

What They Forgot to Teach You About R



`rstudio::conf` 2019

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rstd.io/wtf-2019-rsc

Day 2, afternoon

Daily survival with Git + GitHub + RStudio

Jenny Bryan
RStudio (& UBC)

 @jennybc
 @JennyBryan

Everyone is encouraged to open issues here:



rstd.io/wtf-2019-rsc
<https://github.com/jennybc/wtf-2019-rsc/issues>

Record glitches, gotchas,
good sidebar discussions, etc.
to address now or later.

Closure re: yesterday's activity

See day 1 session 4 landing page for links to fully realized **packages-report** repos:

one by Jenny (you saw), one by Jim (includes a Makefile)

Where did we do yesterday?

Confirmed your setup 

New repo, GitHub first, then RStudio

- Made several successful roundtrips
- Importance of viewing diffs and commits

Special R + GitHub stuff:

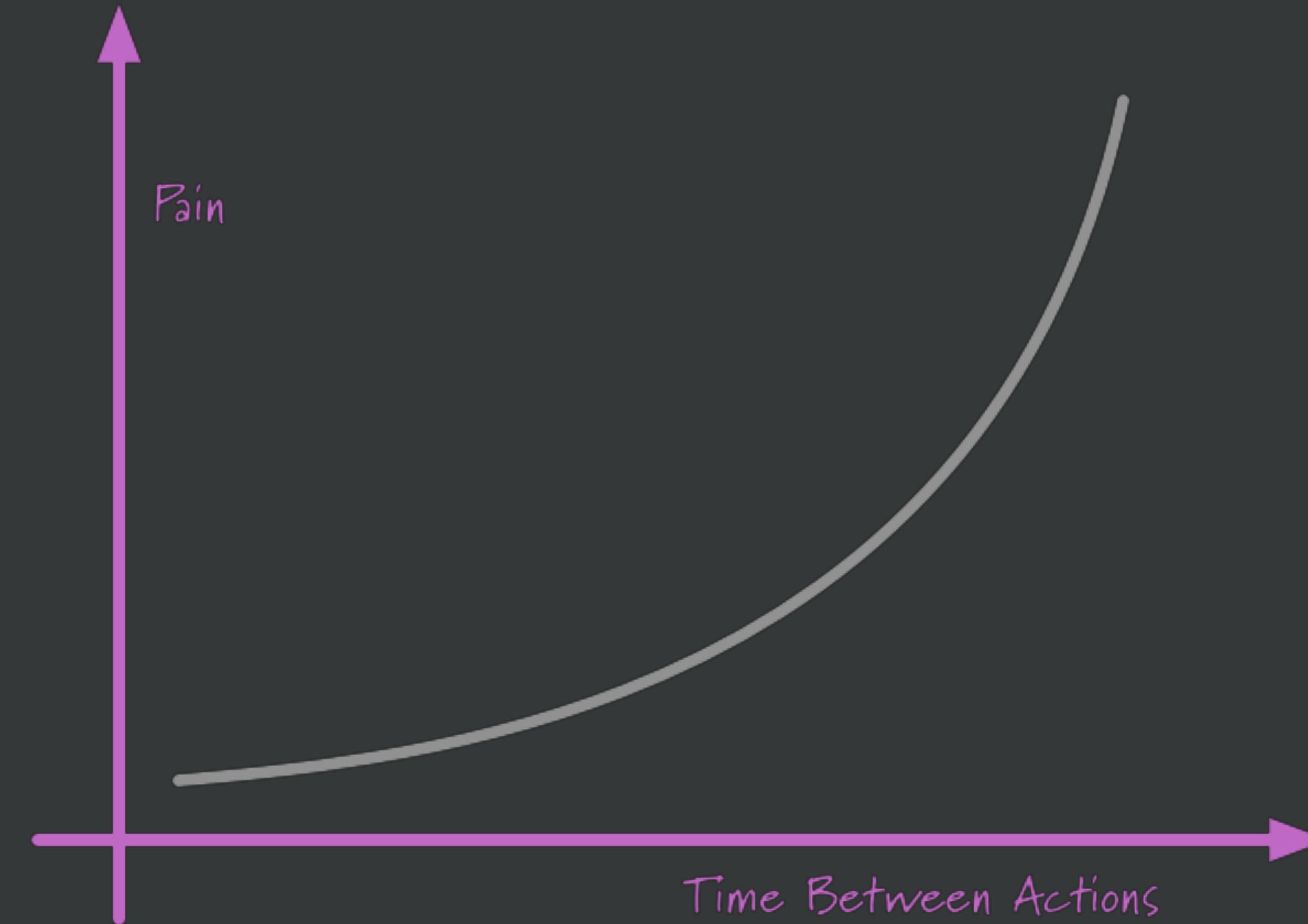
- R or Rmd -> md is easy, high payoff
- GitHub Pages can use any md to make world's easiest website

Today we'll preview some intermediate
workflows you'll enjoy soon.

*Deep
Thoughts*



"If it hurts, do it more often."



<https://martinfowler.com/bliki/FrequencyReducesDifficulty.html>

"If it hurts, do it more often."

Apply this to git commit, pull, merge, push.
(and restarting R, re-running your scripts)

Why?

Take your pain in smaller pieces.

Tight feedback loop can reduce absolute pain.

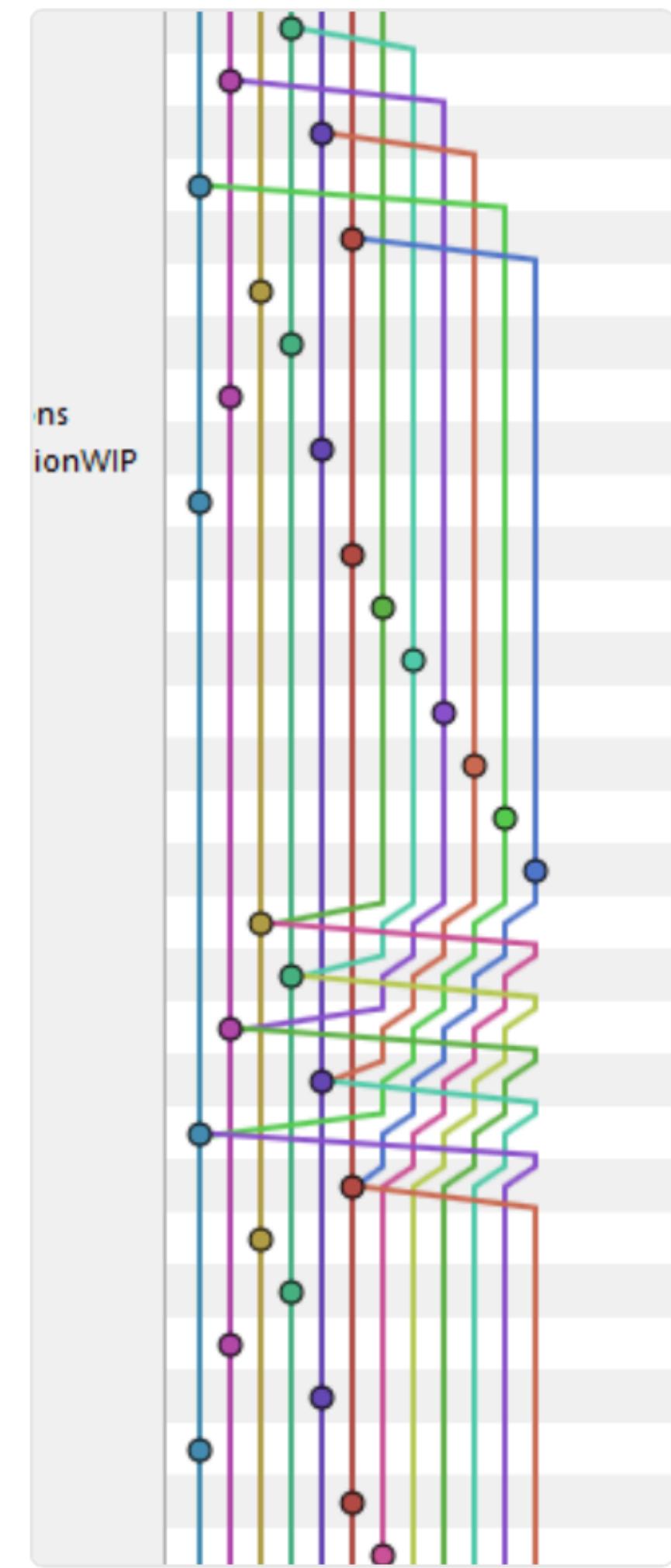
Practice changes what you find painful.



Huenry Hueffman
@HenryHoffman

Follow

I fucked up Git so bad it turned into Guitar Hero



You do NOT want "Guitar Hero" Git history.

The longer you wait to integrate, the harder it will be.

*Deep
Thoughts*



Recovering from Git(Hub) failure

Scenario: You have a huge mess you cannot fix.

Official answer: git reset.

Unofficial answer: burn it all down 

So I can face Jim Hester when he sees this:

git reset (mixed and hard) is genuinely worth learning.

SourceTree, for example, makes it easy to do hard or mixed resets to previous states.

After you reset to a non-broken state, have another go at whatever you were doing.

**The amount of energy
necessary to refute
bullshit is an order of
magnitude bigger
than to produce it**



- Alberto Brandolini

The amount of Git skilz
necessary to fix a borked up
repo is an order of magnitude
bigger than to bork it.

- Me



BURN IT ALL DOWN

 requires you have a remote repo in a decent state!

Commit early, commit often! And push! It's your safety net.

Rename local repo to, e.g. "foo-borked".

Re-clone to a new, clean local repo, "foo".

Copy any files that are better locally from "foo-borked" to "foo".
Commit. Push. Carry on.

THIS IS GIT. IT TRACKS COLLABORATIVE WORK
ON PROJECTS THROUGH A BEAUTIFUL
DISTRIBUTED GRAPH THEORY TREE MODEL.

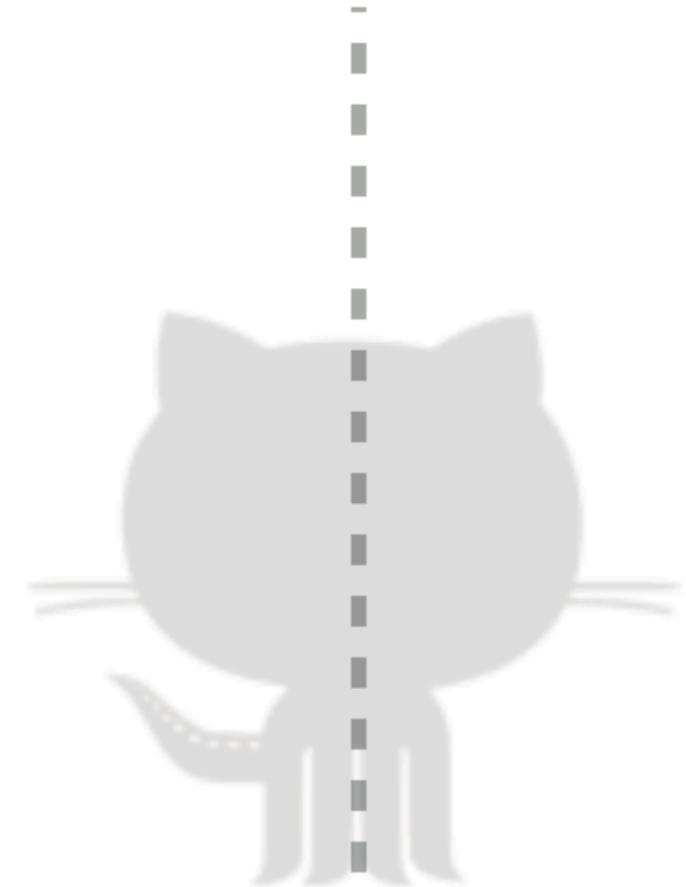
COOL. HOW DO WE USE IT?

NO IDEA. JUST MEMORIZIZE THESE SHELL
COMMANDS AND TYPE THEM TO SYNC UP.
IF YOU GET ERRORS, SAVE YOUR WORK
ELSEWHERE, DELETE THE PROJECT,
AND DOWNLOAD A FRESH COPY.



Why do you have to care about
remotes, eventually?

Them

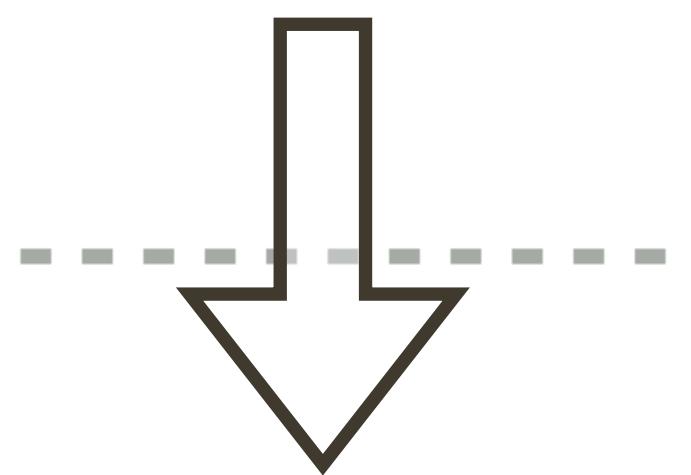
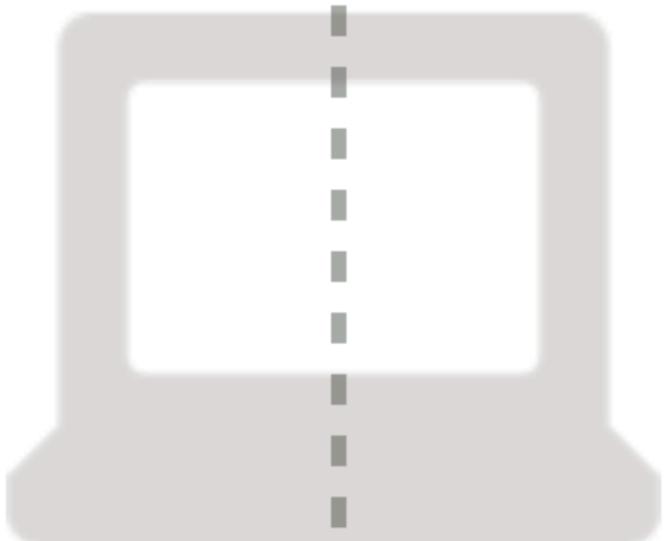


You



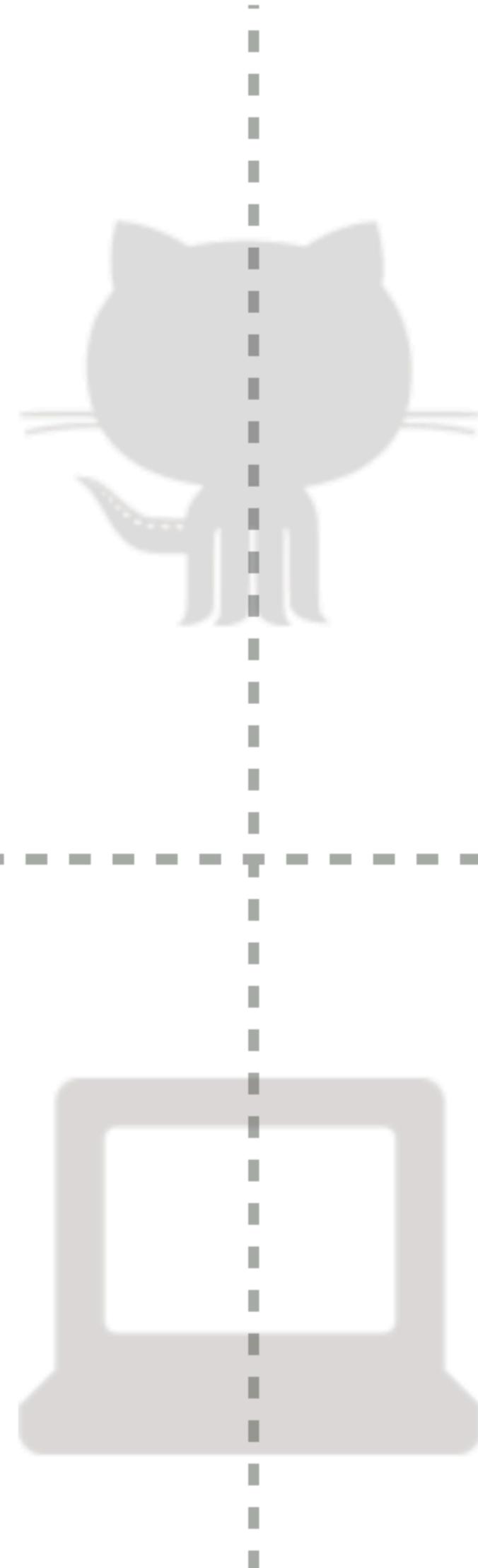
origin

not your
problem



"clone"

Them



You



origin

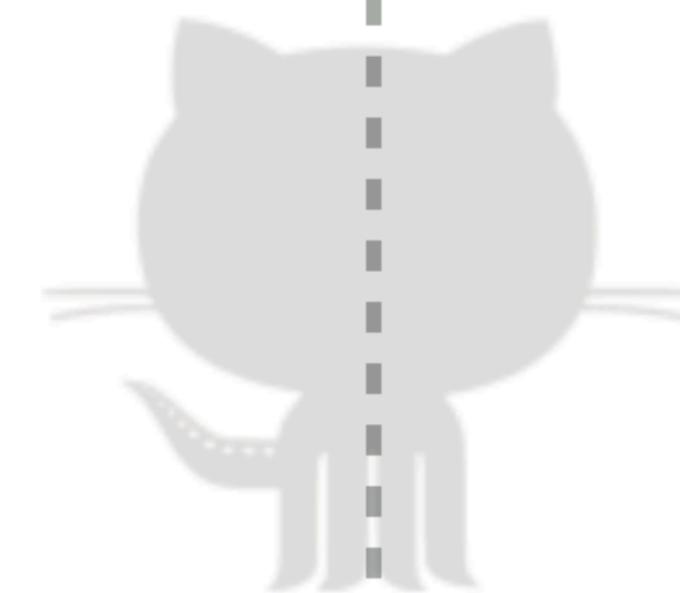
push ↑ ↓ pull



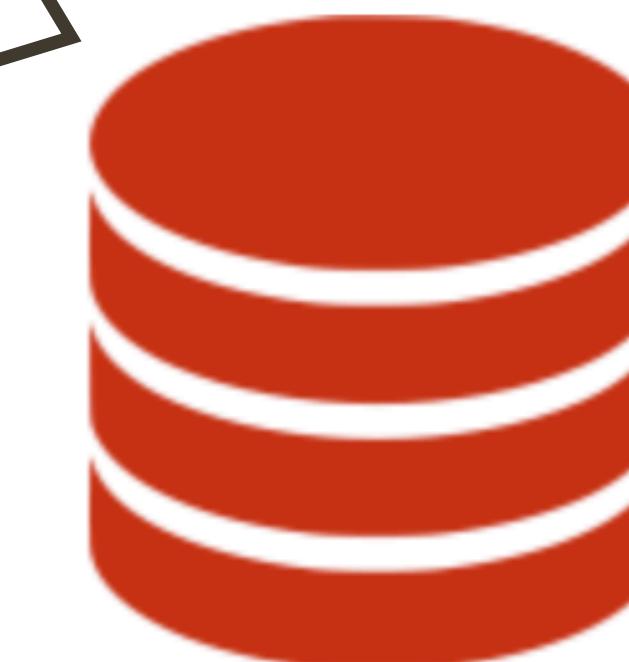
not your
problem

daily work, your stuff

Them
origin



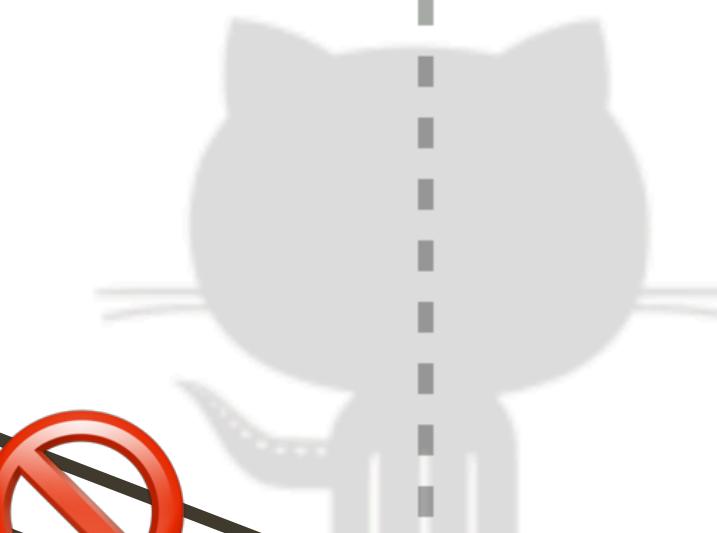
not your
problem



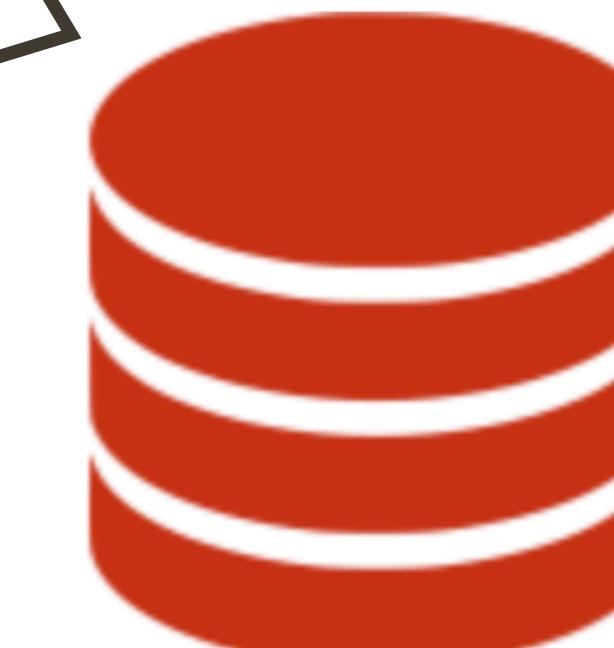
"clone"

*not as useful as you might think
because you can never send a PR

Them
origin



not your
problem



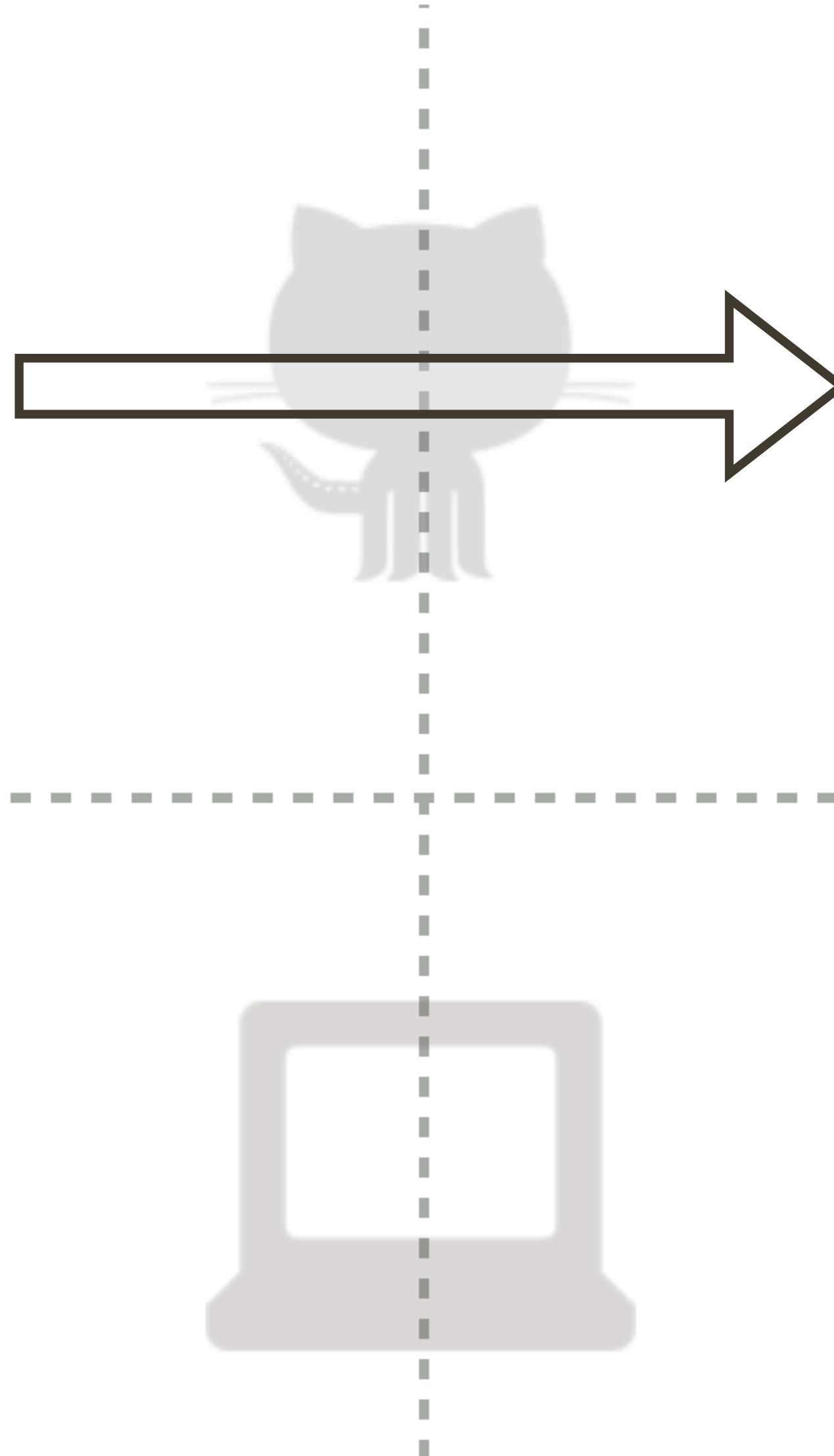
"clone"

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because you can never send a PR

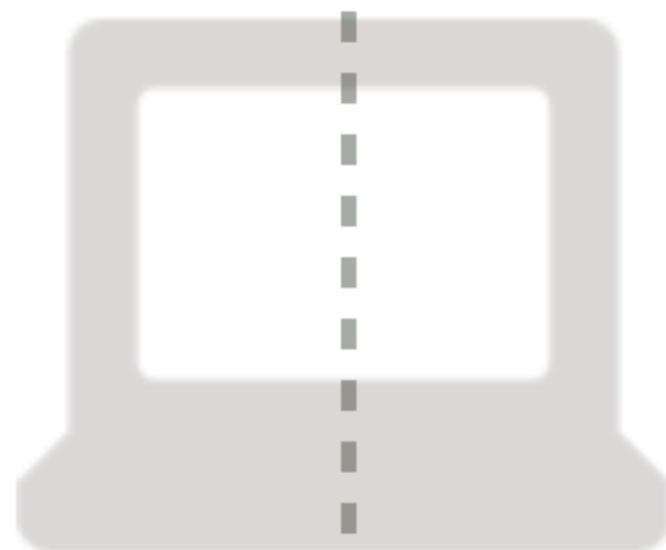
Them



You

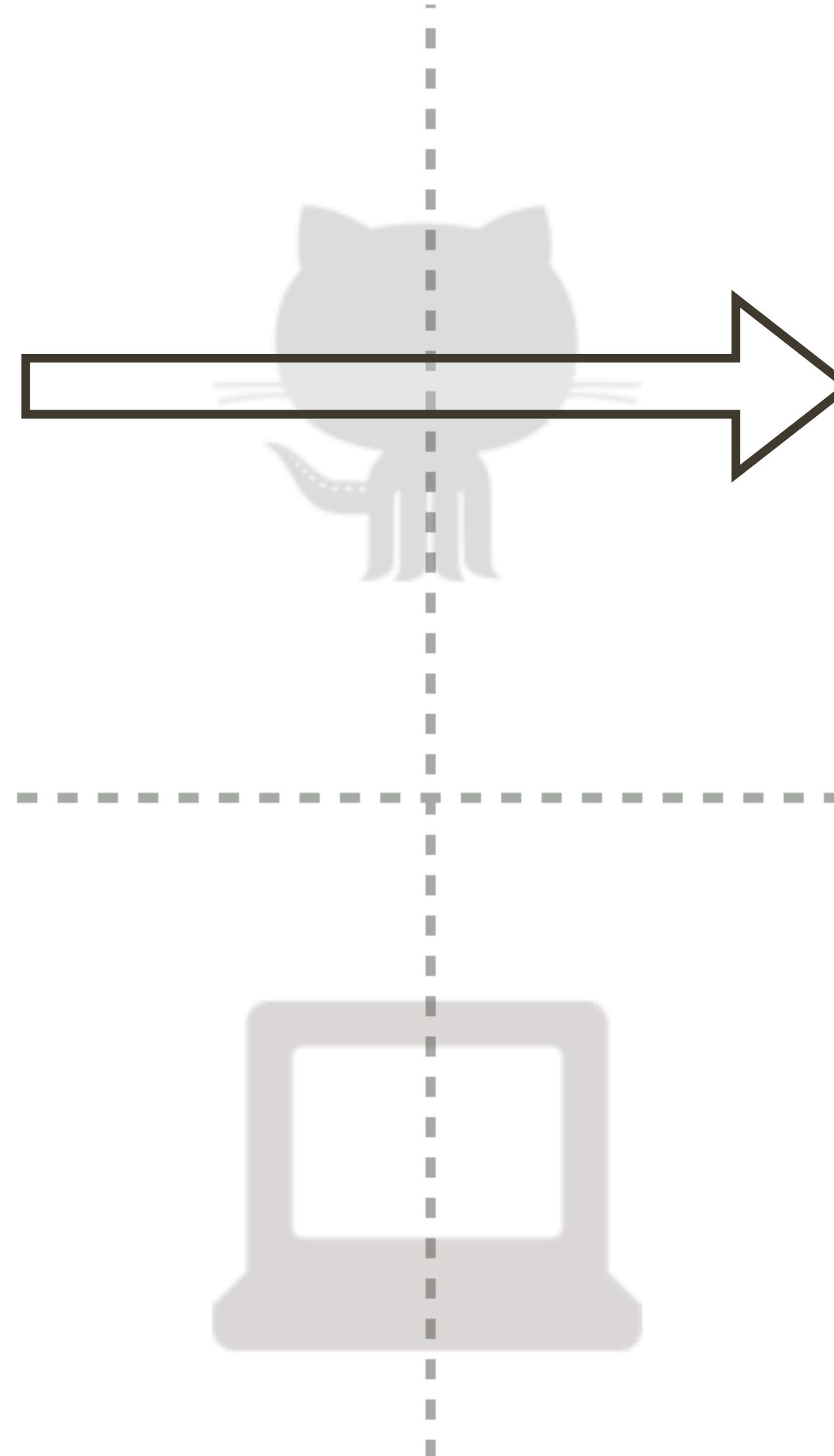


not your
problem



"fork"

Them



You

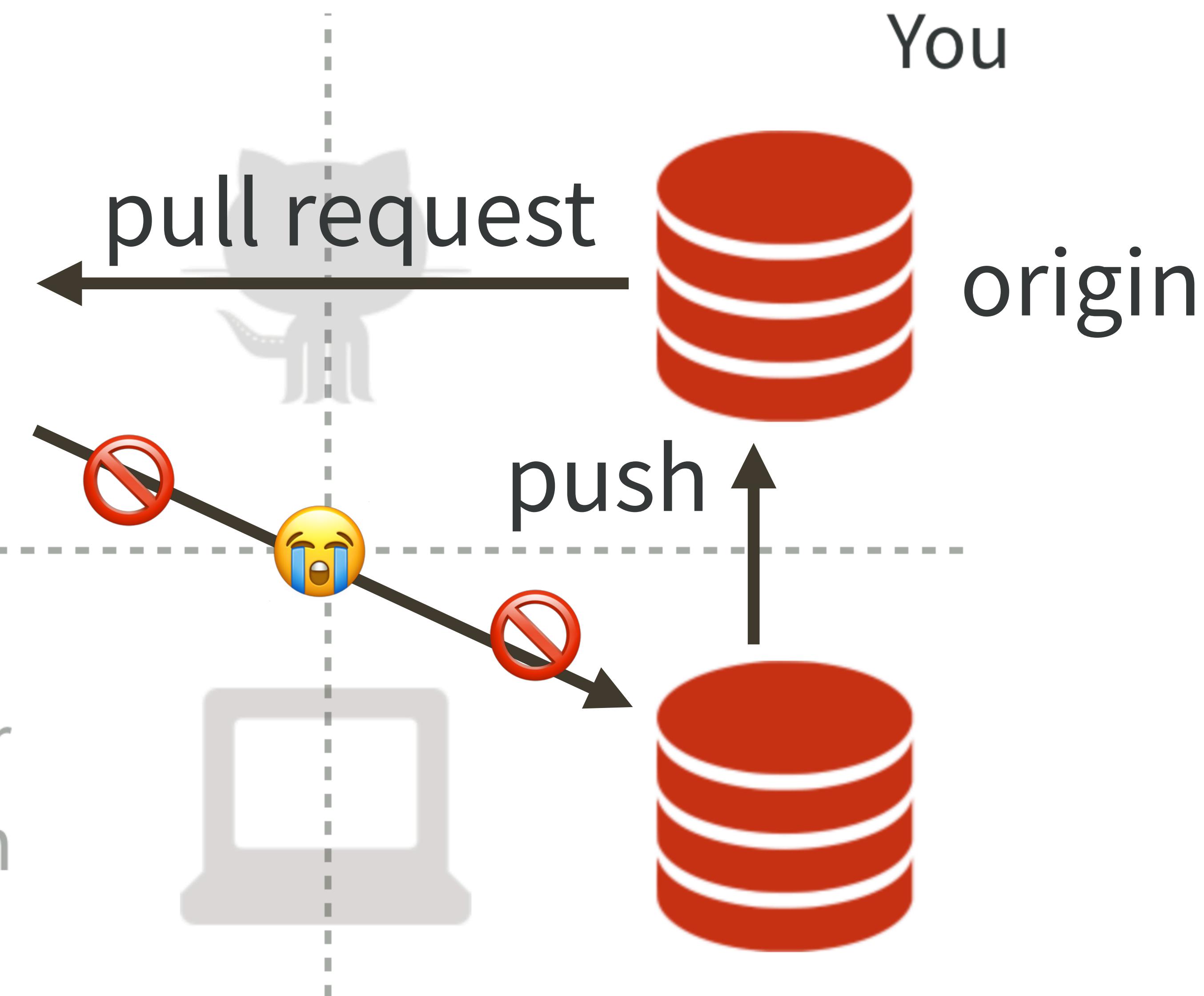


origin

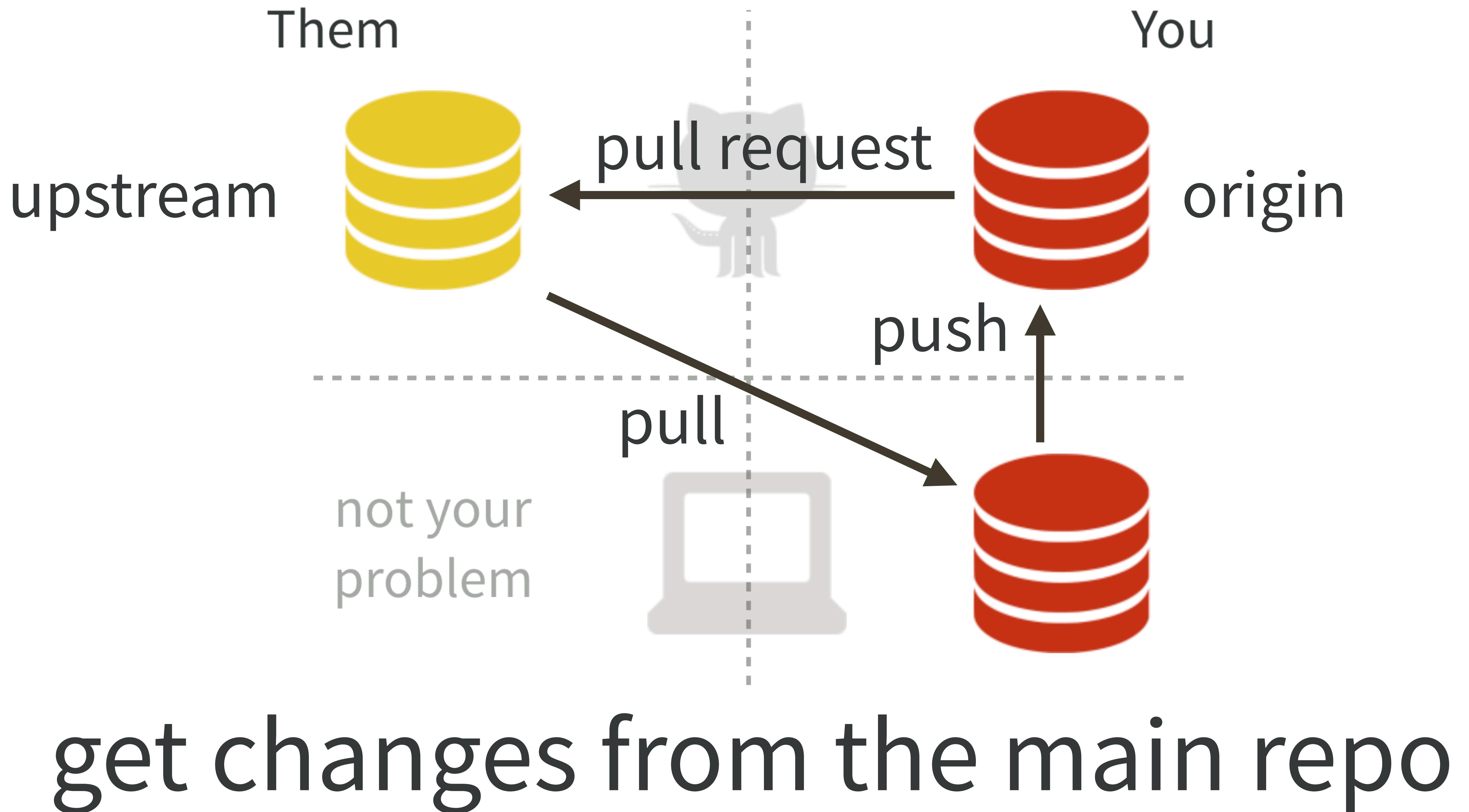


"fork and clone"

Them
????



get changes from the main repo



Scenarios when you need to add a remote:

Add the main repo as a second remote, typically
nicknamed "upstream" (fork and clone
workflow, 2 months later, you need to re-sync)

Add your fork as a second remote, when you did
"clone" and, in hindsight, you wish you'd done
"fork and clone"

"Burn it all down", the Fork version 🔥

If you contribute to a repo once every 4 years, you can also just delete your (old) fork and your (old) local repo and start over (fork, clone, edit, push, PR).

Obviously does not apply to a repo to which you regularly contribute.

fork and clone rstd.io/wtf-2019-rsc here
and add upstream remote

Key commands

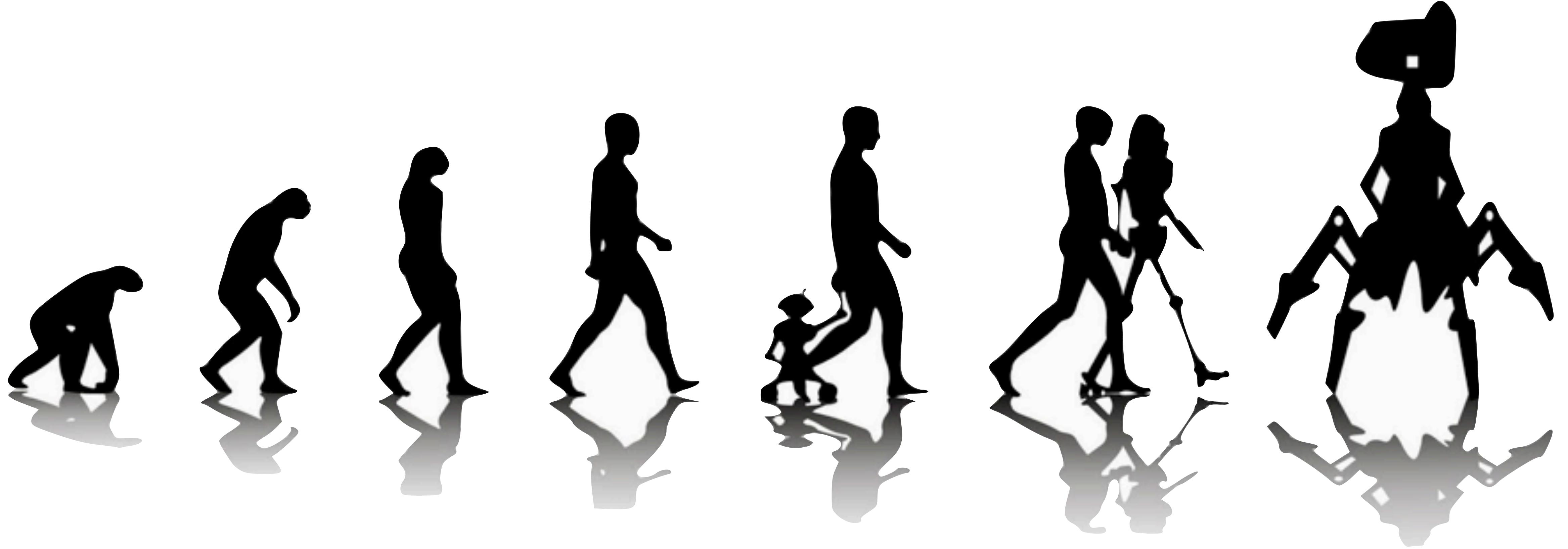
git remote -v

git remote add upstream <https://github.com/OWNER/REPO.git>

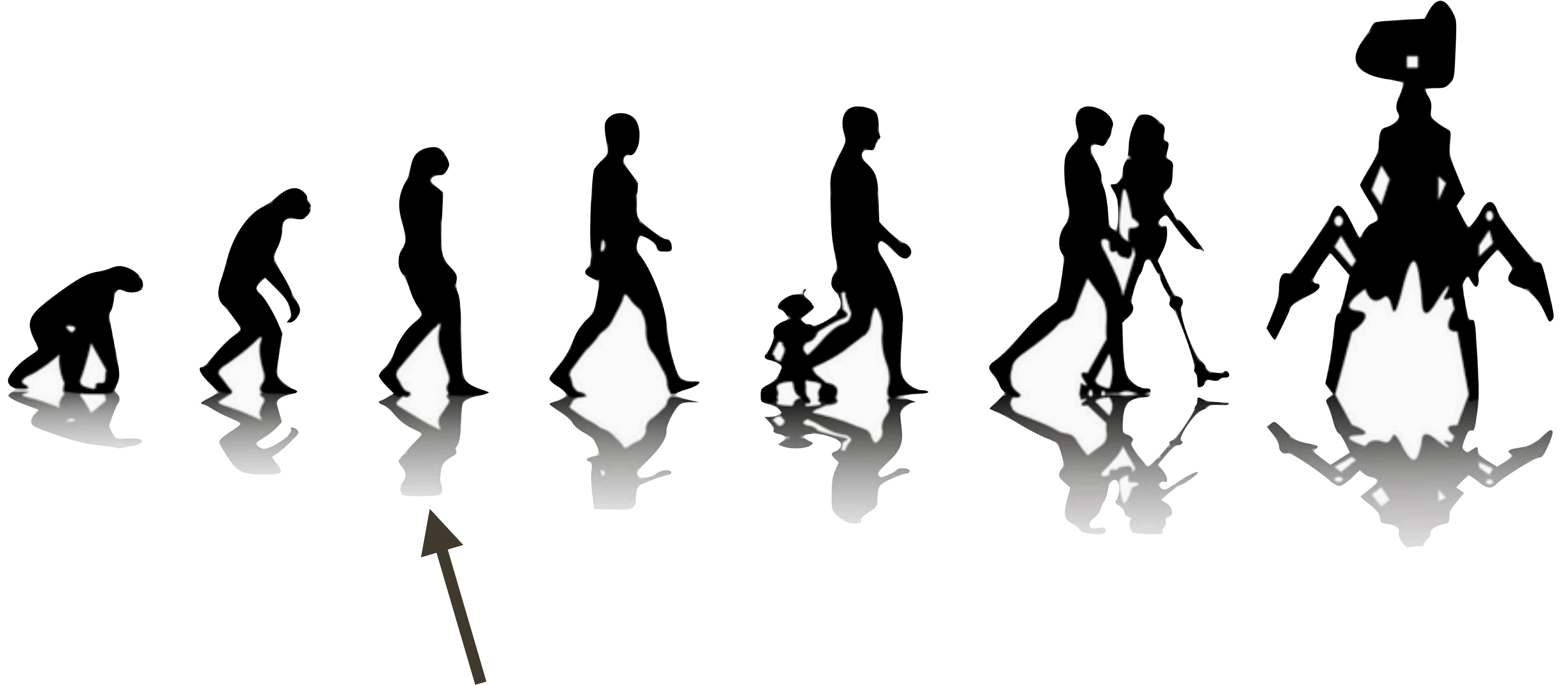
git pull upstream master --ff-only

git push

Why do you have to care about
branches, eventually?



"Git is great because you have the entire
history of your project."



OK, but how do you actually go back in time?

Levels of Git Time Travel

"I just need to see the past."

Browse & search on GitHub.

"I need to visit the past."

Create and checkout a branch.

"I want to return to the past."

Revert (or reset).

"I had a great cookie last October."

Cherry pick or checkout a path.

"I want to change the past."

 there be dragons

git push --force

For the purposes of this workshop, we consider this forbidden.

It can be useful -- we use it! -- but requires care.

Not a great idea for early days with Git and GitHub.

main source:

<https://git-scm.com/book/en/v2/Git-Tools-Reset-Demystified>

	HEAD	Index	Workdir	WD Safe?
Commit Level				
<code>reset --soft [commit]</code>	REF	NO	NO	YES
<code>reset [commit]</code>	REF	YES	NO	YES
<code>reset --hard [commit]</code>	REF	YES	YES	NO
<code>checkout [commit]</code>	HEAD	YES	YES	YES
File Level				
<code>reset (commit) [file]</code>	NO	YES	NO	YES
<code>checkout (commit) [file]</code>	NO	YES	YES	NO

"I just need to see the past."

Browse & search on GitHub.

live: browse history on GitHub

for a repo we created yesterday,

search all of GitHub for our own
weird words

"I need to visit the past."

Create and checkout a branch.

live: for a repo we created yesterday,
locally, time travel by "create &
checkout" of a branch

return to present: git checkout master

Creates branch "branchname" at a certain state

```
git branch branchname <sha1-of-commit>
```

```
git branch branchname HEAD~3
```

Creates and checks out branch! Woot.

```
git checkout -b branchname <sha1-of-commit or HEAD~3>
```

Go back to master

```
git checkout master
```

"I want to return to the past."

Revert = make a new commit that reverses a commit. Do this to undo something that has been pushed.

live: for a repo we created yesterday, make a commit, push, then revert it, then push look at history on github

```
git revert --no-edit <sha1-of-commit>
```

Or to just make a new commit that
undoes the last commit:

```
git revert --no-edit HEAD
```

"I want to return to the past."

Reset. Safe only for work that has not been pushed.

live: for a repo we created yesterday,
make a change, don't commit, and dismiss it
make a commit then undo via reset

Dismiss current uncommitted changes

```
git reset --hard
```

Or, frankly, I always use "Discard All" in RStudio or
"Discard file" in SourceTree

Un-commit last commit, but keep the changes

```
git reset HEAD^1
```

Or, frankly, I always use SourceTree to do this

"I had a great cookie last October."

Cherry pick a whole commit or
checkout a specific file from a specific commit.

live: for a repo we created yesterday,
make a branch and make a commit on it
go back to master
cherry pick that commit
pick an earlier commit and restore a specific file to that version

apply a specific commit to current branch

```
git cherry-pick <sha1-of-commit>
```

checkout a specific file from an earlier version

```
git checkout <sha1-of-commit> -- R/foo.R
```

Safety nets

It is very hard to actually destroy data with Git.

You can almost always recover using the ref log.

But ... no one actually enjoys using the ref log.

Before doing something iffy, create a "safety net" branch.

This can make it easier to back out of bad decisions.

Safety nets

If you have high confidence, create the safety net branch.

Then checkout master and have at it.

If things go poorly, reset master to the safety net state.

If you have low confidence, create the safety net branch.

Have at it.

If things go poorly, checkout master and carry on.

The Repeated Amend

It is very hard to actually destroy data with Git.

Any committed state can be recovered.

Rock climbing analogy → commit often!

If you're embarrassed by the clutter and tiny steps, use git amend to slowly build up a "real" commit before you push it.

work, commit, work, amend, work, amend, work, amend, PUSH
work, commit, work, amend, work, amend, work, amend, PUSH

The Repeated Amend

live: for a repo we created yesterday,
locally, build up a commit with a few
amends then push (prove the
intermediate states do not show up)

Amend lets you update the message and/or the changes in the commit

```
git commit --amend -m "an updated commit message"
```

Amend is available in the usual RStudio commit interface, btw.

Levels of Git Time Travel

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Browse & search on GitHub.

"I need to visit the past."

Create and checkout a branch.

"I want to return to the past."

Revert (or reset).

"I had a great cookie last October."

Cherry pick or checkout a path.

"I want to change the past."

 there be dragons

Recovering from Git(Hub) failure

Scenario: You try to push and cannot

What's the problem?

There are changes on GitHub that you don't have.

Pull. If the gods smile upon you, merge works. Now push.

Let's create this situation.

Make sure local Git pane is clear.

Make sure local and remote are synced (push, pull).

Edit & commit to file A locally.

Edit & commit to file B remotely.

Try to push. You will fail.



```
jenny@2015-mbp bunny-scarf $ git push  
To github.com:jennybc/bunny-scarf.git  
! [rejected]      master -> master (fetch first)  
error: failed to push some refs to 'git@github.com:jennybc/bunny-scarf.git'  
hint: Updates were rejected because the remote contains work that you do  
hint: not have locally. This is usually caused by another repository pushing  
hint: to the same ref. You may want to first integrate the remote changes  
hint: (e.g., 'git pull ...') before pushing again.  
hint: See the 'Note about fast-forwards' in 'git push --help' for details.
```

Remedy? Do what it says!

pull, then push ... **pull, then push** ... pull, then push

Look at your Git history.

You will see a merge commit, where the local and remote changes were reconciled.

This is best case scenario and is likely with good Git habits (lots of small frequent commits and merges, no binary files in repo).



Recovering from Git(Hub) failure

Scenario: You pull and get a merge conflict.

What's the problem?

GitHub can't figure out how to reconcile diffs.

Resolve the conflicts.

Or abort ... and come back later.

Let's create this situation.

Make sure local Git pane is clear.

Make sure local and remote are synced (push, pull).

Edit & commit to file A locally.

Make conflicting edit & commit to file A remotely.

Try to push. You will fail. Try to pull. You will fail. All is fail.

From github.com:jennybc/bunny-scarf

958548f..3357952 master -> origin/master

Auto-merging README.md

CONFLICT (content): Merge conflict in README.md

Automatic merge failed; fix conflicts and then commit the result.

<<<<< HEAD

Wingardium Leviosaaaaaaaa

=====

Wing-GAR-dium Levi-0-sa

>>>>> 33579525d88af071268b0a0c64c54f357712589a

<<<<< HEAD

Wingardium Leviosaaaaaaaa

=====

Wing-GAR-dium Levi-0-sa

>>>>> 33579525d88af071268b0a0c64c54f357712589a

Git inserts **markers** at each locus of conflict and shows you both versions.

You must form a consensus version and delete the markers, at each locus. Commit. Push. Carry on.

<<<<< HEAD

Wingardium Leviosaaaaaaaa

=====

Wing-GAR-dium Levi-0-sa

>>>>> 33579525d88af071268b0a0c64c54f357712589a

If you're just not up for this right now, do
git merge --abort to back out.

You can keep working locally. But you must deal with this
problem before you can resume syncing with GitHub.

If time permits

Show "Existing project, GitHub last" workflow.

This is what `usethis::use_github()` automates, when it actually works 😬.

New folder + make it an RStudio Project

- `usethis::create_project("~/i_am_new")`
- RStudio > New Project... > New Directory > New Project

Make a new local RStudio Project called **firstlast**

Say YES to "Create a git repository"

Or, if you need to make existing Project a git repo after the fact:

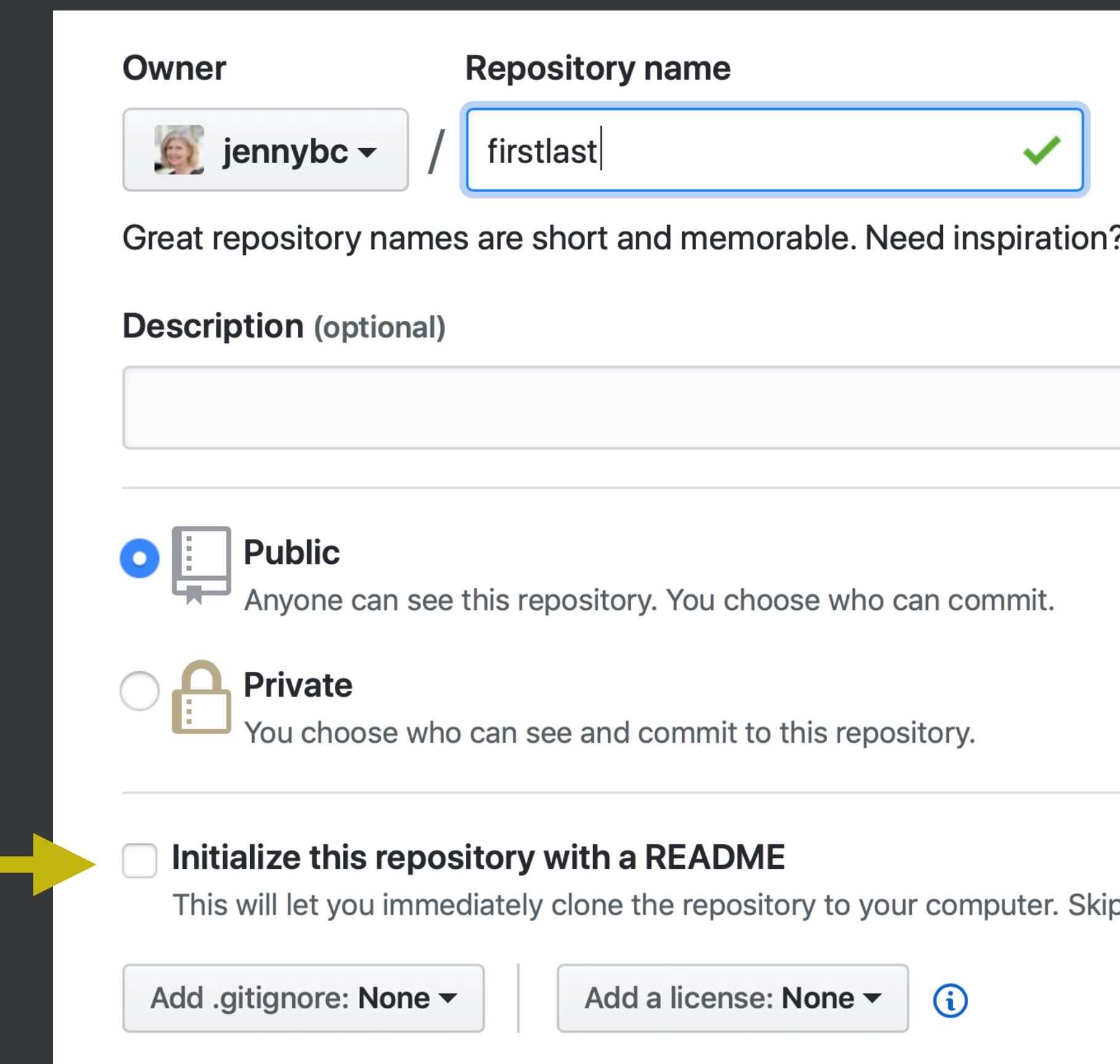
- In R: `usethis::use_git()`
- In shell: `git init`
- In RStudio: *Tools > Version Control > Project Setup*, set Version system to Git

Create a new repo on GitHub called **firstlast**

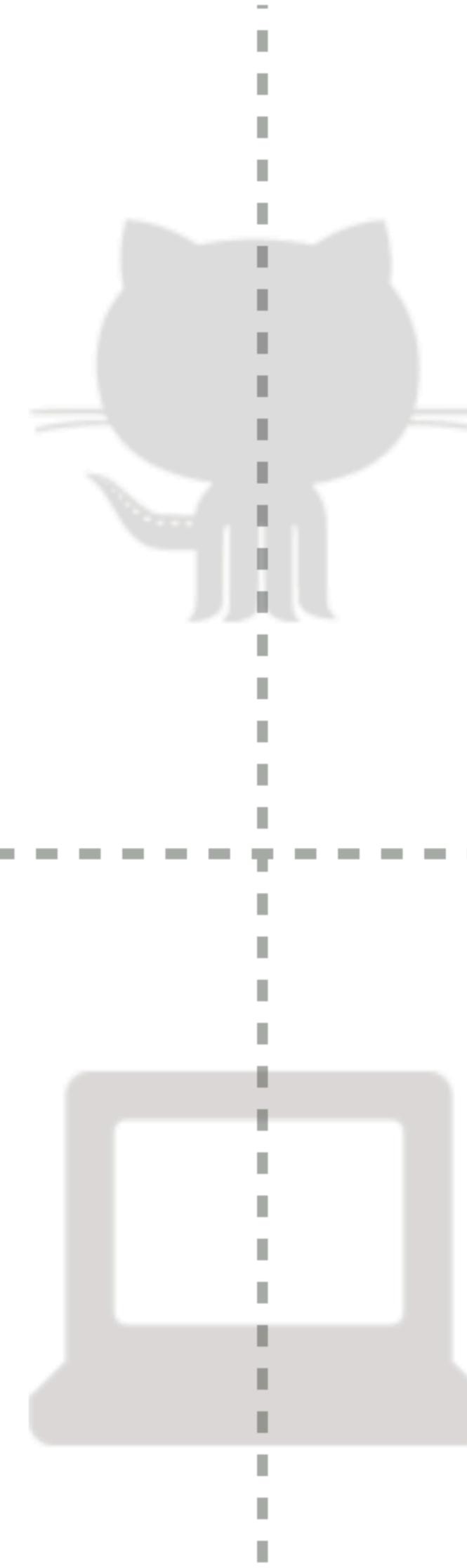
NO! No README

this time.

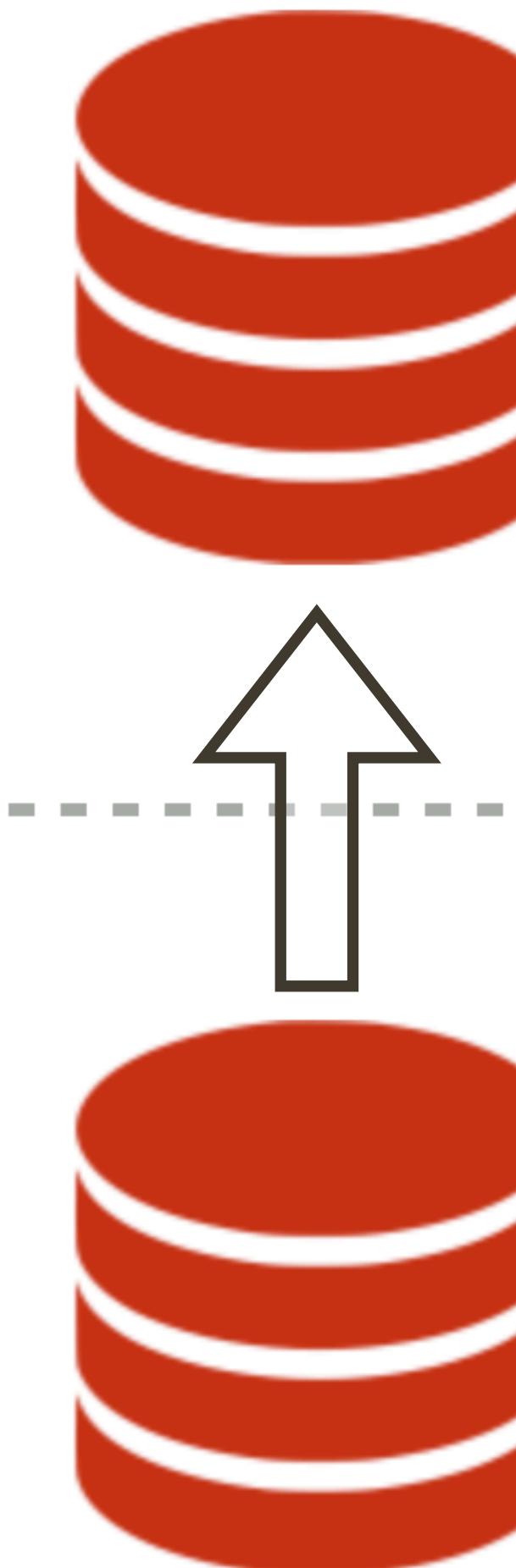
We want this repo
to be empty.



Them



You



origin

not your
problem

```
git remote add origin https://github.com/YOU/REPO.git  
git push --set-upstream origin master
```