Introduction to Version Control with Git

Software Carpentry

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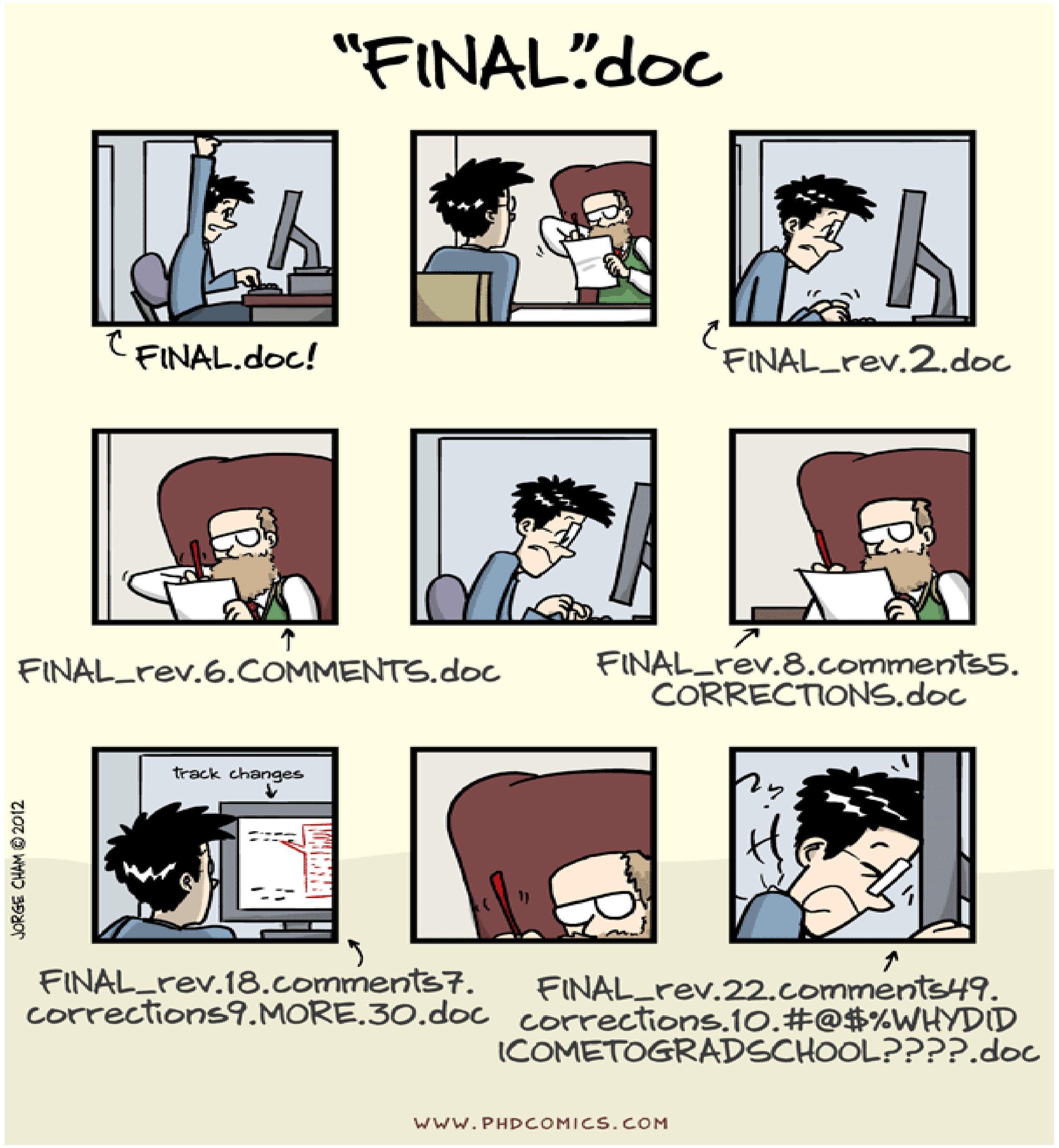
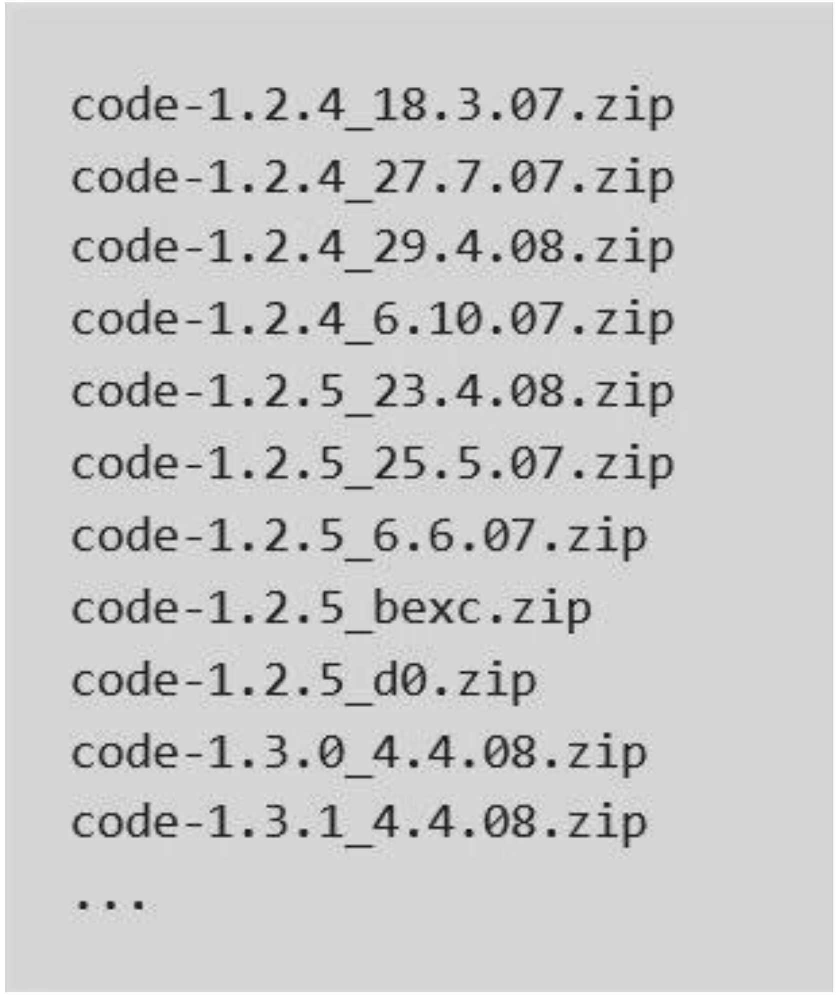
Agenda

- What is version control and why should I use it?
- What is Git and how do I use it in my work?

Workshop setup

- Concepts: slides, demos
- Hands-on: type along, exercises





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code-1.2.4_27.7.07.zip
code-1.2.4_29.4.08.zip
code-1.2.4_6.10.07.zip
code-1.2.5_23.4.08.zip
code-1.2.5_25.5.07.zip
code-1.2.5_6.6.07.zip
code-1.2.5_bexc.zip
code-1.2.5_d0.zip
code-1.3.0_4.4.08.zip
code-1.3.1_4.4.08.zip
...
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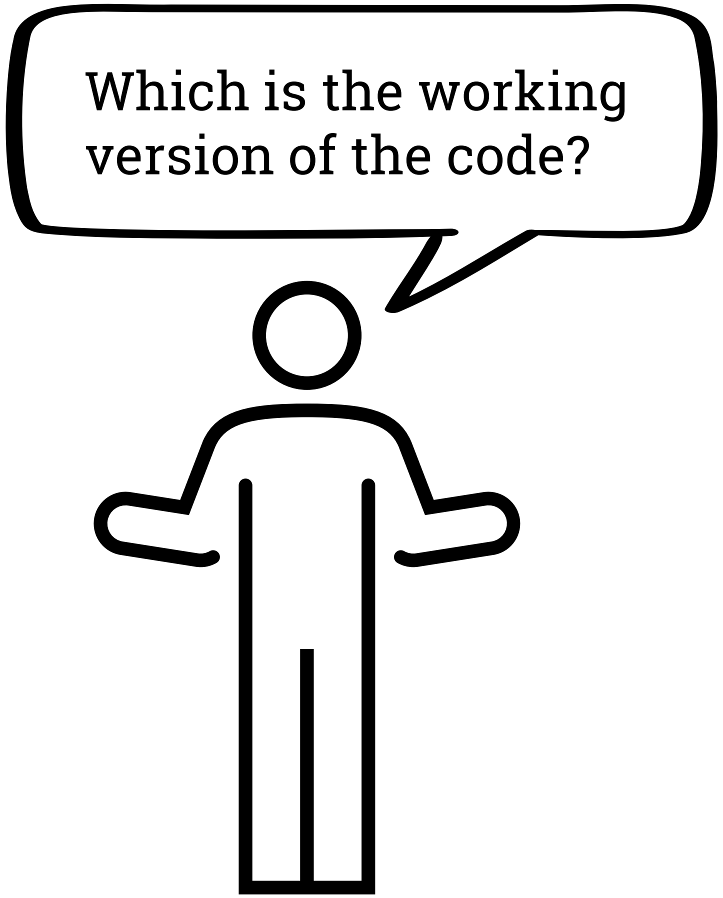
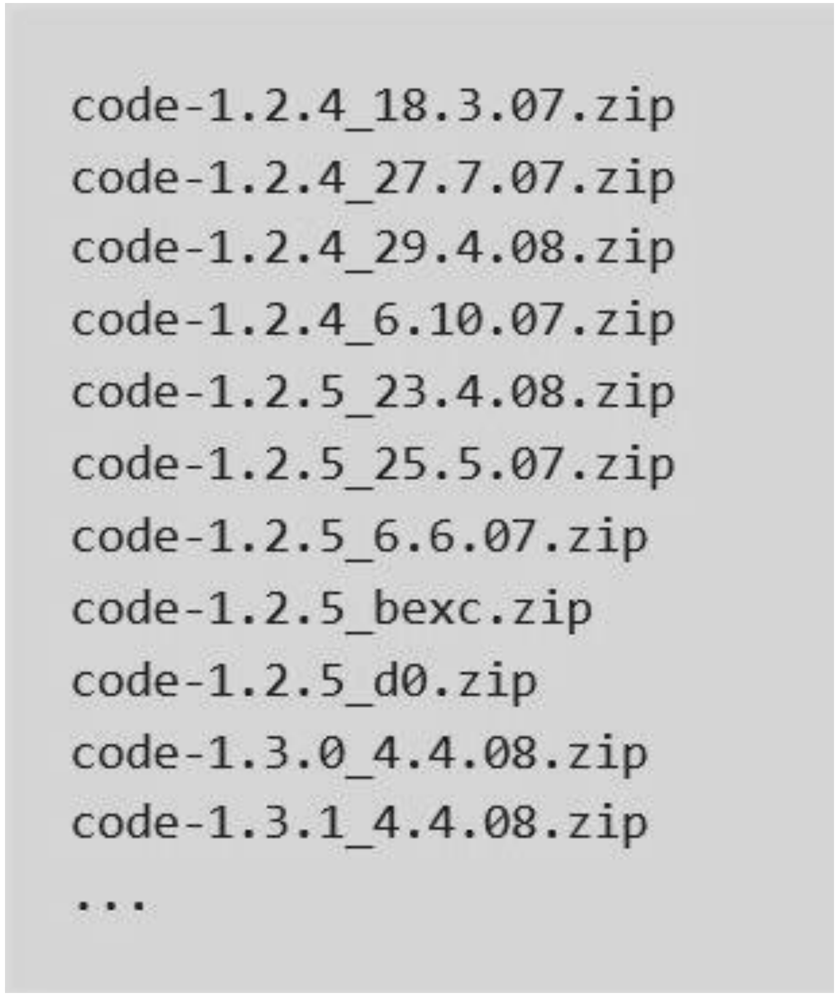
Image source: "Piled Higher and Deeper" by Jorge Cham, http://www.phdcomics.com

Image source: https://coderefinery.github.io/git-intro/motivation/





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code-1.3.1_4.4.08.zip
...
```

Image source: https://coderefinery.github.io/git-intro/motivation/

Version control

- Principal idea
  - Record snapshots of your work
  - Record incremental changes on top of base version
- Implementation
  - Version control system/tools

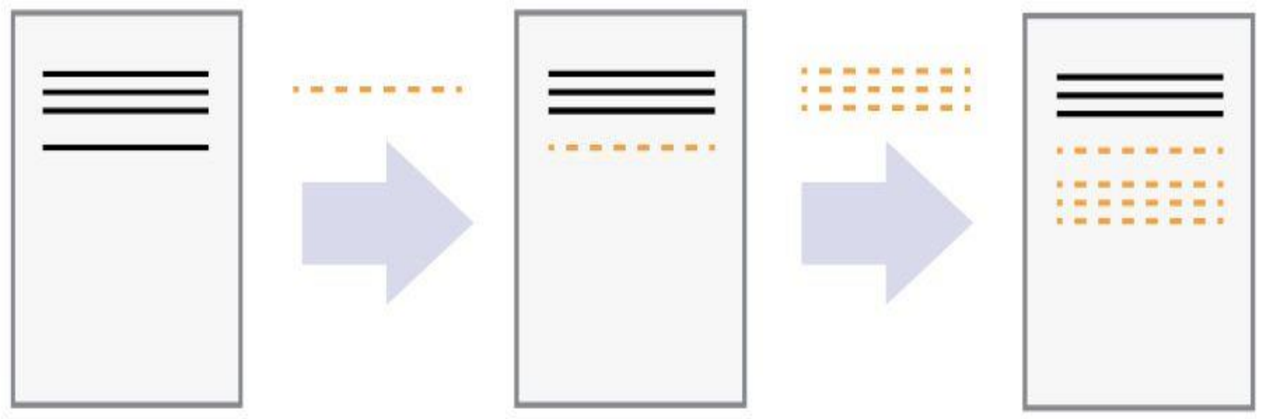


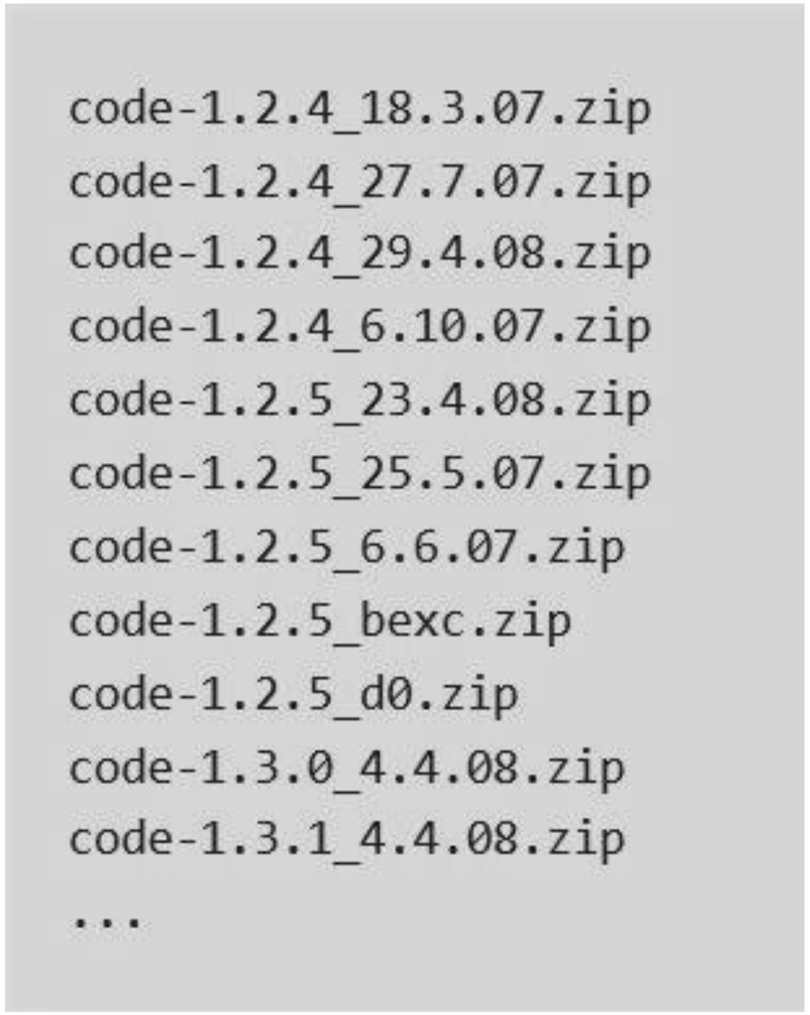
Image source: https://swcarpentry.github.io/git-novice/01-basics.html

Git

- Version control system
- Software
- Command-line interface

Goals for today

Goal 1



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code-1.3.1_4.4.08.zip
...
```
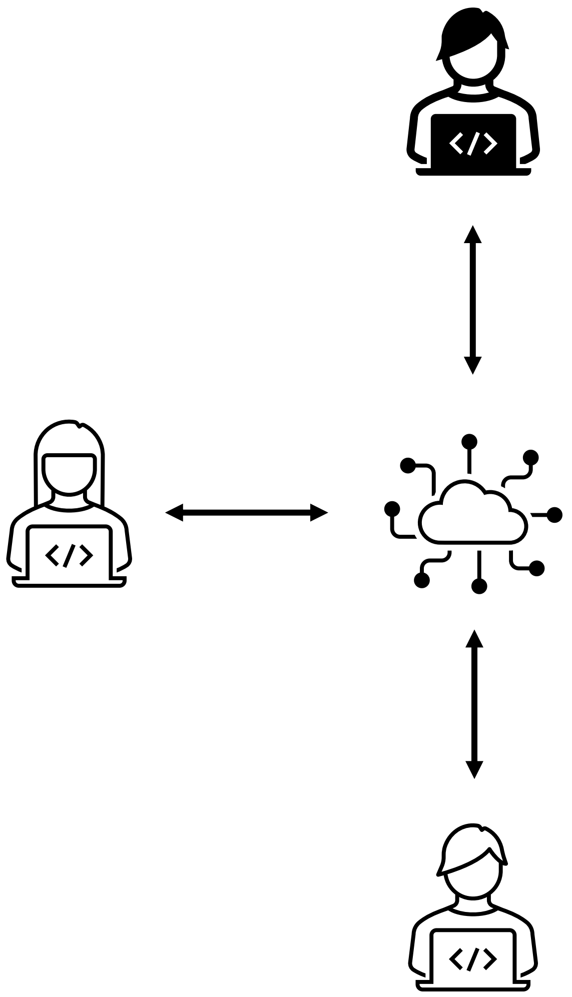

code

Image source: https://coderefinery.github.io/git-intro/motivation/

Goal 2

- Share your work with others on the internet
- Collaborating



Roadmap

1. Version control your work locally on your computer

   (Python code snippet)

   a) Setup Git
   b) Tracking changes
   c) Exploring history

2. Sharing your work with others and collaborating

git command-line syntax

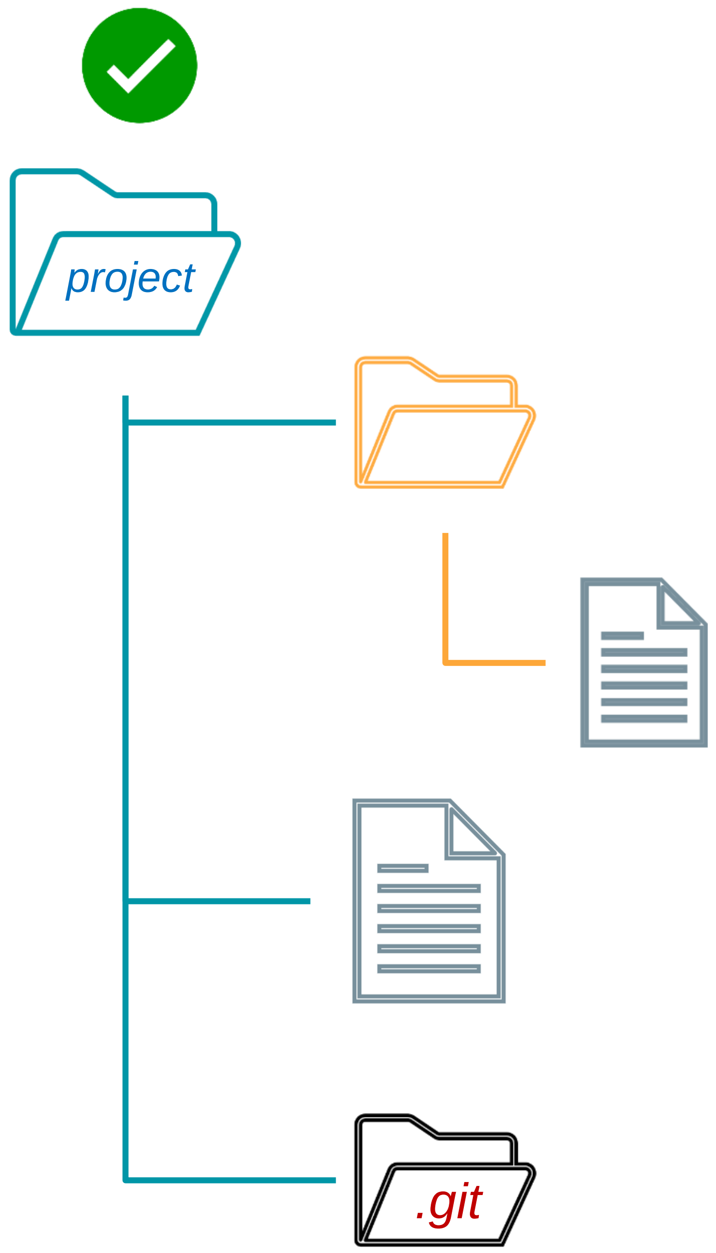
```
git <command> [options]
```

```
git --help
```

Git repository

- Git stores snapshots and version history in **.git** folder
- .git is a hidden folder
- Must be manually created
- *git init* creates a .git/ folder to store information about tracked files and history

Git Repository



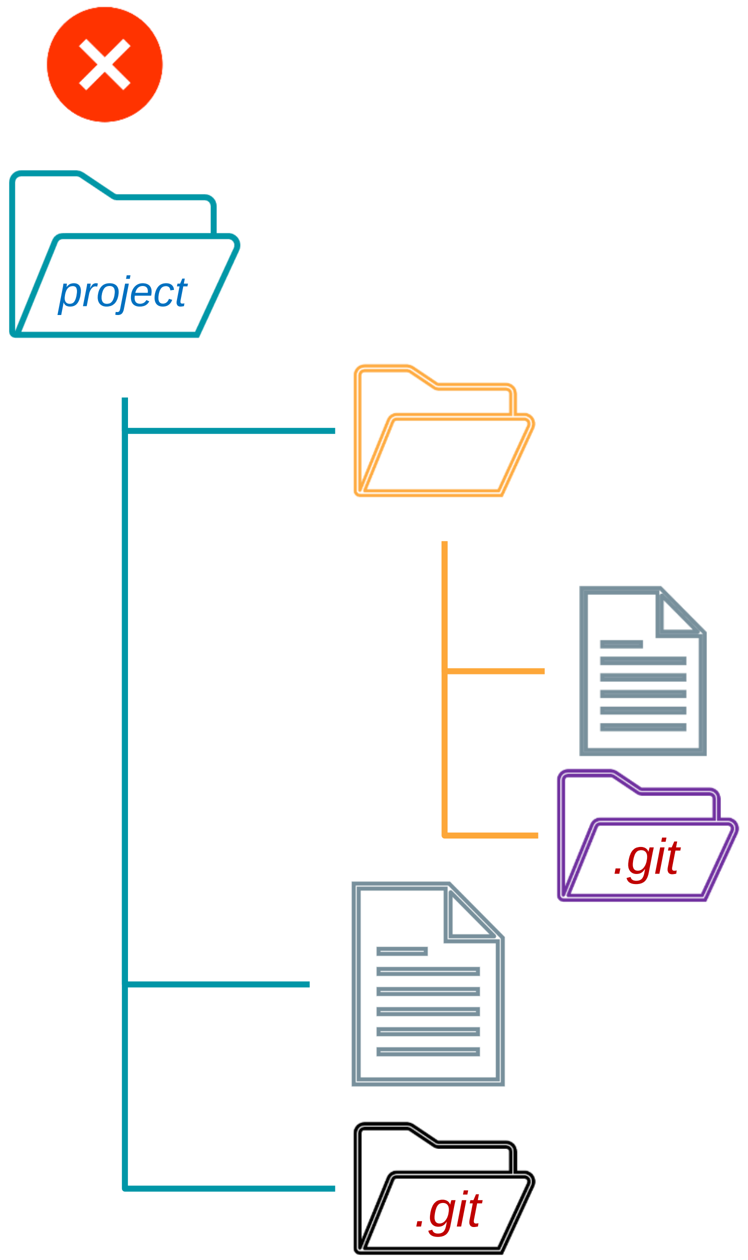
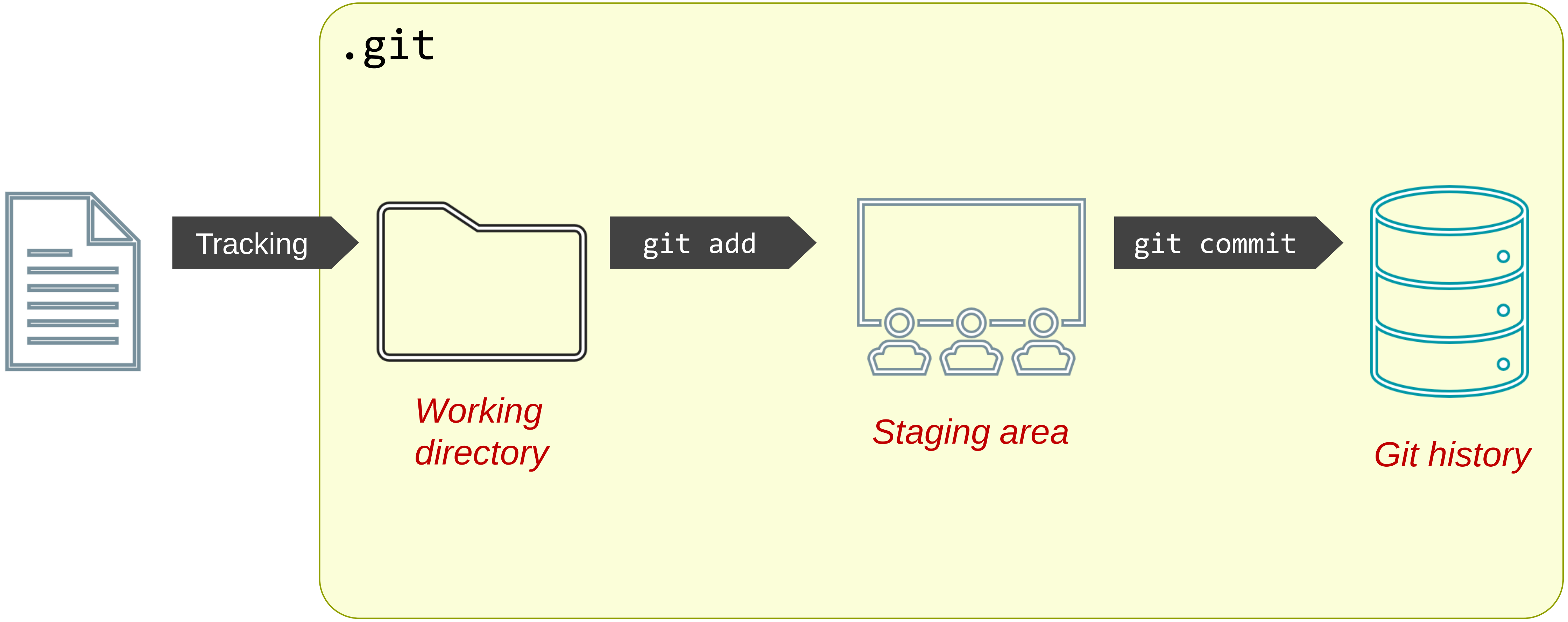


Image source: https://github.com/manuGil/lecture-notes/blob/main/git-notes.md

Tracking changes

- How do I record changes in Git?
- How do I check the status of my version control repository?
- How do I record notes about what changes I made and why?

Tracking Changes in a Git repository



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Cycle: Modify-Add-Commit

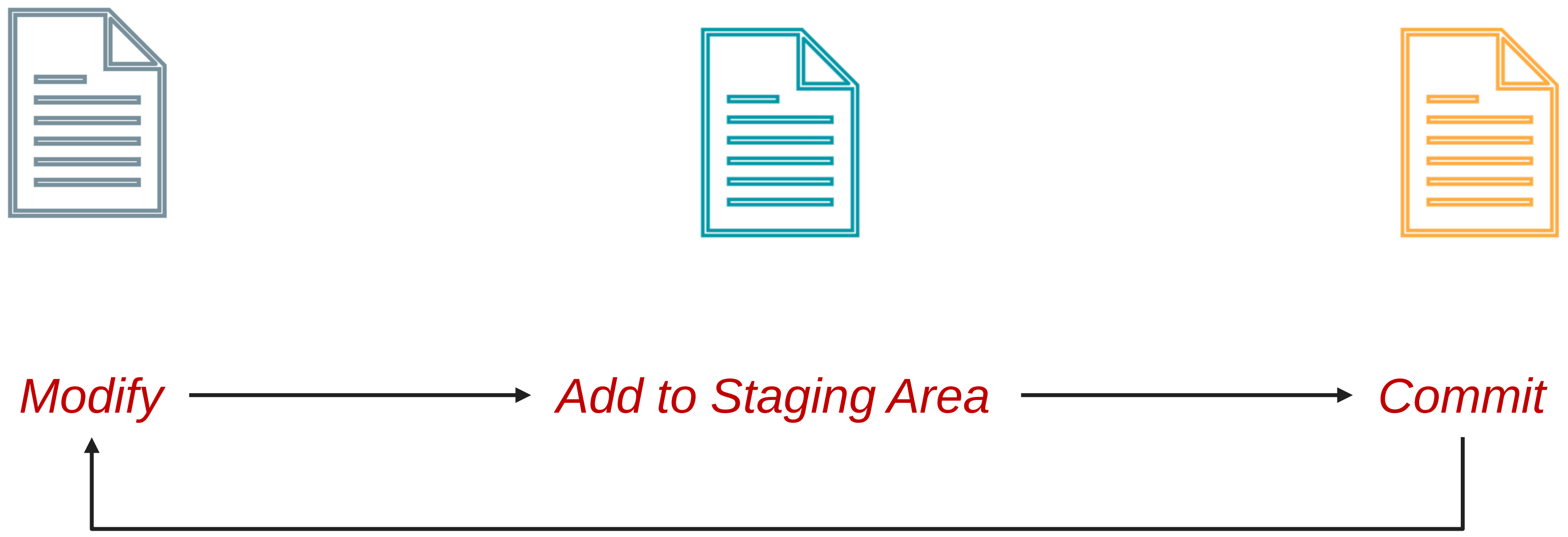


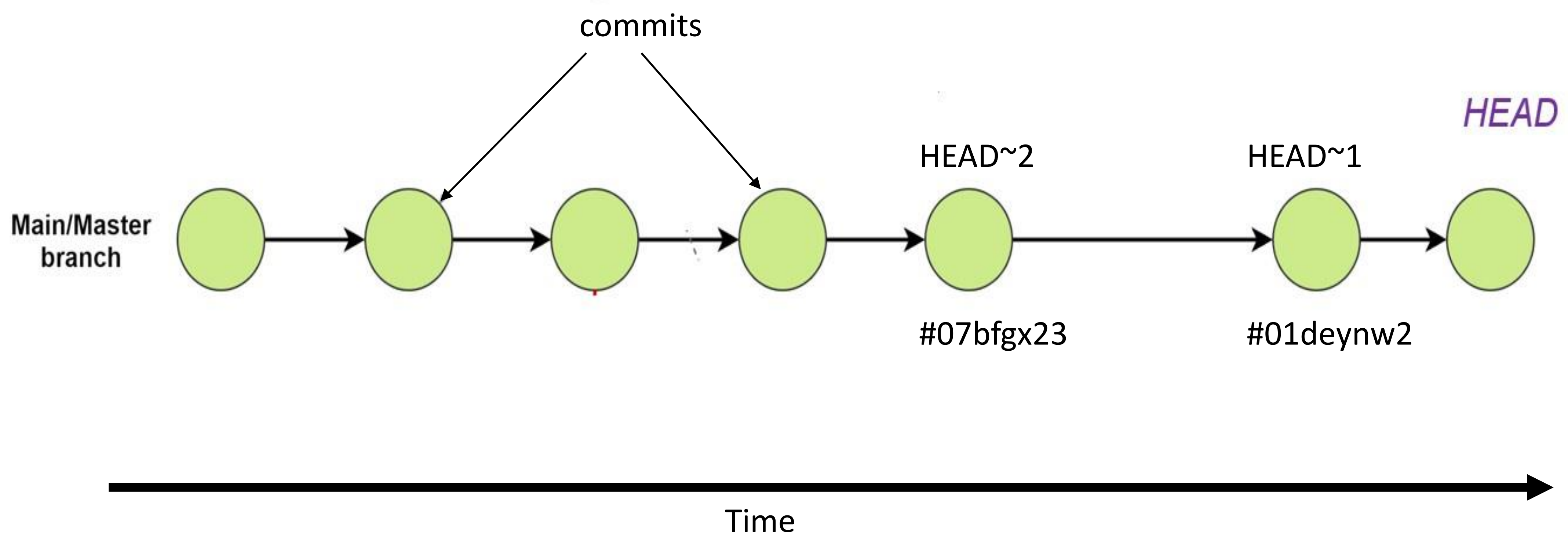
Image source: https://github.com/manuGil/lecture-notes/blob/main/git-notes.md

On track?

Exploring history

- How can I identify old versions of files?
- How do I review my changes?
- How can I recover old versions of files?

Git history tree



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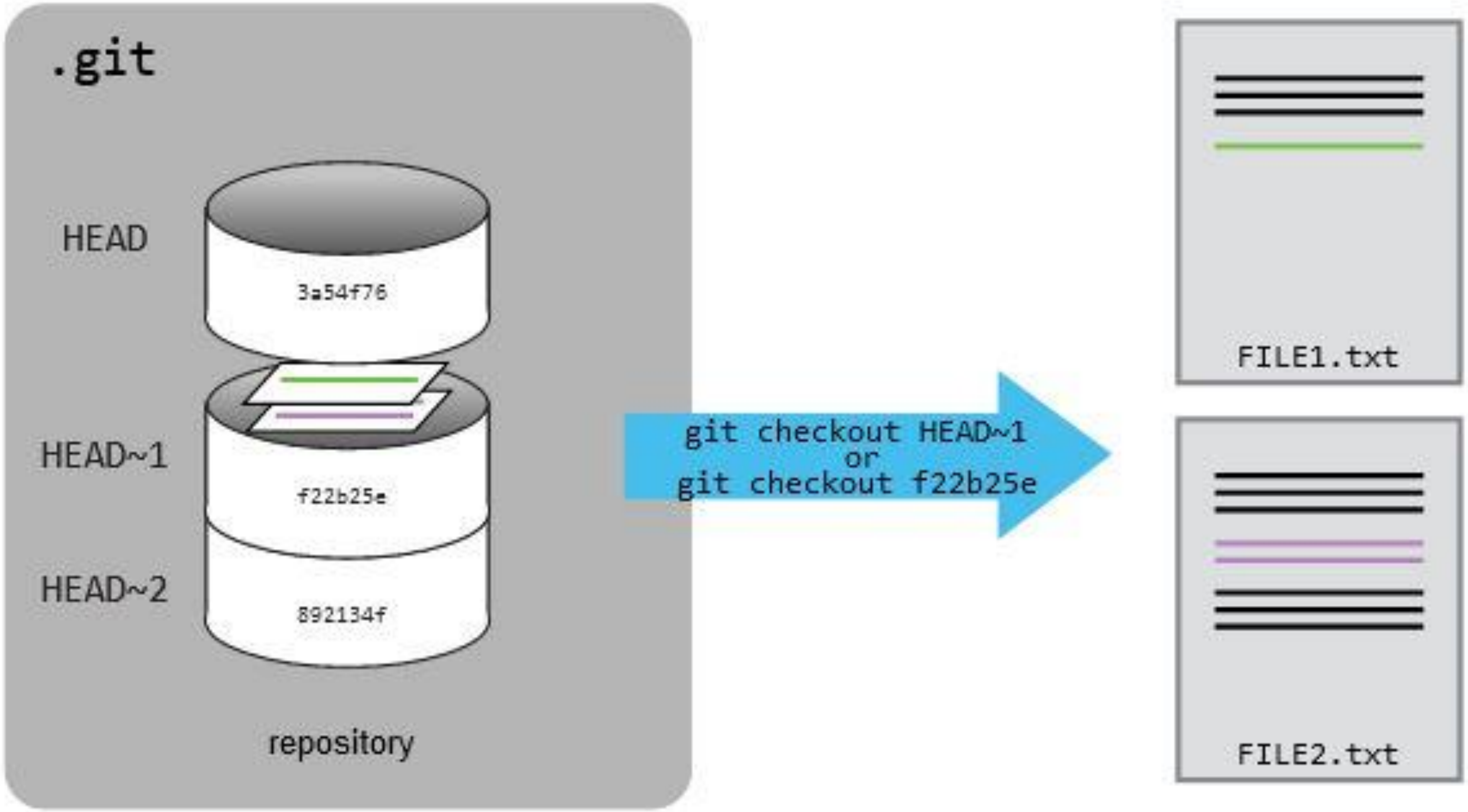


Image source: https://swcarpentry.github.io/git-novice/05-history.html

On track?

Exercise

- Create new repository, use the modify-add-commit cycle, and recover older versions.

  1. Create and initialize a repository called ‘my-repo’.
  2. Create a file ‘research.txt’ with the sentence “Science is awesome”
  3. Add and commit the changes. Remember to use a meaning message.
  4. Change sentence in ‘research.txt’ to “Science is messy”
  5. Add and commit.
  6. Revert changes to very first version of ‘research.txt’, and commit.

- Check your history log – you should have 3 commits.

Remotes in GitHub

How do I share my changes with others on the web?

Remotes in GitHub

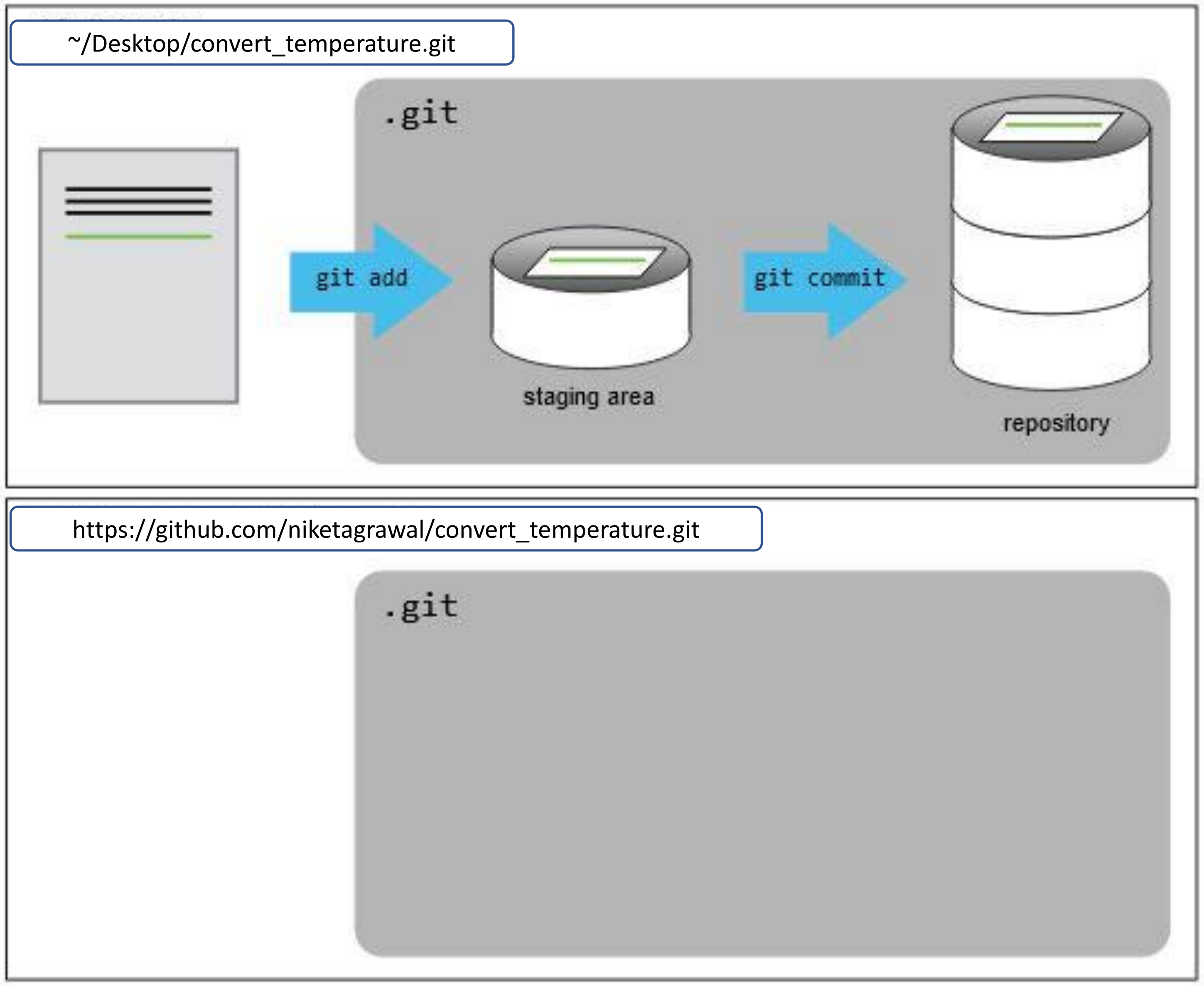

~/Desktop/convert_temperature.git
.git
git add
staging area
git commit
repository
https://github.com/niketagrawal/convert_temperature.git
.git

Image source: https://swcarpentry.github.io/git-novice/07-github.html

Connecting to remotes (GitHub)

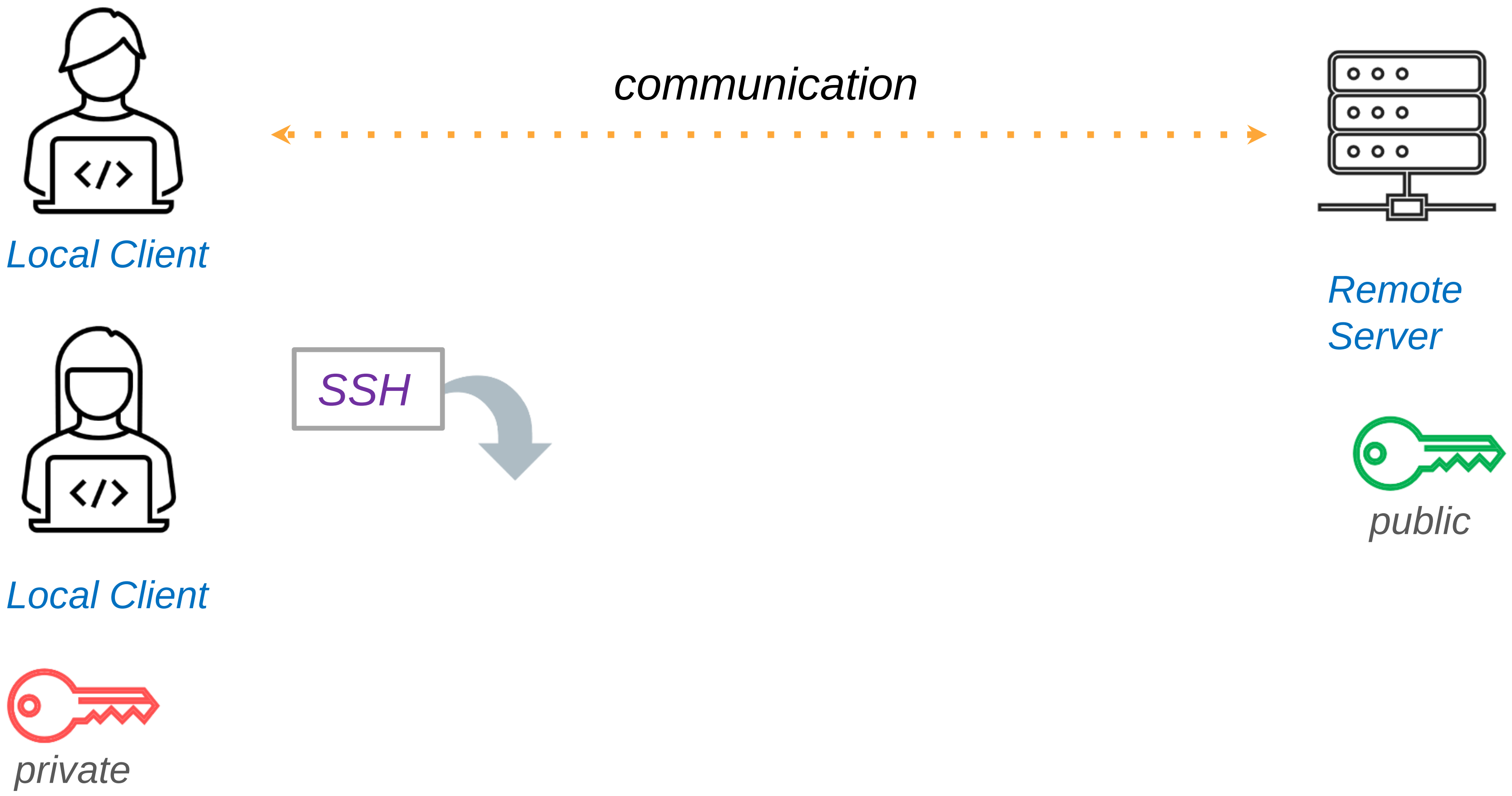
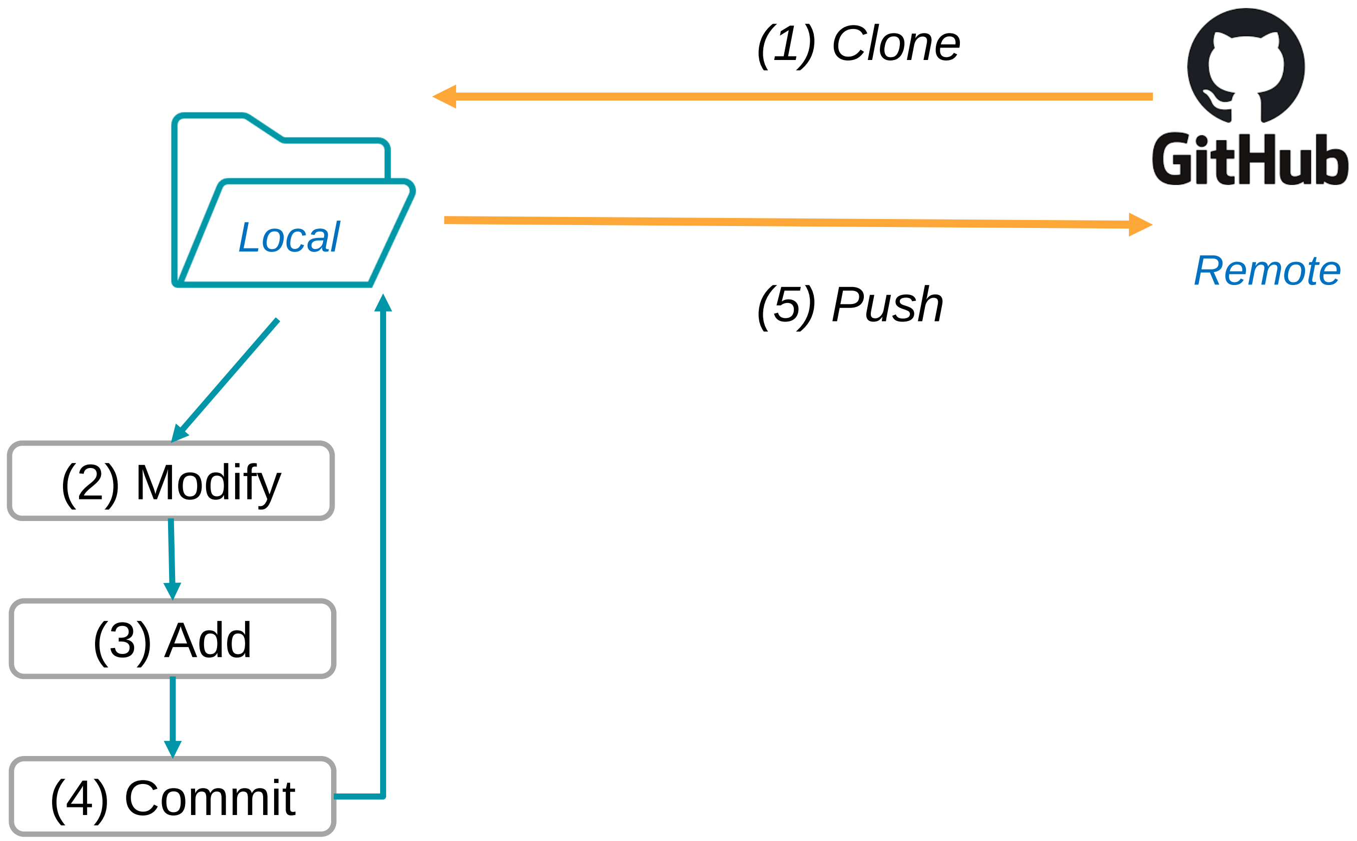


Image source: https://github.com/manuGil/lecture-notes/blob/main/git-notes.md

git + GitHub

Collaborating

Collaborating



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Conflicts

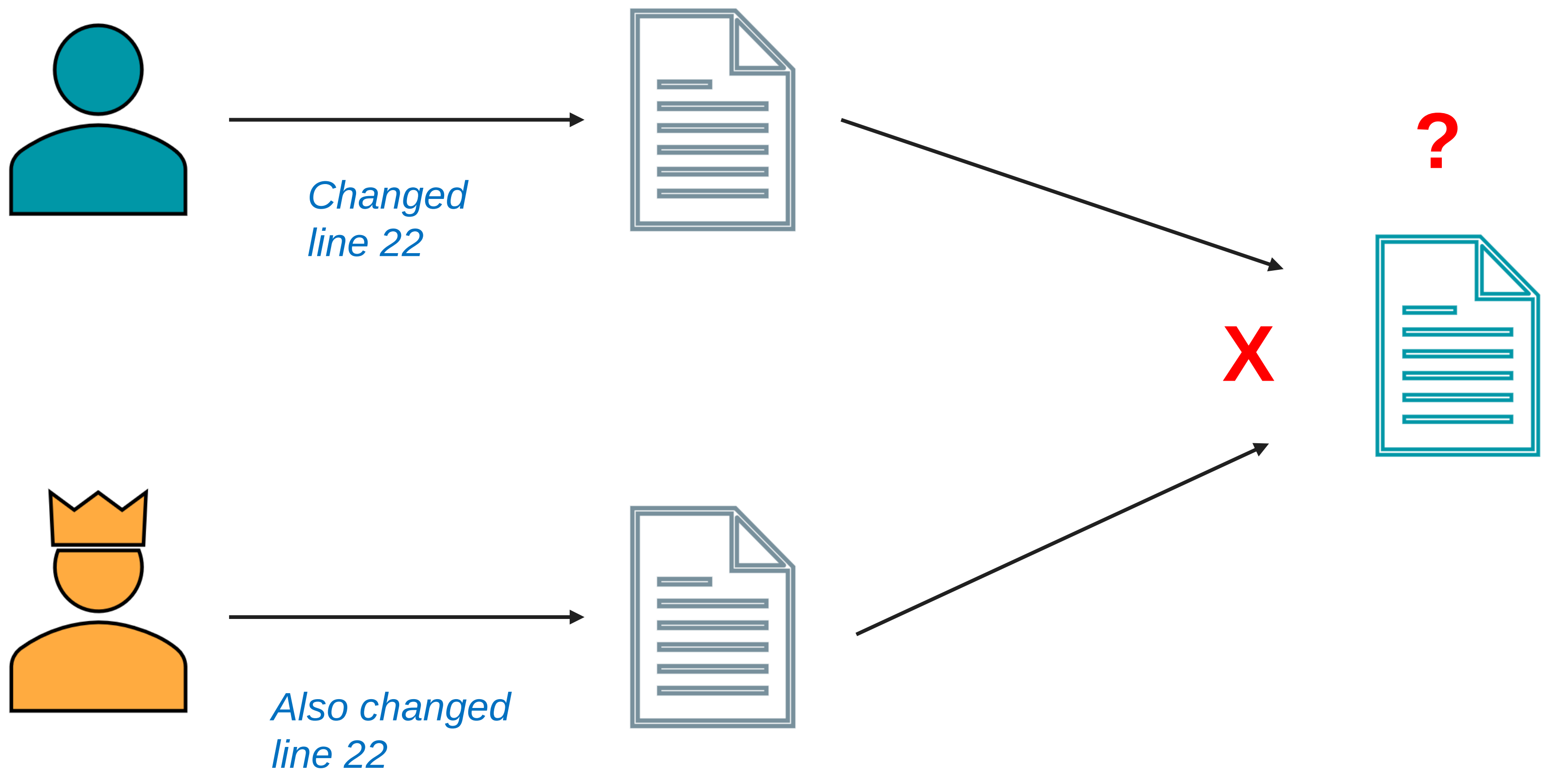

Image source: https://github.com/manuGil/lecture-notes/blob/main/git-notes.md

- Repository initialization **git init**
- Git records changes via commits to the **history three**
- Remember the **modify-add-commit** cycle
- Don't include large datasets in your repositories. Set a **.gitignore** file
- Remotes store copies of the git repositories (e.g., GitHub, TU Delft GitLab)
- Collaborative workflow: **pull, add, commit, push**
- Be aware of **conflicts**

https://swcarpentry.github.io/git-novice/