Git/GitHub Workflows (DRAFT)

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This is a draft presentation for an RLadies NYC workshop which will take place in January 2019.

Feedback welcome by issue or email: jtr13@columbia.edu

Git/GitHub Workflows that will be covered here

1. GitHub only
2. GitHub + local master branch
3. GitHub + local master plus additional branches on your repo

(To be added:
4. Contributing to someone else's repo)

The Workflows

1. GitHub only: **work, upload**
2. GitHub + local master branch:
   pull, work, commit/push
3. GitHub + local master plus feature additional branches on your repo:
   pull, branch, work, commit/push, submit pull request, [merge pull request], [delete branch on GitHub], delete local branch

Git/GitHub Workflows

1. **GitHub only**
2. GitHub + local master branch
3. GitHub + local master plus additional branches on your repo

1. GitHub only

GitHub only

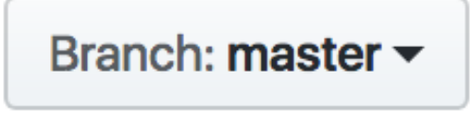
- It's very simple.
- You just create an account on GitHub.
- If you want to share files, create a repository and give it a name.
- You can then upload whatever you'd like to the repository.

GitHub only

- It's an easy way to share files.
- Other people can copy (fork) the repository, submit pull requests, and/or create issues.
- If you want them to be able to read material on GitHub without downloading, write in **markdown** or share **pdfs.**

GitHub only

Notes:

- The repository has one branch and it is called "master": 

- If you don't provide a commit message when you upload the file, you will get the default "Add files via upload"
- You can even create files right on GitHub. The default commit message in this case is: "Create <filename>"

GitHub only

Examples:

https://github.com/jtr13/codehelp/blob/master/R/reorder.md

https://github.com/jtr13/codehelp/blob/master/GitHubWorkflow.pdf

Git/GitHub Workflows

1. GitHub only
2. **GitHub + local master branch**
3. GitHub + local master plus additional branches on your repo

2. Create a local clone of our GitHub repository

Why?

- It's hard to write code on GitHub since you can't run it.
- The GitHub version serves as a backup--with code that works--while I experiment locally.

The Setup

- There are a few things you need to do to get setup, including downloading Git. A great resource is:

http://happygitwithr.com

Part I Installation

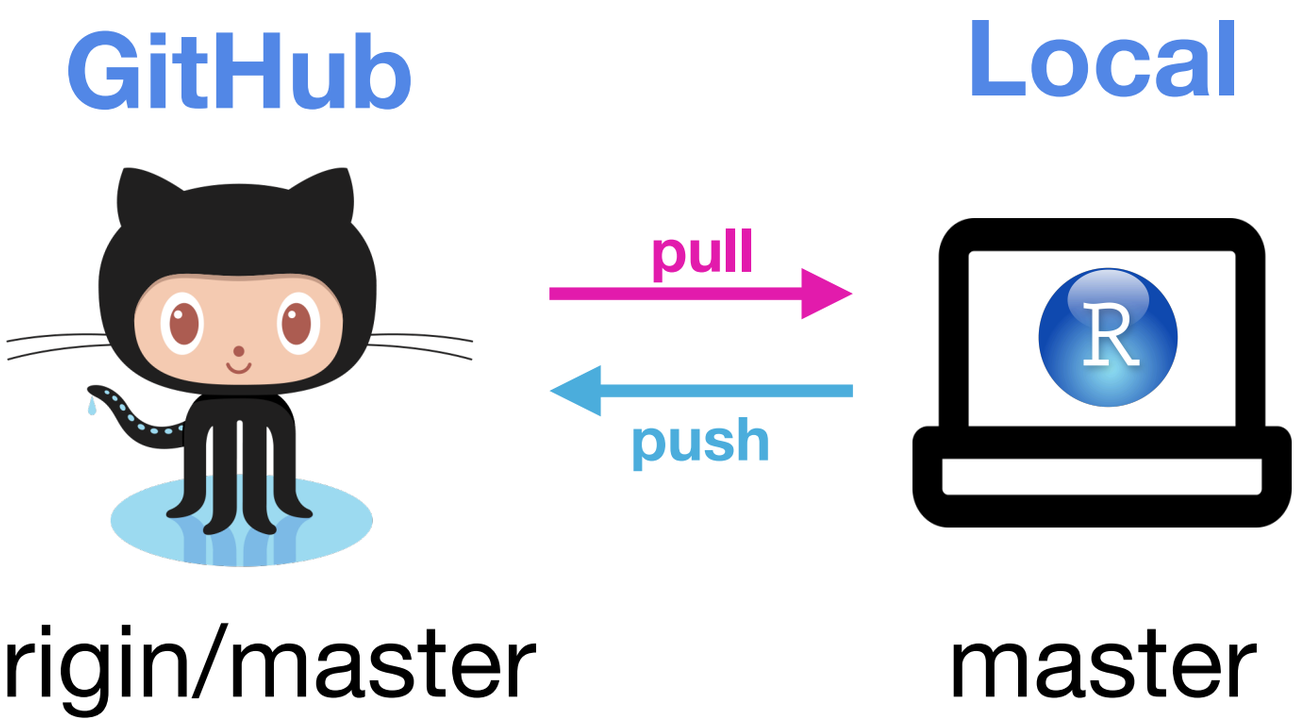
Part II Connect Git, GitHub, RStudio

by Jenny Bryan, the STAT 545 TAs, Jim Hester

The Setup

- Do not be intimidated by the number of chapters in these two parts. Why?
- Some of it you've already done.
- Some of the chapters are very short.
- A lot of the material deals with Other Operating Systems.
- A lot of the material is designed to help you troubleshoot and may not apply.

Our new model



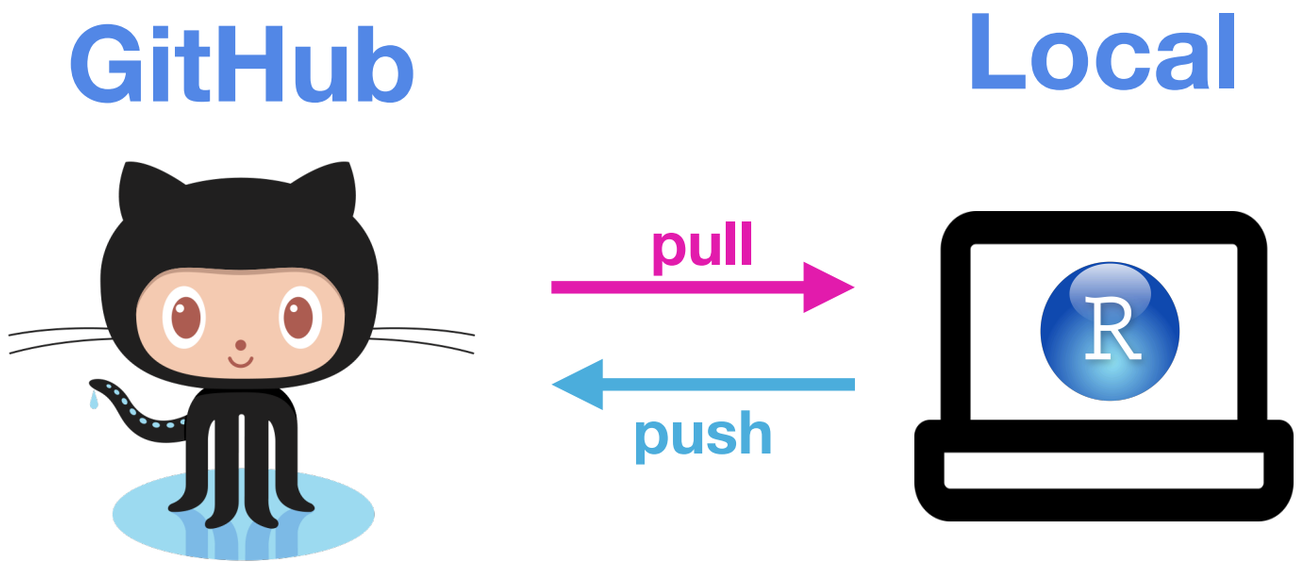
- This workflow is described in more detail in *Happy Git with R,* Chapter 16 "New project, GitHub first"

To begin: clone the repo

- This only needs to be done once.
- Click this on GitHub: 

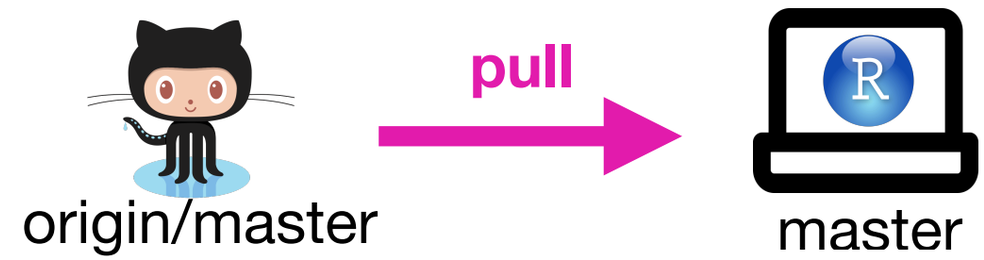
- Copy the link.
- Switch to RStudio.
- Click: "File" "New Project..."
 "Version Control"  "Git"
- Paste the URL from GitHub, click "Create Project" and we're ready to go.

Now we're ready to start.



The workflow is: **pull, work, commit/push.**
Since we just cloned the repo, we don't really need to start with pull, but we will do so anyway so we start the pattern on step 1.

Step 1. Pull

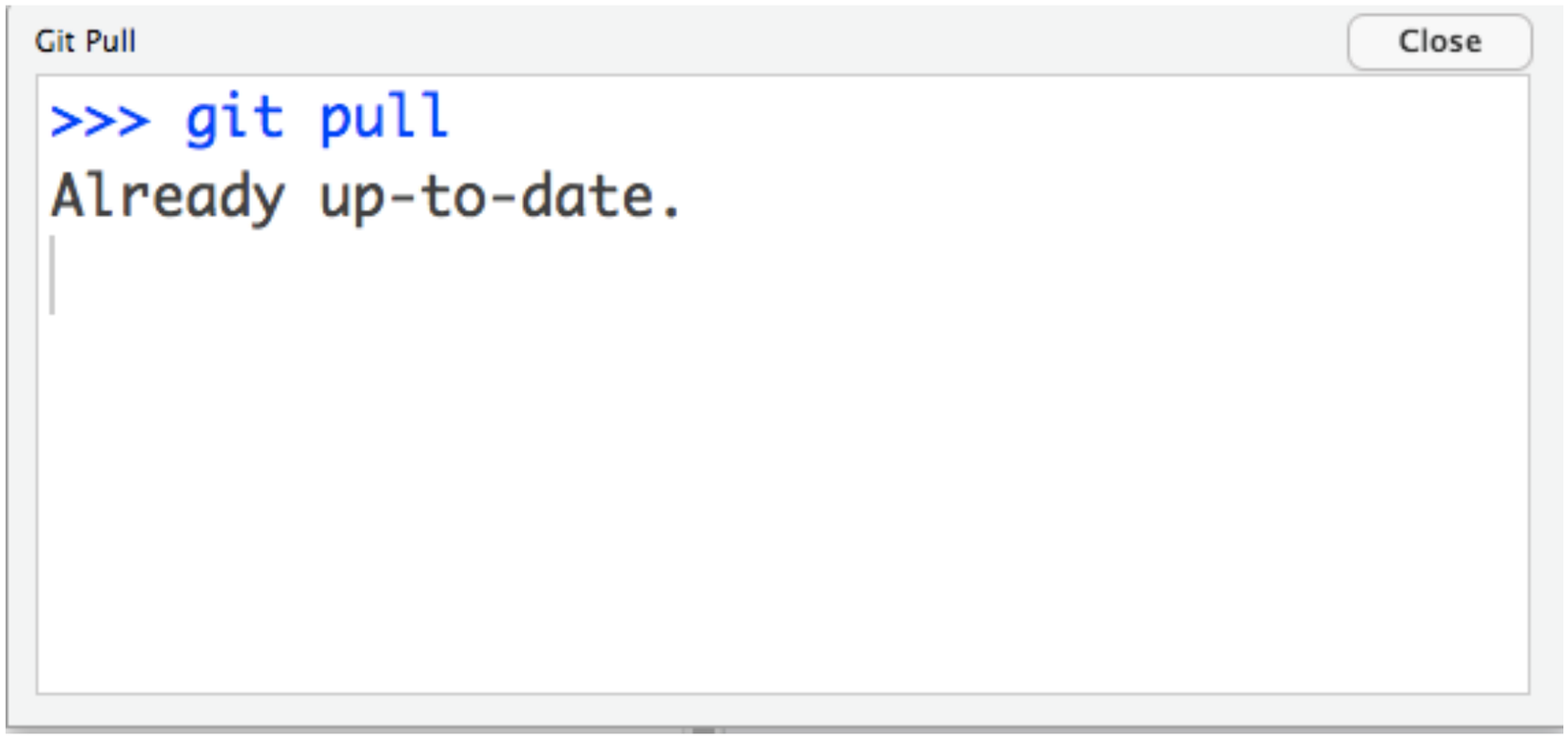


- We want to make sure that we begin working locally, we're up-to-date with the remote.

- Since nothing has changed we will get a message that we're already up to date.

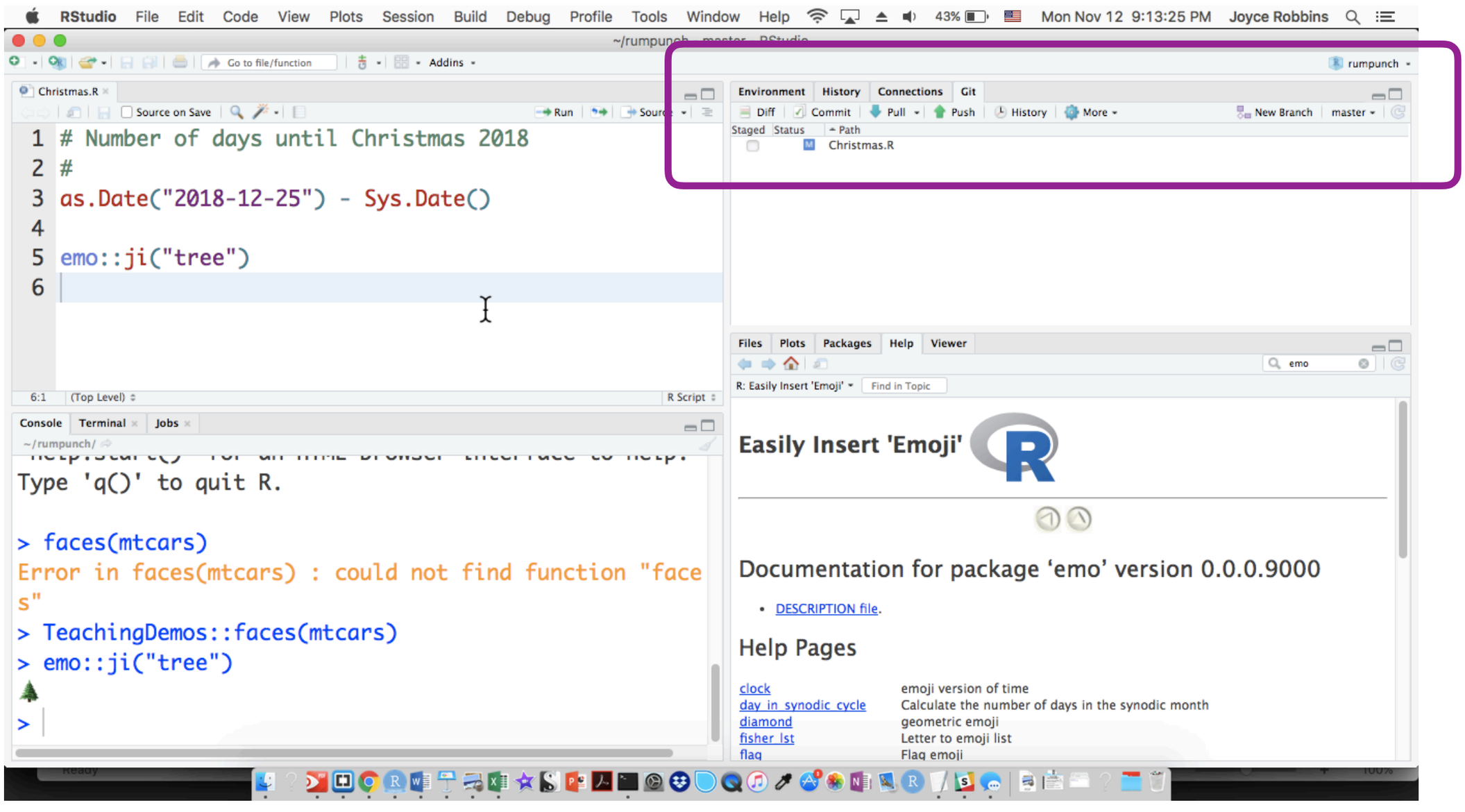
Step 1. Pull

- After clicking the pull button (down arrow) in the Git pane, we see:



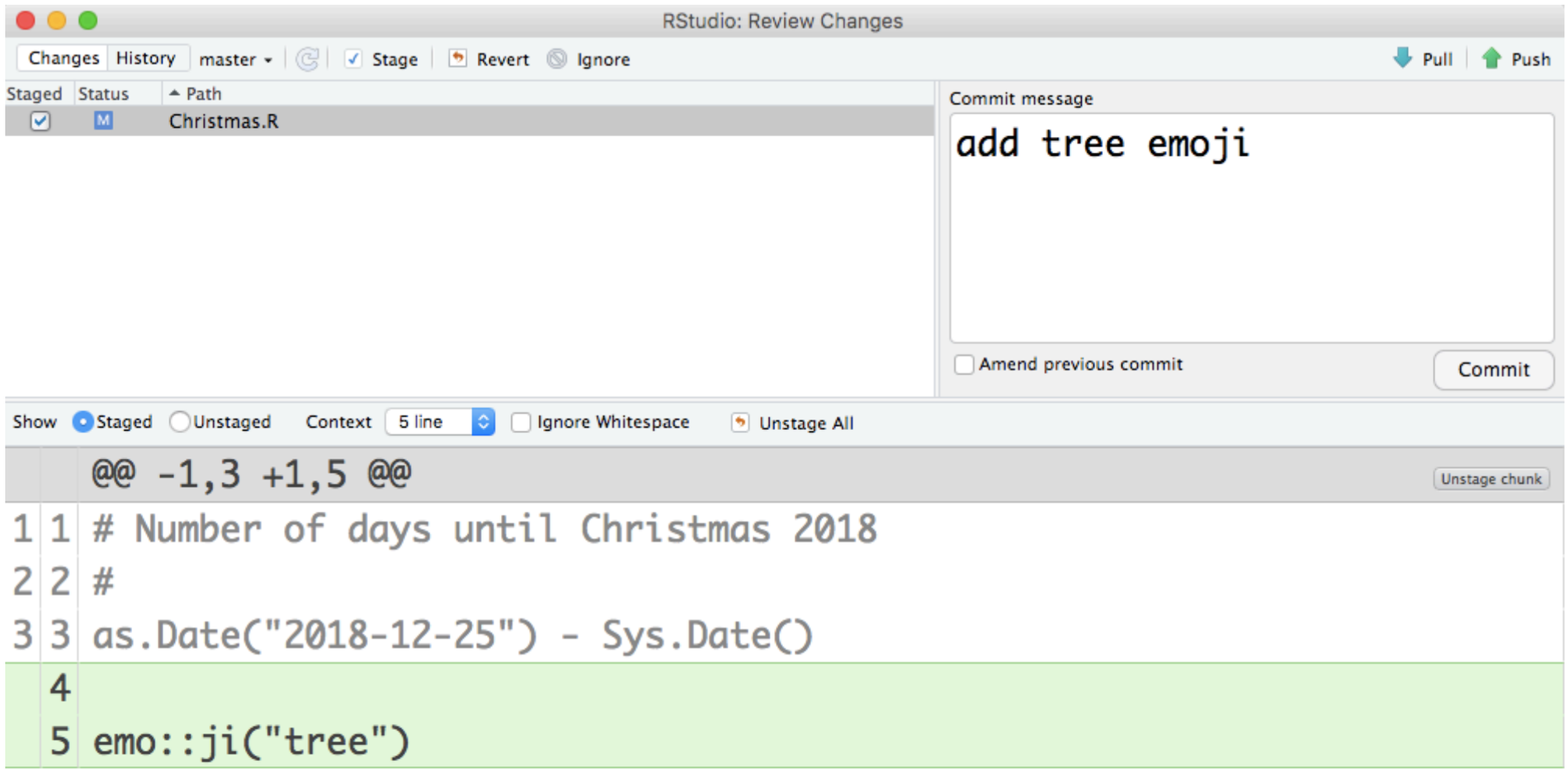
Step 2. Work

(demo in RStudio)

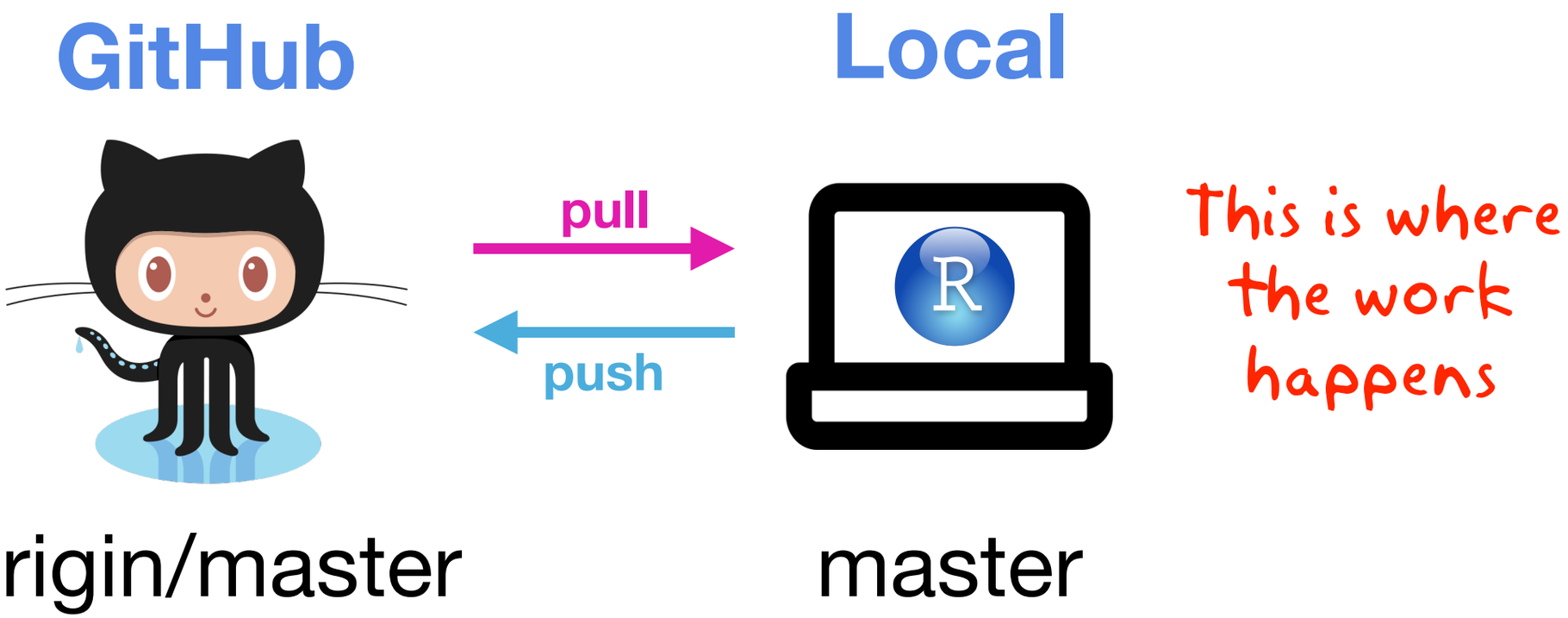


Step 3. Commit/Push

(demo in RStudio / GitHub)



Our new model (summary)



Git/GitHub Workflows

1. GitHub only
2. GitHub + local master branch
3. **GitHub + local master plus additional branches on your repo**

3. Create a new branch

Why?

- By working on a branch, we can allow collaborators to review our code before merging to master.
- The keyword is collaborators, but branching is useful regardless.

3. Remote + local master + other branches

From the perspective of the project:

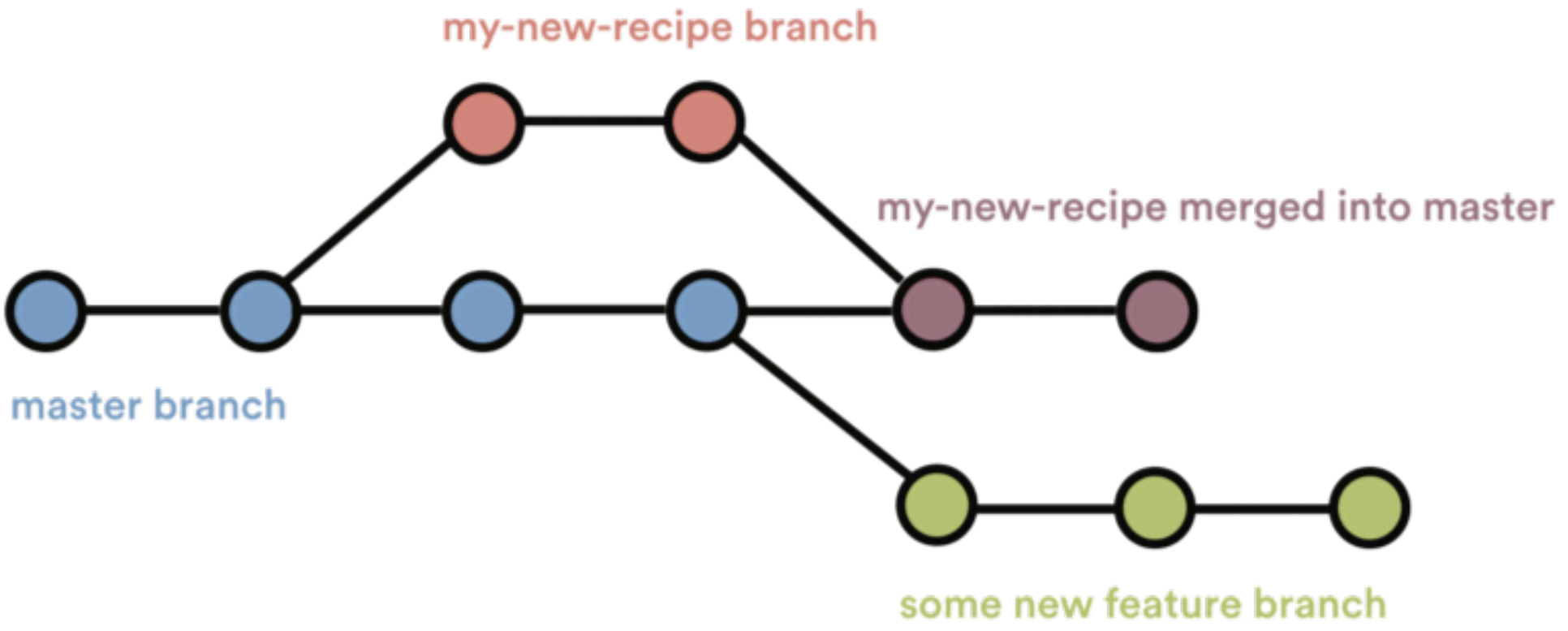


Image source: https://medium.com/designing-atlassian/learn-to-love-git-part-three-collaboration-a778157d3a1c

Your perspective

Start by creating or forking repo on GitHub, then cloning it (once)

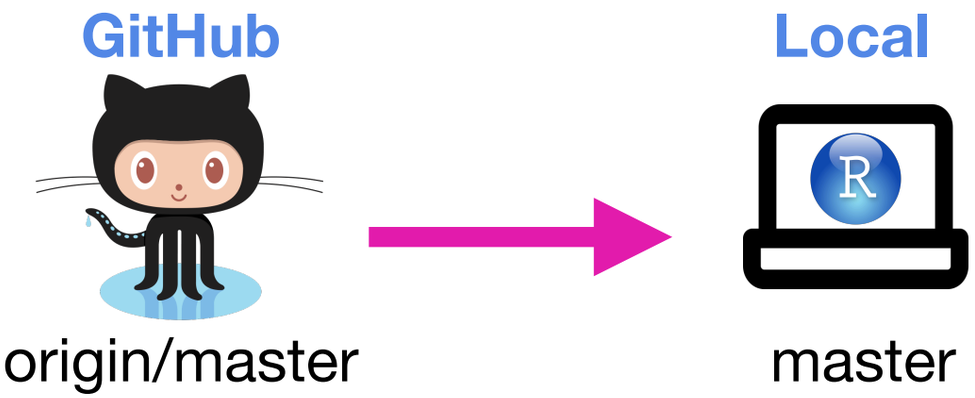
origin/master

Your perspective

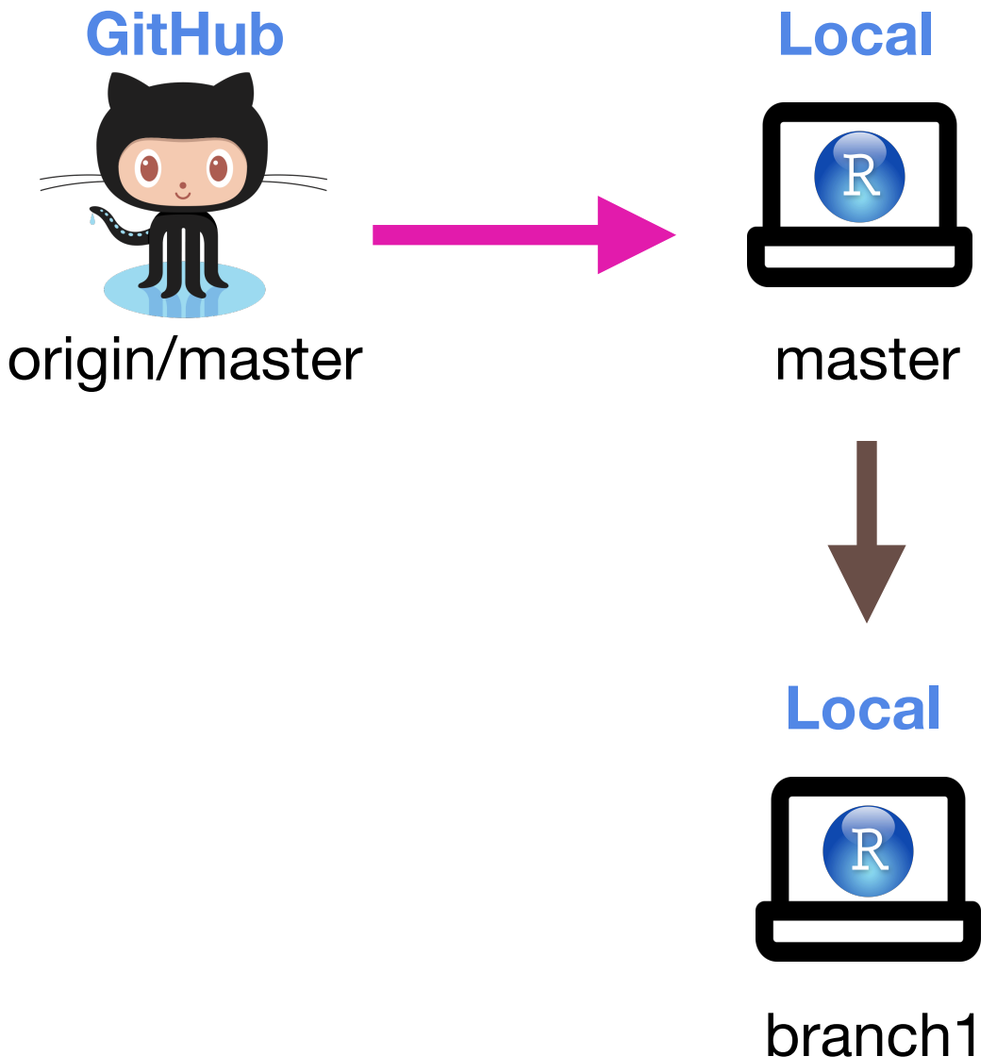
Working, shared code lives here

origin/master

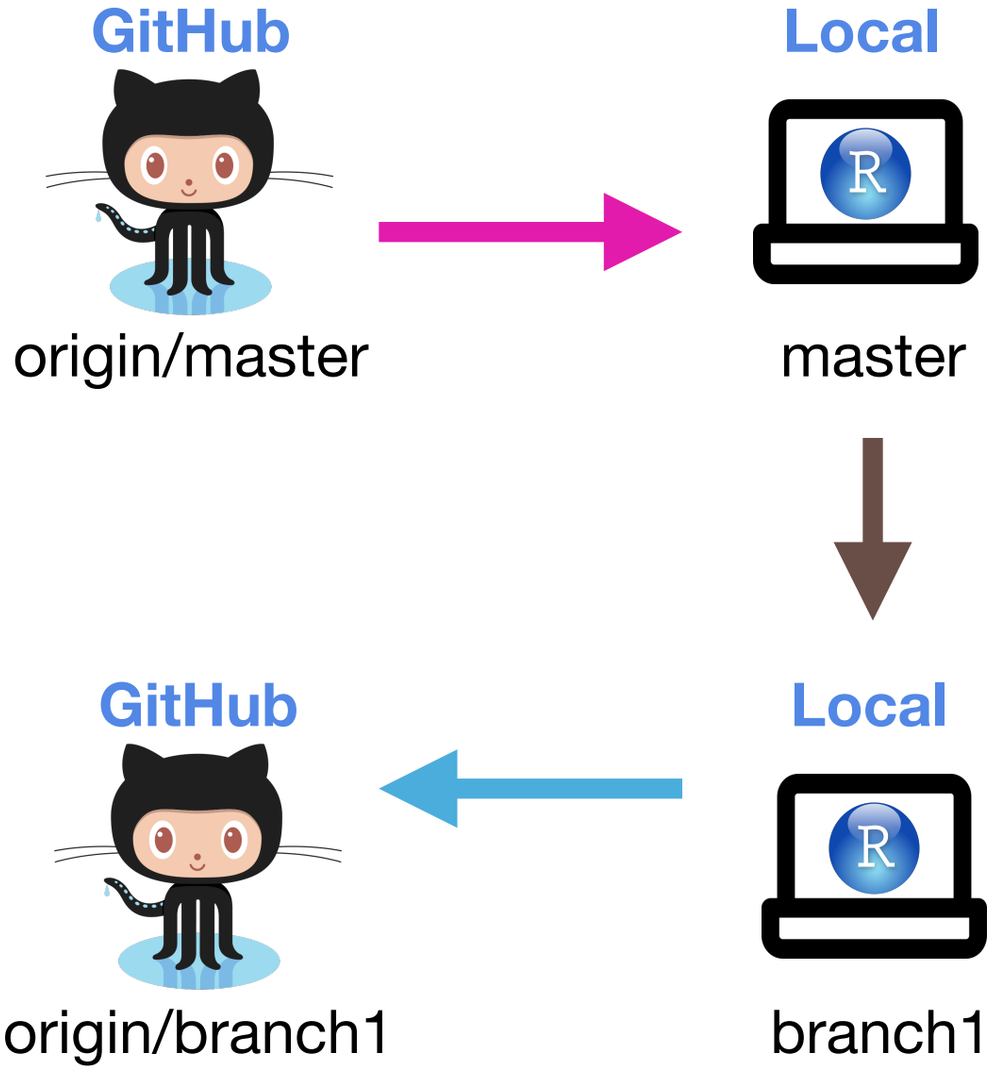
Your perspective



Your perspective

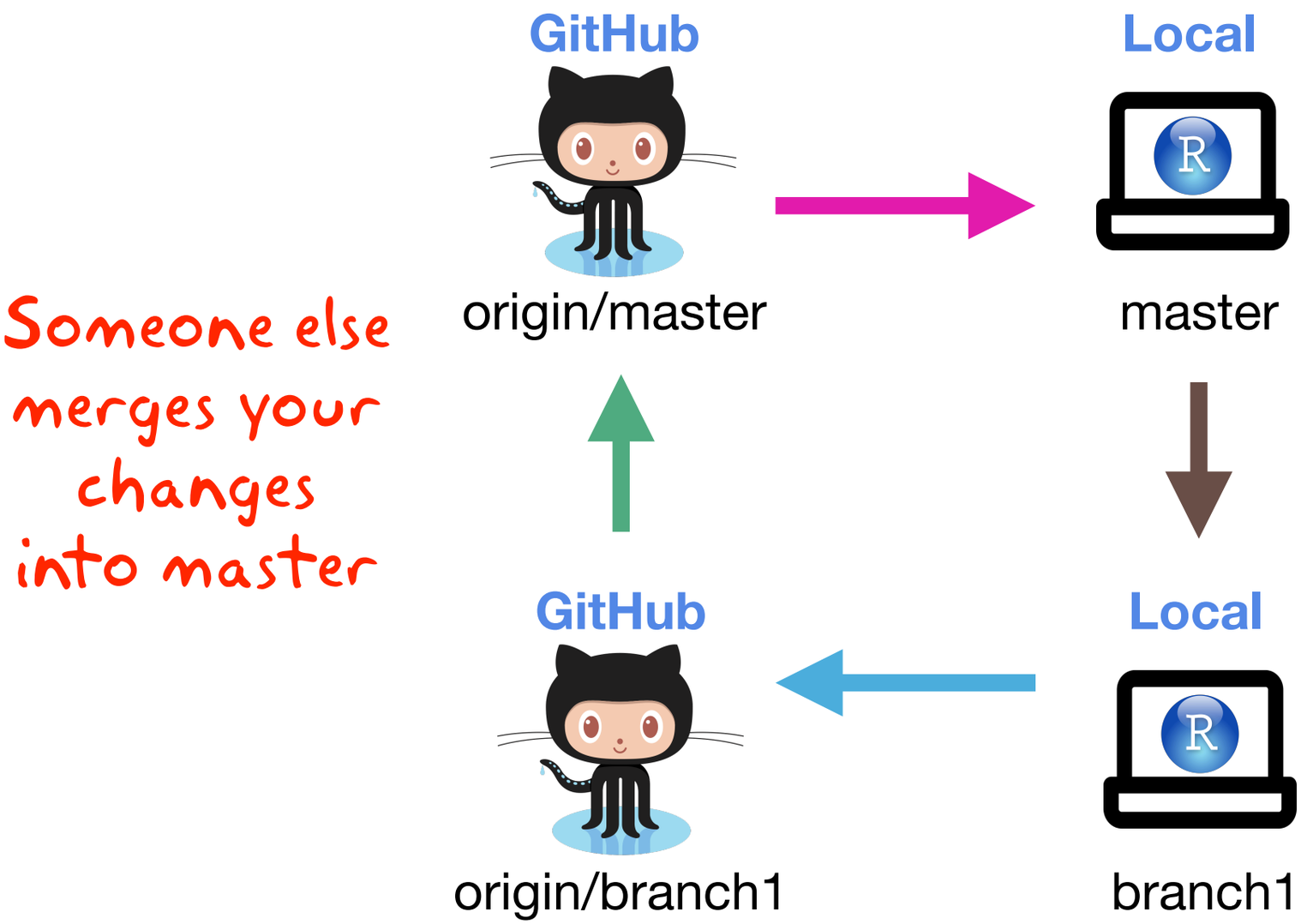


Your perspective

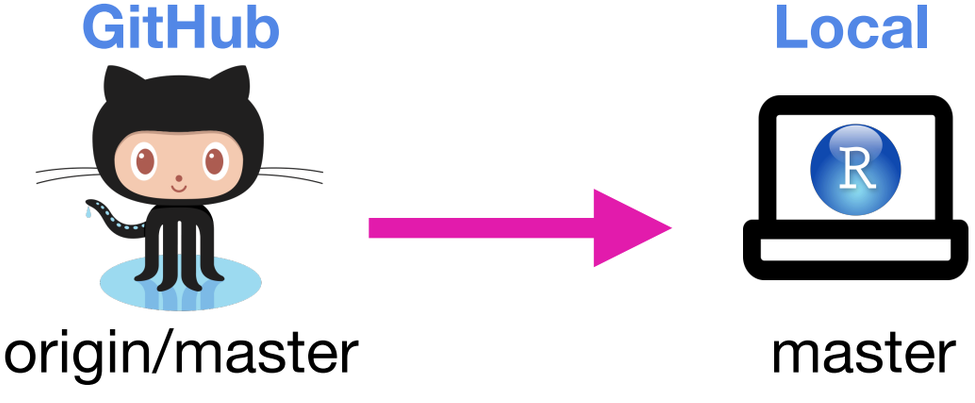


Push the new branch to GitHub to be reviewed

Your perspective

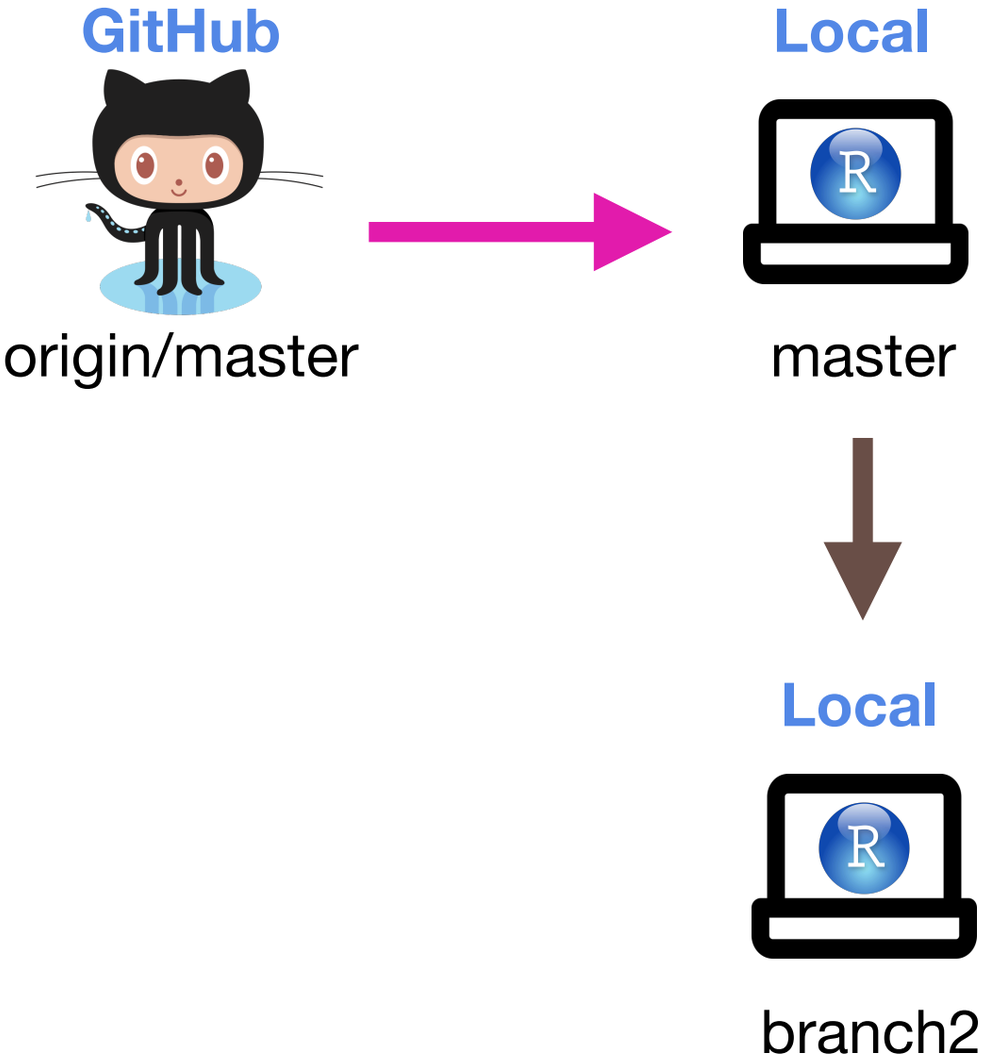


Your perspective



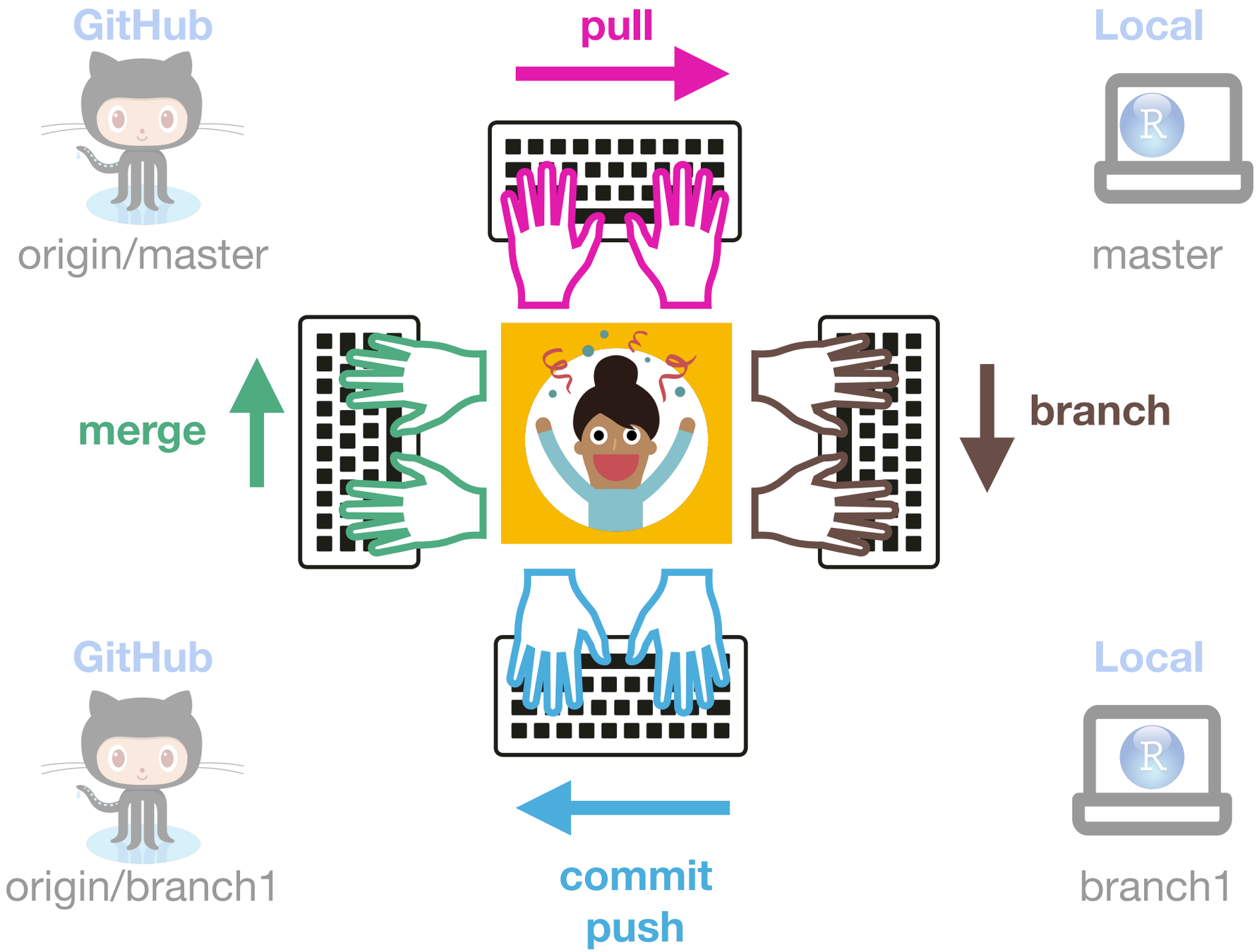
Your branch is deleted and the new stuff is pulled into your copy of the master branch.

Your perspective

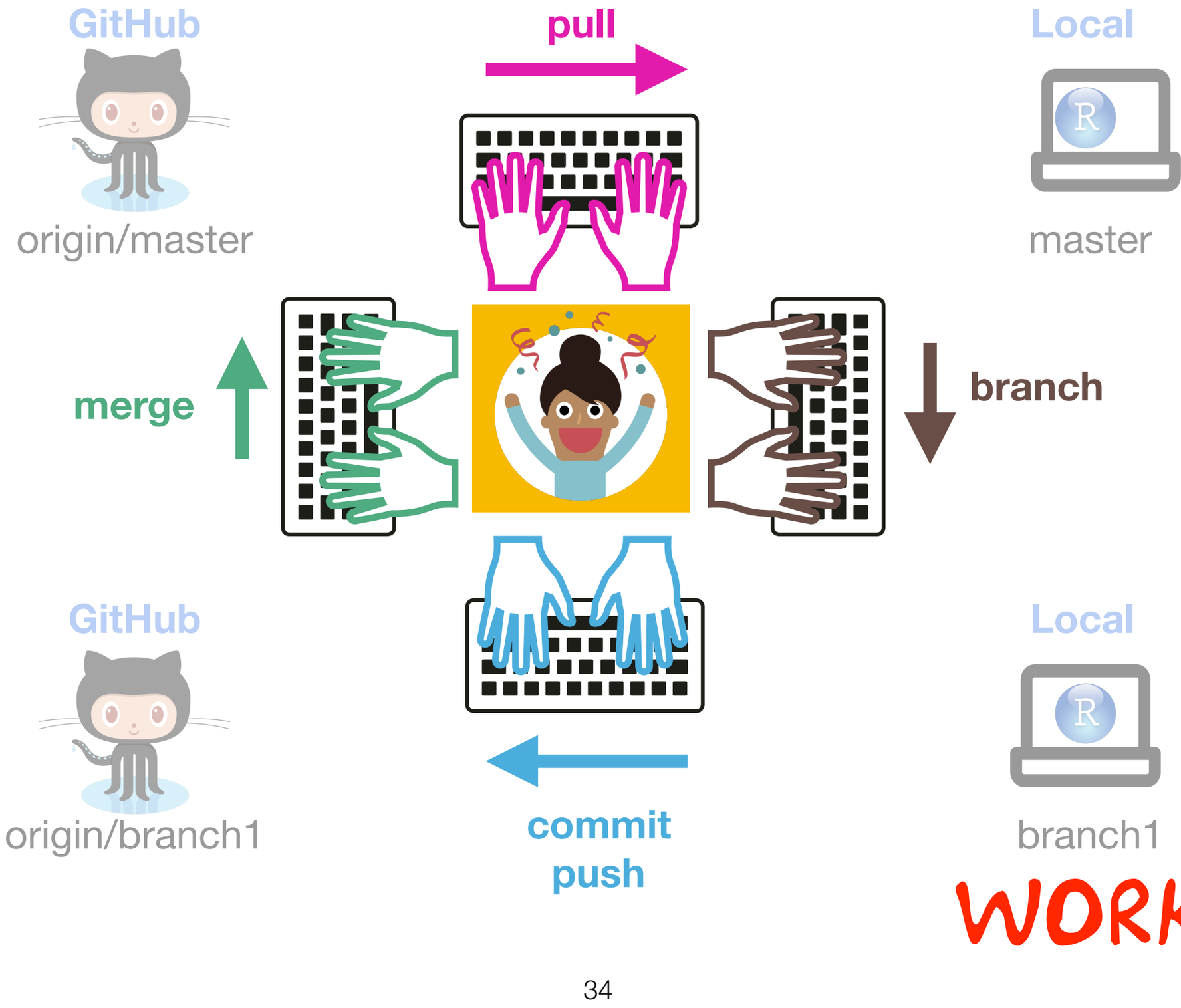


And so on and so on...

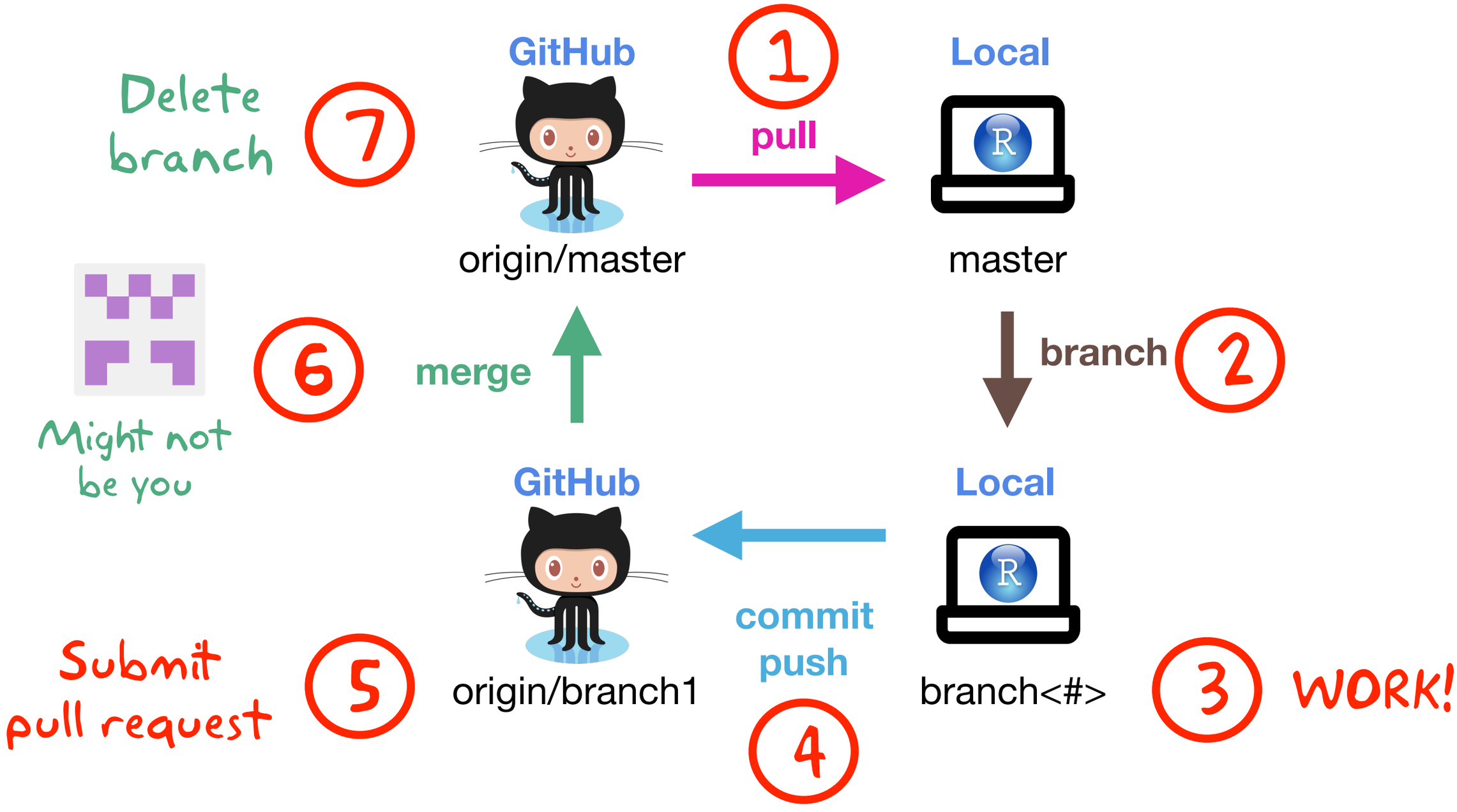
Your perspective



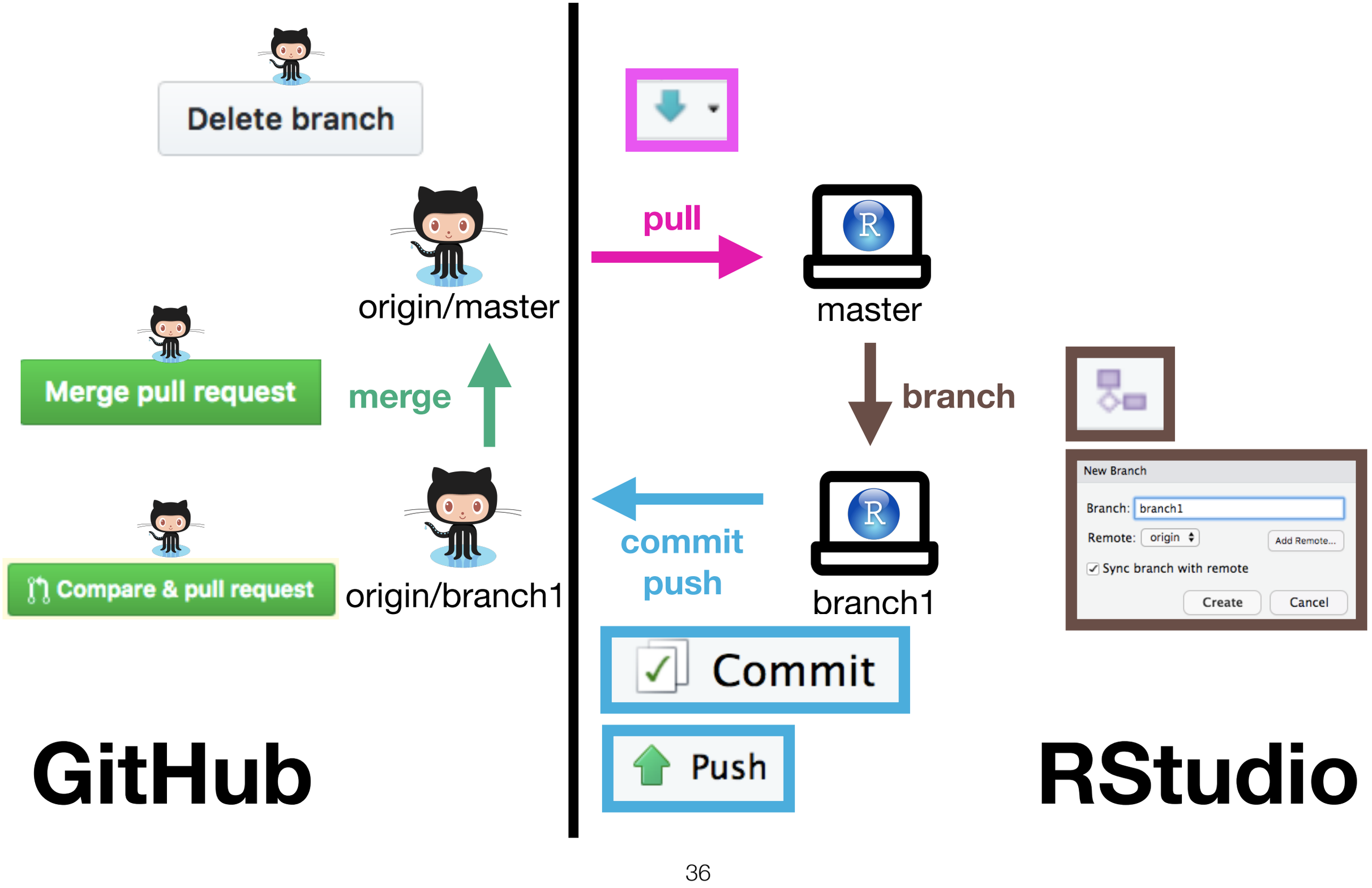
Your perspective



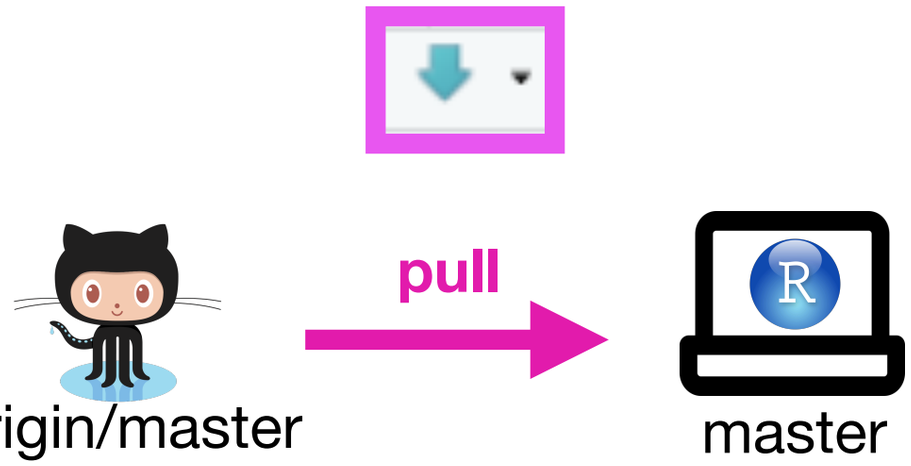
Your workflow



What's happening where

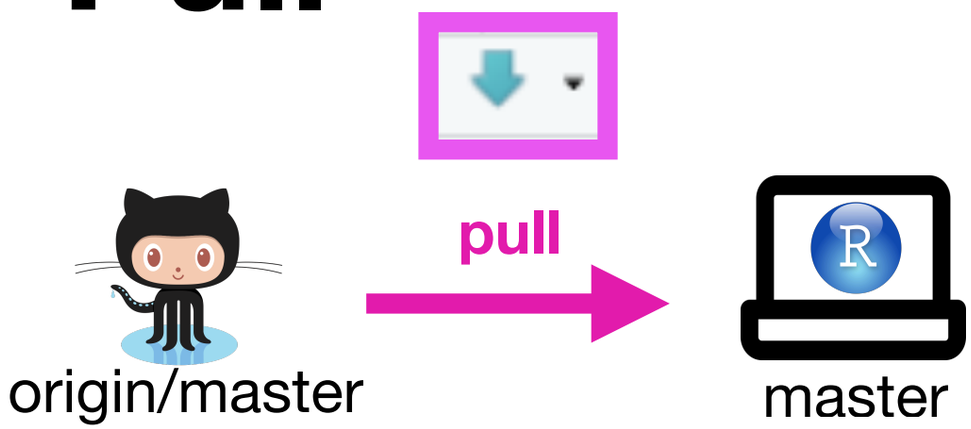


Step 1. Pull



- Every work session should begin with a pull to make sure that we're up-to-date with master (as in the previous workflow).

Step 1. Pull

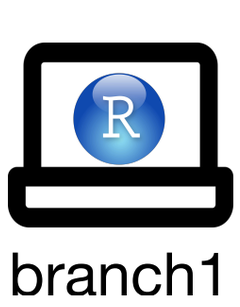


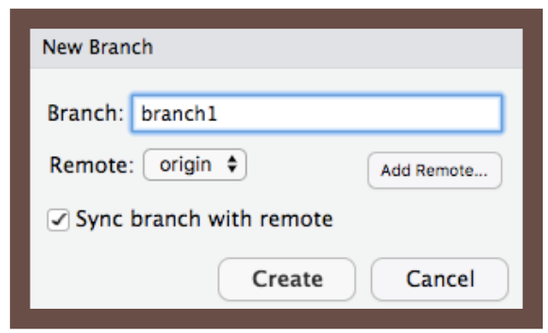
- If all goes well (no conflicts), our copy of master will be updated:

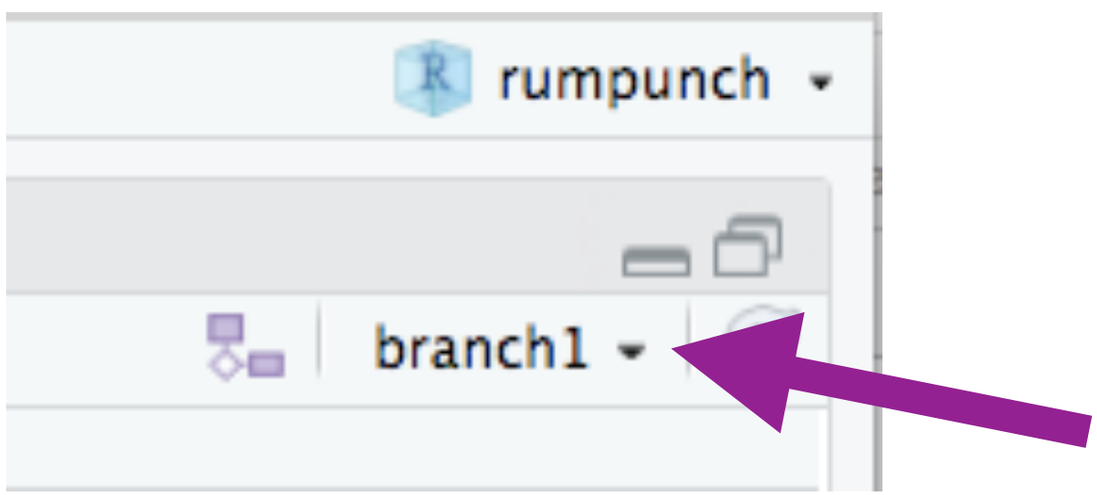
```
>>> git pull
From https://github.com/jtr13/rumpunch
   788e3b0..465857b  master     -> origin/master
Updating 788e3b0..465857b
Fast-forward
 Thanksgiving.R | 3 +++
 1 file changed, 3 insertions(+)
```

Step 2: Create a new branch

- We'll do our work on this branch.
- Check the top right corner to be sure you're in the right place:

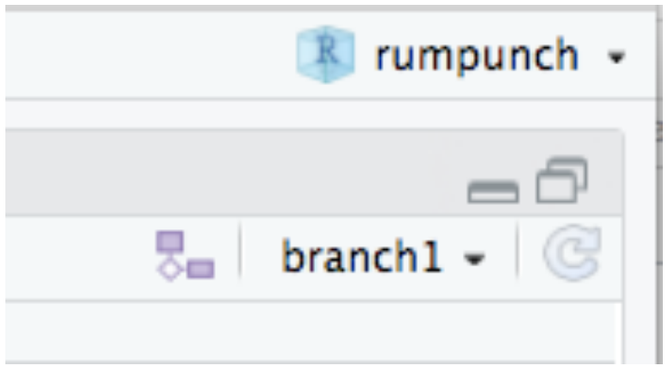






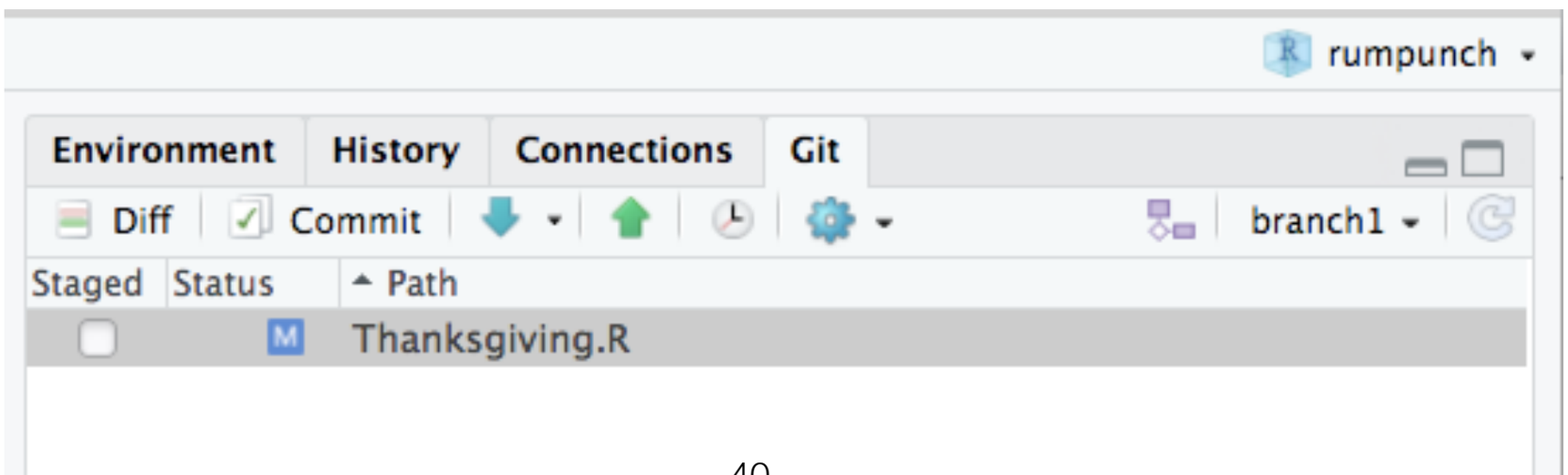
Step 3: Work

```
28
29  ## @param .op Can be a function or a quoted name of a function. If a
30  ##   quoted name, the default environment is the [base
31  ##   environment][rlang::base_env] unless you supply a
32  ##   [quosure][rlang::quo].
33  quo_reduce <- function(..., .op) {
34    stopifnot(is_symbol(.op) || is_function(.op))
35
36    dots <- quos(...)
37    if (length(dots) == 0) {
38      abort("At least one expression must be given")
39    } else if (length(dots) == 1) {
40      return(dots[[1]])
41    }
42
43    op_quo <- as_quosure(.op, base_env())
44    op <- quo_get_expr(op_quo)
45
46    expr <- reduce(dots, function(x, y) expr((!!op)((!!x), (!!y))))
47    new_quosure(expr, quo_get_env(op_quo))
48  }
```

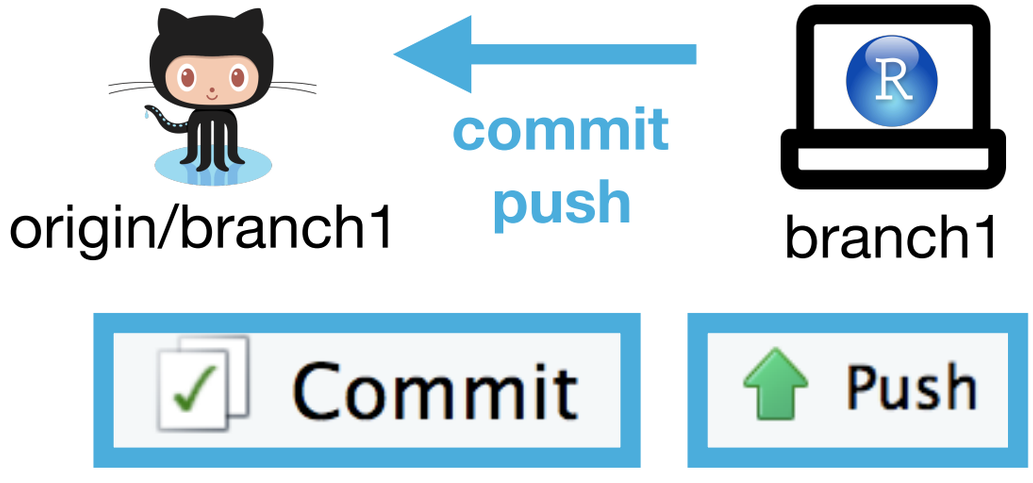


branch1

- Observe changing files in the Git pane:



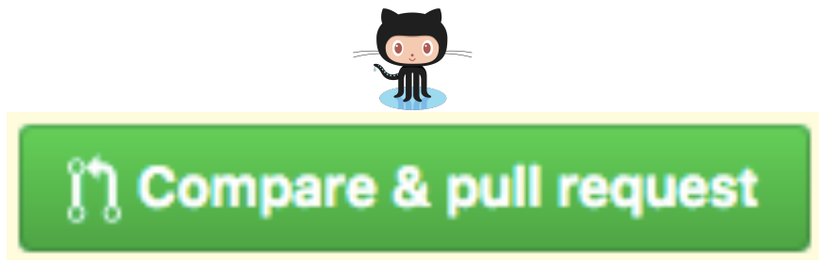
Step 4: Commit and push



- Commit and push files as before.
- If all goes well:

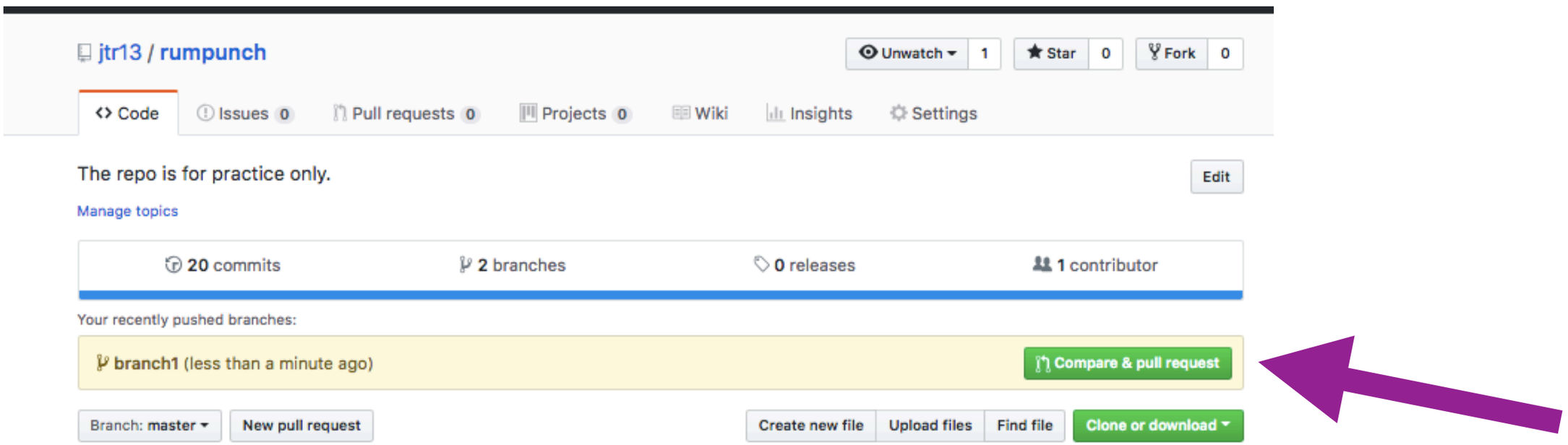
```
>>> git push origin refs/heads/branch1
To https://github.com/jtr13/rumpunch.git
   7424222..6cf5975  branch1 -> branch1
```

Step 5: Submit a pull request



origin/branch1

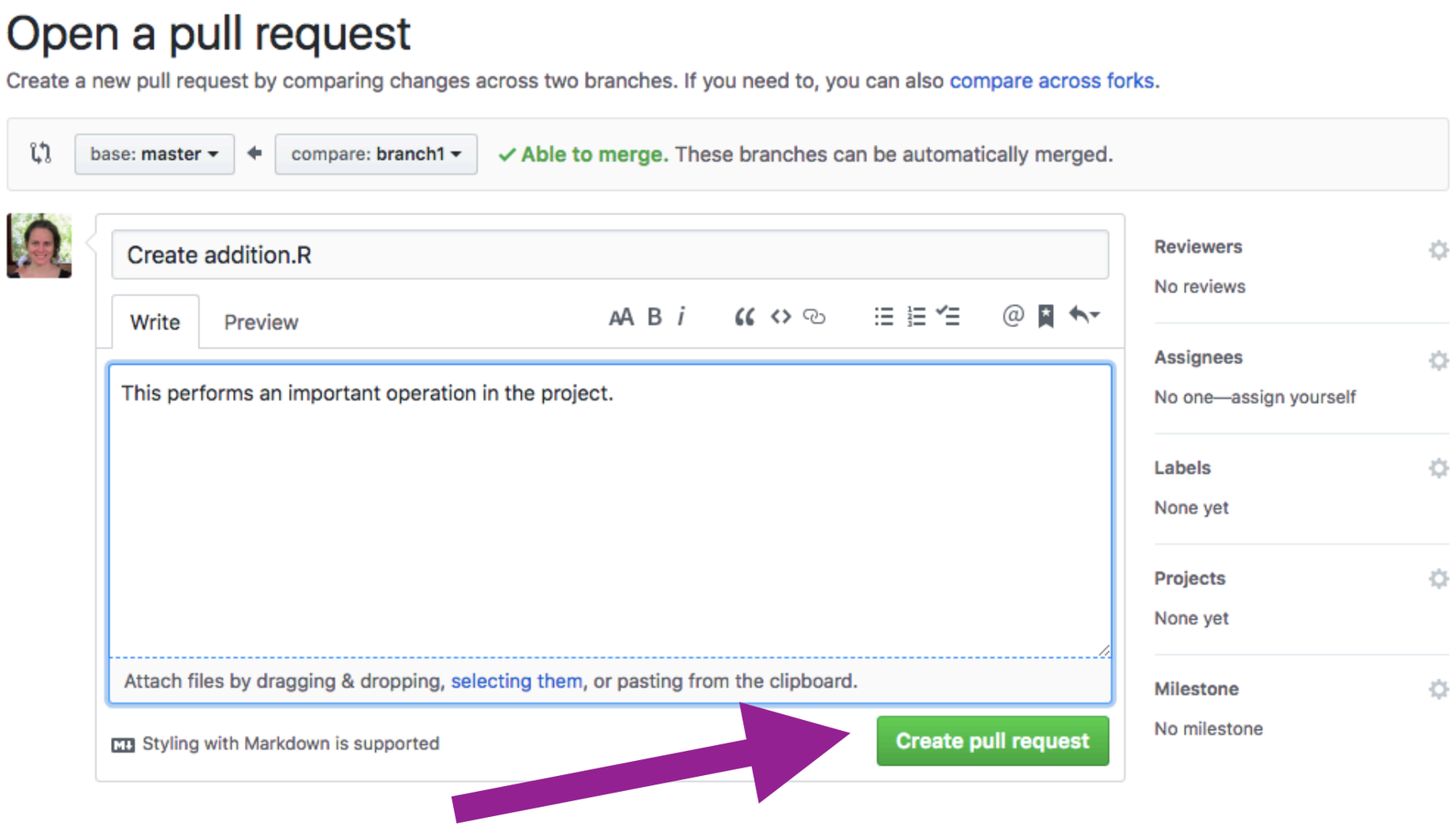
- GitHub detects a difference between the master branch and branch1:



Step 5: Submit a pull request

- Click: 

- Add a description



- Then click "Create pull request"

Step 6: Merging a pull request

- There are a lot of opinions on who should merge the pull request: the original author (you) or someone else
- What's most important is that you communicate with your collaborators and decide how you're going to manage the pull requests.
- Practice both merging your own pull requests and letting someone else do it.

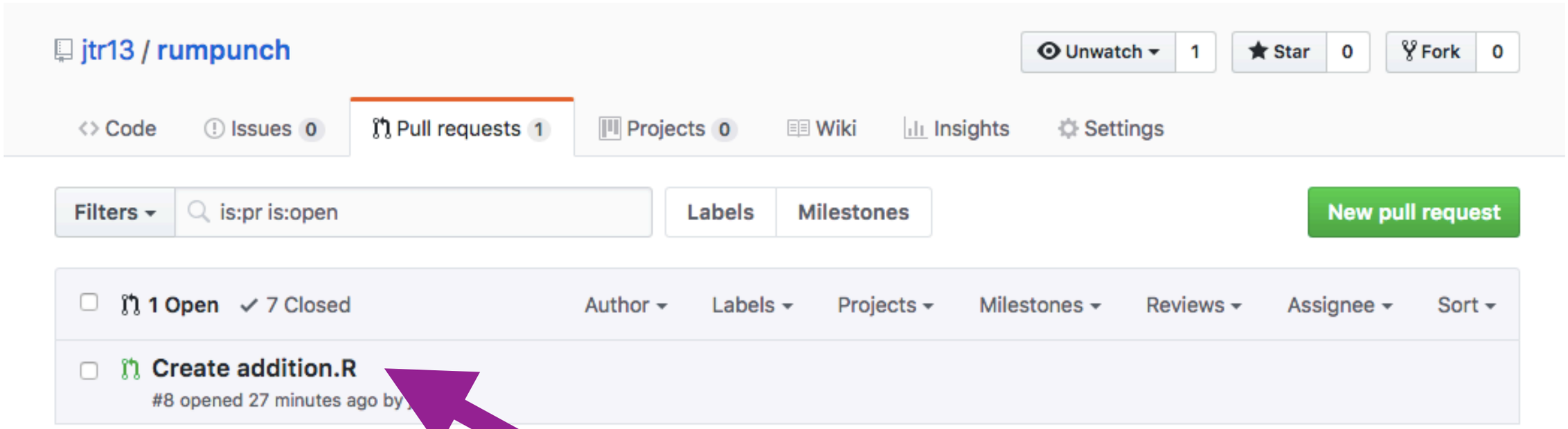
Step 6: Merging a pull request

- Pull requests can either be merged on GitHub, or locally.
- Here we only cover merging pull requests on GitHub.
- To learn how to do it locally, see:

"Explore and extend a pull request", *Happy Git with R* (ch. 25)

Step 6: Merging a pull request

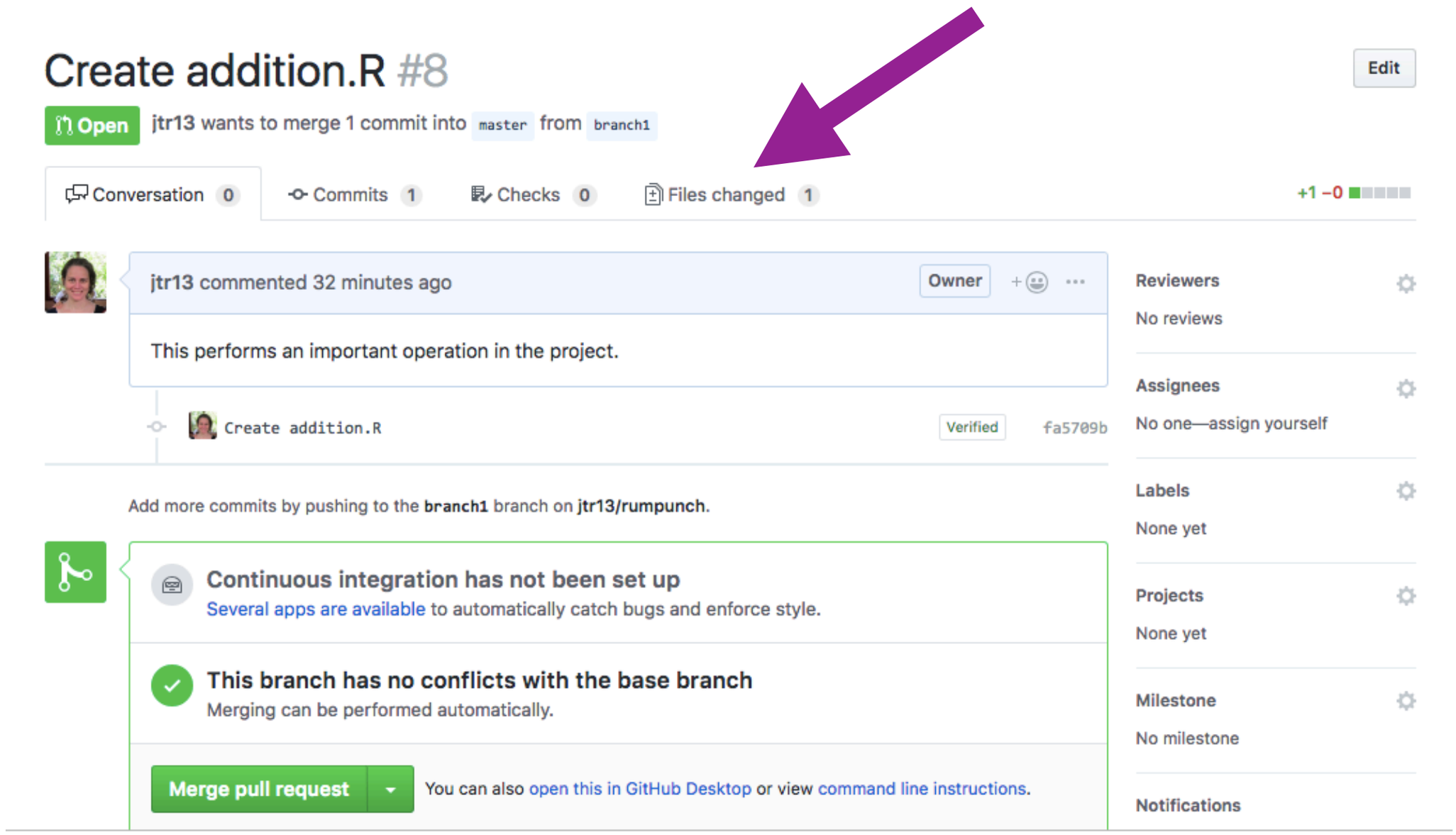
- If you're the one merging the pull request, click the "Pull Requests" tab and you'll see something like this:



- Click the title of the pull request

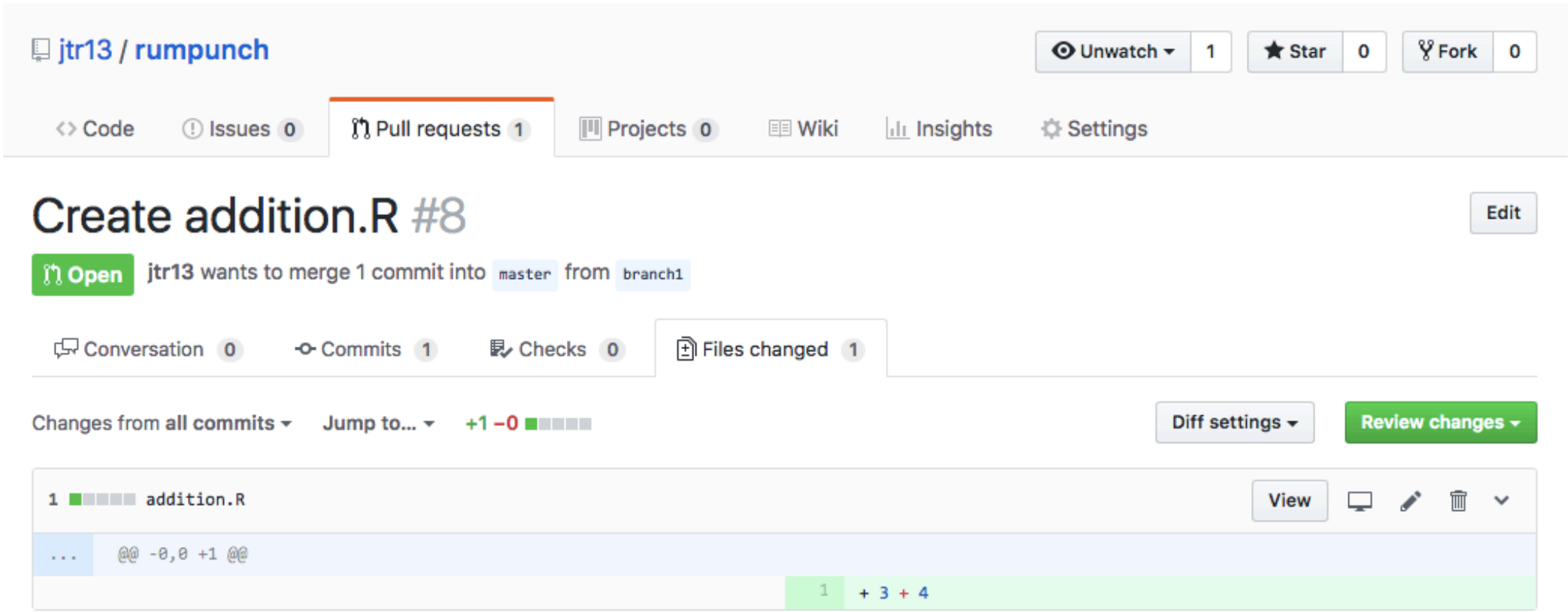
Step 6: Merging a pull request

- Click "Files changed"



Step 6: Merging a pull request

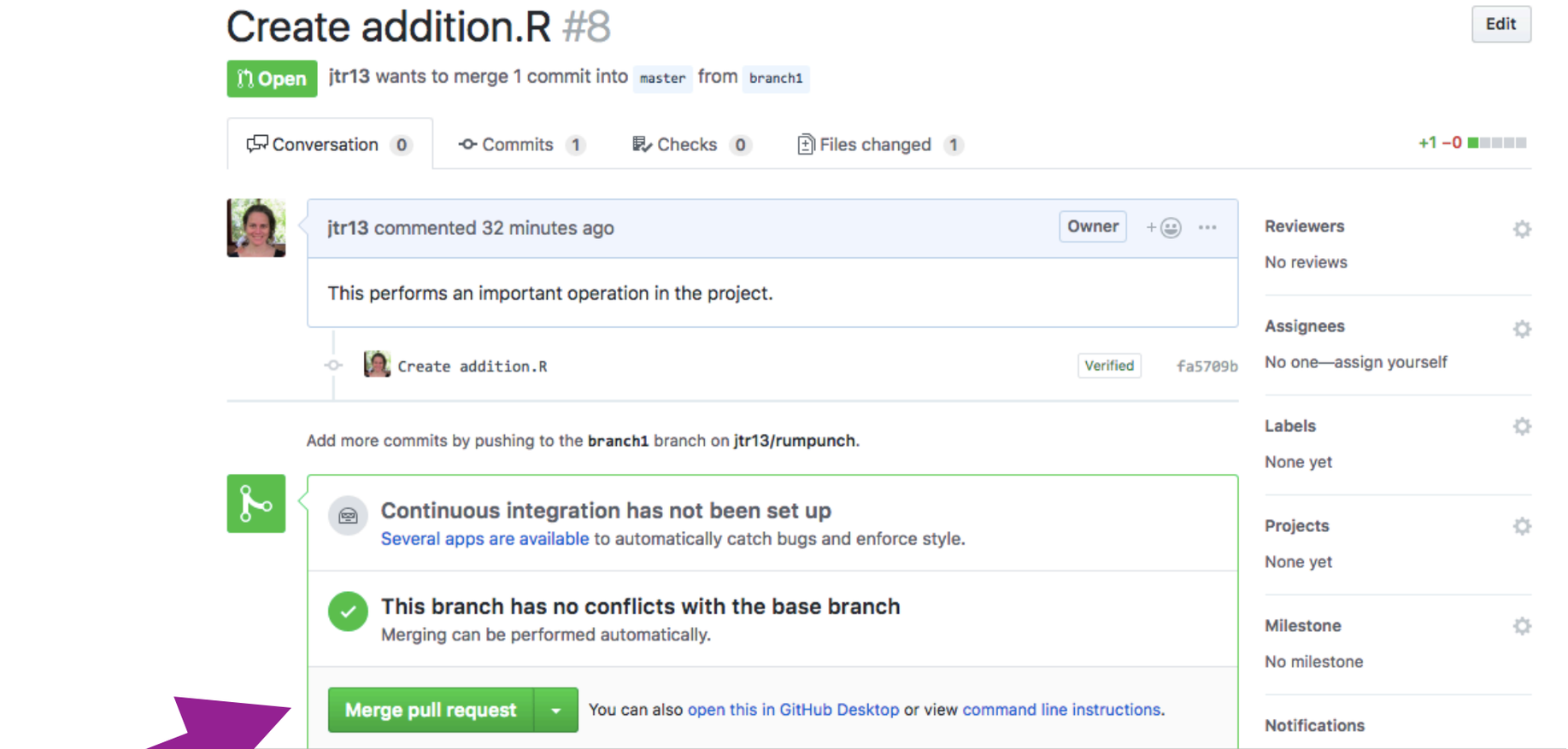
- Review the changes



- Leave comments to the author to make edits (if applicable)

Step 6: Merging a pull request

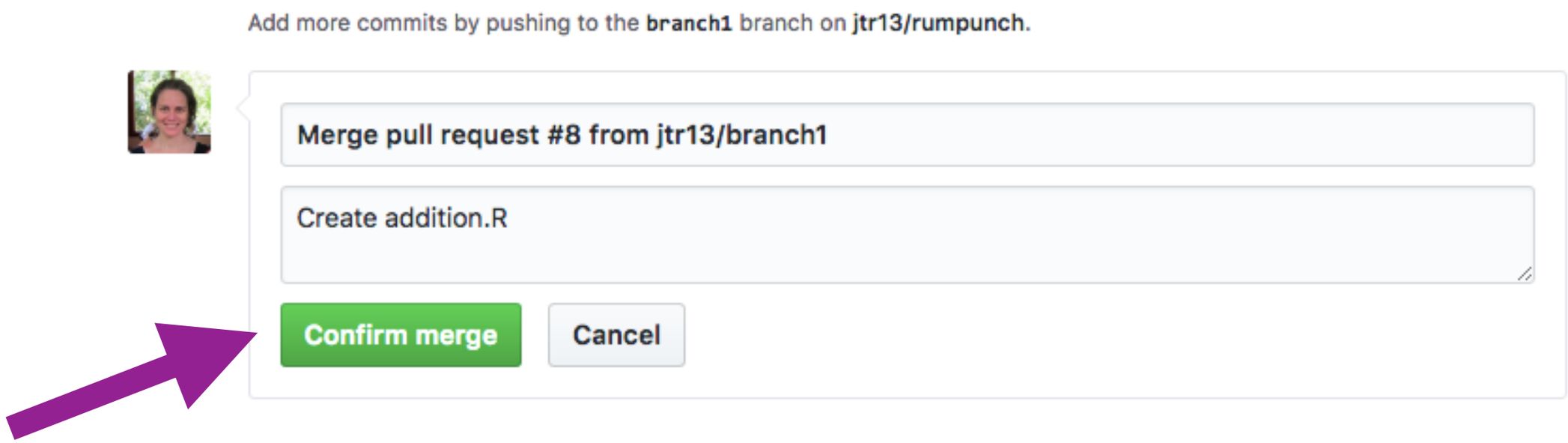
- Click back to return the pull request



- If you're satisfied with the code, click "Merge pull request"

Step 6: Merging a pull request

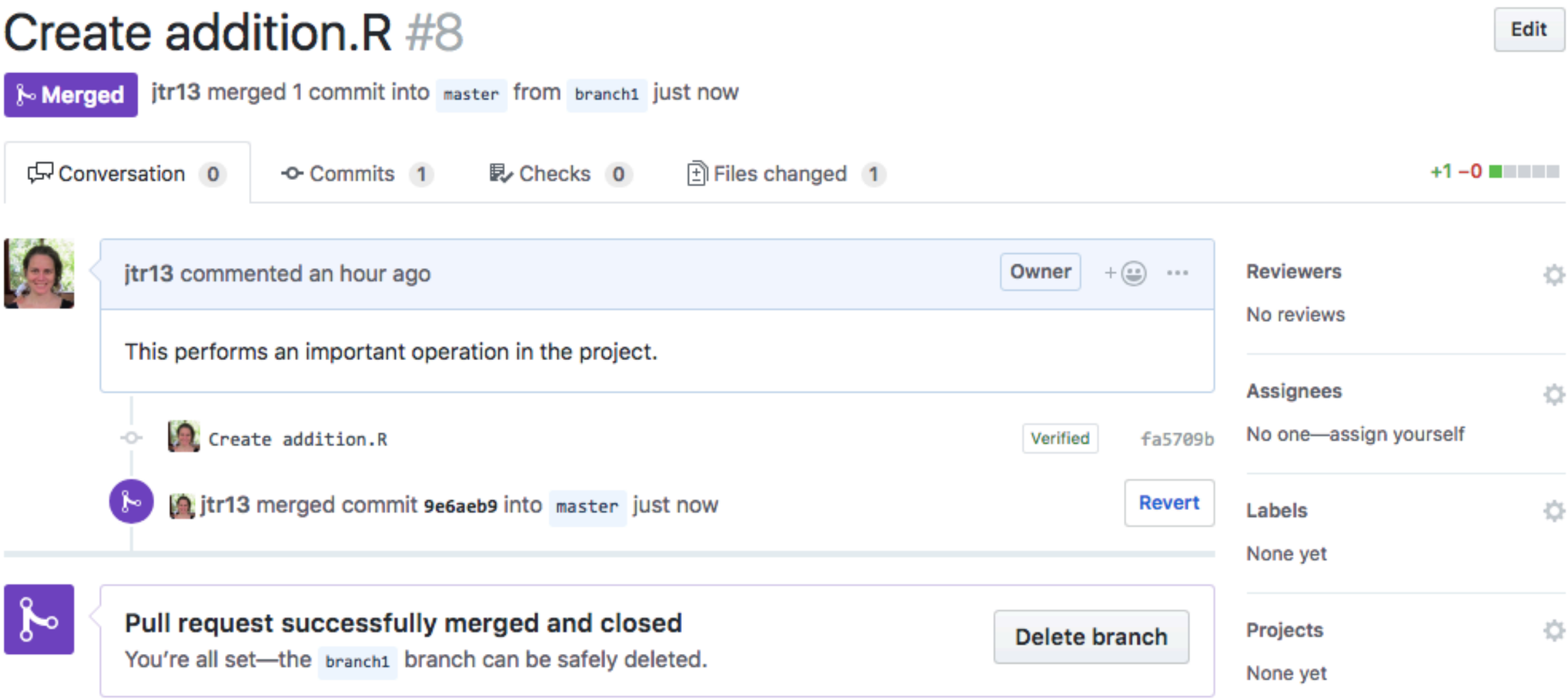
- Almost done...



- And if you really meant it, click "Confirm merge"

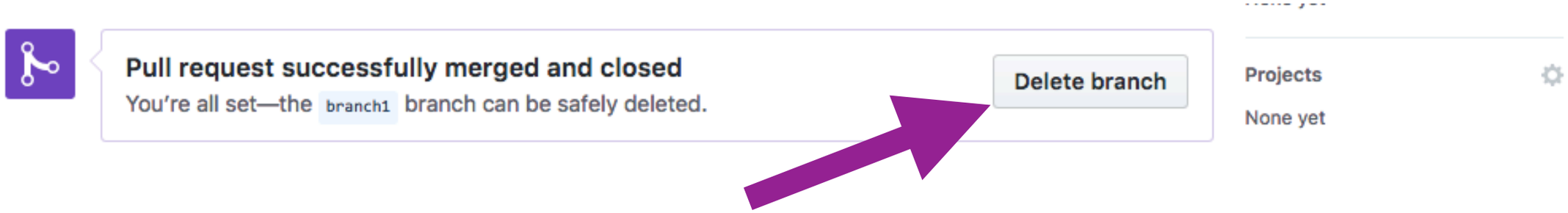
Step 6: Merging a pull request

- Success!



Step 6: Delete the branch

- It's a good idea to delete merged branches. When the merge is complete, you're given the option to delete the branch on GitHub:



Step 7: Delete the branch locally

```
> git branch -d <branchname>
```

Stop tracking remote branch

```
> git fetch -p
```

Workflow for project groups

1. Create an organization, or one person creates the repo and gives others write access
2. **Discuss** a workflow, for example, take turns being the one who merges pull requests
3. Create a test repo to practice and try to create merge conflicts

More resources

https://edav.info/github.html

Terminology

Think in terms of *repositories* and *branches*

Types of Repositories (from your perspective)

local repository -- resides on *your* computer

remote repository -- resides somewhere else

> **origin** -- the repo that you created or forked on GitHub
>
> **upstream** -- the original repo of the project that you forked (if you didn't create it)

Note: these are simplified definitions that focus on the way these terms are most commonly used