

# Version Control Concepts (with Git)

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# Why use version control?

There are two main purposes for version control:

- To maintain an historical record of changes to code, documents or data
  - To be able to easily undo changes that led to errors or other problems
  - To be able to return to a version of particular importance (e.g published paper)
- To manage collaboration between a team of developers

# Basic concepts of version control

- Version control systems (like Git) maintain **repositories**, stores of documents and their changes over time. Repositories can be local (located on your own computer) or remote (located at a sharable site, like GitHub).
- A version of a document is added to a repository by performing a **commit**. A commit should always be accompanied by a short description of the changes made in this version of the document.
- A **push** will update a remote repository with changes committed to a local repository.
- Important milestones can be marked by **tag**.
- A **branch**, or **fork**, is a copy of a repository made at a particular point in time. Changes can be committed to a branch without affecting the original (**trunk**).
- A branch can be reintegrated with the trunk by a **merge** or **pull**.

# How to use git

- Command line via terminal on MacOS or linux, or RStudio
  - Terminal on MacOS and linux
  - Command prompt on Windows
  - RStudio terminal
- GUI: many to choose from...
  - SourceTree
  - GitHub Desktop
  - etc.
- RStudio projects

# Important git commands (terminal)

- **git init**: Create a local repository
- **git clone**: Create a local copy of a remote repository
- **git add**: Stage a change, i.e. mark a file to be committed
- **git commit**: Add all staged documents to repository
- **git status**: Shows the status of changed files, could be untracked, modified or staged.
- **git push**: Updates remote repository with commits made to local repository (since last push)
- **git pull**: Updates local repository with commits made to remote repository
- **git merge**: Combines two branches