

rbtl - Research Beyond the Lab

Literate Programming with R Markdown

Lars Schöbitz

2022-03-31

Today

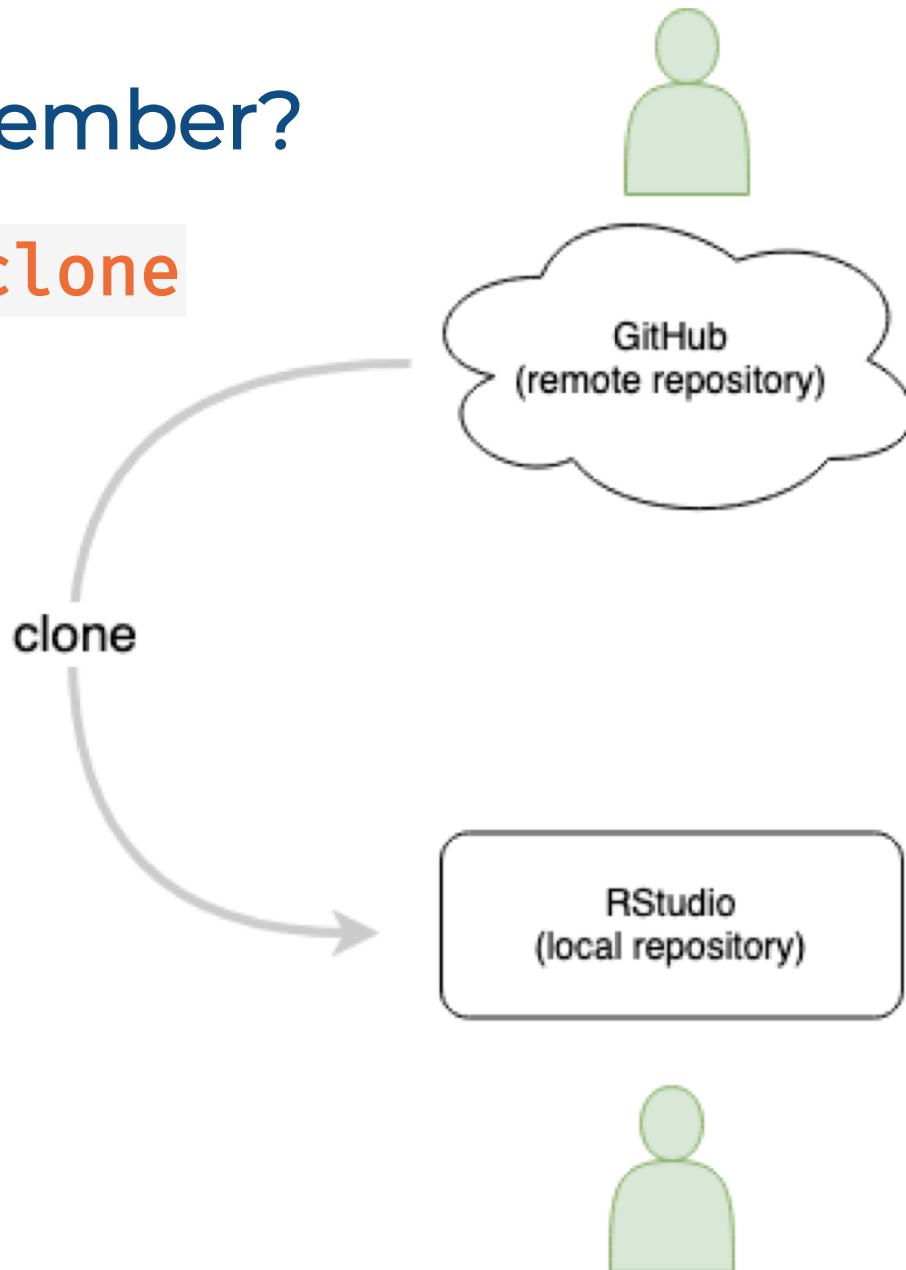
1. Homework Assignment 3 - How to get solutions?
2. R Markdown
3. Homework Assignment 4

Homework Assignment 3 - Solutions

A new git command

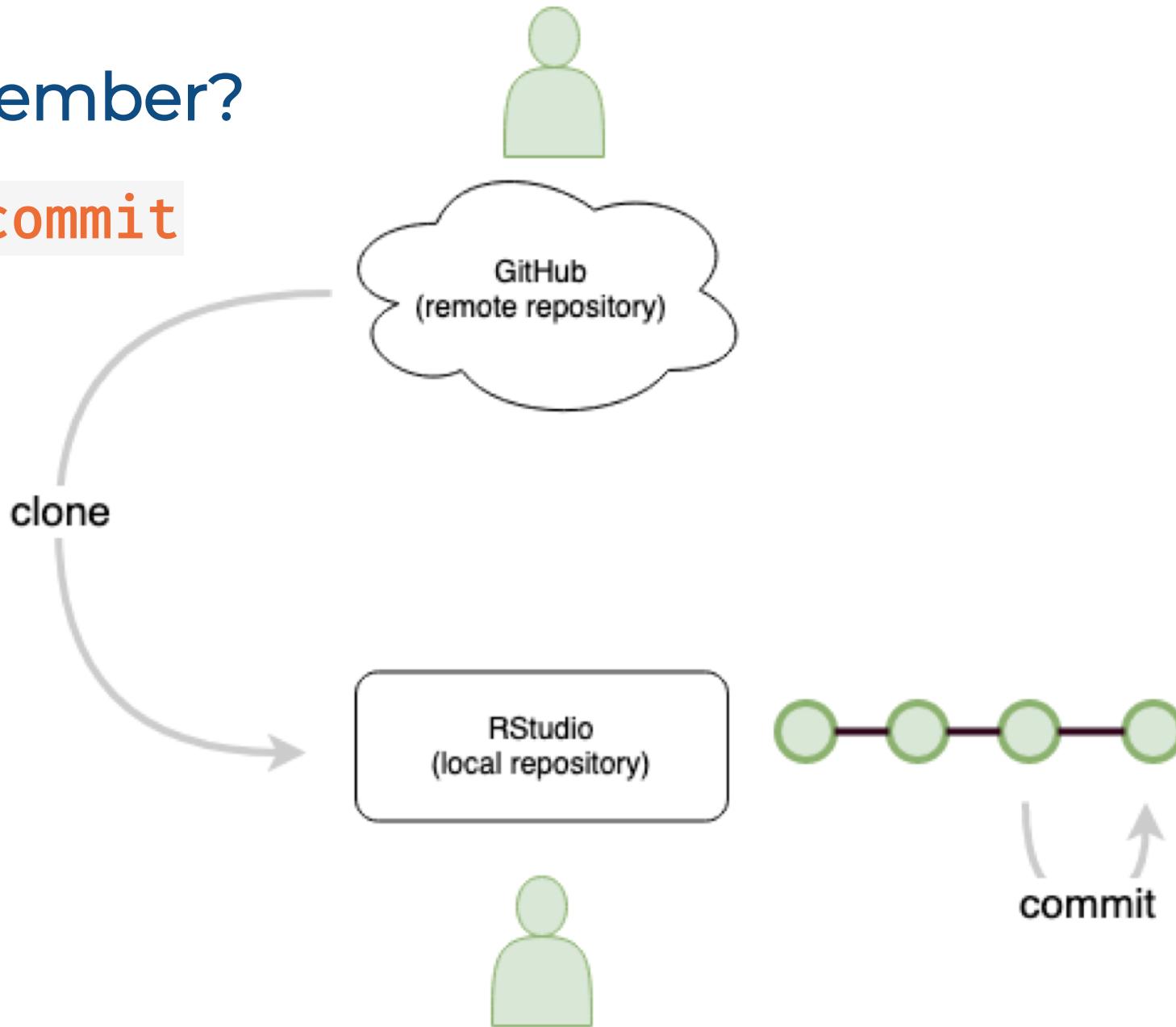
Remember?

git clone



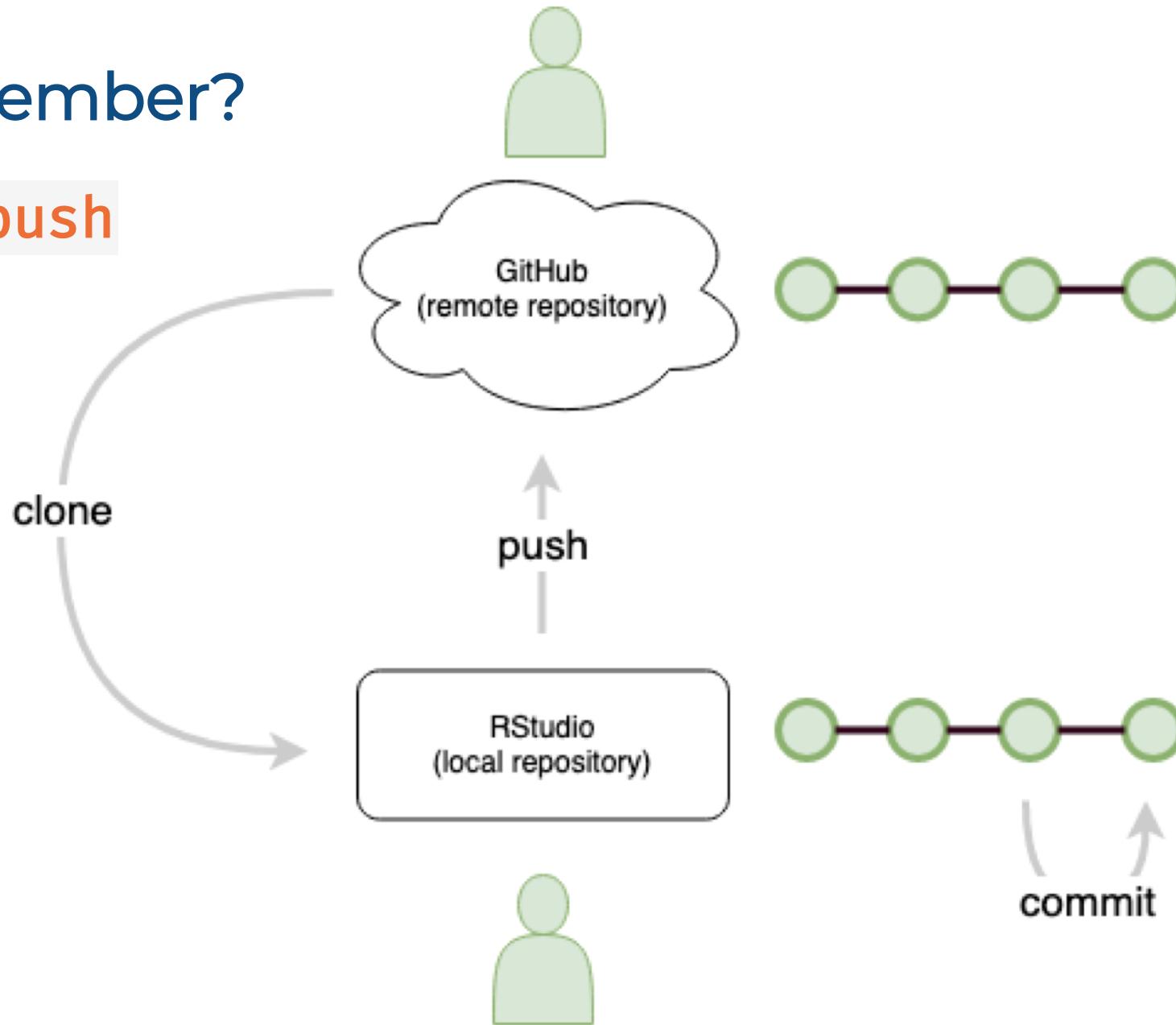
Remember?

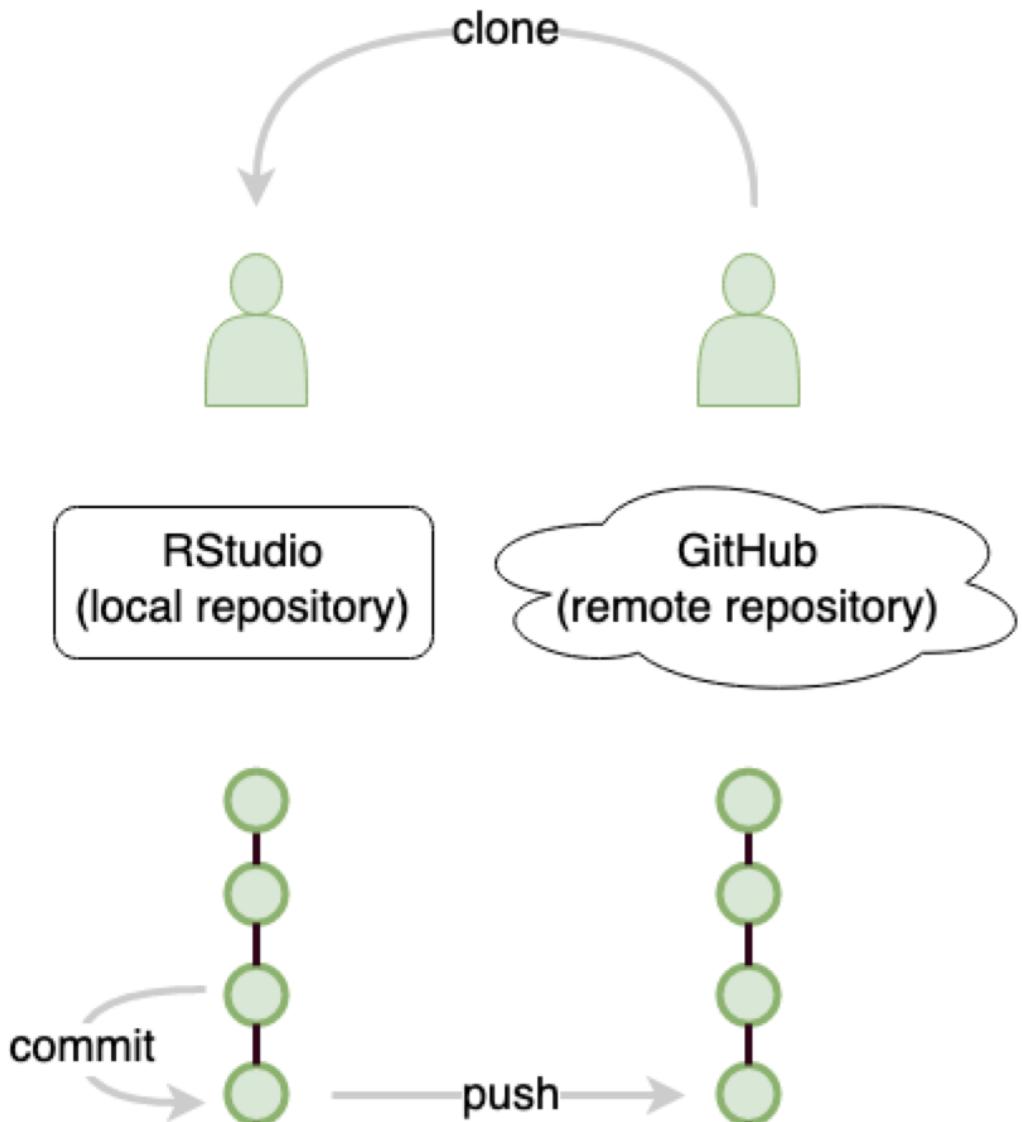
git commit



Remember?

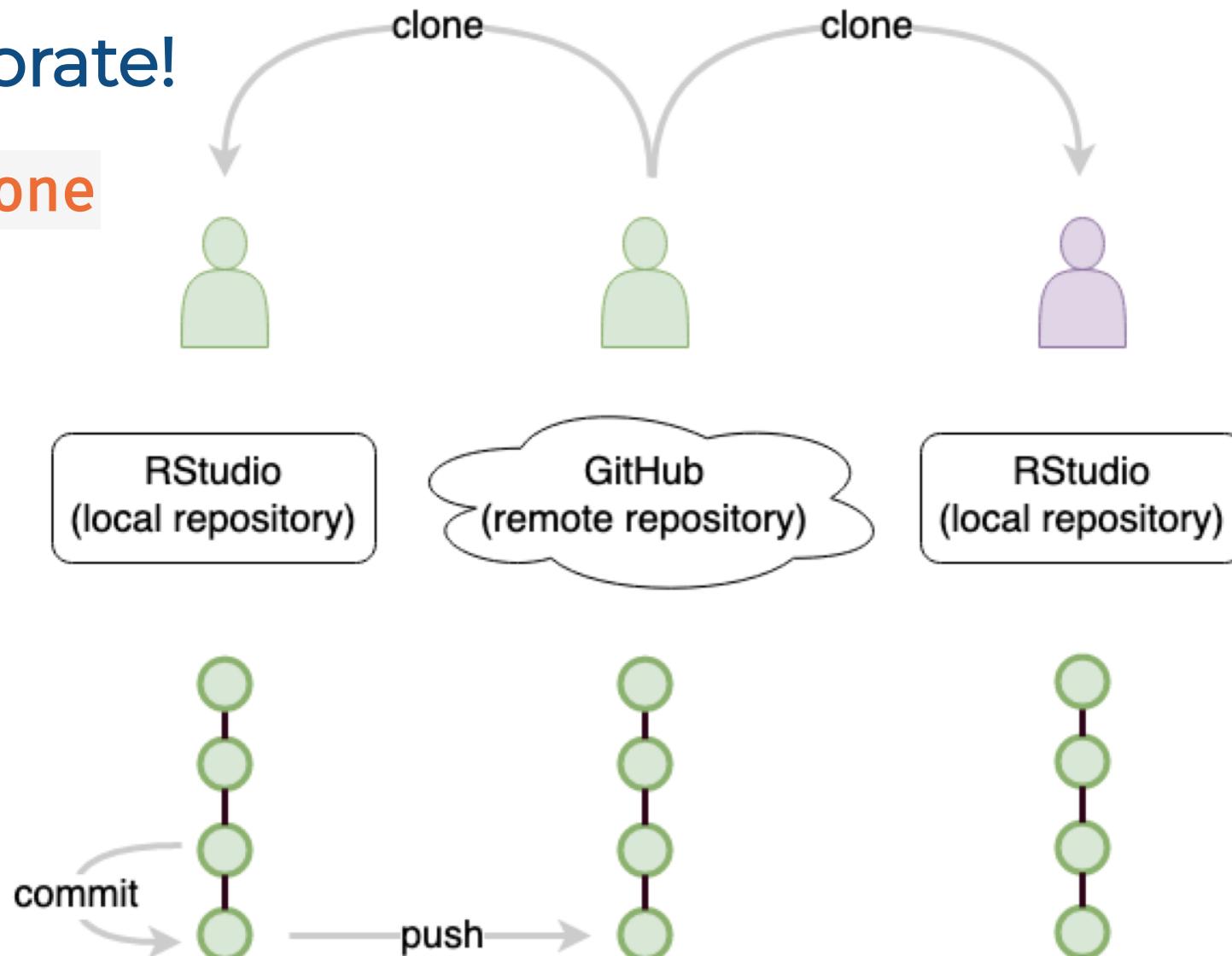
git push





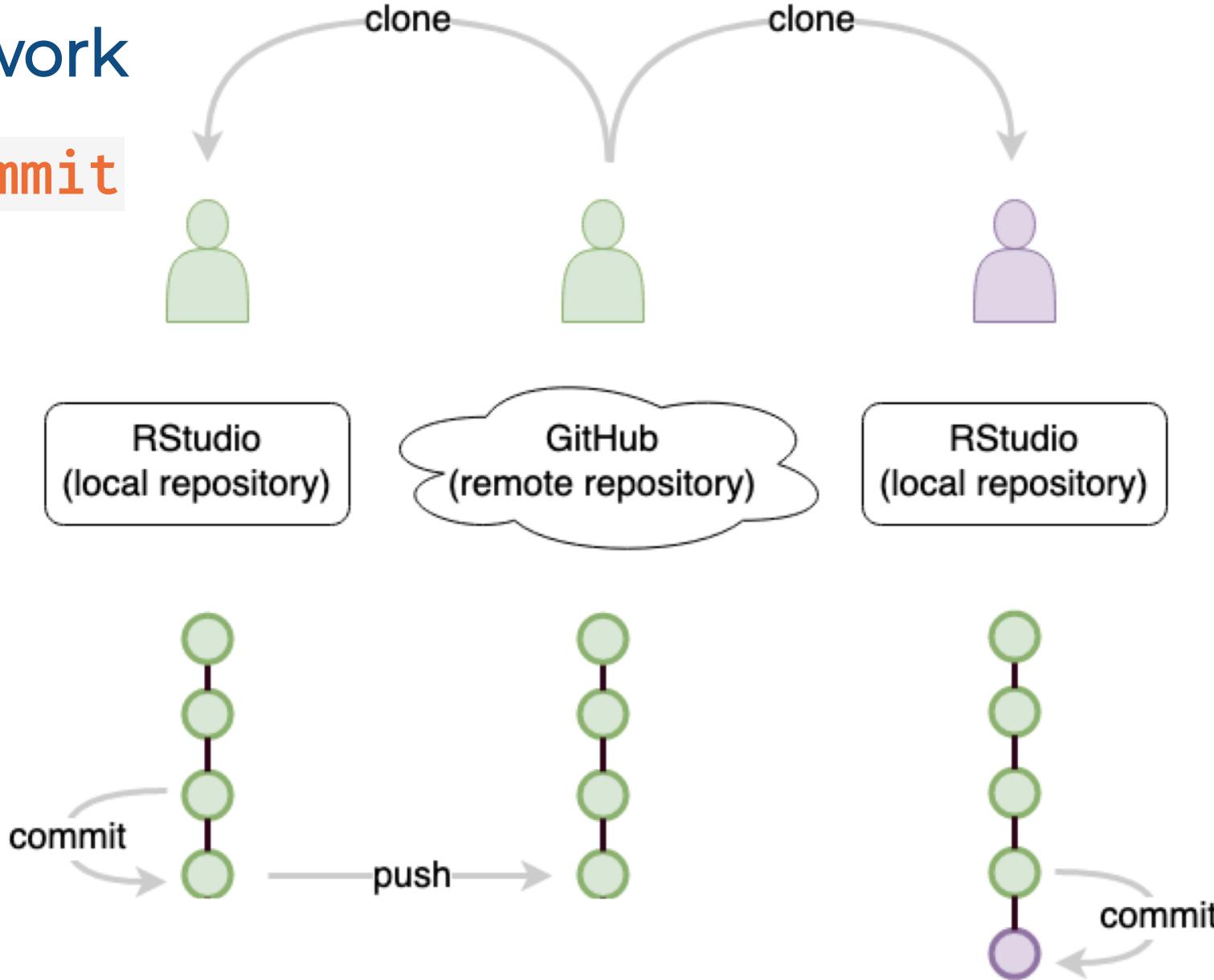
Collaborate!

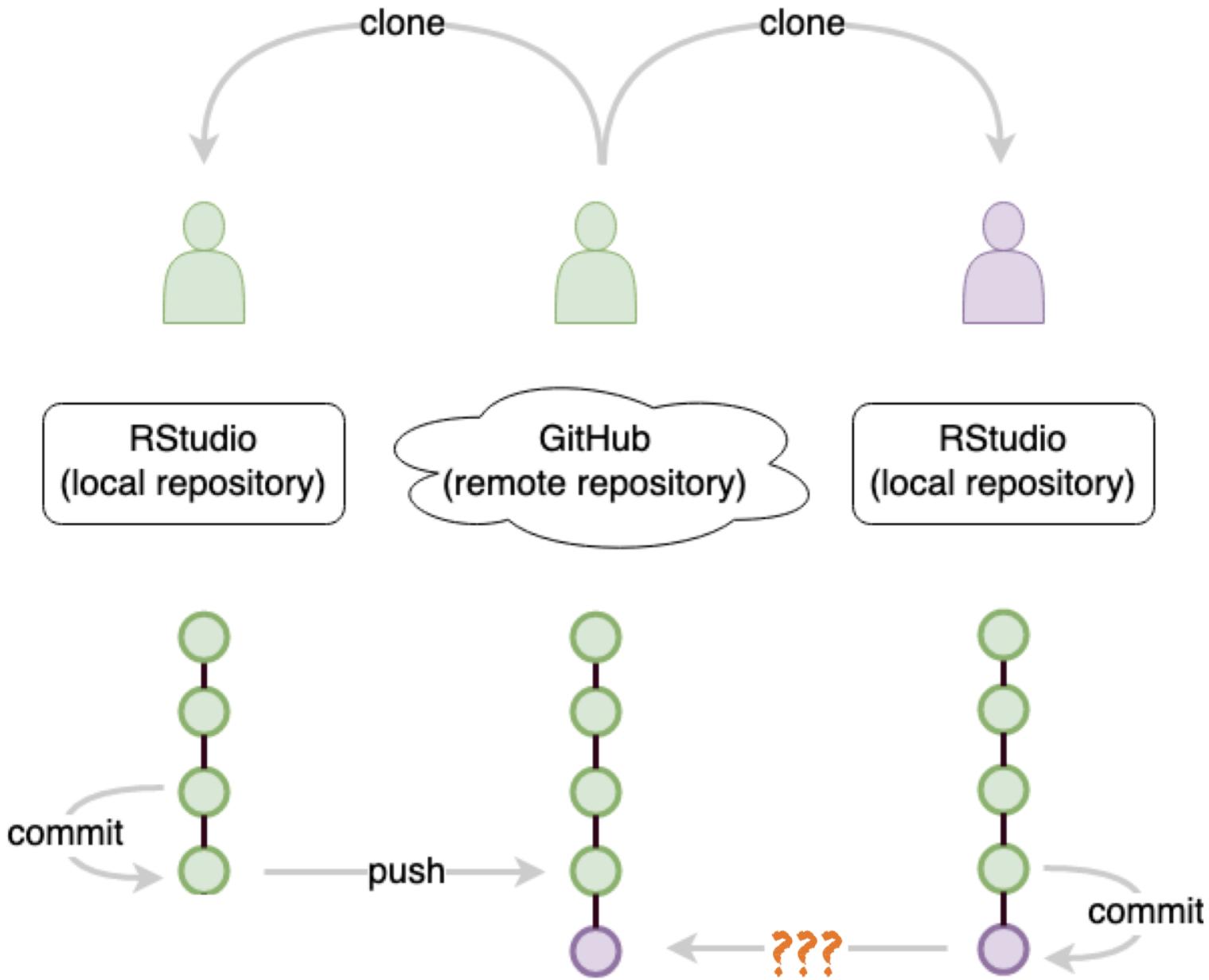
git clone



Track work

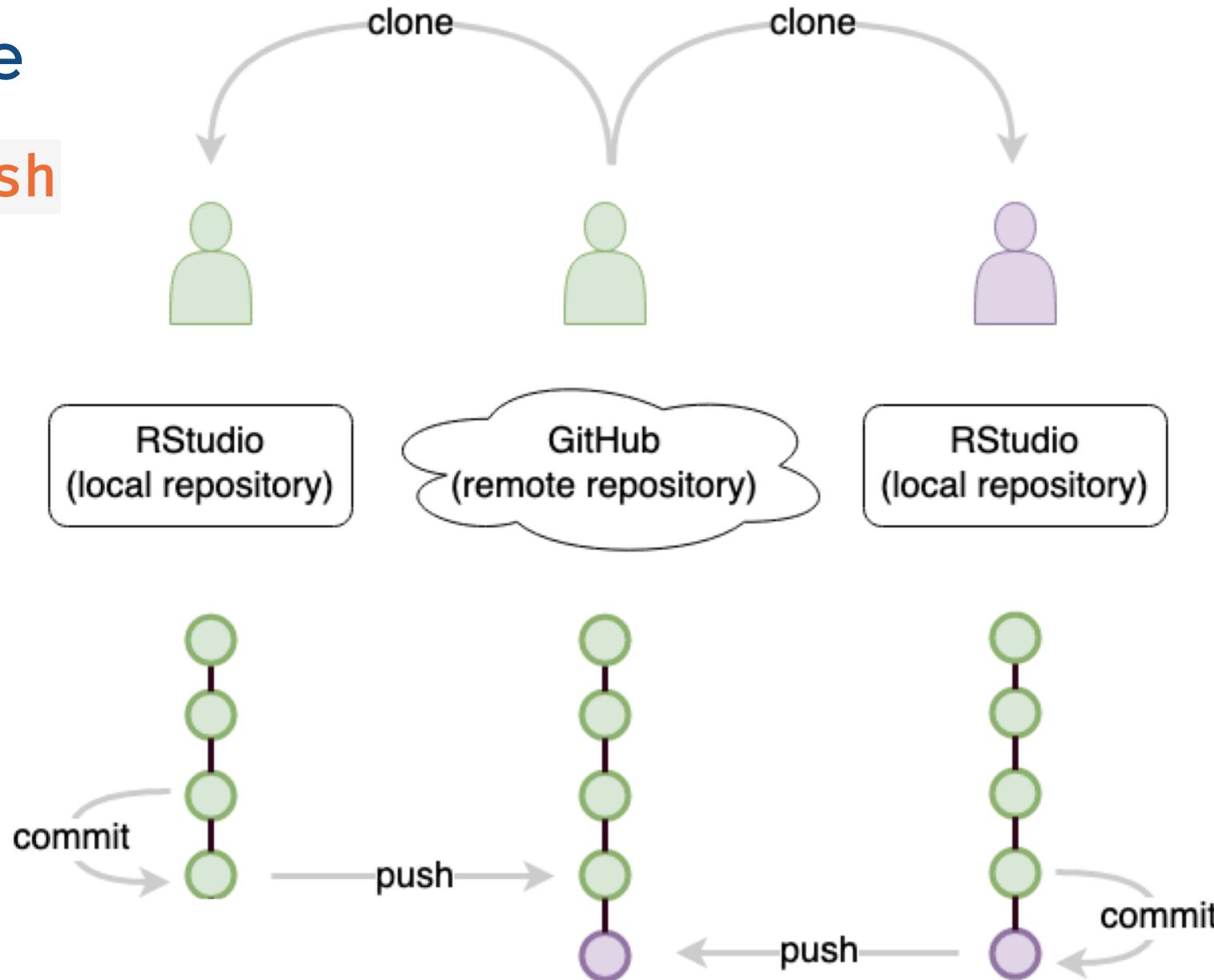
git commit





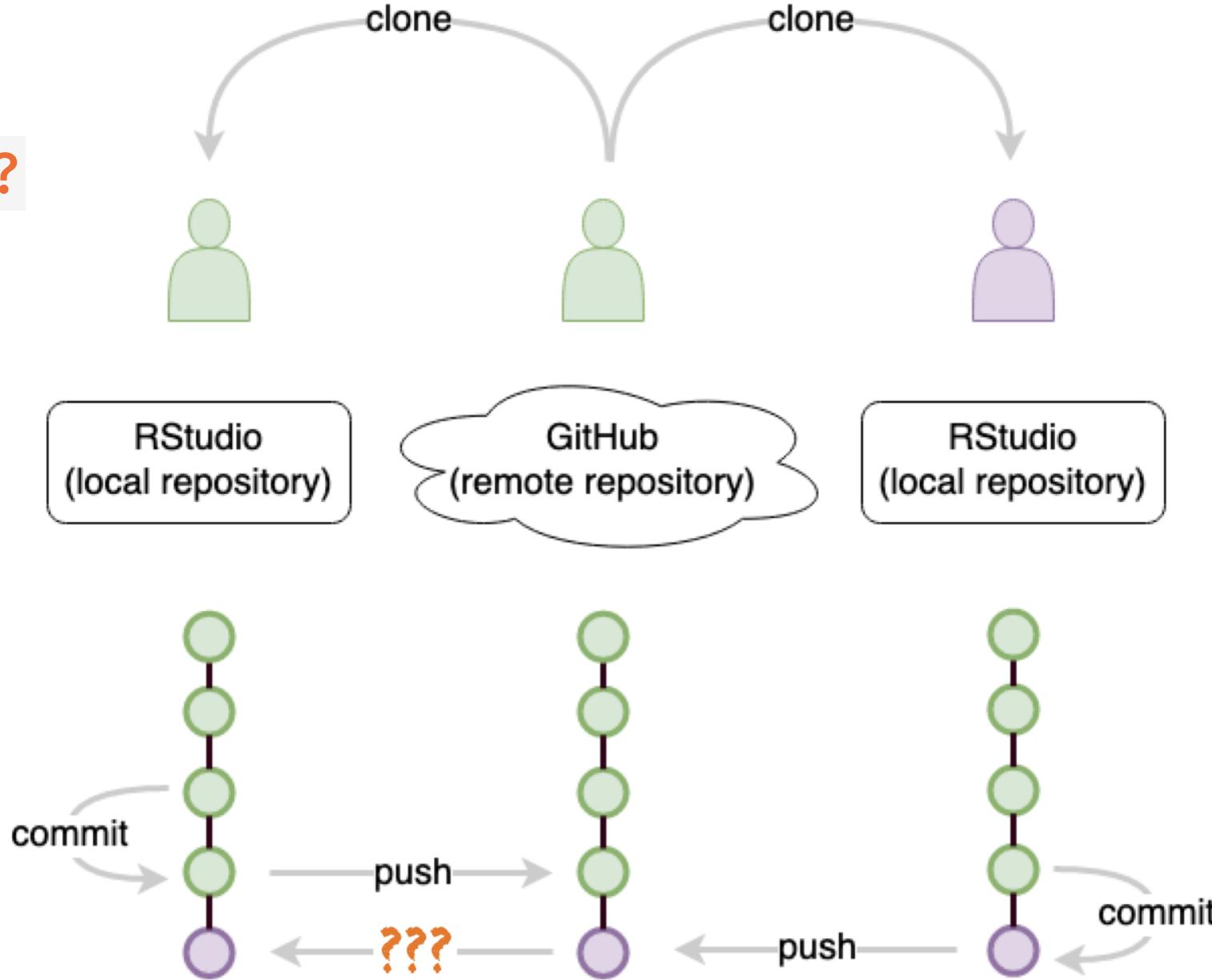
Update

git push



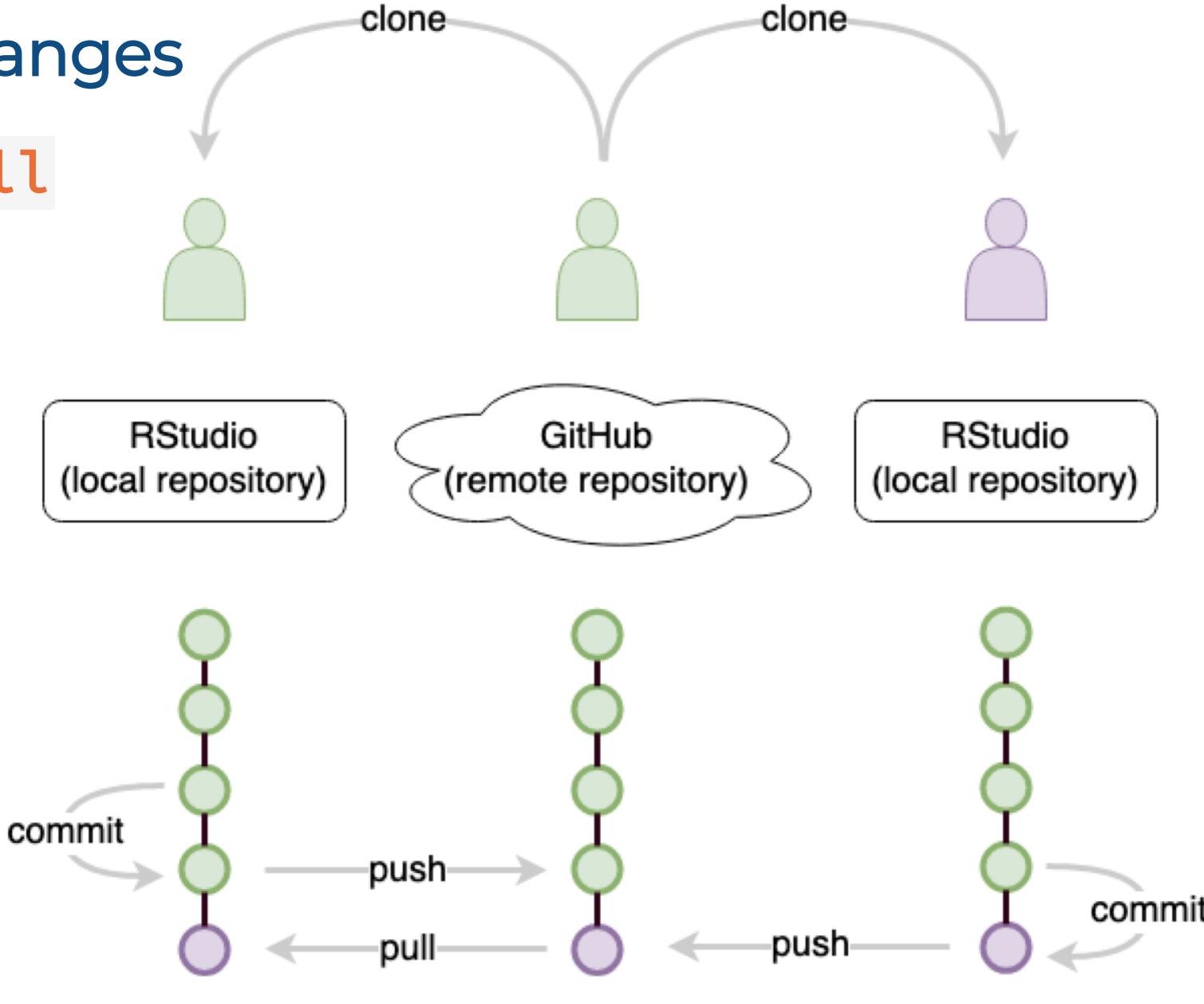
New!

git ???

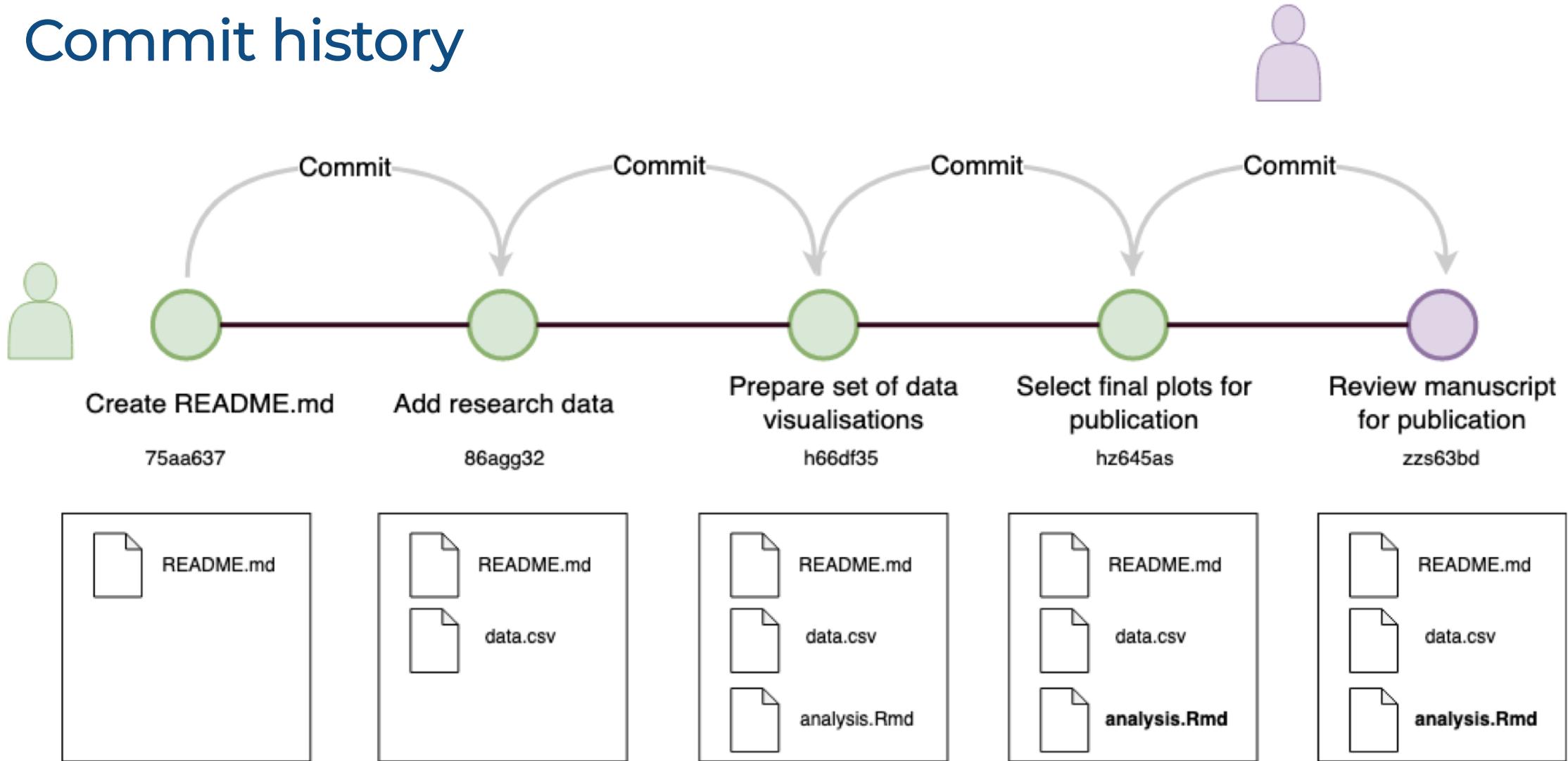


Get changes

git pull



Commit history



R Markdown

R markdown

On the input side...

- Write text in markdown
- Insert code using R
- Write "metadata" with YAML
- Insert equation with LaTeX

On the output side...

- Output to HTML
- Output to PDF
- Output to Word
- Many other variations too

Lots of little things to learn!
We'll start with markdown...

The screenshot shows a Microsoft Word document window titled "Document1". The ribbon menu is visible at the top, with the "Home" tab selected. The toolbar below the ribbon contains icons for Paste, Bold, Italic, Underline, and other text styling options. The main content area of the document includes the following text:

Heading Level 1

This is a paragraph with **bold** and *italic* text. Following is a list in bullet form:

- Point 1
- Point 2
- Point 3

A hyperlink is included to [reference the slides](#) that have inspired this text.

Heading Level 2

This looks simple.

At the bottom of the screen, the status bar displays "Page 1 of 1", "47 words", "English (United States)", and zoom controls.

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?><w:document xmlns:o="urn:schemas-microsoft-com:office:office" xmlns:r="http://schemas.openxmlformats.org/officeDocument/2006/relationships" xmlns:v="urn:schemas-microsoft-com:vml" xmlns:w="http://schemas.openxmlformats.org/wordprocessingml/2006/main" xmlns:w10="urn:schemas-microsoft-com:office:word" xmlns:wp="http://schemas.openxmlformats.org/drawingml/2006/wordprocessingDrawing" xmlns:wps="http://schemas.microsoft.com/office/word/2010/wordprocessingShape" xmlns:wpg="http://schemas.microsoft.com/office/word/2010/wordprocessingGroup" xmlns:mc="http://schemas.openxmlformats.org/markup-compatibility/2006" xmlns:wp14="http://schemas.microsoft.com/office/word/2010/wordprocessingDrawing" xmlns:w14="http://schemas.microsoft.com/office/word/2010/wordml" mc:Ignorable="w14 wp14"><w:body><w:p w:rsidP="3DB3F1AF" w14:paraId="53FDABE3" xmlns:wp14="http://schemas.microsoft.com/office/word/2010/wordml" wp14:textId="6B19D258"><w:pPr><w:pStyle w:val="Normal" /><w:bidi w:val="0" /><w:jc w:val="left" /><w:rPr><w:rFonts w:ascii="Times New Roman" w:hAnsi="Times New Roman" w:eastAsia="Times New Roman" w:cs="Times New Roman" /></w:rPr></w:pPr><w:r w:rsidRPr="3DB3F1AF" w:rsidR="3DB3F1AF"><w:rPr><w:rFonts w:ascii="Times New Roman" w:hAnsi="Times New Roman" w:eastAsia="Times New Roman" w:cs="Times New Roman" /></w:rPr><w:t xml:space="preserve">This is my Word document.</w:t></w:r><w:r w:rsidRPr="3DB3F1AF" w:rsidR="3DB3F1AF"><w:rPr><w:rFonts w:ascii="Times New Roman" w:hAnsi="Times New Roman" w:eastAsia="Times New Roman" w:cs="Times New Roman" /></w:rPr><w:t xml:space="preserve">It has </w:t></w:r><w:r w:rsidRPr="3DB3F1AF" w:rsidR="3DB3F1AF"><w:rPr><w:rFonts w:ascii="Times New Roman" w:hAnsi="Times New Roman" w:eastAsia="Times New Roman" w:cs="Times New Roman" /><w:b w:val="1" /><w:bCs w:val="1" /><w:i w:val="0" /><w:iCs w:val="0" /></w:rPr><w:t xml:space="preserve">bold </w:t></w:r><w:r w:rsidRPr="3DB3F1AF" w:rsidR="3DB3F1AF"><w:rPr><w:rFonts w:ascii="Times New Roman" w:hAnsi="Times New Roman" w:eastAsia="Times New Roman" w:cs="Times New Roman" /></w:rPr><w:t xml:space="preserve">text, </w:t></w:r><w:r w:rsidRPr="3DB3F1AF" w:rsidR="3DB3F1AF"
```

Slide taken from: Danielle Navarro - R markdown

Word documents are complicated

- A .docx file is a compressed folder with lots of files
- A .docx file is proprietary file format
- Your text is buried in with a lot of formatting information

HTML documents are complicated

- Looks simple because I removed most formatting
- Still unpleasant to look at

What do we want?

- Something that... you can write in **plain text**
- Something that... is **human readable**
- Something that... allows **formatting**
- Something that... can **build** to something pretty

markdown to the rescue!

markdown file format

A markup language with a simple syntax intended as a replacement for
HTML - [Definition](#)

- Is a **markup language** - [Definition](#)
- Is an **open format** - [Defintion](#)
- Is **non proprietary** - [Definition](#)

Here's an example of a markdown document...

Introduction

Welcome to my ****awesome** class**. You will learn all kinds of useful things about R markdown.

Why should you care?

- Markdown is simple and reproducible
- You can make it pretty if you want to
- The R Markdown variant lets you add R code

Where can you find these slides?

<https://rbtl-fs22.github.io/website/posts/week4/>

Here's what the output looks like...

Introduction

Welcome to my **awesome** class. You will learn all kinds of useful things about R markdown.

Why should you care?

- Markdown is simple and reproducible
- You can make it pretty if you want to
- The R Markdown variant lets you add R code

Where can you find these slides?

<https://rbtl-fs22.github.io/website/posts/week3/>

Let's dive into the details...

Emphasising text

What you type...

```
this is *italics*
```

```
this is **bold**
```

```
this is ***bold italics***
```

What you get...

this is *italics*

this is **bold**

this is ***bold italics***

Creating lists

What you type...

- unnumbered lists
 - look like this
-
1. numbered lists
 2. look like this

What you get...

- unnumbered lists
 - look like this
-
1. numbered lists
 2. look like this

Creating headings

What you type...

```
# Level 1 heading  
## Level 2 heading  
### Level 3 heading
```

What you get...

Level 1 heading

Level 2 heading

Level 3 heading

And R markdown?

R markdown

- Something that... lets you write text in **markdown**
- Something that... lets you include **R code** (e.g. for data vis)
- Something that... can **build** to HTML, PDF, Word, etc

Rmarkdown

TEXT. CODE. OUTPUT.
(GET IT TOGETHER, PEOPLE.)



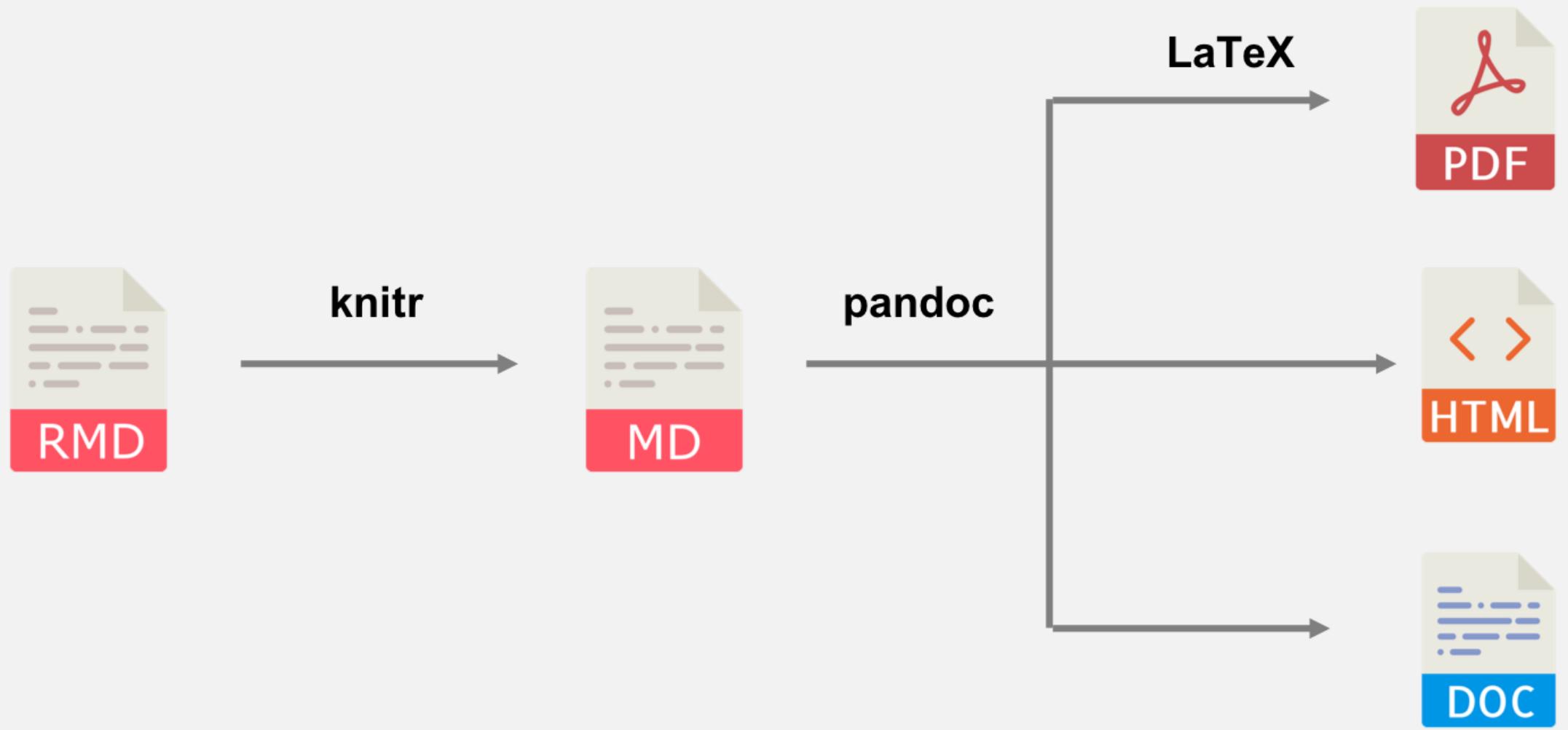
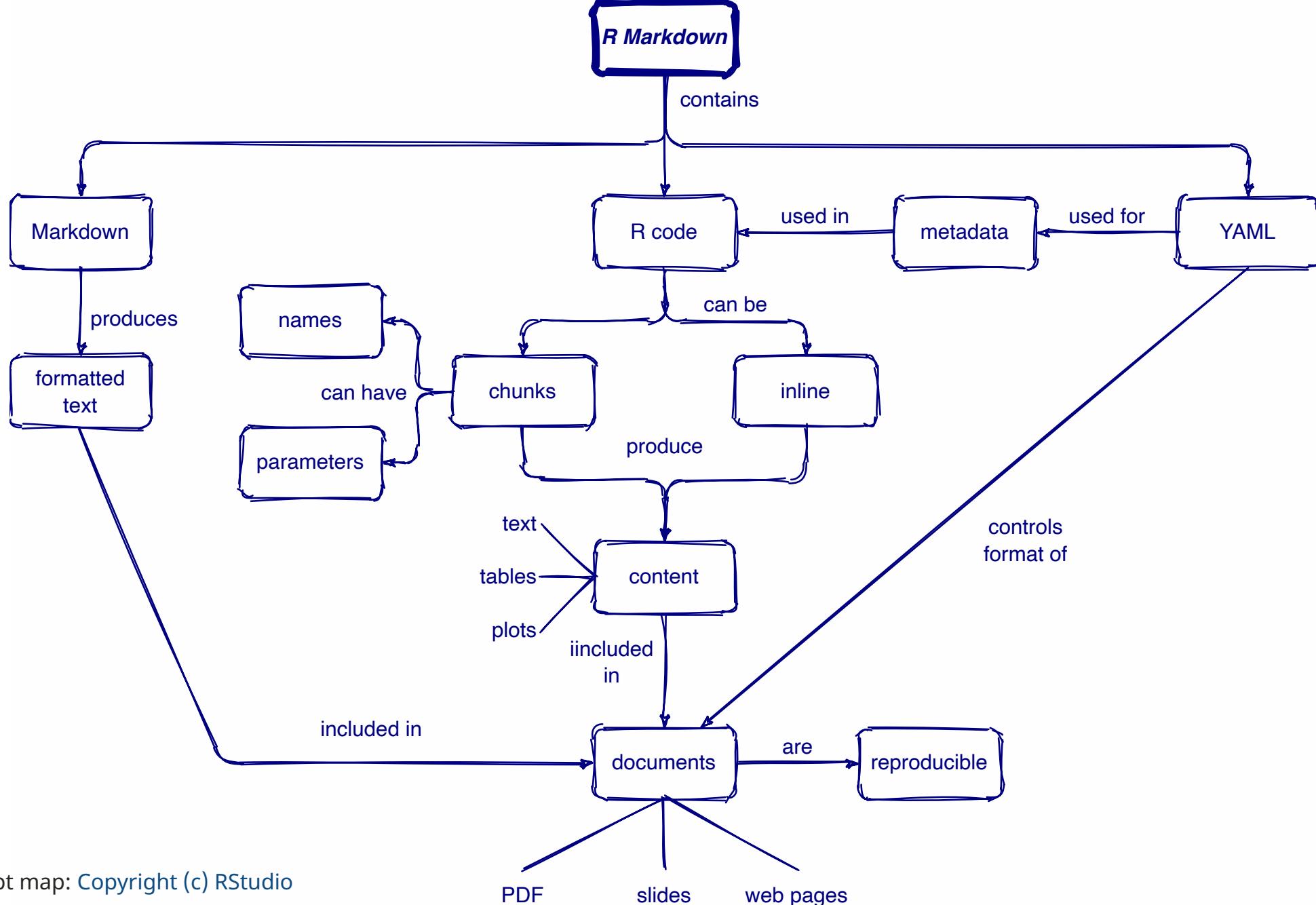


Image from: [R Markdown Cookbook](#)



Homework Assignment 4 - Learning Objectives

These learning objectives are related to the assignment for this week.

- Learners can explain the difference between the markdown (.md) and R Markdown (.Rmd) file format
- Learners can paraphrase how a file written in a markup language like markdown (.md) differs from a file written in a proprietary file format like DOCX
- Learners can identify four components of an R markdown file (YAML, code chunk, R code, markdown)

Homework Assignment 4 - Group work submission

- Due on **22nd March**

Exercise 2: Each ~~group~~ person will

1. Add the research questions that you and/or your group have worked on.
2. Write up the research design you are planning to use for your data collection.
3. Submit their sample population:
 - Bins: (1) Number; (2) Location, (3) Frequency of sampling
 - Human population, for example random, over 60, family, cyclist, etc.
4. Write up the variables that are needed, together with the respective questions and possible response values.

Bin location?

You can download a CSV with data on all bins from:

- https://www.ogd.stadt-zuerich.ch/geoportal_download/71dc10de-a5e2-11ec-94cb-005056b0ce82.zip (**valid until 22nd March**)
- <https://www.stadt-zuerich.ch/geodaten/download/Abfallgefaesse> (**Stadt Zürich Open Data, in German**)

Thanks! 🌻

Slides created via the R packages:

xaringan
gadenbuie/xaringanthemer

The chakra comes from [remark.js](#), [knitr](#), and [R Markdown](#).

Access slides as PDF on [GitHub](#)

All material is licensed under [Creative Commons Attribution Share Alike 4.0 International](#).