If you have not already done so, please download and install …

- **R 3.6.0**
  https://cran.r-project.org/
- **Rstudio Desktop**
  https://www.rstudio.com/products/rstudio/download/
- **git**
  https://git-scm.com/downloads

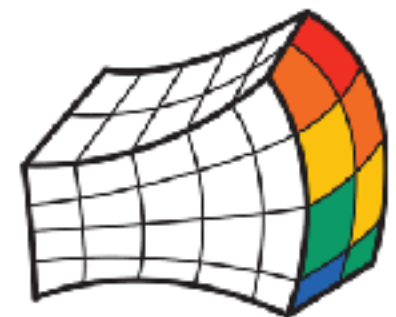# Tools for reproducible research: git/github, Rstudio, markdown

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3D Morphometrics and Image Analysis Workshop
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SLICER**MORPH**

Why reproducible research?

“Computation-based science publication is currently a doubtful enterprise because there is not enough support for identifying and rooting out sources of error in computational work ”
— Donoho (2010)

“an article about computational result is advertising, not scholarship. The actual scholarship is the full software environment, code and data, that produced the result”
— Claerbout and Karrenbach (1992)

Why scientists want reproducible research?

- **Improved work and work habits**

- **Improved teamwork**

- **Greater impact**

- **Greater continuity and cumulative impact**

How do you record the history of your projects?
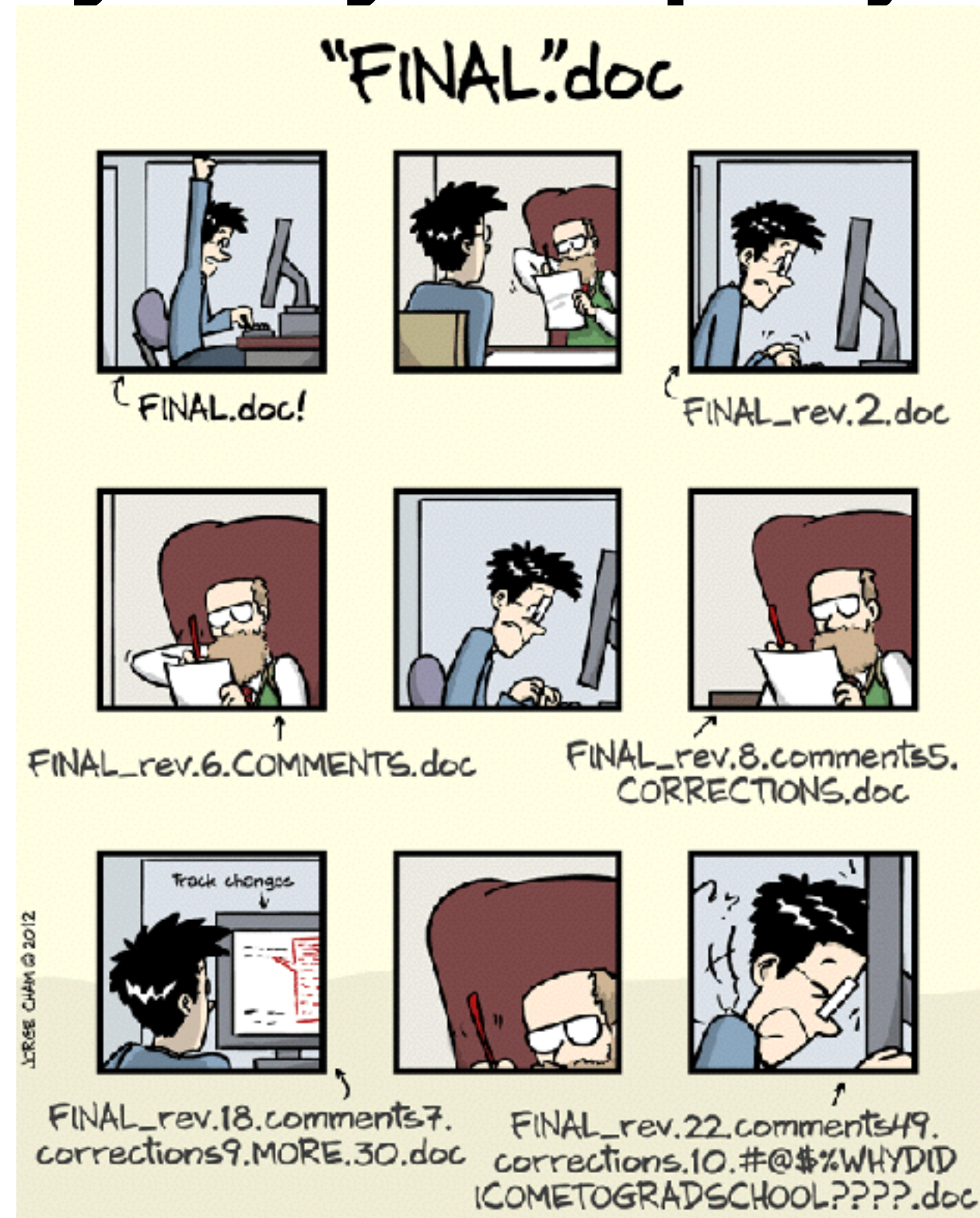
How do you record the history of your projects?

ariaDNE_revision3.pdf

ariaDNE_revision3.spl

ariaDNE_revision3.tex

ariaDNE_revision4.aux
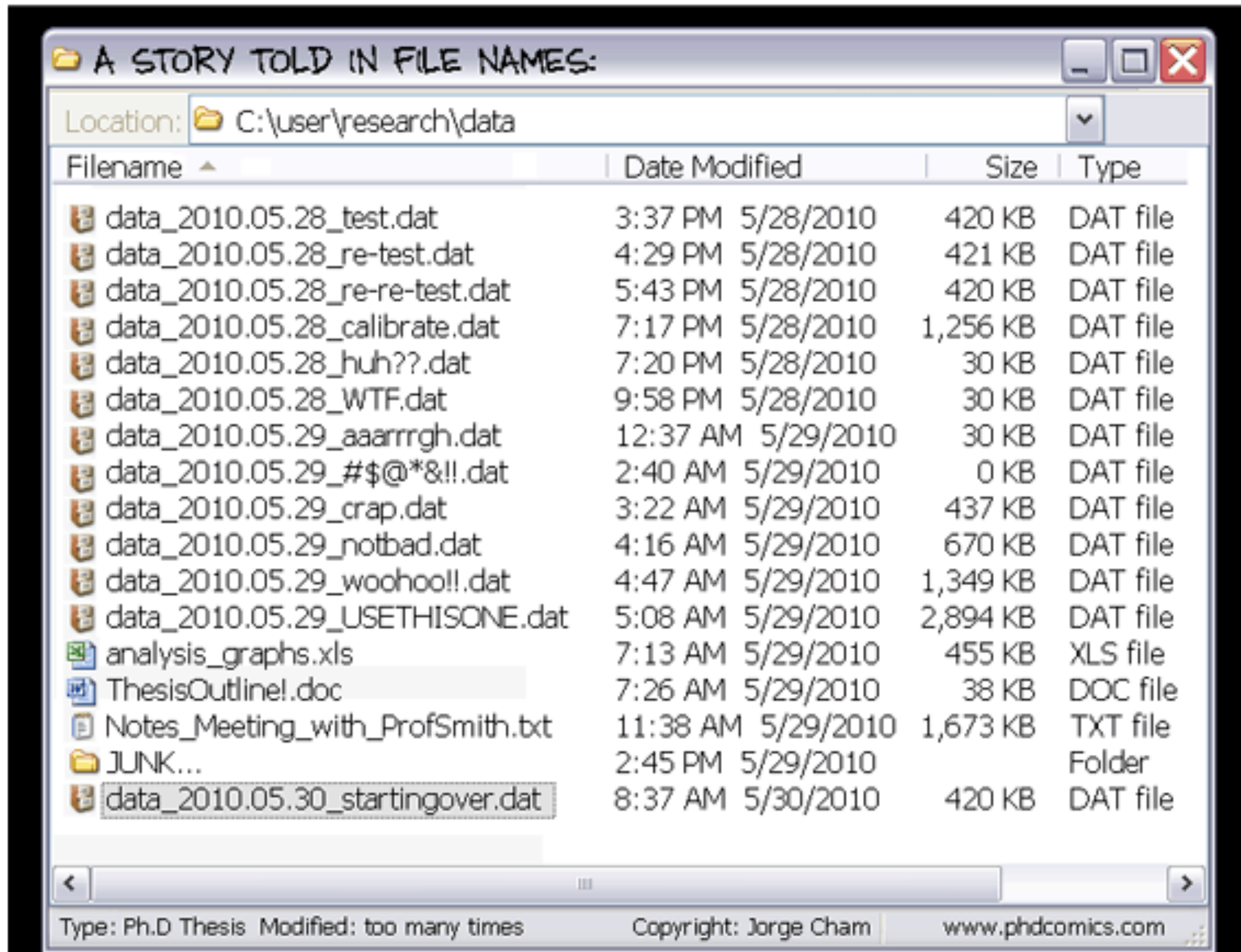
ariaDNE_revision4.bbl

ariaDNE_revision4.bib ☆

ariaDNE_revision4.blg

How do you record the history of your projects?

How do you record the history of your projects?

Best practice is version control

Version control starts with a base version of the document, and it saves just the changes you made at each step of the way.

Git is a version control system

Github is a hosting service for Git

Git and Github in a larger community

- Exposure

- Be a keener

- Collaboration
    Compare with
        - Edit save and attach
        - Google doc
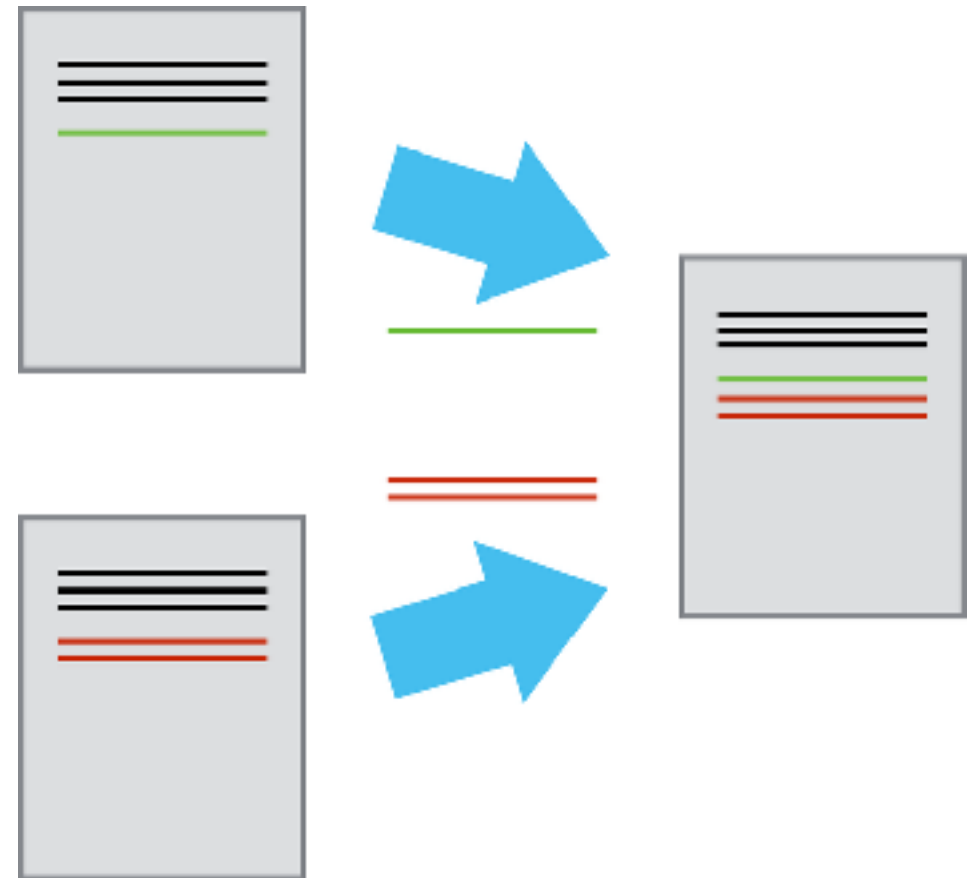
What Git/Github is not

- A real-time collaboration tool

- A backup replacement

- Keeping files in sync real-time (e.g., Dropbox)

- Not good with binary files (office docs, pdfs, pictures, etc.)

Some basic git commands

- Git add *

- Git commit -m "commit message"

- Git push

- Git pull

Local   **Remote**
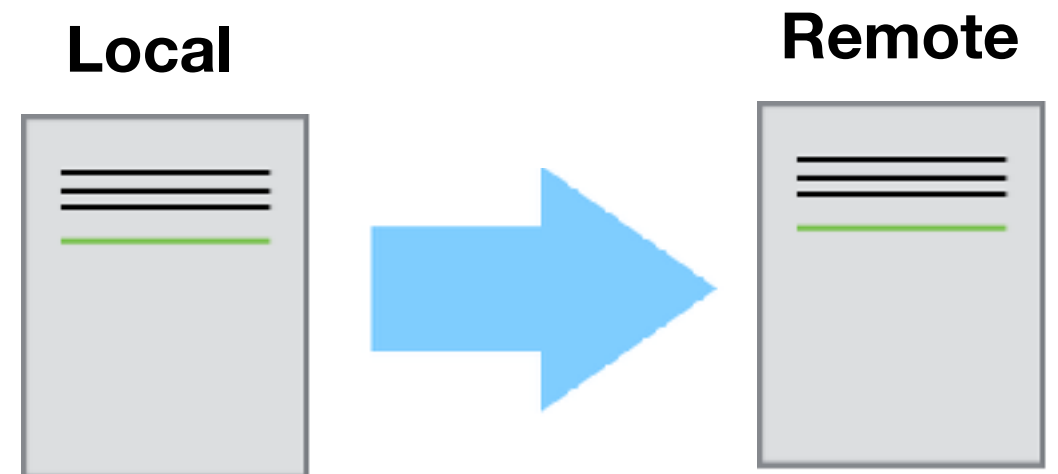
In this lab, we will

- Get Git working in Rstudio

- Pull from SlicerMorphWorkshop

- Create your own repository and make a push

- Markdown

Exercise 1: pull from workshop GitHub page

- **Please go to this page for instructions**

  https://github.com/SlicerMorph/S_2019

Exercise 2: create your own repository and push

- **Please go to this page for instructions**

  https://github.com/SlicerMorph/S_2019

Markdown is a way to style text on web

Our webpage is written via Markdown
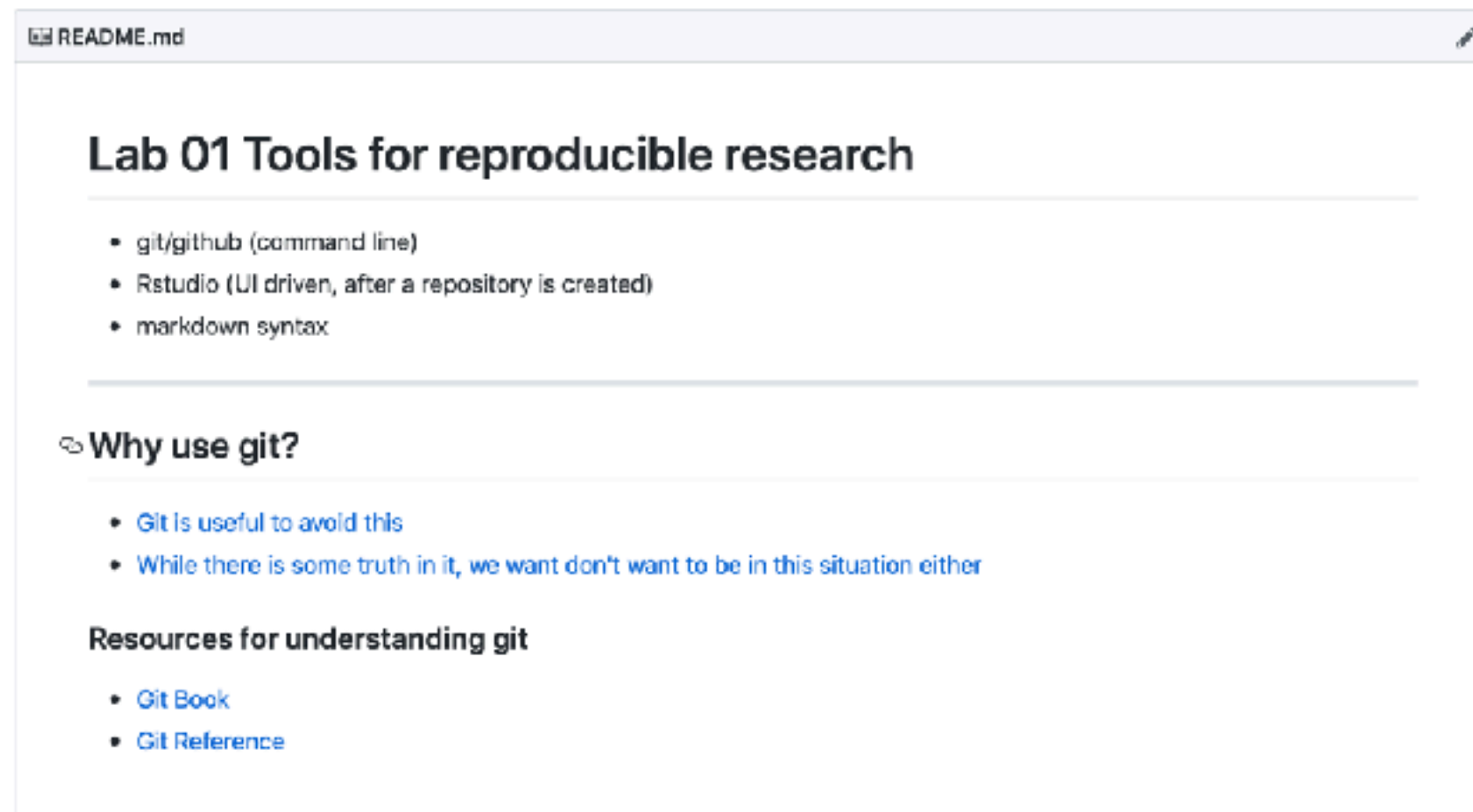
Mostly, Markdown is just a regular text with a few non-alphabetic characters thrown in like # or *.

Markdown examples

Text: ** bold, * italic, link

```
It's very easy to make some words **bold** and other words
*italic* with Markdown. You can even
 [link to Google!](http://google.com)
```

It's very easy to make some words **bold** and other words *italic* with Markdown. You can even link to Google!

Markdown examples

List, bullet point, dashes

```
Sometimes you want numbered lists:

1. One
2. Two
3. Three


Sometimes you want bullet points:

* Start a line with a star
* Profit!

Alternatively,

- Dashes work just as well
- And if you have sub points, put two spaces before the dash or
star:
  - Like this
  - And this
```

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1. One
2. Two
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Sometimes you want bullet points:

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Alternatively,

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- And if you have sub points, put two spaces before t
    - Like this
    - And this

Markdown examples

Images:

If you want to embed images, this is how you do it:

![Image of Yaktocat]
(https://octodex.github.com/images/yaktocat.png)

If you want to embed images, this is how you do it:

Markdown examples

Headers ## and quotes >:

```
# Structured documents

Sometimes it's useful to have different levels of headings to
structure your documents. Start lines with a `#` to create
headings. Multiple `##` in a row denote smaller heading sizes.

### This is a third-tier heading

You can use one `#` all the way up to `######` six for
different heading sizes.

If you'd like to quote someone, use the > character before the
line:

> Coffee. The finest organic suspension ever devised... I beat
the Borg with it.
> - Captain Janeway
```

Markdown examples

Headers ## and quotes >:

Structured documents

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Markdown examples

Task list: [x] and emoji :EMOJICODE:

```
GitHub supports many extras in Markdown that help you reference
and link to people. If you ever want to direct a comment at
someone, you can prefix their name with an @ symbol: Hey
@kneath — love your sweater!


But I have to admit, tasks lists are my favorite:


- [x] This is a complete item
- [ ] This is an incomplete item


When you include a task list in the first comment of an Issue,
you will see a helpful progress bar in your list of issues. It
works in Pull Requests, too!


And, of course emoji!
```