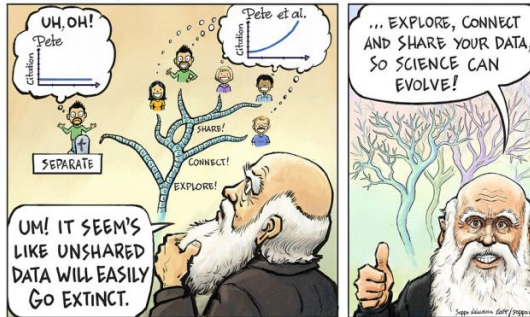


# GIT Introduction

What is that? Who needs it? How does it work?

## DATAVOLUTION – THE SURVIVAL OF THE BITTEST



Cartoon: Seppo Leinonen, [www.seppo.net](http://www.seppo.net)

Jörg Steinkamp, Moritz Schlarb, Christian Meesters



Zentrum für Datenverarbeitung

- 1 What is Git?
- 2 Who needs Git?
- 3 How git handles files
- 4 GitHub.com vs GitLab.com
- 5 Online Demo

# What is Git?

## Git is ...

- a **Version Control System (VCS)**
- a Revision Control System (RCS)
- a Source Code Manager (SCM)

# What is Git?

## Git is ...

- a **Version Control System (VCS)**
- a Revision Control System (RCS)
- a Source Code Manager (SCM)

or any meaningful combination of the above words



# What is Git?

## Git is ...

- a **Version Control System (VCS)**
- a Revision Control System (RCS)
- a Source Code Manager (SCM)

or any meaningful combination of the above words

## History

- 1970s: Source Code Control System (SCCS)
- early 1980s: Revision Control System (RCS)
- 1986: Concurrent Version System (CVS)
- ~2001: Subversion (SVN)
- BitKeeper, Mercurial, Monotone
- 2005: Git

# What is Git?

- Distributed

# What is Git?

- Distributed
- Scalable

# What is Git?

- Distributed
- Scalable
- Fast and efficient

# What is Git?

- Distributed
- Scalable
- Fast and efficient
- Integrity and trust

# What is Git?

- Distributed
- Scalable
- Fast and efficient
- Integrity and trust
- Immutability

# What is Git?

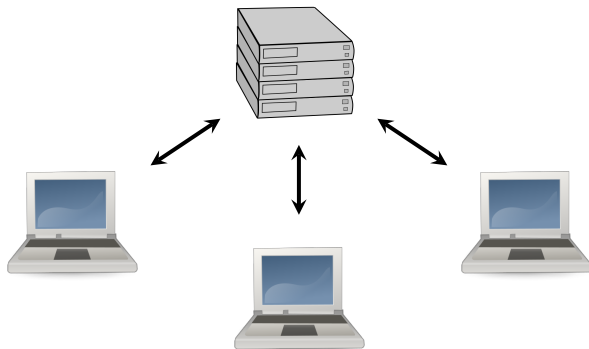
- Distributed
- Scalable
- Fast and efficient
- Integrity and trust
- Immutability
- Branched development

# What is Git?

- Distributed
- Scalable
- Fast and efficient
- Integrity and trust
- Immutability
- Branched development
- Free and open

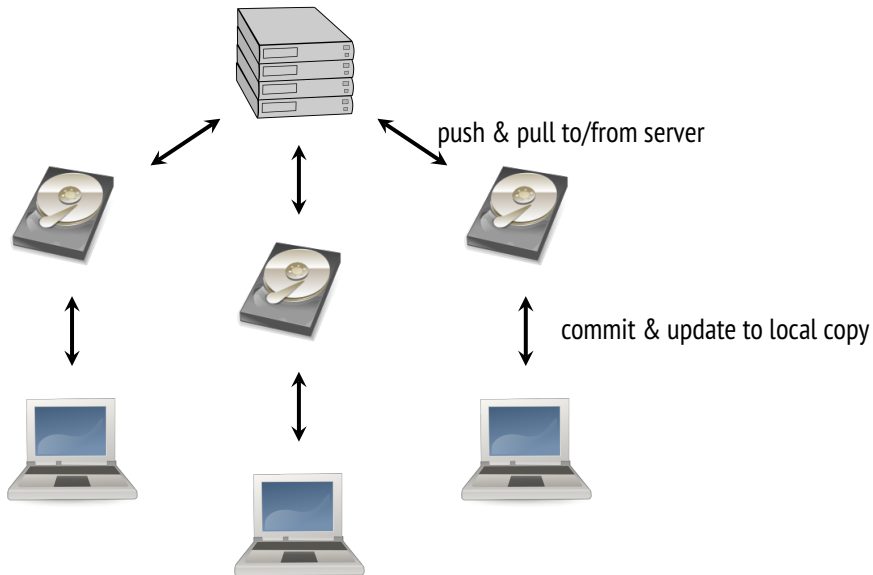


# Centralized vs. Distributed



Direct commit & update on server

# Centralized vs. Distributed



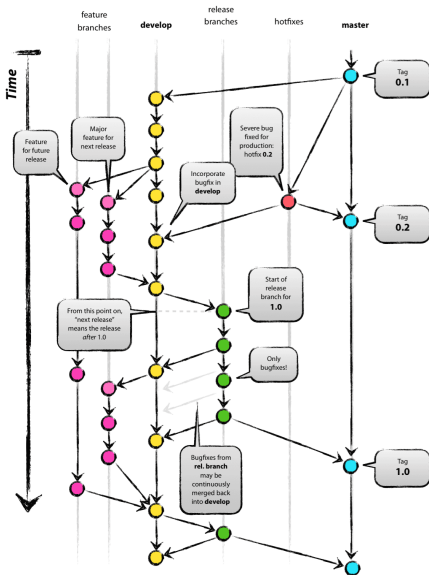
## Scalability; fast and efficient

- Work individually or in large groups
- Small projects and large projects

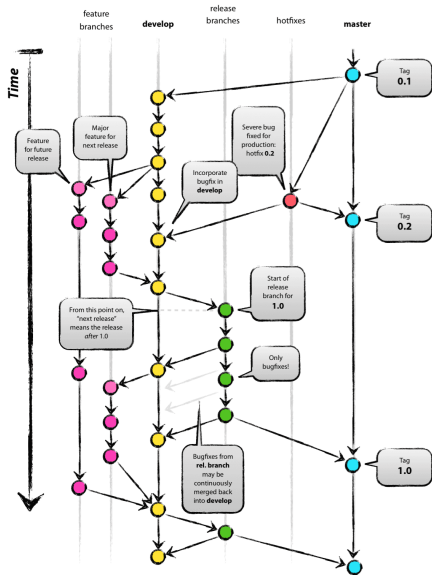
## Integrity and trust; immutability

Once committed & pushed no manipulation is possible

# Branching

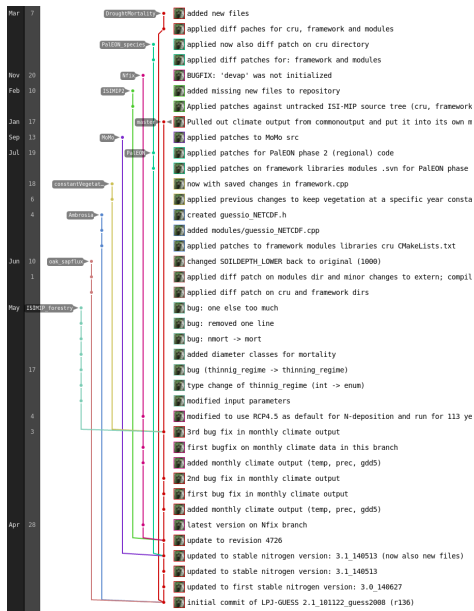


## Branching



Driesen, 2010

Steinkamp, Schlarb, Meesters



## GIT Introduction

## What is Git?

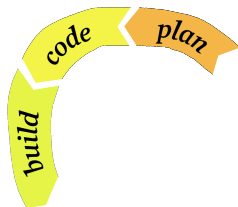
6 / 16

- concept



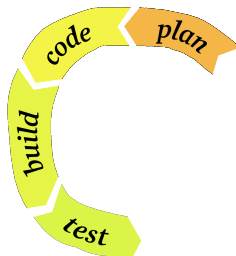
# Development and Operation: DevOps

- concept
- first draft



# Development and Operation: DevOps

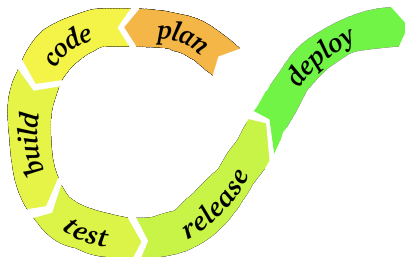
- concept
- first draft
- supervisor feedback





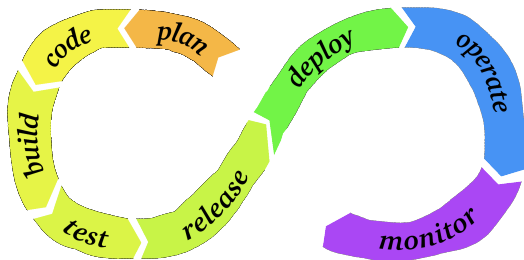
# Development and Operation: DevOps

- concept
- first draft
- supervisor feedback
- submission



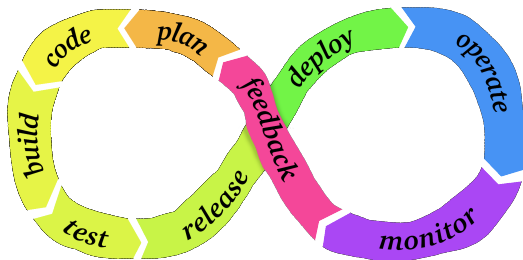
# Development and Operation: DevOps

- concept
- first draft
- supervisor feedback
- submission
- in review



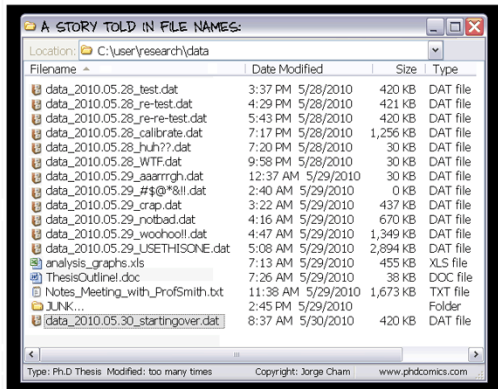
# Development and Operation: DevOps

- concept
- first draft
- supervisor feedback
- submission
- in review
- feedback

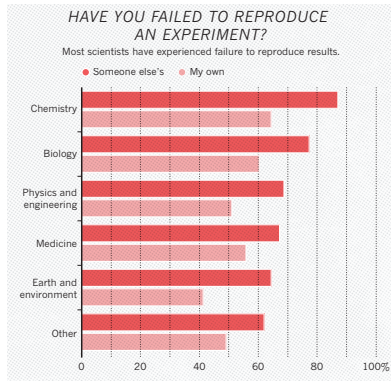


# Who needs Git?

Everyone who wants to avoid

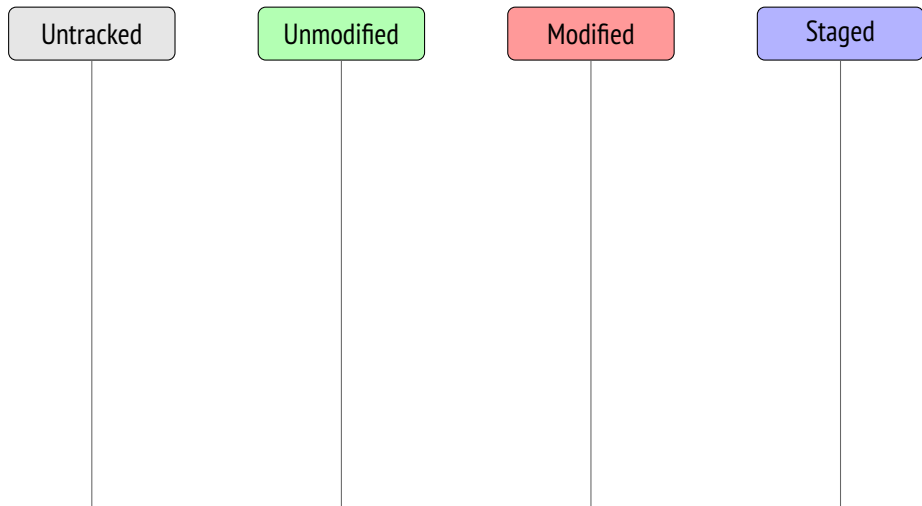


Jorge Cham [www.phdcomics.com](http://www.phdcomics.com)



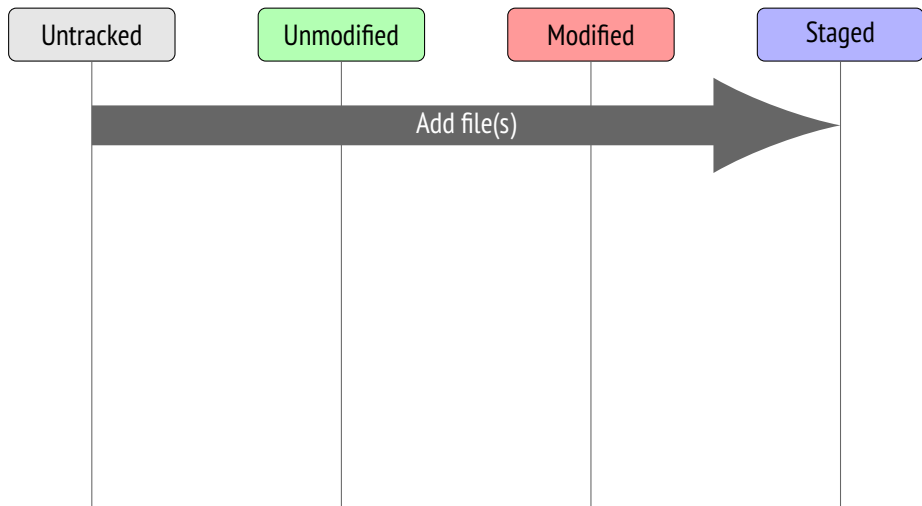
Baker (2016), Nature.

# How git handles files



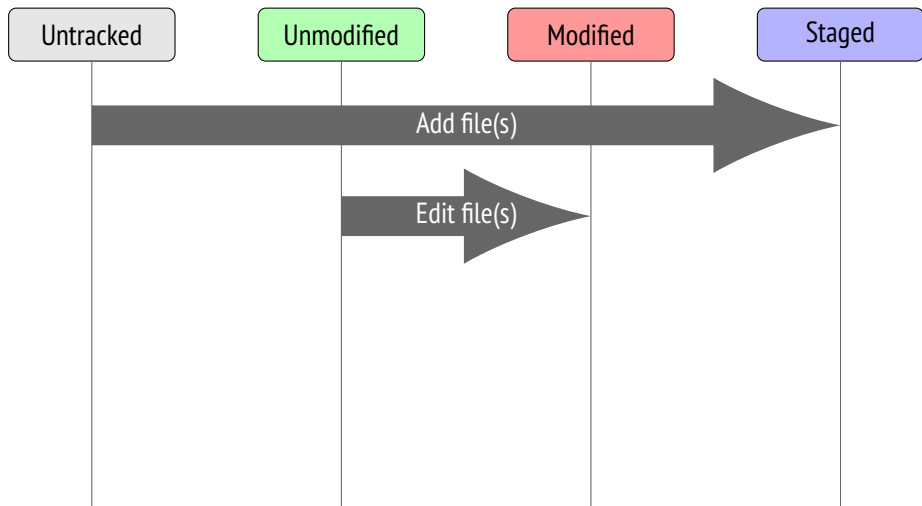
modified after Chacon & Straub: Pro Git

# How git handles files



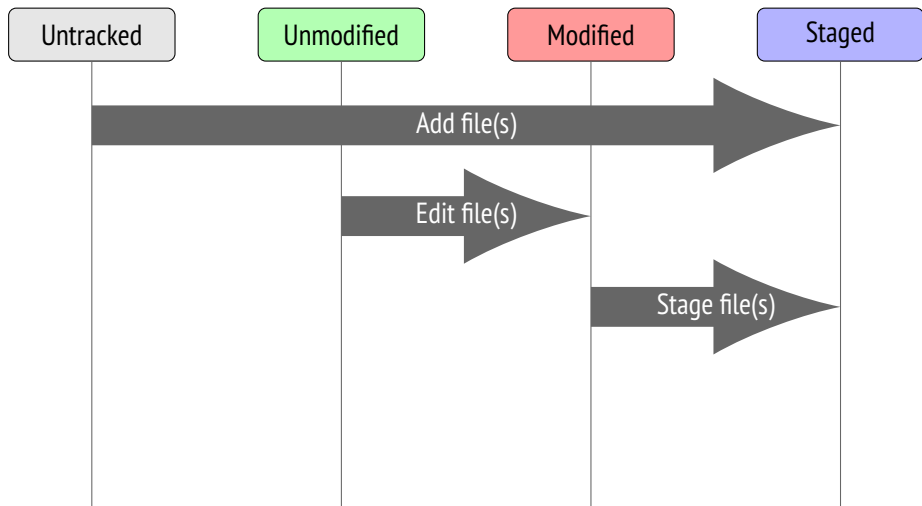
modified after Chacon & Straub: Pro Git

# How git handles files



modified after Chacon & Straub: Pro Git

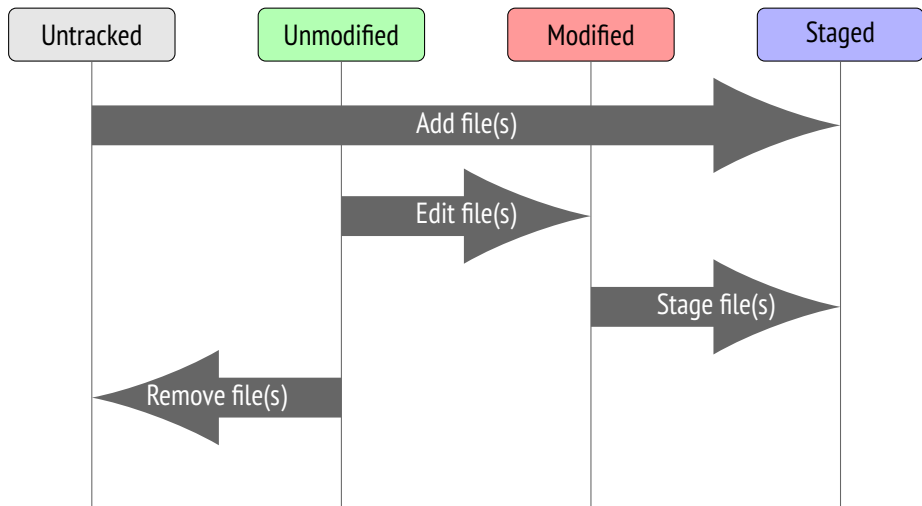
# How git handles files



modified after Chacon & Straub: Pro Git

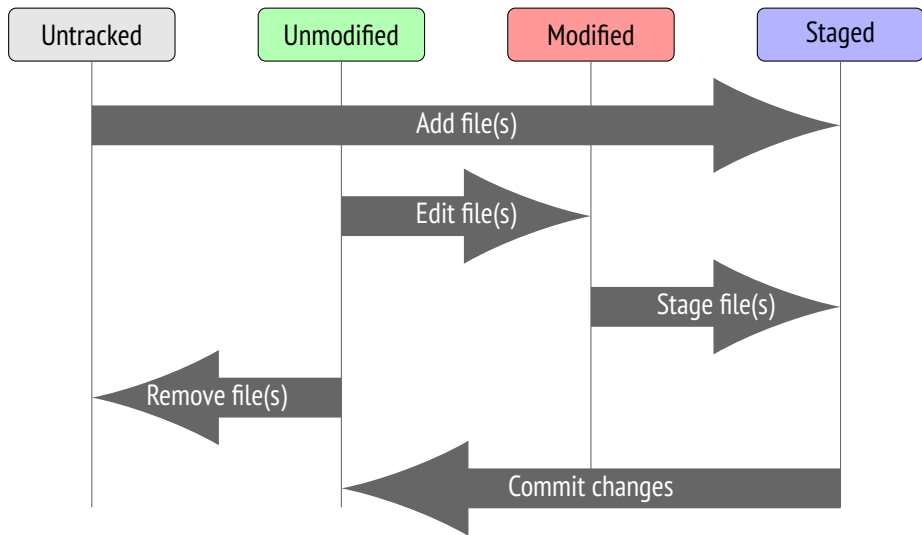


# How git handles files



modified after Chacon & Straub: Pro Git

# How git handles files



modified after Chacon & Straub: Pro Git



## Good filetypes

all text files

- .txt
- .rtf
- .svg
- .CSV
- ...



## Good filetypes

all text files

- .txt
- .rtf
- .svg
- .csv
- ...



## Bad filetypes

all binary files

- .doc, .docx
- .xls, .xlsx
- .png, .jpg
- .mp3, .mp4
- ...



## Good filetypes

all text files

- .txt
- .rtf
- .svg
- .csv
- ...



## Bad filetypes

all binary files

- .doc, .docx
- .xls, .xlsx
- .png, .jpg
- .mp3, .mp4
- ...

... and why???

# Filetypes

The screenshot shows the GitLab web interface. On the left is a sidebar with navigation links: h2g2, Project information, Repository, Files, Commits, Branches, Tags, Contributors, Graph, Compare (selected), Locked Files, Issues (0), Merge requests (1), Requirements, CI/CD, Security & Compliance, and Collapse sidebar. The main content area shows the 'Commits (1)' section for the commit 'Update english.txt' by Jörg Steinkamp, authored 4 minutes ago. Below this, it shows 'Showing 1 changed file' with 3 additions and 3 deletions. The file 'english.txt' is selected, and the diff is shown in side-by-side view. The diff highlights changes in 'english.txt', showing deletions (marked with '-') and additions (marked with '+').

Commits (1)

**Update english.txt**  
Jörg Steinkamp authored 4 minutes ago

27ab988a

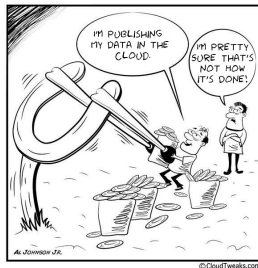
Showing 1 changed file with 3 additions and 3 deletions

Hide whitespace changes Inline Side-by-side

english.txt

1	- XXX The book begins with city council workmen arriving at Arthur	1	+ The book begins with city council workmen arriving at Arthur
2	2 Dent's house. They wish to demolish his house in order to	2	2 Dent's house. They wish to demolish his house in order to
3	- build a XXX bypass.	3	+ build a bypass.
4	4	4	4
5	5 Arthur's best friend, Ford Prefect, arrives, warning him of	5	5 Arthur's best friend, Ford Prefect, arrives, warning him of
6	- the end of the world. Ford is revealed to be an alien who YYY	6	+ the end of the world. Ford is revealed to be an alien who
7	7 had come to Earth to research it for the titular Hitchhiker's	7	7 had come to Earth to research it for the titular Hitchhiker's
8	8 Guide to the Galaxy, an enormous work providing information	8	8 Guide to the Galaxy, an enormous work providing information
9	9 about every planet and place in the universe. The two head	9	9 about every planet and place in the universe. The two head
...	...	...	...

# GitHub.com vs GitLab.com



modified after @Cloudways

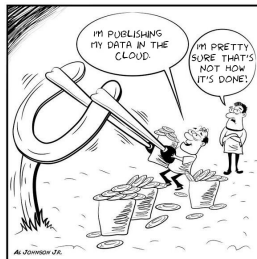
# GitHub.com vs GitLab.com

## GitHub

- repos initially public

## GitLab

- repos initially private



©CloudTweaks.com

modified after @Cloudways



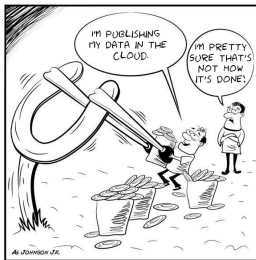
# GitHub.com vs GitLab.com

## GitHub

- repos initially public
- coarse access control

## GitLab

- repos initially private
- fine access control



©CloudTweaks.com

modified after @Cloudways

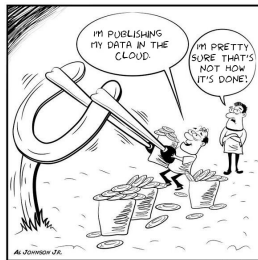
# GitHub.com vs GitLab.com

## GitHub

- repos initially public
- coarse access control
- no integrated CI/CD

## GitLab

- repos initially private
- fine access control
- integrated CI/CD



©CloudTweaks.com

modified after @Cloudways

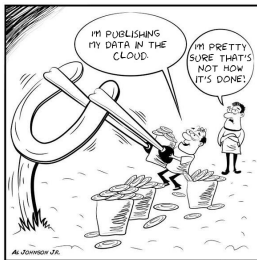
# GitHub.com vs GitLab.com

## GitHub

- repos initially public
- coarse access control
- no integrated CI/CD
- no self-hosting

## GitLab

- repos initially private
- fine access control
- integrated CI/CD
- self-hosting



©CloudTweaks.com

modified after @Cloudways

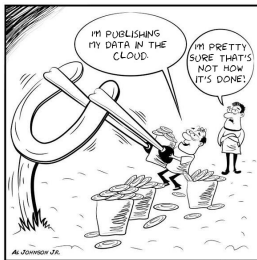
# GitHub.com vs GitLab.com

## GitHub

- repos initially public
- coarse access control
- no integrated CI/CD
- no self-hosting
- zenodo integration

## GitLab

- repos initially private
- fine access control
- integrated CI/CD
- self-hosting
- no zenodo integration



©CloudTweaks.com

modified after @Cloudways

<https://gitlab.rlp.net>



## **Beginner course, introducing**

- Gitlab WebUI
- Issues
- Merging



## **Advanced course, dealing with**

- Protected branches
- Code Review in Gitlab
- CI/CD

## Introduction to shell programming

- Crash course for beginners
- Mandatory knowledge for HPC.

# Scientific Computing – Upcoming Courses

## Introduction to shell programming

- Crash course for beginners
- Mandatory knowledge for HPC.

## Introduction to High Performance Computing (HPC)

a.k.a. “Mogon-Introduction” – HPC and cluster usage for our local clusters



# Scientific Computing – Upcoming Courses

## Introduction to shell programming

- Crash course for beginners
- Mandatory knowledge for HPC.

## Introduction to High Performance Computing (HPC)

a.k.a. “Mogon-Introduction” – HPC and cluster usage for our local clusters

## Various other courses

- Ilias - Registration for HPC
- Ilias - Registration for Linux/Unix
- <https://hpc.uni-mainz.de/kurse-und-workshops/>



## Further readings

- [Git-SCM](#)
- [git novice intro by swcarpentry](#)
- [git - the simple guide](#)
- ['Expert' answers @ StackOverflow](#)
- [Oh shit, git! \(pardon the profanity\)](#)
- [How to teach Git](#)
- [Git auf deutsch](#)