2024 TdP

Git & GitHub

Quick introduction

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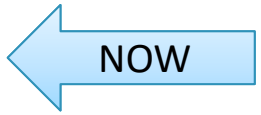
Goal

- What is Revision Control?
- What is Git?
- What is GitHub?
- How to access Revision Control with Git and GitHub from within Eclipse?
- What are the Eclipse workflows useful in this course?

Version Control Systems

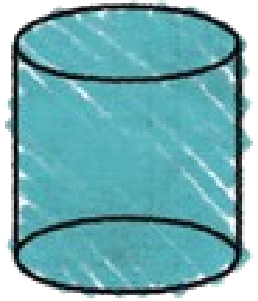
Record changes to a file or a set of files over time so that you can recall specific versions later

- Three generations:
  - Local (RCS, SCCS)
  - Centralized (CVS, Subversion, Team Foundation Server)
  - Distributed (Git, Mercurial)



Basic Concepts

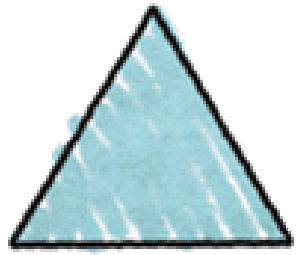
- **Repository**
  - place where you store all your work
  - contains every version of your work that has ever existed
    - files
    - directories layout
    - history
  - can be shared with the whole team



Basic Concepts

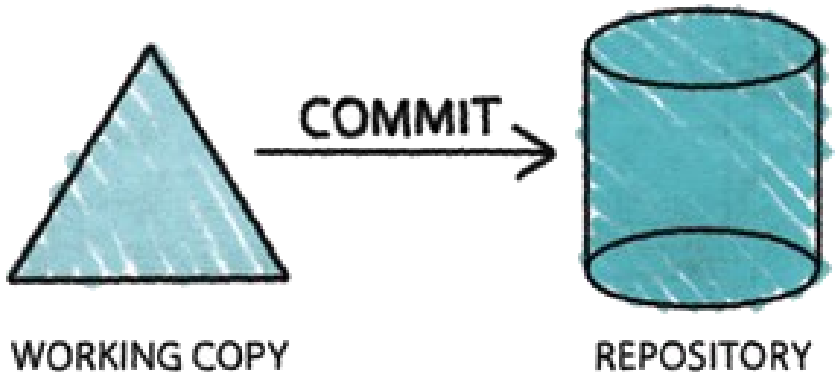
Working copy

- a snapshot of the repository used for… working
- the place where changes happens
- private, not shared with the team
- it also contains some metadata so that it can keep track of the state of things
  - has a file been modified?
  - is this file new?
  - has a file been deleted?



WORKING COPY

Basic Concepts



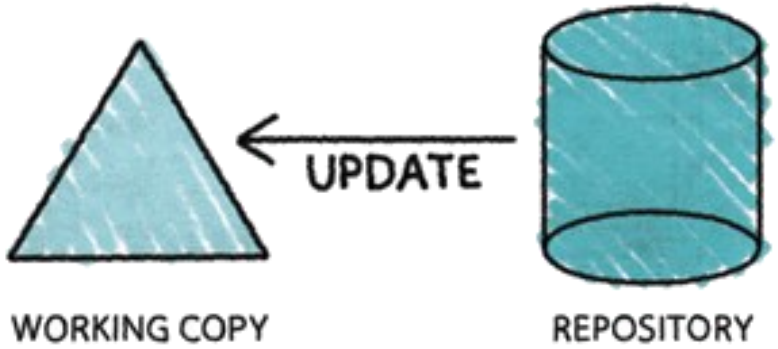
Commit

- the operation that modifies the repository
- atomically performed by modern version control tools
  - the integrity of the repository is ensured
- it is typical to provide a log message (or comment) when you commit
  - to explain the changes you have made
  - the message becomes part of the history of the repository

Basic Concepts

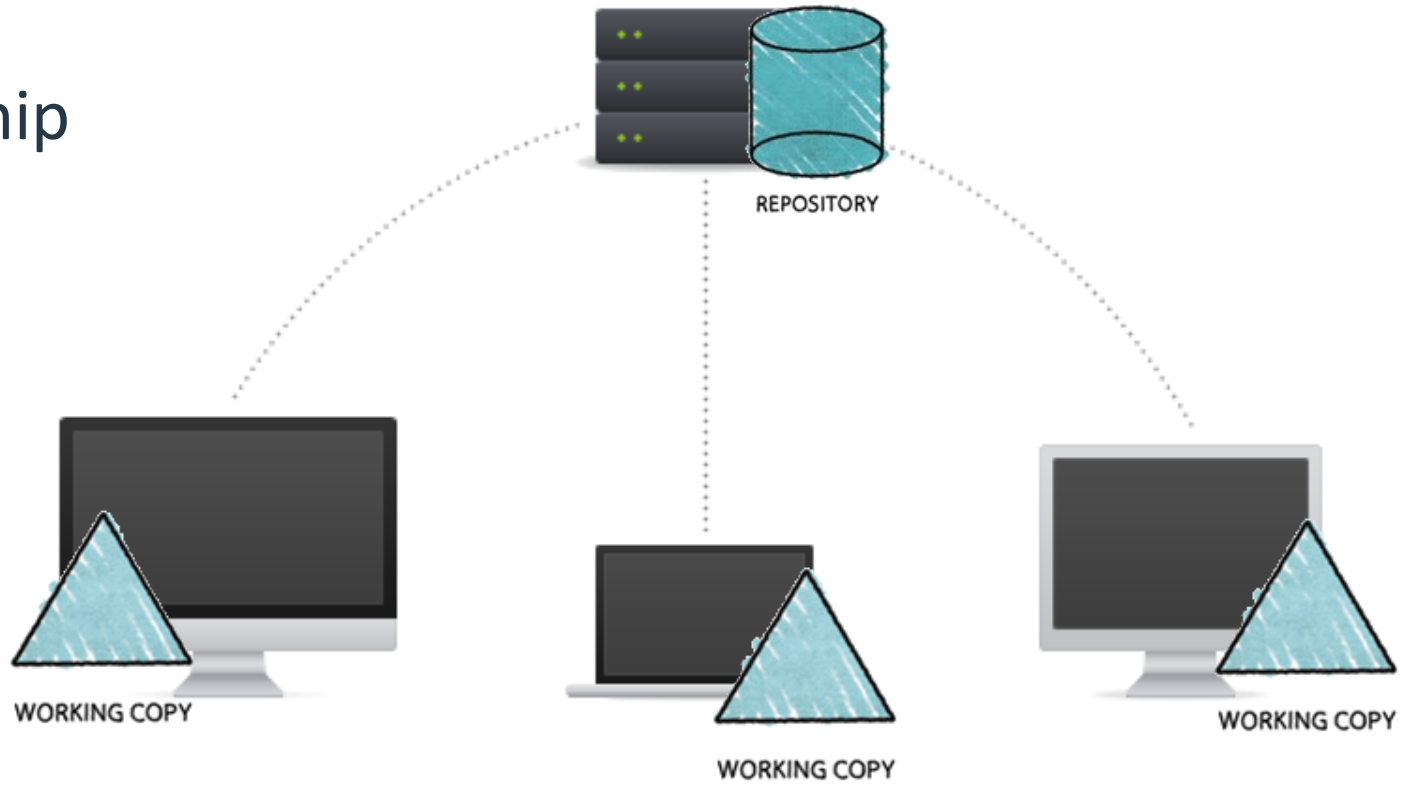
Update

- update the working copy with respect to the repository
  - apply changes from the repository
  - merge such changes with the ones you have made to your working copy, if necessary



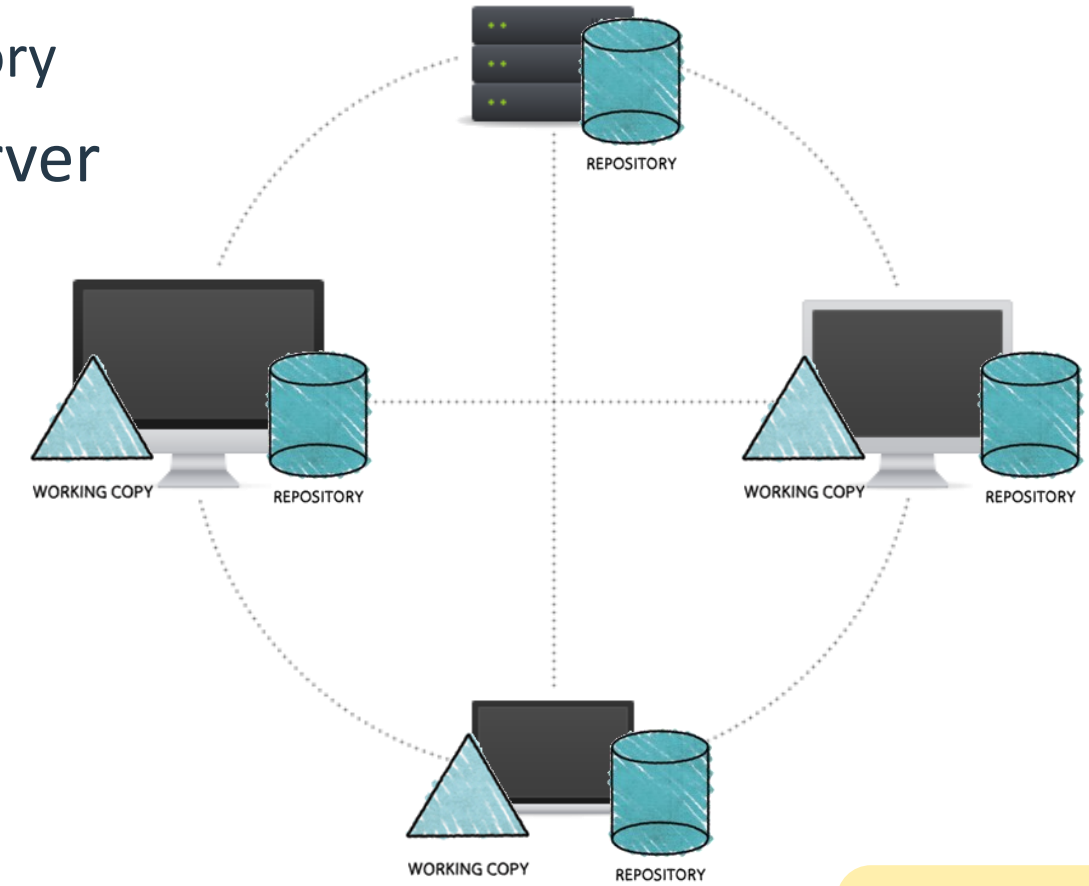
Centralized Version Control

- one central repository
- client-server relationship



Distributed Version Control

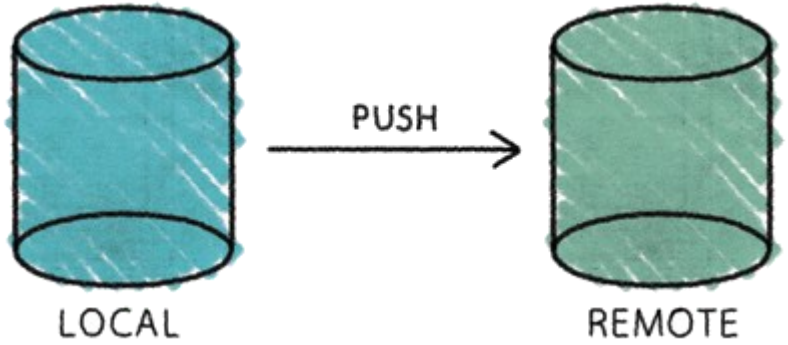
- clients and server have the full copy of the repository
  - local repositories ‘clone’ a remote repository
- it is possible to have more than one server



More Basic Concepts

Push

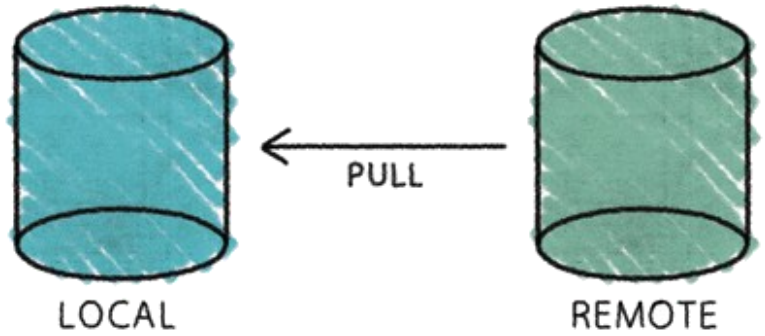
- copy changesets from a local repository instance to a remote one
  - synchronization between two repository instances



More Basic Concepts

Pull

- copy changesets from a remote repository instance to a local one
  - synchronization between two repository instances



Introducing… Git

- Distributed Version Control System
- Born
  - on 2005 for the Linux kernel project
  - to be used via command line
- Website: http://git-scm.com
- Highlights:
  - free and open source
  - strong support for non-linear development
  - fully distributed
  - efficient handling of large projects
  - cryptographic authentication of history

Getting started with Git

- Standard installations
  - http://git-scm.com/downloads
- Available for all the platform
- Git Graphical Applications
  - http://git-scm.com/downloads/guis
  - Suggestion: GitExtensions, SourceTree, Fork
- For this course, Git is
  - integrated in PyCharm

Hosted Git

- To have (at least) one remote repository
  - alternative: set up your own Git server!
- Most popular:
  - **GitHub, https://github.com/**
  - Bitbucket, https://bitbucket.org/
  - GitLab, https://about.gitlab.com/gitlab-com/

GitHub

- Slightly different than other code-hosting sites
  - instead of being primarily based on the project, it is user-centric
  - social coding
- Owned by Microsoft
  - free account to host as many open source project as you want
  - free plans for students
    - https://education.github.com

For Labs

- Create a personal GitHub account
  - You will have “education” discounts if you use your University e-mail
  - https://education.github.com
- Try Git!
  - http://try.github.io/
  - 15 minutes tutorial

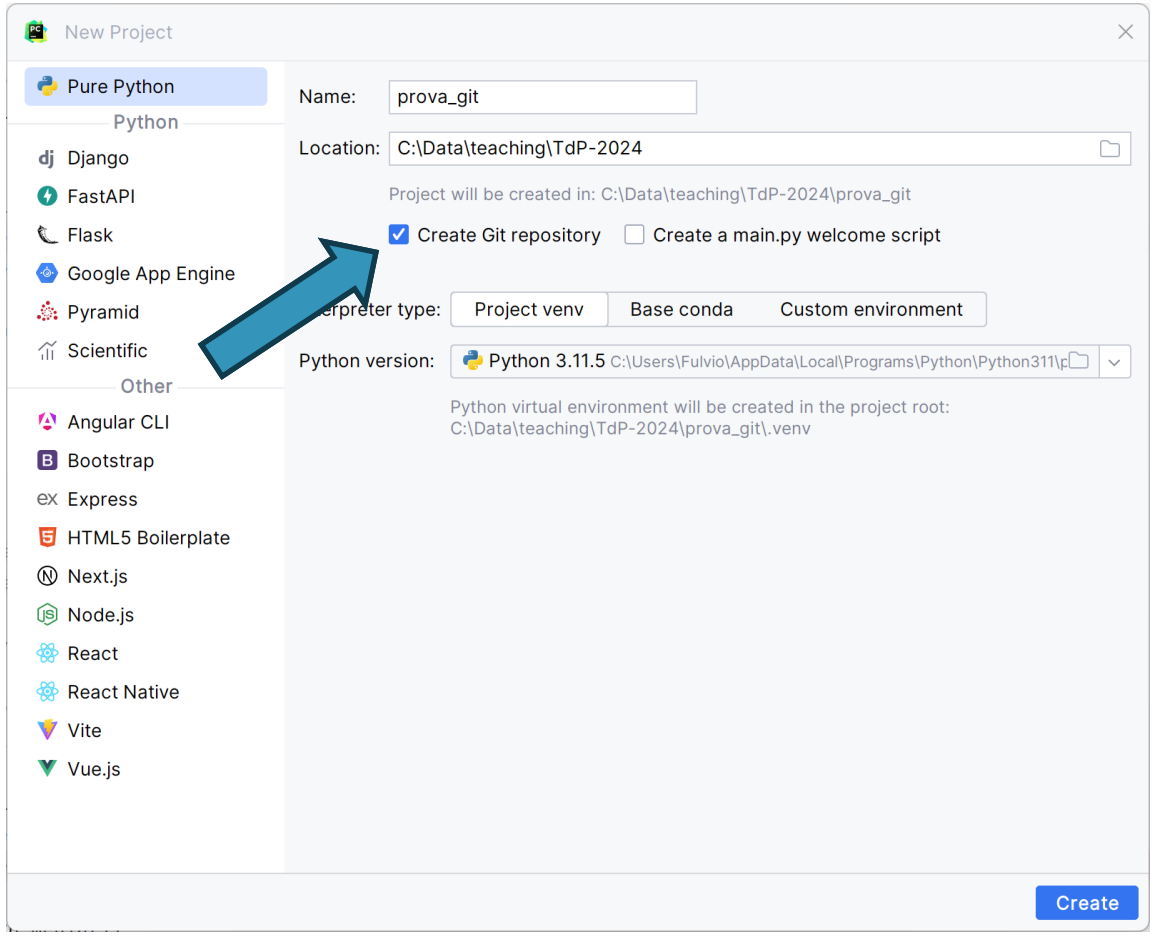
Quick introduction to Git & GitHub

GITHUB-BASED WORKFLOWS

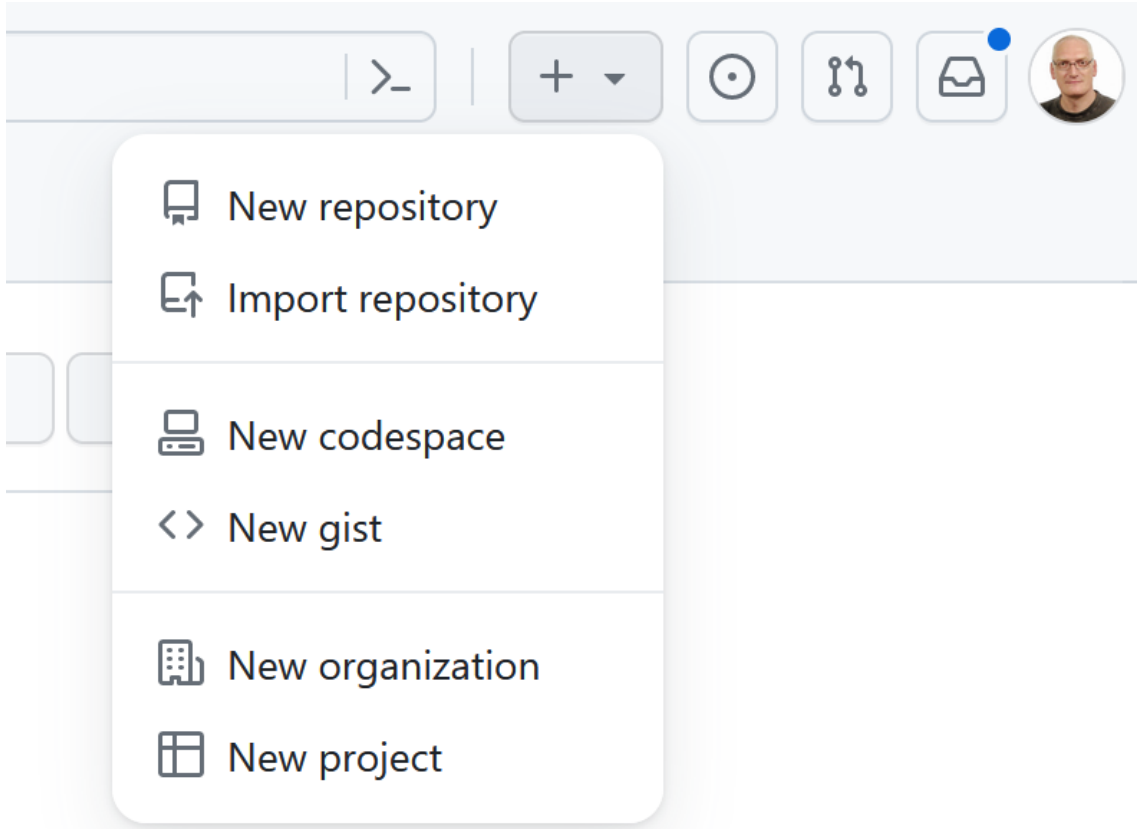
Workflow 1: “Create new project”

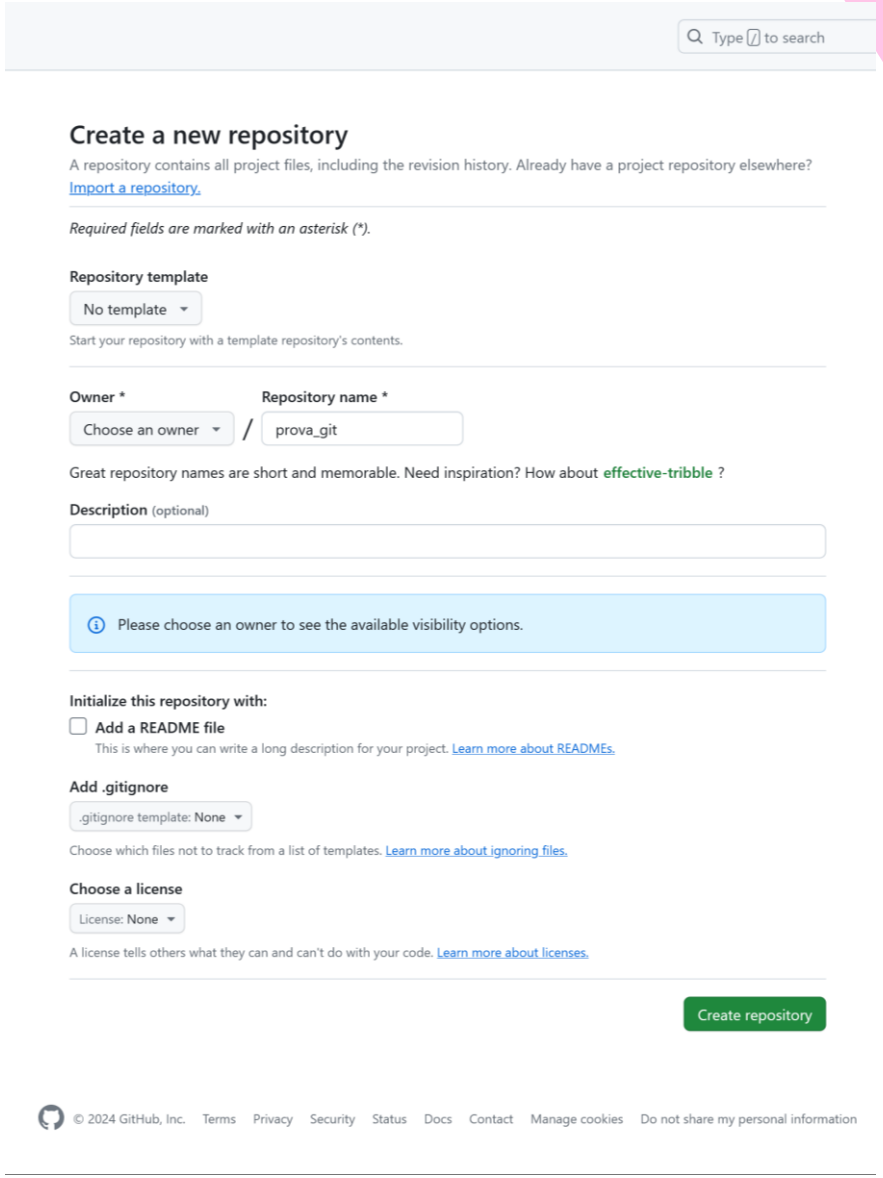
1. Create a project in PyCharm
    1. File/New Project…
    2. Select “Create Git Repository”
2. Create and edit Python files
3. Create a new (empty) project in GitHub
    1. Copy the Project URL
4. Push changes (**Commit&push**)
    1. The first time, you must Define Remote

Create new project in PyCharm

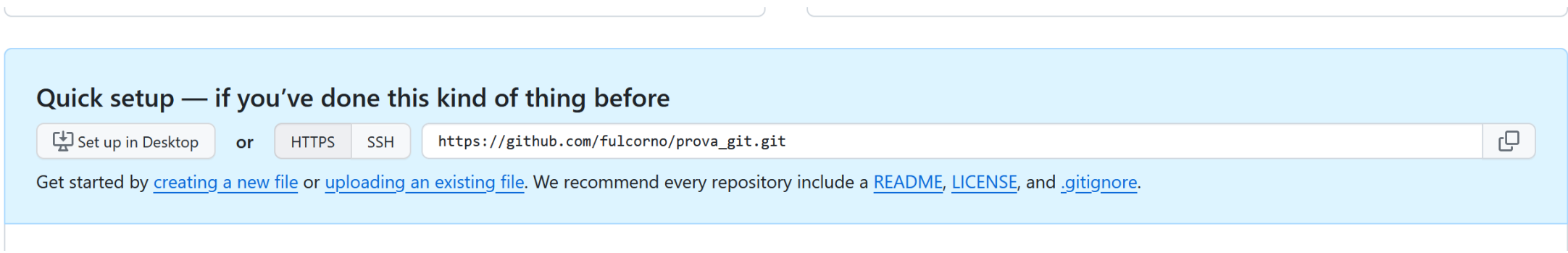


Create Repository in GitHub

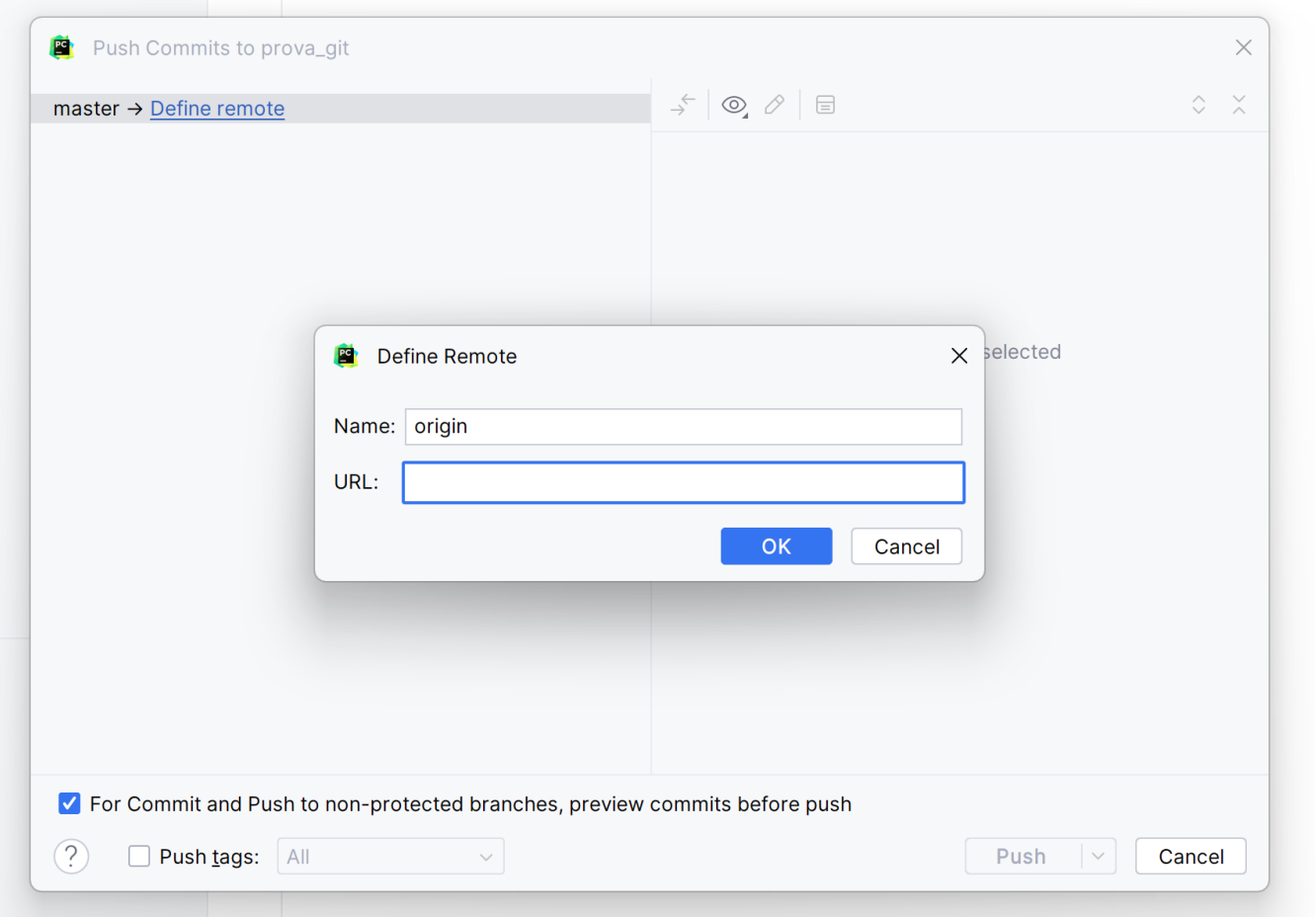




Copy the Repository URL



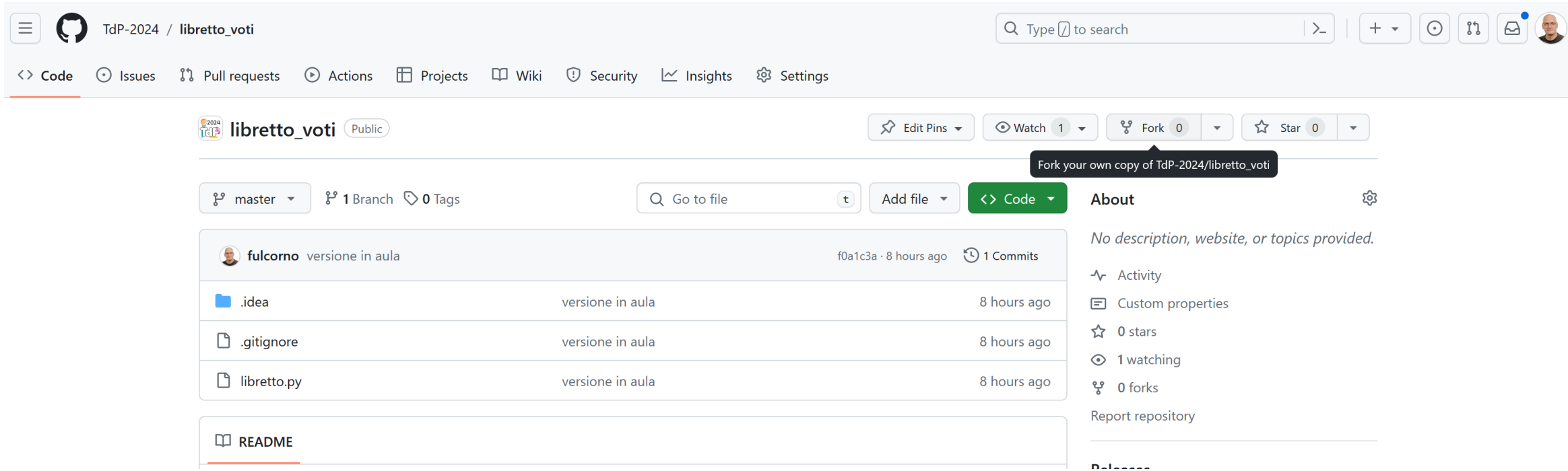
Defining remote to push



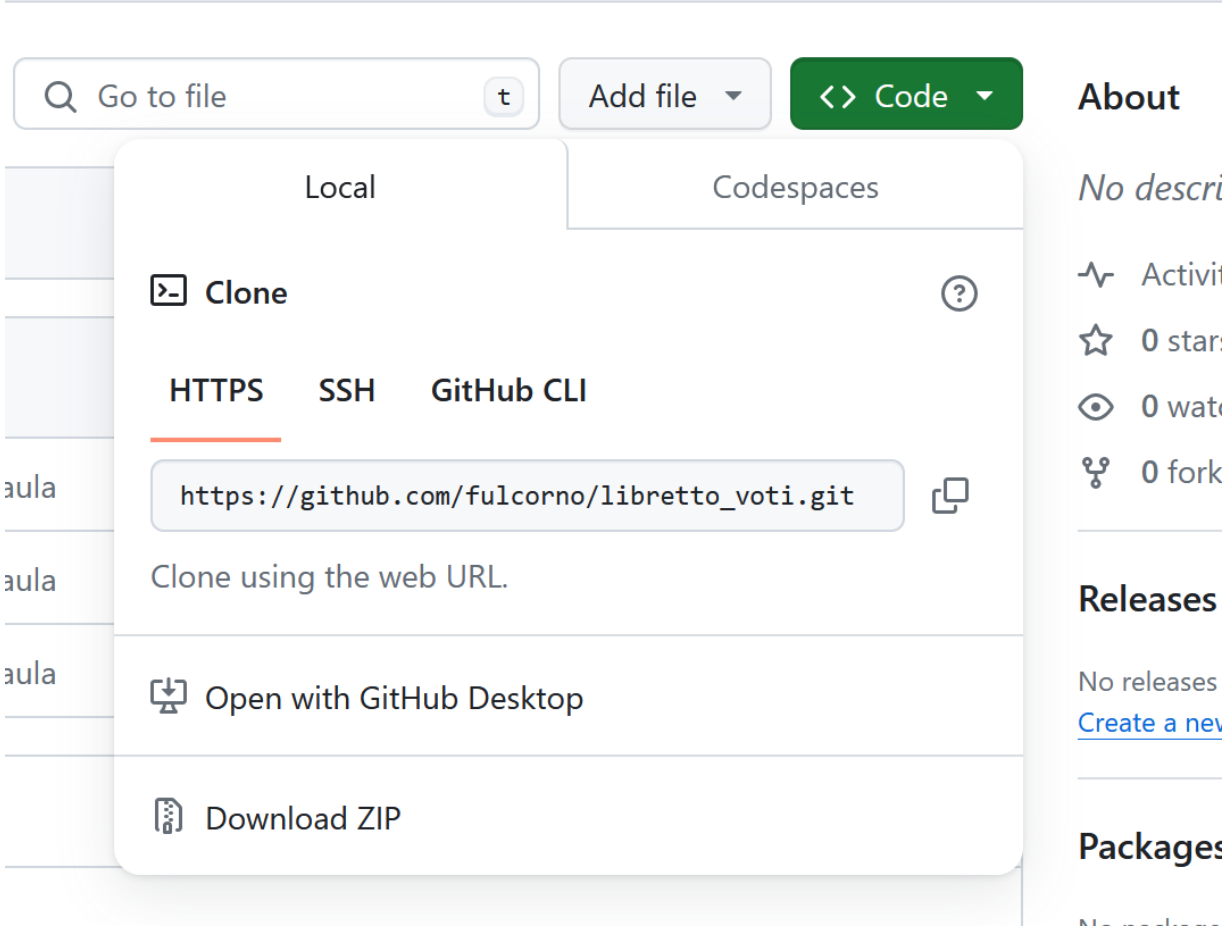
Workflow 2: “Work on a project”

1. “**Fork**” the project in GitHub (you make a copy in your repository)
2. **Clone** your project in PyCharm
3. Work on the project
4. **Commit** and **Push** the changes

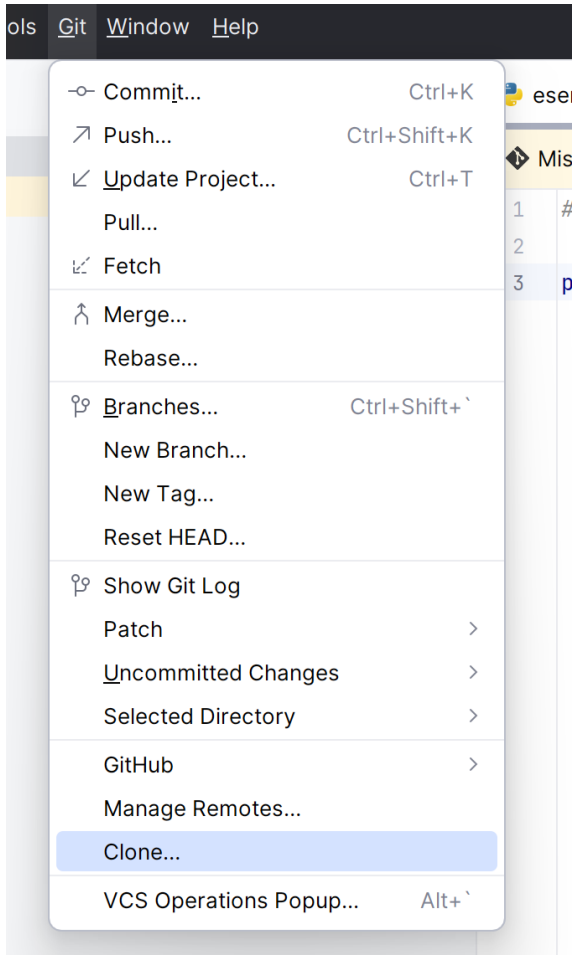
Forking the project

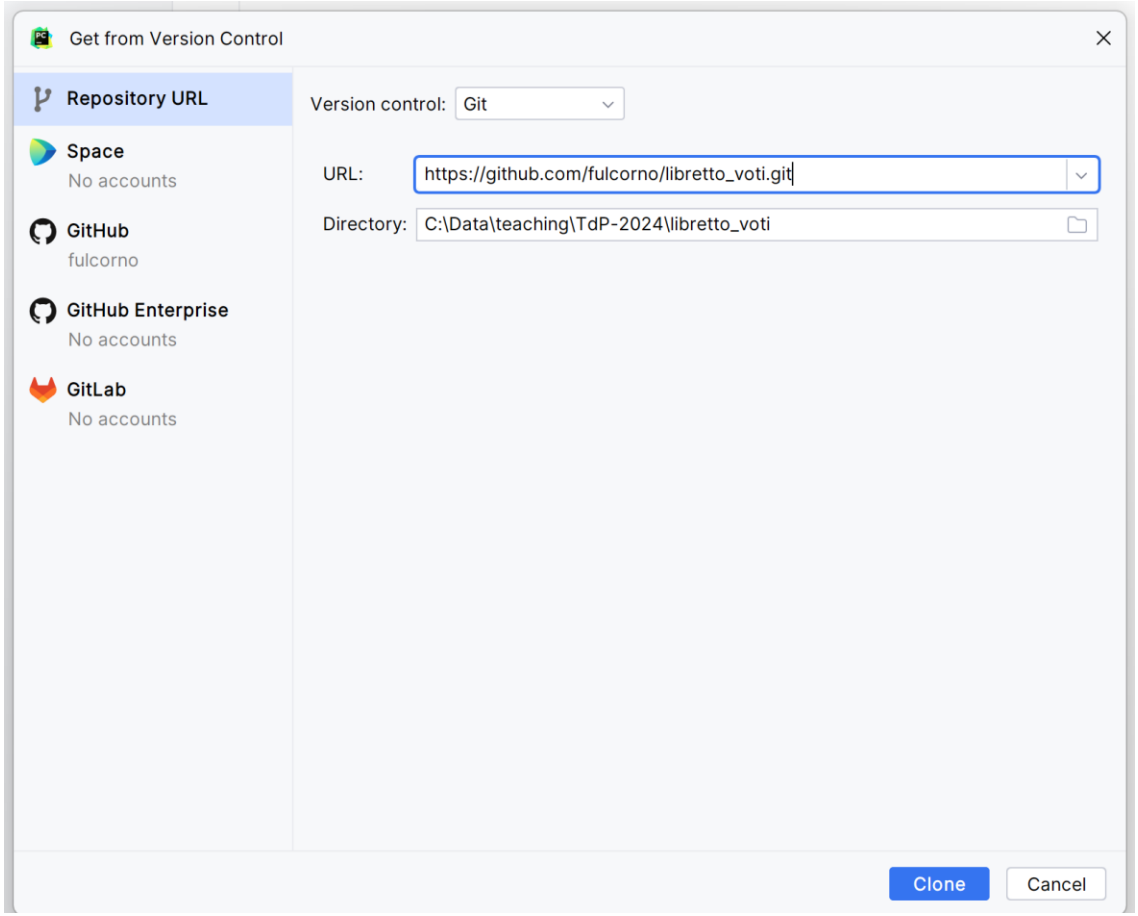


Copy the new project URL



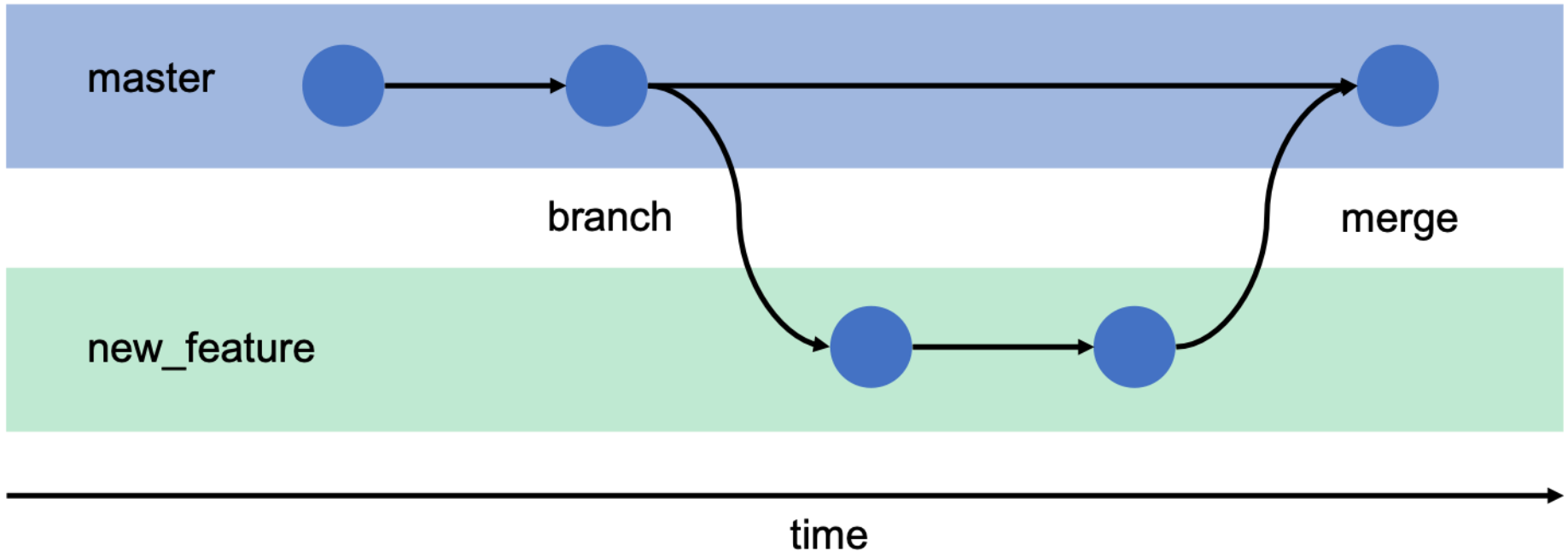
Clone the project





MORE ADVANCED GIT

Branches



Branches… in brief

- used to develop features isolated from each other
- the *main (or master)* branch is the “default” branch when you create a repository
  - you should use other branches for development and merge them back to the master branch upon completion
- Branches can be local (your local repo) or may be pushed to GitHub

LINKS AND REFERENCES

References

- Git Reference
  - http://gitref.org/
- Git - the simple guide
  - http://rogerdudler.github.io/git-guide/
- Git Documentation
  - http://git-scm.com/docs
- Pro Git (online book)
  - http://git-scm.com/book
- Version Control by Example (online book)
  - http://www.ericsink.com/vcbe/

References

- Try Git!
  - http://try.github.io/
- Various Git resources
  - https://help.github.com/articles/what-are-other-good-resources-for-learning-git-and-github
- A successful Git branching model
  - http://nvie.com/posts/a-successful-git-branching-model/
- Some Git (graphical) clients
  - http://git-scm.com/downloads/guis

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