



INTRODUCTION TO VERSION CONTROL

Time travel for beginners

June 29, 2018 | Julia Sprenger | INM-6/10



Part I: Why should I care about versions?

"FINAL".doc



FINAL.doc!



FINAL_rev.2.doc



FINAL_rev.6.COMMENTS.doc



FINAL_rev.8.comments5.
CORRECTIONS.doc



FINAL_rev.18.comments7.
corrections9.MORE.30.doc



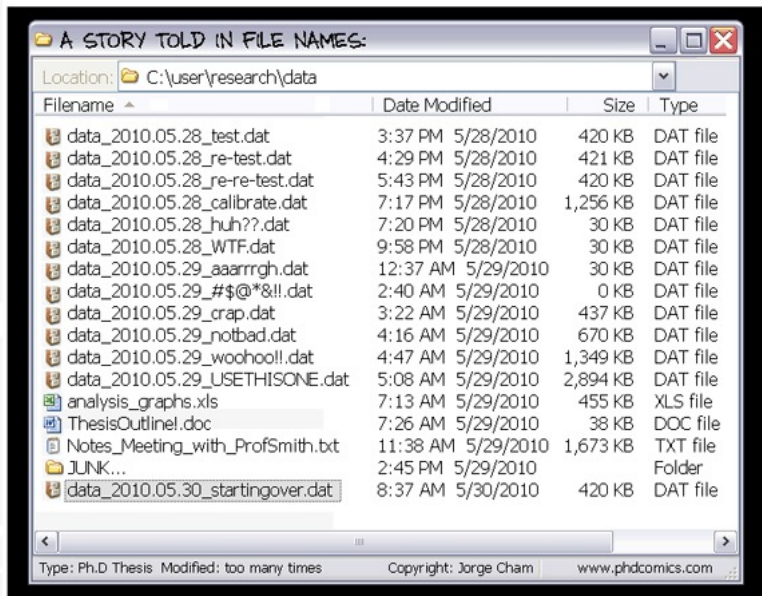
FINAL_rev.22.comments49.
corrections.10. #@\$%WHYDID
ICOMETOGRADSCHOOL????.doc



JORGE CHAM © 2012

WWW.PHDCOMICS.COM

<http://phdcomics.com/comics.php?f=1531>



<http://phdcomics.com/comics.php?f=1323>

VERSION CONTROL USING FOLDER AND FILENAMES

- only readable by you ...

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- ... as long as you remember

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- no consistent structure or naming scheme enforced

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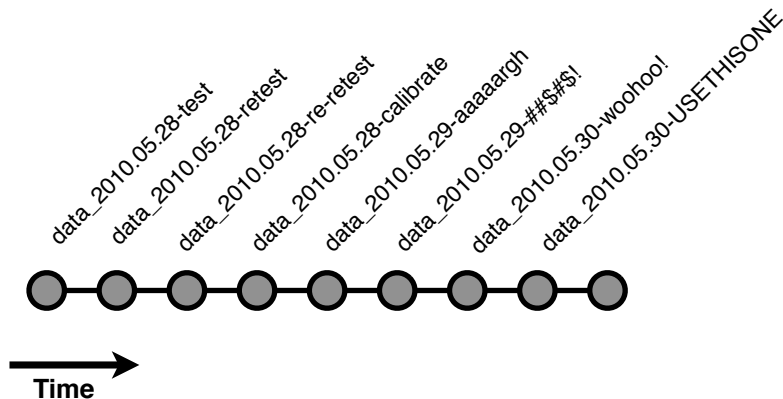
- only readable by you ...
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- no detailed description of changes (why were changes performed?)

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- ...



The history of a project can be
viewed as a series of changes

Changes

- A unique identifier
- What changed?
- When did it change?
- Who changed it?
- Why did it change?



Part II: Version Control Systems

DIFFERENT VERSION CONTROL SYSTEMS



GIT

distributed system



Mercurial

distributed system



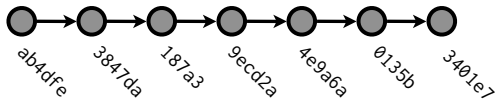
SVN

centralized system

GIT

- only selected version present on disc
- history stored in hidden .git folder
- smart version handling for text based files by using file differences
- user generated commit messages provide reason for and small summary of change

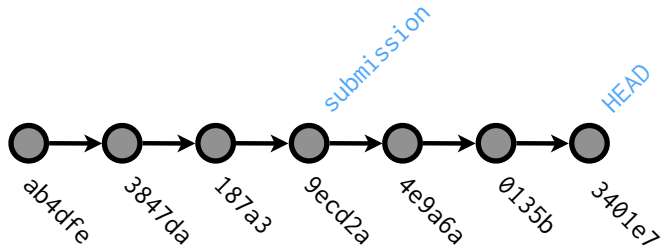
With git, each change (**commit**) is given a unique identifier, called a **sha**



The sha is a key into a database that provides the author, date, and a description

GIT

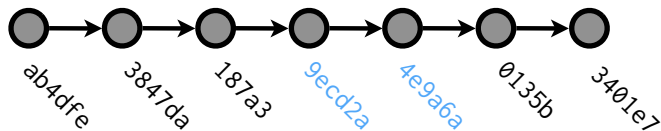
You can also name individual commits



```
git tag submission 9ecd2a
```


GIT

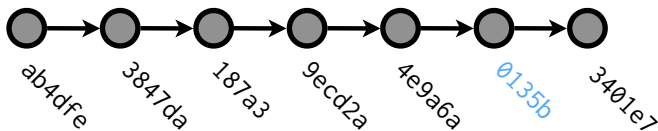
Then see exactly what's changed



```
git diff 9ecd2a..4e9a6a
```

GIT

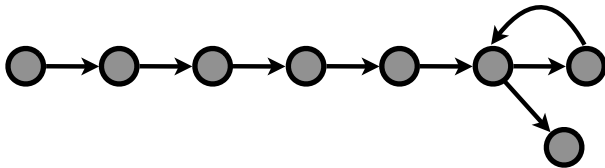
You can revert to a previous change with git checkout



git checkout 0135b

GIT

That allows you to undo mistakes



GIT INTERFACES



Git Cheat Sheet

For more awesome cheat sheets
visit rebellabs.org!



Create a Repository

From scratch -- Create a new local repository
`$ git init [project name]`
Download from an existing repository
`$ git clone my_url`

Observe your Repository

List new or modified files not yet committed
`$ git status`
Show the changes to files not yet staged
`$ git diff`
Show the changes to staged files
`$ git diff --cached`
Show all staged and unstaged file changes
`$ git diff HEAD`
Show the changes between two commit ids
`$ git diff commit1 commit2`
List the change dates and authors for a file
`$ git blame [file]`
Show the file changes for a commit id and/or file
`$ git show [commit]:[file]`
Show full change history
`$ git log`
Show change history for file/directory including diffs
`$ git log -p [file/directory]`

Working with Branches

List all local branches
`$ git branch`
List all branches, local and remote
`$ git branch -av`
Switch to a branch, my_branch, and update working directory
`$ git checkout my_branch`
Create a new branch called new_branch
`$ git branch new_branch`
Delete the branch called my_branch
`$ git branch -d my_branch`
Merge branch_a into branch_b
`$ git checkout branch_b`
`$ git merge branch_a`
Tag the current commit
`$ git tag my_tag`

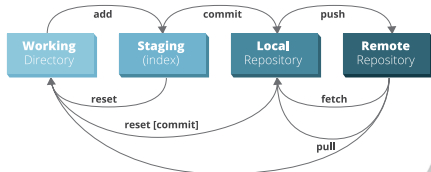
Make a change

Stages the file, ready for commit
`$ git add [file]`
Stage all changed files, ready for commit
`$ git add .`
Commit all staged files to versioned history
`$ git commit -m "commit message"`
Commit all your tracked files to versioned history
`$ git commit -am "commit message"`
Unstages file, keeping the file changes
`$ git reset [file]`
Revert everything to the last commit
`$ git reset --hard`

Synchronize

Get the latest changes from origin (no merge)
`$ git fetch`
Fetch the latest changes from origin and merge
`$ git pull`
Fetch the latest changes from origin and rebase
`$ git pull --rebase`
Push local changes to the origin
`$ git push`
Finally!
When in doubt, use git help
`$ git command --help`


Or visit <https://training.github.com/> for official GitHub training.



BROUGHT TO YOU BY
JRebel

http://files.zereturnaround.com/pdf/zt_git_cheat_sheet.pdf

GIT INTERFACES

 --distributed-even-if-your-workflow-isnt

[About](#)
[Documentation](#)
[Downloads](#)
[GUI Clients](#)
[Logos](#)
[Community](#)

The entire **Pro Git** book written by Scott Chacon and Ben Straub is available to read online for free. Dead tree versions are available on Amazon.com.

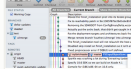
GUI Clients

Git comes with built-in GUI tools for committing (`git-gui`) and browsing (`gitk`), but there are several third-party tools for users looking for platform-specific experience.

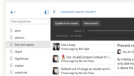
If you want to add another GUI tool to this list, just [follow the instructions](#).

[All](#) [Windows](#) [Mac](#) [Linux](#) [Android](#) [iOS](#)

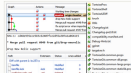
19 Windows GUIs are shown below ↓



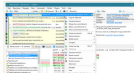
SourceTree
Platform: Mac, Windows
Price: Free
License: Proprietary




GitHub Desktop
Platform: Mac, Windows
Price: Free
License: MIT



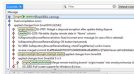
TortoiseGit
Platform: Windows
Price: Free
License: GNU GPL



Git Extensions
Platform: Linux, Mac, Windows
Price: Free
License: GNU GPL



GitKraken
Platform: Linux, Mac, Windows
Price: Free for non-commercial use
License: Proprietary



SmartGit
Platform: Linux, Mac, Windows
Price: \$19.95 / Free for non-commercial use
License: Proprietary

<https://git-scm.com/download/gui>

GIT INTERFACES

The screenshot displays a Git GUI application window titled "phd_meeting (~/.presentations/2018-07-02_INM-Retreat)". The interface is divided into three main sections: a sidebar on the left, a commit history list in the middle, and a diff view on the right.

Sidebar:

- All commits:** A list of commits, with the current commit "master" selected.
- Branches:** A list of branches, including "improvements" (selected), "master", and "origin".
- Remotes:** A list of remotes, including "origin" and "master".
- Tags:** A list of tags, including "v0.1".

Commit History:

Commit	Author	Time
master	Merge improvements into master	3 minutes ago
(origin/master)	fix typos	9 minutes ago
	remove duplicate slide	2 hours ago
improvements	Fix logical order of slides	A minute ago
	Improve argumentation for git introduction	12 minutes ago
v0.1	first complete version	2 hours ago
	finished introduction	11 hours ago
	add basic repo description	12 hours ago
	update gitignore not to include source files	Jun 21, 14:25
	add compiled pdf version	Jun 21, 14:23
	add first set of graphics	Jun 21, 14:22

Diff View:

```
98 98      \item history stored in hidden .git folder
99 99      \item smart version handling for text based files by using file differences
100 +      \item user generated commit messages provide reason for and small summary of cha
101 101      \end{itemize}
102 102      \end{minipage}
103 103      \hrfill
... .. @@ -212,7 +213,7 @@ english,
212 213      \item DOI service
213 214      \item version controlled
214 215      \item open source
215 -      \item developed and hosted by German Neuroinformatics Node
216 +      \item developed and hosted by German Neuroinformatics Node
217 217      \end{itemize}
218 218      \end{columns}}
219 219      \end{frame}
... .. @@ -258,8 +259,8 @@ english,
258 259      \end{itemize}
259 260      More interesting references
260 261      \begin{itemize}
261 -      \item GIT cheatsheet \url{https://services.github.com/on-demand/downloads/github
262 -      \item Interactive GIT cheatsheet \url{http://ndpssoftware.com/git-cheatsheet.html
263 +      \item GIT cheat sheet \url{https://services.github.com/on-demand/downloads/githu
264 +      \item Interactive GIT cheat sheet \url{http://ndpssoftware.com/git-cheatsheet.htm
265 266      \item GitHub \url{https://github.com}
266 266      \item GIN data management platform \url{https://web.gin.g-node.org}
267 267      \end{itemize}
```

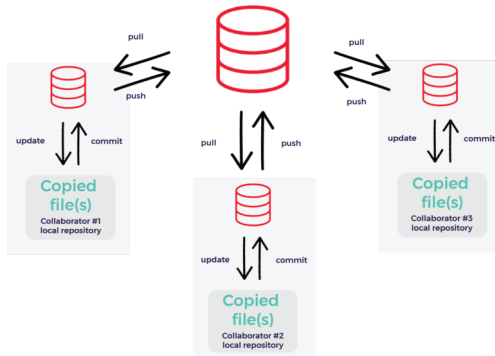


Part III: Collective Version Control

COLLABORATIVE CHAOS CONTROL

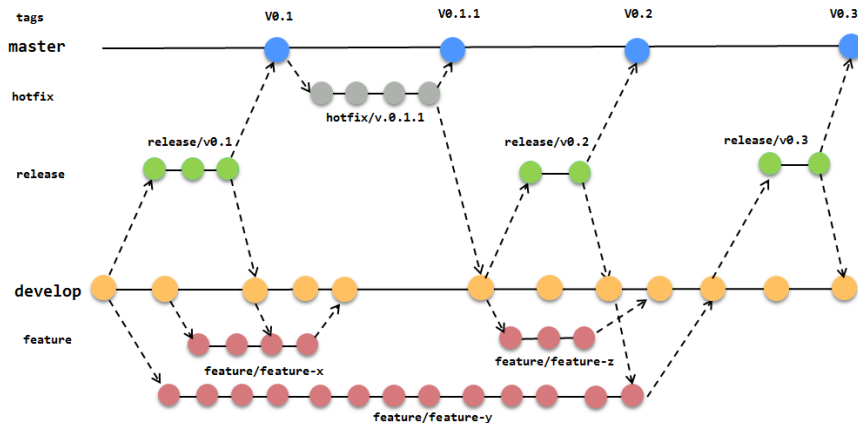
Distributed Version Control

Main Server Repository

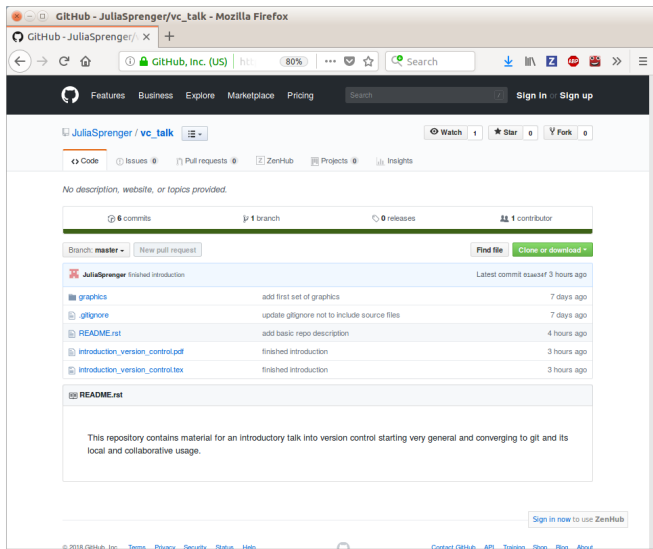


<https://www.positivethinkingcompany.com/articles/articles-web-mobile/git-technology-simplifies-coding-collaboration/>

COLLABORATIVE CHAOS CONTROL



<https://fpy.cz/pub/slides/git-workshop>



- visualization of repository content and changes
- issue collection & discussion
- pull requests
- statistics
- **public** & private repositories



Part IV: Version Control for 'big data'

GIT-ANNEX & GIN



GIT-ANNEX

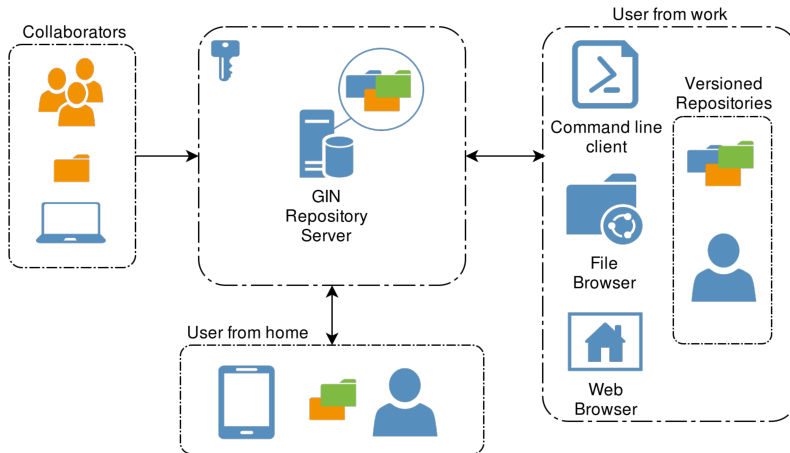
<https://git-annex.branchable.com>

- better suited for large and binary files
- large files are only copied when necessary
- large files are only downloaded by request



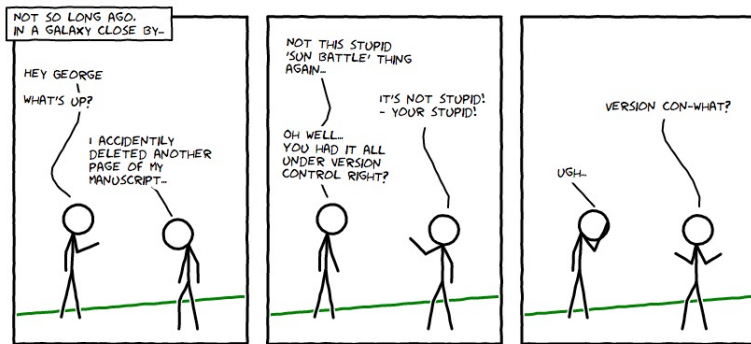
<https://web.gin.g-node.org>

- data management service based on git and git-annex
- public & private repositories
- DOI service
- version controlled
- open source
- developed and hosted by German Neuroinformatics Node



SUMMARY

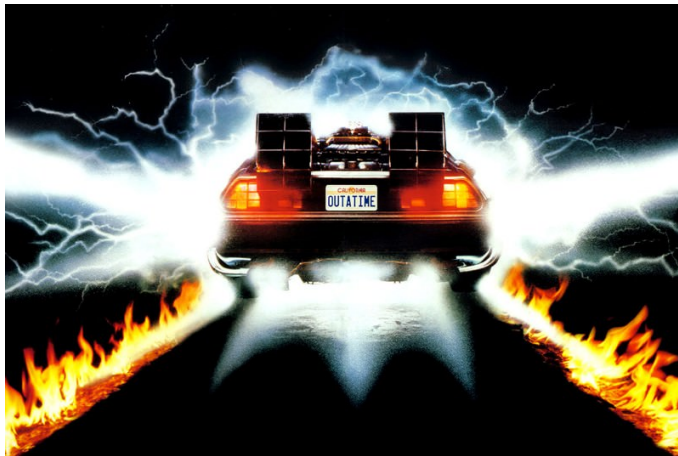
- Version control can help manage your files for
 - local projects
 - collaborative projects via GitHub
- GIT is a distributed version control system ideal for text based files
- GIT-ANNEX extends GIT functionality to also cover large, binary files
- GIN is a data management platform using GIT and GIT-ANNEX



<http://smutch.github.io/VersionControlTutorial>

THANKS FOR YOUR ATTENTION

For new time travel fans: Hands-on GIT session in a future PhD Meeting



<https://www.newscientist.com/article/dn28374-back-to-the-future-does-physics-of-martys-time-travel-add-up/>

REFERENCES AND FURTHER READS

This presentation is available at https://github.com/JuliaSprenger/vc_talk

Inspiration for this presentation comes from

- Version Control Tutorial & GIT

<https://github.com/rstudio/webinars/tree/master/06-Collaboration-and-time-travel-version-control>

More interesting references

- GIT cheat sheet

<https://services.github.com/on-demand/downloads/github-git-cheat-sheet.pdf>

- Interactive GIT cheat sheet <http://ndpsoftware.com/git-cheatsheet.html>

- GitHub <https://github.com>

- GIN data management platform <https://web.gin.g-node.org>