浙江大学爱丁堡大学联合学院

ZJU-UoE Institute

Using Git and GitHub

IBI 1, Lecture 4.2

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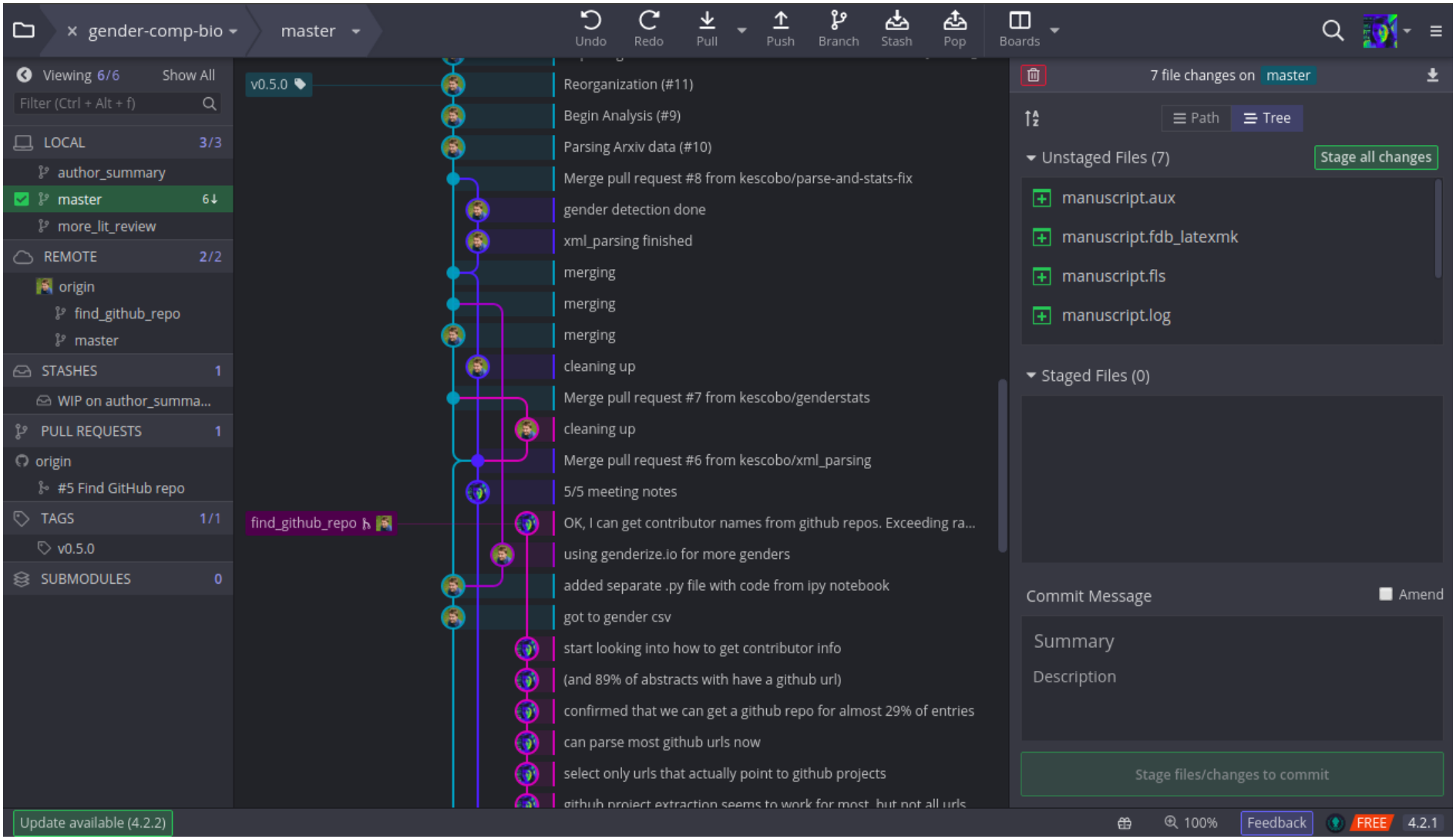
Pre-lecture version

The lecture recording pauses at various points to ask you questions that you should think about. Providing the answers beforehand would defeat that purpose. Therefore, if you look at the slides before listening to the lecture recording, look at this version. A complete version will also be uploaded to Learn. In the meantime, here is a picture of an adorable baby koala.

By Sheba_Also 43,000 photos [CC BY-SA 2.0 (https://creativecommons.org/licenses/by-sa/2.0)], via Wikimedia Commons

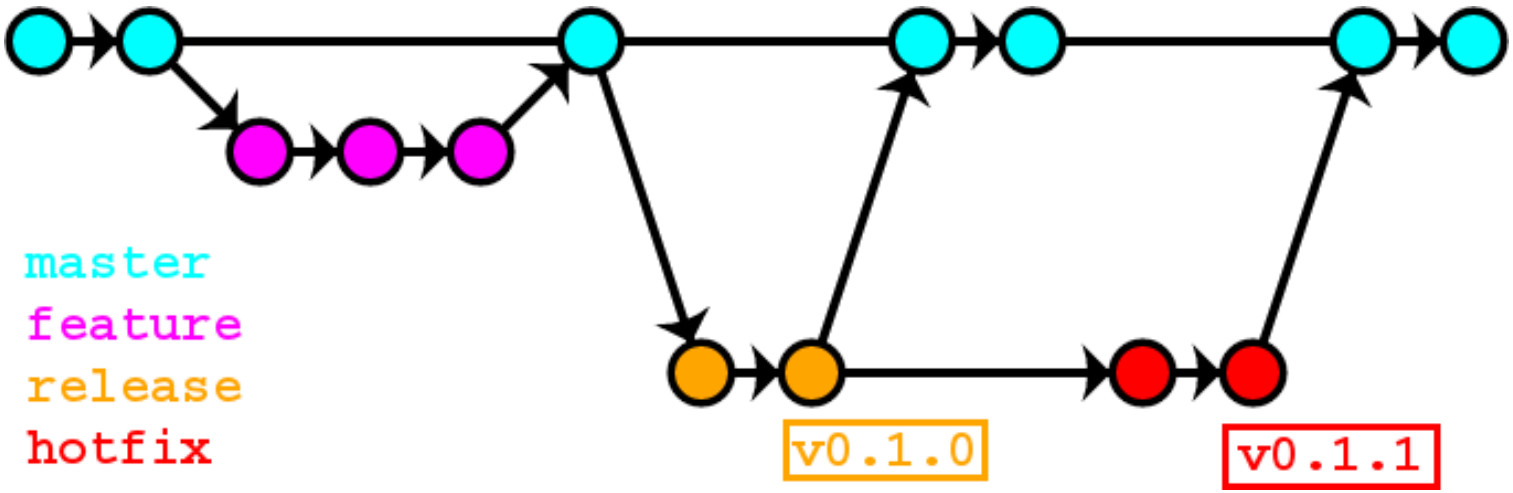
How version control works with Git and GitHub



Learning Objectives

After this lecture, you should be able to better...

- Explain the principles of version control
- Manage projects with Git and GitHub

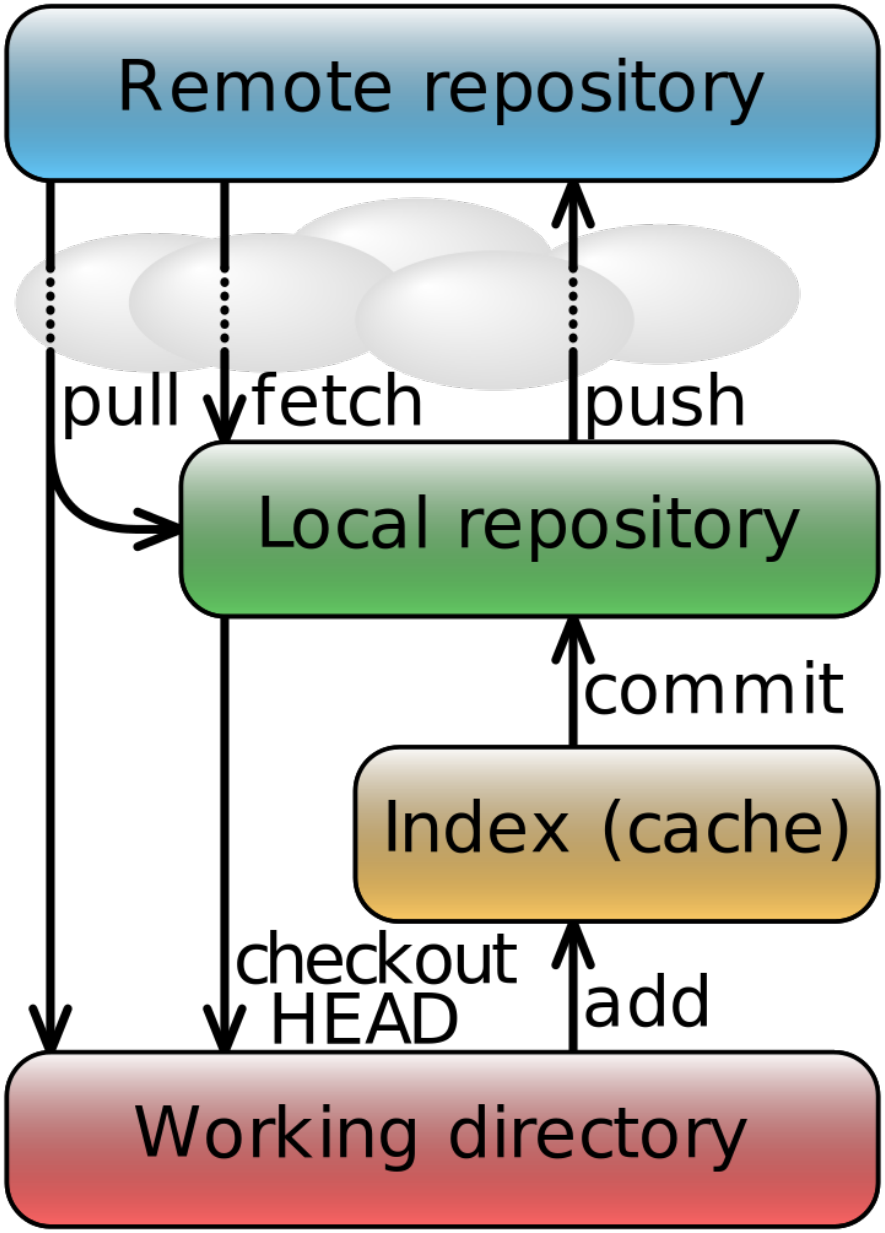


Outline

What is Git?

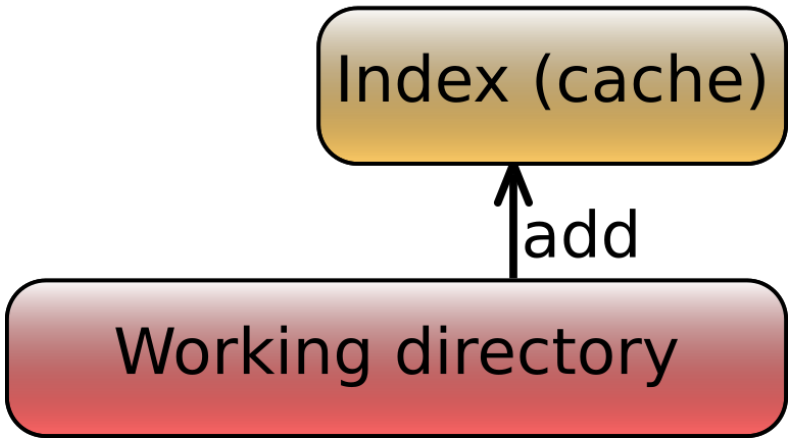
- Version-control system
- Developed in 2005 by Linus Torvalds and Junio Hamano
- Designed for collaborative work on software
- Integrates with GitHub online

The Git Workflow



Init, Add

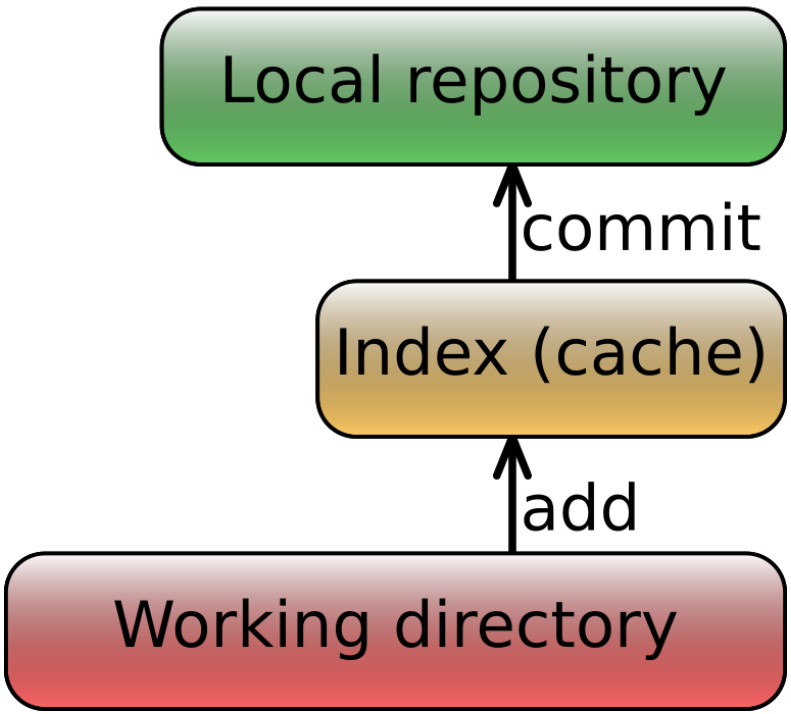
Init, Add



- The directory you are working in (on your computer) is the *working directory*
- **git init**
  Set up new Git repository
- **git add** <**file**>
  Add file to Git repository
- Needs to be done only once for each file

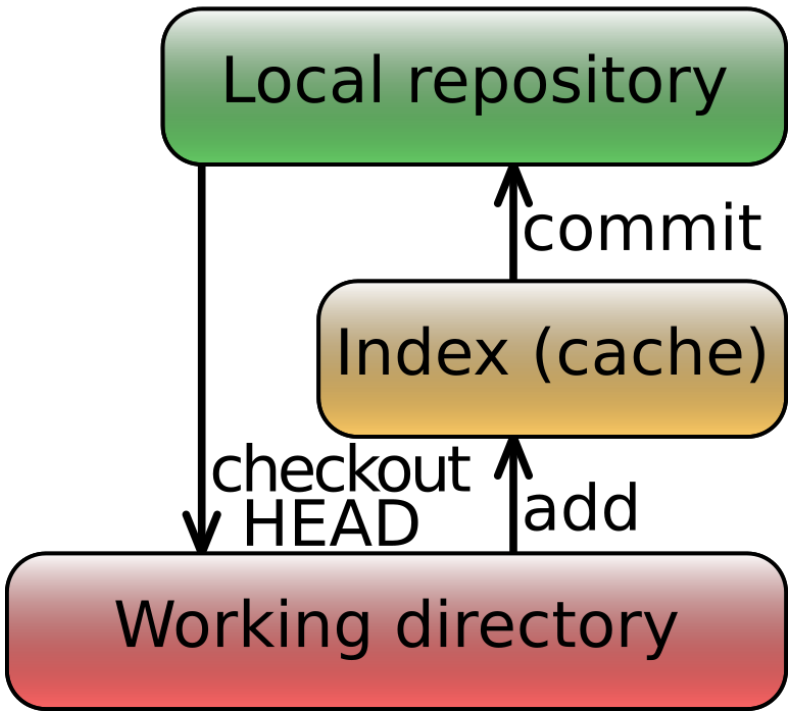
Commit

Commit



- **git commit**
  Save changes in file to local repository
- "Local": on your computer
- User specifies a *commit message*
- Needs to be done for every change you want to record

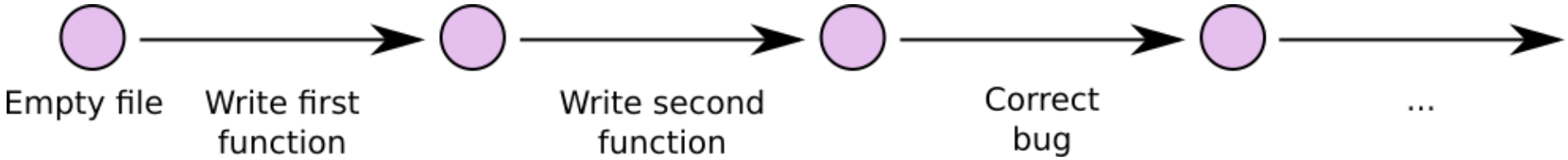
Commit



- **git commit**
  Save changes in file to local repository
- "Local": on your computer
- User specifies a *commit message*
- Needs to be done for every change you want to record
- **git checkout HEAD**
  reads latest version from local repository into working directory (not usually needed!)

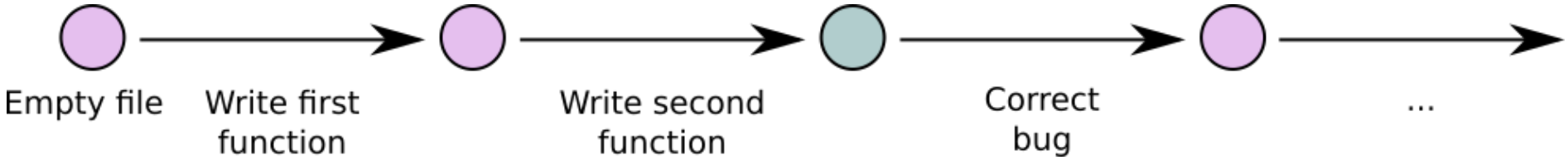
Revert

git revert <commitNumber>



Revert

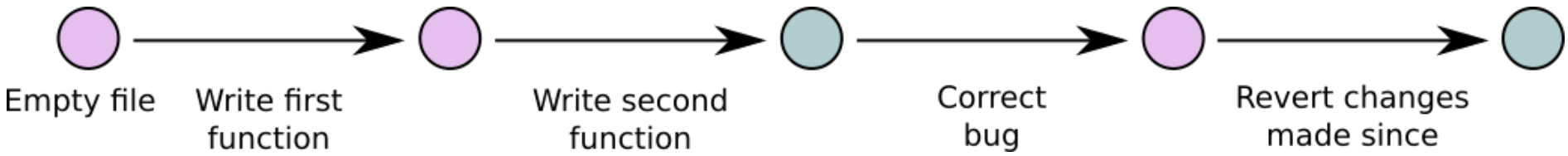
git revert <commitNumber>



Reverts to the version that was committed as <**commitNumber**>

Revert

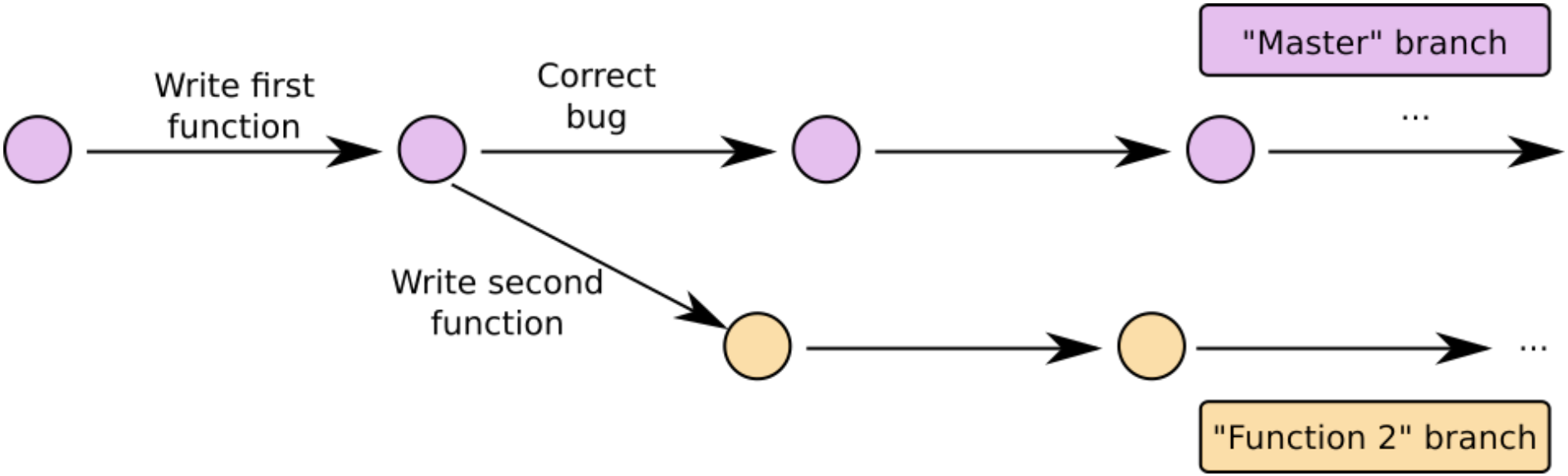
git revert <commitNumber>



Reverts to the version that was committed as <**commitNumber**>
(Keeps record of changes that were reverted.)

Branch

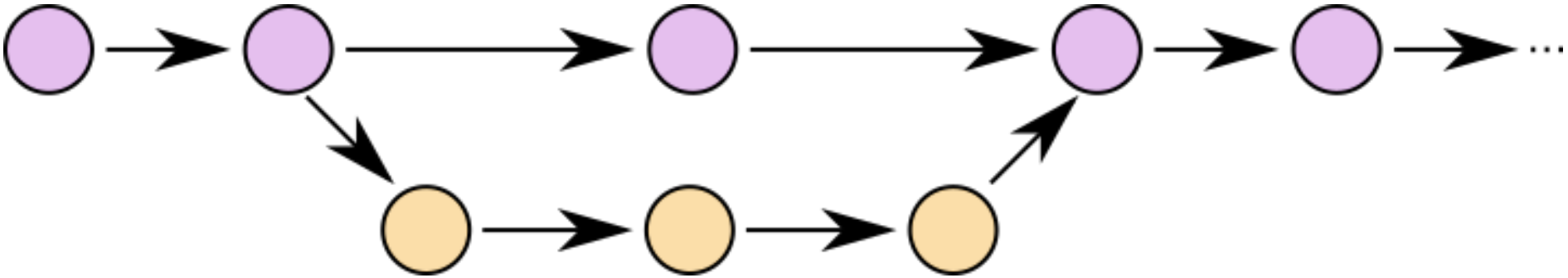
Branch



- **git branch** <**branchname**> - Create a new branch
- **git checkout** <**branchname**> - Switch to branch
- **git branch** - Check which branch you are on
- How do you switch back to the main branch?

Merge

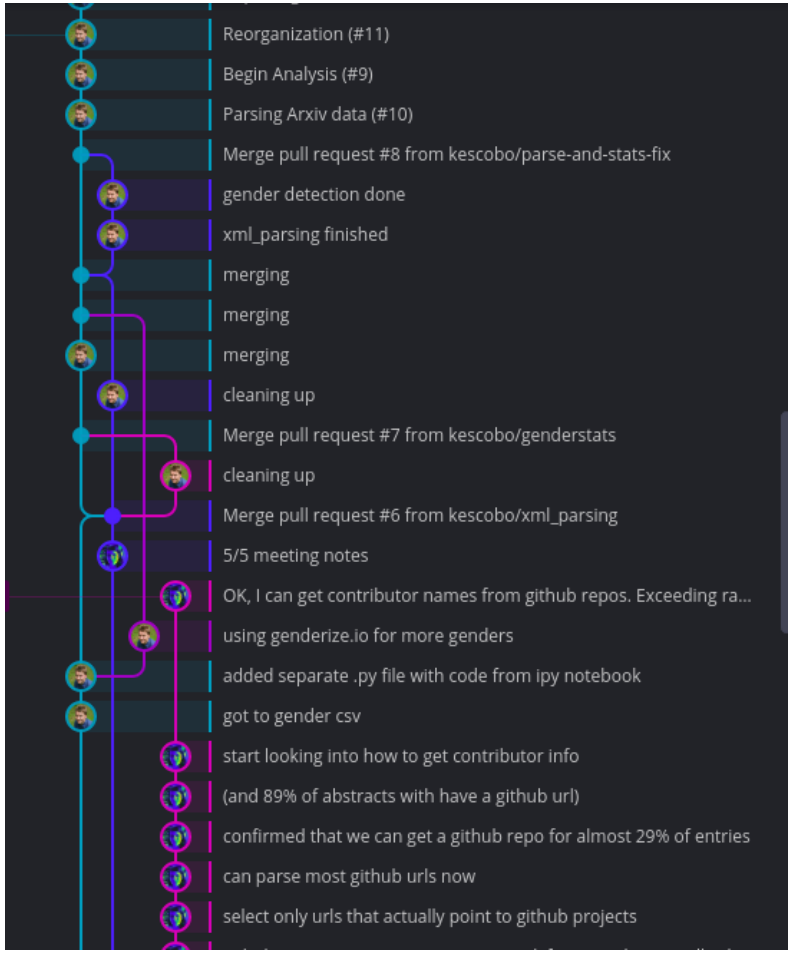
Merge



- **git merge** <**branchname**> - Merge <**branchname**> into current branch
- (Before that, make sure you are on the correct branch!)
- Merge can create conflicts if the contents of the branches are different. You will have to look through those conflicts and resolve them for a successful merge.

GitKraken

- Git can be used from the command line, but in this course, we will use the GitKraken GUI (Graphical User Interface).
- This allows for visual inspection of history and click-based running of Git commands.
- More in the Practical!



Outline

GitHub

- Web-based hosting service for Git repositories
- Hosts remote Git repositories
- What can GitHub do that Git alone cannot?

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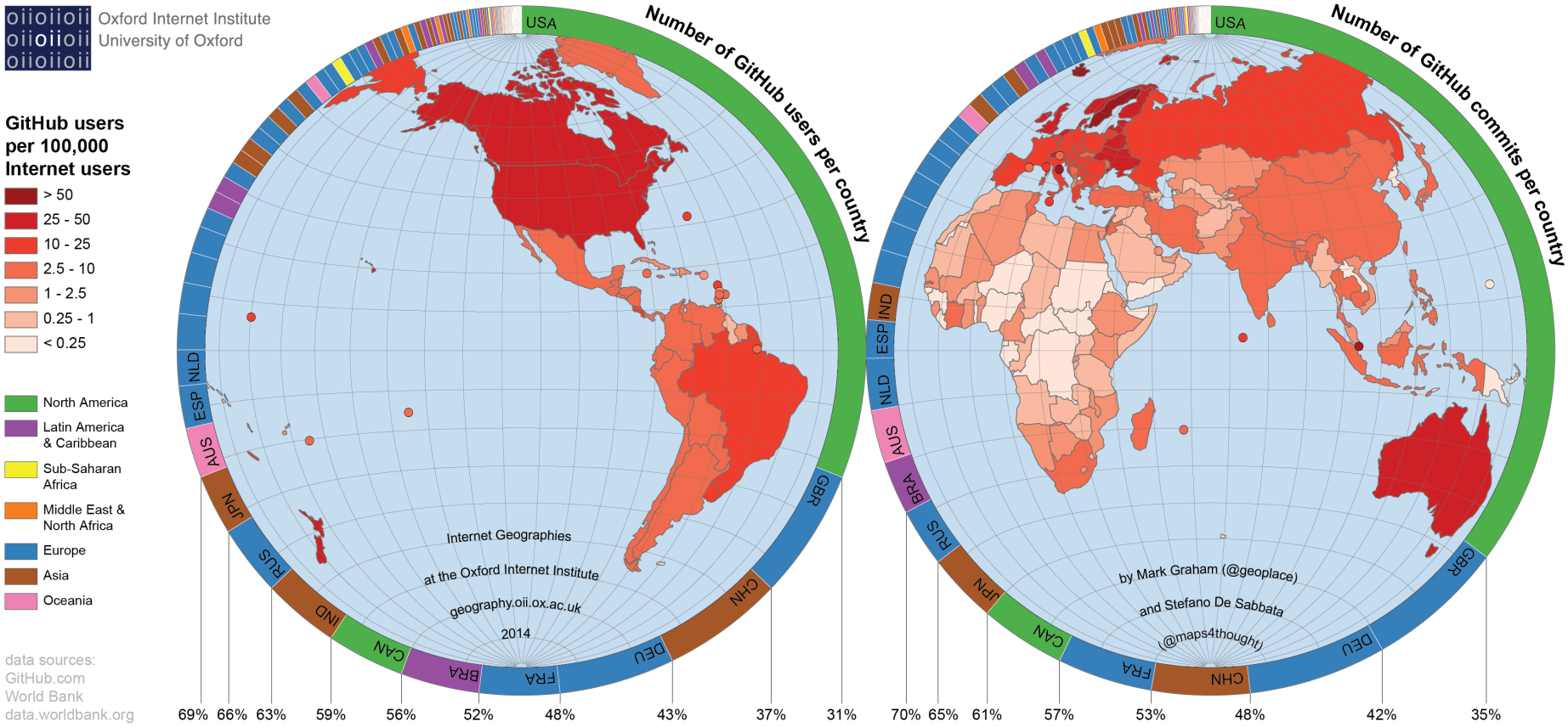
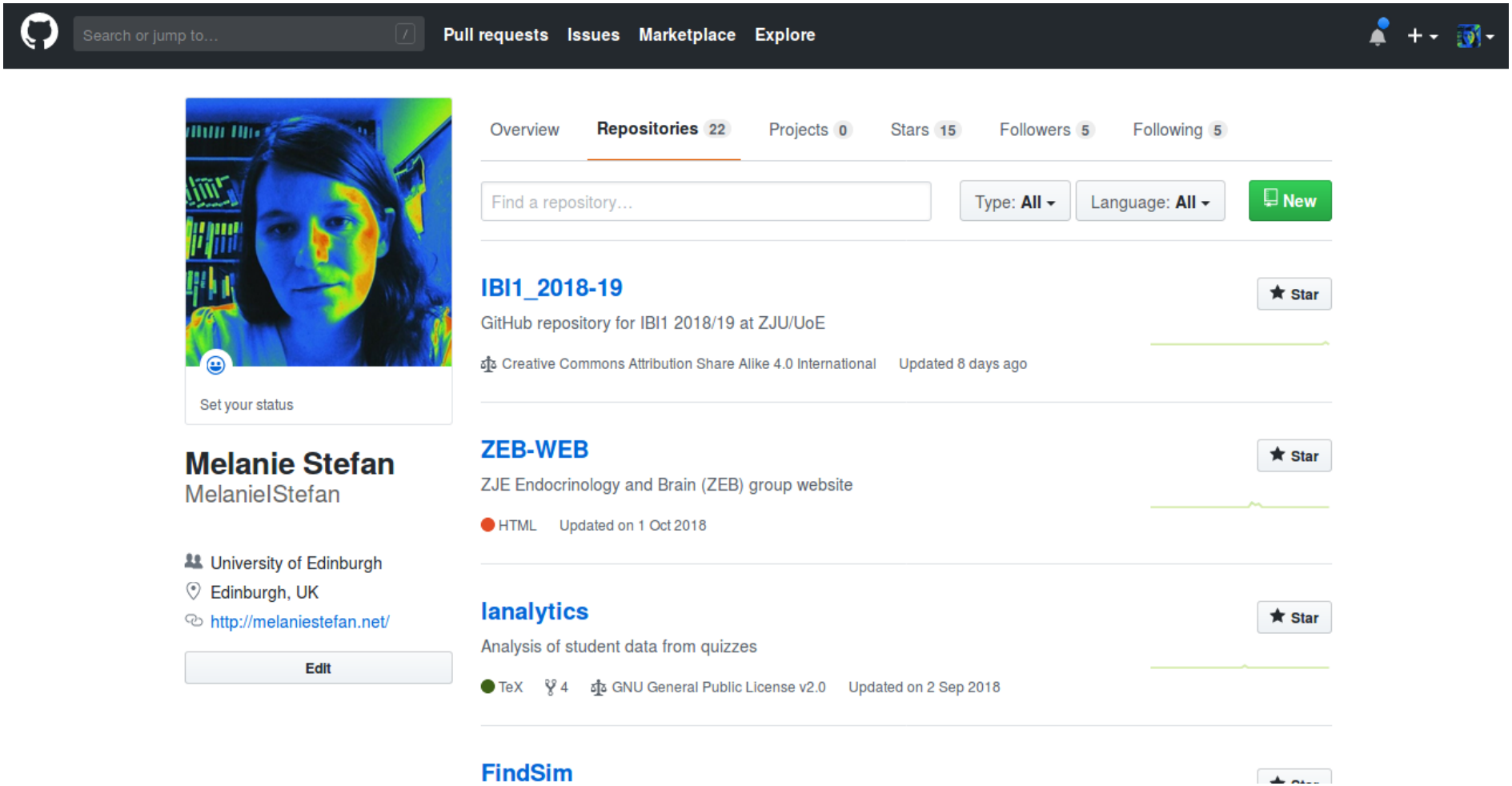
- What can GitHub do that Git alone cannot?

GitHub is widely used by software developers



GitHub | Mapping collaborative software

GitHub profile



Fork, Clone

Fork (in GitHub): Create a version of an existing GitHub repository that you want to work on.

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Fork (in GitHub): Create a version of an existing GitHub repository that you want to work on.

git clone: Make a local version of a GitHub repository.

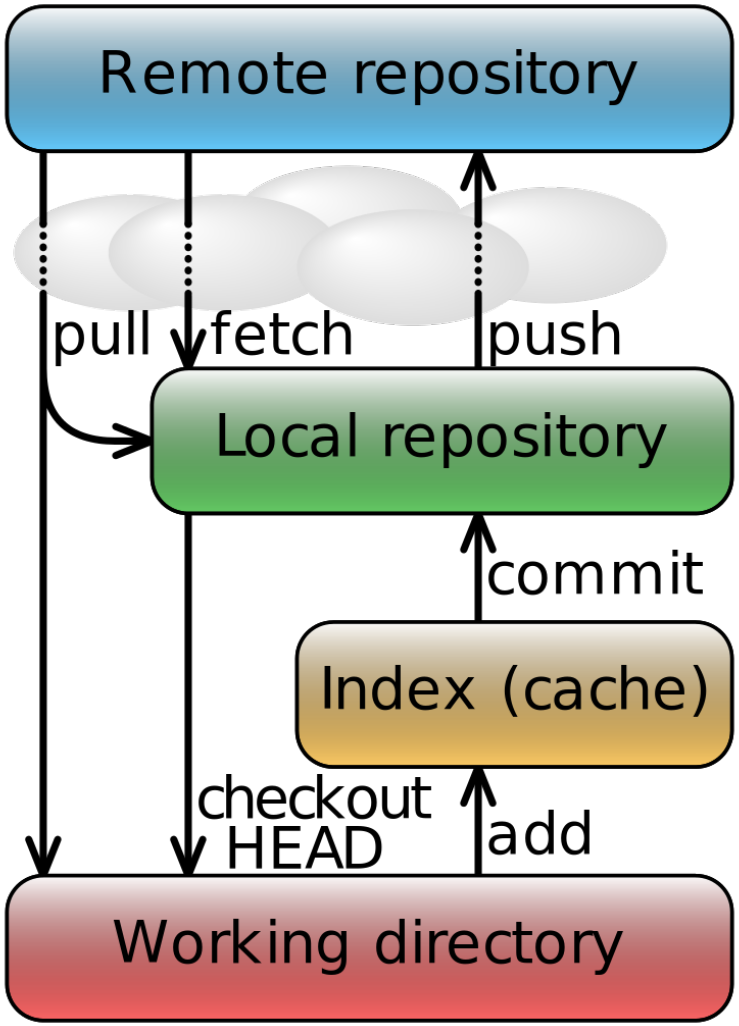
Fork, Clone

Fork (in GitHub): Create a version of an existing GitHub repository that you want to work on.

git clone: Make a local version of a GitHub repository.
For a given project, you only need to Fork and Clone once.

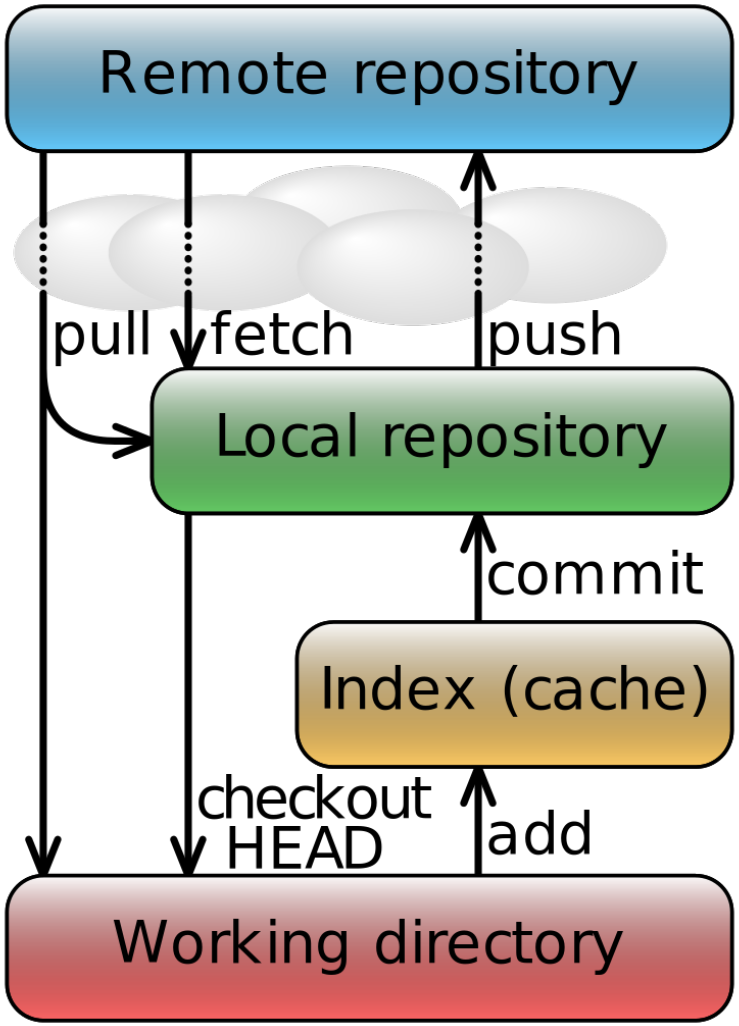
Moving between GitHub and local repo

Moving between GitHub and local repo



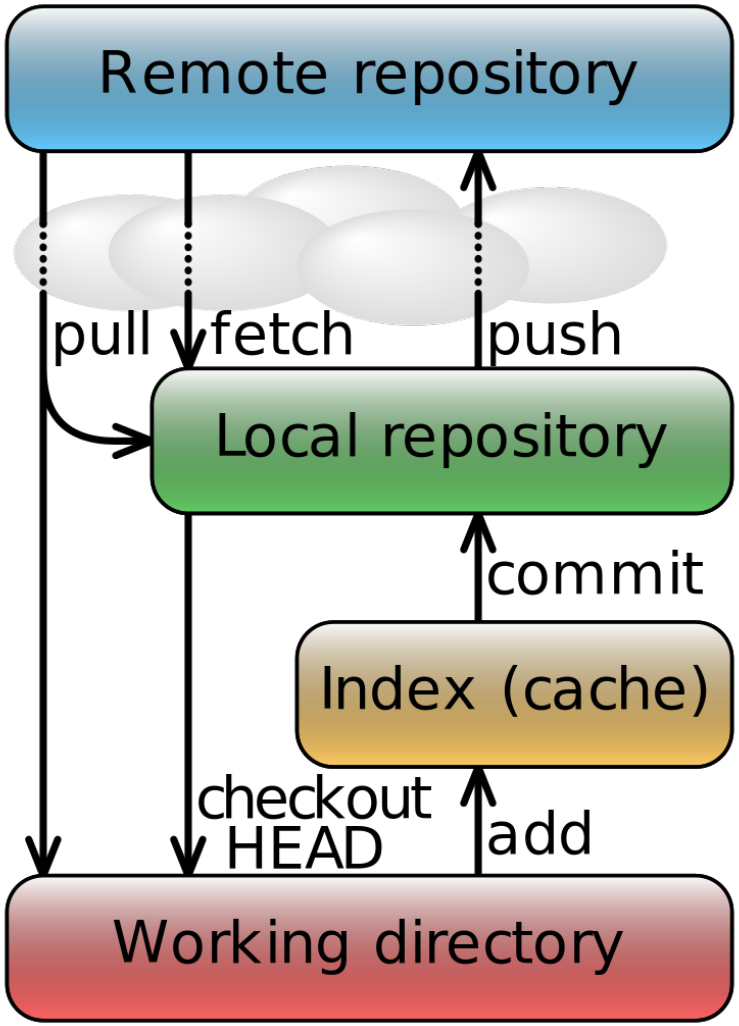
- **git push**
  Push changes to GitHub

Moving between GitHub and local repo



- **git push**
  Push changes to GitHub
- **git fetch**
  Get changes from GitHub

Moving between GitHub and local repo

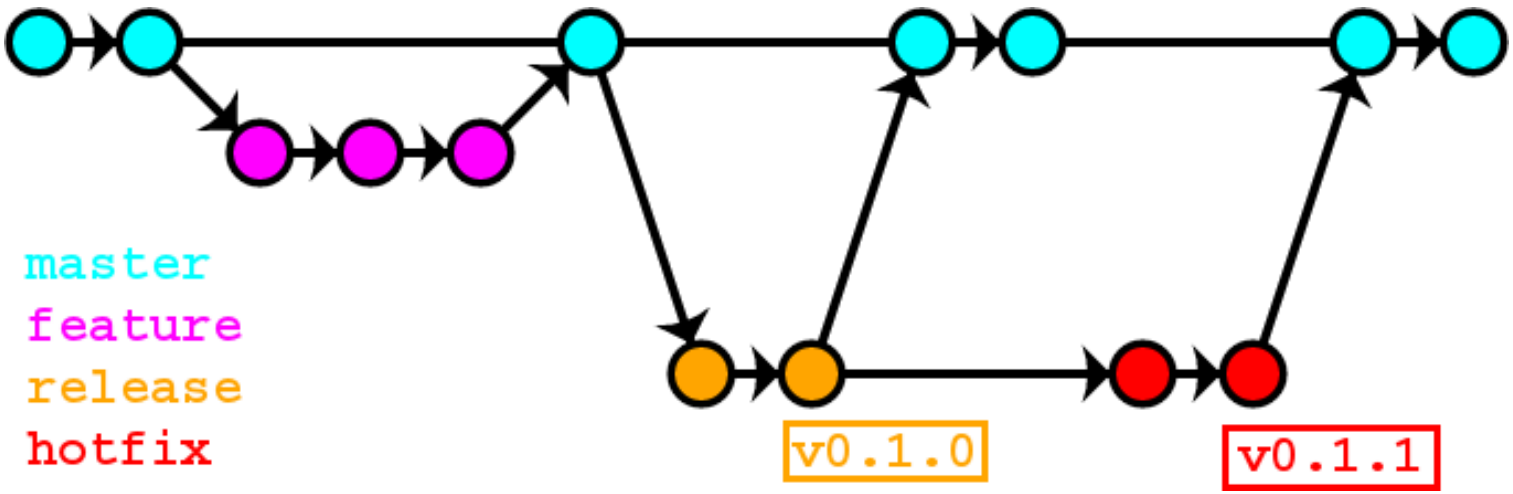


- **git push**
  Push changes to GitHub
- **git fetch**
  Get changes from GitHub
- **git pull**
  git fetch + **git merge**

Review

Now, you should be able to better...

- Explain the principles of version control
- Manage projects with Git and GitHub



We will practice all of this in the Practical!

Useful links

- GitHub: `https://github.com/`
- Git Tutorials by Atlassian. *Detailed and advanced git tutorials. More advanced than you need for this course, but may be helpful if you have questions about more advanced features and subtle points.* `https://www.atlassian.com/git/tutorials`
- Oh shit, git! By Katie Sylor-Miller. *(Advanced command-line recipes to fix common git problems.)* `https://ohshitgit.com/`

Image credits

- Diagrams of version control processes. My own work, CC BY-SA 4.0, 2019.
- Example of Git project flow. By Qeef - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=70287997
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- GitHub fork icon. GitHub [OFL (http://scripts.sil.org/cms/scripts/page.php?item_id=OFL_web)]
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- GitHub profile screenshot, taken 2019.
- Map of GitHub users. By Stefano.desabbata - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=34897645
- Screenshots from a project with the GitKraken software taken 2019.