

Version control with git for Mathematicians

<https://github.com/gabindu/git-intro>

Gabriel Indurskis, based on slides by Max Joseph

January 27, 2020

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- ② How do you work with collaborators on the same files?
- ③ How much would your science/teaching/life suffer if your workstation exploded right now? (scale from 1-10)

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- in principle a commandline tool, but can use convenient graphical interfaces and websites (GitHub/GitLab/BitBucket)
- many modern editors support it directly without the need of external software

“Always remember your first collaborator is your future self, and your past self doesn’t answer emails”

- Christie Bahlai

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Optionally, create yourself an account on GitHub and log in on GitHub Desktop. (We will actually use GitLab for most things, but having access to GitHub directly is nice as well.)

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 - if you use Emacs, install `magit` package.

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~/.ssh/id_ed25519.pub (or maybe id_rsa.pub if you already had an older key)
 - in Git Bash, you can use the command

```
cat ~/.ssh/id_ed25519.pub | clip
```


to easily copy the relevant text.

Command line git

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Somewhere on your computer, create a new directory with a (text) file, e.g. `test.tex` or `test.txt`, and fill it with some example content (at least a few lines). (You could also just copy an already existing document.)

You can do this with your usual methods, or on the commandline, for example with:

```
mkdir my-first-git-repo
cd my-first-git-repo
echo "This is a fancy test!" > test.txt
```

You can also create other files, of whatever type you want (LaTeX, Markdown, HTML, Python scripts, ...) - binary files are ok as well!

Tell git to keep track of your files

Initializing a repository

On the commandline (Git Bash on Windows), make sure that you are inside the directory you created, then execute:

```
git init
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If you call `ls -a`, you should now notice that a hidden `.git/` directory was created. This is where git does its magic, and you should therefore never touch this directory or its contents!

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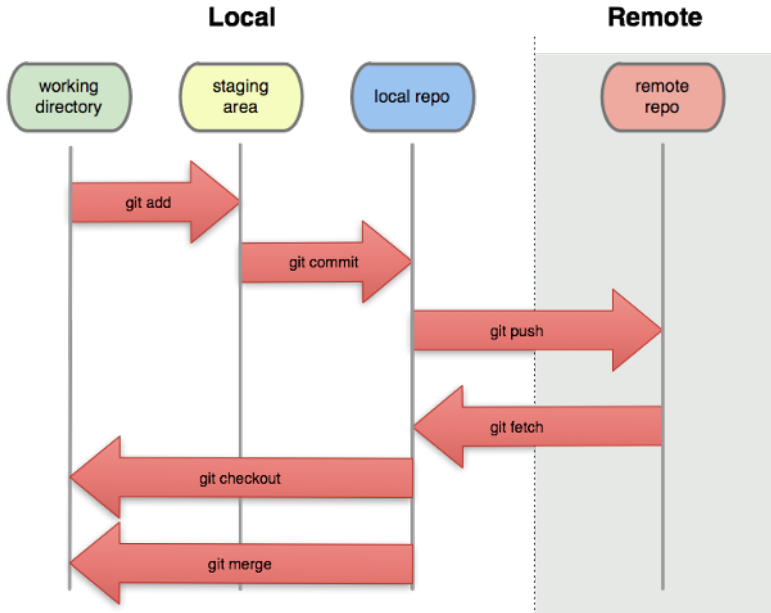
```
git add test.txt
```

or, to add all changed/new files (careful, this might add undesired temporary files):

```
git add --all
```

For future reference: If you want to avoid adding temporary files (like LaTeX auxiliary files etc.), you can add a file `.gitignore` which tells git to *never* even propose to track these files. You can download an appropriate `.gitignore` file for whatever type of document you’re working on at <https://www.gitignore.io/>

Your changes are now “staged”



Committing

Changes aren't final until they're committed

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git status
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git commit -m 'changed x, y, and z'
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If you just use `git commit`, git will open an editor to ask you for a commit message. You can set the default editor by one of the following commands:

```
git config --global core.editor "atom --wait"
```

```
git config --global core.editor "emacs -nw"
```

```
git config --global core.editor "zile"
```


Commit messages

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	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.

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- 5 View updated log with `git log`

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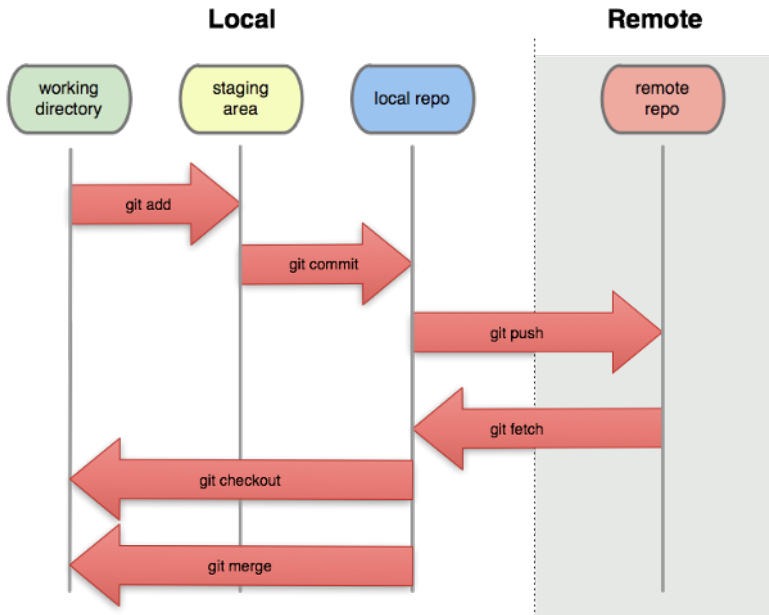
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- Hang on, we do!

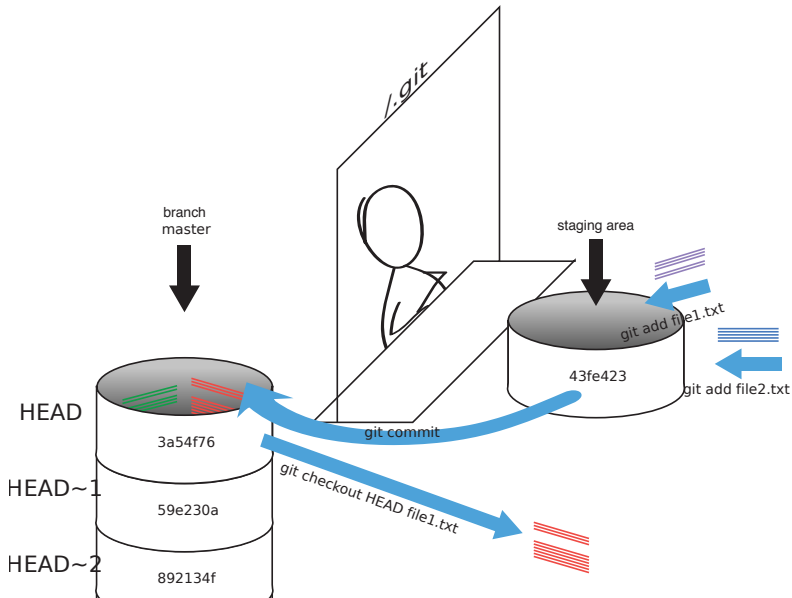
```
git diff
```

```
git checkout HEAD test.txt
```

What happened?



Wait, what does HEAD refer to?



Mirroring your repository on the internet

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 - popularity & user base
- *I personally find GitLab the best free offer at the moment - but you can use all three if you want (and you can always switch)!*

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(use the URL shown on the website for your project, best the one using SSH, to avoid having to type in passwords all the time.)

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- 3 Verify the path of the remote:

```
git remote -v
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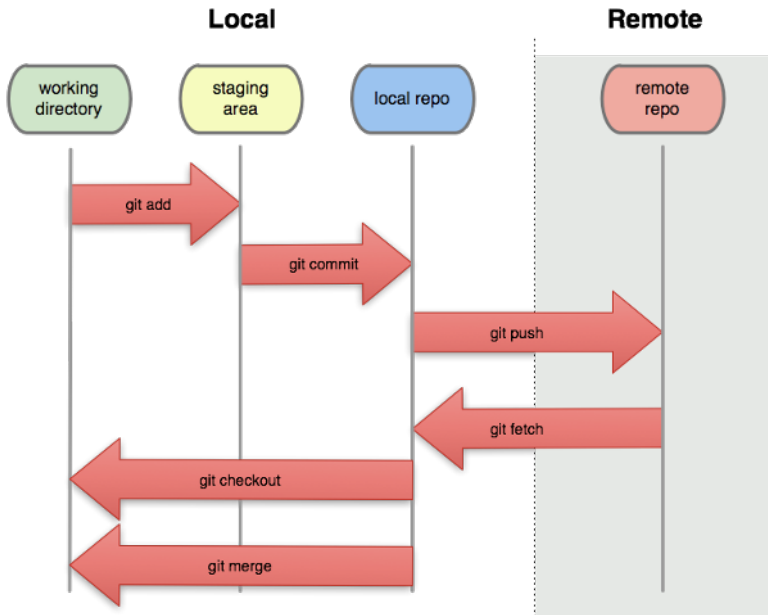
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Technical detail: `git fetch` only checks the status of the remote, while `git pull` actually applies those changes in your working directory.

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- Important rule to remember: Always `git pull` before starting to edit your local files!

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```
cd folder-where-you-want-it
git clone URL
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Clone an already existing repository

Find the URL of a repository you want to work on.

- For example, log into GitLab and go to the main page of our [CourseOutlines-Math-ChamplainStLambert](#) repository.
- Click on “Clone” and select the URL shown under “clone with SSH” (this avoids having to type in passwords all the time).
- Now get the files onto your computer:
 - In GitHub Desktop: “Clone repository”, then enter the URL (if the SSH URL does not work, try again with the https URL)
 - or, on the commandline:

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cd folder-where-you-want-it
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- This automatically connects your new local repo with the remote, so you can directly use `git push` and `git pull`.

Branches

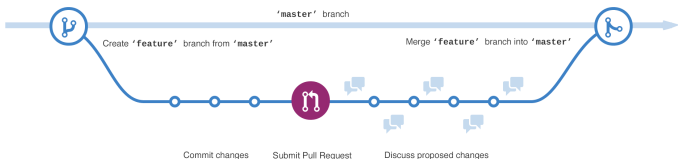
- Any repository has a default “branch” in which all files are stored, usually called “master”. This branch is usually reserved for the current most up-to-date, well-working production version (good example to keep in mind: the live files for a website, e.g. <http://math.mychamplain.ca>)

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- But when working on new “features”, it’s usually not a good idea to immediately put those into the master branch!
- So, instead, you create a new branch, work in there without danger of destroying anything for others, and finally ask for the changes to be **merged** into the master branch:



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On GitLab:

- go to “Repository -> Branches”, it should list all branches

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- click on “merge request” next to your branch

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- click on “merge request” next to your branch
- fill in some details in the form to explain what you did

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- *Always* use `git pull` before you start editing. This pulls in any changes made by others (or yourself on another computer!) from the remote repository.

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Slack.com

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- I've created a Slack group “CCSL Math Dept” for us, simply let me know if you'd like me to (re-)send an invitation.

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