rbtl - Research Beyond the Lab

Literate Programming with R Markdown

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Today

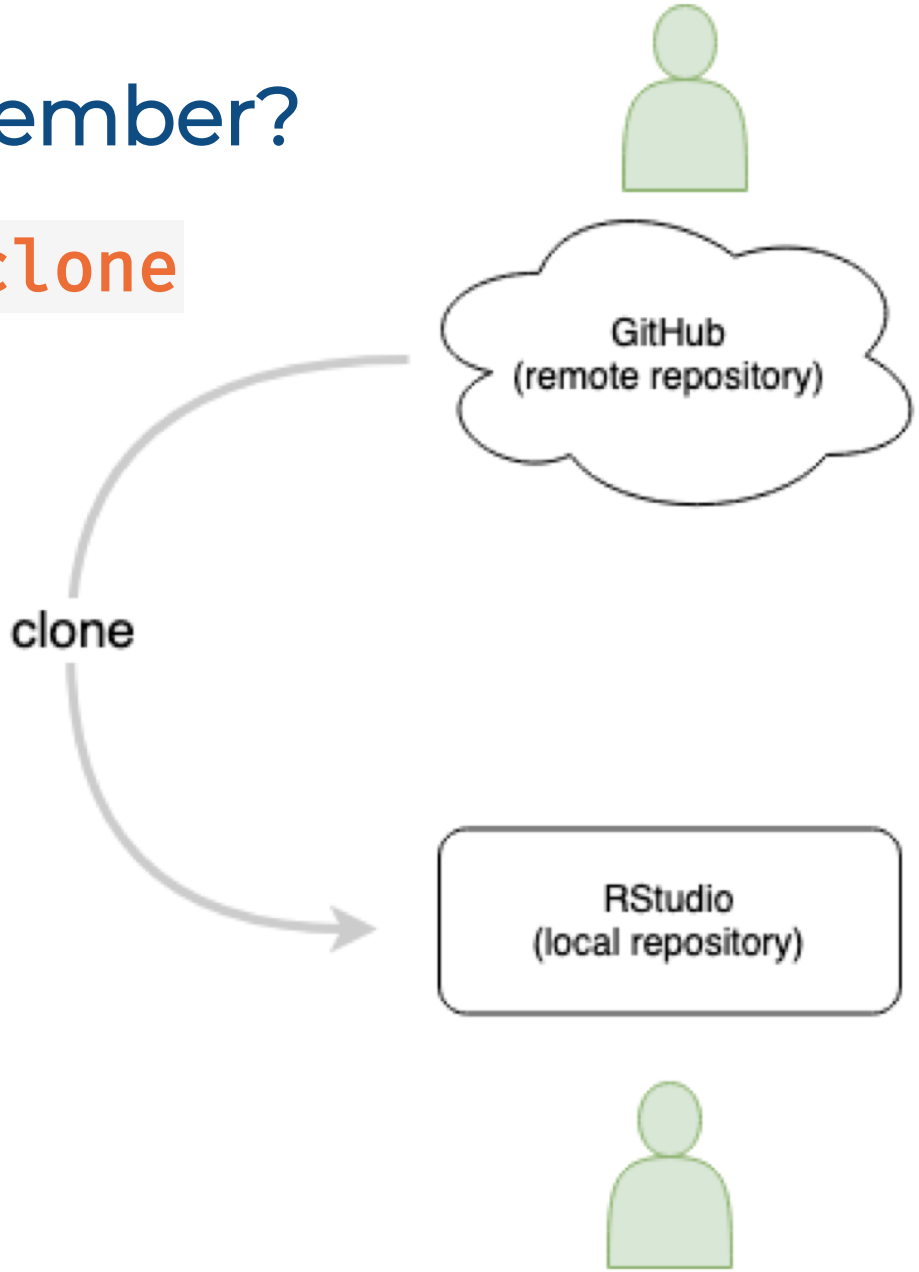
1. Homework Assignment 3 - How to get solutions?
2. R Markdown
3. Homework Assignment 4

Homework Assignment 3 - Solutions

A new git command

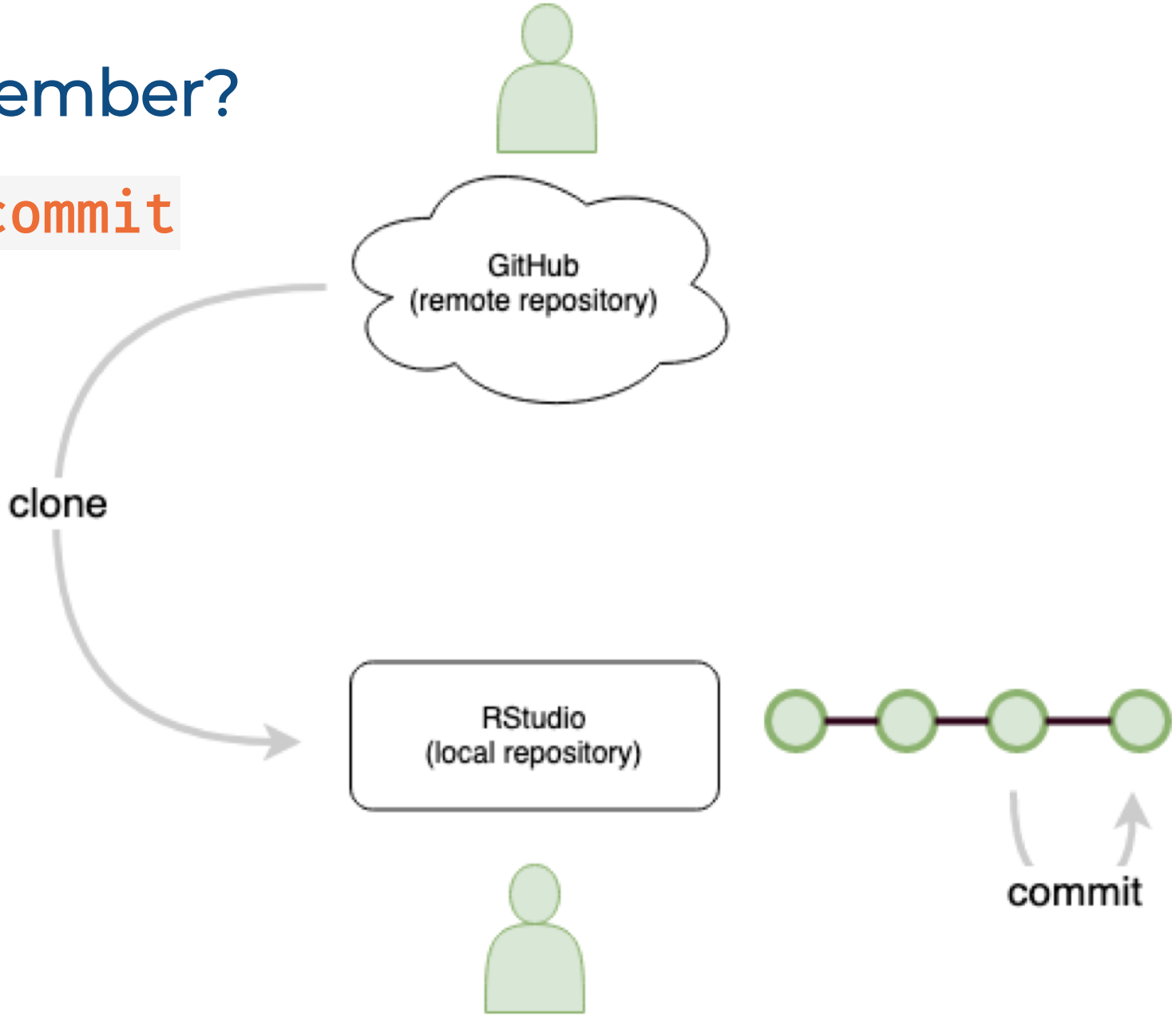
Remember?

`git clone`



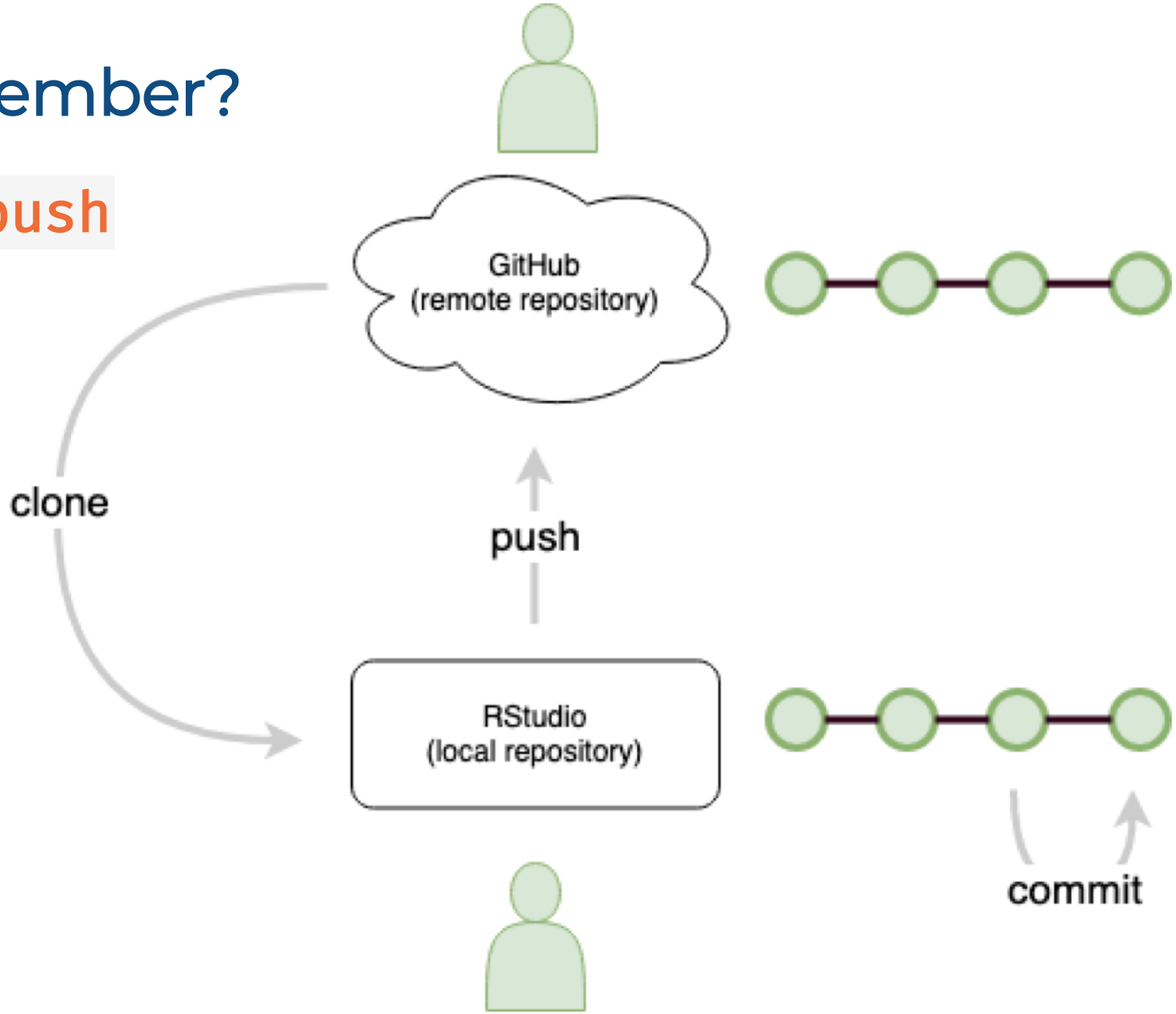
Remember?

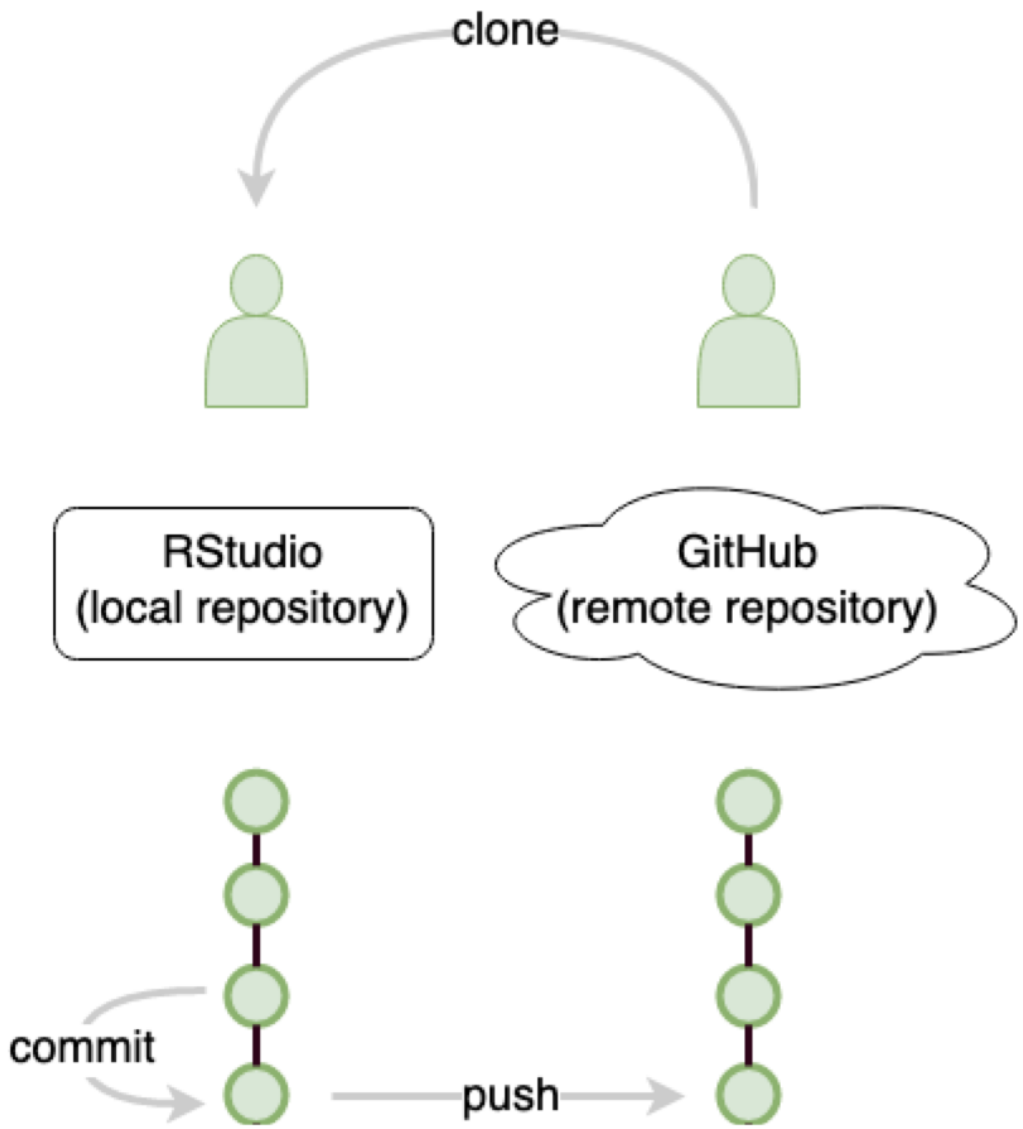
`git commit`



Remember?

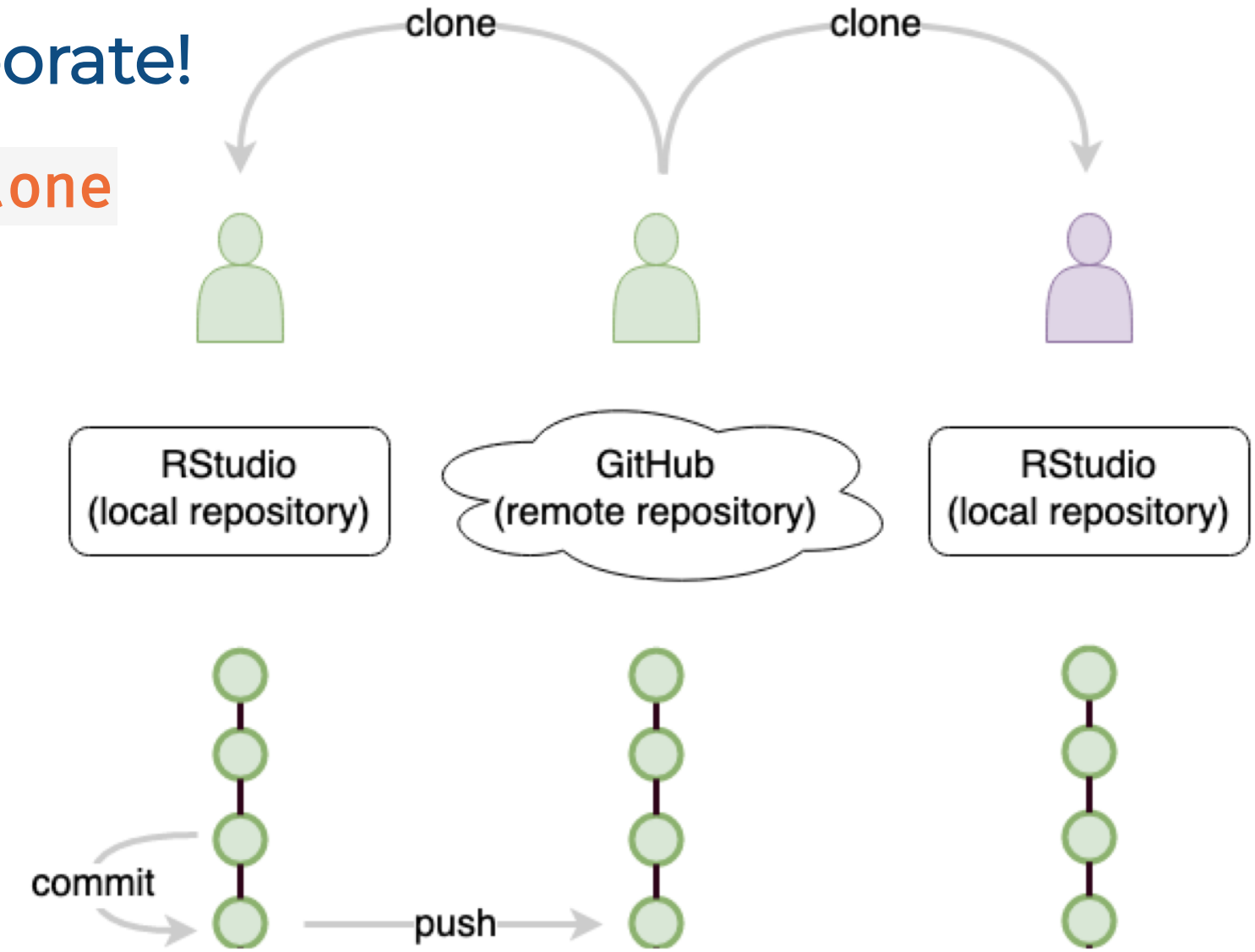
`git push`




clone
RStudio
(local repository)
GitHub
(remote repository)
commit
push

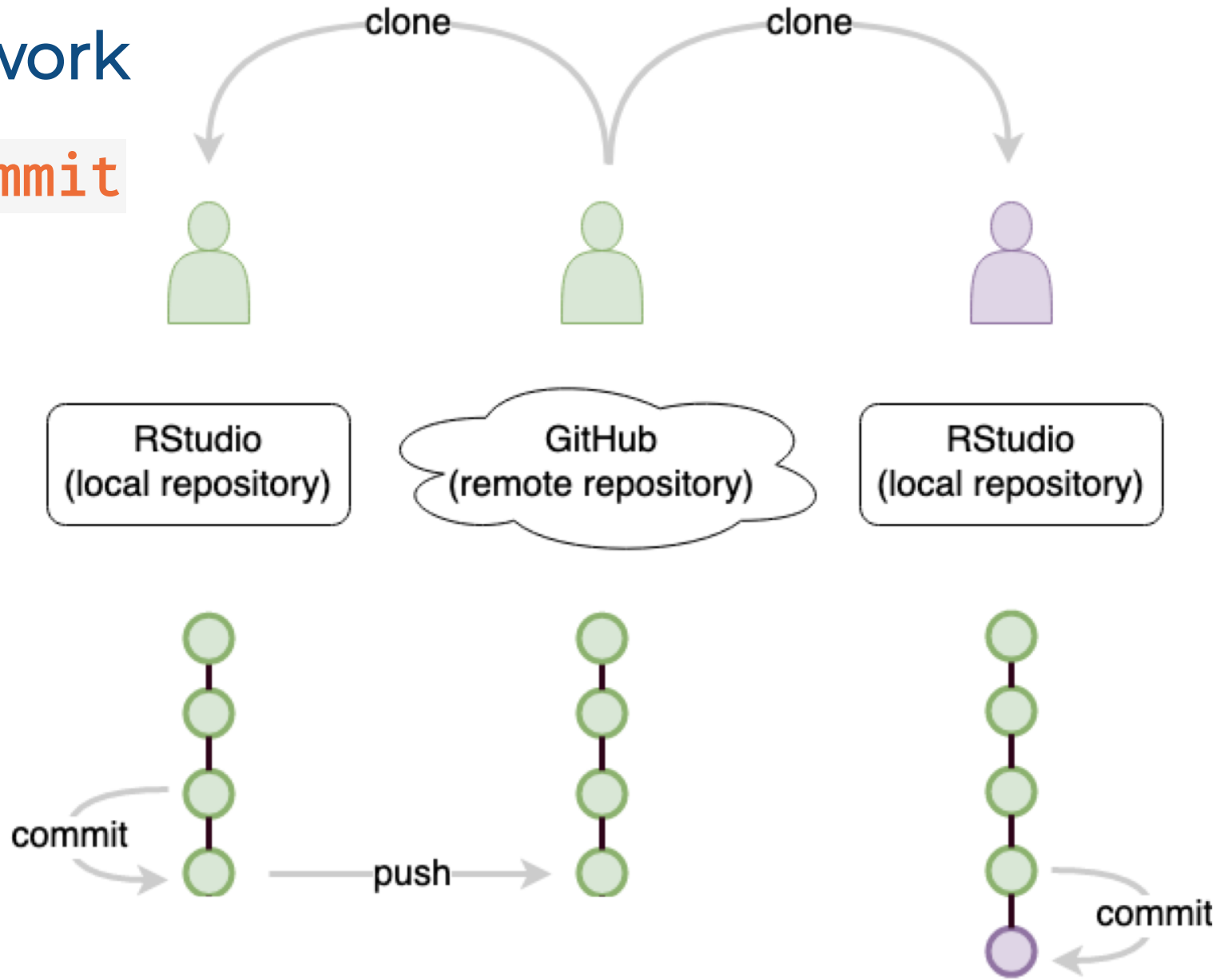
Collaborate!

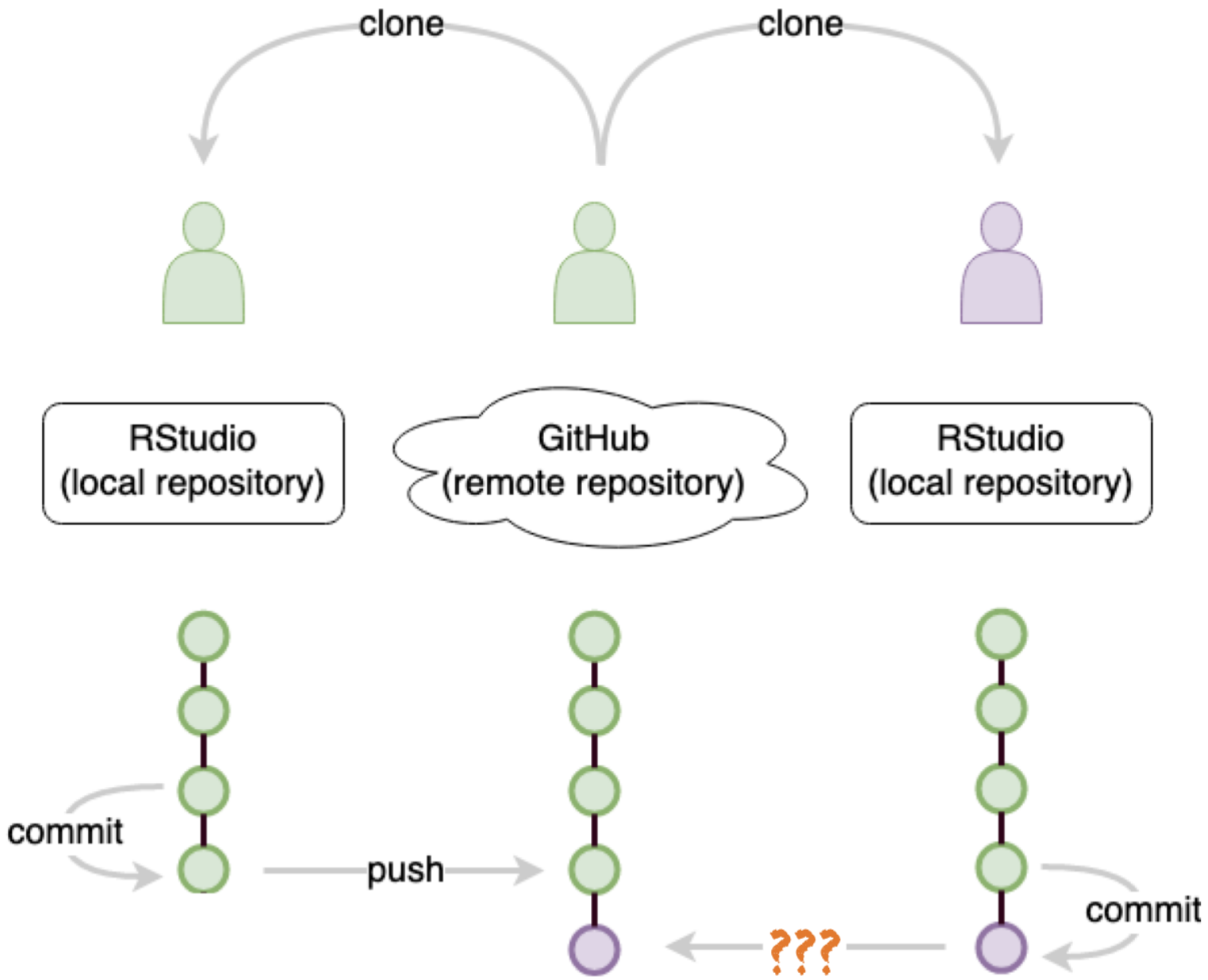
`git clone`



Track work

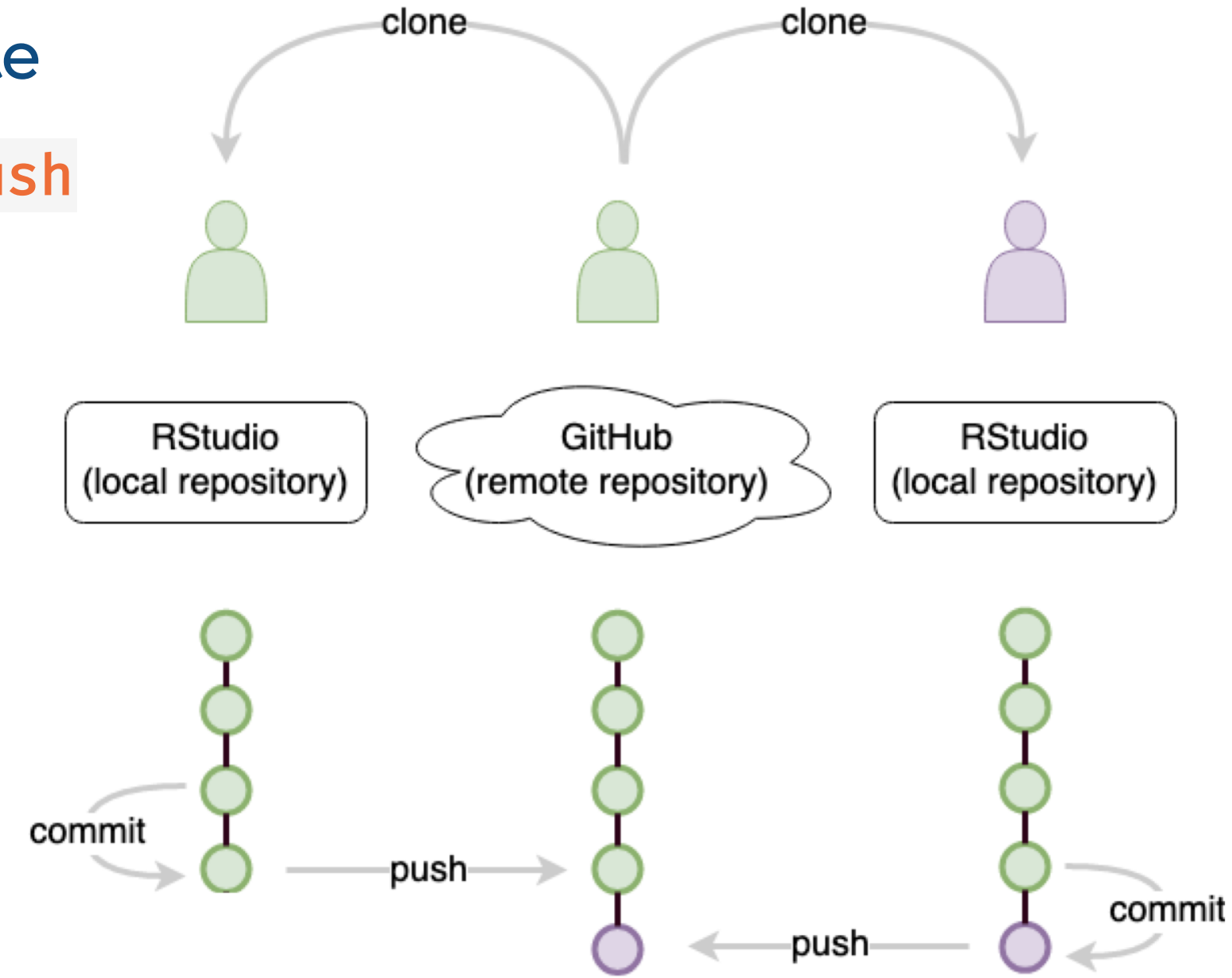
`git commit`




clone
clone
RStudio
(local repository)
GitHub
(remote repository)
RStudio
(local repository)
commit
push
???
commit

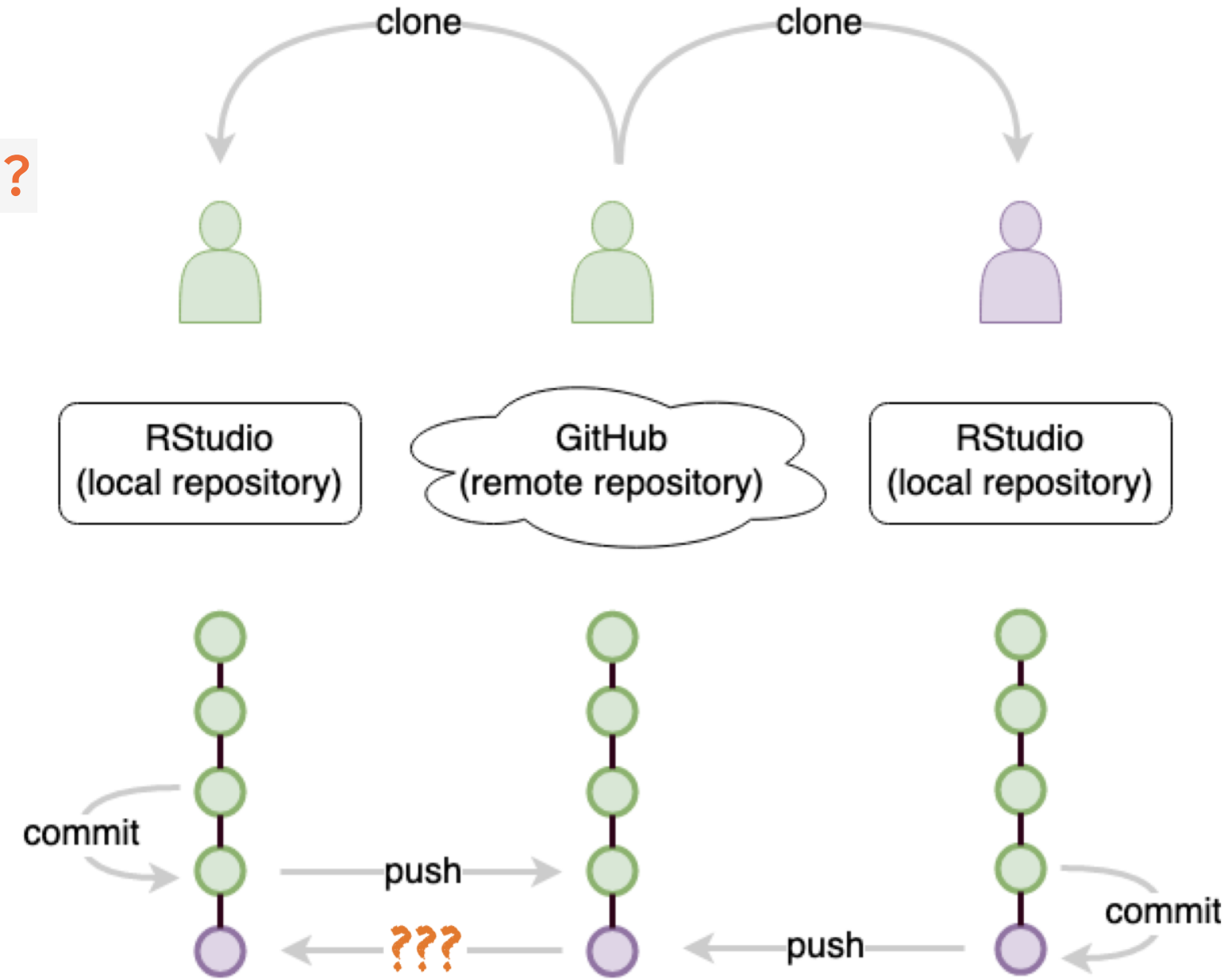
Update

`git push`



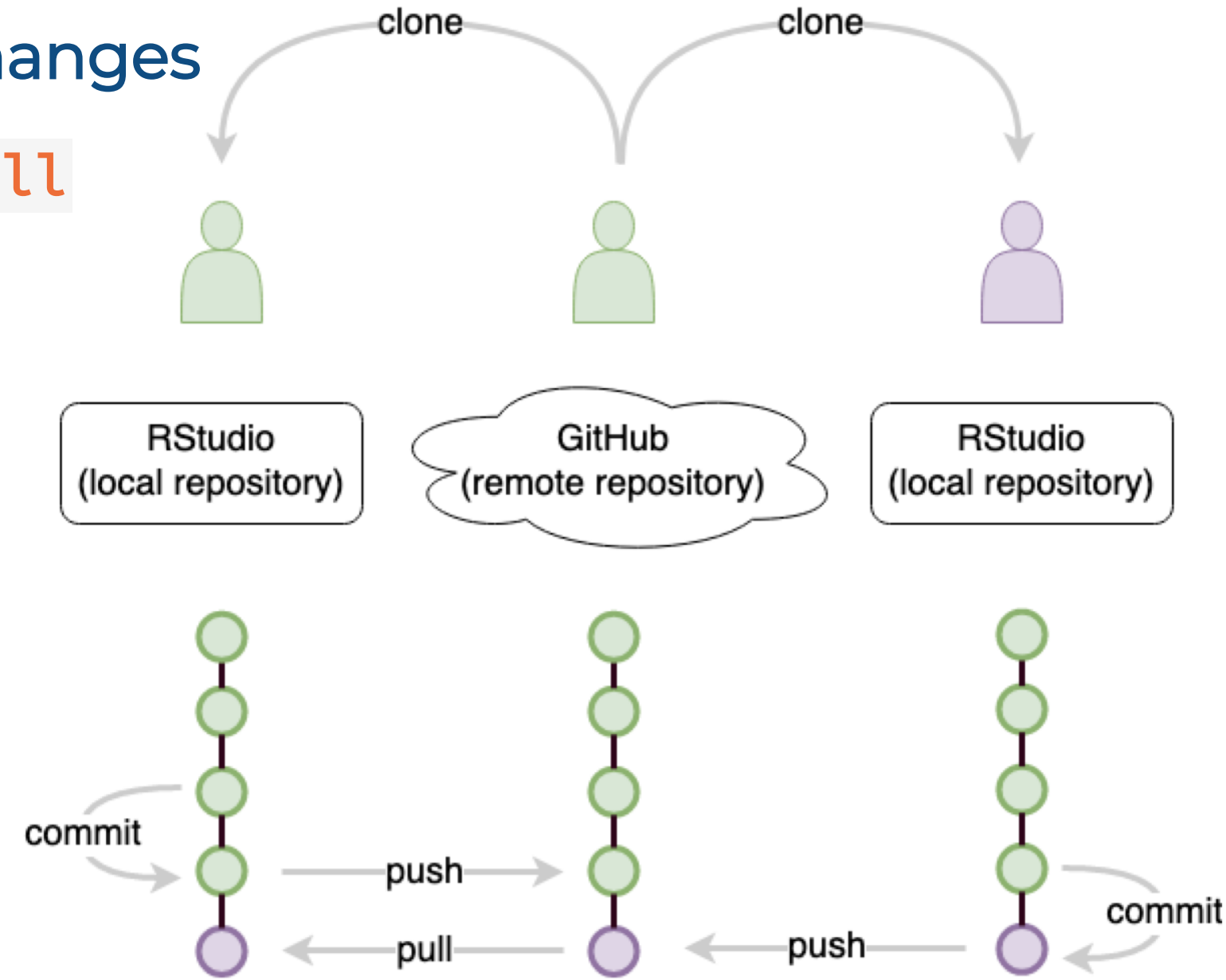
New!

`git ???`

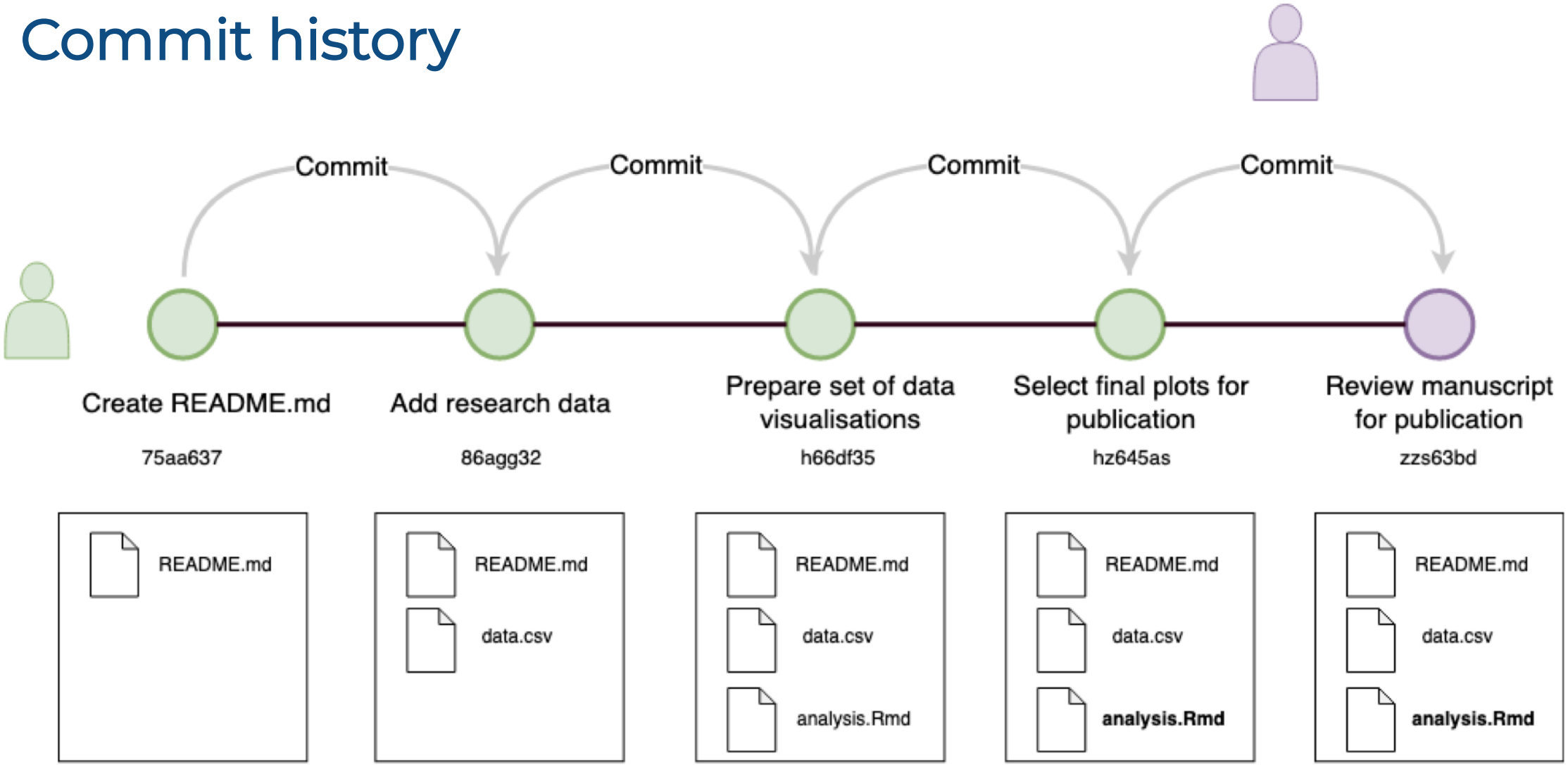

clone
clone
RStudio
(local repository)
GitHub
(remote repository)
RStudio
(local repository)
commit
push
???
push
commit

Get changes

`git pull`



Commit history



R Markdown

R markdown

On the input side...

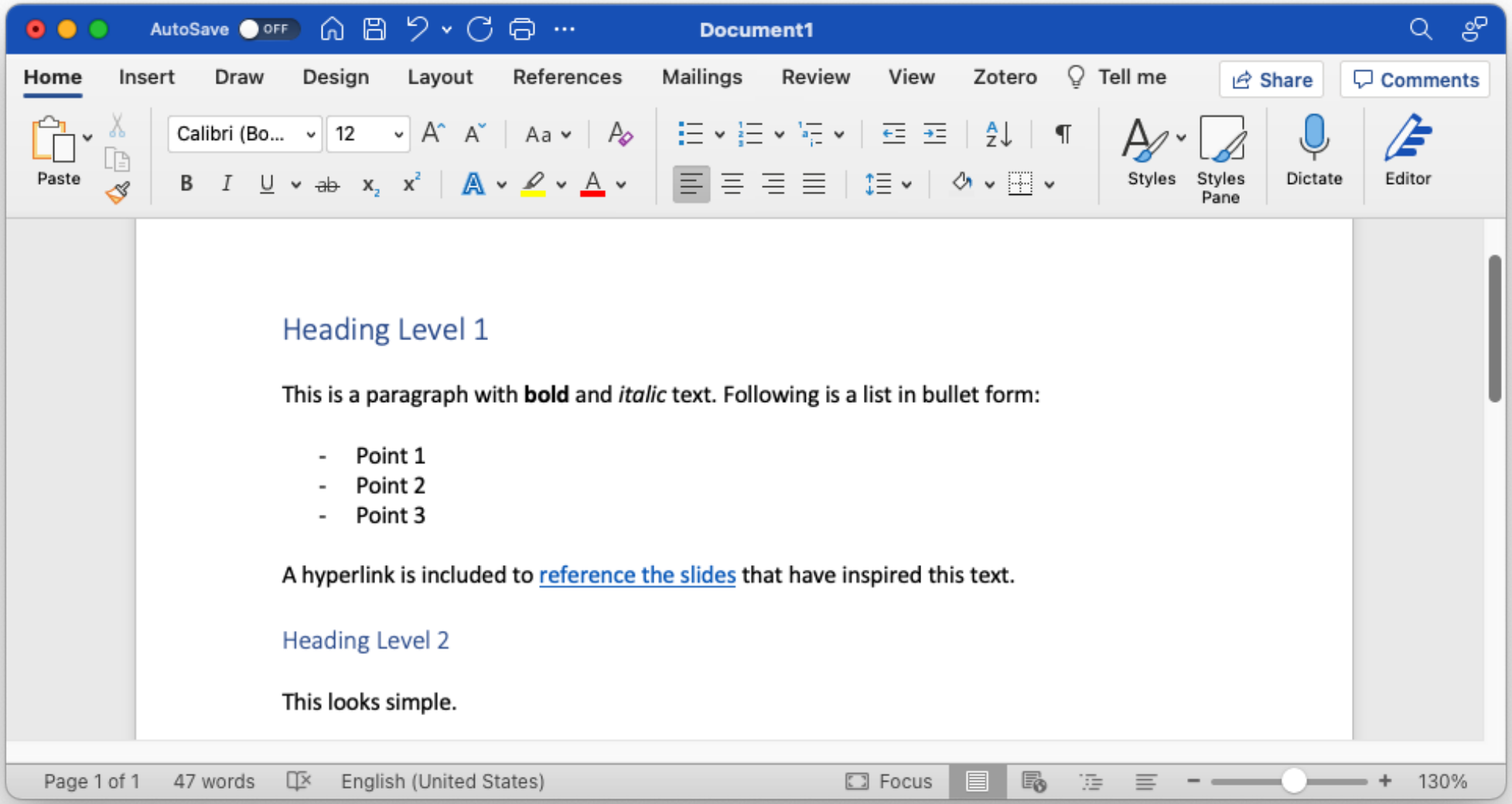
- Write text in markdown
- Insert code using R
- Write "metadata" with YAML
- Insert equation with LaTeX

On the output side...

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

Slide taken from: Danielle Navarro - R markdown

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



Slide taken from: Danielle Navarro - R markdown

```
<?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
```

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

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HTML documents are complicated

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

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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

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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/
```

Slide taken from: Danielle Navarro - R markdown

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***

Slide taken from: Danielle Navarro - R markdown

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

Slide taken from: Danielle Navarro - R markdown

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

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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

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Artwork by @allison_horst

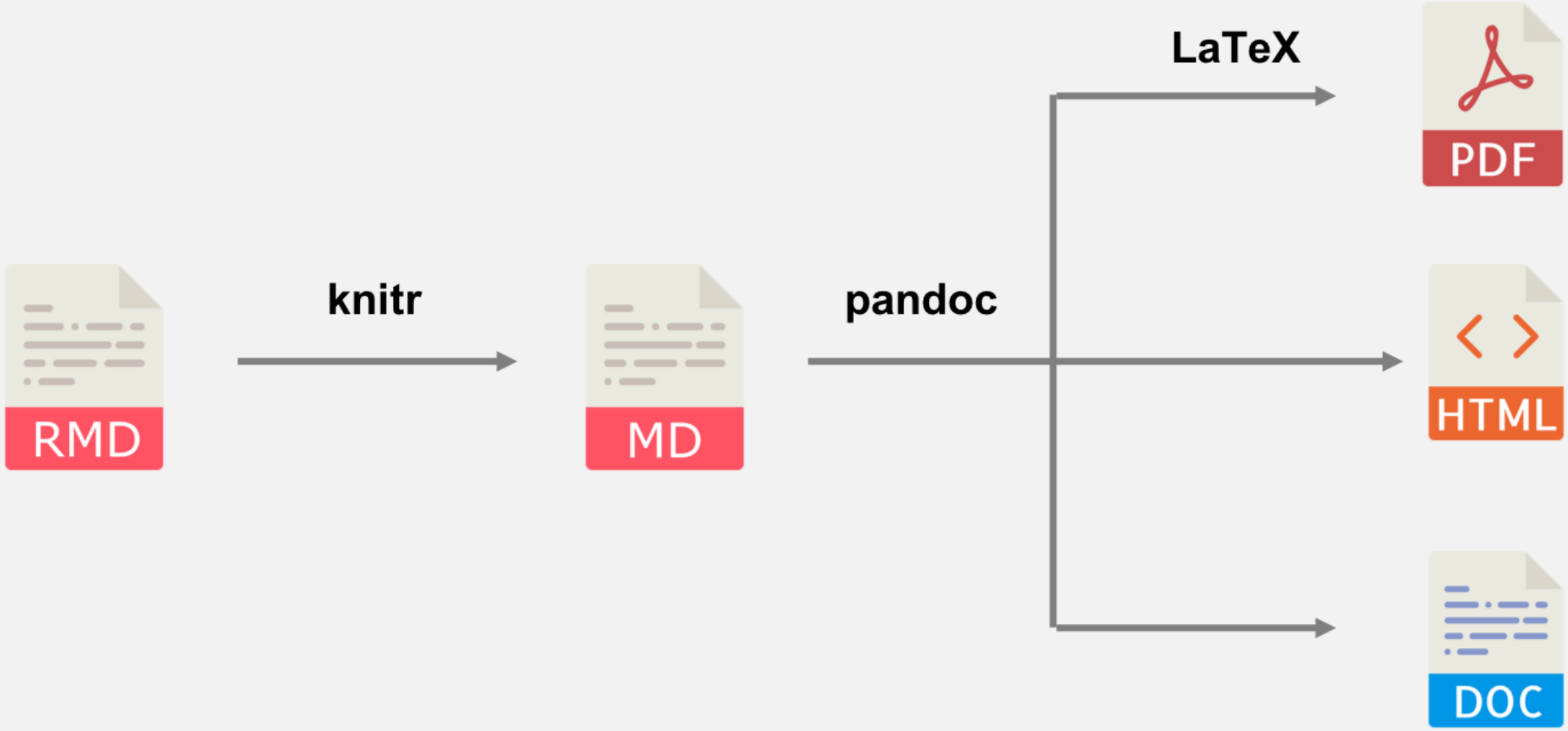
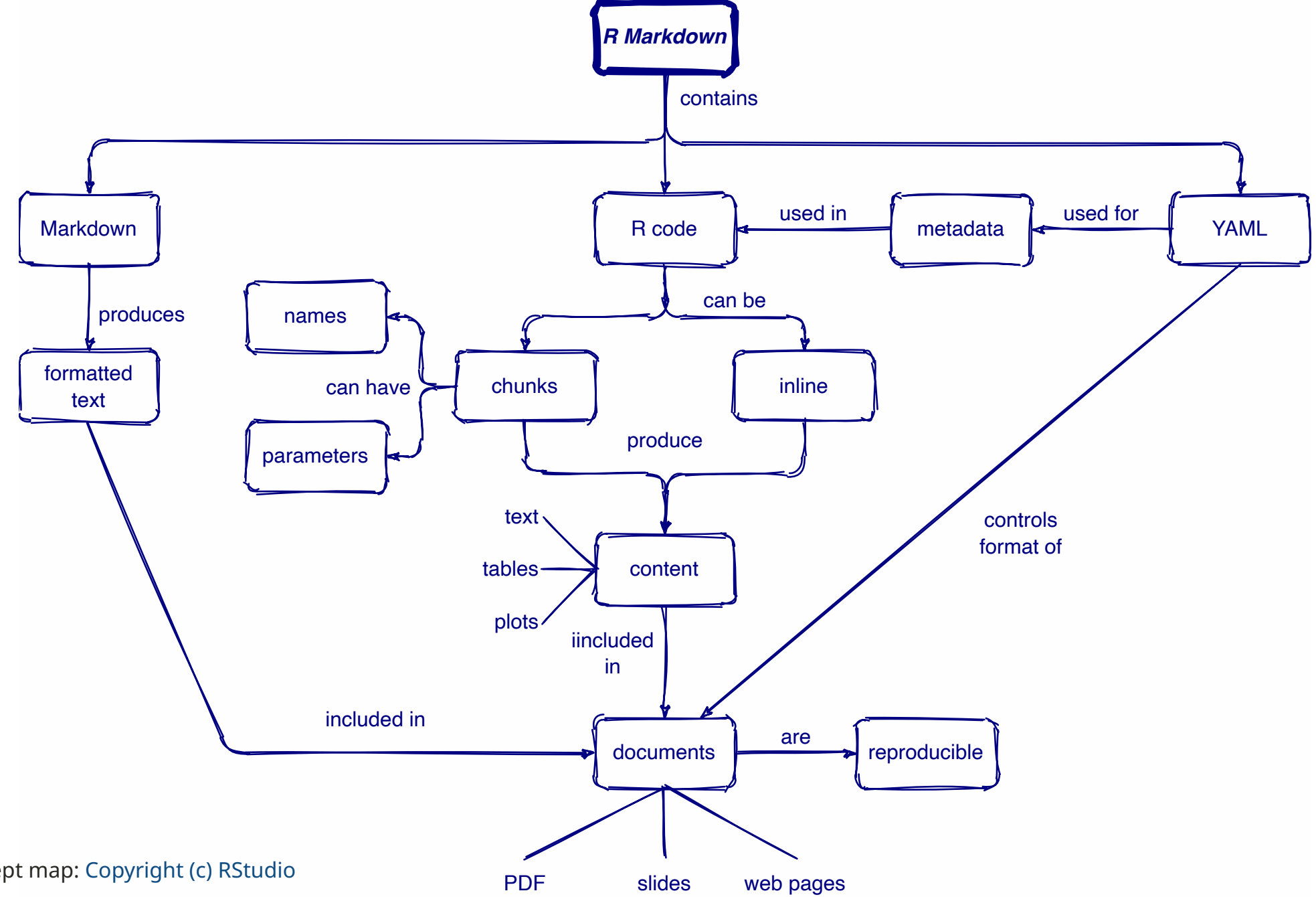


Image from: R Markdown Cookbook



Concept map: Copyright (c) RStudio

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

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