INF5750

Version control

University of Oslo
Department of Informatics

Background

- Version control system essential when collaborating on code
- Use version control system both for individual assignments and group projects
- Git will be used in this course

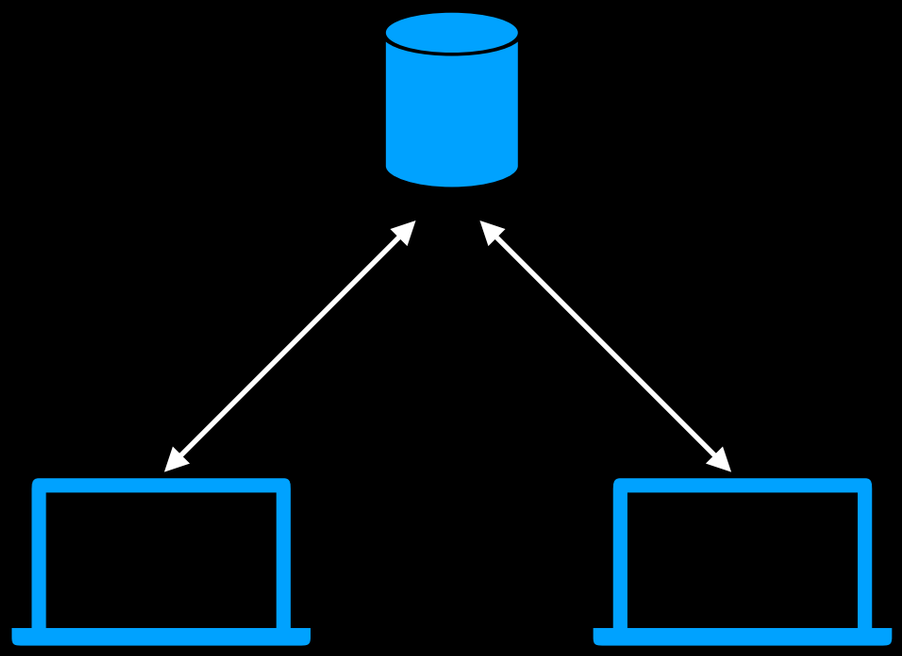
Repository

- Where everything is stored
- Stores every change to any file that has been *commited*
- Administrative information is kept in hidden folder (for example .git)

Centralized vs distributed

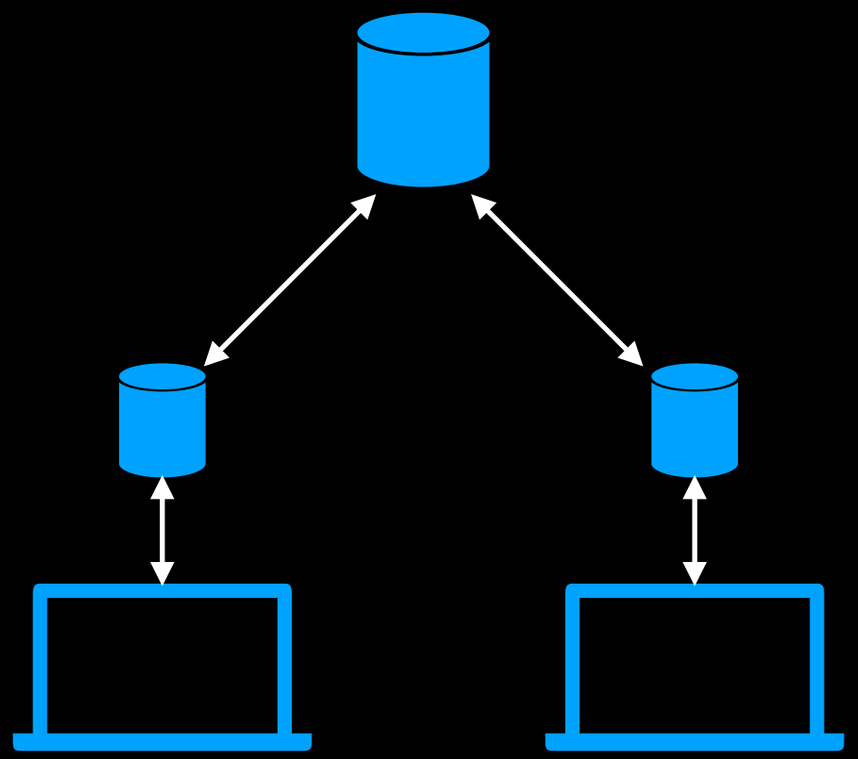
Centralized

Each developer works
against one central repository



Distributed

Each developer has a full local copy of the repository, and pushes changes from the local to the central repository



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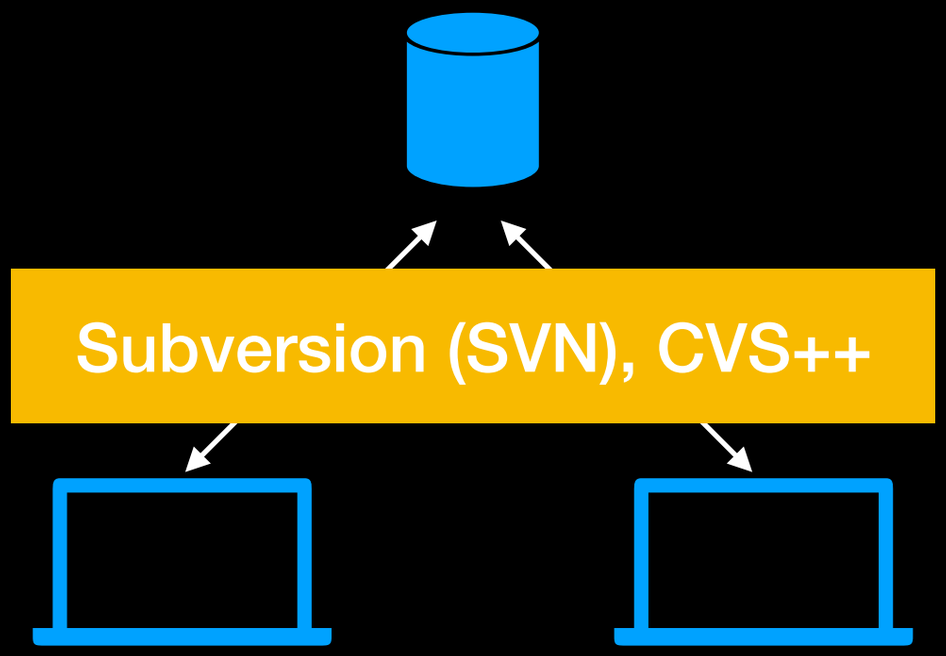

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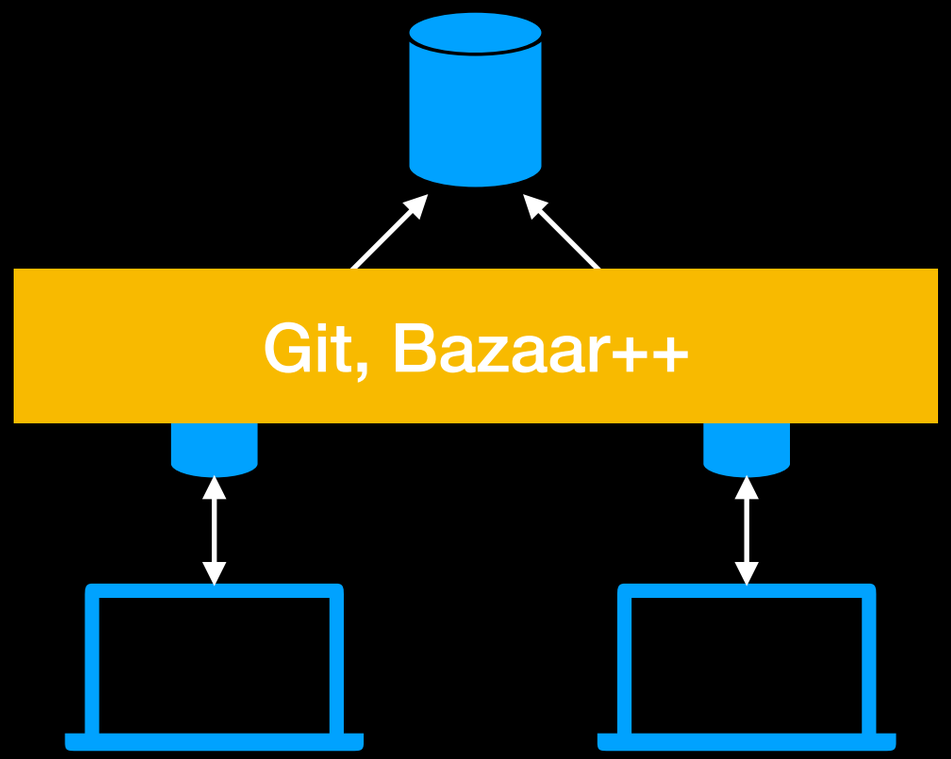


Centralized vs distributed

- Advantages of distributed version control:
    - Several smaller commits can be made privatly then pushed together as a whole
    - Everything but pushing/pulling to central repository can be done offline
- Disadvantages of distributed version control:
    - Repositories with large files or long history can become big

Working tree

Repository

Staging area

Working tree

checkout

src

index.html

app.js

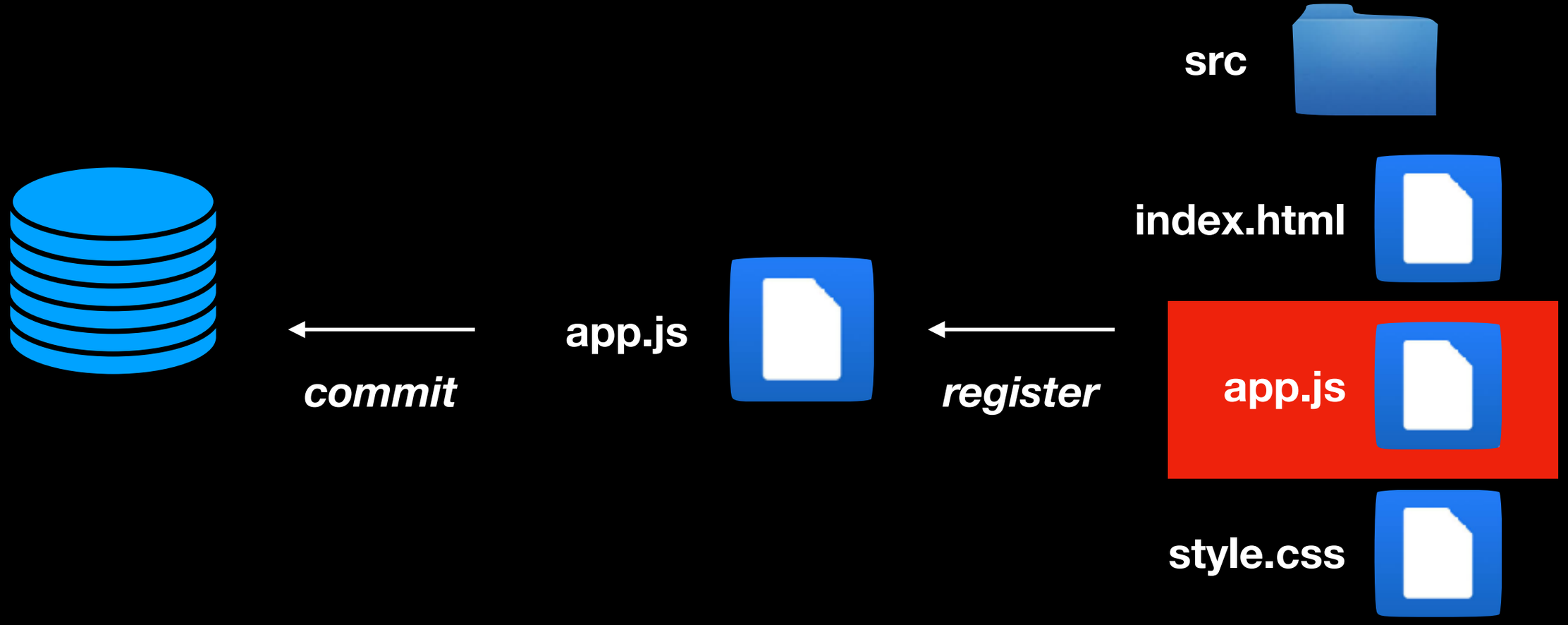
style.css

Working tree

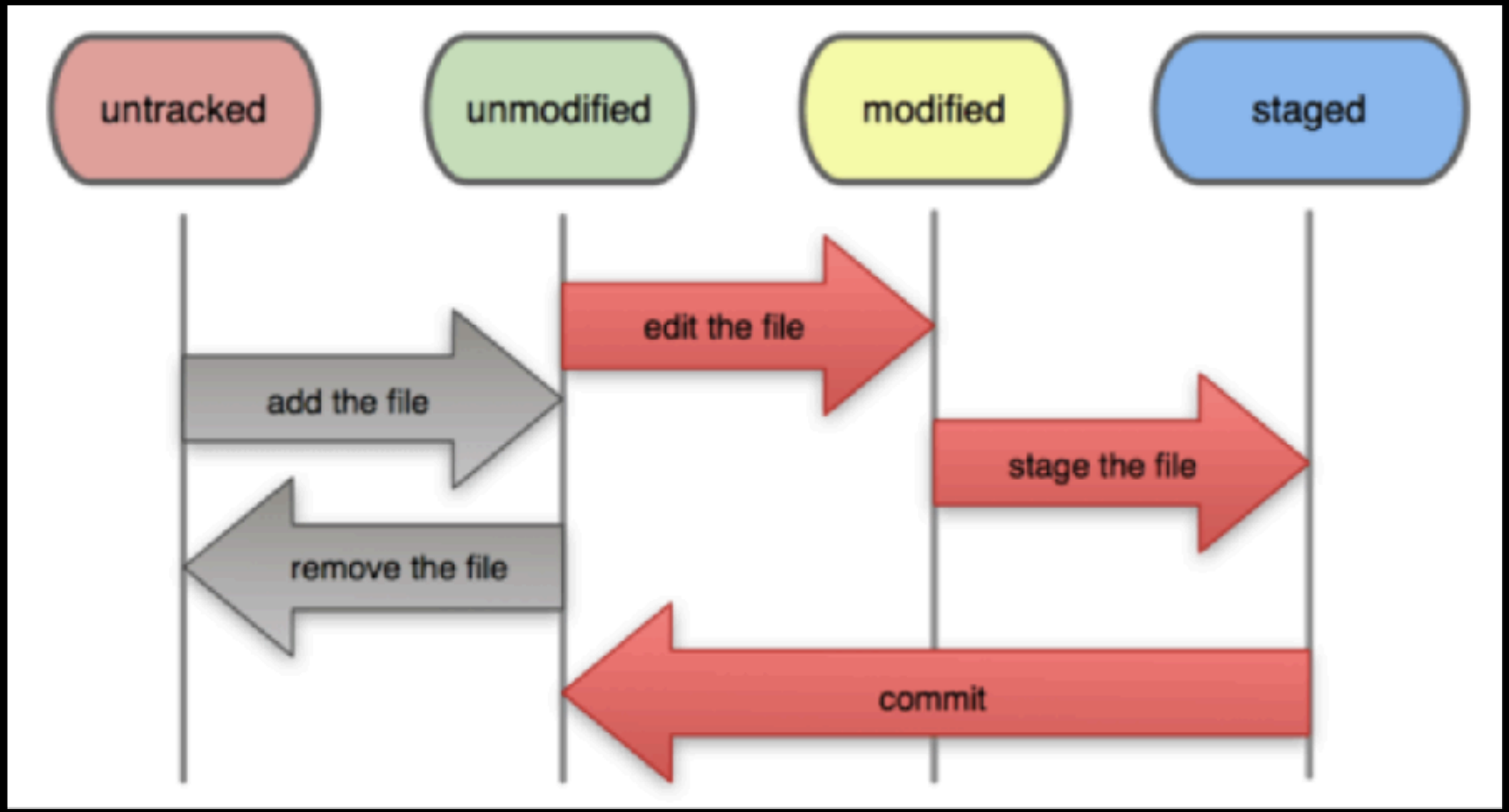
Repository

Staging area/
index

Working tree



File status


untracked
unmodified
modified
staged
edit the file
add the file
stage the file
remove the file
commit

Revisions

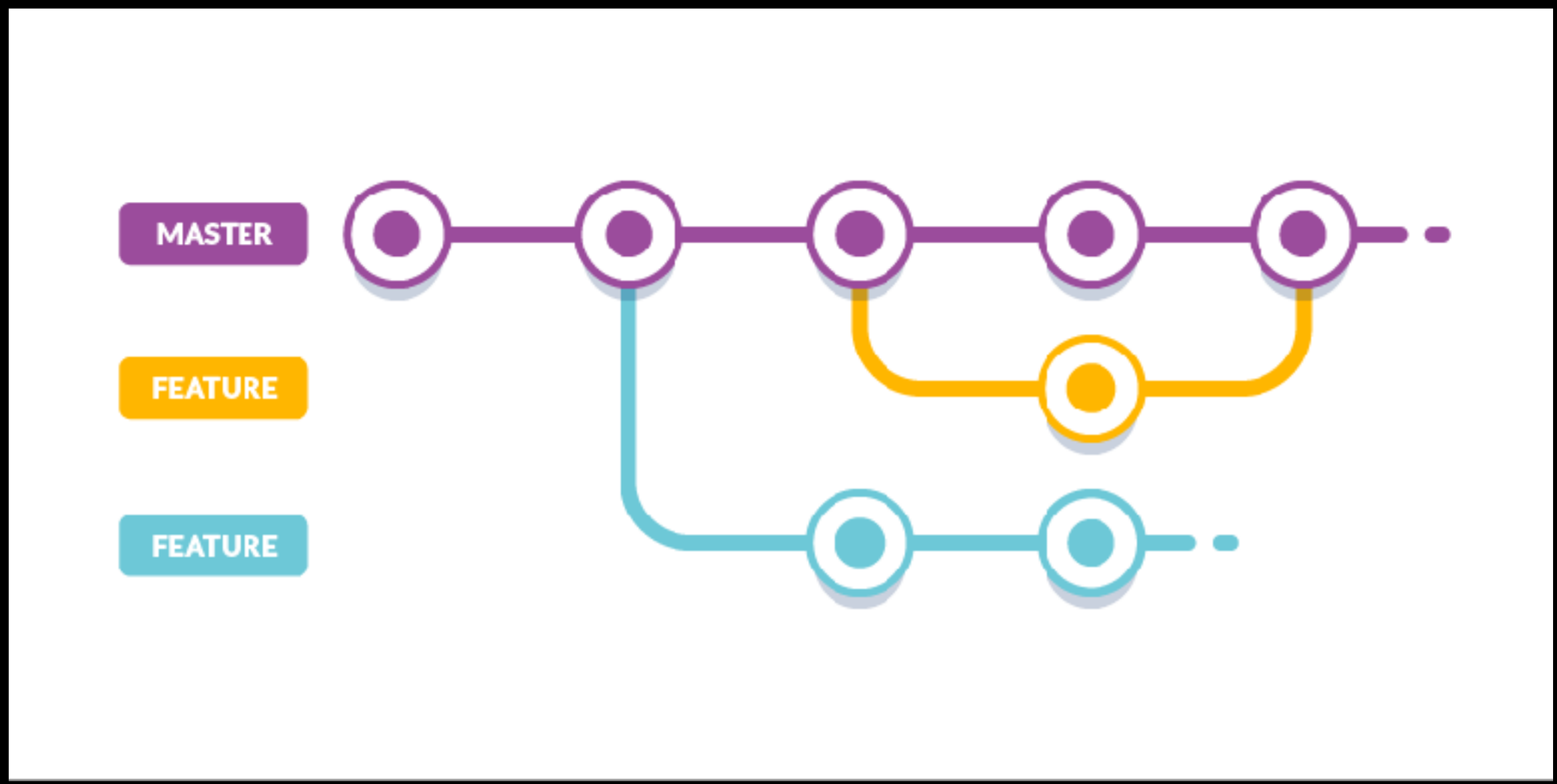
- Each *commit* creates a *revision* with a unique identifier
- Each *revision* refers to a state of a branch
- Revisions can be:
  - checked out - creates a working tree with the state of the branch when it was commited
  - reverted - undoing changes in that commit

Branches

- *master* is the original/main line of development - also a branch
- A *branch* is a copy of master which exists independently and is maintained separately - can later be merged
- Useful in several situations:
  - Large modifications which takes long time and affects other parts of the system (safety, flexibility, transparency)
  - Different versions for production and development
  - Customised versions for different requirements

Master and branches

- Different workflows/philosophies exists - features branches, relsease branhces, development branches



source: https://buddy.works

Conflicts

- A *conflict* occur if more than one developer modifes the same part of a file
- Git tries to auto-resolve conflicts
- Must be resolved manually if auto-resolve fails

Pull Requests

- Useful when working on repositories without permission to commit

- *pull request* - request that the maintainer of the repository pull and merge your changes

- Two models:

    - fork repository - pull requests from private to central repository

    - make branch in repository - pull requests from feature branch to master

Good practice

- Update (fetch changes and merge) and test *before* commiting
- Update before editing
- Commit often - check changes before commiting
- Add source code and configuration files
- Don’t add generated files, libraries, IDE files etc

Resources

Git basics:
http://rogerdudler.github.io/git-guide/

Git and GitHub at UiO:
http://www.uio.no/tjenester/it/maskin/filer/versjonskontroll/github.html [norwegian]
https://github.uio.no

source: https://xkcd.com