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WD4307
Web Application and Development Tools

Topic 02 - Git Training 2

Last Revised: 21-01-2024

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Individual work

GitHub

- Hosts your repositories
- Track student progress
- Social features to enable collabora

Let's create a repository in GitHub!

Let's set up a place to host your code

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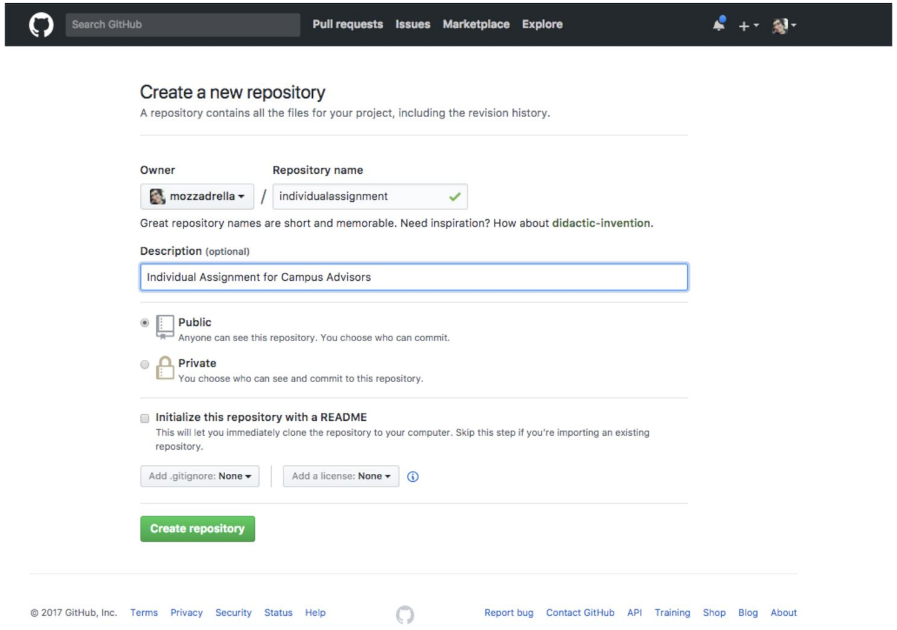
- A repository on GitHub!
- https://github.com/new
- You have access to free private repositories, but let's choose public for now



Create a new repository

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

Owner: mozzadrella / Repository name: individualassignment ✓

Great repository names are short and memorable. Need inspiration? How about didactic-invention.

Description (optional): Individual Assignment for Campus Advisors

[✓ 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

Create repository

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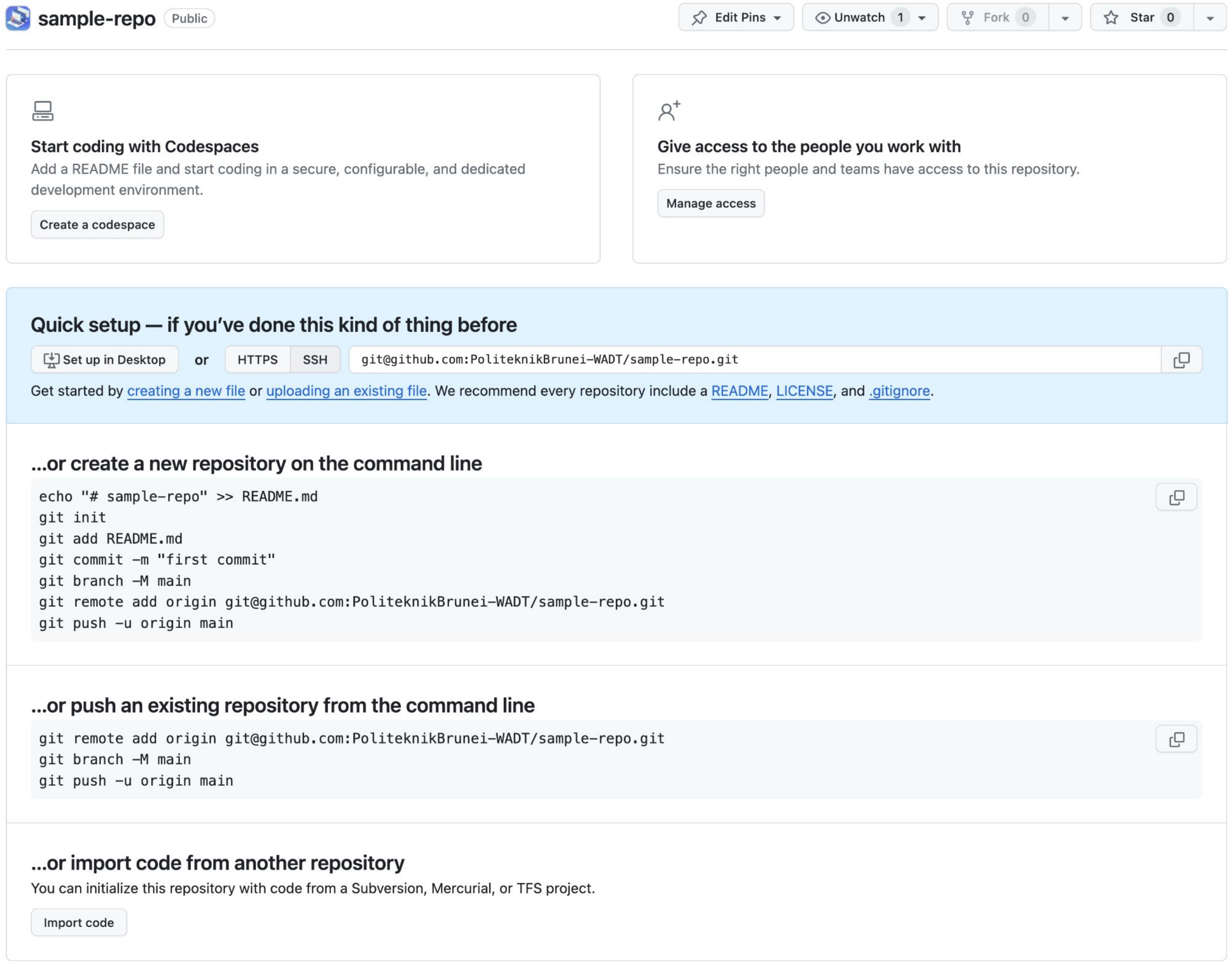


Start coding with Codespaces

Add a README file and start coding in a secure, configurable, and dedicated development environment.

Give access to the people you work with

Ensure the right people and teams have access to this repository.

Quick setup — if you've done this kind of thing before

```
git@github.com:PolitekniKBrunei-WADT/sample-repo.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 "# sample-repo" >> README.md
git init
git add README.md
git commit -m "first commit"
git branch -M main
git remote add origin git@github.com:PoliteknikBrunei-WADT/sample-repo.git
git push -u origin main
```

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

```
git remote add origin git@github.com:PoliteknikBrunei-WADT/sample-repo.git
git branch -M main
git push -u origin main
```

...or import code from another repository

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

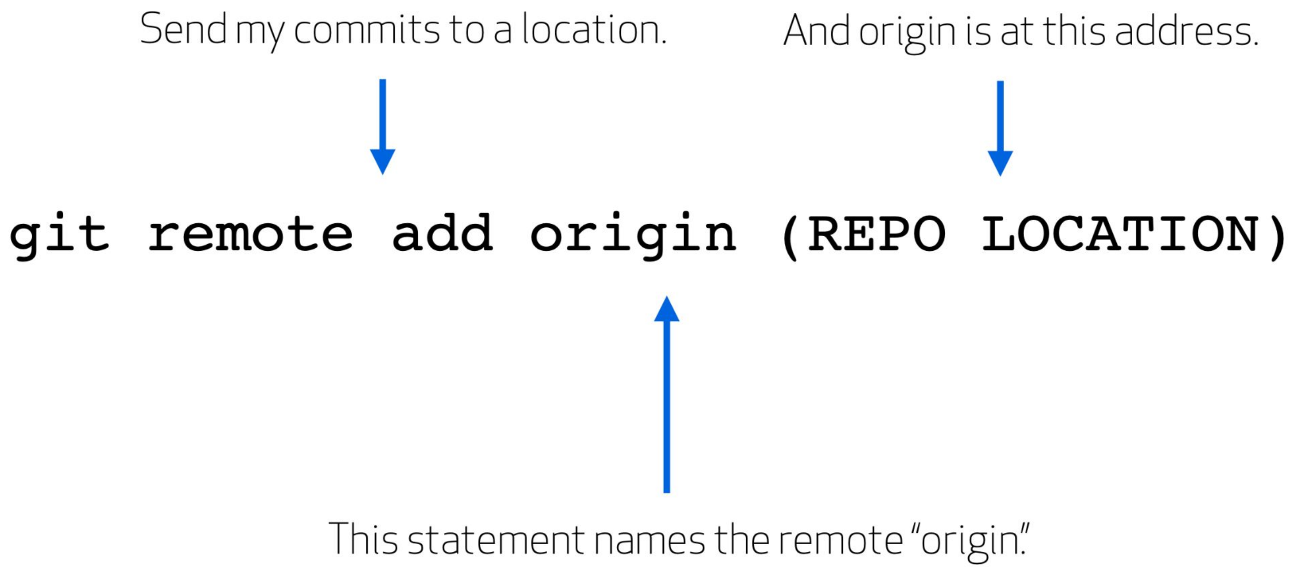
Remote

- Adding a remote allows the transfer of your commits to another machine.

```
git remote add origin (REPO LOCATION)
```

- The bookmarked location is referred to as a "remote"

Add origin



Send my commits to a location.

And origin is at this address.

```
git remote add origin (REPO LOCATION)
```

This statement names the remote "origin."

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Back to the terminal!

Pushing to a remote

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- How do you get your commits up to the remote?

Link remote with local.

-u is short for --set-upstream

```
git push –u origin master
```

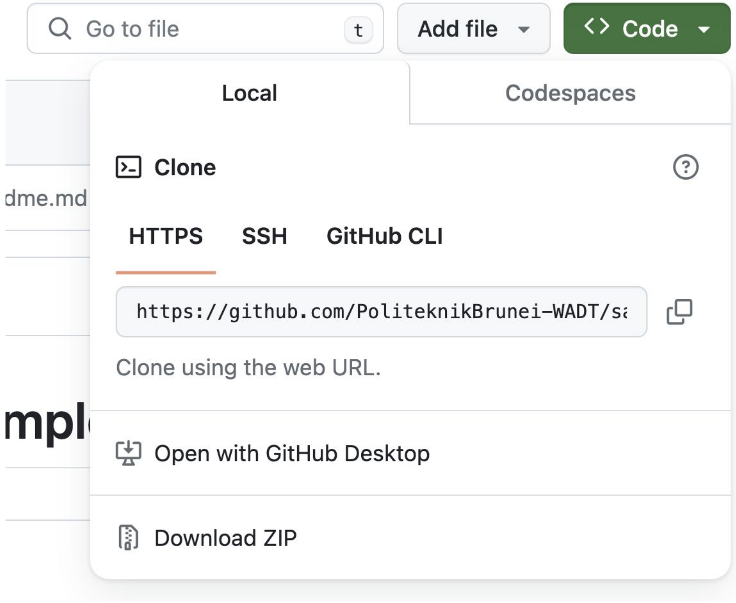
Useful because you can just write "git push" when you want to push future commits.

Types of remote addresses

- HTTP/HTTP Surls
- Git protocol over SSH and use the file path
- GitHub Desktop client (clone repository and openi n Desktop)

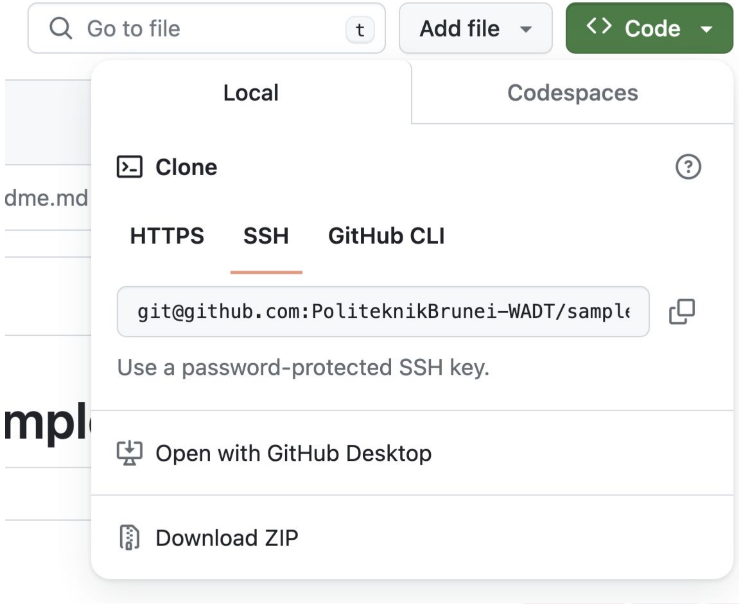
Using HTTPS

Using SSH



```
https://github.com/PoliteknikBrunei-WADT/sa
```

Clone using the web URL.



```
git@github.com:PoliteknikBrunei-WADT/sample
```

Use a password-protected SSH key.

https://github.com/PoliteknikBrunei-WADT/sample-repo.git

git@github.com:PoliteknikBrunei-WADT/sample-repo.git

Checking remote with -v

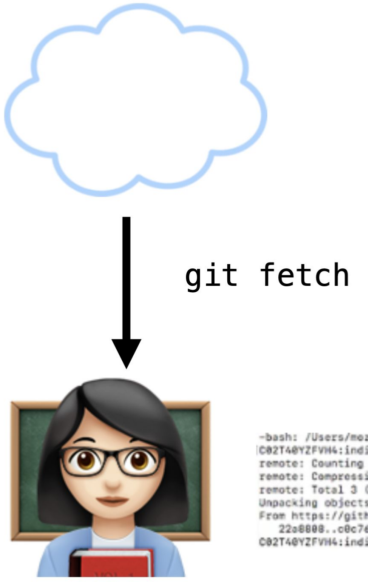
Using SSH

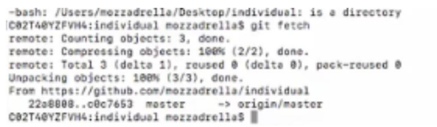
```
$ git remote -v
$ origin  git@github.com:PoliteknikBrunei-WADT/sample-repo.git (fetch)
$ origin  git@github.com:PoliteknikBrunei-WADT/sample-repo.git (push)
```

Using HTTPS

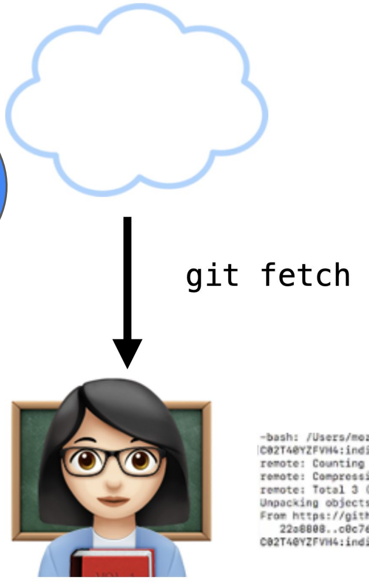
```
$ git remote -v
$ origin  https://github.com/PoliteknikBrunei-WADT/sample-repo.git (fetch)
$ origin  https://github.com/PoliteknikBrunei-WADT/sample-repo.git (push)
```

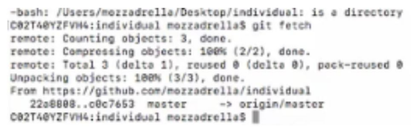
Fetch




```
-bash: /Users/mozzadrella/Desktop/individual: is a directory
C02T40YZFVH4:individual mozzadrella$ git fetch
remote: Counting objects: 3, done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 1), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), done.
From https://github.com/mozzadrella/individual
   22a0808..c0c7653  master     -> origin/master
C02T40YZFVH4:individual mozzadrella$ 
```

Hmm, when I run `git log` I can't see these commits in my local repo





```
-bash: /Users/mozzadrella/Desktop/individual: is a directory
C02T40YZFVH4:individual mozzadrella$ git fetch
remote: Counting objects: 3, done.
remote: Compressing objects: 100% (2/2), done.
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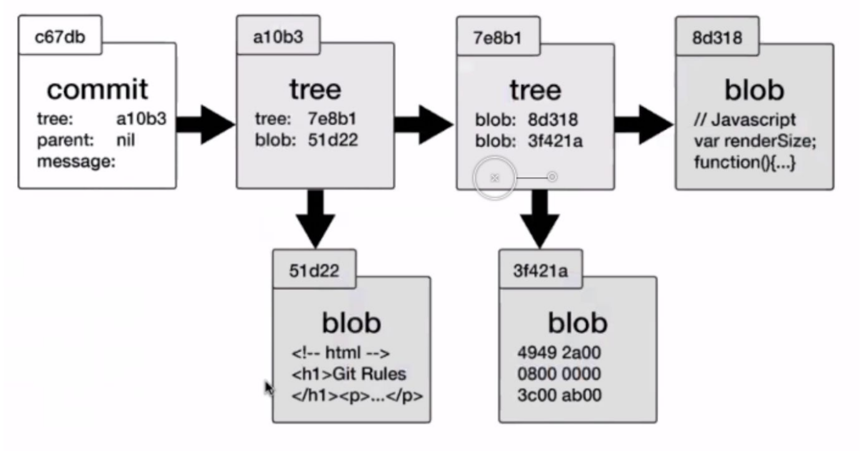
Unpacking objects: 100% (3/3), done.
From https://github.com/mozzadrella/individual
   22a0808..c0c7653  master     -> origin/master
C02T40YZFVH4:individual mozzadrella$ 
```

Counting Objects

- Git **only** transmits the necessary objects.
- **Push**: sends objects the remote doesn't have.
- **Fetch**: receives objects we don't have locally.



Activity!

Work with remotes

1. On the command line: create a repository from the command line called “individual-work”
2. On GitHub.com, create a repository.
3. On GitHub.com, upload your last slide’s (Git Training 01) activity to the “Individual” repository.
4. Use the command line to bring the commits back down to your local repository.

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Let’s talk about this command

Which branch do you want to push?

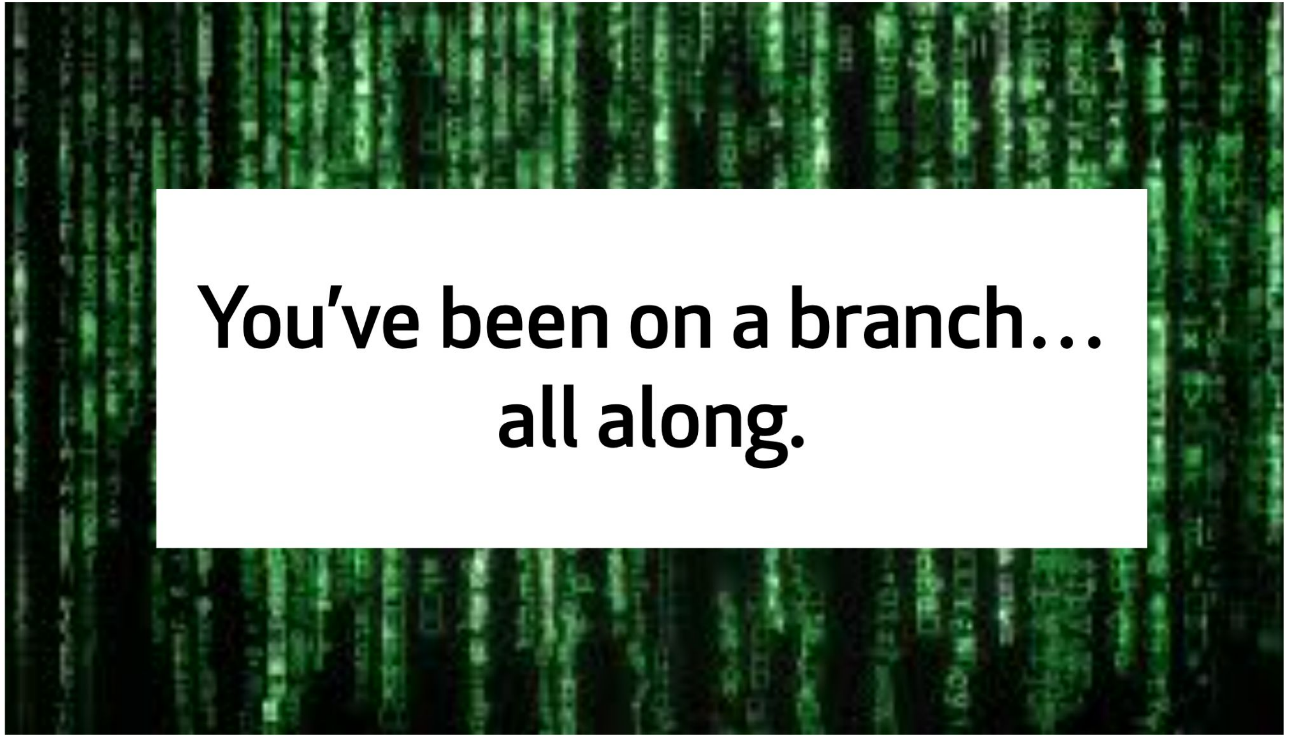
```
git push —u origin master
```

You want to push master.
To origin, the remote.

Let's talk about this command

But what is "master"?

```
git push –u origin master
```



You've been on a branch… all along.

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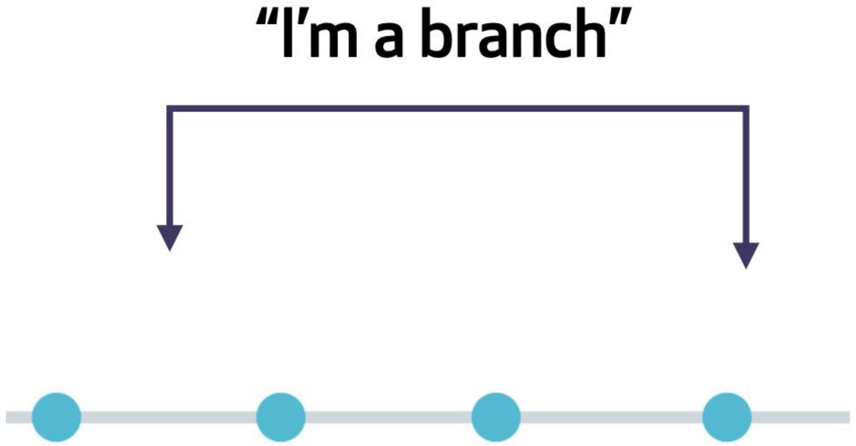
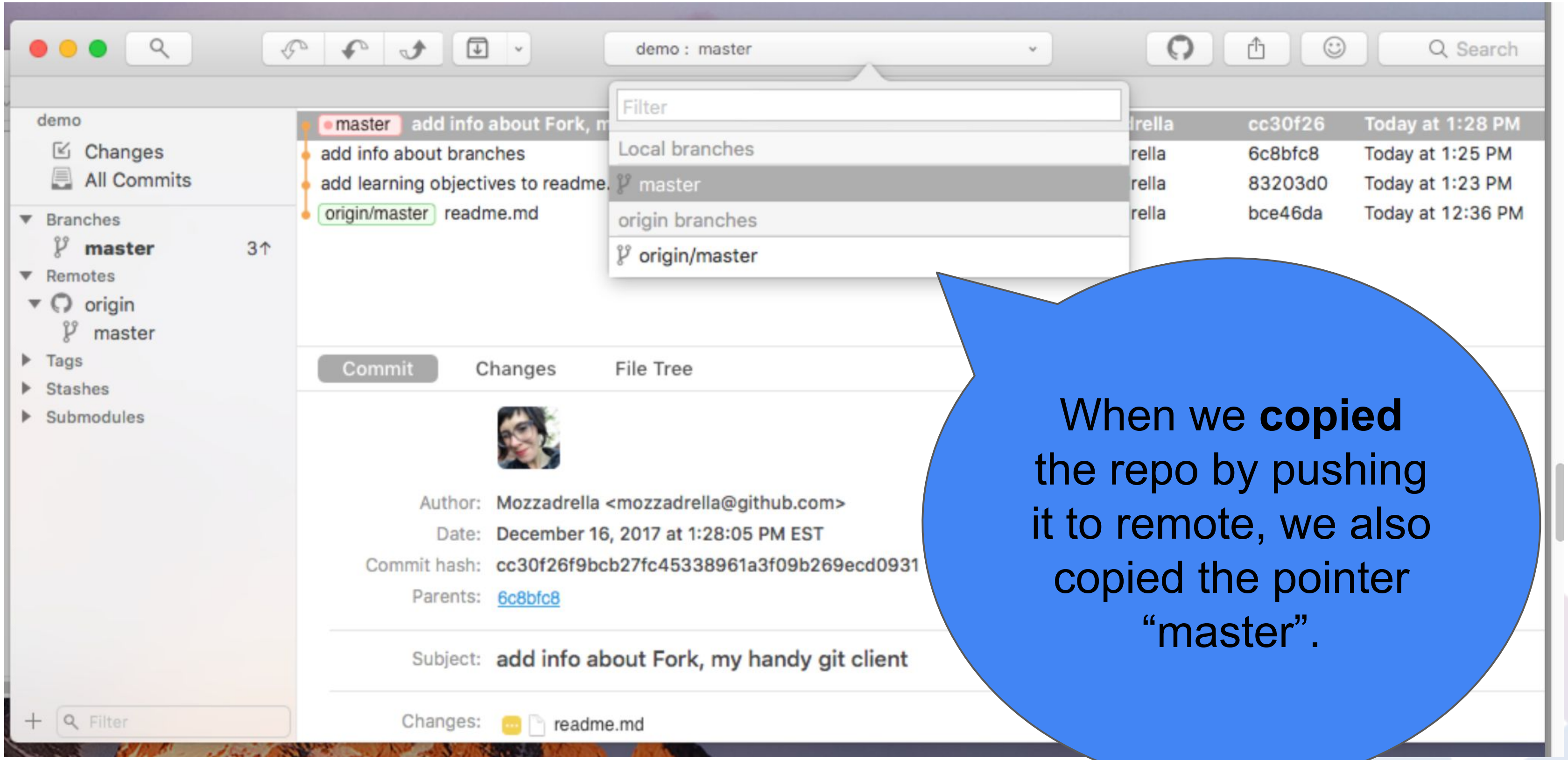
An aside to discuss about branches

Branches are bookmarks to commits

- “Master” is the default, it’s a naming convention. But few years back GitHub wants to change this to “Main”*
- Can think about branches as either a bookmark or a pointer for commits.
- As we add commits, the active branch updates to point to the newest commit (HEAD).

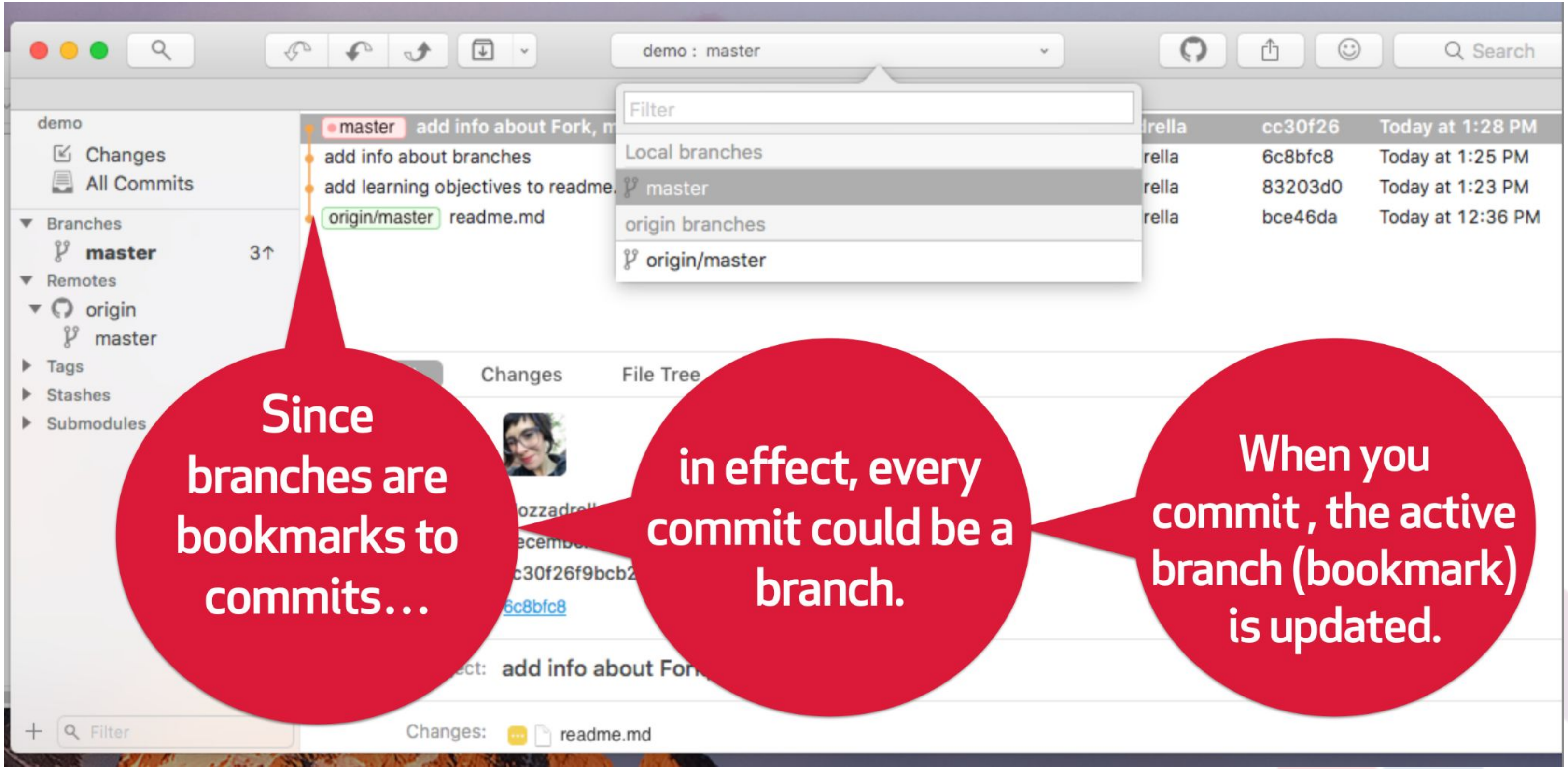




master add info about Fork, m	rella	cc30f26	Today at 1:28 PM
add info about branches	rella	6c8bfc8	Today at 1:25 PM
add learning objectives to readme.	rella	83203d0	Today at 1:23 PM
origin/master readme.md	rella	bce46da	Today at 12:36 PM

Author: Mozzadrella <mozzadrella@github.com>
Date: December 16, 2017 at 1:28:05 PM EST
Commit hash: cc30f26f9bcb27fc45338961a3f09b269ecd0931
Parents: 6c8bfc8
Subject: add info about Fork, my handy git client
Changes: readme.md

When we **copied** the repo by pushing it to remote, we also copied the pointer “master”.



master add info about Fork, m	rella	cc30f26	Today at 1:28 PM
add info about branches	rella	6c8bfc8	Today at 1:25 PM
add learning objectives to readme.	rella	83203d0	Today at 1:23 PM
origin/master readme.md	rella	bce46da	Today at 12:36 PM

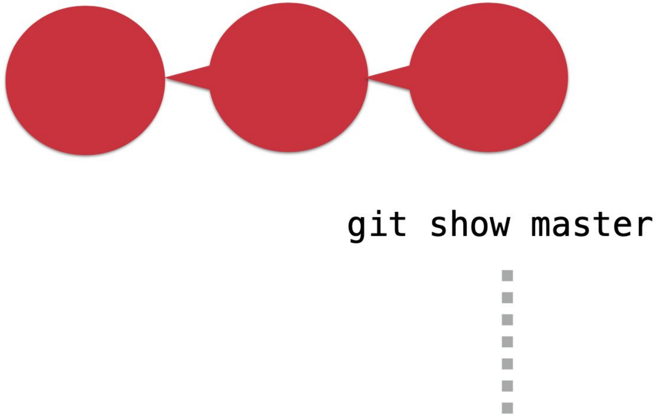
Since branches are bookmarks to commits…

in effect, every commit could be a branch.

When you commit , the active branch (bookmark) is updated.

Using branches in your terminal

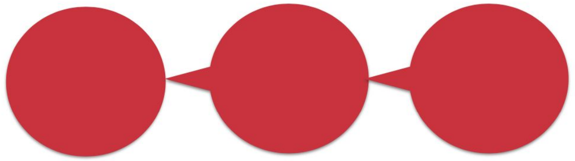
- Remember, branches are pointers to commits.
- If we say 'git show master' we'll see the commit master points to.



```
commit cc30f26f9bcb27fc45338961a3f09b269ecd0931
(HEAD -> master)
Author: Mozzadrella <mozzadrella@github.com>
Date:   Sat Dec 16 13:28:05 2017 -0500
```

Using branches in your terminal

- Remember, branches are pointers to commits.
- If we say 'git show master' we'll see the commit master points to.



```
git show master
```

```
commit cc30f26f9bcb27fc45338961a3f09b269ecd0931
(HEAD -> master)
Author: Mozzadrella <mozzadrella@github.com>
Date:   Sat Dec 16 13:28:05 2017 -0500
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Using branches in your terminal

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- Remember, branches are pointers to commits.
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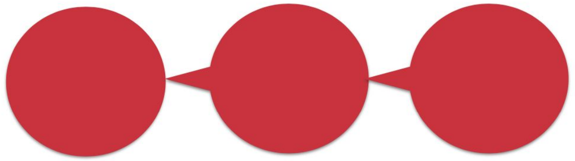


```
git show master
```

```
commit cc30f26f9bcb27fc45338961a3f09b269ecd0931
(HEAD -> master)
Author: Mozzadrella <mozzadrella@github.com>
Date:   Sat Dec 16 13:28:05 2017 -0500
```

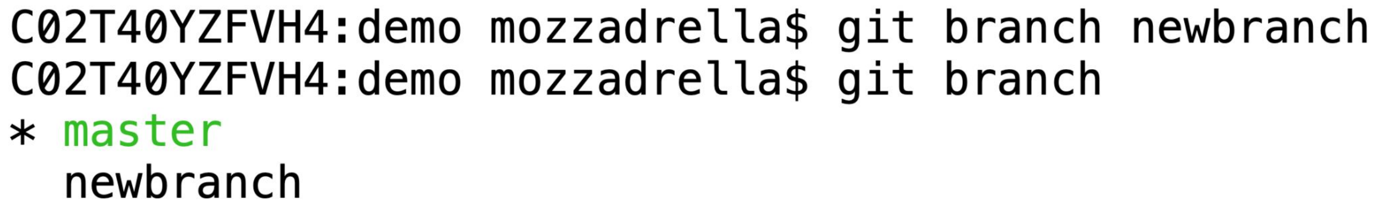
Finding the active branch

- 'Git branch' will show you the branches in your project…
- and the "*" indicates your currently active branch.
- If you made commits at that moment, the active branch would be updated to point to the new commit.

```
C02T40YZFVH4:demo
mozzadrella$ git branch
* master
```

Creating a new branch

- To summon a new branch, use ‘`git branch`’ and the new branch name. We’ll call ours ‘newbranch’

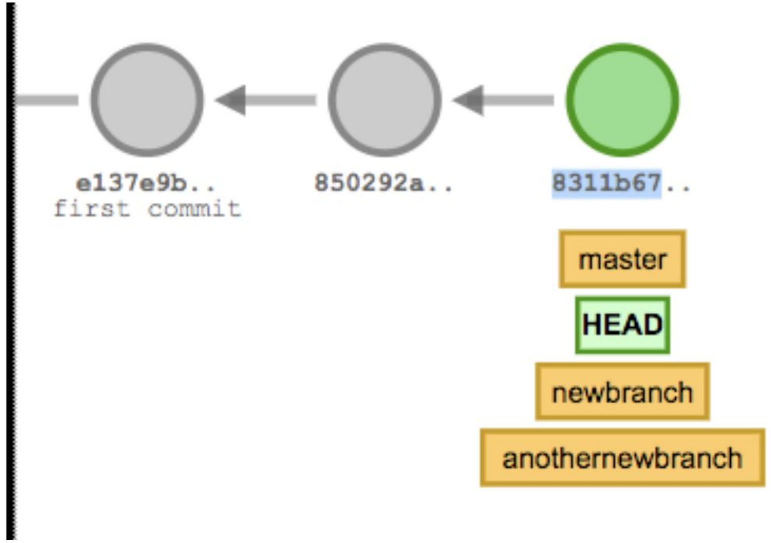


```
C02T40YZFVH4:demo mozzadrella$ git branch newbranch
C02T40YZFVH4:demo mozzadrella$ git branch
* master
  newbranch
```

Branches point back to the currently active commit

- If we created 2 new branches from

8311b67



Branches point back to the currently active commit

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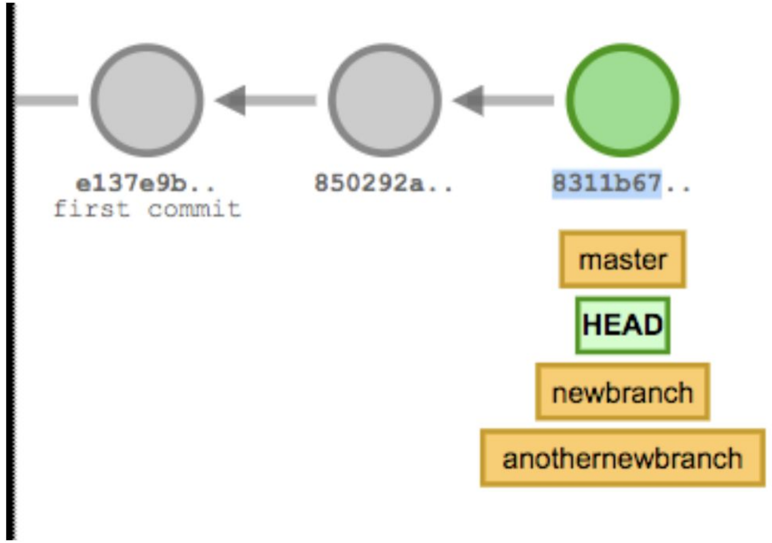
- If we created 2 new branches from

  8311b67

- they would both point to

  8311b67



Branching from commits using references

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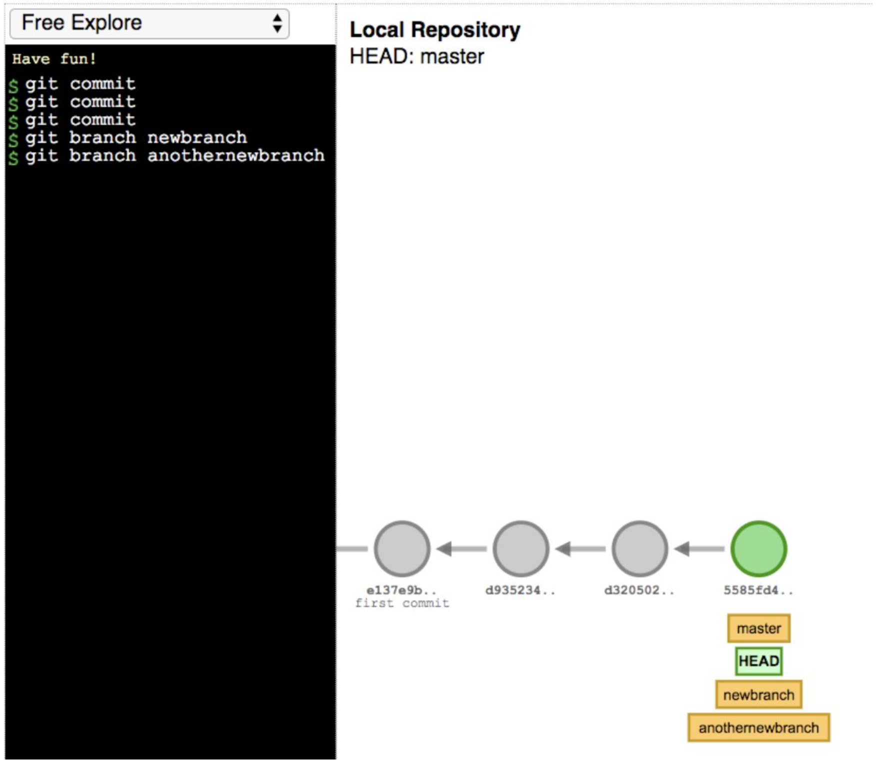
git branch <name> createsa branch at HEAD

git branch <name> <ref> creates a branch at <ref>

<ref> can be HEAD, a branch name, a commit, or a commit-ish (e.g. HEAD^or master~3)



```
Have fun!
$ git commit
$ git commit
$ git commit
$ git branch newbranch
$ git branch anothernewbranch
```

Or branch from previous commits

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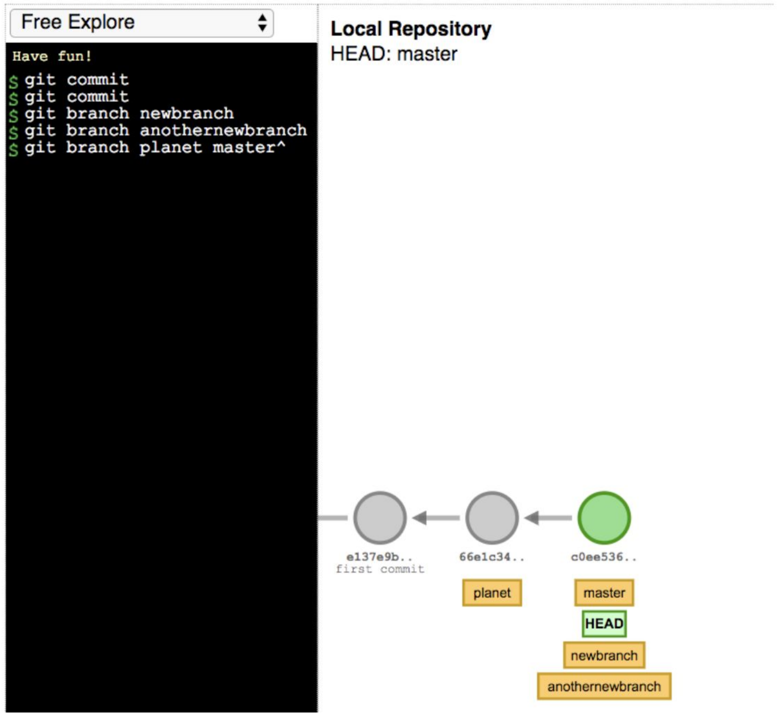
```
git branch planet master^
```



Free Explore

```
Have fun!
$ git commit
$ git commit
$ git branch newbranch
$ git branch anothernewbranch
$ git branch planet master^
```

Local Repository
HEAD: master

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A final word on branches...

```
tree .git/refs
```

```
└── refs
    ├── heads
    │   ├── master
    │   ├── newbranch
    │   └── planet
    ├── remotes
    │   └── origin
    │       └── master
    └── tags
```

Note: ‘tree’ command only available on Linux Operating System

Those files contain the commit ID...

```
C02T40YZFVH4:demo mozzadrella$ cat .git/refs/heads/planet
6c8bfc88bb440844f18a5e0a6ca885998b461bb7
```

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So the implementation for branches is a file with a hash in it.

Back to the world of network activity

Pull = fetch + merge

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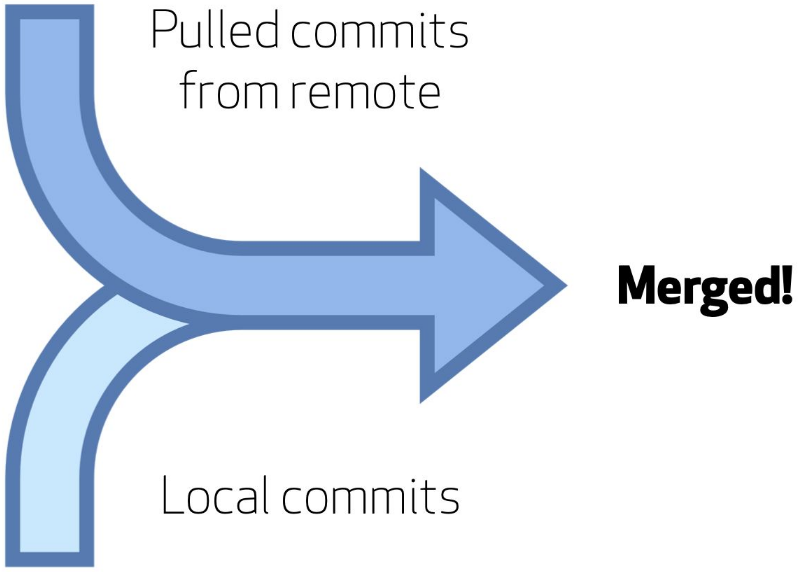
- "`pull`" first fetches the commits and stores them locally.
- Merge takes the two divergent commits, puts them together in the staging area and makes a new commit with two parents.
- Merge updates the active branch to point to the new merge commit
- You'll see the new commits reflected in your local project when you run "`git log`"



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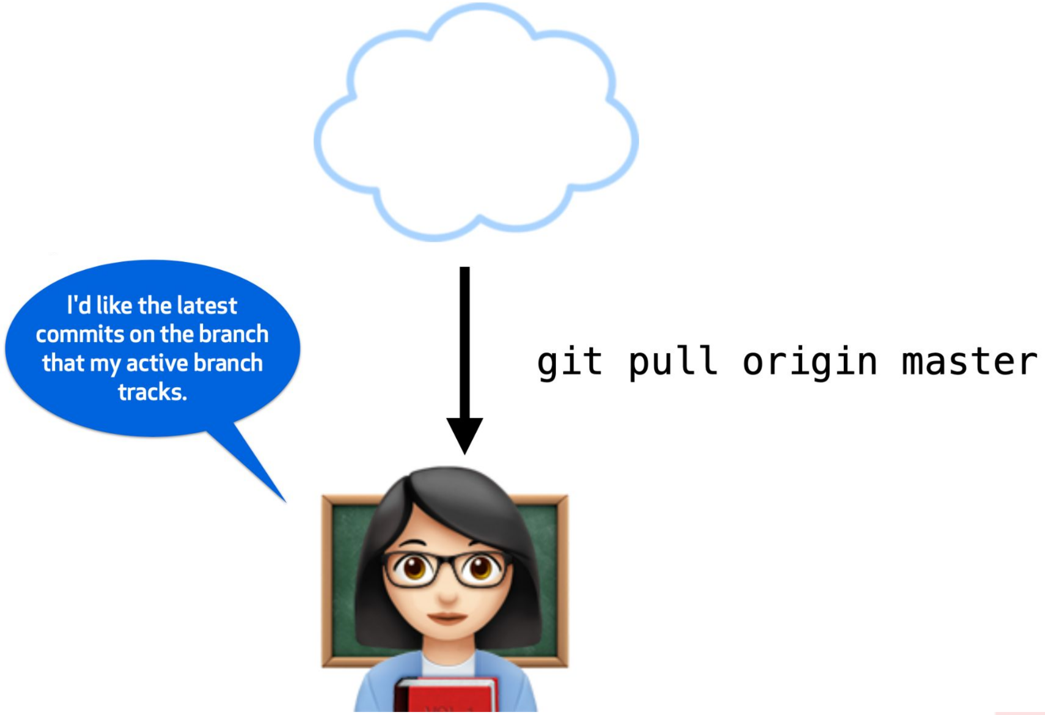
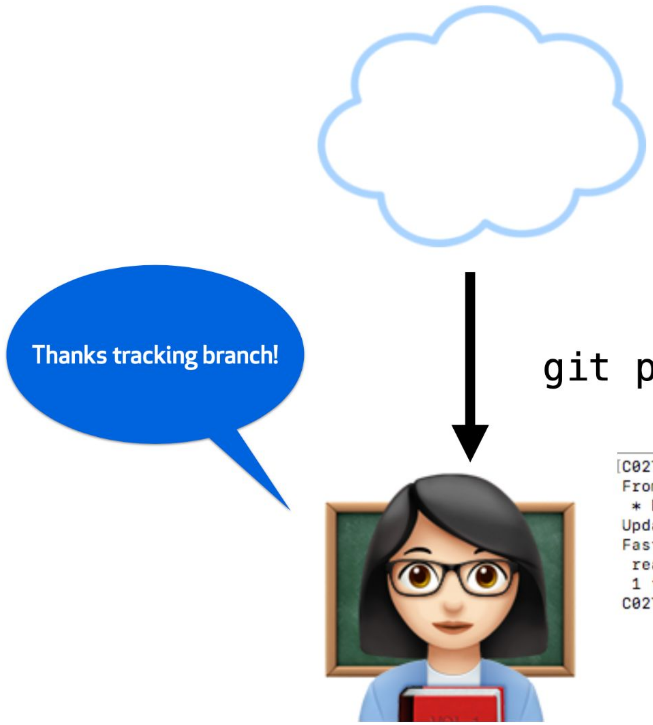
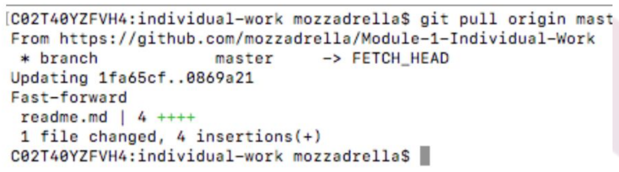
Watch what happens when we run “`pull`”


I'd like the latest commits on the branch that my active branch tracks.
git pull origin master

Watch what happens when we run “`pull`”



git pull origin master



```
[C02T40YZFVH4:individual-work mozzadrella$ git pull origin mast
From https://github.com/mozzadrella/Module-1-Individual-Work
 * branch            master     -> FETCH_HEAD
Updating 1fa65cf..0869a21
Fast-forward
 readme.md | 4 ++++
 1 file changed, 4 insertions(+)
C02T40YZFVH4:individual-work mozzadrella$ 
```

To sum up, here are the commands with network activity:

```
git push
git fetch
git pull
```

Note: You can’t do a `git pull` if your local repository contains uncommitted code or changes that are not ‘saved/committed. You’ll need to either commit your changes first or “`stash`” it

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Thank you