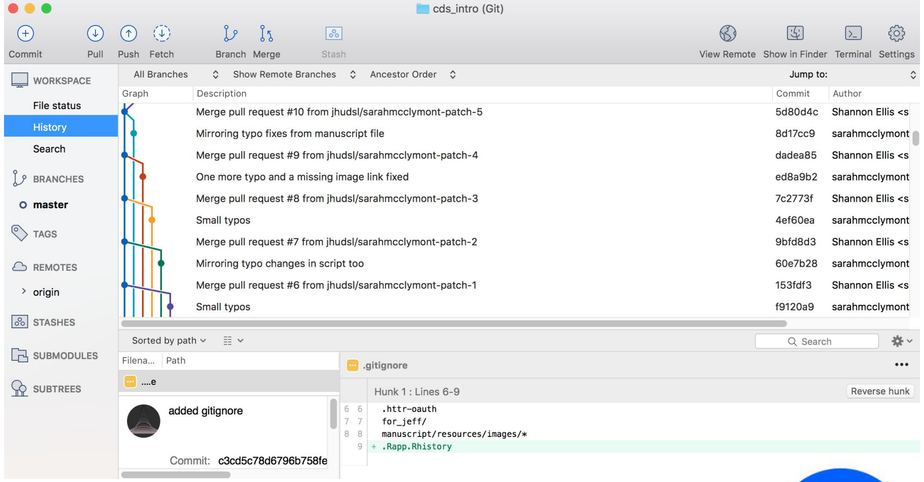
app/src/ui/t.../dropdown.tsx

```
@@ -145,6 +145,10 @@ export class ToolbarDropdown extends
 React.Component<
     this.state = { clientRect: null }
   }

+  private get isOpen() {
+    return this.props.dropdownState === 'open'
+  }
+
   private dropdownIcon(state: DropdownState): OcticonSym
bol {
     // @TODO: Remake triangle octicon in a 12px version,
     // right now it's scaled badly on normal dpi monitor
s.
@@ -249,6 +253,13 @@ export class ToolbarDropdown extends
 React.Component<
     }
   }

+  private onFoldoutKeyDown = (event:
React.KeyboardEvent<HTMLElement>) => {
+    if (!event.defaultPrevented && this.isOpen &&
event.key === 'Escape') {
+      event.preventDefault()
+      this.props.onDropdownStateChanged('closed', 'keybo
ard')
```

GitHub Desktop



Graph	Description	Commit	Author
	Merge pull request #10 from jhudsl/sarahmcclymont-patch-5	5d80d4c	Shannon Ellis <s
	Mirroring typo fixes from manuscript file	8d17cc9	sarahmcclymont
	Merge pull request #9 from jhudsl/sarahmcclymont-patch-4	dadea85	Shannon Ellis <s
	One more typo and a missing image link fixed	ed8a9b2	sarahmcclymont
	Merge pull request #8 from jhudsl/sarahmcclymont-patch-3	7c2773f	Shannon Ellis <s
	Small typos	4ef60ea	sarahmcclymont
	Merge pull request #7 from jhudsl/sarahmcclymont-patch-2	9bfd8d3	Shannon Ellis <s
	Mirroring typo changes in script too	60e7b28	sarahmcclymont
	Merge pull request #6 from jhudsl/sarahmcclymont-patch-1	153fdf3	Shannon Ellis <s
	Small typos	f9120a9	sarahmcclymont

Filena...	Path
....e	

added gitignore

Commit: c3cd5c78d6796b758fe

.gitignore

Hunk 1 : Lines 6-9

```
  .httr-oauth
  for_jeff/
  manuscript/resources/images/*
+ .Rapp.Rhistory
```

SourceTree

Why version control with git and GitHub?

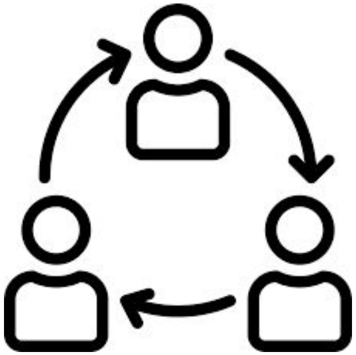
Collaboration

Returning to a safe state

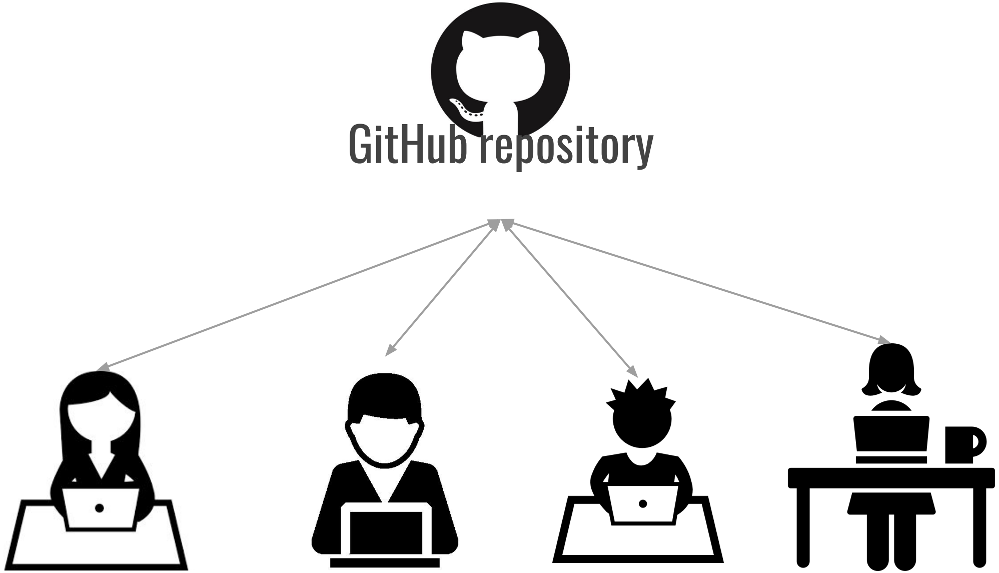
Exposure for your work

Tracking others' work

Collaborate like you do with Google Docs



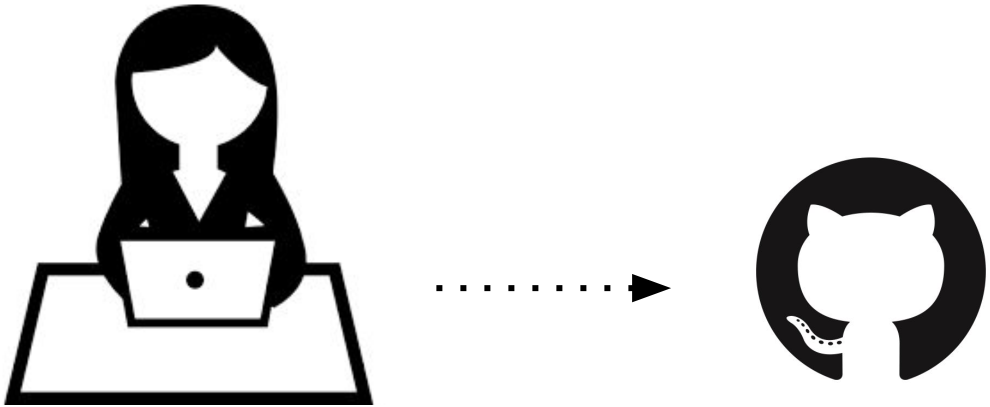
Collaboration



Each person is making changes **locally** (on their computer)

Make changes locally, while knowing a stable copy exists

Returning to
a safe state



You're free and safe to **try things out locally**. You'll only send changes to the repo when you're at a stable point

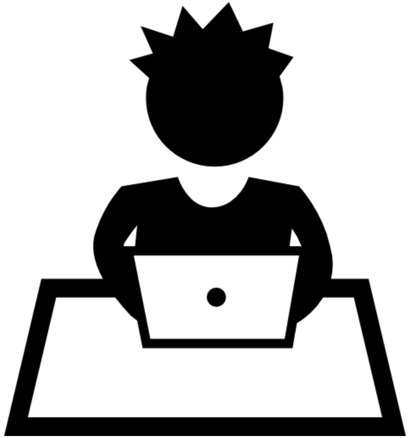
Your repositories will be visible to others!

Exposure for your work

Your public GitHub repos are your coding social media

Keep up with others’ work easily

Tracking others’ work



As a social platform, you can see others’ work too!

When you’ll HAVE to use GitHub in this course

- Course materials
- completing A1 (individual)
- Final Project Submission (one member of group)

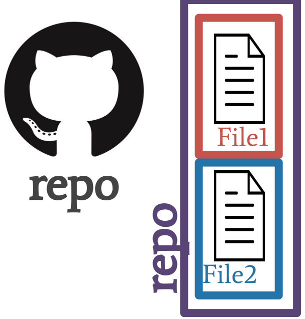
Your team SHOULD use GitHub to work on and complete your final project in this course!

When you’ll HAVE to use GitHub in this course

- Course materials
- Completing A1
- Final Project Submission

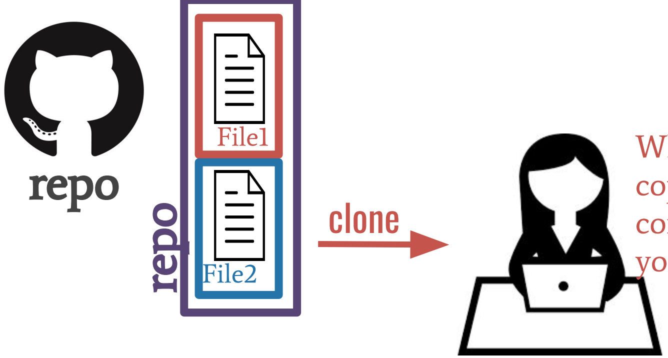
When you SHOULD use GitHub in this course

- To work on your projects with your group members!
  - version control is *perfect* for this!
- To share your project with the world!
  - GitHub is your social media platform in the coding world!
  - Remember to give credit to teammates

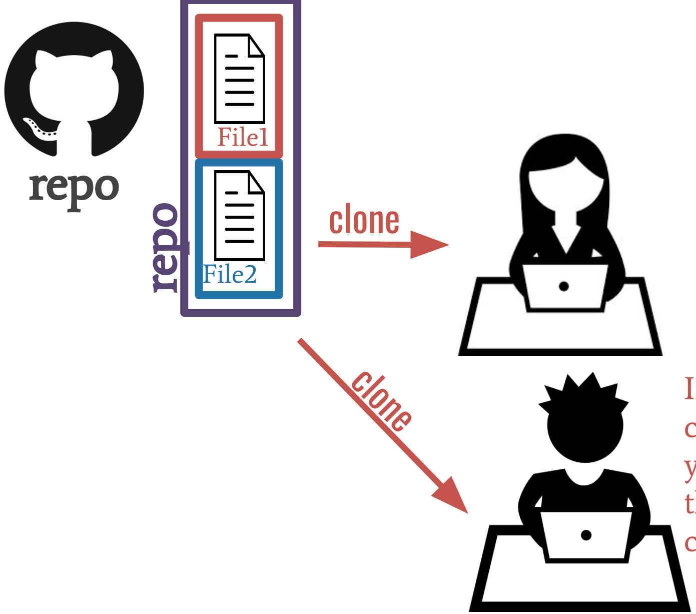


A **GitHub repo** contains all the files and folders for your project.

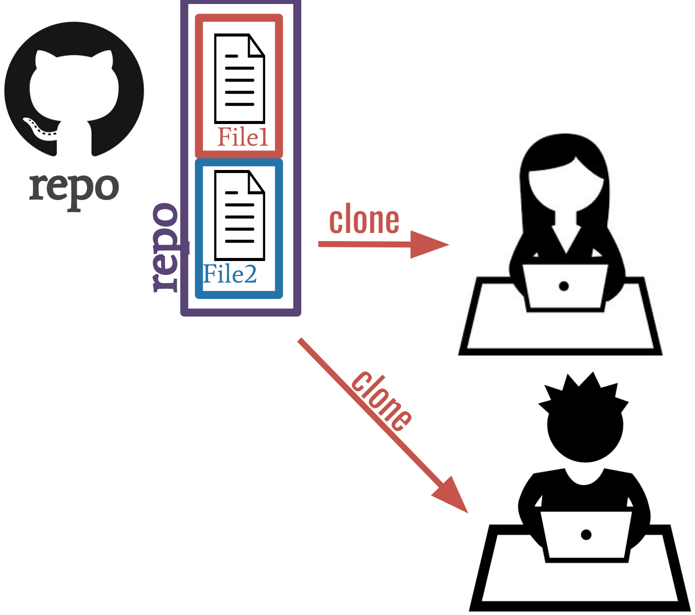
GitHub is a **remote host**. The files are geographically distant from any files on your computer.



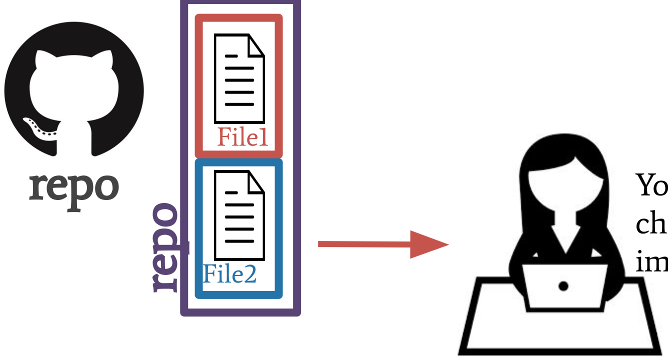
When you first make a copy onto your local computer (read: laptop), you **clone** the repository.



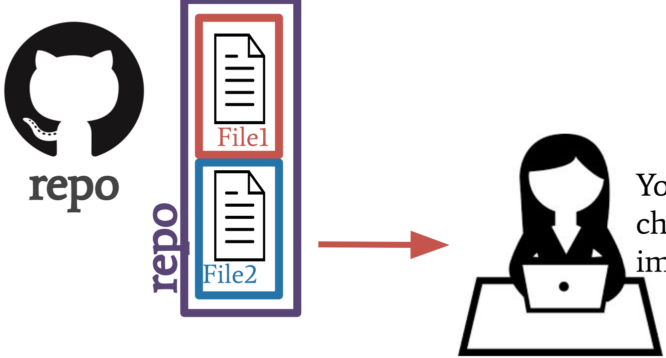
If someone else on your project cloned the repo at the same time, you would have identical copies of the project on each of your computers.



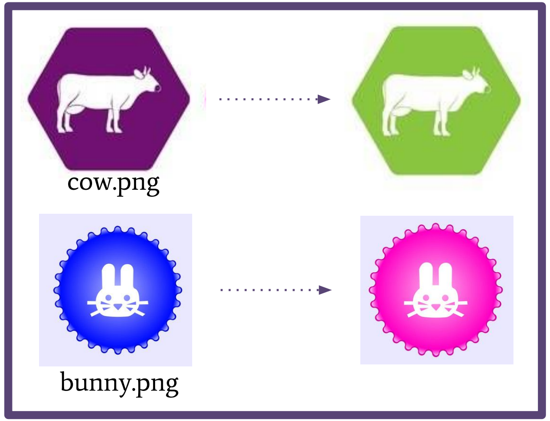
Yay! Everyone can work on the project!

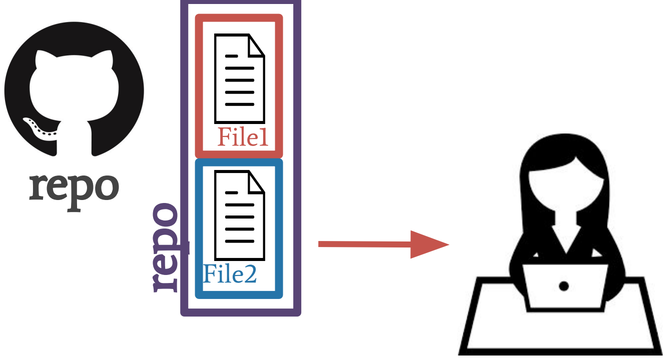


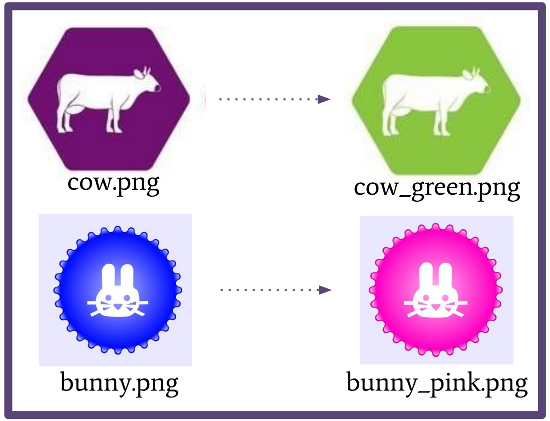
You decide you want to change a few of the images in the project.



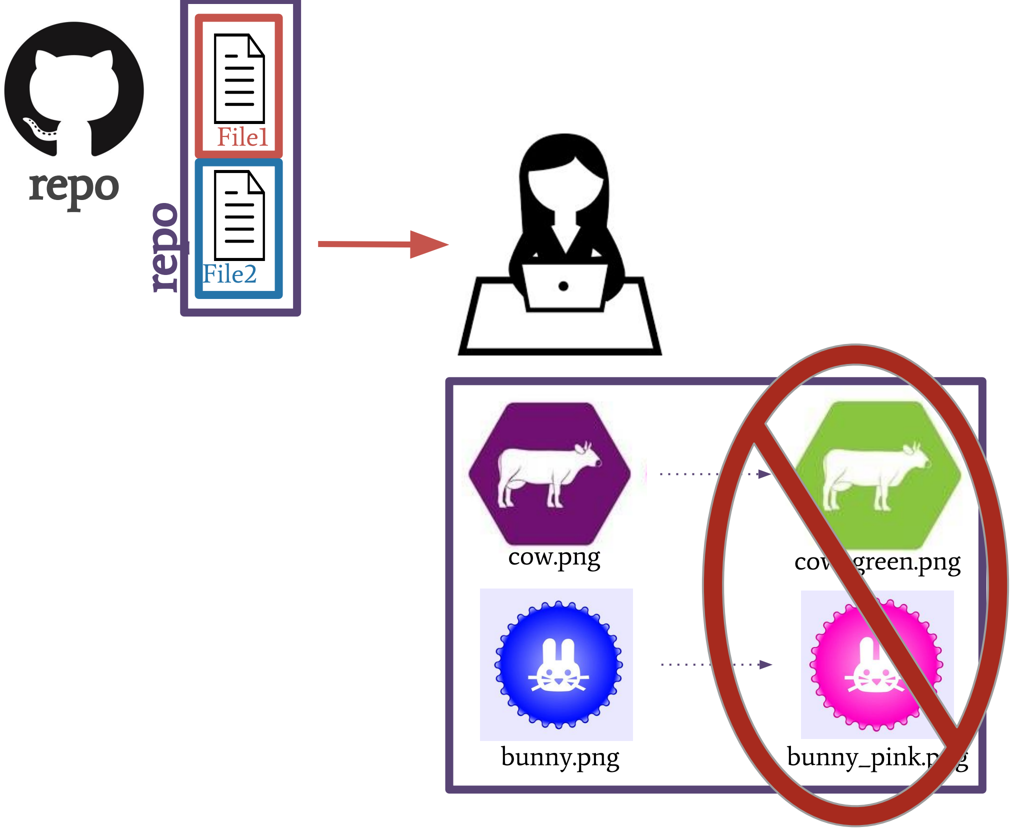
You decide you want to change a few of the images in the project.



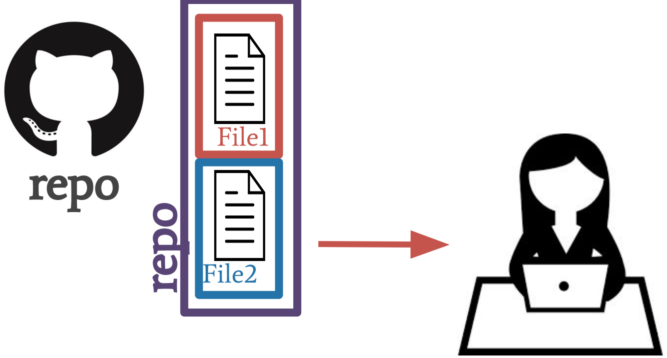


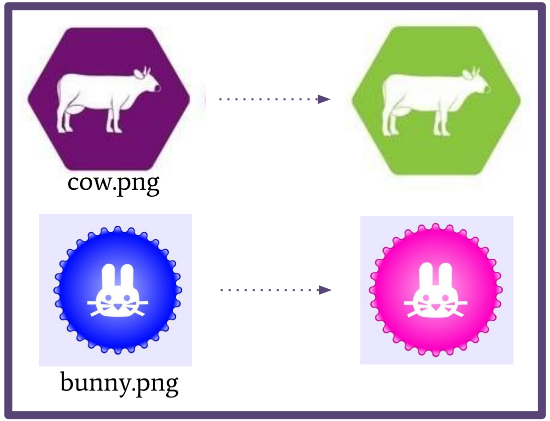


without git...you’d likely rename these files....

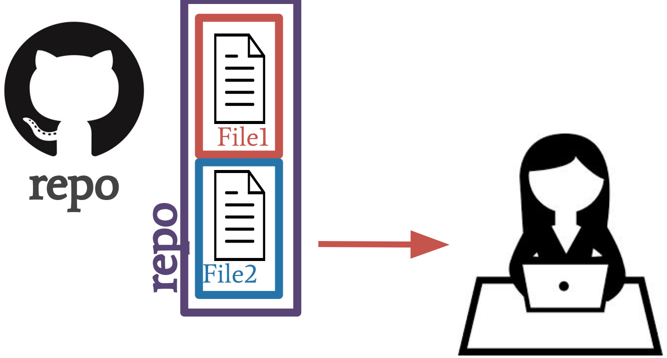


Thank goodness those days are over!

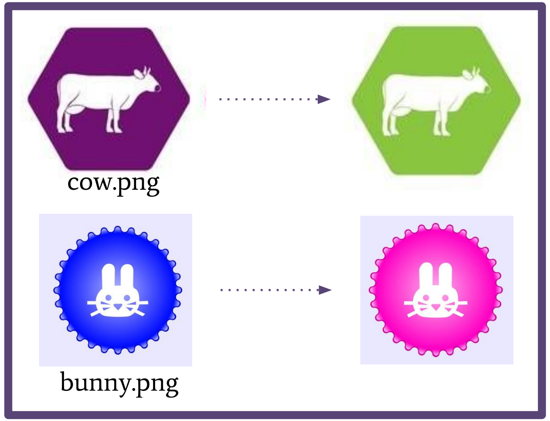




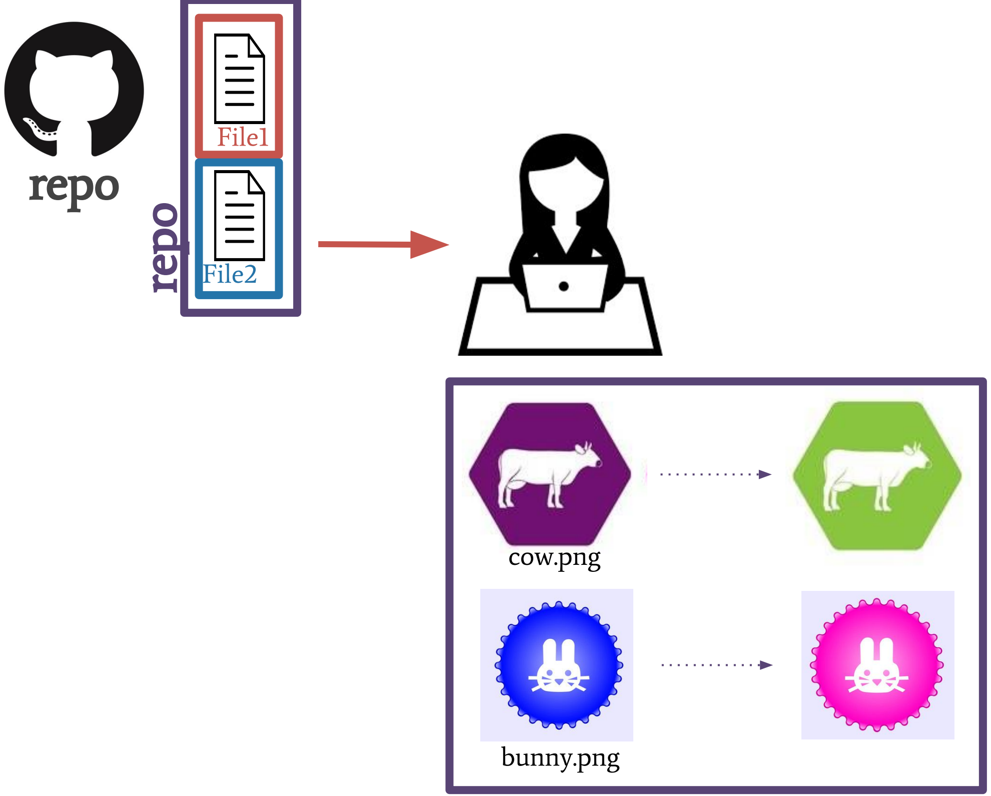
Instead, you tell git which files you'd like to keep track of using **add**. This process is called *staging*.



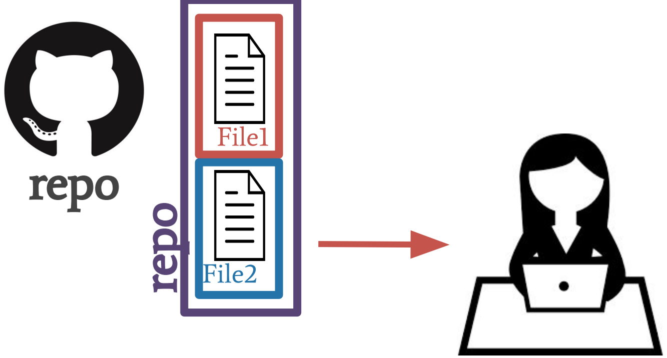
`git add file`	stages specified file (or folder)
`git add .`	stages **new and modified** files
`git add -u`	stages **modified and deleted** files
`git add -A`	stages **new, modified, and deleted** files
`git add *.csv`	Stages any files with .csv extension
`git add *`	Use with caution: stages everything

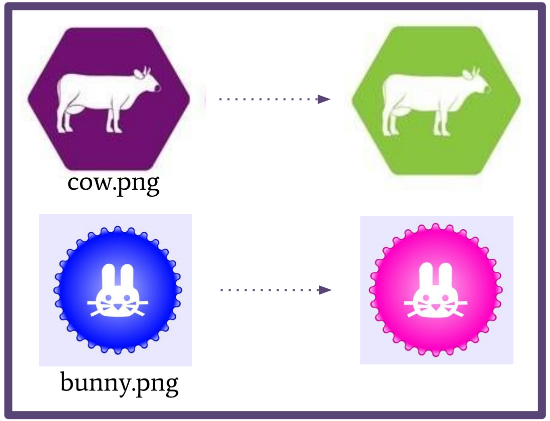


Instead, you tell git which files you'd like to keep track of using **add**. This process is called *staging*.



Then, you create a snapshot of your files at this point. This snapshot is called a **commit**.





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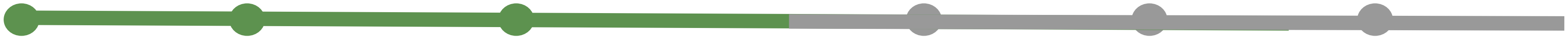
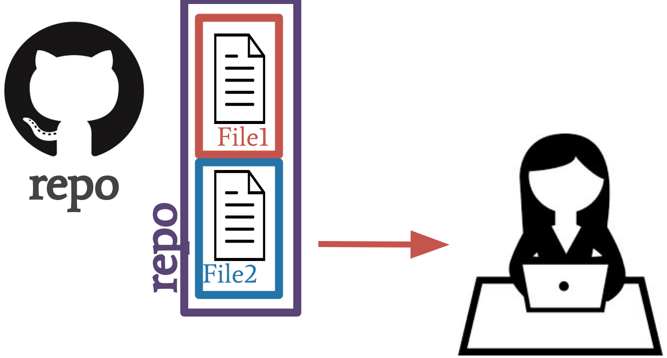
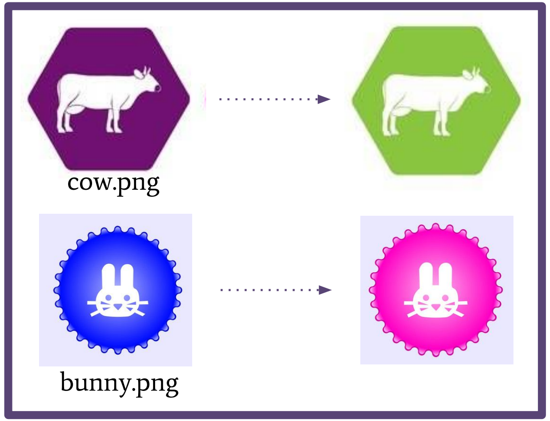


A **commit** tracks who, what, and when



You can make commits more informative by adding a **commit message**.

Example: git **commit** -m “*changed colors for animal icons*”



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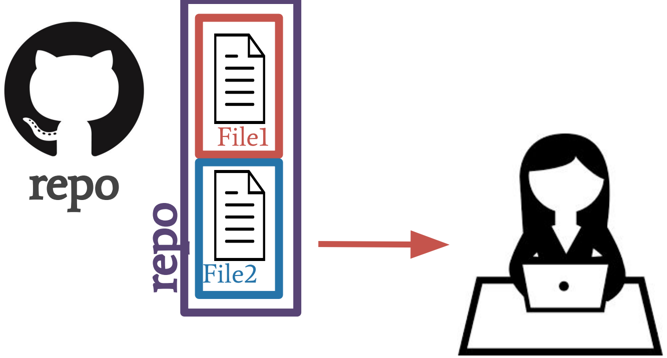
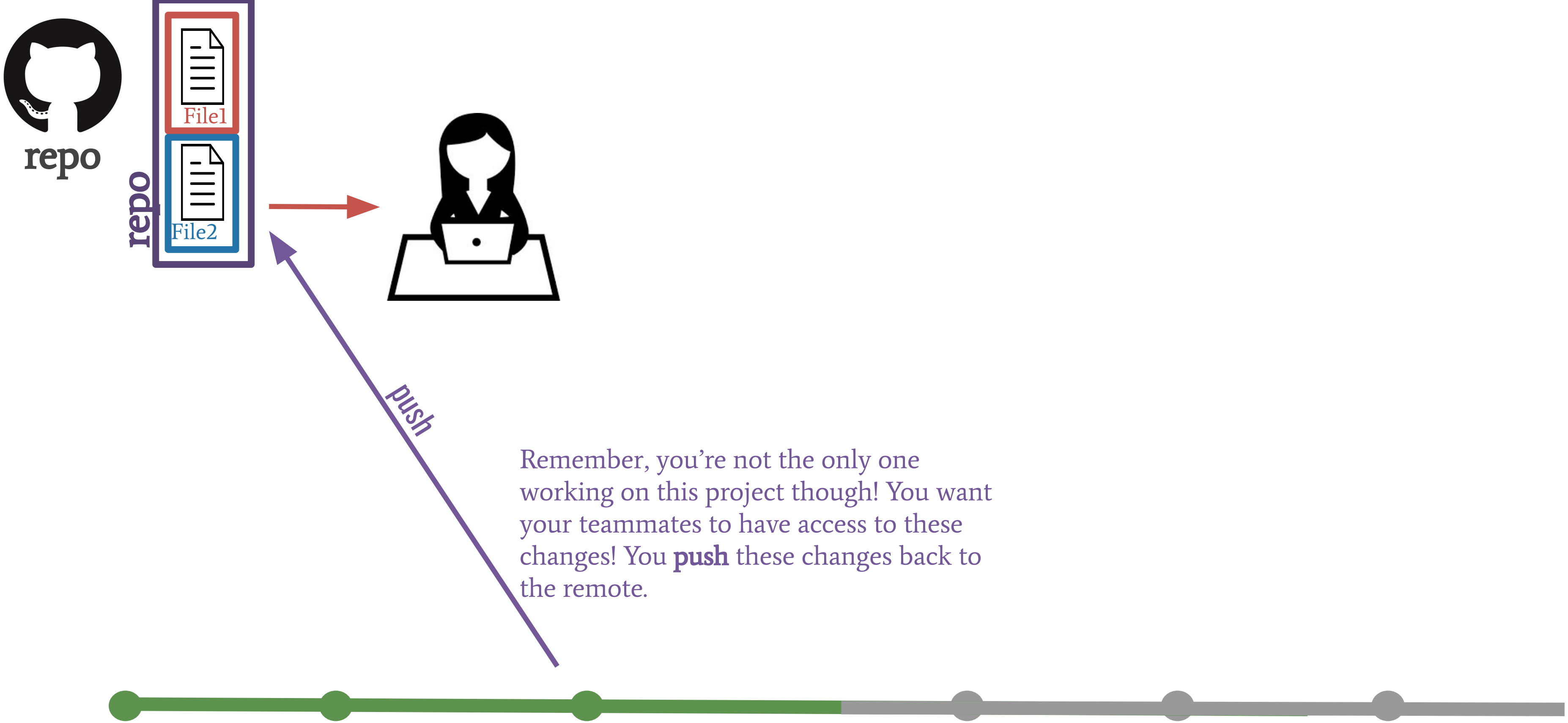


Shannon Ellis
11/28/18 3:28pm

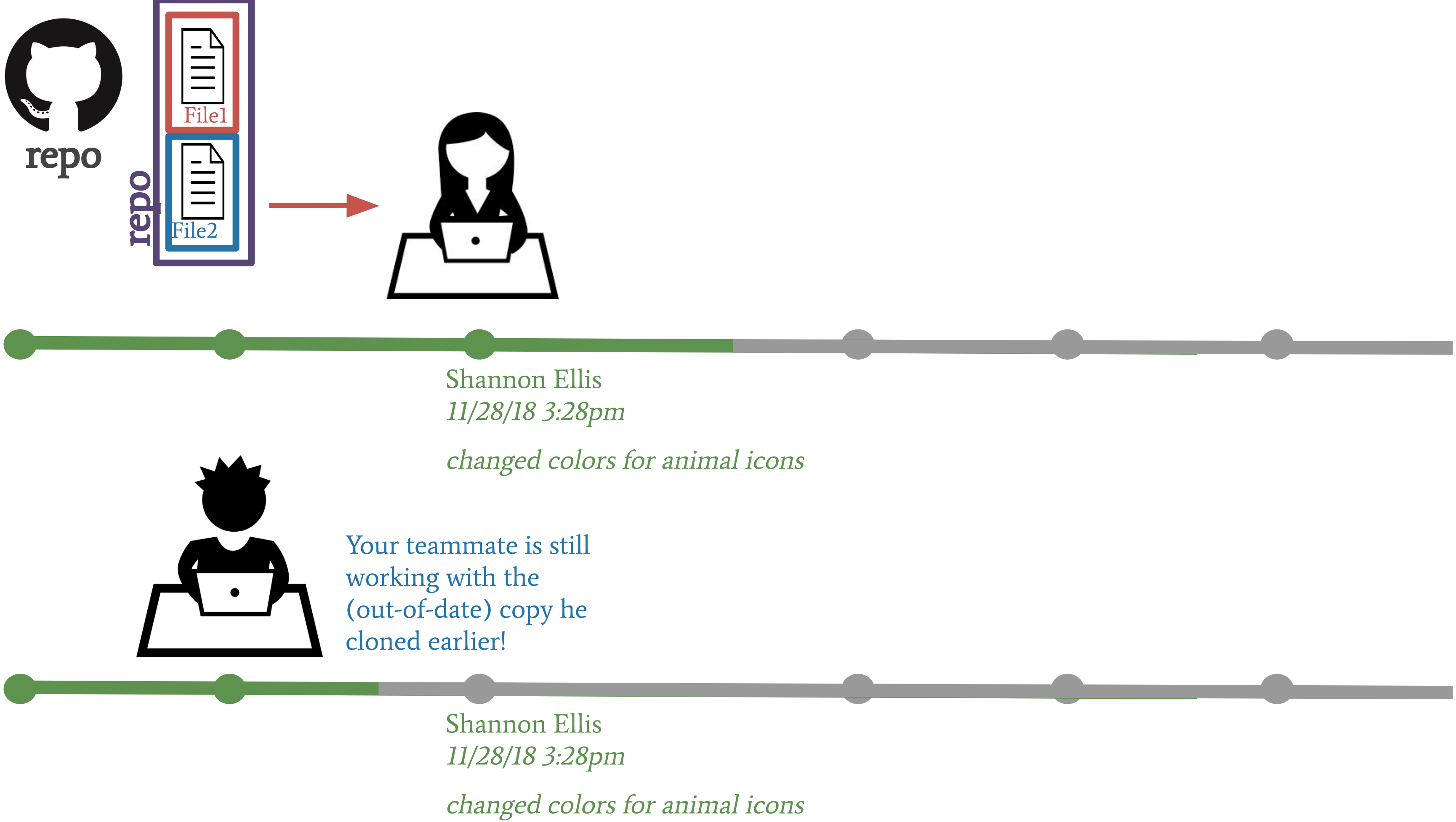
changed colors for animal icons



Remember, you're not the only one working on this project though! You want your teammates to have access to these changes! You **push** these changes back to the remote.

Shannon Ellis
11/28/18 3:28pm

changed colors for animal icons



Shannon Ellis
11/28/18 3:28pm

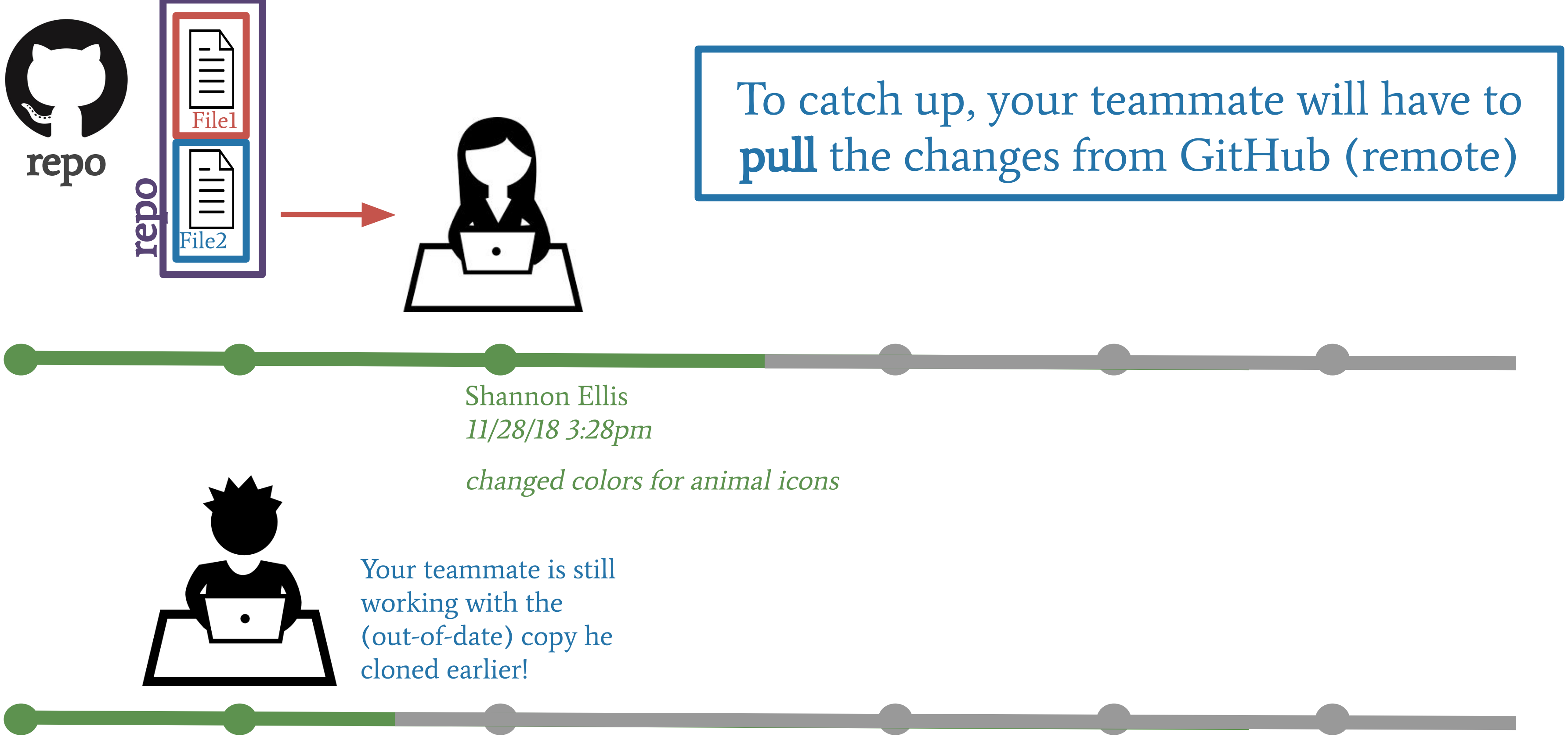
changed colors for animal icons

Your teammate is still working with the (out-of-date) copy he cloned earlier!

Shannon Ellis
11/28/18 3:28pm

changed colors for animal icons

To catch up, your teammate will have to **pull** the changes from GitHub (remote)



Shannon Ellis
11/28/18 3:28pm

changed colors for animal icons

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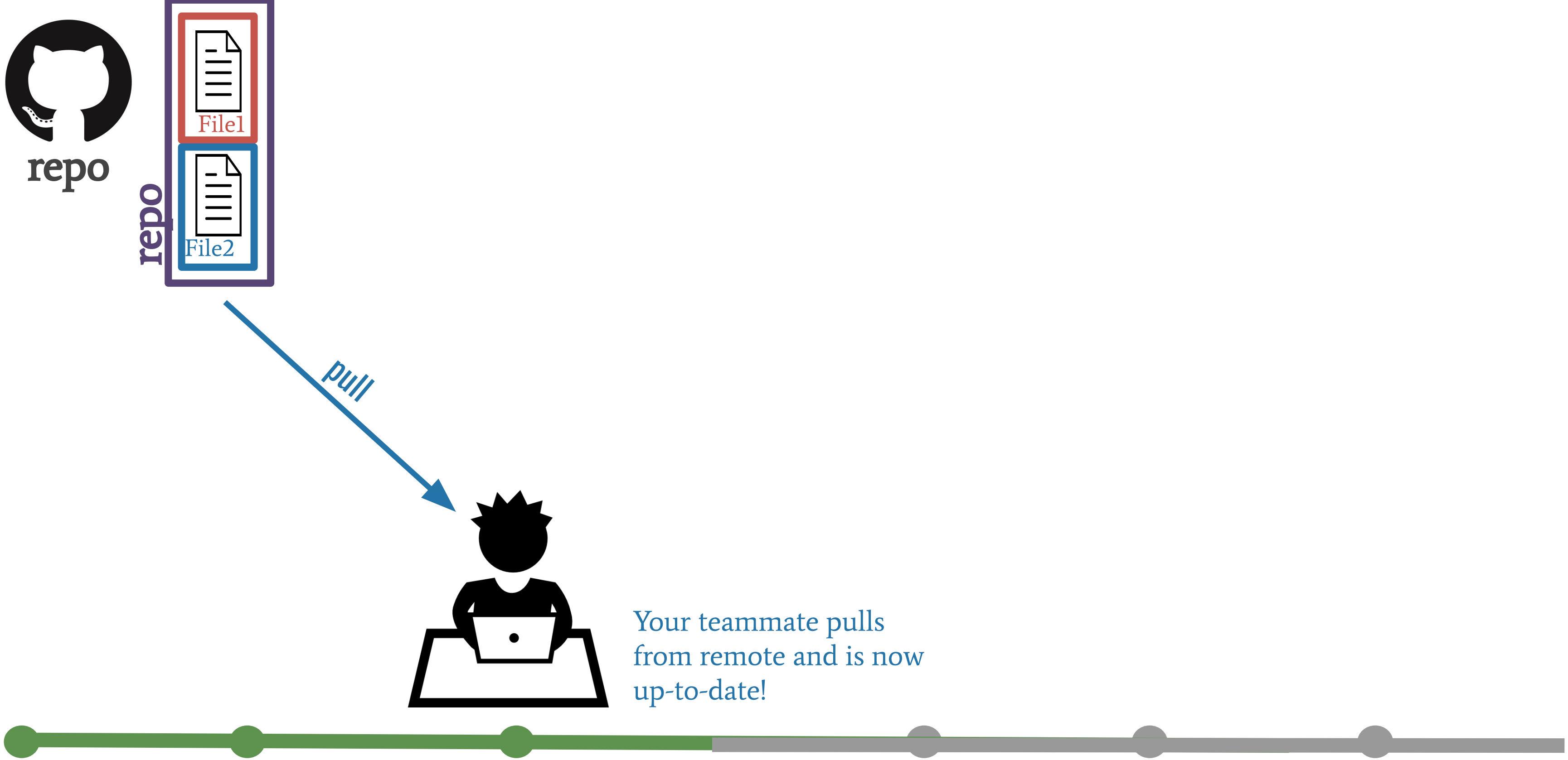
Shannon Ellis
11/28/18 3:28pm

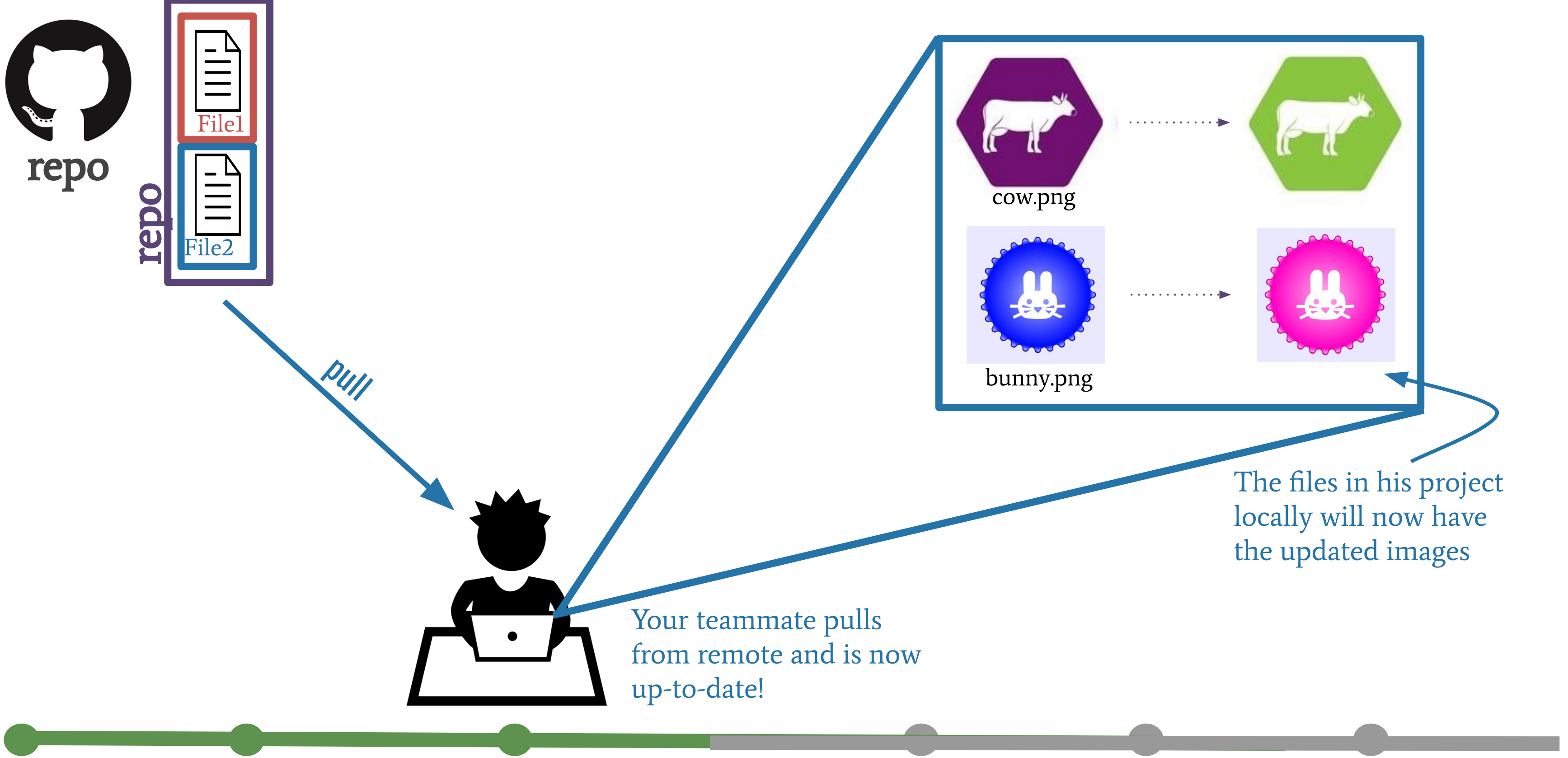
changed colors for animal icons



Your teammate pulls from remote and is now up-to-date!

Shannon Ellis
11/28/18 3:28pm

changed colors for animal icons



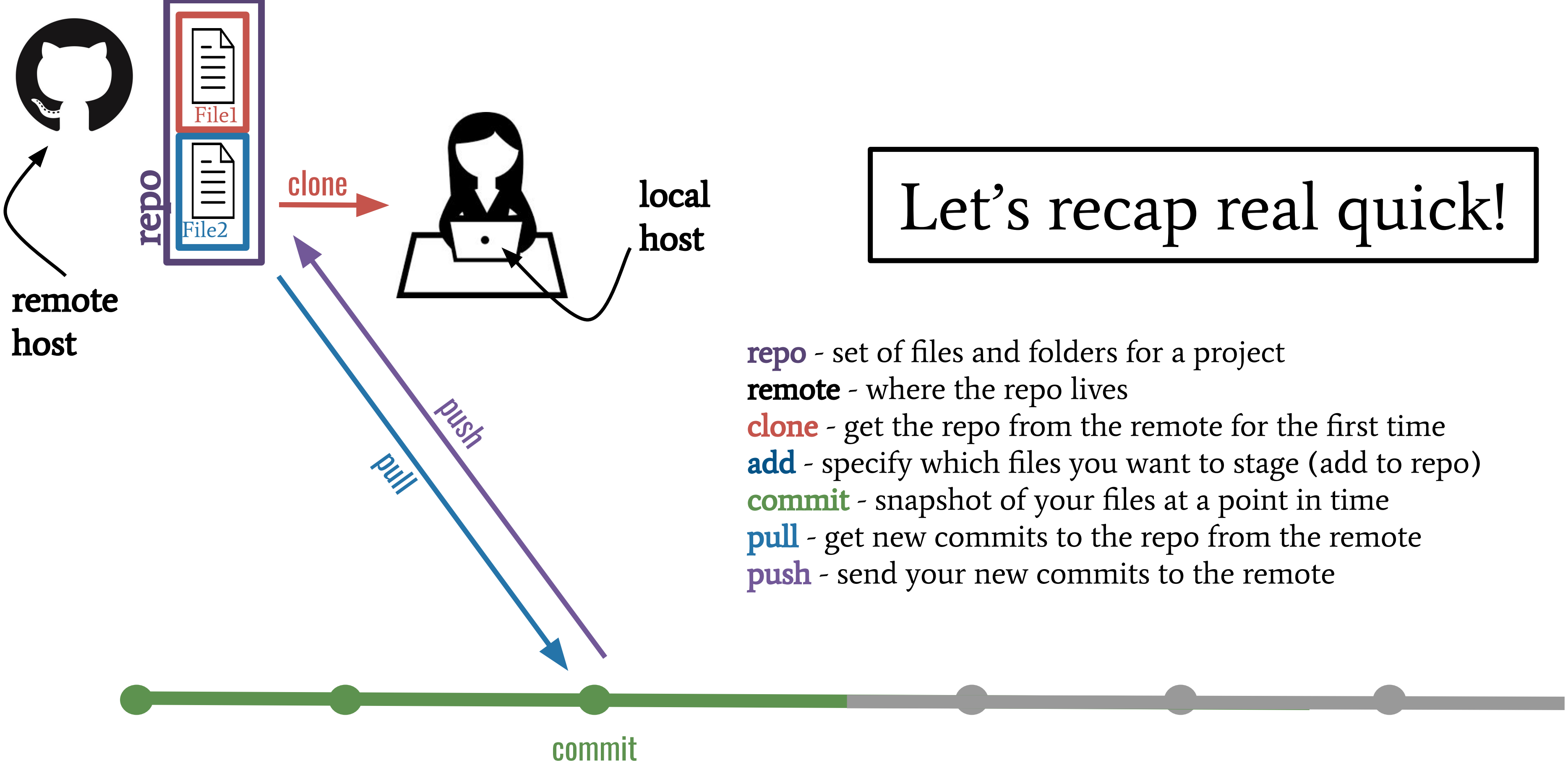
The files in his project locally will now have the updated images

Your teammate pulls from remote and is now up-to-date!

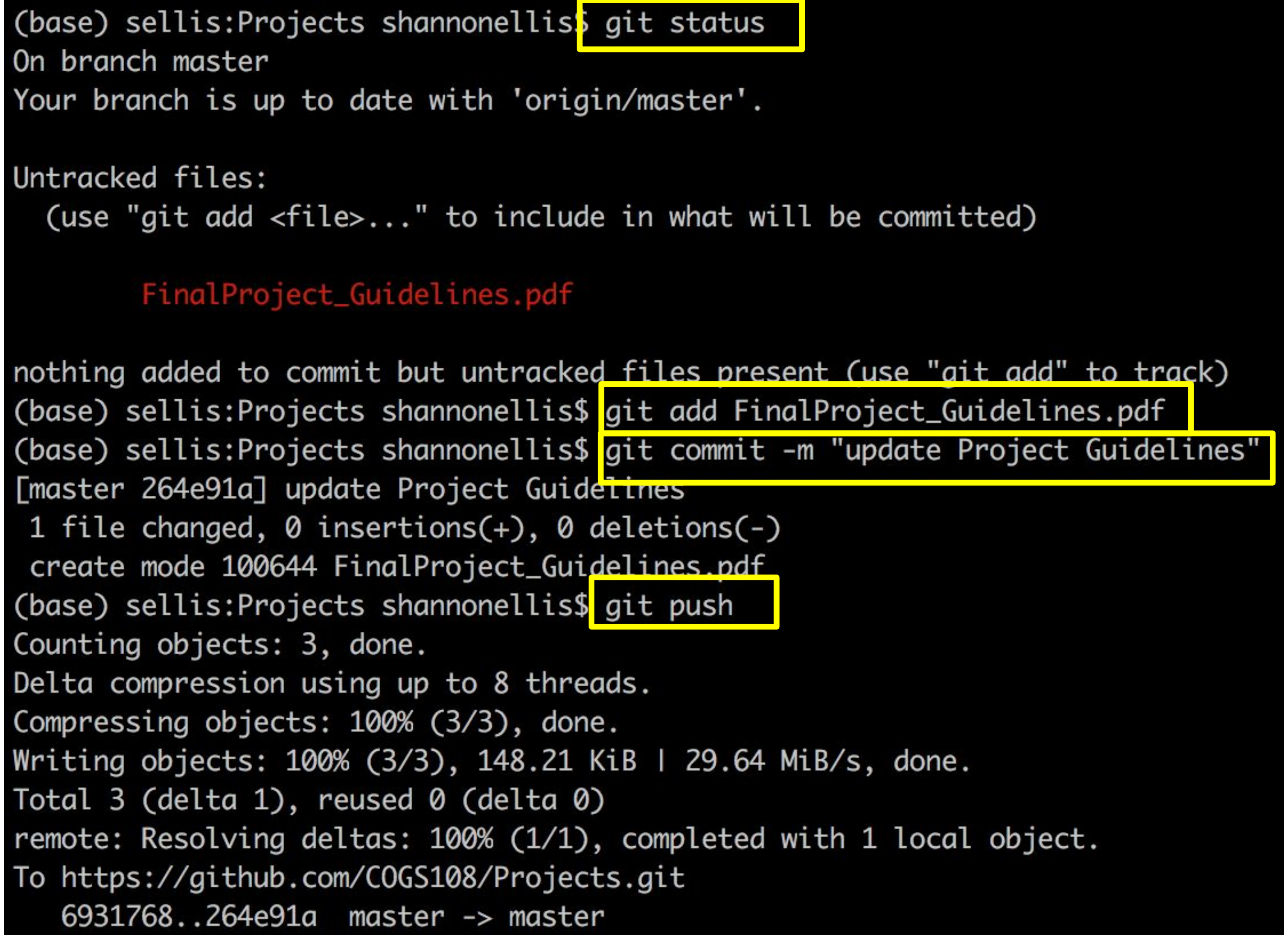
Shannon Ellis
11/28/18 3:28pm

changed colors for animal icons

Let’s recap real quick!



repo - set of files and folders for a project
remote - where the repo lives
clone - get the repo from the remote for the first time
add - specify which files you want to stage (add to repo)
commit - snapshot of your files at a point in time
pull - get new commits to the repo from the remote
push - send your new commits to the remote



```
(base) sellis:Projects shannonellis$ git status
On branch master
Your branch is up to date with 'origin/master'.

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

        FinalProject_Guidelines.pdf

nothing added to commit but untracked files present (use "git add" to track)
(base) sellis:Projects shannonellis$ git add FinalProject_Guidelines.pdf
(base) sellis:Projects shannonellis$ git commit -m "update Project Guidelines"
[master 264e91a] update Project Guidelines
 1 file changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 FinalProject_Guidelines.pdf
(base) sellis:Projects shannonellis$ git push
Counting objects: 3, done.
Delta compression using up to 8 threads.
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 148.21 KiB | 29.64 MiB/s, done.
Total 3 (delta 1), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
To https://github.com/COGS108/Projects.git
   6931768..264e91a  master -> master
```

Review & Question Time

Version Controller I

You’ve been working with a team on a project in a repo. You’ve made changes locally and you want to see them on the remote.

What do you do to get them on the remote?

A clone

B remote

C merge

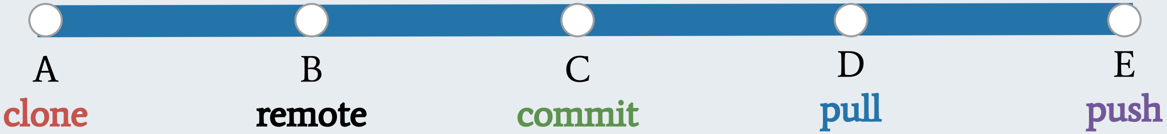
D pull

E push

Version Controller II

Your teammate has given you access to a GitHub repository to work on a project together. You want to get them for the first time on your computer locally.

What do you do to get the repo on your computer?



A clone

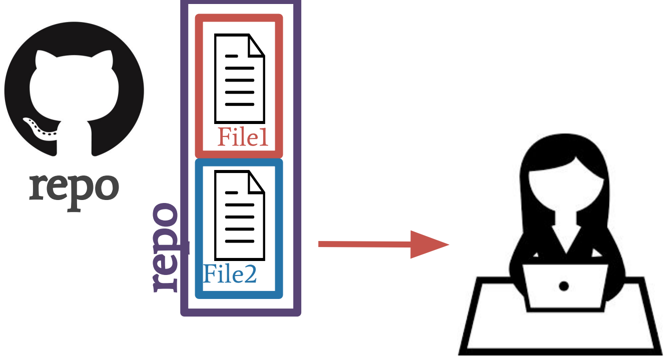
B remote

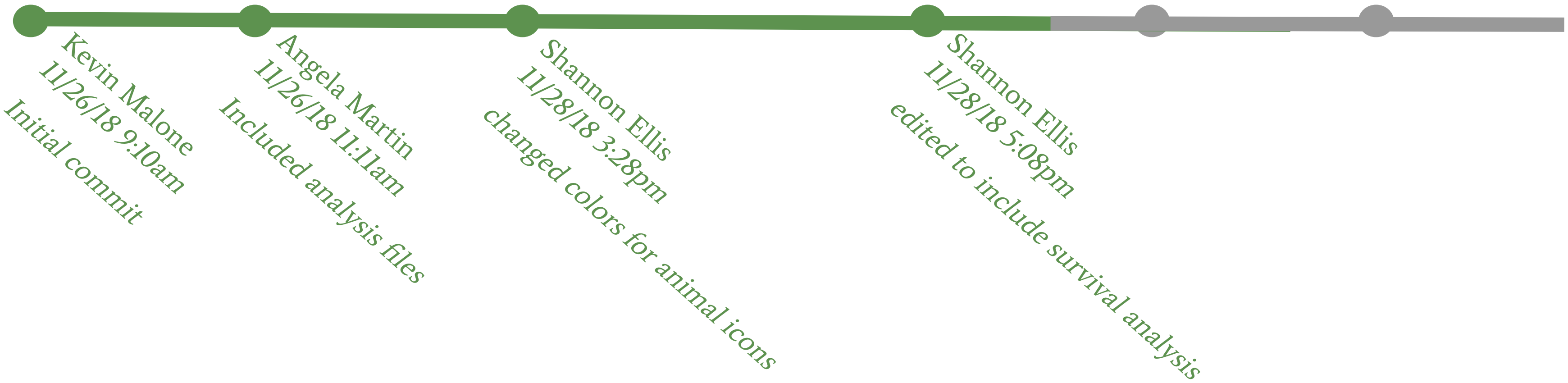
C commit

D pull

E push

Each time you create a commit, git tracks the changes made automatically.



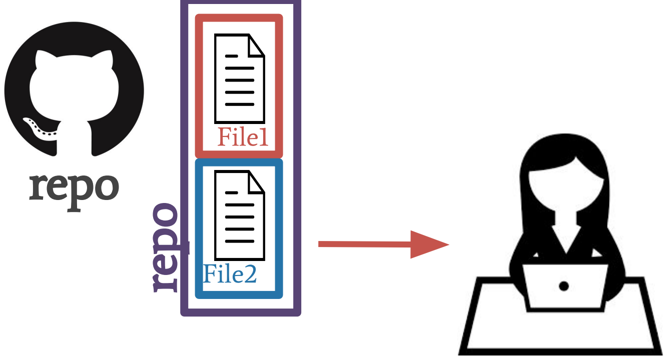


Kevin Malone
11/26/18 9:10am
Initial commit

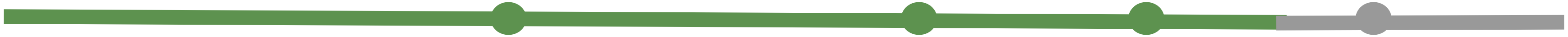
Angela Martin
11/26/18 11:11am
Included analysis files

Shannon Ellis
11/28/18 3:28pm
changed colors for animal icons

Shannon Ellis
11/28/18 5:08pm
edited to include survival analysis



By committing each time you make changes, git allows you to time travel!



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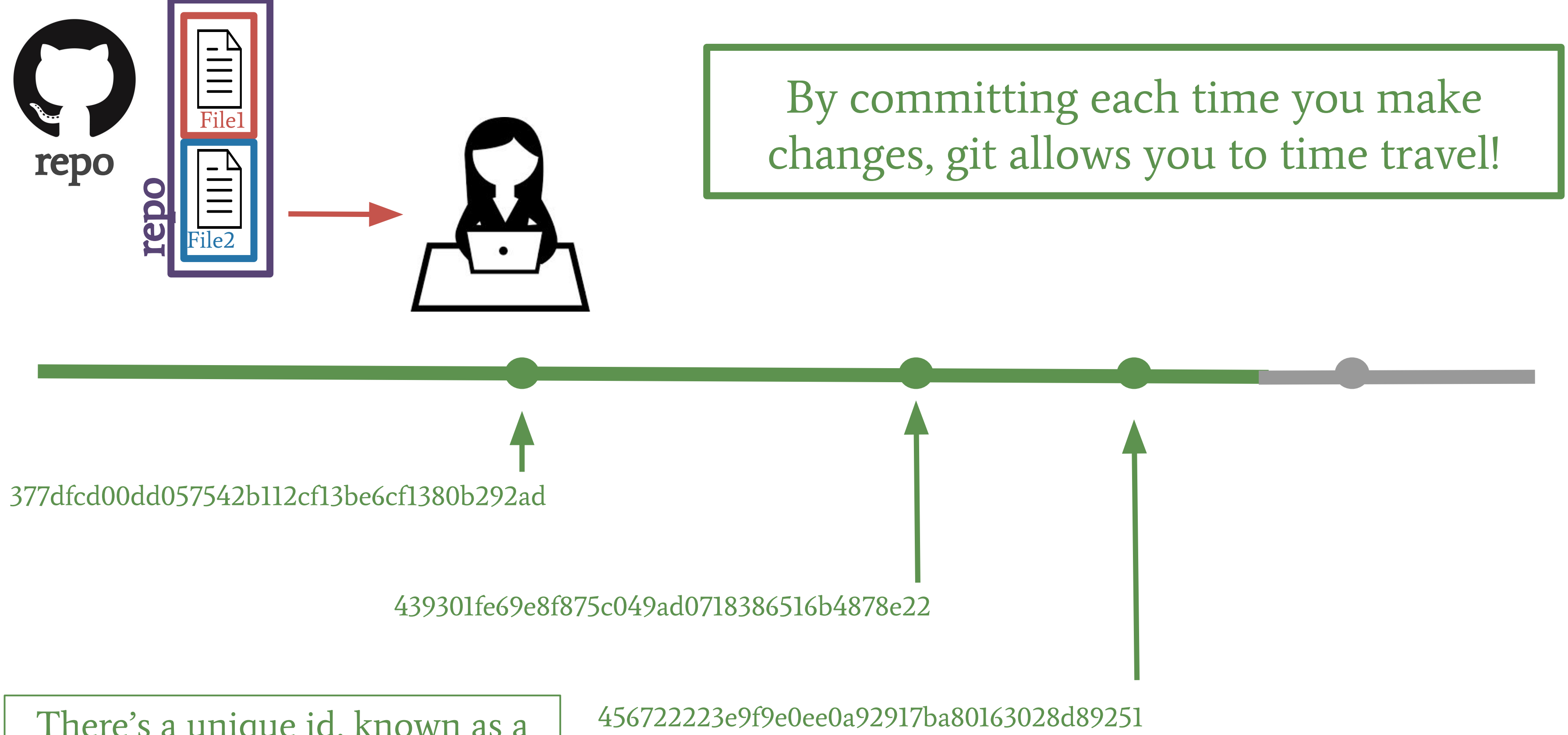
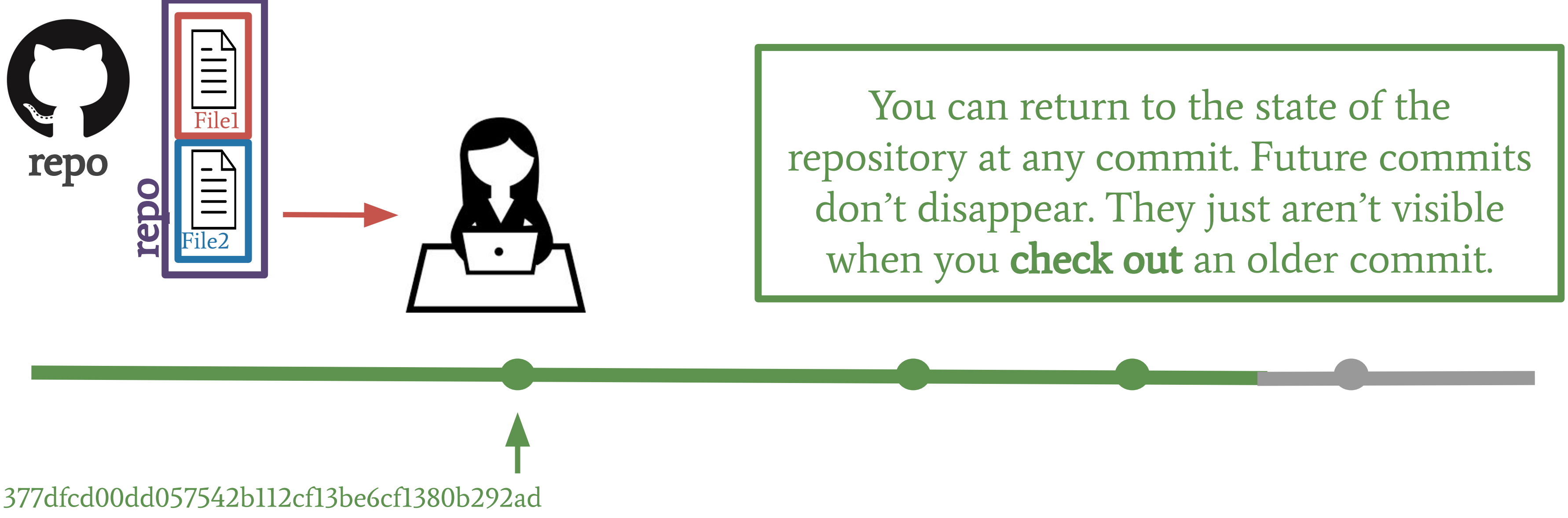


377dfcd00dd057542b112cf13be6cf1380b292ad

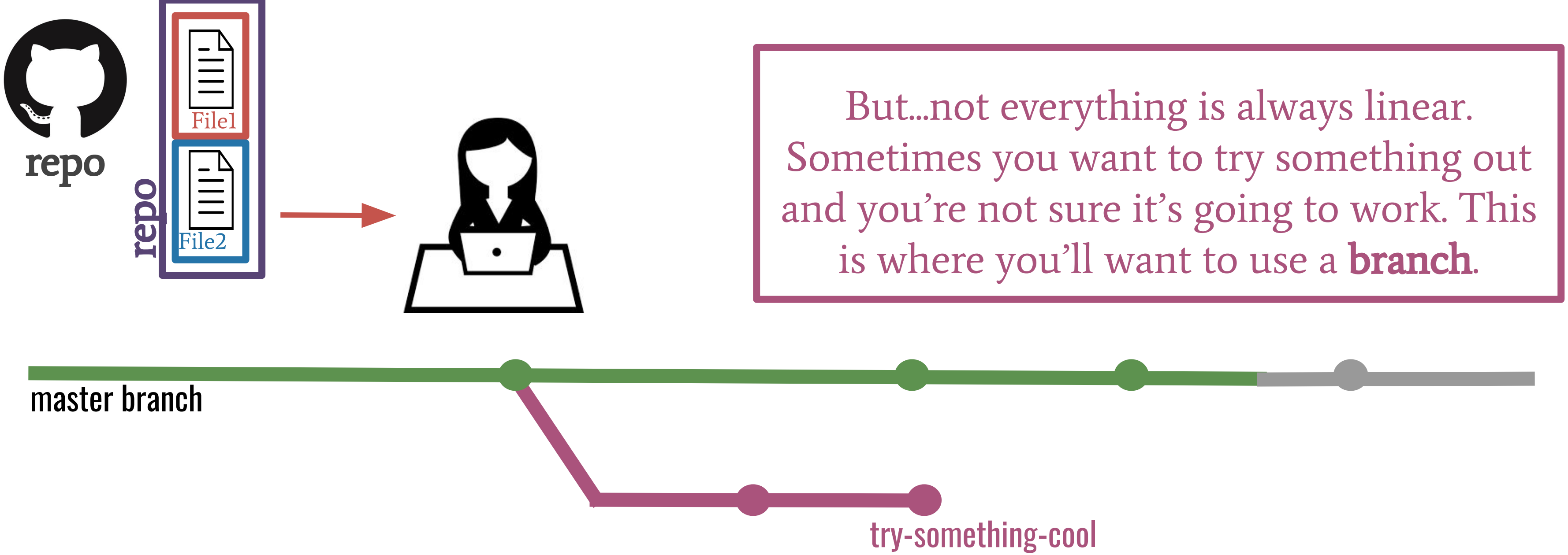
439301fe69e8f875c049ad0718386516b4878e22

456722223e9f9e0ee0a92917ba80163028d89251

There’s a unique id, known as a **hash**, associated with each commit.

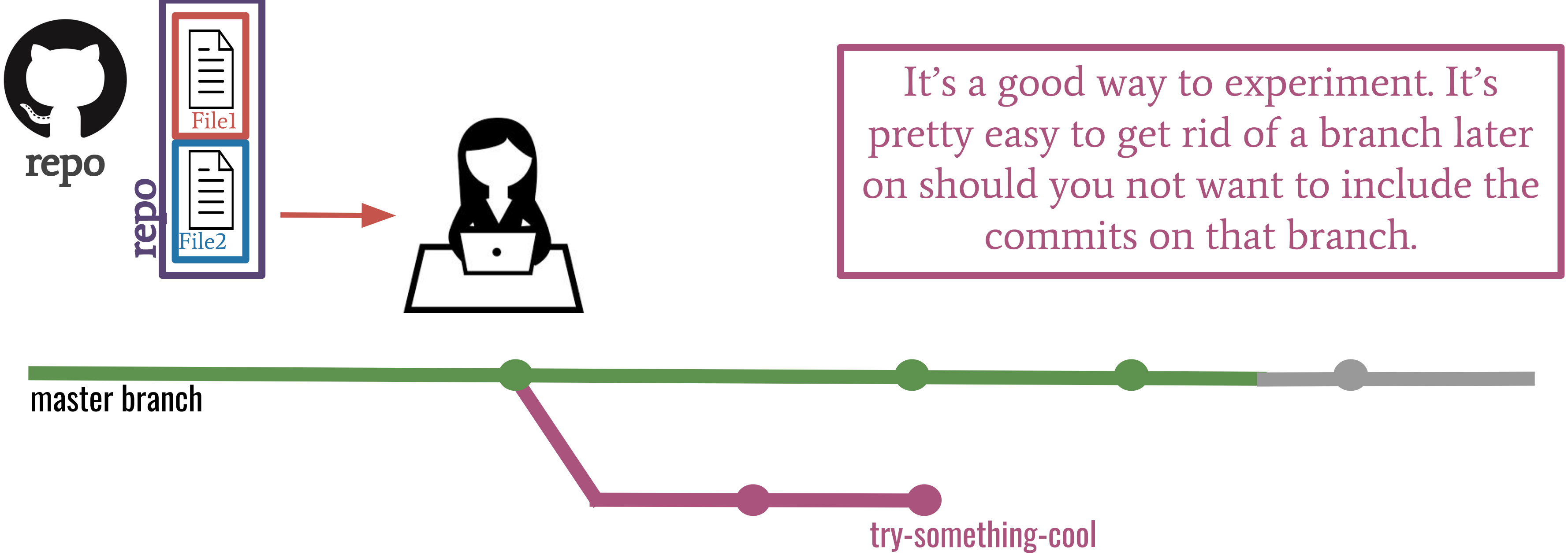


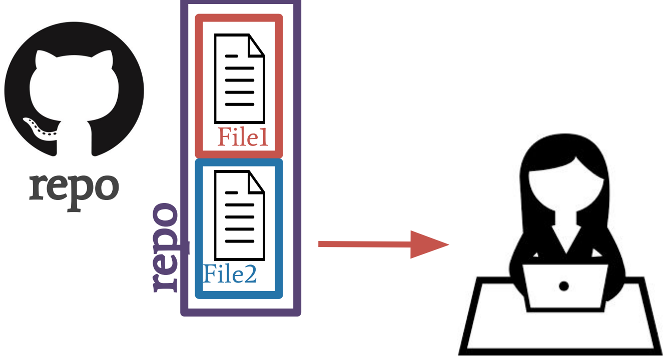
You can return to the state of the repository at any commit. Future commits don't disappear. They just aren't visible when you **check out** an older commit.



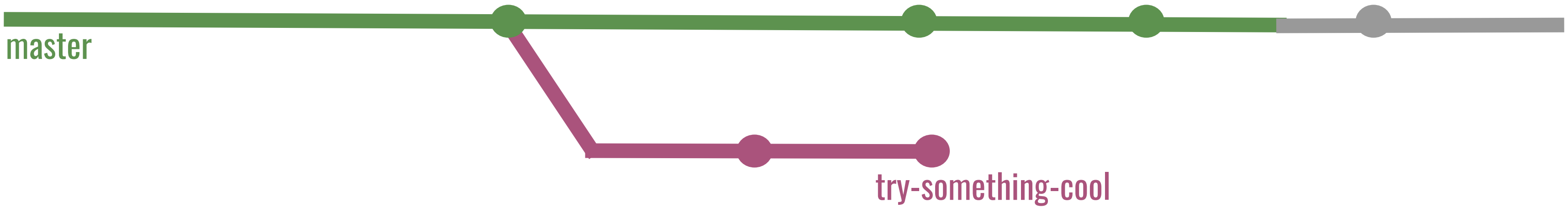
But…not everything is always linear. Sometimes you want to try something out and you're not sure it's going to work. This is where you'll want to use a **branch**.

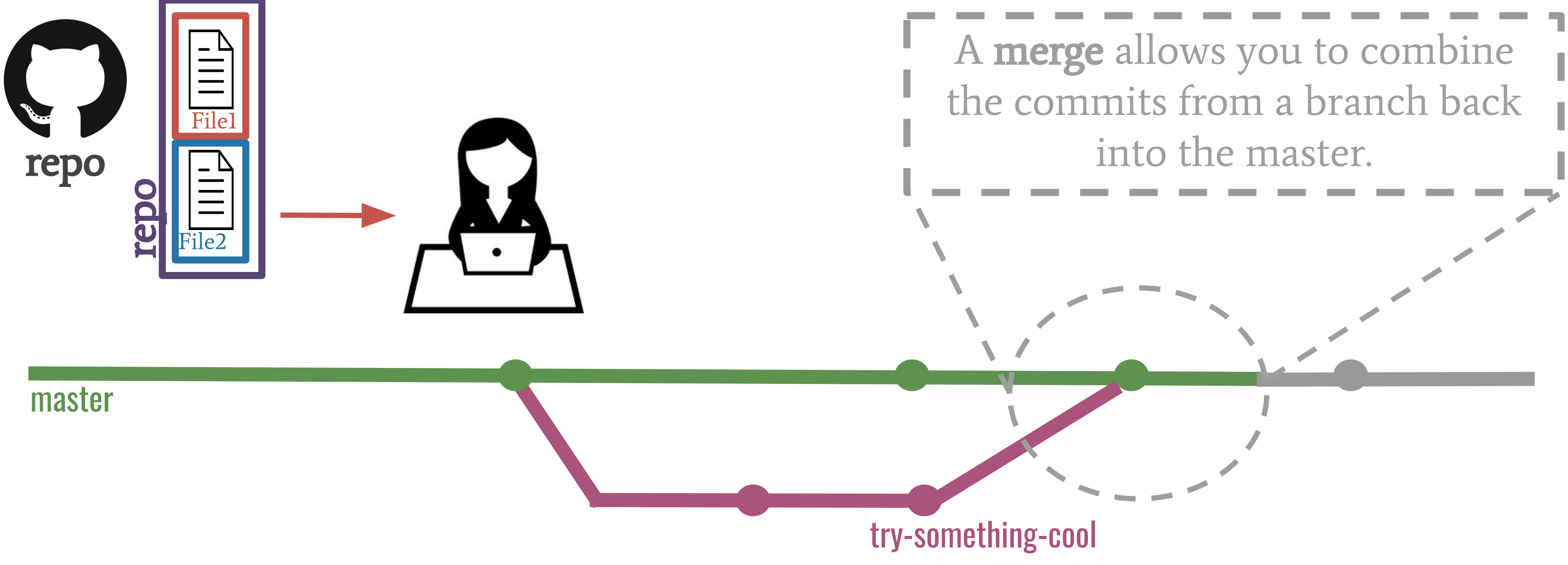
It’s a good way to experiment. It’s pretty easy to get rid of a branch later on should you not want to include the commits on that branch.



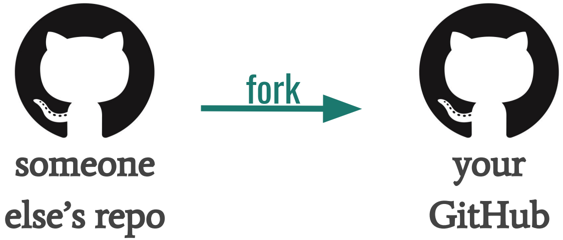


But…what if you DO want to include the changes you've made on your **try-something-cool** branch into the **master** branch?





A **merge** allows you to combine the commits from a branch back into the master.

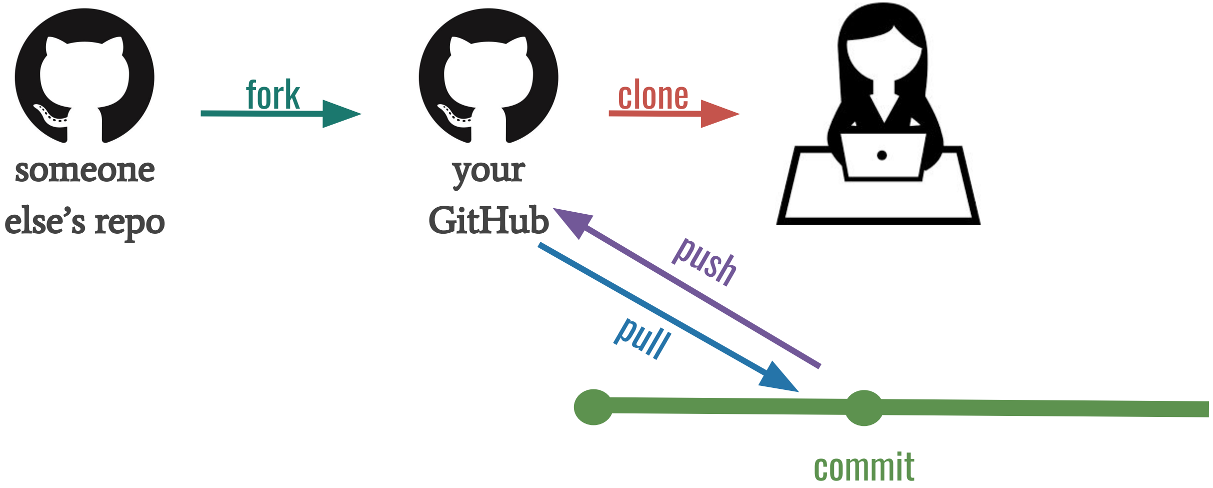


someone else's repo

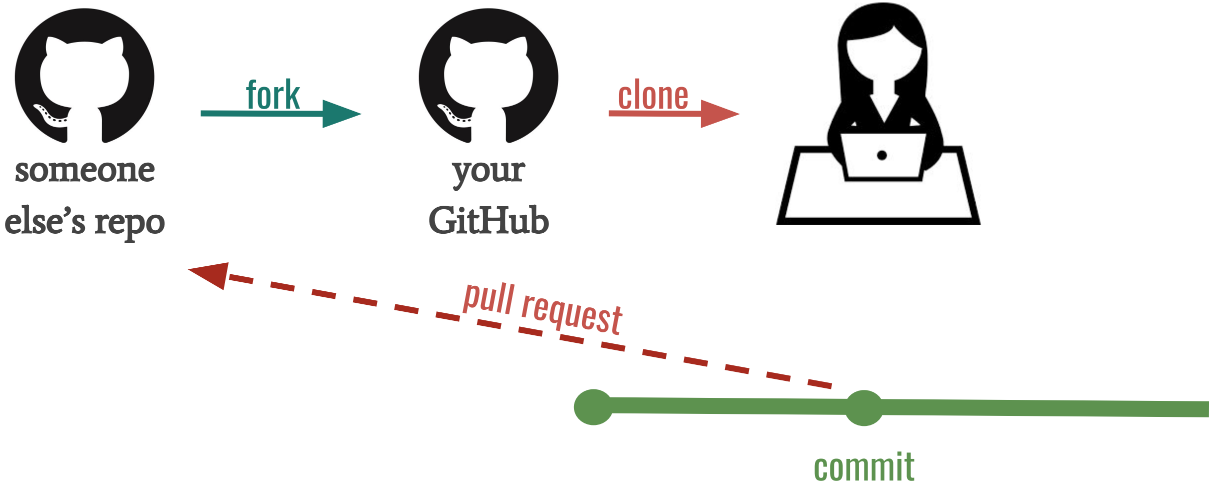
fork

your GitHub

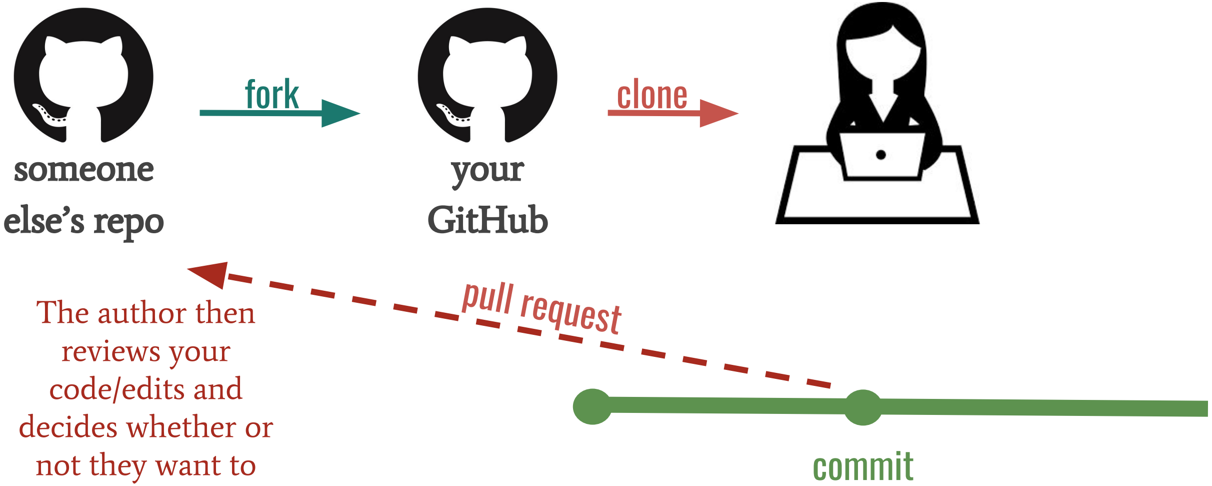
What if someone else is working on something cool and you want to play around with it? You'll have to **fork** their repo.



After you fork their repo, you can play around with it however you want, using the workflow we've already discussed.



But what if you think you've found a bug in their code, a typo, or want to add a new feature to their software? For this, you'll submit a **pull request** (aka **PR**).



someone else's repo

fork

your GitHub

clone

pull request

commit

The author then reviews your code/edits and decides whether or not they want to **merge your pull request**.

But what if you think you've found a bug in their code, a typo, or want to add a new feature to their software? For this, you'll submit a **pull request** (aka **PR**).

someone else's repo

Last but not least...what if you find a bug in someone else's code OR you want to make a suggestion but aren't going to submit a suggestion with a PR. For this, you can file an **issue** on GitHub.

someone else's repo

Last but not least…what if you find a bug in someone else's code OR you want to make a suggestion but aren't going to submit a suggestion with a PR. For this, you can file an **issue** on GitHub.

Issues are *bug trackers*. While, they can include bugs, they can also include feature requests, to-dos, whatever you want, really!

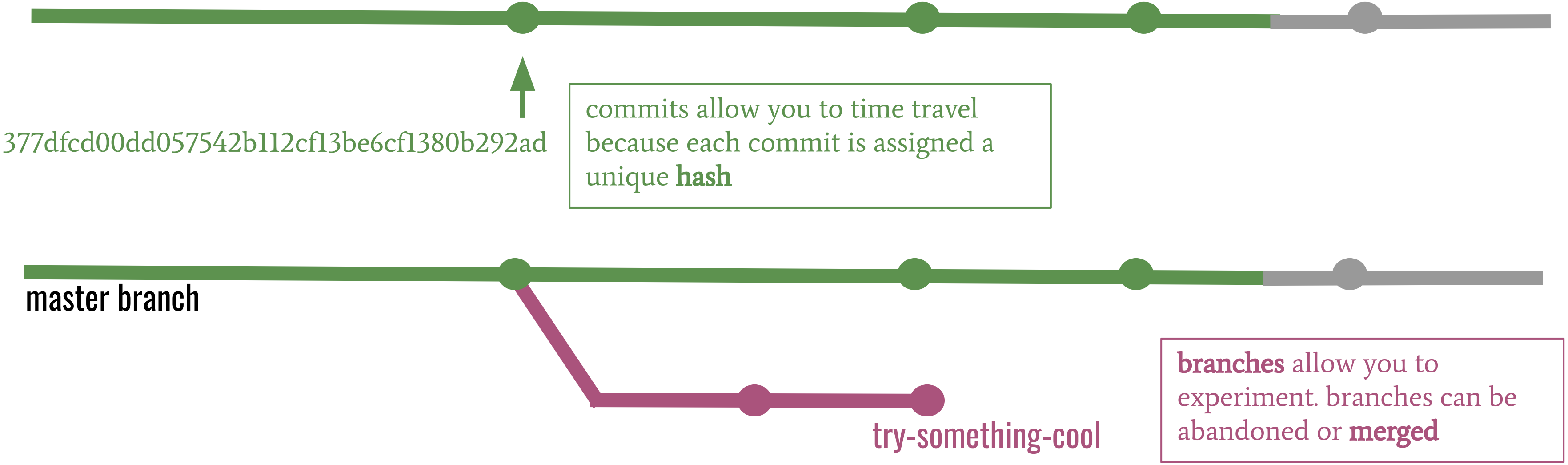
They can be assigned to people.

They can be closed once addressed ….or if the software maintainer doesn't like the suggestion

377dfcd00dd057542b112cf13be6cf1380b292ad

commits allow you to time travel because each commit is assigned a unique **hash**

One more git recap...



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branches allow you to experiment. branches can be abandoned or **merged**

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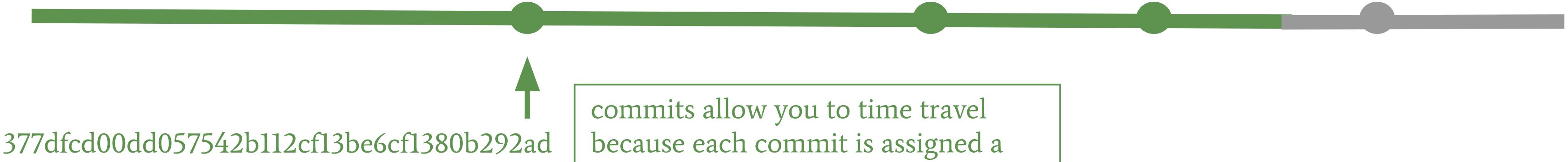

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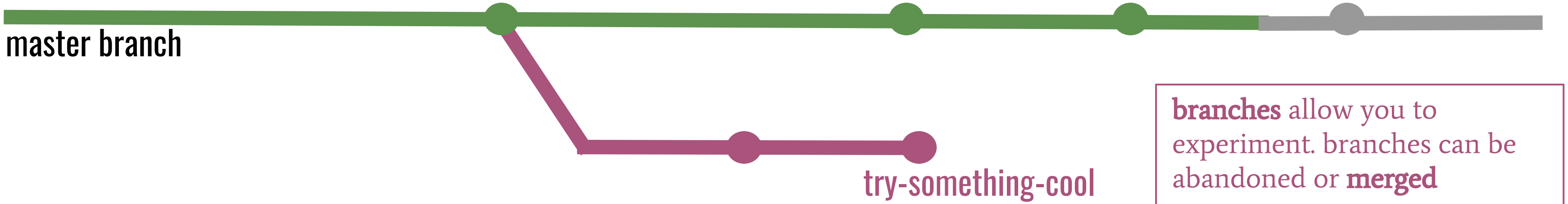

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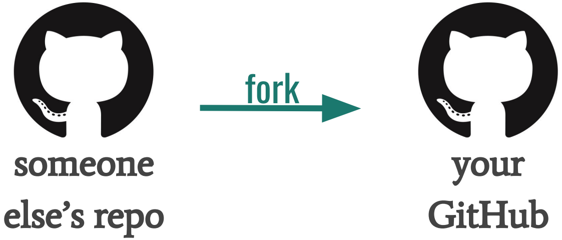

You can work on others’ repos by first **forking** their repository onto your GitHub

One more git recap...

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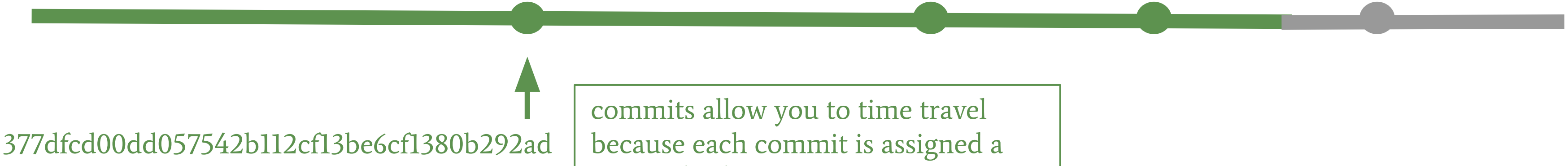

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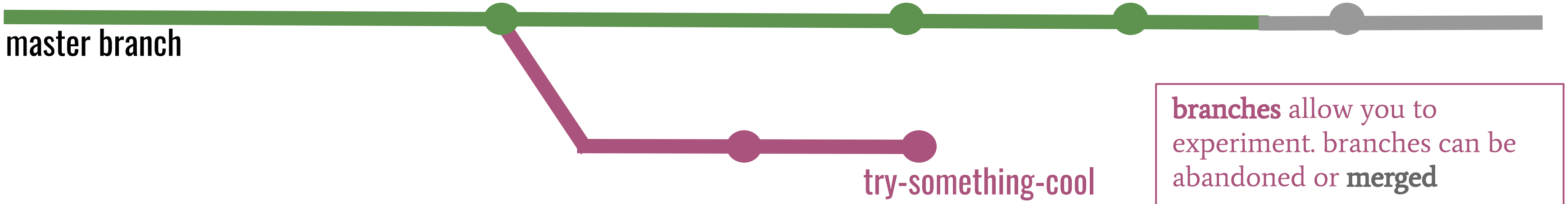

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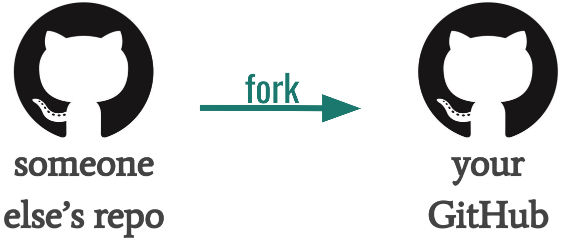


You can work on others' repos by first **forking** their repository onto your GitHub

Pull requests allow you to make specific edits to others' repos

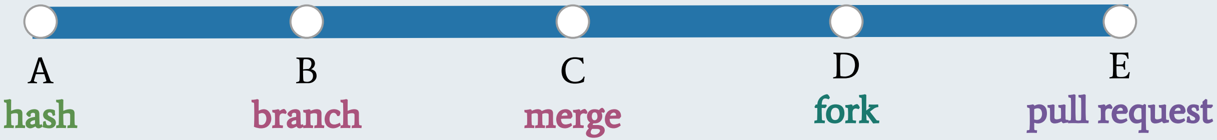
Issues allow you to make general suggestions to your/others' repos

Review & Question Time

Version Controller III

To experiment within your own repo (test out a new feature, make some changes you're not sure will work)...

what should you do?



A
hash

B
branch

C
merge

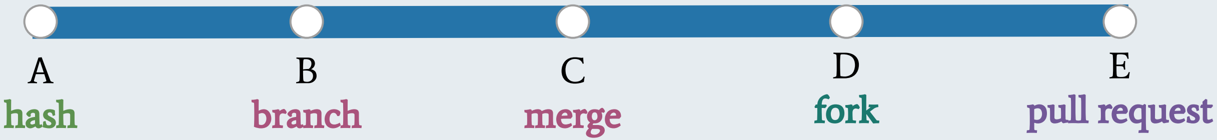
D
fork

E
pull request

Version Controller IV

If you’ve made edits to someone else’s repo that you’re not a collaborator on…

what would *they* have to do to incorporate your changes?



A hash

B branch

C merge

D fork

E pull request