

Mini-workshop \LaTeX and Git

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de aveiro



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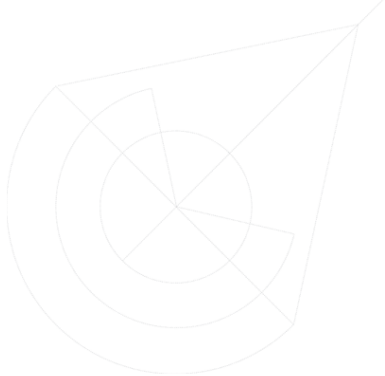
INSTITUIÇÕES ASSOCIADAS



Introduction to \LaTeX

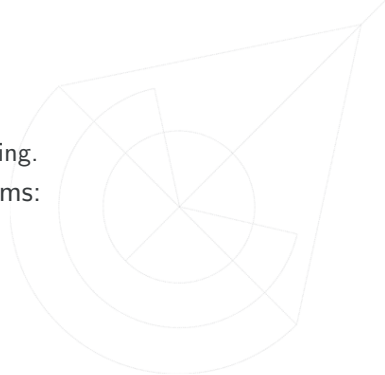


Intro



Initial notions

- What is it?
 - A document preparation system for high-quality typesetting.
- It has some advantages when compared to Office platforms:
 - Free.
 - Easy reference and citation management.
 - Potent mathematical writing.
 - Very commonly used in science and engineering.
 - It's as cross-platform as you can get.



Initial notions

- What is needed for it to work?
 - A \TeX distribution (MiKTeX, MacTeX, etc).
 - Some text editor: Texmaker, TeXworks, TeXShop, Overleaf and Sharelatex (online editor).
- What is handy to have?
 - Citation manager (Mendeley, Bibdesk or other).
 - A decent PDF reader (Foxit Reader, Adobe Acrobat or other).
- Whenever you have any doubts, Google en.wikibooks.org/wiki/LaTeX.

Special characters

- These characters will not work properly if written directly.

#	Defines arguments
\$	Start math mode
^	Starts superscript
_	Starts subscript
%	Makes rest of line commented
{ }	Defines an isolated set of characters
\	Defines a command

What is a command

- A command has the following structure:

`\commandname[option1, option2]{argument1}{argument2}`

- Examples:

`\documentclass[11pt]{report}`

`\usepackage[utf8x]{inputenc}`

- The `\usepackage` command includes packages in the document, these packages give meaning to a few commands. Example:

`\usepackage{amsmath}` allows for equation writing.



What is an environment

```
\begin{environment}
```

...ambient content...

```
\end{environment}
```

- There is plenty of code that only functions inside a specific environment. Example:

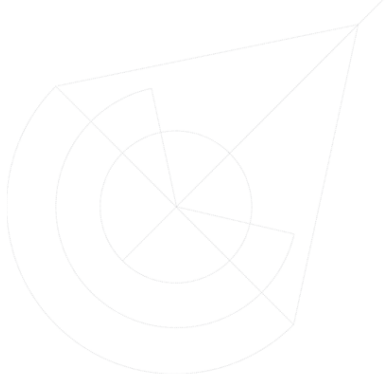
```
\begin{document}
```

...document content...

```
\end{document}
```

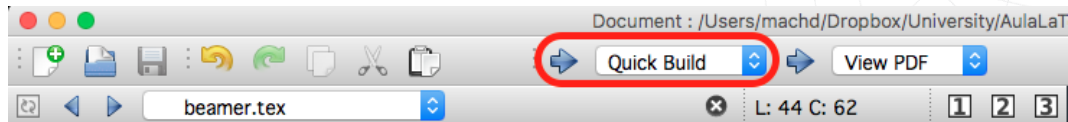


How to start a document



Offline \LaTeX compilation

- The code to be compiled should be in a `.tex` file.
- Compilation can be done with a `.tex` editor or in the command line.



- When using an offline compiler, save the `.tex` file and run the compiler inside a folder, \LaTeX generates a bunch of support files.

Offline L^AT_EX compilation

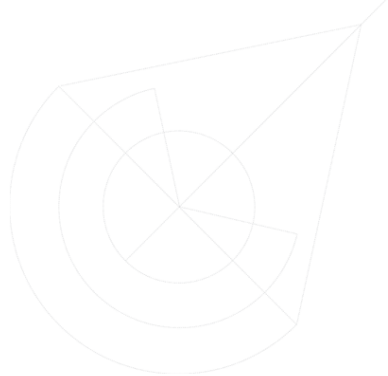
- This is what a L^AT_EX code looks like.

```
1  \documentclass{report}
2  \usepackage[utf8]{inputenc}
3
4  \begin{document}
5  Isto é um documento com uma linha de texto.
6  \end{document}
```

- Compilation usually returns a .pdf file.

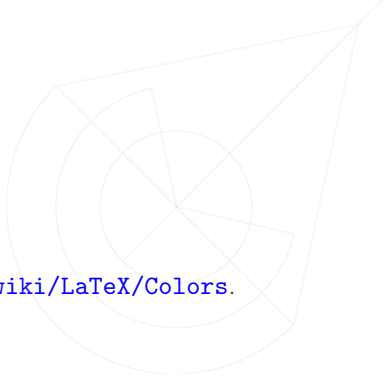
Isto é um documento com uma linha de texto.

Simple text editing



bold, *italics*, underline, colourful

- ▶ `\textbf{Bold text}`
- ▶ `\textit{Italicised text}`
- ▶ `\underline{Underlined text}`
- ▶ `\textcolor{Colourname}{Colourful text}`
 - ▶ Colour names can be found here → en.wikibooks.org/wiki/LaTeX/Colors.



Paragraphs, line breaks and sections

- `\\` Breaks the line, doesn't start a new paragraph.
- `\par` Breaks the line and starts a new paragraph.
- `\chapter{Chapter name}` Starts a chapter.
- `\section{Section name}` Starts a section.
`\subsection{Subsection name},`
`\subsubsection{Subsubsection name}`
- All of these are numbered, writing a `*` before the `{}` suppresses this.



Titles, authors and tables of contents

- All of these can be generated automatically by \LaTeX , their appearance depends on the template.
- In this case, you need to give \LaTeX the necessary information, in the preamble write:
 - `\title{Title}`
 - `\author{Author or Authors}`
 - `\date{Date}`
- For the title to appear you need to use the `\maketitle` command, usually right after:
`\begin{document}`
- You may be given a template where the title is defined explicitly, in that case just alter the corresponding text.
- To generate the index just write the command `\tableofcontents`, usually right after the `\maketitle`.

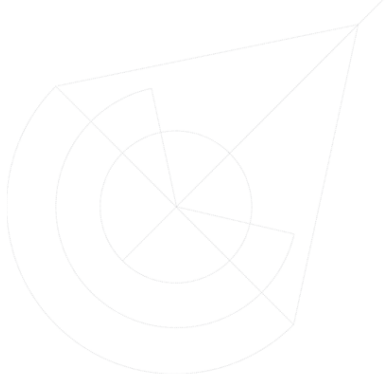
Changing the language of the document

- Some compilers have a spell checker, set it to the language you are using.

- The language of the document can be changed with the `babel` package.

```
1 \documentclass{report}
2 \usepackage[utf8]{inputenc}
3 \usepackage[portuguese]{babel}
4
5 \title{Isto é um título}
6 \author{Eu escrevi isto}
7 \date{\today}
8
9 \begin{document}
10 \maketitle
11 \tableofcontents
12 \chapter{Isto é um capítulo}
13 \section{Isto começa uma secção}
14 \subsection*{Esta subsecção não é numerada}
15 Isto é um documento com uma linha de texto.
16 \chapter{Isto é outro capítulo}
17 \end{document}
```


Making tables



Tables - the hard way

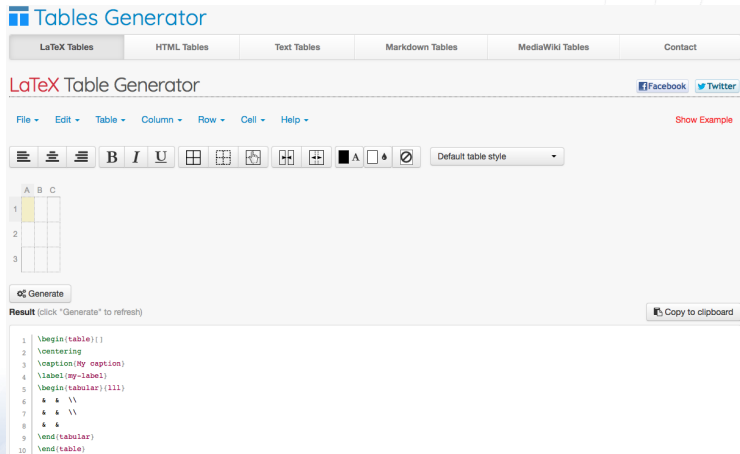
- You need to use the `{table}` environment.
- You need to use the `{tabular}` environment.
- You need to set the column alignment and if you want to have vertical lines between them.
- You have to set the horizontal lines you want.

```
\begin{table}[]  
\begin{tabular}{c|cl}  
cell1 & cell2 & cell3 \\ \hline  
cell4 & cell5 & cell6  
\end{tabular}  
\end{table}
```

- You can declare merged cells, partial horizontal and vertical lines, this easily becomes way too complex.

Tables - the easy way

- Use this website www.tablesgenerator.com.



The screenshot shows the 'Tables Generator' website interface. At the top, there are tabs for 'LaTeX Tables', 'HTML Tables', 'Text Tables', 'Markdown Tables', 'MediaWiki Tables', and 'Contact'. The 'LaTeX Tables' tab is selected. Below the tabs, the text 'LaTeX Table Generator' is displayed, along with links to Facebook and Twitter. A menu bar includes 'File', 'Edit', 'Table', 'Column', 'Row', 'Cell', and 'Help'. A toolbar contains icons for table structure (rows, columns, rowspan, colspan), text formatting (bold, italic, underline), and other options like 'Default table style'. A small table preview is shown with 3 rows and 3 columns. Below the preview is a 'Generate' button. The 'Result' section shows the generated LaTeX code for a table with 3 columns and 3 rows, including a caption and labels. A 'Copy to clipboard' button is also present.

Tables Generator

LaTeX Tables HTML Tables Text Tables Markdown Tables MediaWiki Tables Contact

LaTeX Table Generator [Facebook](#) [Twitter](#)

File Edit Table Column Row Cell Help Show Example

Generate

Result (click "Generate" to refresh) [Copy to clipboard](#)

```
1 \begin{table}[]
2 \centering
3 \caption{My caption}
4 \label{my-label1}
5 \begin{tabular}{|lll|}
6 & & \\
7 & & \\
8 & & \\
9 \end{tabular}
10 \end{table}
```

What are *floats*?

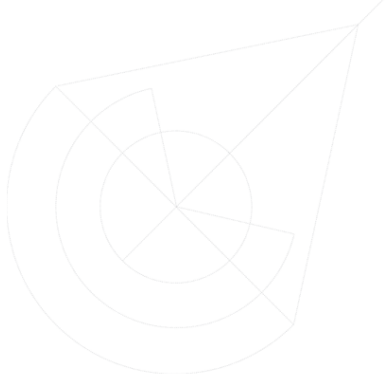
- You may have noticed a blank space in the previous code.
- With the information inside the `[]`, \LaTeX decides where it will draw the table.

```
1 \begin{table}[ ]
2 \centering
3 \caption{My caption}
4 \label{my-label}
5 \begin{tabular}{lll}
6 & & \\
7 & & \\
8 & & \\
9 \end{tabular}
10 \end{table}
```

Types of *float*

- There are multiple types of *floats*:
 - H - Draws the *float* exactly where it is declared, may deform the text.
 - h - Draws the *float* close to where it is declared, this avoids deforming the text.
 - t - Draws the float at the top of the page in which it is declared.
 - b - Draws the *float* at the bottom of the page in which it is declared.
 - p - Draws the float in a page restricted to *floats*.
- The `{figure}` environment also uses floats *floats*.
- Use the package `{float}`

Figures and images



How to declare an image

- Use the `{graphicx}` package.
- Images need to be inside a folder where \LaTeX knows it should look.

```
\graphicspath{ {pathtofolder1}{pathtofolder2} }
```

- Images should be declared inside the `{figure}` environment.

```
\begin{figure}[float]
```

```
\centering
```

```
\includegraphics[figure alterations]{imagenname}
```

```
\end{figure}
```

- PNG, JPG, PDF are all accepted. Other file types are as well, check google in case of doubts.
- Multiple properties can be altered, check en.wikibooks.org/wiki/LaTeX/Importing_Graphics

Lists and enumerations



How to make a list

- The `{itemize}` environment generates unnumbered lists.
- The `{enumerate}` environment generates numbered lists.
- Nested lists are very much possible.
- Items are identified by the `\item` command.

```
\begin{itemize}
```

```
\item First item of the unnumbered list
```

```
\begin{enumerate}
```

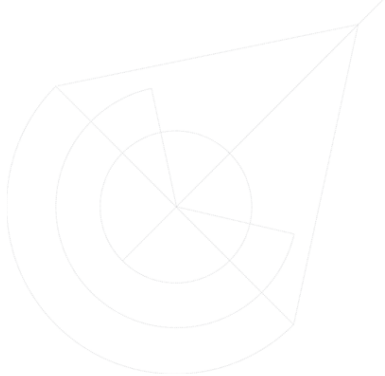
```
\item First item of the numbered sublist
```

```
\item Second item of the numbered sublist
```

```
\end{enumerate}
```

```
\item Second item of the unnumbered list
```

```
\end{itemize}
```



Equations and other math topics



Math environments

- Use the `{amsmath}` package.
- `$equation$` generates an inline equation, can be included in the middle of a sentence.
- `$$equation$$` generates a separated, centred equation.
- The `{equation}` environment generates numbered equations, this is the best option.

```
\begin{equation}  
equation  
\end{equation}
```

- A blank line inside a math environment causes a compilation error!

Greek letters and other special symbols

- You need to use the letter names in english.
 - `\alpha` writes α .
 - `\beta` writes β .
 - etc
- There are arrows and mathematical symbols
 - `\rightarrow` writes \rightarrow .
 - `\simeq` writes \simeq .
 - etc
- All of these symbols can only be used in a math environment.
- Check the list here en.wikibooks.org/wiki/LaTeX/Mathematics



Fractions, parentheses and square roots

- Inside a math environment, it's declared as:

`\frac{numerator}{denominator}`

- You can have a parentheses with necessary size to envelop the fraction:

`\left(\frac{numerator}{denominator}\right)`

- This method for parentheses works with `[`, `{` e `“.”`.
- Using `\left.something\right)` causes only the right parenthesis to be drawn.
- Having a mismatched number of `\left` or `\right` causes a compilation error!
- Roots envelop the whole radicand:

`\sqrt[index]{radicand}`

Superscripts, subscripts, vectors and accents

- The `^` symbol puts things in superscript, this is how you write powers.

`basis^{exponent}` \Rightarrow $\text{basis}^{\text{exponent}}$

- The `_` symbol puts things in subscript, this is how you write indices.

`basis_{subscript}` \Rightarrow $\text{basis}_{\text{subscript}}$

- Vectors are declared by the `\vec{}` command.

`\vec{v}` \Rightarrow \vec{v}

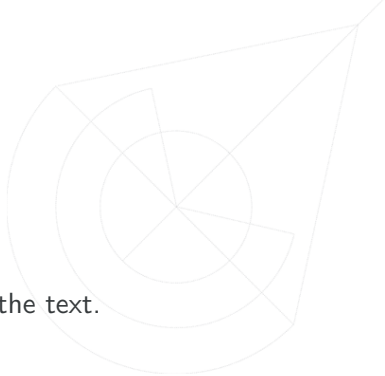
- For more, see en.wikibooks.org/wiki/LaTeX/Mathematics

Referencing content



What is a reference?

- To call, by a number, some equation, figure or table.
- There are 3 different commands for this:
 - `\label{identificationtext}`
 - `\ref{identificationtext}`
 - `\eqref{equationidentificationtext}`
- You can call the reference before and after it appears in the text.
- \LaTeX deals with the pesky problem of numbering.



Referencing equations

- Just add a label to the equation:

```
\begin{equation}\label{labeltext}
```

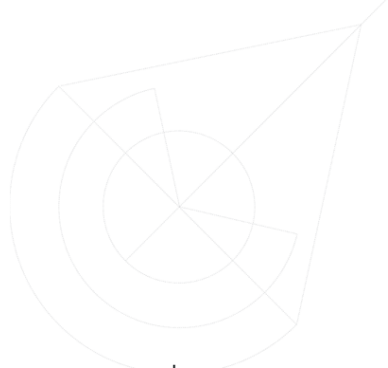
equation content

```
\end{equation}
```

- You then call the reference with the `\eqref` command:

"As demonstrated in relation `\eqref{labeltext}`..."

- This command is made especially for equations, the reference appears between parenthesis.

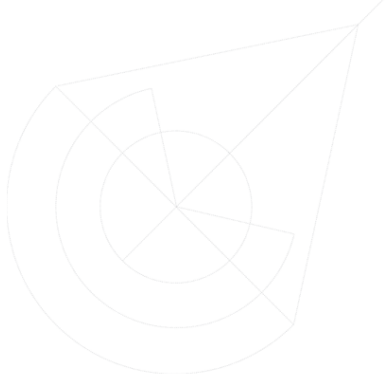


Referenciar tabelas e figuras

- The figure/table needs to have a caption.
- Just add a label to the figure/table.

```
\begin{table}[]  
\caption{legend}  
\label{labeltext}  
\begin{tabular}{c|cl}  
Table content...  
\end{tabular}  
\end{table}
```

- You then call the reference with the `\ref` command.
- Usually, table captions are placed above the table.

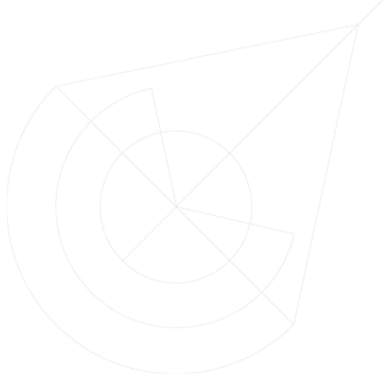


Referenciar tabelas e figuras

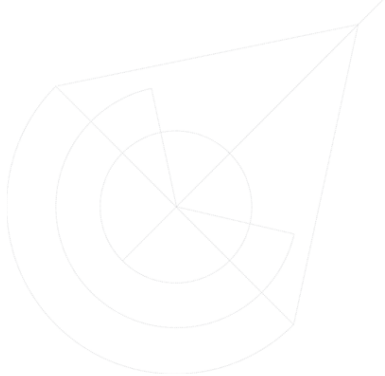
- The figure/table needs to have a caption.
- Just add a label to the figure/table.

```
\begin{figure}[float]  
\centering  
\includegraphics[...]{imagenname}  
\caption{legend}  
\label{labeltext}  
\end{figure}
```

- You then call the reference with the `\ref` command.



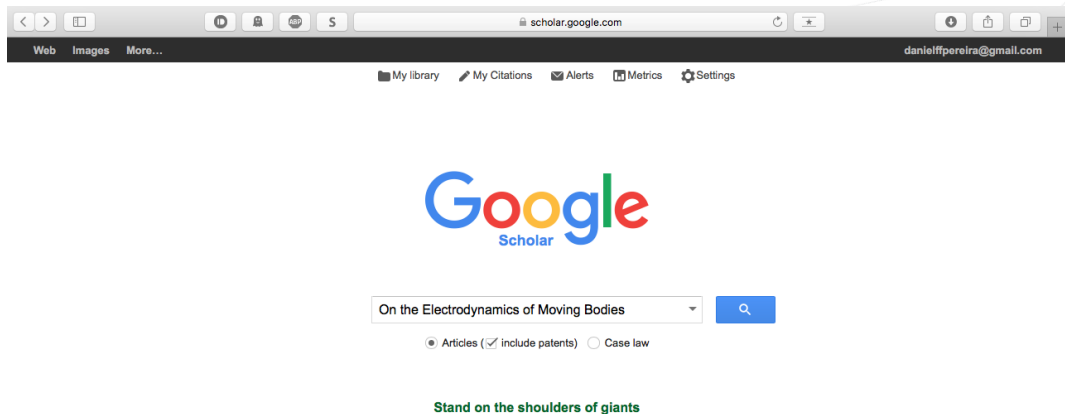
Bibliographies and citations



How to make a bibliography

- Easiest way is to have a .bib file.
- This file can be made by hand or with a reference management software (Mendeley, Bibdesk or other).
- I'll show you how to do it by hand.
- Generate a .bib file, somehow, by changing the extension of a .txt created with notepad, for example.
- Go get the reference text and copy it into the .bib file.

Where to get references



Where to get references

The screenshot shows a Google Scholar search interface. The browser address bar displays 'scholar.google.com'. The search bar contains the text 'On the Electrodynamics of Moving Bodies'. Below the search bar, the results are listed. The first result is a PDF document titled 'On the electrodynamics of moving bodies' by A. Einstein, dated 1905, available from libarch.nmu.org.ua. The second result is an HTML document with the same title by A. Einstein, dated 1952, available from sites.ifi.unicamp.br. The interface includes navigation links like 'Web', 'Images', and 'More...', a 'My Citations' button, and filters for 'Articles', 'Case law', 'My library', 'Any time', and 'Sort by relevance'.

Web Images More... danielffpereira@gmail.com

Google On the Electrodynamics of Moving Bodies

Scholar About 35,200 results (0.05 sec) My Citations

Articles

Case law

My library

Any time

Since 2017

Since 2016

Since 2013

Custom range...

Sort by relevance

Sort by date

[PDF] On the electrodynamics of moving bodies

[A Einstein - 1905 - libarch.nmu.org.ua](#)

It is known that Maxwell's electrodynamics—as usually understood at the present time—when applied to moving bodies, leads to asymmetries which do not appear to be inherent in the phenomena. Take, for example, the reciprocal electrodynamic action of a magnet and a

Cited by 929 Related articles All 141 versions Cite Save More

[PDF] nmu.org.ua

[HTML] On the electrodynamics of moving bodies

[A Einstein - The principle of relativity, 1952 - sites.ifi.unicamp.br](#)

It is known that Maxwell's electrodynamics—as usually understood at the present time—when applied to moving bodies, leads to asymmetries which do not appear to be inherent in the phenomena. Take, for example, the reciprocal electrodynamic action of a magnet and a

Cited by 372 Related articles All 7 versions Cite Save More

[HTML] unicamp.br

On the electrodynamics of moving bodies

[A Einstein - 1923 - philpapers.org](#)

Abstract It is known that Maxwell's electrodynamics—as usually understood at the present time—when applied to moving bodies, leads to asymmetries which do not appear to be inherent in the phenomena. Take, for example, the reciprocal electrodynamic action of a

Where to get references

The screenshot shows a Google Scholar search results page. The search query is "On the Electrodynamics of Moving Bodies". The results show a PDF link to a document by A. Einstein from 1905. A "Cite" dialog box is open, displaying various citation formats for the selected document.

Cite

Copy and paste a formatted citation or use one of the links to import into a bibliography manager.

MLA Einstein, Albert. "On the electrodynamics of moving bodies." (1905).

APA Einstein, A. (1905). On the electrodynamics of moving bodies.

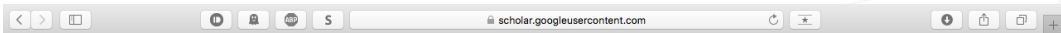
Chicago Einstein, Albert. "On the electrodynamics of moving bodies." (1905).

Harvard Einstein, A., 1905. On the electrodynamics of moving bodies.

Vancouver Einstein A. On the electrodynamics of moving bodies.

[BibTeX](#) [EndNote](#) [RefMan](#) [RefWorks](#)

Where to get references



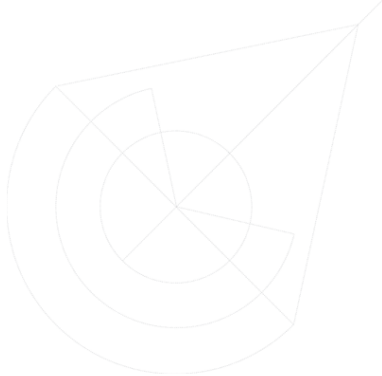
```
@article{einstein1905electrodynamics,  
  title={On the electrodynamics of moving bodies},  
  author={Einstein, Albert},  
  year={1905}  
}
```

Understanding the citation text

```
@article{einstein1905electrodynamics,  
  title={On the electrodynamics of moving bodies},  
  author={Einstein, Albert},  
  year={1905}  
}
```

- Different publications want different formats.

```
@typeofsource{citetext,  
  title={Source title},  
  author={Authors},  
  year={Publication year}  
}
```



How to insert the bibliography in the document

- After preparing a .bib file, you need to feed it to \LaTeX .

$\text{\backslash bibliograph}\{\text{bibliography}\}$

- There are different styles of bibliographies, they change the way things are presented.

$\text{\backslash bibliographstyle}\{\text{plain}\}$

- By default, \LaTeX only includes cited sources in the bibliography, if you want uncited sources to be included, use the code:

$\text{\backslash nocite}\{*\}$

How to cite a source

- After having included the bibliography in the document, this is cited with the `\cite{citetext}` command.
- If you wish to cite multiple sources at the same time, do:

`\cite{citetext1,citetext2,citetext3,...}`

- For more, see en.wikibooks.org/wiki/LaTeX/Bibliography_Management

This concludes the \LaTeX mini-workshop

Introduction to Git



Intro



Initial notions

- What is it?
 - A database control and sharing system.
- GitHub is a very popular option, it's free and open. Create an account on GitHub.
- You need to install the git distribution.
 - Windows: gitforwindows.org
 - Mac: sourceforge.net/projects/git-osx-installer/files/
 - Linux: run the following code in the console (this should work for most distros)

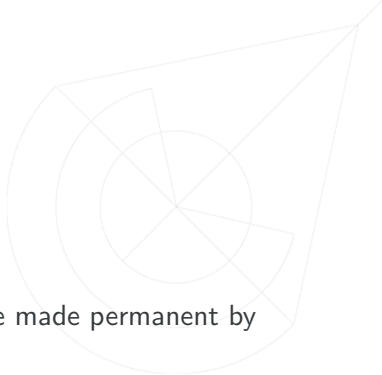
`sudo apt-get update`

`sudo apt-get install git`

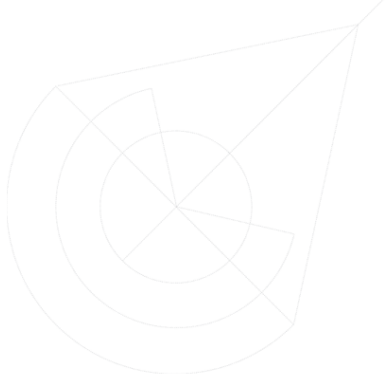
- You should use a Git client:
 - GitKraken: www.gitkraken.com/git-client
 - GitHub Desktop: desktop.github.com

What is a repository

- A repository is a data structure that:
 - Stores a set of files and/or a directory structure.
 - A historical record of the changes to those files.
- The main repository lives somewhere in a server.
- You can **clone** a copy of the repository to your PC.
- Changes are made locally to the cloned repository can be made permanent by **committing** to it.
- Changes can then be **pushed** to the external repository.
- If you are working on another computer, you can then **pull** the changes from the external repository.

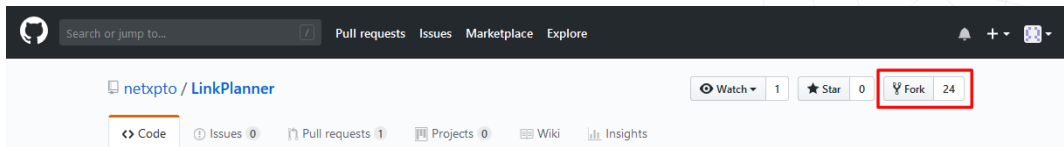


Forking repositories



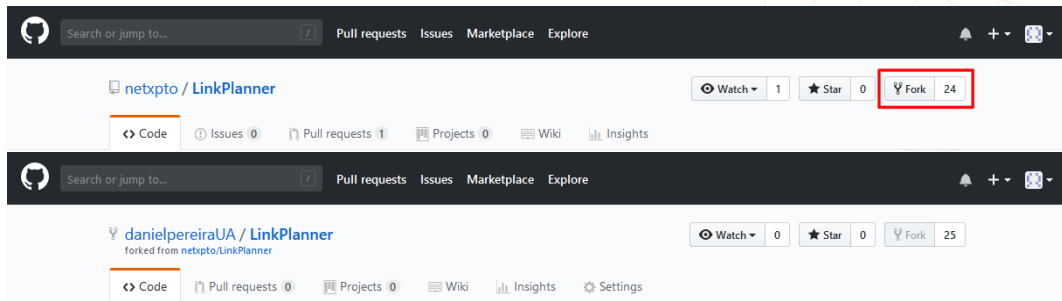
What the fork?

- A fork is a copy of another repository.
- In the GitHub website, navigate to the repository you want to fork.



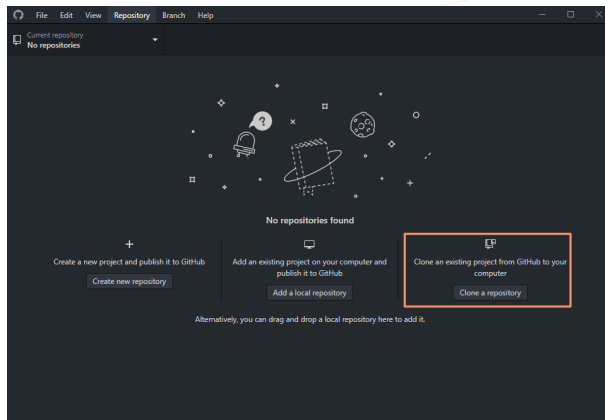
How to fork a repository

- A fork is a copy of another repository.
- In the GitHub website, navigate to the repository you want to fork.



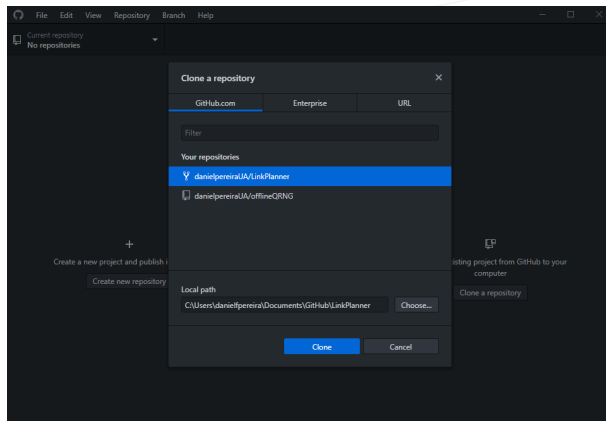
How to clone your fork

- This is not the only way to do it, but it is the easiest.
- In the GitHub Desktop app, choose to *clone a repository*.



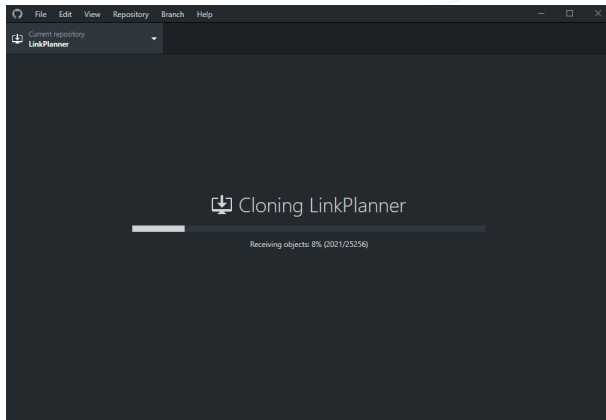
How to clone your fork

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How to clone your fork

- This is not the only way to do it, but it is the easiest.
- In the GitHub Desktop app, choose to *clone a repository*.
- Then you just have wait while it downloads, may take a while.



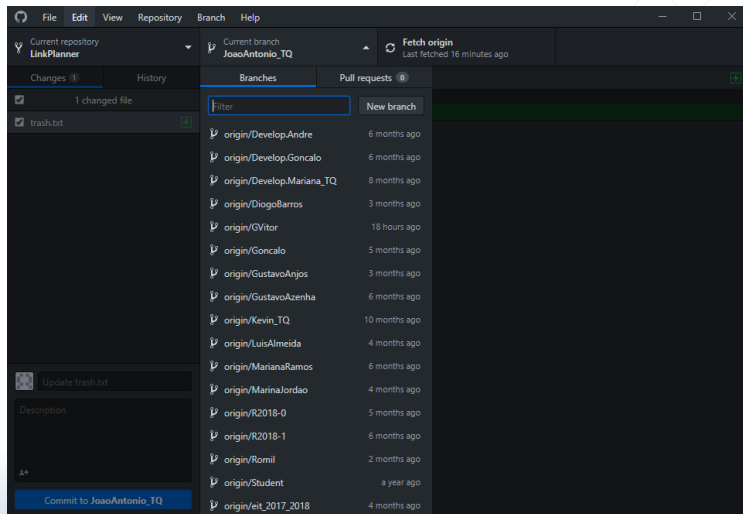
Working inside your fork



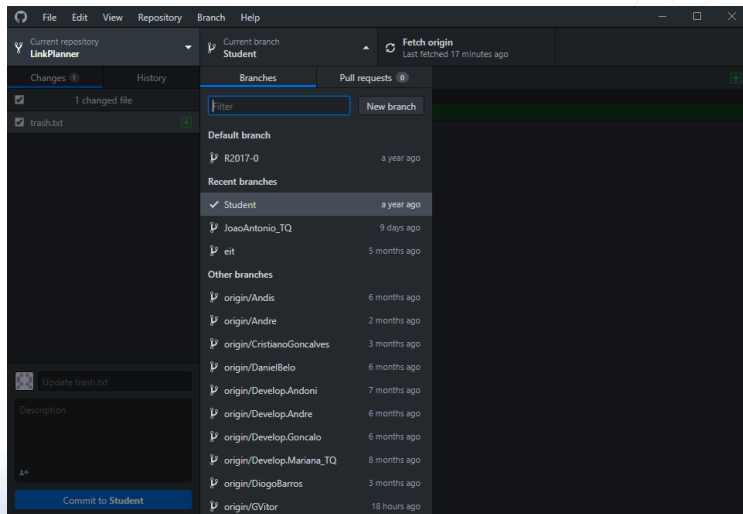
Branches

- What is a branch?
 - You can see it as a split of a repository inside it.
 - While a fork is to another account, a branch remains in the same account.
 - Allows code to be tested before it is included in the main branch.
- You won't have to worry about branches much in this class, only that you work on the branch allotted to you.

Branches

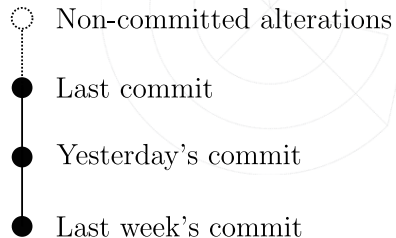


Branches

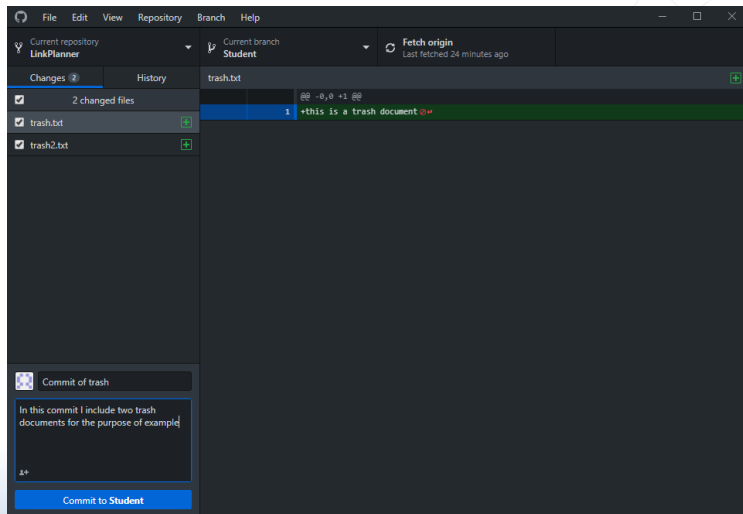


Committing, pushing and pulling

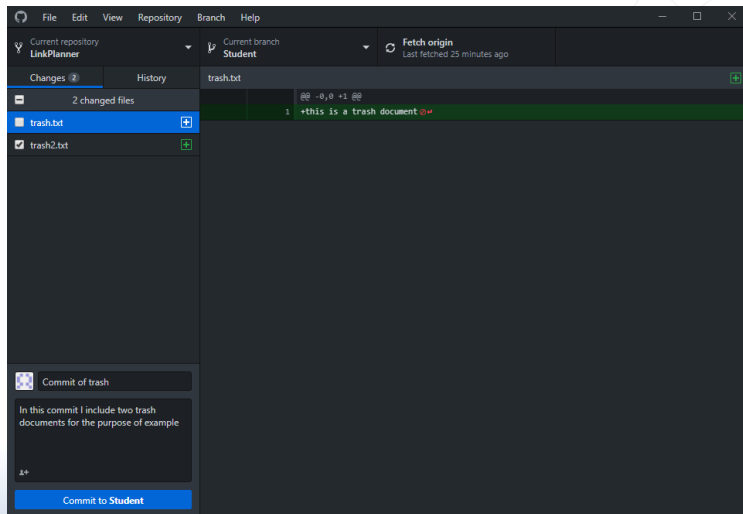
- Alterations made on your **clone** (that lives on your computer) can be made “official” by *committing* to them.
- You can discard changes by *checking out* the version of the latest commit. You can even **check out** a version of a file from any previous commit.
- The alterations you make this way are local to your machine, you need to **push** them to your “cloud” repository.
- If you wish to work on your repository on another machine, you will need to **pull** the latest version from the “cloud” repository.



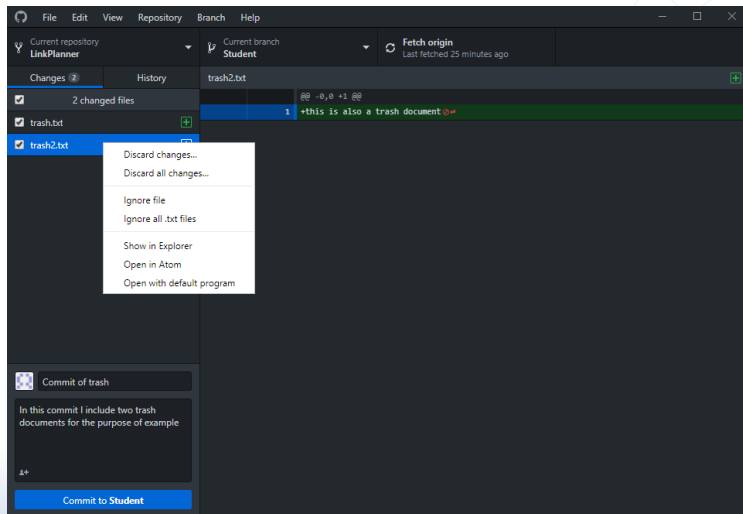
Committing, pushing and pulling



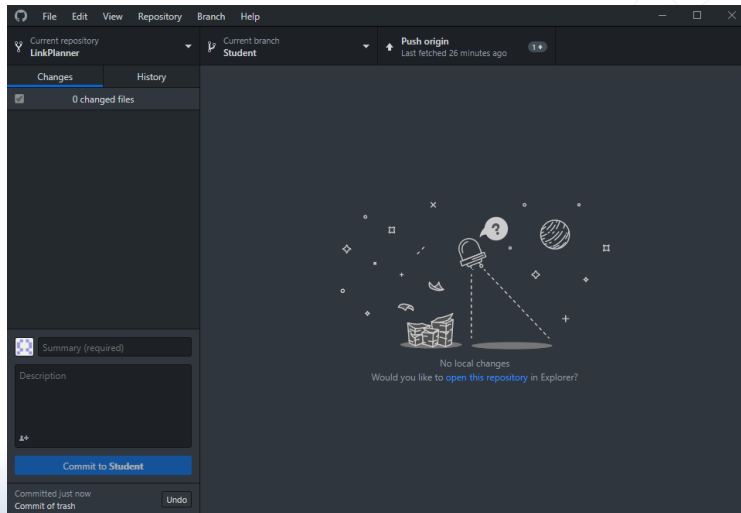
Committing, pushing and pulling



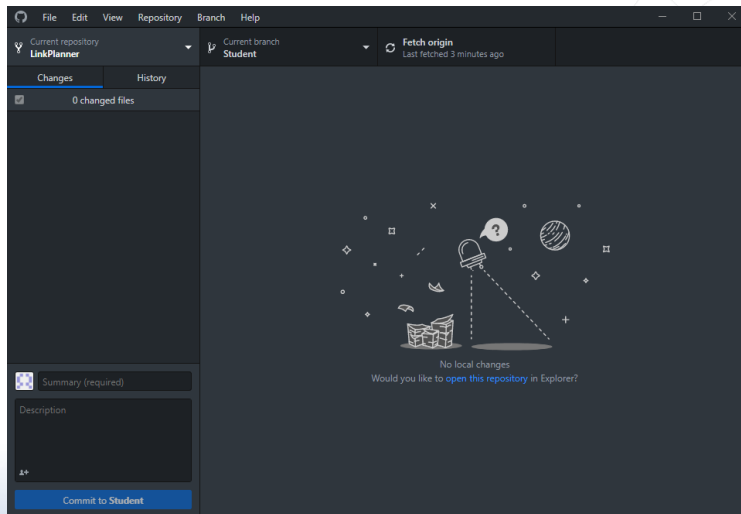
Committing, pushing and pulling



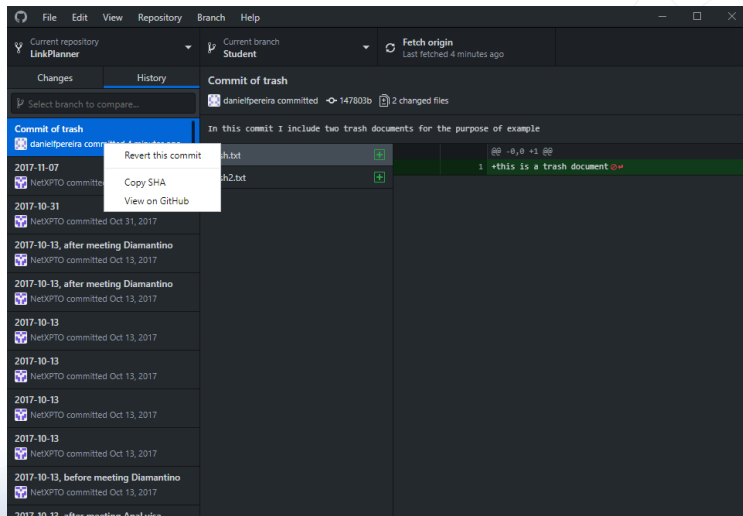
Committing, pushing and pulling



Committing, pushing and pulling



Committing, pushing and pulling



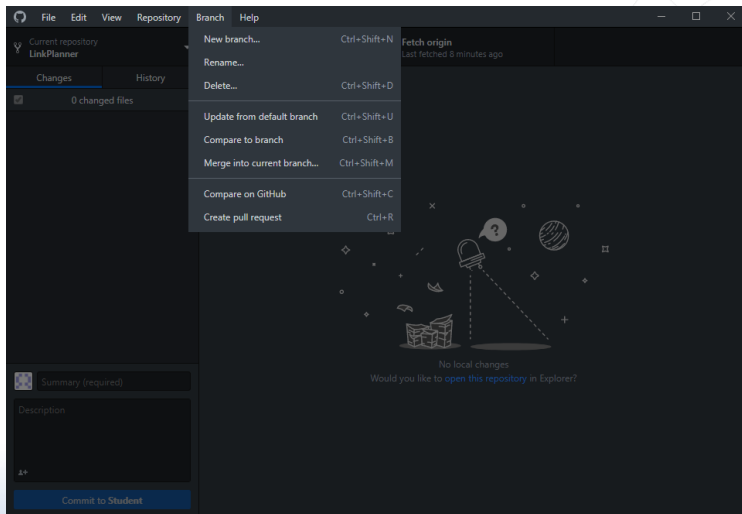
Communicating between forks



Pull requests

- The alterations you made and pushed to your account only live in your fork.
- If you want to share them with someone else (for example the owner of the original repository) you need to open a pull request.

Pull requests



Pull requests


netxpto / LinkPlanner

Watch 1 Star 0 Fork 25


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Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also [compare across forks](#).


 base fork: netxpto/LinkPlanner

base: Student

 head fork: danielpereiraUA/LinkPlanner

compare: Student

✓ **Able to merge.** These branches can be automatically merged.



Commit of trash

Write Preview

AA B i “ < > ↺ ≡ ≡ ≡ @ 📎 ↶

In this commit I include two trash documents for the purpose of example

Attach files by dragging & dropping, [selecting them](#), or pasting from the clipboard.

☒ Allow edits from maintainers. [Learn more](#)



Create pull request

Pull requests


- The alterations you made and pushed to your account only live in your fork.
- If you want to share them with someone else (for example the owner of the original repository) you need to open a pull request.
- The owner of the repository you are requesting the pull to needs to approve it before it actually happens.




Pull requests

- The alterations you made and pushed to your account only live in your fork.
- If you want to share them with another fork of the same repository (for example original repository) you need to open a pull request.
- The owner of the repository you are requesting the pull to needs to approve it before it actually happens.
- Now say you want to update your fork from another fork of the same repository (for example, from the original repository).
- You do the reverse of what you did previously.
- Create a pull request from the fork you want to pull from into your fork.

Pull requests


 **danielpereiraUA / LinkPlanner**
forked from netxpto/LinkPlanner


 Watch ▾ 0  Star 0  Fork 25


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Initial upload

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 791 commits


 25 branches

 0 releases

 10 contributors

Branch: R2017-0 ▾ **New pull request** [Create new file](#) [Upload files](#) [Find file](#) [Clone or download ▾](#)

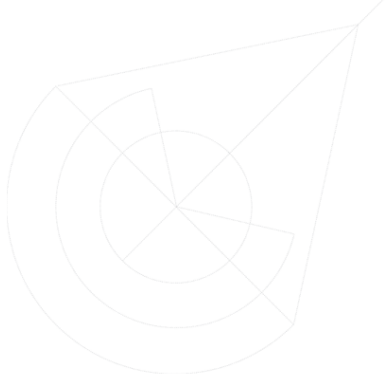
This branch is even with netxpto:R2017-0. [🔗 Pull request](#) [📄 Compare](#)

 netxpto 2017-11-07

Latest commit cadabbe on Nov 7, 2017

📁 doc/tex	2017-11-07	a year ago
📁 include	2017-10-13, before meeting Diamantino	a year ago
📁 lib	2017-10-13, after meeting Diamantino	a year ago

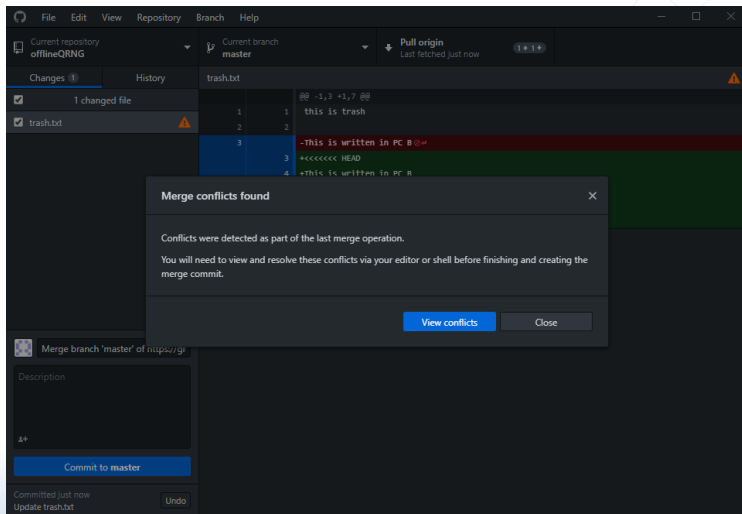
What if things go wrong?



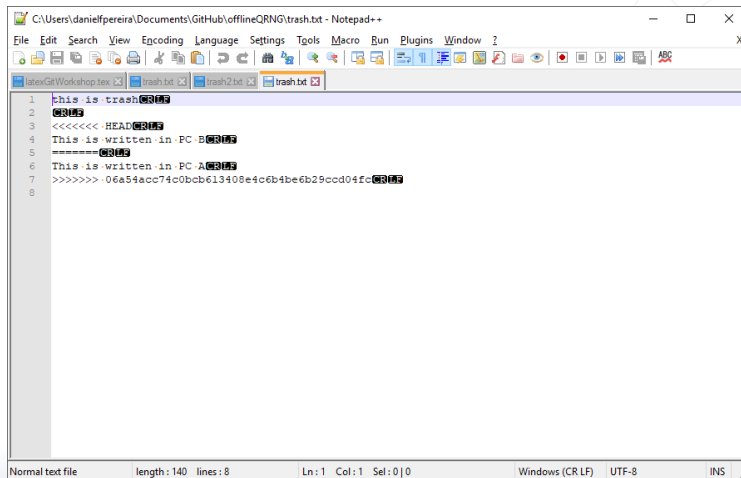
Conflicts

- A conflict arises when:
 - Change a file on PC A, push it to the cloud.
 - Change the same file on PC B before pulling the changes made on PC A.
 - When you then try to pull/push the changes made on PC A/B, you will have a conflict.
- Git knows you made changes on both machines, it even knows what changes you made in which.
- It needs you to tell it what changes to accept and what changes to discard.
- This is called merging.

Conflicts



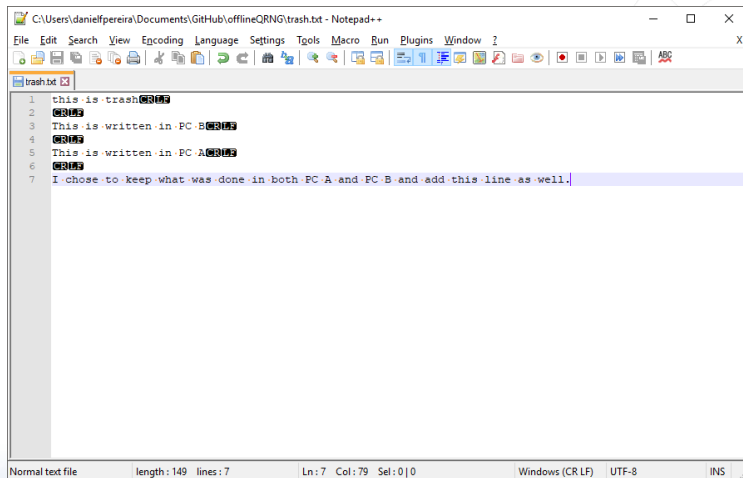
Conflicts



```
1 this is trashCRIFS
2 CRIFS
3 <<<<<< HEADCRIFS
4 This is written in PC-BOSCRIFS
5 =====CRIFS
6 This is written in PC-ACRIFS
7 >>>>>> 06a54acc74c0bcb613408e4c6b4be6b29cd04fcCRIFS
8
```

Normal text file length: 140 lines: 8 Ln: 1 Col: 1 Sel: 0 | 0 Windows (CR LF) UTF-8 INS

Conflicts



CAUsers\danielfpereira\Documents\GitHub\offlineQRNG\trash.txt - Notepad++

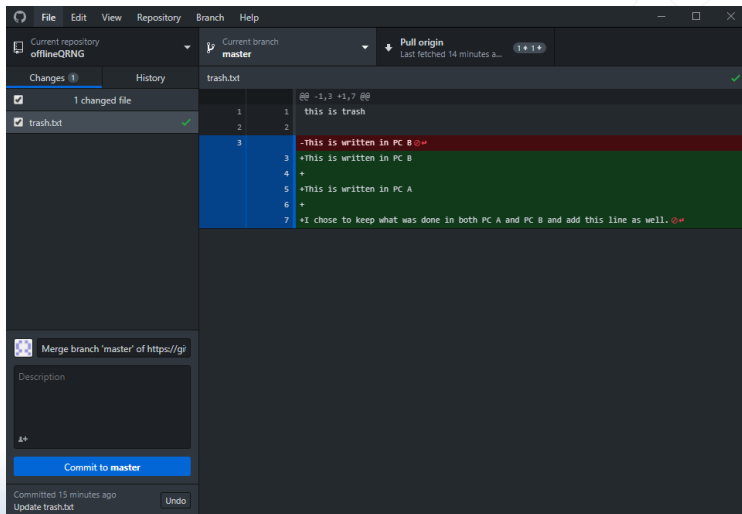
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?

trash.txt

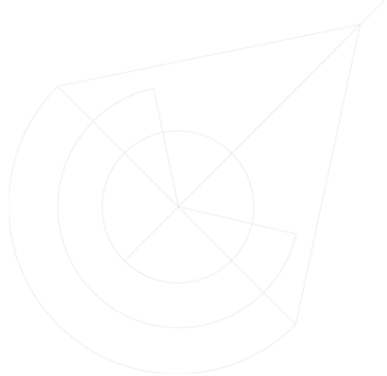
```
1 this is trash CRUI
2 CRUI
3 This is written in PC-B CRUI
4 CRUI
5 This is written in PC-A CRUI
6 CRUI
7 I chose to keep what was done in both PC-A and PC-B and add this line as well.
```

Normal text file length: 149 lines: 7 Ln: 7 Col: 79 Sel: 0 | 0 Windows (CR LF) UTF-8 INS

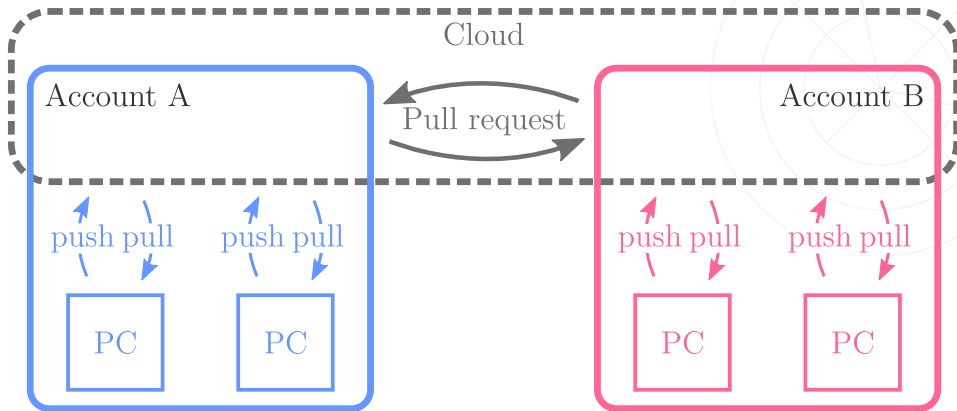
Conflicts



Summary



Topology of communications



This concludes the Git mini-workshop

The end!

