

# git

What it is and why you should really use it

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# What is version control, anyway

A tool that keeps track of the changes to the code and can:

- Restore an older version, show what was changed, when and by whom
- Keep a copy on a server that survive when your computer is gone
- Allow many people to work on the same project
- Allow to explore variations of the codebase in parallel and later abandon/merge them

# Why git

It is basically the standard.

There are others: SVN, Mercurial, Fossil, etc.

**git** is the protocol, GitHub, GitLab, BitBucket are providers

**Distributed:** It can be used offline without any remote server, or with multiple server

# Common pitfalls

1. Not using version control :)
2. Not committing often
3. Committing with meaningless messages
4. Committing logically unrelated changes
5. Committing input datasets
6. Committing passwords!

	COMMENT	DATE
○	CREATED MAIN LOOP & TIMING CONTROL	14 HOURS AGO
○	ENABLED CONFIG FILE PARSING	9 HOURS AGO
○	MISC BUGFIXES	5 HOURS AGO
○	CODE ADDITIONS/EDITS	4 HOURS AGO
○	MORE CODE	4 HOURS AGO
○	HERE HAVE CODE	4 HOURS AGO
○	AAAAAAAAA	3 HOURS AGO
○	ADKFJSLKDFJSDKLFJ	3 HOURS AGO
○	MY HANDS ARE TYPING WORDS	2 HOURS AGO
○	HAAAAAAAAAANDS	2 HOURS AGO

AS A PROJECT DRAGS ON, MY GIT COMMIT  
MESSAGES GET LESS AND LESS INFORMATIVE.

# Git command line

You can use git with the graphical interface integrated in IDEs, but is convenient to learn to use it from the command line.

IDEs interfaces can change, the CLI doesn't. You always have it.

It's faster and simpler, once you get used to it.

On Windows you can use git-bash

# Useful commands cheatsheet

Just the essential:

- `git init` - start version control
- `git clone` - to copy a repository on your machine
- `git status` - show the current state of the repository
- `git add` - add a file or its changes to the staged commit
- `git commit` - snapshots the current state
- `git fetch` - retrieve the metadata from the remote repository
- `git push`/`git pull` - sync to/from your local repository
- `git checkout` - change the local branch
- `git merge` - merge with another branch
- `git branch` - create, list or delete branches

# Clone a repository

```
git clone git@github.com:jacopofar/IntroPythonForDS.git
```

**or**

```
git clone https://github.com/jacopofar/IntroPythonForDS.git
```

the result is the same, in general using the key is better: you can later generate deploy keys to clone the repository without sending around your own secret key



# See the history of a repository

**git status** is always useful to get the current state of the repo

**git log** shows the history of it

**git log --all --oneline --graph** to get a representation

**git checkout** to change current branch

# Create a new repo from scratch

- |                            |                                   |
|----------------------------|-----------------------------------|
| 1. make an empty directory | 1. mkdir practice-repo            |
| 2. make a file             | cd practice-repo                  |
| 3. initialize the repo     | 2. git init                       |
| 4. add all files           | 3. touch README.md                |
| 5. commit the changes      | 4. git add *                      |
|                            | 5. git commit -m 'initial commit' |

Try to commit other changes, and see the history.

Also try to use **git diff** and **git diff --cached** before and after modifying and adding a file

# Push the changes

You can use **git push/pull** to update a remote server with the local changes or retrieve the changes.

You can have multiple remote servers, if not specified the one called **origin** is used

If you have an account on GitHub or others you can try right now

# Branching

You can create a new version of a repo and work in parallel on multiple version.  
For example if you want to add a feature that is not trivial

**git checkout -b new-branch-name** to create it

Try to branch and commit on the new branch, and see the history

# Merging

You can incorporate the changes from a branch into another using merge

first go to the target branch:

```
git checkout master
```

now merge the source branch

```
git merge branch-name
```

Some people use **rebase** for this purpose, is slightly more complex and we'll skip it

# On the terminology

A **commit** is a snapshot of the whole repository, not the change of it

A **branch** is a label on a commit which is moved forward automatically, not a branch of the commit tree

The way git calls things is often not very clear

# Conflicts

What if a file was changed in both branches and you try to merge? You have a **conflict**

Let's try to trigger one. Notice that the branch we created previously is still there.

use **checkout** to move between master and the other branch, and commit some change in both. Try to merge and see what happens.

We have to solve them by hand and commit, git cannot infer what we want to do with the files.

# .gitignore

You can ask git to not track files putting them in the .gitignore

Use it for credentials, dataset files and editor/system files that do not have to be under version control

Ideally, a file should be either in .gitignore or under version control

Use **git status** freely to check the status of the repository



# Contribute to a project on Github

(Also valid on Gitlab and others)

1. **fork** the repository

# Go deeper

Material from a previous year:

<https://github.com/ADGEfficiency/programming-resources/blob/master/git.md>

A gentle introduction:

<https://www.growingwiththeweb.com/2014/02/a-gentle-introduction-to-git.html>

**Interactive branching tutorial:**

<https://learngitbranching.js.org/>

The official tutorial:

<https://git-scm.com/docs/gittutorial>