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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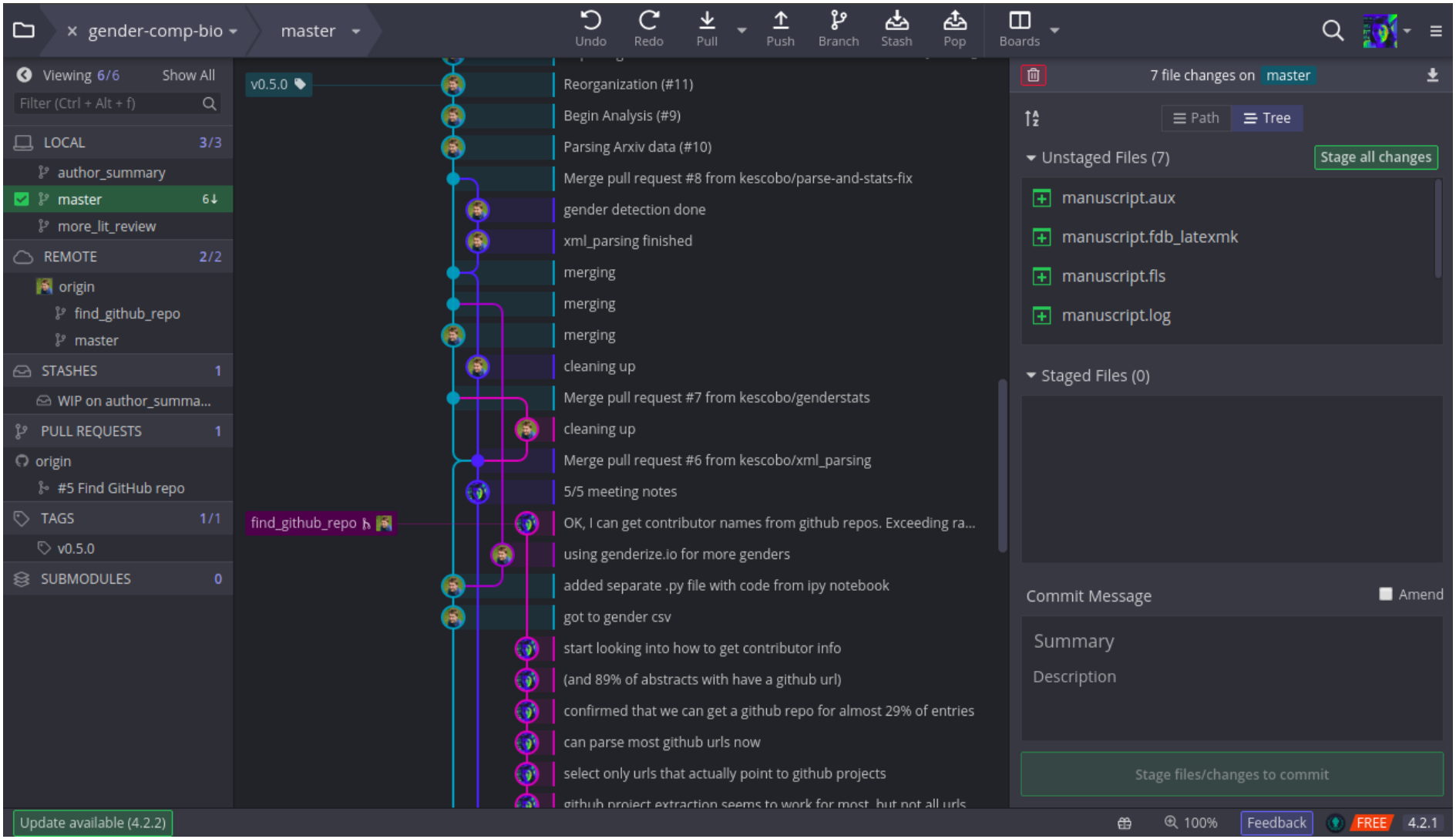
Semester 2, 2019/20

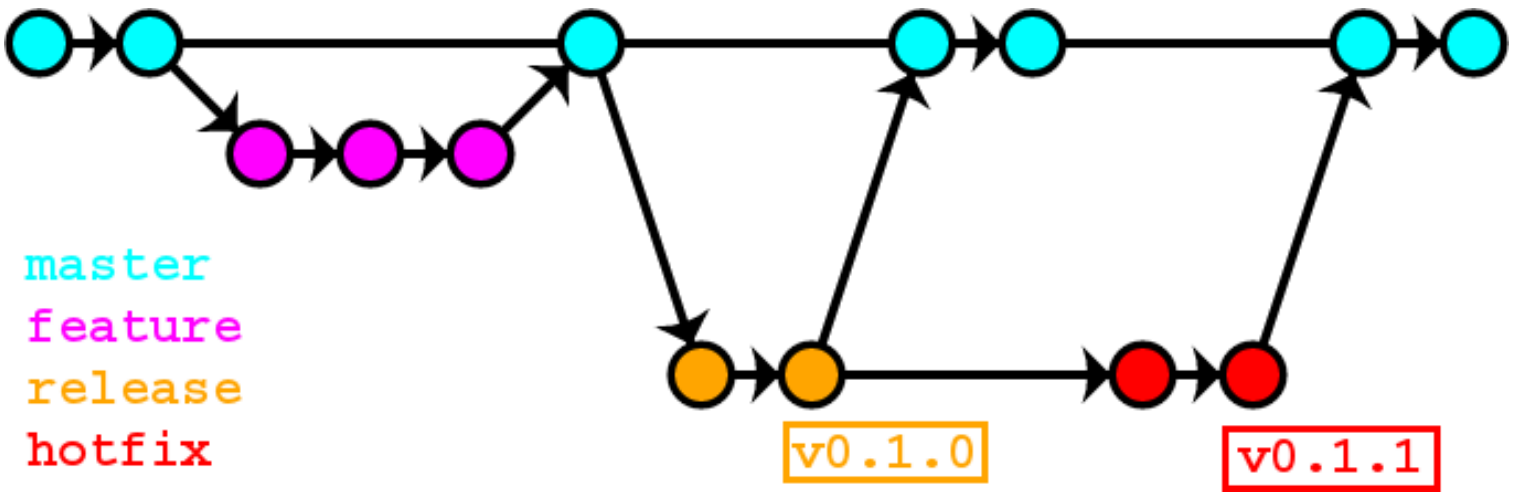
How version control works with Git and GitHub



Learning Objectives

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

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

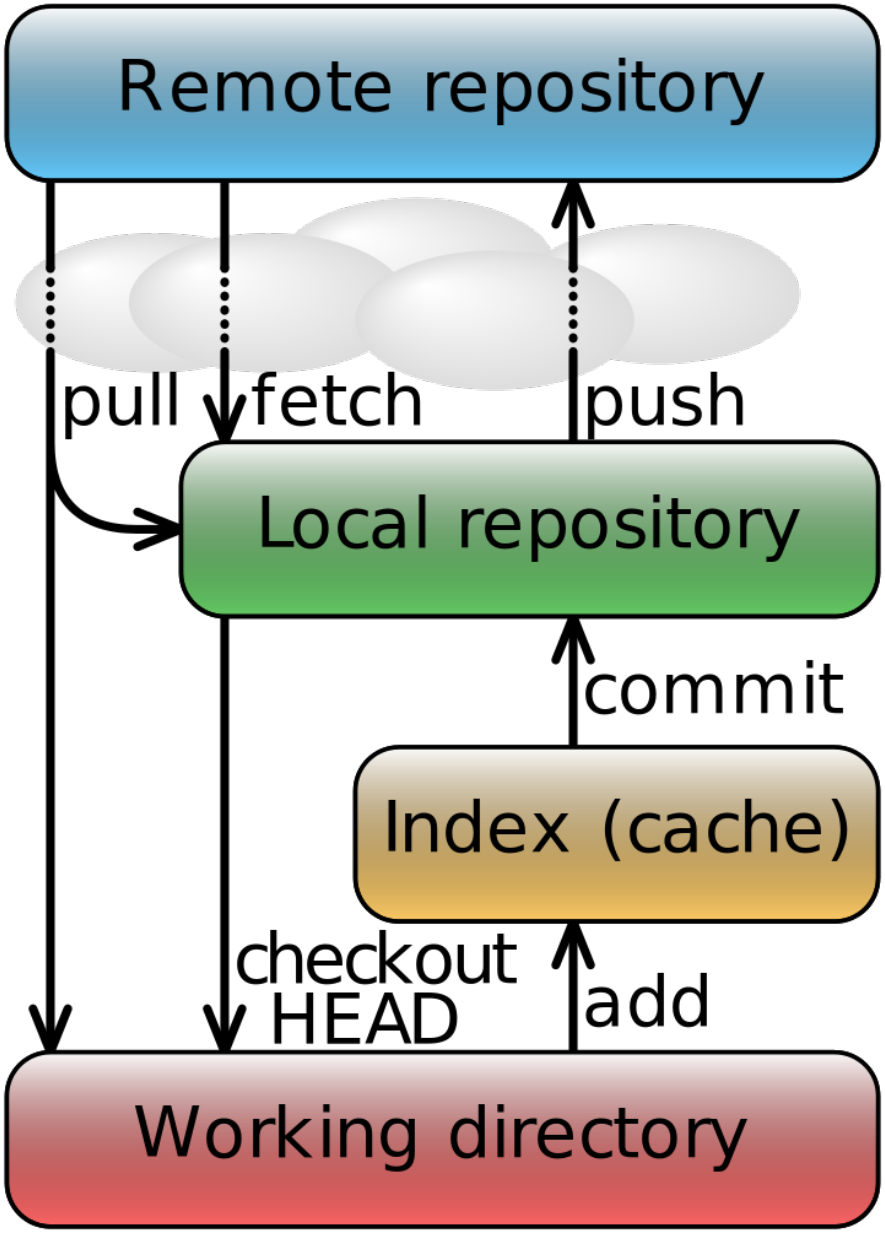


Outline

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

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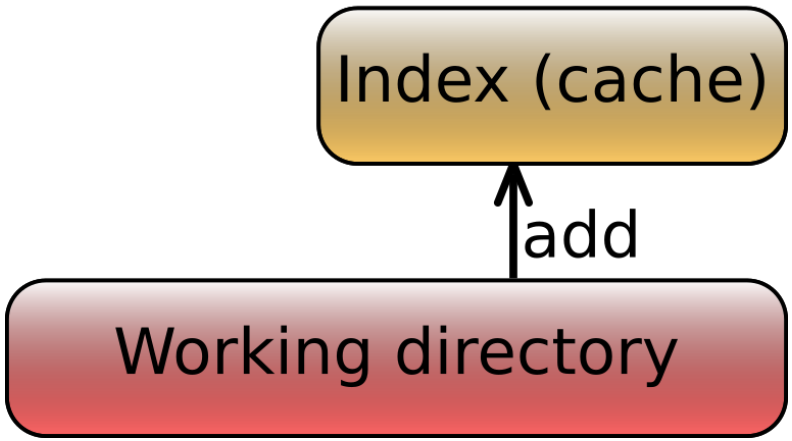
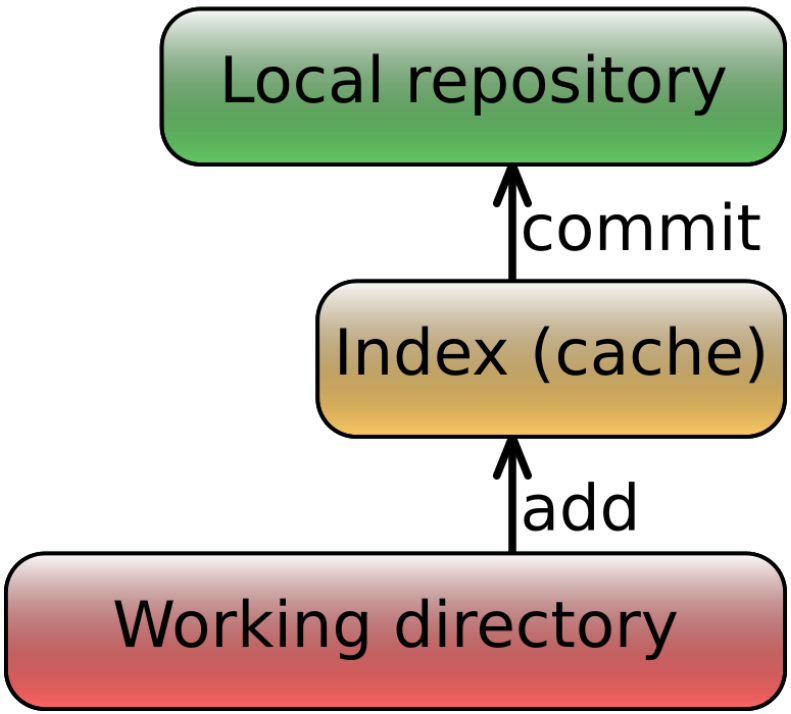


- The directory you are working in (on your computer) is the *working directory*
- **git init**
  Set up new Git repository
- **git add** <**file**>
  Add file to Git repository
- Needs to be done only once for each file

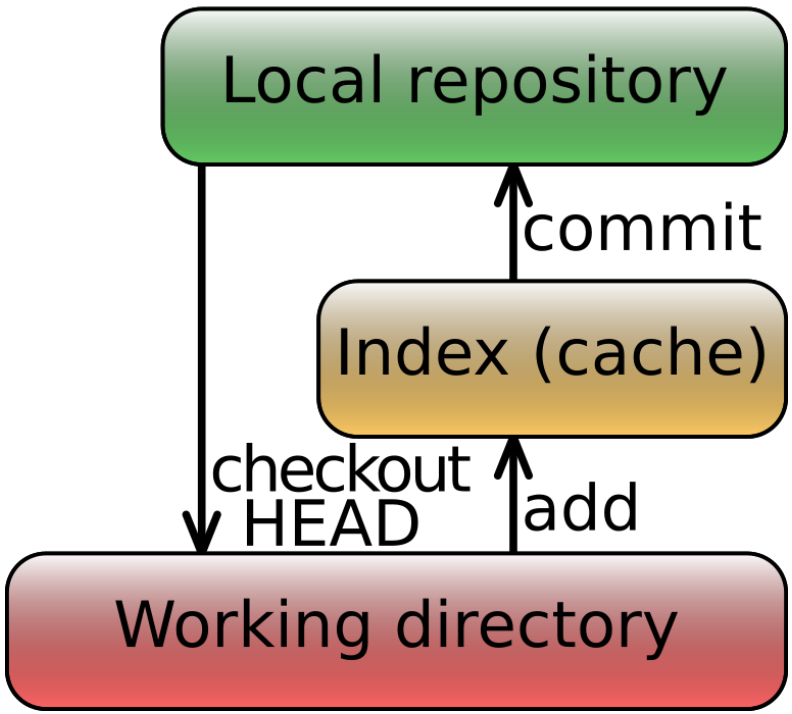
Commit

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

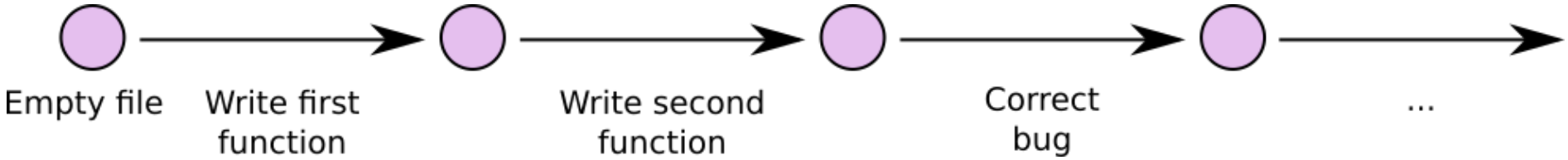
Commit



- **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!)

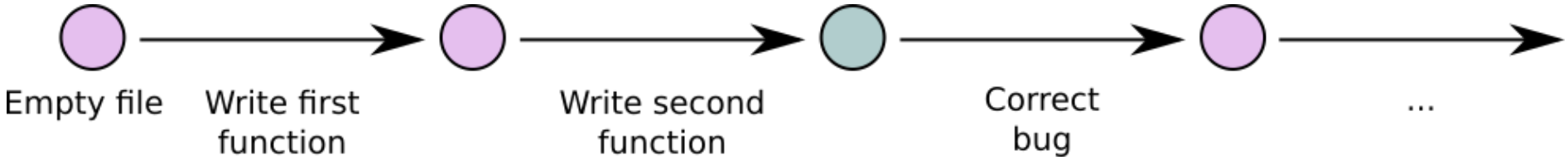
Revert

git revert <commitNumber>



Revert

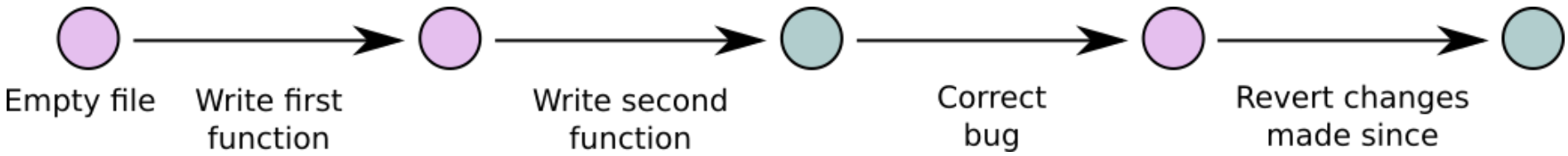
git revert <commitNumber>



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

Revert

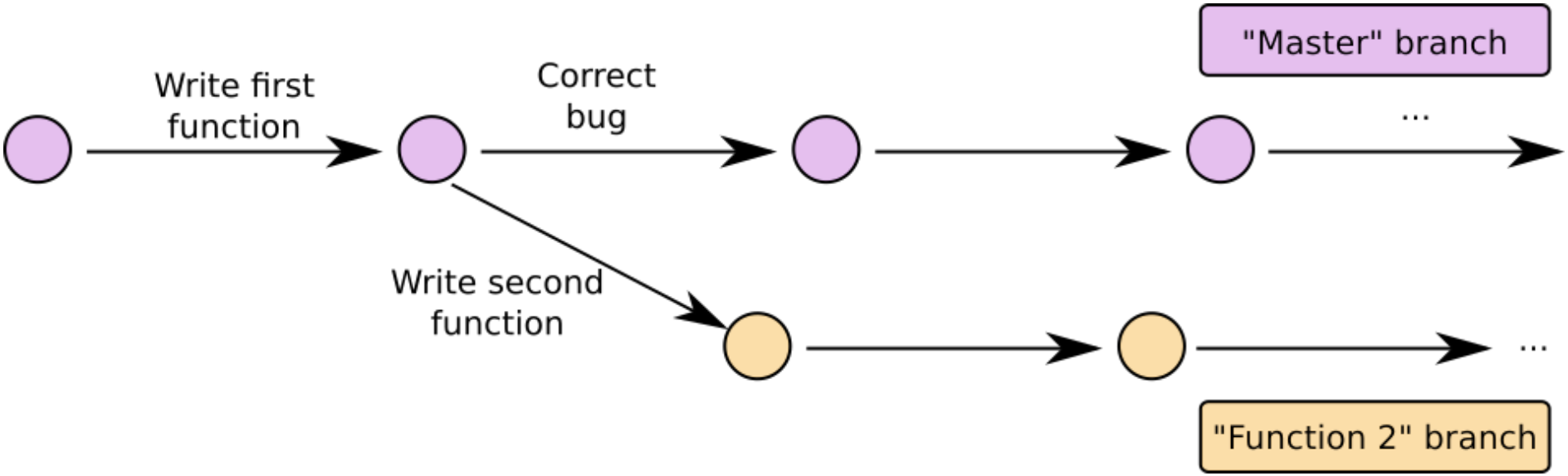
git revert <commitNumber>



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

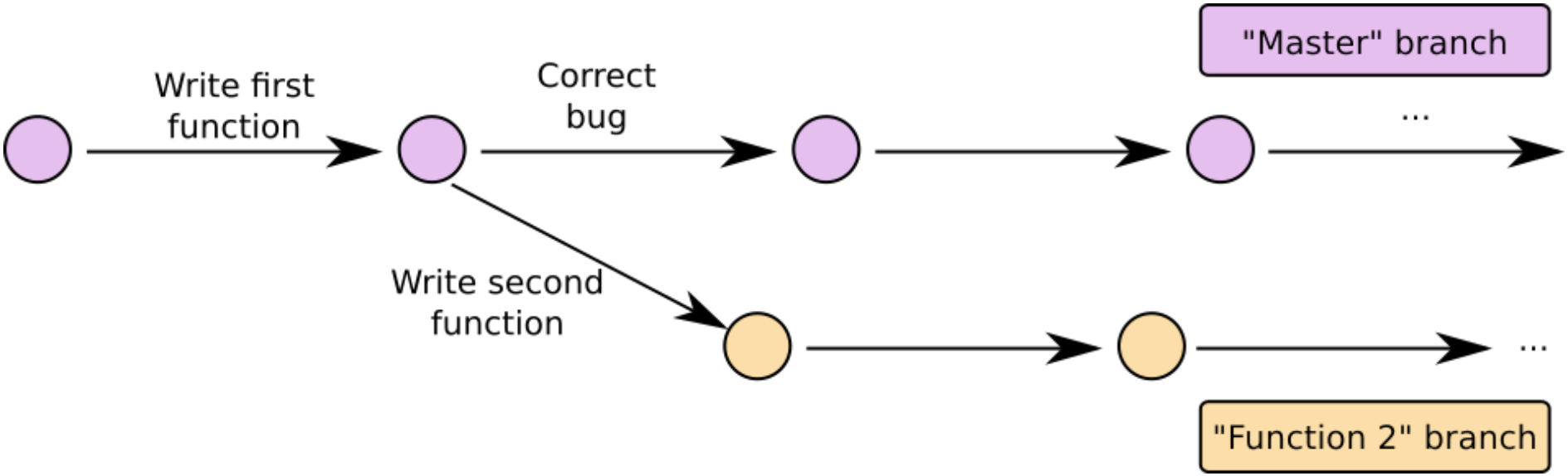
Branch

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?

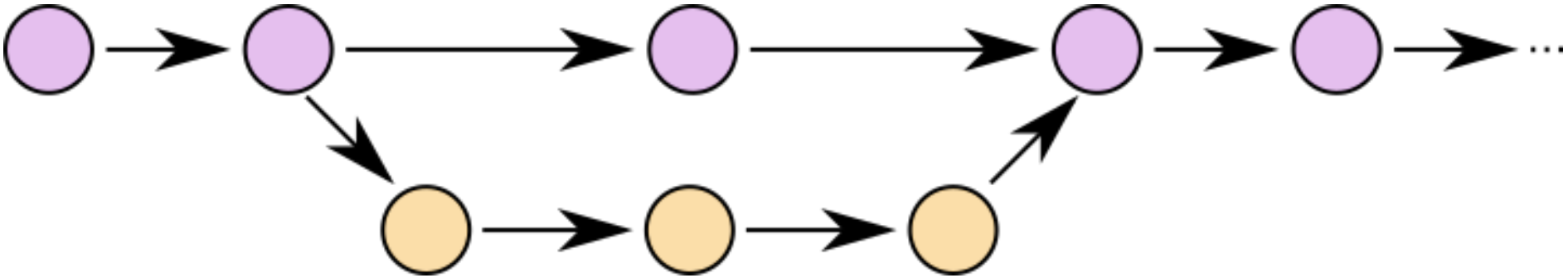
Branch



- **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?
  git checkout master

Merge

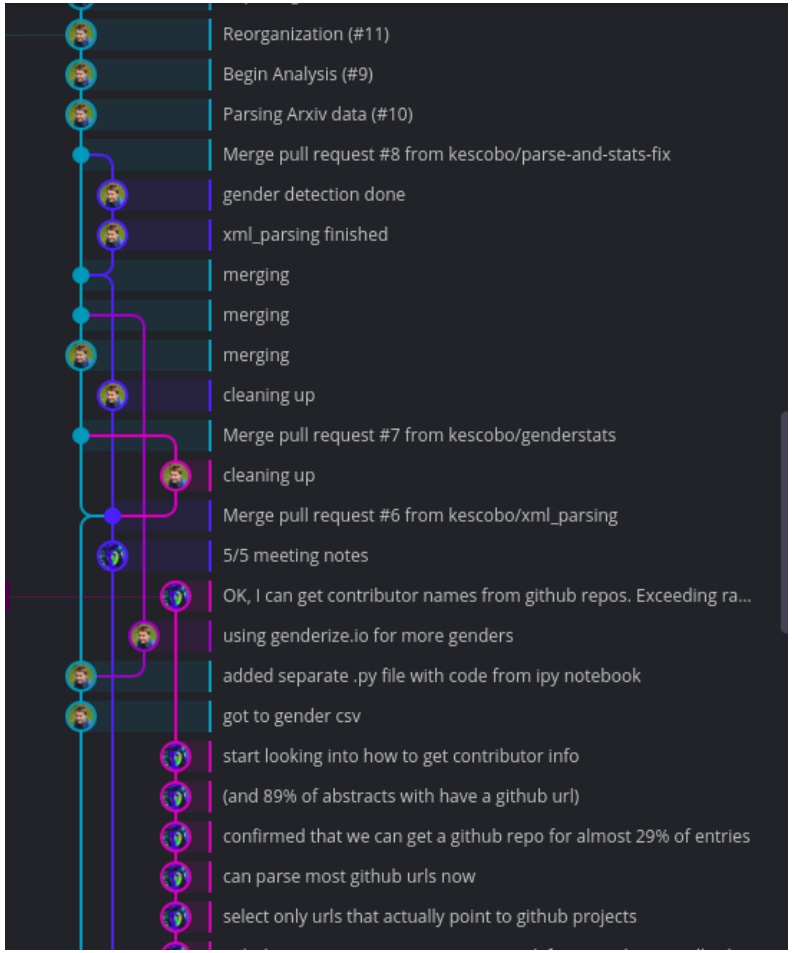
Merge



- **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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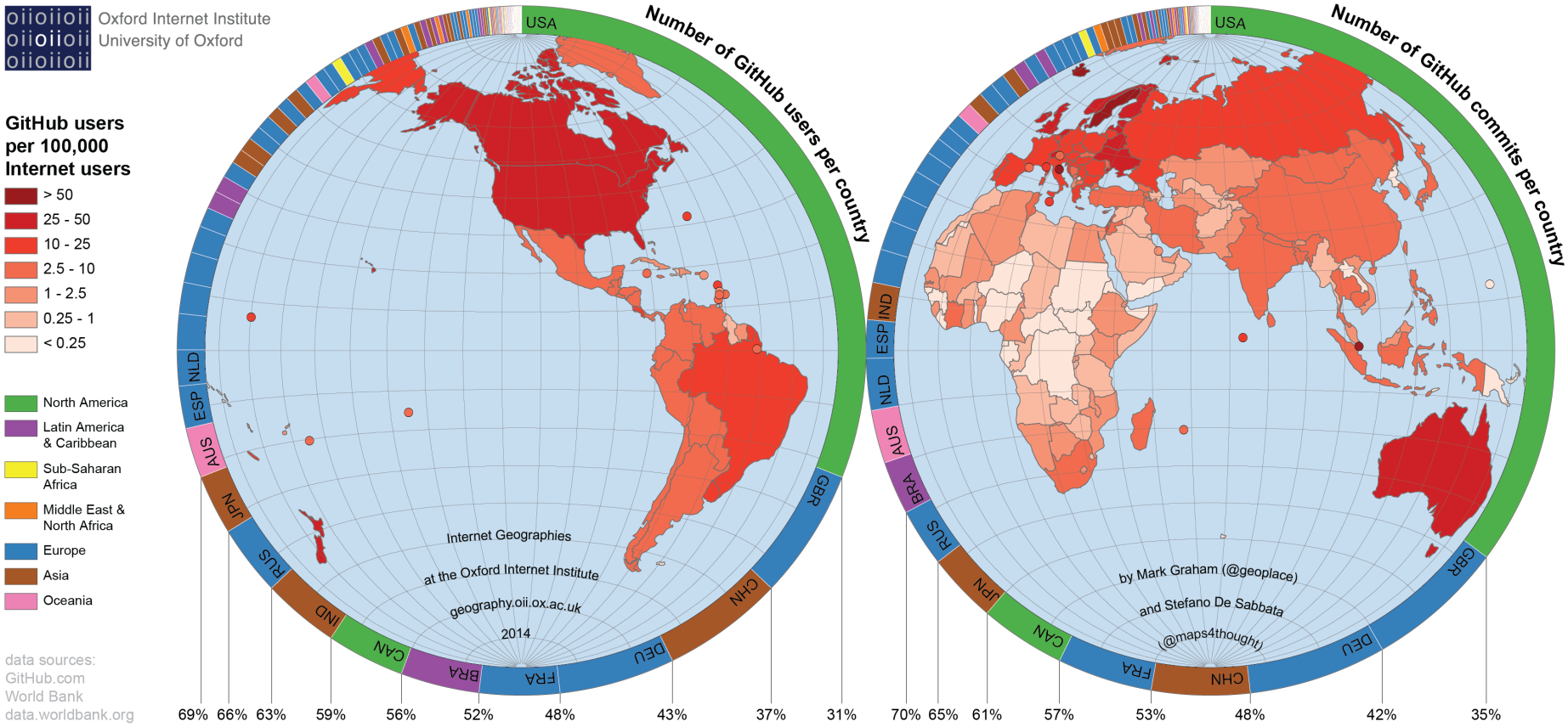
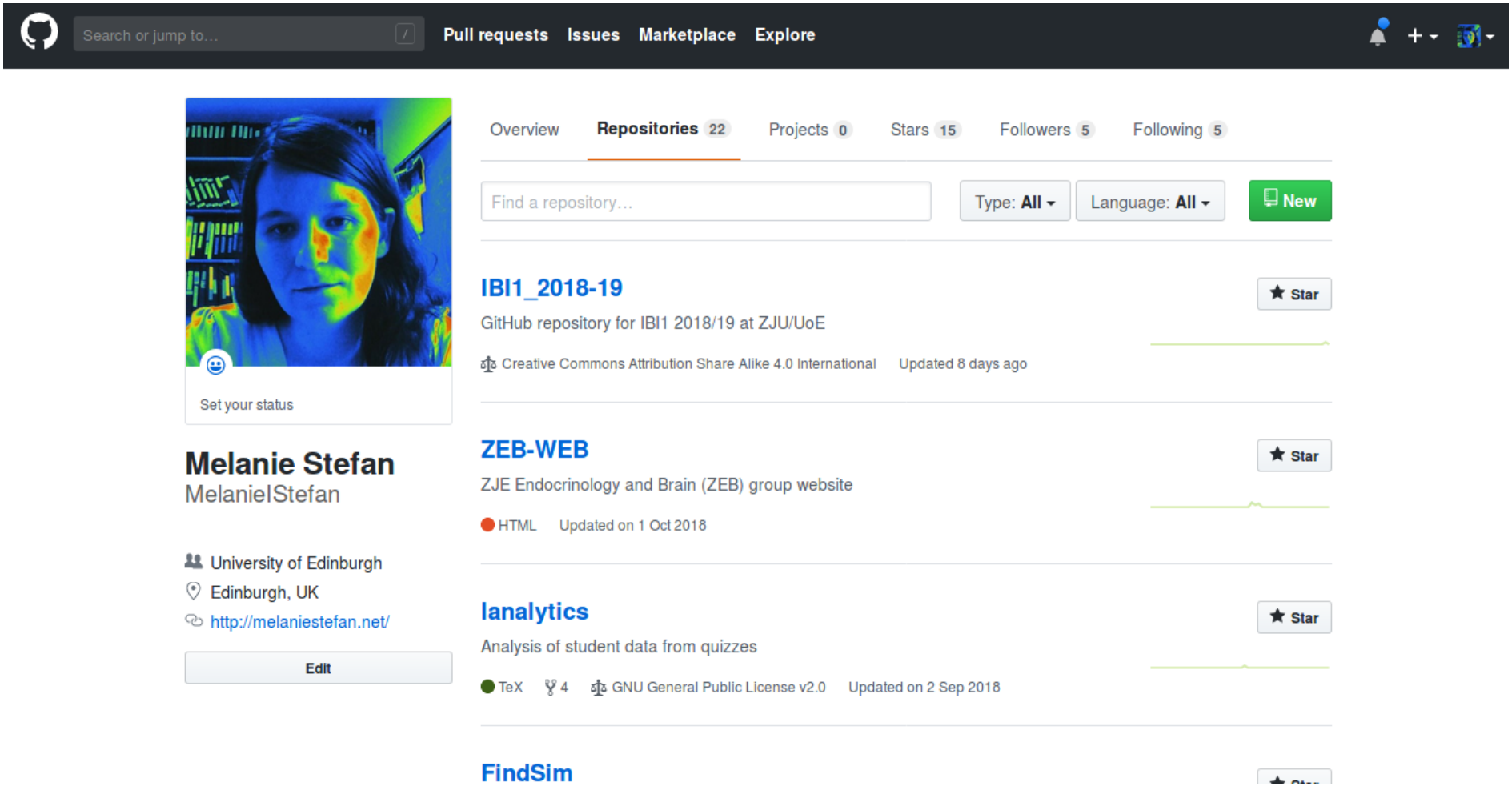
- Web-based hosting service for Git repositories
- Hosts remote Git repositories
- What can GitHub do that Git alone cannot?
- Stores projects outside a local machine
- Allows people worldwide to collaborate

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

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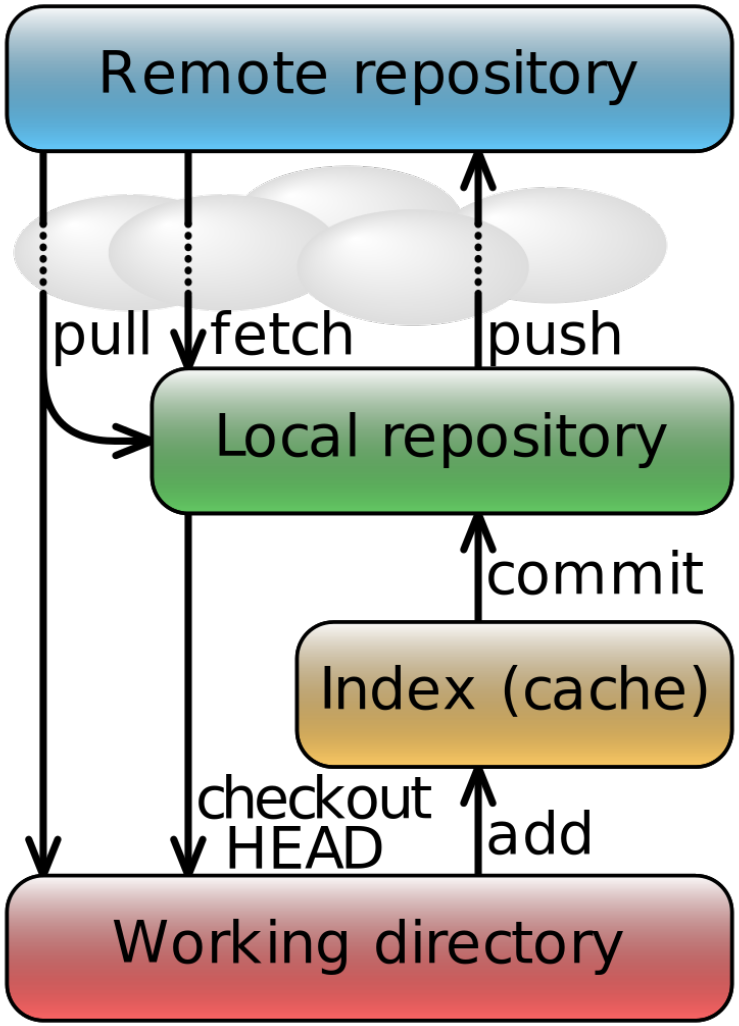
Fork (in GitHub): Create a version of an existing GitHub repository that you want to work on.

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

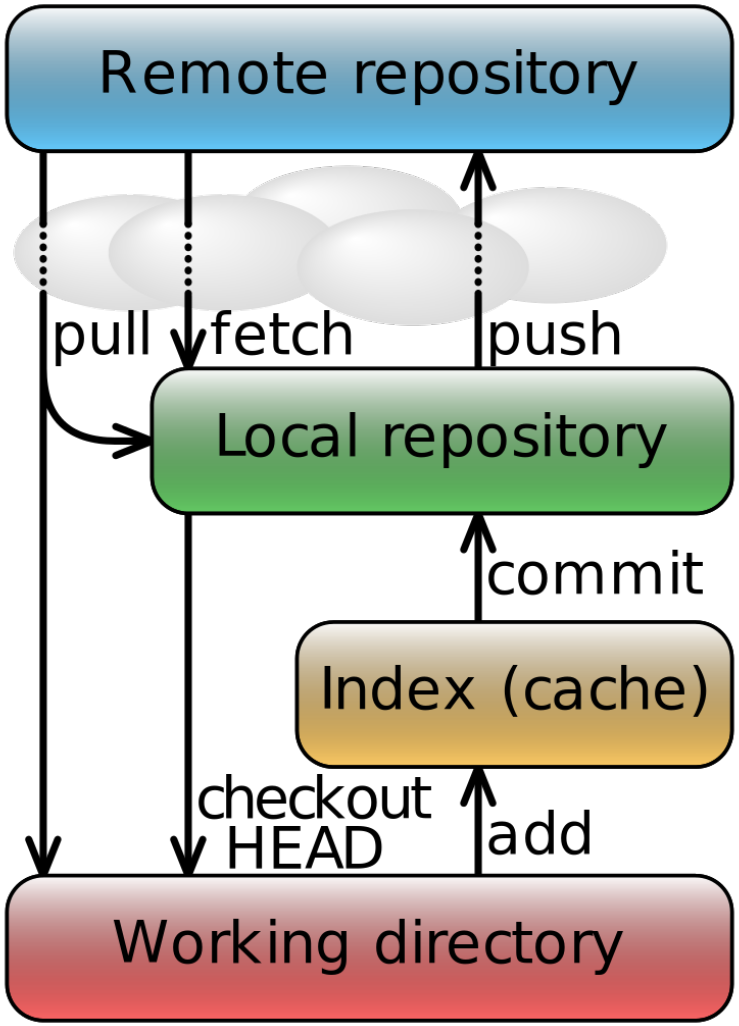
Moving between GitHub and local repo

Moving between GitHub and local repo



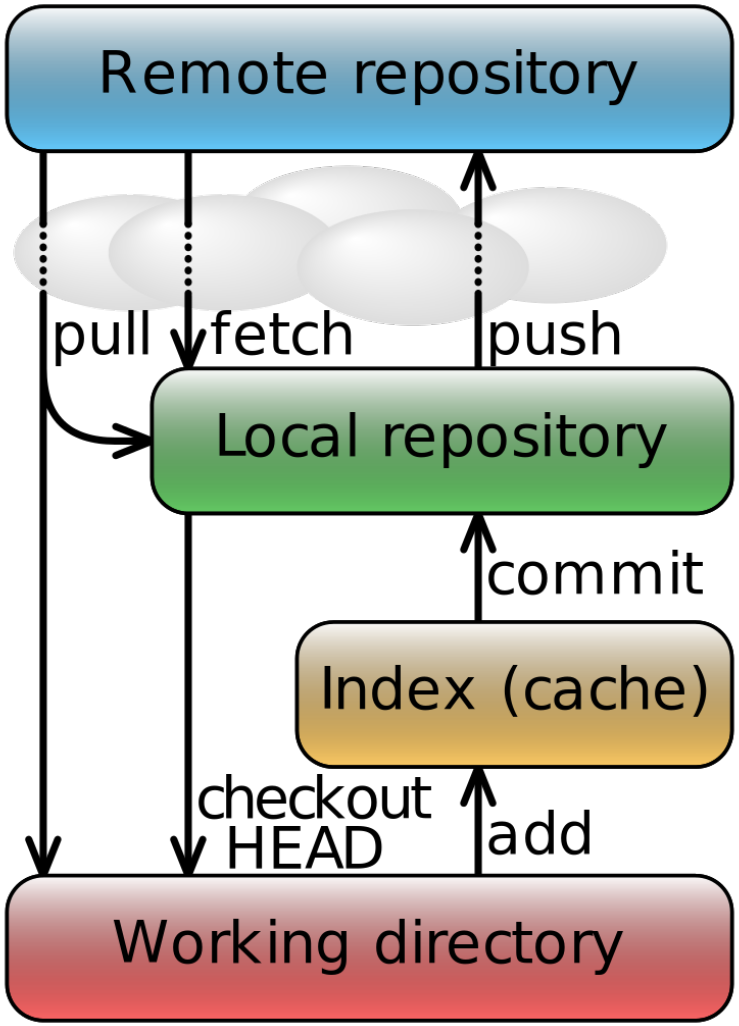
- **git push**
  Push changes to GitHub

Moving between GitHub and local repo



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

Moving between GitHub and local repo

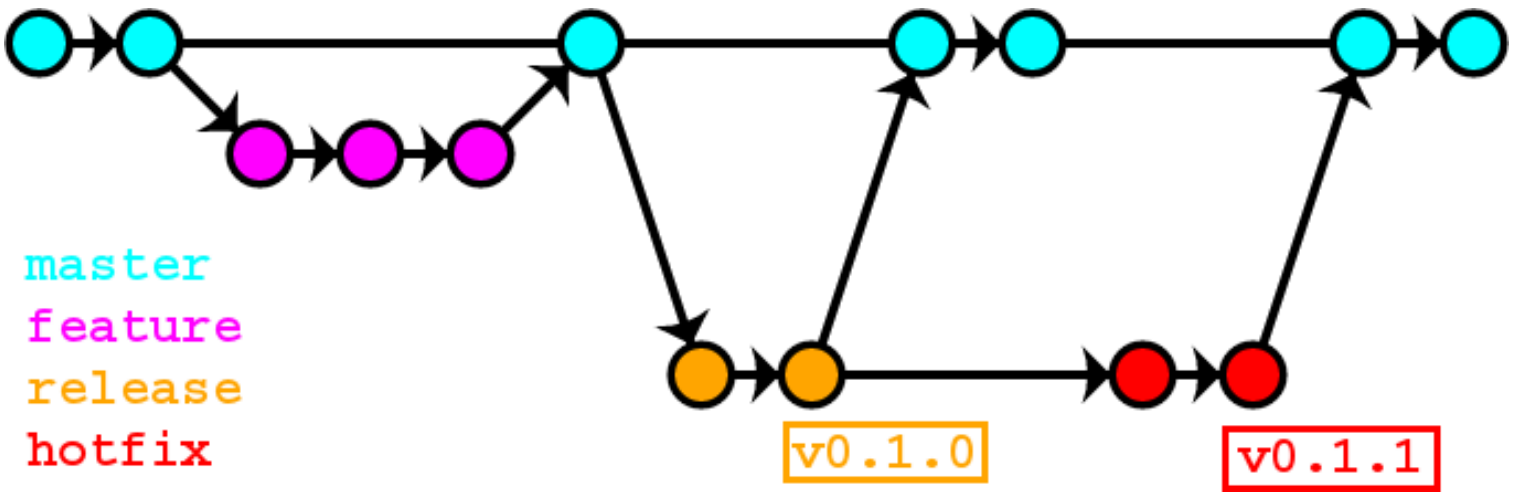


- **git push**
  Push changes to GitHub
- **git fetch**
  Get changes from GitHub
- **git pull**
  git fetch + **git merge**

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)]
- GitHub logo. GitHub [MIT (http://opensource.org/licenses/mit-license.php)]
- 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.