

Code and data management with Git

Introduction to Version Control



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Course Outline

- Introduction
- Git basics
- Practical 1
- The git commit graph
- Practical 2
- Lunch break
- Collaboration: remote repositories
- Practical 3

<https://git.lumc.nl/courses/gitcourse>

- What is version control?
 - Definition
 - General features
 - Step by step example
 - Distributed repositories
 - Why to use/not use version control?
- Git
- Web-based remotes
 - GitLab vs GitHub

What is version control?

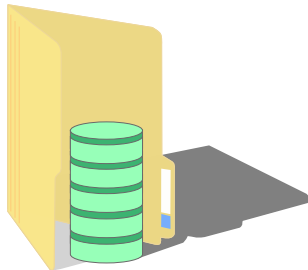
Definition

*The **management of changes** to documents, computer programs, large web sites, and other collections of information.*

— Wikipedia

*A system that **records changes** to a file or set of files over time so that you can recall specific versions later.*

— <https://git-scm.com/>



What is version control?

General features

- Keep track of your files in an orderly manner.
 - Hide old versions.
 - Easily access old versions.
 - Check the differences between current and older versions.
- Enables collaboration.
 - Record who made changes and when.

What is version control?

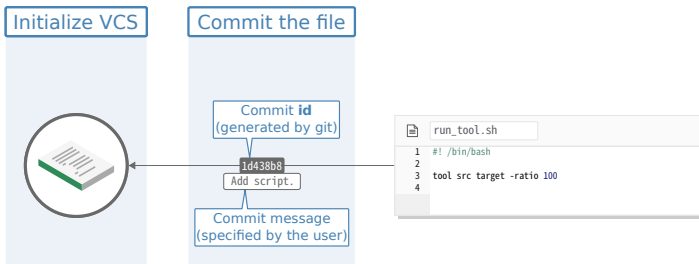
Step by step



```
run_tool.sh
1  #! /bin/bash
2
3  tool src target -ratio 100
4
```

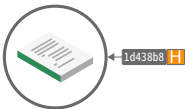
What is version control?

Step by step



What is version control?

Step by step



Edit the existing file

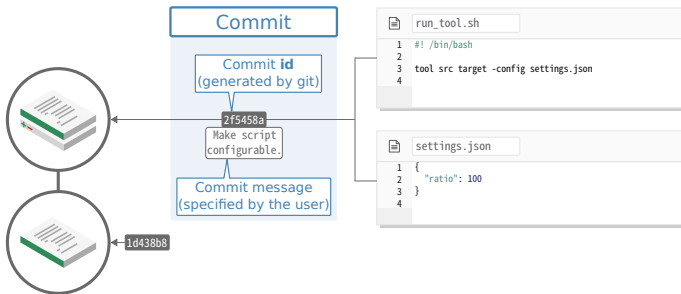
```
run_tool.sh
1  #!/bin/bash
2
3  tool src target -ratio=100 -config settings.json
4
```

```
settings.json
1  {
2    "ratio": 100
3  }
4
```

Create new file

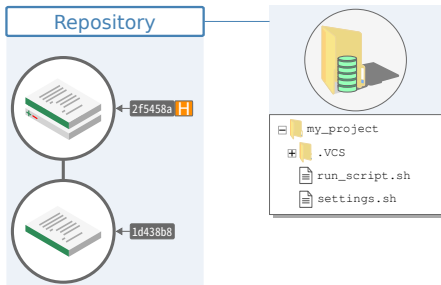
What is version control?

Step by step



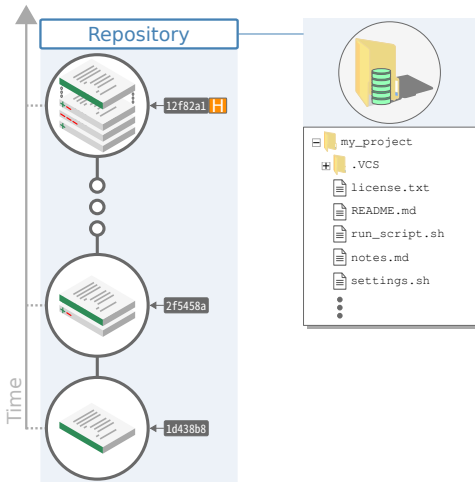
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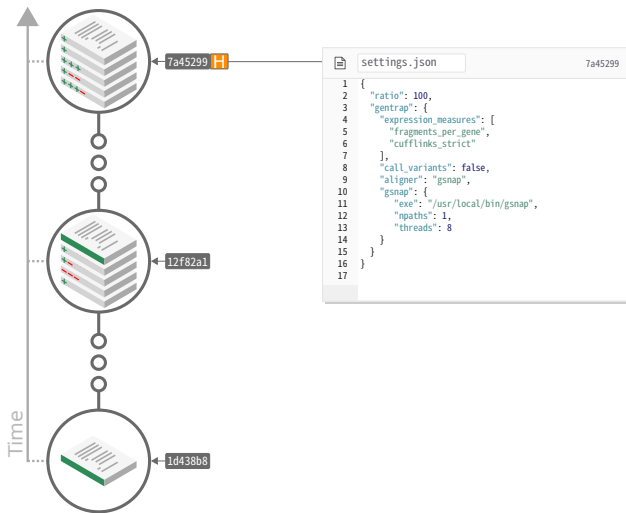
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Step by step



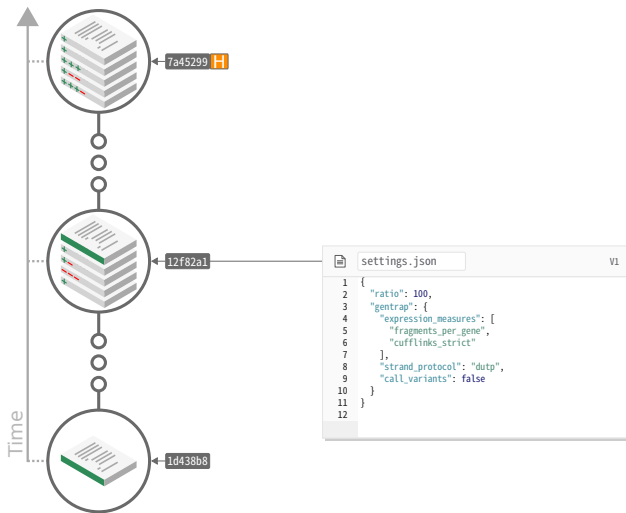
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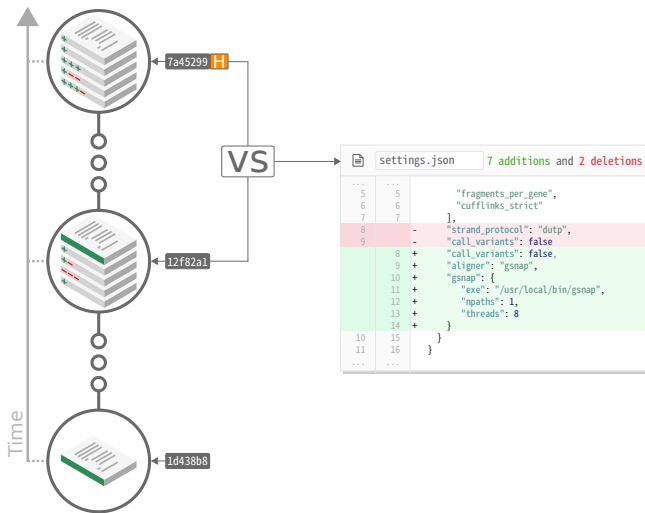
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Step by step



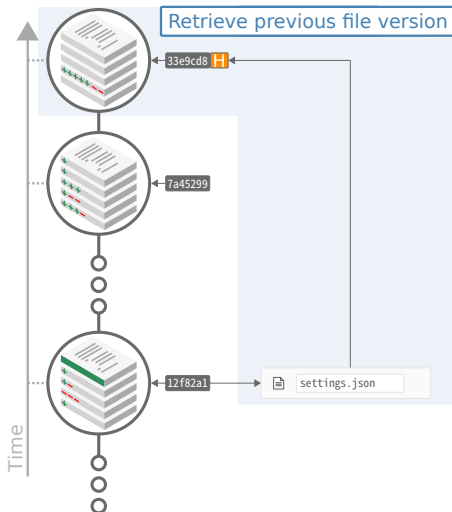
What is version control?

Step by step



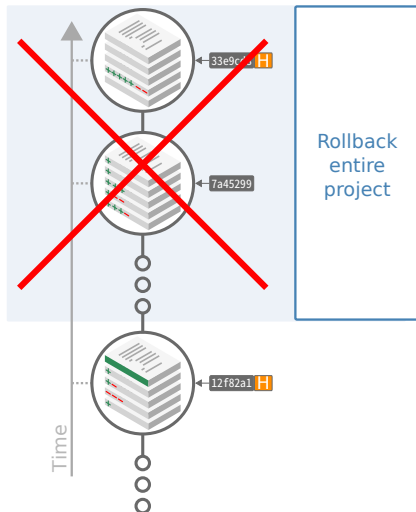
What is version control?

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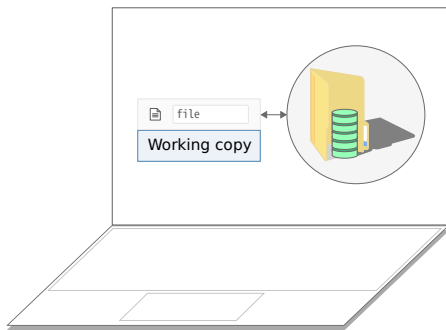
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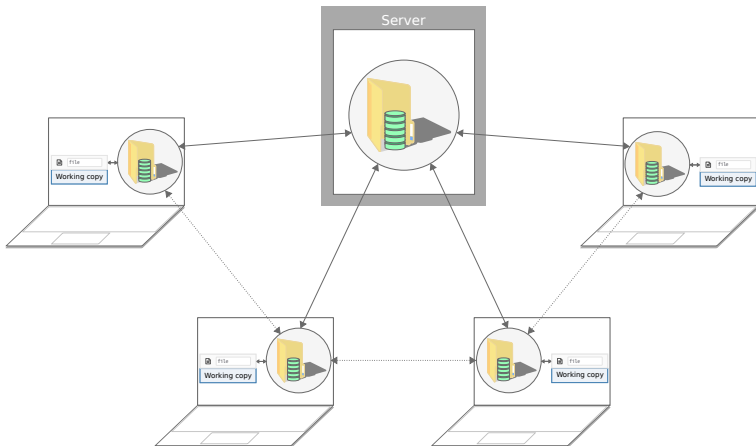
What is version control?

Local repository



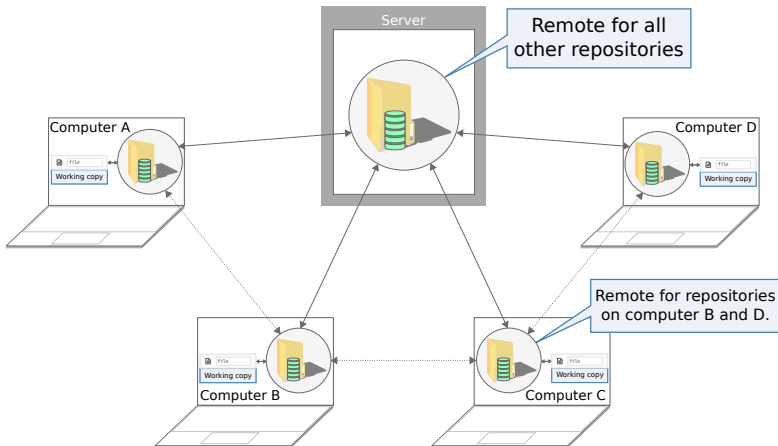
What is version control?

Distributed repositories



What is version control?

Distributed repositories



What is version control?

Why should I use it?

For a single user:

- Revert files to a previous state.
- Revert the entire project back to a previous state.
- Review changes made over time.
- Backup.

What is version control?

Why should I use it?

For a single user:

- Revert files to a previous state.
- Revert the entire project back to a previous state.
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For multiple users:

- A reliable way to share files between people/computers.
- Allow multiple people working on the same project at the same time.
- Conflict resolution.
- See who made which changes at which time.

What is version control?

Why should I not use it?

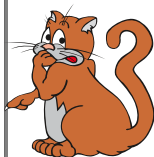
- I have my own system.

What is version control?

Why should I not use it?

- I have my own system.

```
my_project
├── backup
├── old
│   ├── backup
│   ├── old
│   ├── working
│   └── working.thisone
├── working
│   └── old
├── second.version
└── old
```



What is version control?

Why should I not use it?

A list of common excuses:

- I have my own system.
- It is too much work.
- I am the only one working on this project.
- This code will not be used by anyone else.
- The bugs can be tracked forever.
- ...

```
[-] my_project
    [+] backup
    [-] old
        [+] backup
        [+] old
        [+] working
        [+] working.thisone
    [-] working
        [+] old
    [-] second.version
        [+] old
```



What is version control?

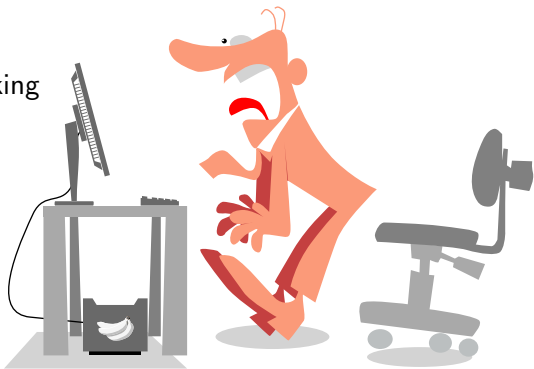
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- The bugs can be tracked forever.
- ...

Eventually leading to:

- I'm too busy rewriting the code I accidentally deleted.



The name

Git (n): A person who is deemed to be despicable or contemptible.
— WordNet.

I'm an egotistical bastard, and I name all my projects after myself. First "Linux", now "git". — Linus Torvalds.



History

Designed to replace the commercial package *BitKeeper*.

- Speed.
- Simple design.
- Strong support for non-linear development
 - Thousands of parallel branches.
- Fully distributed.
- Able to handle large projects like the Linux kernel efficiently.

Installation

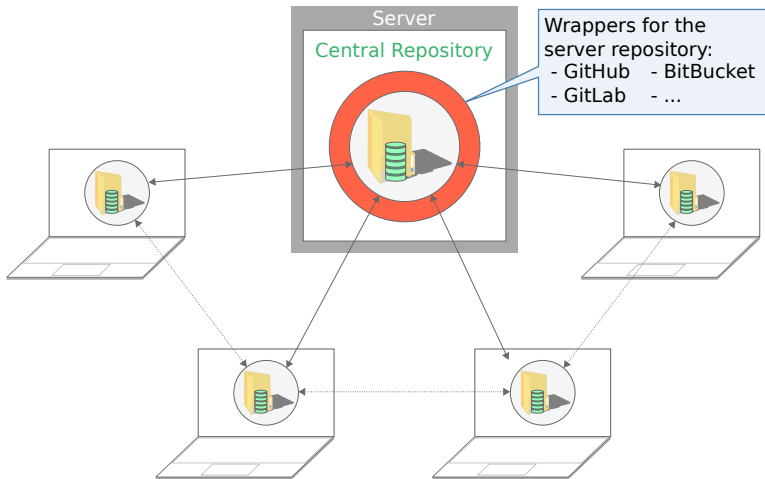
- Linux
 - `sudo apt-get install git` (Ubuntu)
 - `sudo yum install git` (Fedora)
- Windows
 - git-scm.com/download/win
- Mac
 - git-scm.com/mac

Once installed you can check Git version:

- `git --version`

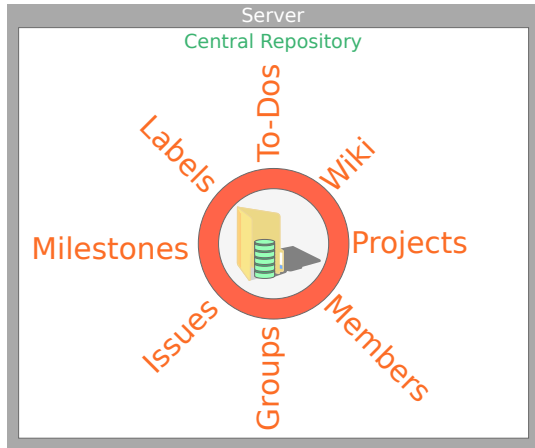
Remotes

Web-based



Remotes

Web-based



Web-based

GitHub:

- Free for public repositories. Paid for private ones.
- Hosting provided for free.

GitLab:

- Self hosting - own installation.
- No hosting provided.
- Basic features for free. Paid advanced ones.

Acknowledgements

Martijn Vermaat
Wibowo Arindrarto
Szymon Kielbasa
Jeroen Laros



<https://git.lumc.nl/humgen/gitcourse>