

# Introduction to Git and Github

By Tobias Elsässer

24.10.2022

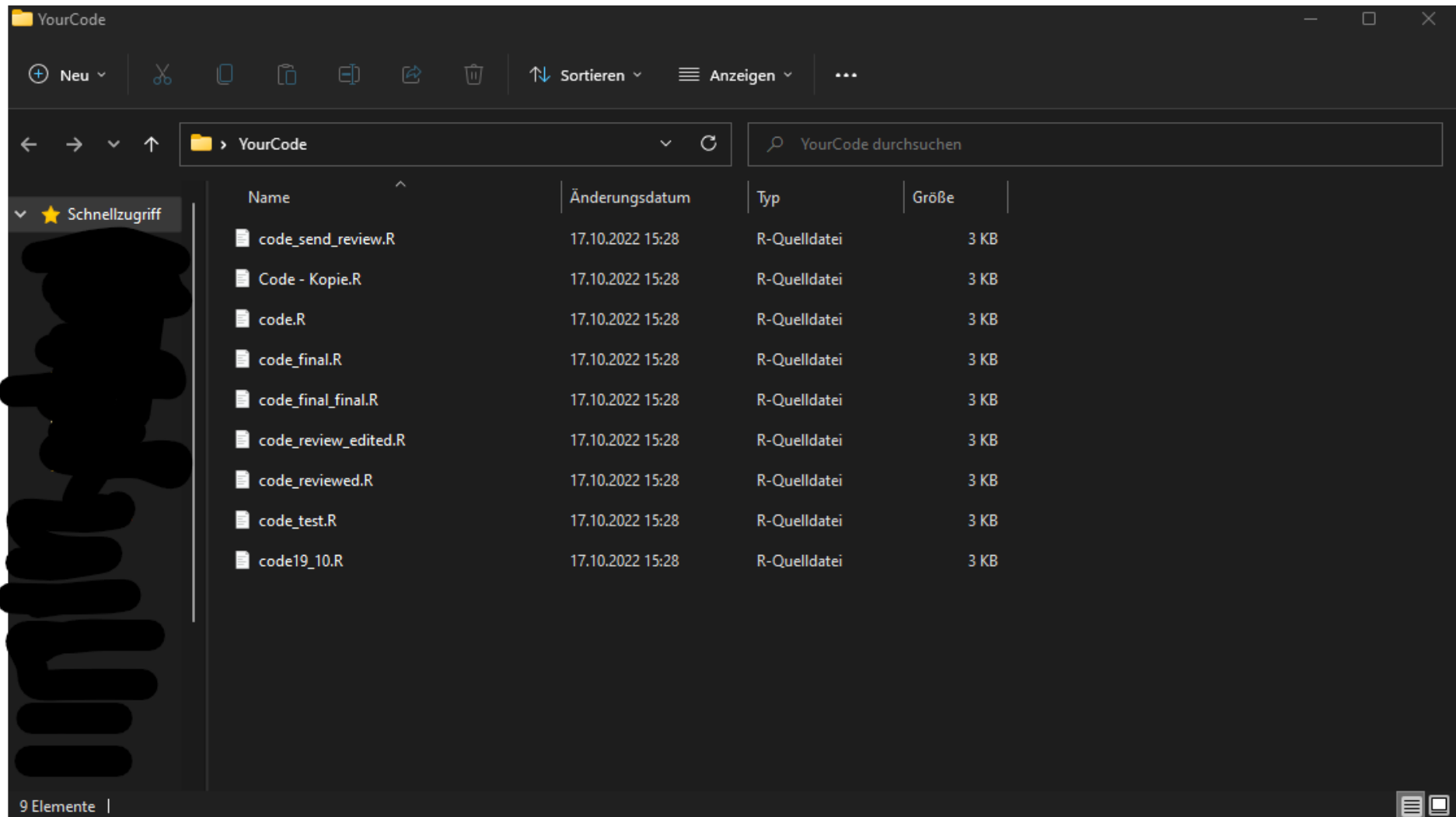
# What is GIT?

- Version control software
  - track changes made in files
- Free and open source

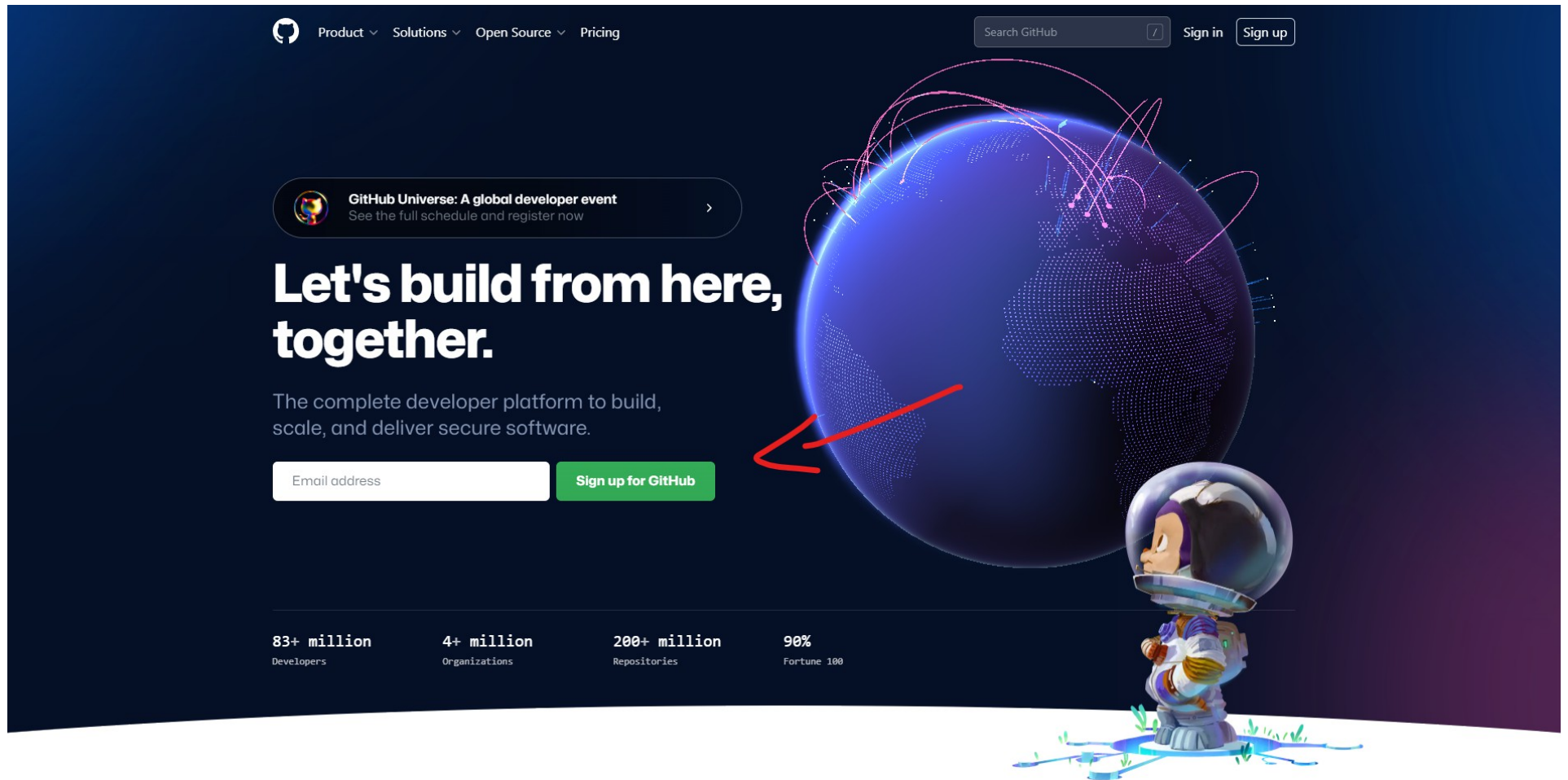
# What is Github?

- Website where you can store your code
- 
- Can be used to share your code or work on the same code with others

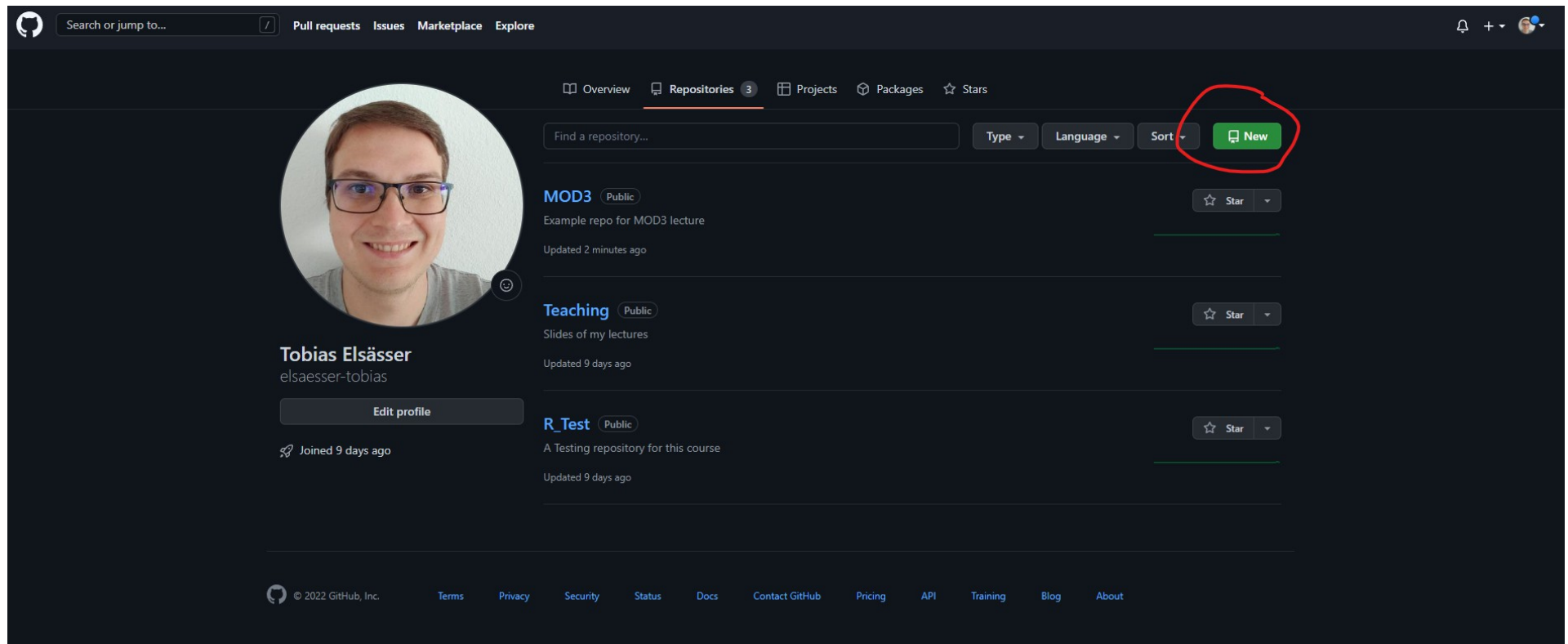
# Why version control?



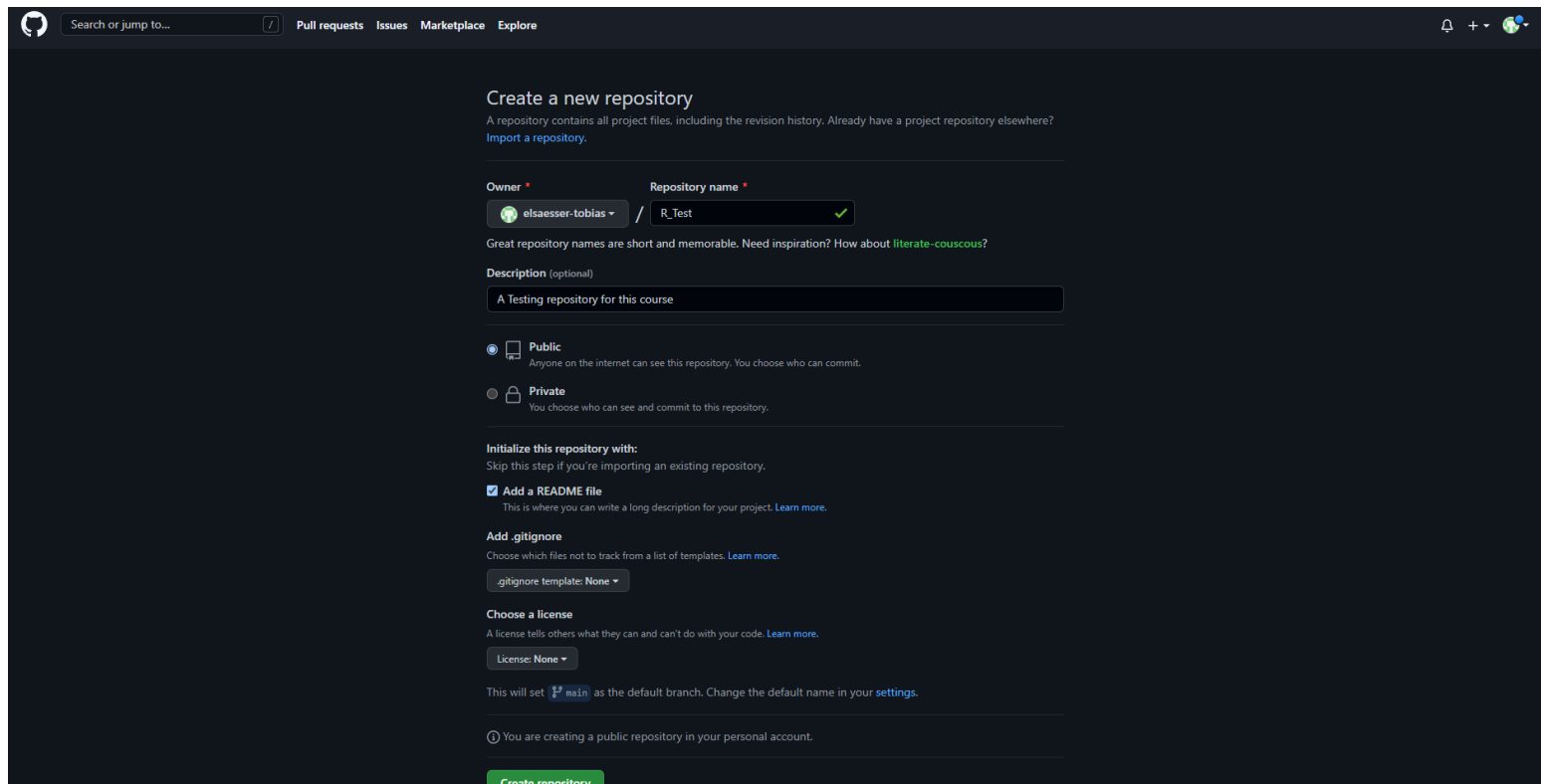
# Github



# Github – Create a Repository



# Github – Create a Repository



The screenshot shows the GitHub 'Create a new repository' page. At the top, there's a navigation bar with the GitHub logo, a search bar, and links for 'Pull requests', 'Issues', 'Marketplace', and 'Explore'. The main heading is 'Create a new repository', followed by a subtext: 'A repository contains all project files, including the revision history. Already have a project repository elsewhere? [Import a repository.](#)'

The form fields include:

- Owner:** A dropdown menu showing 'elsaesser-tobias'.
- Repository name:** A text input field containing 'R\_Test' with a green checkmark icon to its right.
- Description (optional):** A text input field containing 'A Testing repository for this course'.
- Visibility:** Two radio buttons. The first is 'Public' (selected) with the subtext 'Anyone on the internet can see this repository. You choose who can commit.' The second is 'Private' with the subtext 'You choose who can see and commit to this repository.'
- Initialize this repository with:** A section with the subtext 'Skip this step if you're importing an existing repository.' It includes a checked checkbox for 'Add a README file' with the subtext 'This is where you can write a long description for your project. [Learn more.](#)'
- Add .gitignore:** A section with the subtext 'Choose which files not to track from a list of templates. [Learn more.](#)' It includes a dropdown menu for '.gitignore template' set to 'None'.
- Choose a license:** A section with the subtext 'A license tells others what they can and can't do with your code. [Learn more.](#)' It includes a dropdown menu for 'License' set to 'None'.

Below the form, there's a note: 'This will set `main` as the default branch. Change the default name in your [settings](#).'

At the bottom, there's a note: 'You are creating a public repository in your personal account.'

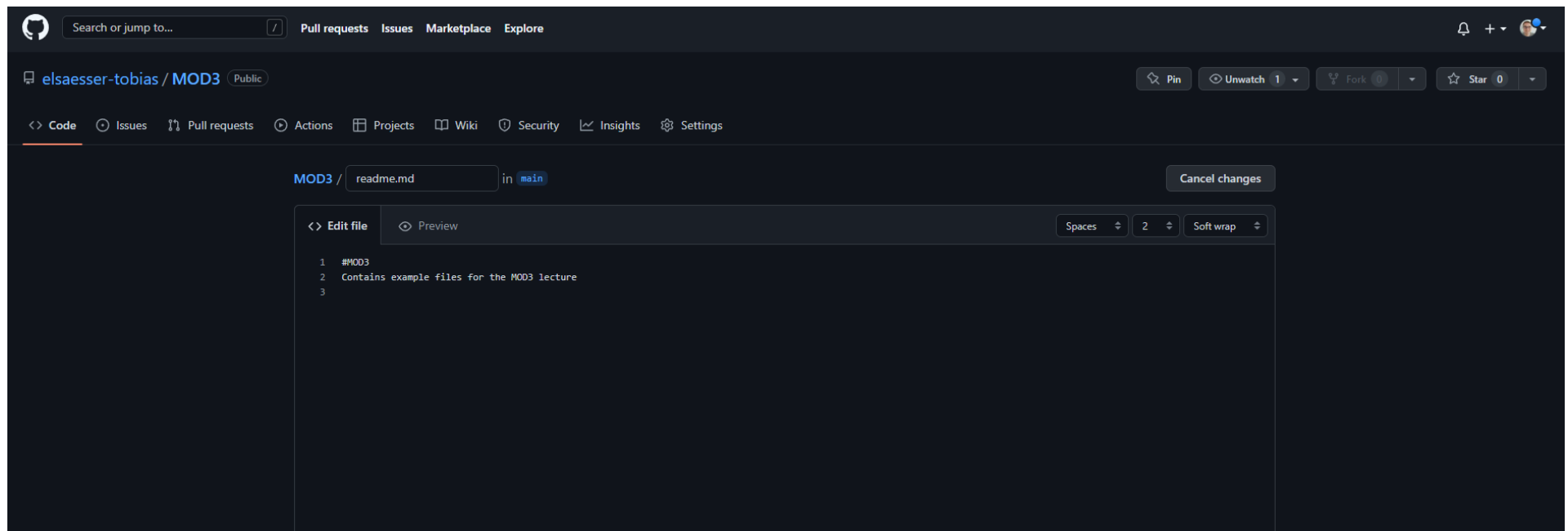
The page concludes with a green 'Create repository' button.

# Github – readme.md

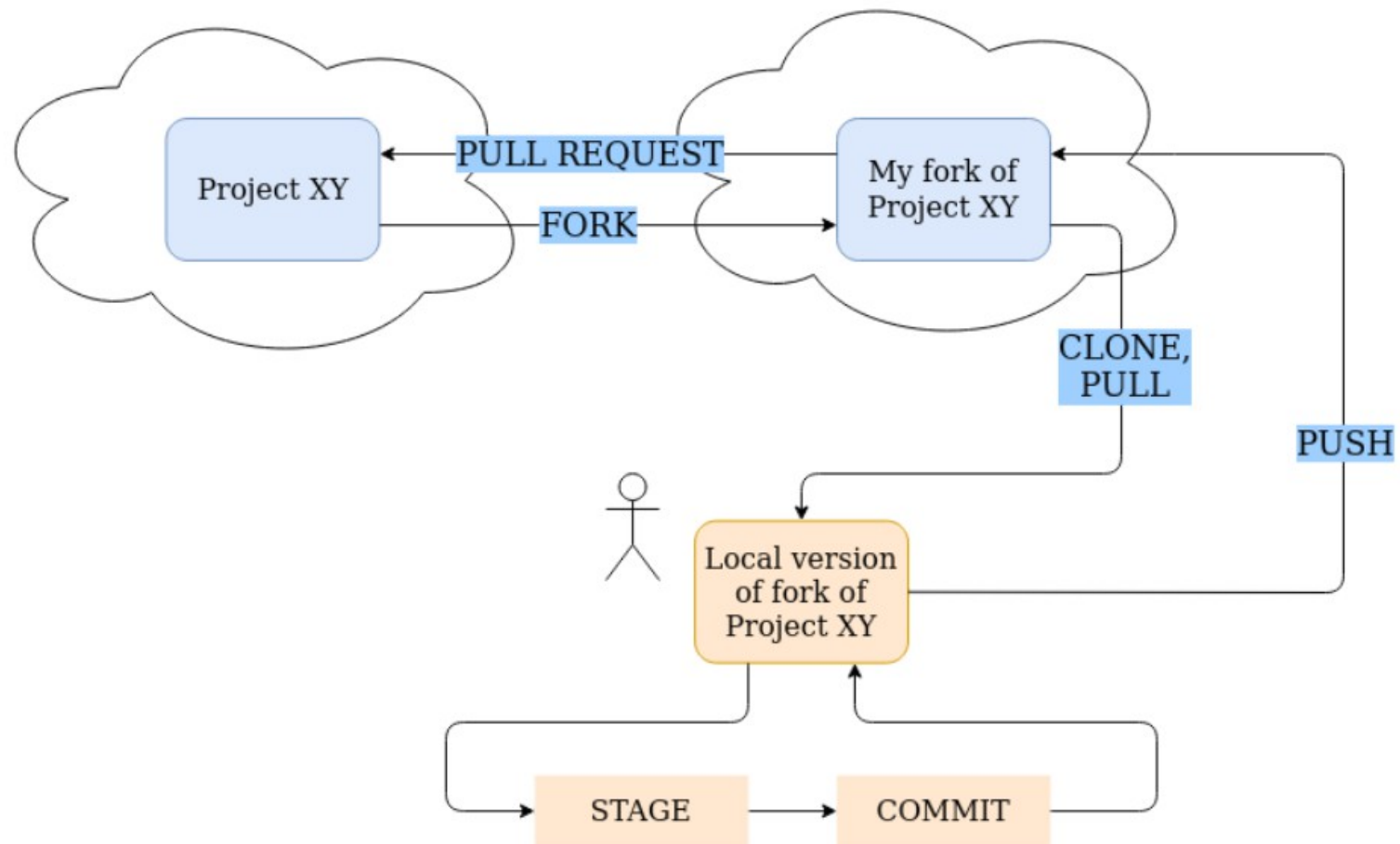
The screenshot displays the GitHub interface for a repository named 'MOD3' by the user 'elsaesser-tobias'. The repository is public and has 0 stars, 0 forks, and 1 watcher. The 'readme.md' file is highlighted, showing its content: '#MOD3 Contains example files for the MOD3 lecture'. A red arrow points to the edit icon (pencil) next to the file name 'readme.md' in the file list. The right sidebar shows the 'About' section with the description 'Example repo for MOD3 lecture' and the 'Releases' and 'Packages' sections, both indicating no published items.



# Github – readme.md



# Git/Github Workflow

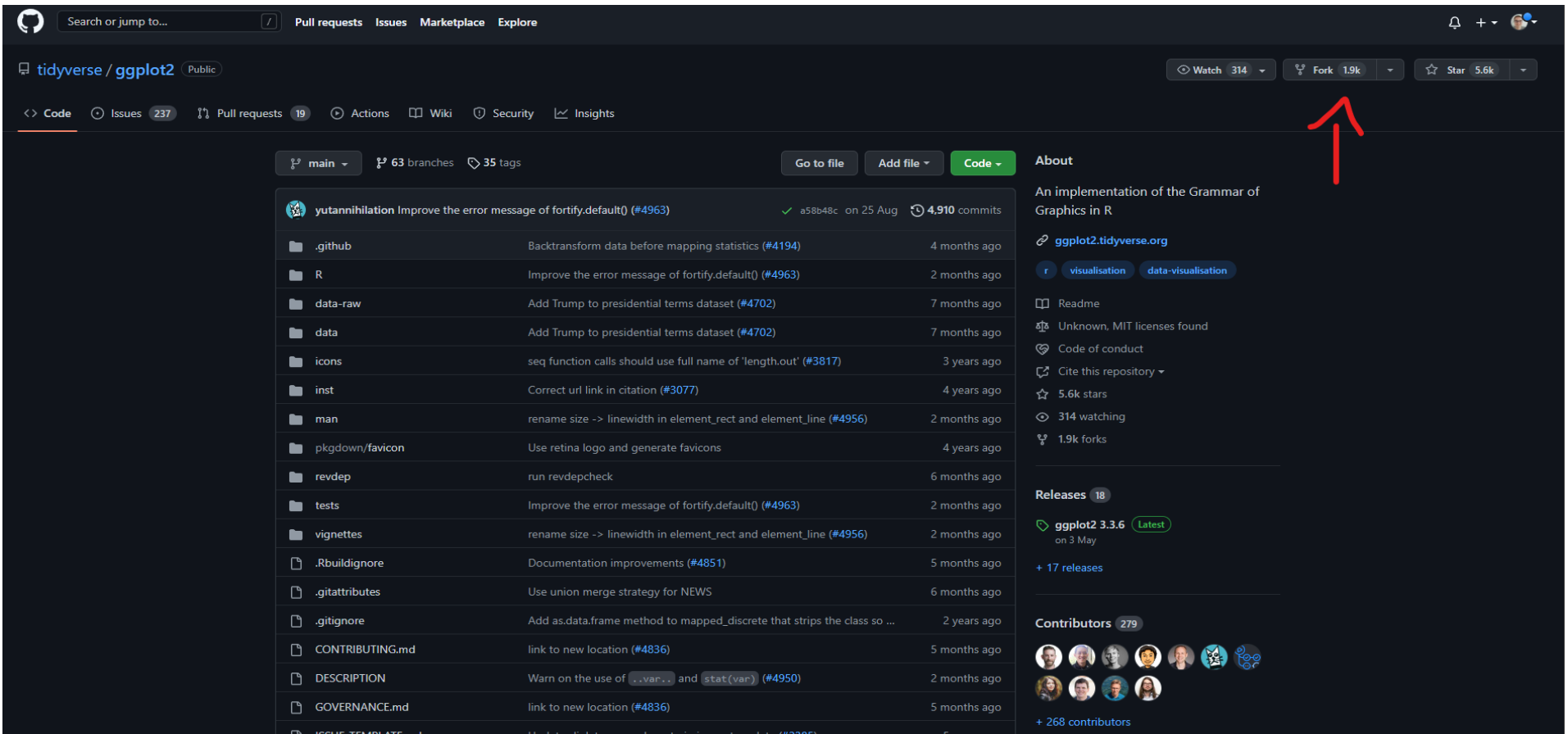


# Git/Github commands

- Fork: copy someone else's repository and be able make changes on the copy

# Git/Github commands

- Fork: copy someone else's repository and be able make changes on the copy



The screenshot shows the GitHub repository page for `tidyverse/ggplot2`. The repository is public and has 314 watches, 1.9k forks, and 5.6k stars. The page includes tabs for Code, Issues (237), Pull requests (19), Actions, Wiki, Security, and Insights. The main content area displays a list of recent commits, with the most recent one by `yutannihilation` titled "Improve the error message of `fortify.default()`" (#4963). The right sidebar contains information about the repository, including the description "An implementation of the Grammar of Graphics in R", the website `ggplot2.tidyverse.org`, and a list of releases, with the latest being `ggplot2 3.3.6` on 3 May.

A red arrow points to the **Fork** button in the top right corner of the repository page, which is used to create a copy of the repository in your own GitHub account.

# Git/Github commands

- Fork: copy someone else's repository and be able make changes on the copy

The screenshot shows the GitHub interface for a repository named 'elsaesser-tobias/ggplot2', which is a fork of 'tidyverse/ggplot2'. The repository is public and has 0 stars and 0 forks. The main branch is 'main', and it is up to date with the upstream repository. The repository contains 4,910 commits. The file list on the left includes .github, R, data-raw, data, icons, inst, man, pkgdown/favicon, revdep, tests, vignettes, .Rbuildignore, .gitattributes, .gitignore, and CONTRIBUTING.md. The right sidebar shows the repository's description, links to the README, license, and code of conduct, and a list of releases and packages.

Search or jump to... [Pull requests](#) [Issues](#) [Marketplace](#) [Explore](#)

[elsaesser-tobias](#) / [ggplot2](#) Public

forked from tidyverse/ggplot2

[Code](#) [Pull requests](#) [Actions](#) [Projects](#) [Wiki](#) [Security](#) [Insights](#) [Settings](#)

[main](#) [1 branch](#) [0 tags](#) [Go to file](#) [Add file](#) [Code](#)

This branch is up to date with tidyverse/ggplot2:main. [Contribute](#) [Sync fork](#)

[yutannihilation](#) Improve the error message of fortify.default() (tidyverse#4963) a58b48c on 25 Aug 4,910 commits

.github	Backtransform data before mapping statistics (tidyverse#4194)	4 months ago
R	Improve the error message of fortify.default() (tidyverse#4963)	2 months ago
data-raw	Add Trump to presidential terms dataset (tidyverse#4702)	7 months ago
data	Add Trump to presidential terms dataset (tidyverse#4702)	7 months ago
icons	seq function calls should use full name of 'length.out' (tidyverse#3817)	3 years ago
inst	Correct url link in citation (tidyverse#3077)	4 years ago
man	rename size -> linewidth in element_rect and element_line (tidyverse#...	2 months ago
pkgdown/favicon	Use retina logo and generate favicons	4 years ago
revdep	run revdepcheck	6 months ago
tests	Improve the error message of fortify.default() (tidyverse#4963)	2 months ago
vignettes	rename size -> linewidth in element_rect and element_line (tidyverse#...	2 months ago
.Rbuildignore	Documentation improvements (tidyverse#4851)	5 months ago
.gitattributes	Use union merge strategy for NEWS	6 months ago
.gitignore	Add as.data.frame method to mapped_discrete that strips the class so ...	2 years ago
CONTRIBUTING.md	link to new location (tidyverse#4836)	5 months ago

**About**

An implementation of the Grammar of Graphics in R

[ggplot2.tidyverse.org](#)

[Readme](#)  
[View license](#)  
[Code of conduct](#)  
[Cite this repository](#)

0 stars  
0 watching  
1.9k forks

**Releases**

No releases published  
[Create a new release](#)

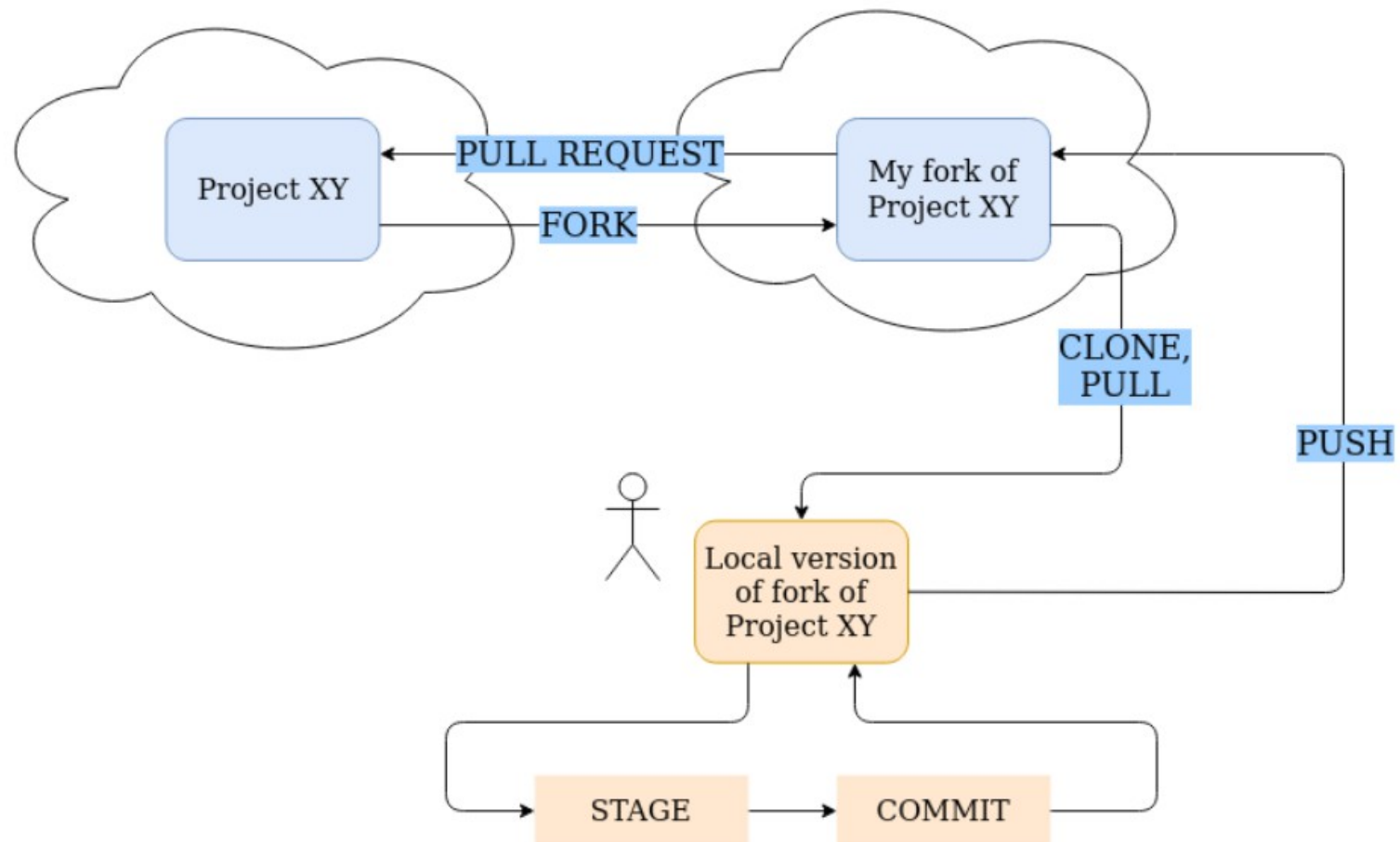
**Packages**

No packages published  
[Publish your first package](#)

**Languages**

R 100.0%

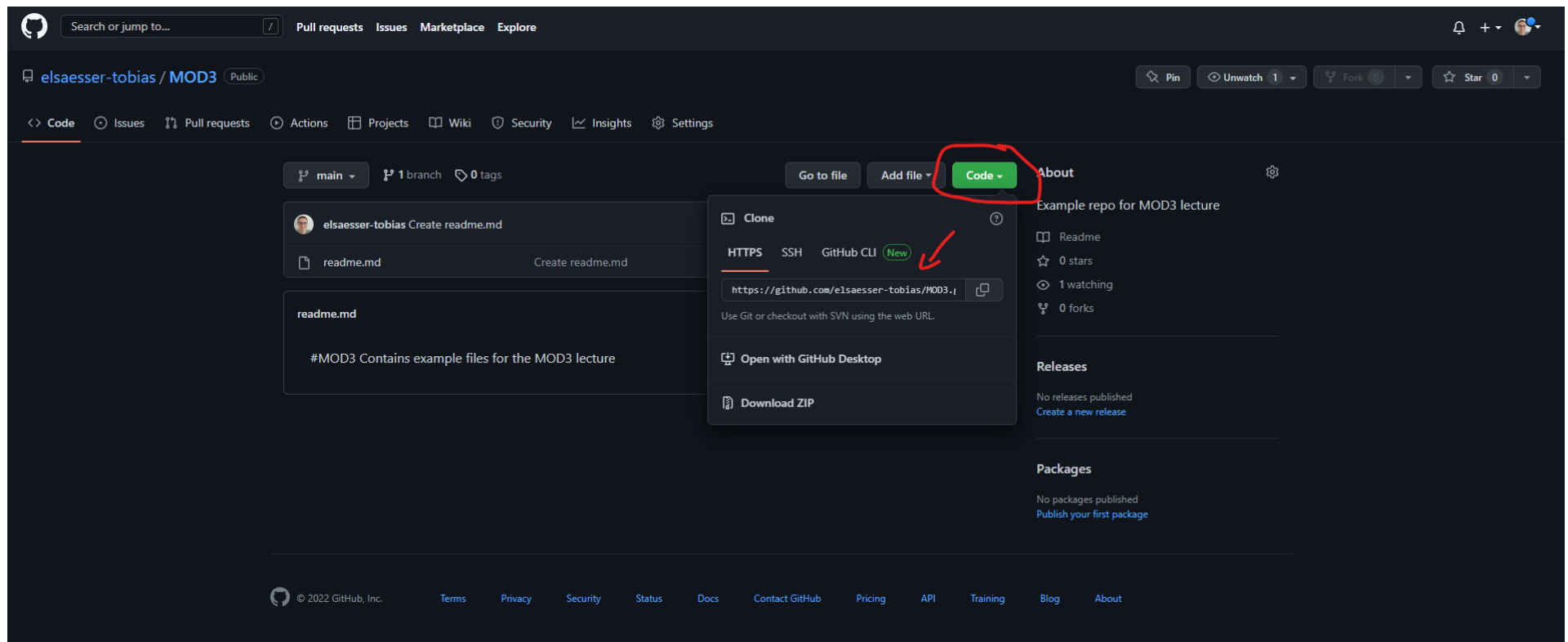
# Git/Github Workflow



# Git/Github commands

- Fork: copy someone else's repository and be able make changes on the copy
- Clone: bring a repository from Github to your local computer

# Git clone

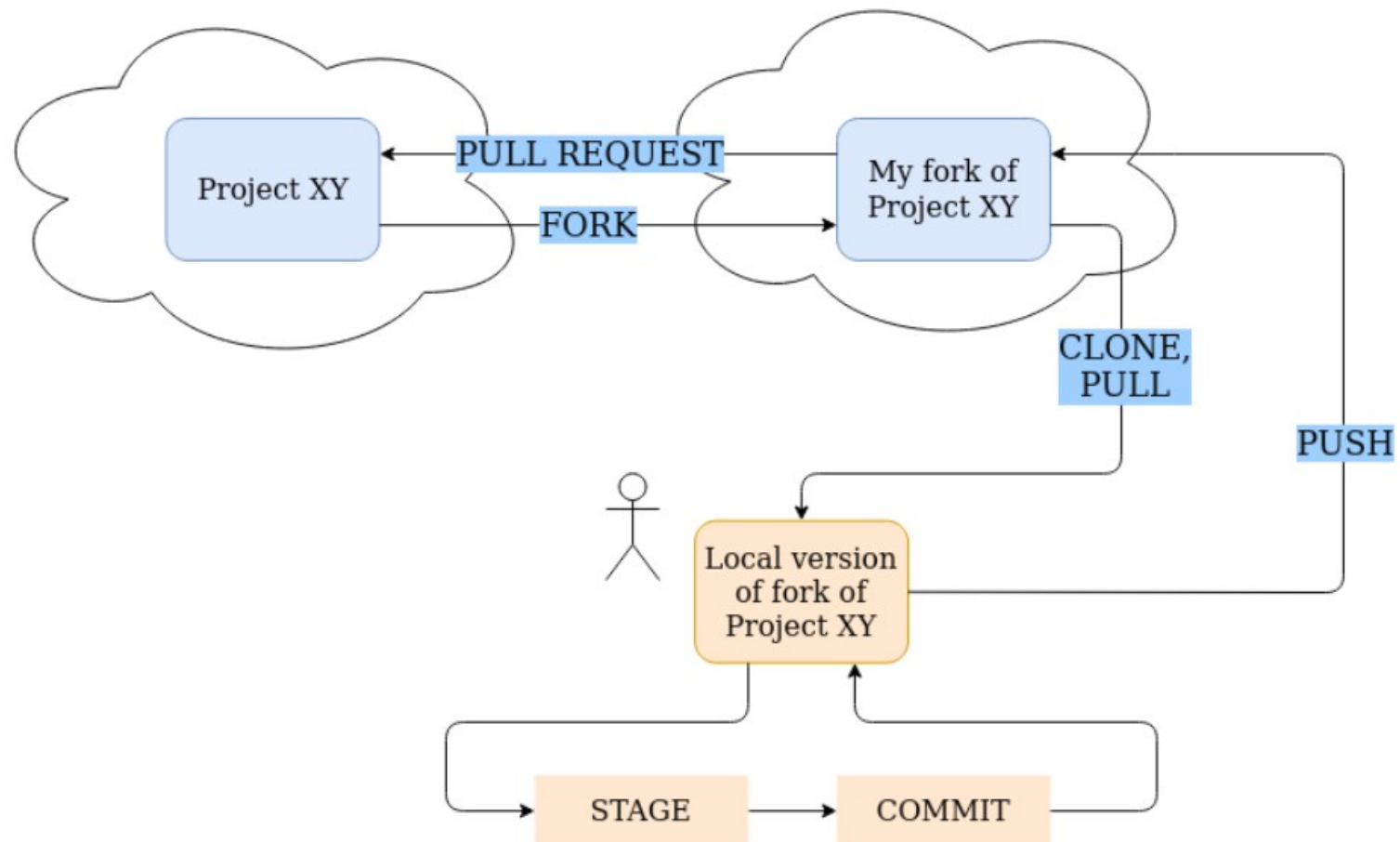




# Git clone

```
elsae@Elsaesser-PC MINGW64 ~  
$ cd C:/Users/elsae/Documents/GIT_Repo  
  
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo  
$ ls  
  
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo  
$ git clone https://github.com/elsaesser-tobias/MOD3.git  
Cloning into 'MOD3'...  
remote: Enumerating objects: 14, done.  
remote: Counting objects: 100% (14/14), done.  
remote: Compressing objects: 100% (7/7), done.  
remote: Total 14 (delta 0), reused 0 (delta 0), pack-reused 0  
Receiving objects: 100% (14/14), done.  
  
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo  
$ ls  
MOD3/  
  
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo  
$ cd MOD3/  
  
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)  
$ ls  
readme.md  
  
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)  
$ ..
```

# Git/Github Workflow



# Git/Github commands

- Fork: copy someone else's repository and be able make changes on the copy
- Clone: bring a repository from Github to your local computer
- Add: used to stage your files
  - track your files and changes made
- Commit: commits the changes you have made

# Git add

```
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)
$ git status
On branch main
Your branch is up to date with 'origin/main'.

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   readme.md

no changes added to commit (use "git add" and/or "git commit -a")

elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)
$ git add readme.md

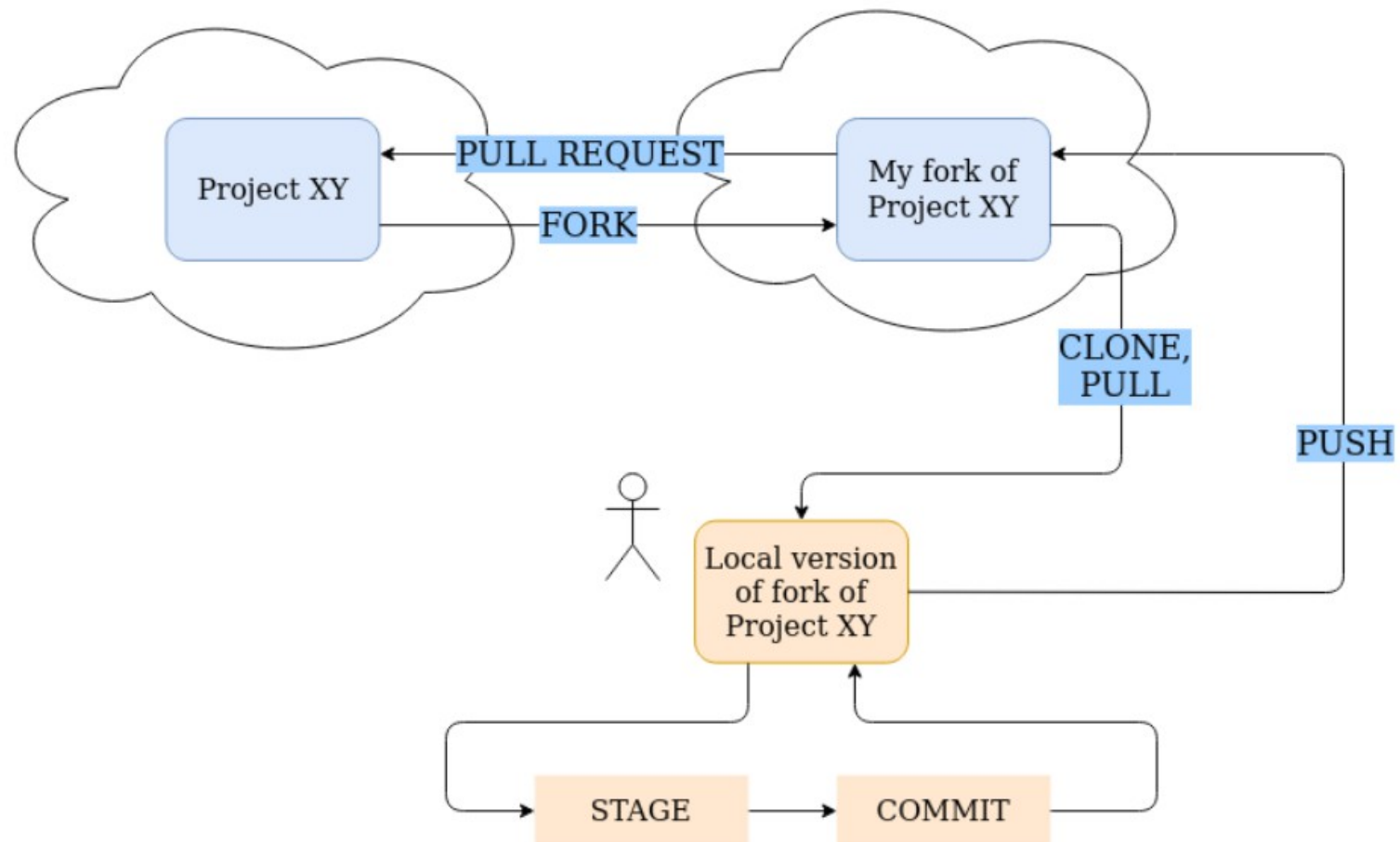
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)
$ git status
On branch main
Your branch is up to date with 'origin/main'.

Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        modified:   readme.md
```

# Git commit

```
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)
$ git commit -m "Your meaningful message"
[main c088555] Your meaningful message
1 file changed, 1 insertion(+)
```

# Git/Github Workflow



# Git/Github commands

- Fork: copy someone else's repository and be able make changes on the copy
- Clone: bring a repository from Github to your local computer
- Add: used to stage your files
  - track your files and changes made
- Commit: commits the changes you have made
- Push: upload your changes to Github
- Pull: download changes from Github to your computer

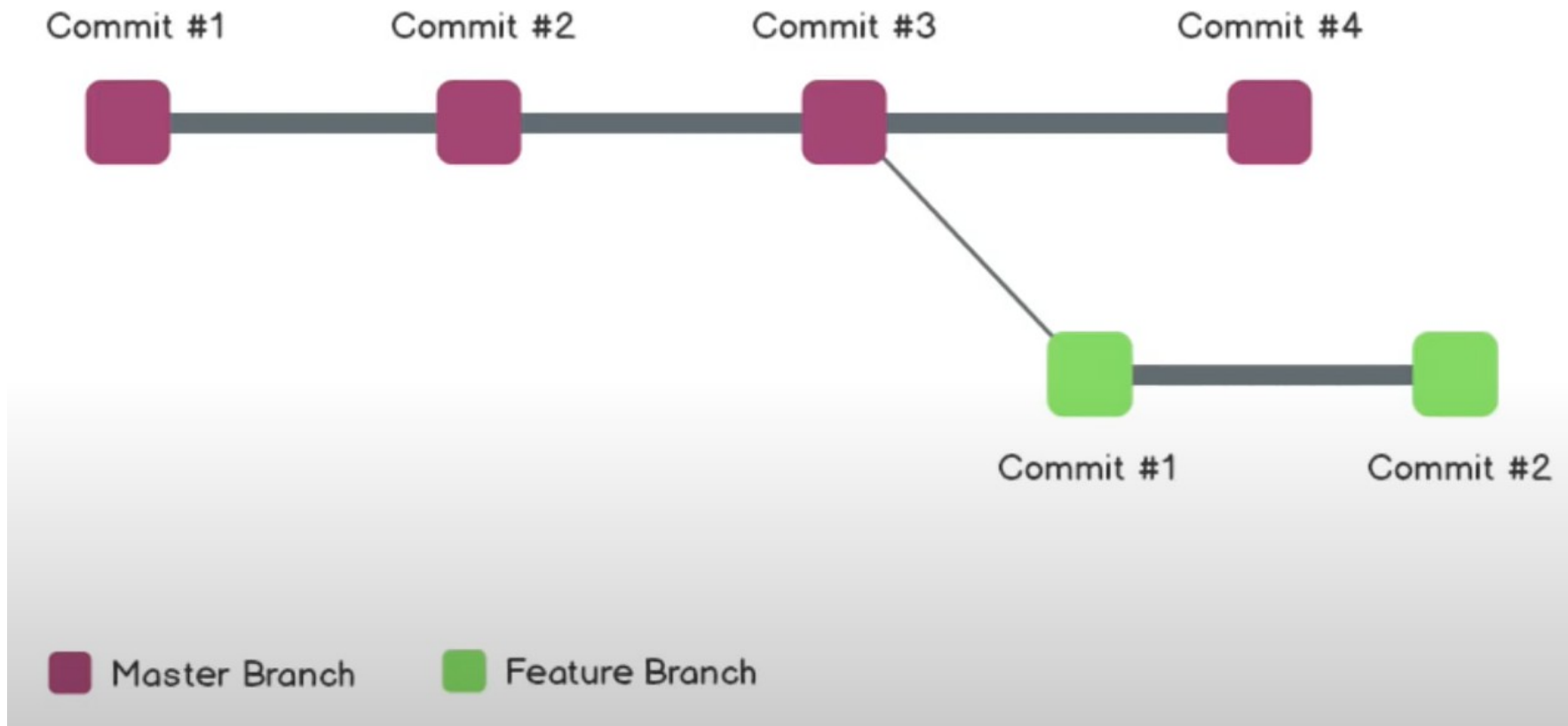
# Git Branching



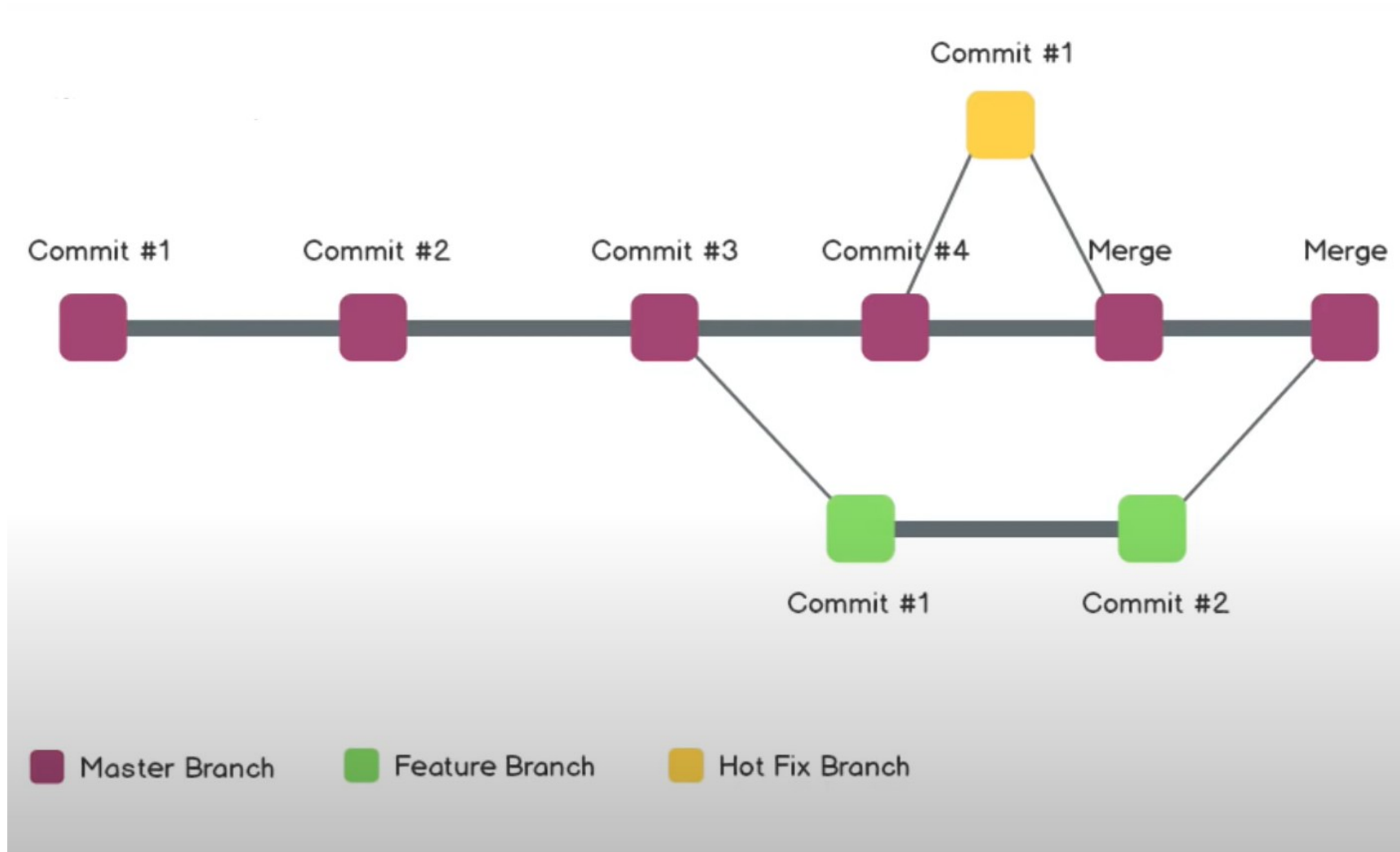


# Git Branching

## Git Branching



# Git Branching



# Git Branching

```
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)
$ git branch
* main

elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)
$ git checkout -b new-feature
Switched to a new branch 'new-feature'

elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (new-feature)
$ git checkout main
Switched to branch 'main'
Your branch is ahead of 'origin/main' by 1 commit.
  (use "git push" to publish your local commits)

elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)
$ git branch
* main
  new-feature

elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)
$ :
```

# Git merge

```
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (main)
$ git merge new-feature
Updating 137c306..93fba56
Fast-forward
 readme.md | 1 +
 1 file changed, 1 insertion(+)
```

Merge locally

```
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (new-feature)
$ git push --set-upstream origin new-feature
Enumerating objects: 15, done.
Counting objects: 100% (15/15), done.
Delta compression using up to 16 threads
Compressing objects: 100% (8/8), done.
Writing objects: 100% (11/11), 1.27 KiB | 1.27 MiB/s, done.
Total 11 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), completed with 1 local object.
remote:
remote: Create a pull request for 'new-feature' on GitHub by visiting:
remote:   https://github.com/elsaesser-tobias/MOD3/pull/new/new-feature
remote:
To https://github.com/elsaesser-tobias/MOD3.git
 * [new branch]      new-feature -> new-feature
branch 'new-feature' set up to track 'origin/new-feature'.
```

Create new branch on Github

# Git undo changes

```
$ git log
commit 93fba56355cd7751004cb91a1196c93f70de75af (HEAD -> new-feature, origin/new-feature, main)
Author: Tobias Elsässer <elsaesser.tobias@web.de>
Date: Thu Oct 20 14:48:05 2022 +0200

    Added a line

commit 137c306c78c5a7c5db95fb2e0ee2808240946d18
Merge: ca8e8ca e80e5f2
Author: Tobias Elsässer <elsaesser.tobias@web.de>
Date: Thu Oct 20 14:42:16 2022 +0200

    Merge branch 'main' of https://github.com/elsaesser-tobias/MOD3

commit ca8e8ca5ba1538d90298ee36950e93522561ab71
Author: Tobias Elsässer <elsaesser.tobias@web.de>
Date: Thu Oct 20 14:42:07 2022 +0200

    Changed
```

# Git undo changes

```
elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (new-feature)
$ git reset HEAD

elsae@Elsaesser-PC MINGW64 ~/Documents/GIT_Repo/MOD3 (new-feature)
$ git reset c08855585e1b278a2b8f3ac8895a8978d9c06b6e
Unstaged changes after reset:
M      readme.md
```

# Additional Information

- Git GUI: Many graphical user interfaces available
- Git integrated in a lot of coding platforms, i.e. VisualStudioCode, Rstudio
- R has the packages gert and usethis for easy Git usage

# Thank you for your attention!

- Slides available at:
- <https://github.com/elsaesser-tobias/Teaching>

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# Resources

- Youtube: freeCodeCamp.org
- <https://docs.github.com/en/get-started/quickstart/hello-world>
- <https://support.rstudio.com/hc/en-us/articles/200532077-Version-Control-with-Git-and-SVN>
- <https://ohshitgit.com/>
- <https://docs.github.com/en/authentication/connecting-to-github-with-ssh/adding-a-new-ssh-key-to-your-github-account>

# Tasks 1 – Working with Github

- Create a Github account if you don't have one
- Create a new repository on your account
- Create a readme.md file
- Change the readme file on Github
- Commit the changes and inspect them

# Tasks 2 – Working with Git

- Fork my Github repository:  
<https://github.com/elsaesser-tobias/MOD3>
- Clone the repository to your local computer
- Change the date mentioned in the file to the correct one
- Stage and commit your changes

# Tasks 3 – Working with Branches

- Create a branch for your local repository
- Add any comment to the readme file
- Stage and commit
- Inspect the difference between the 2 files
- Merge the branch to your local master branch
- Upload the branch as a new branch to Github (might cause some trouble)
- Merge your 2 branches on Github
- Create a pull request for against my original repo