Introduction to RStudio

Day 1 - Introduction to Data Analysis with R

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Difference between R and RStudio

R is the **programming language** and the **program** that does the actual work

- Can be used with many different programming environments (But RStudio is the best for R)

RStudio is the **integrated development environment** (IDE)

- Provides an interface to R
- Specifically built around R code
- Execute code
- Syntax highlighting
- File and project management
- …

Difference between R and RStudio

Analogy and image from ModernDive Book

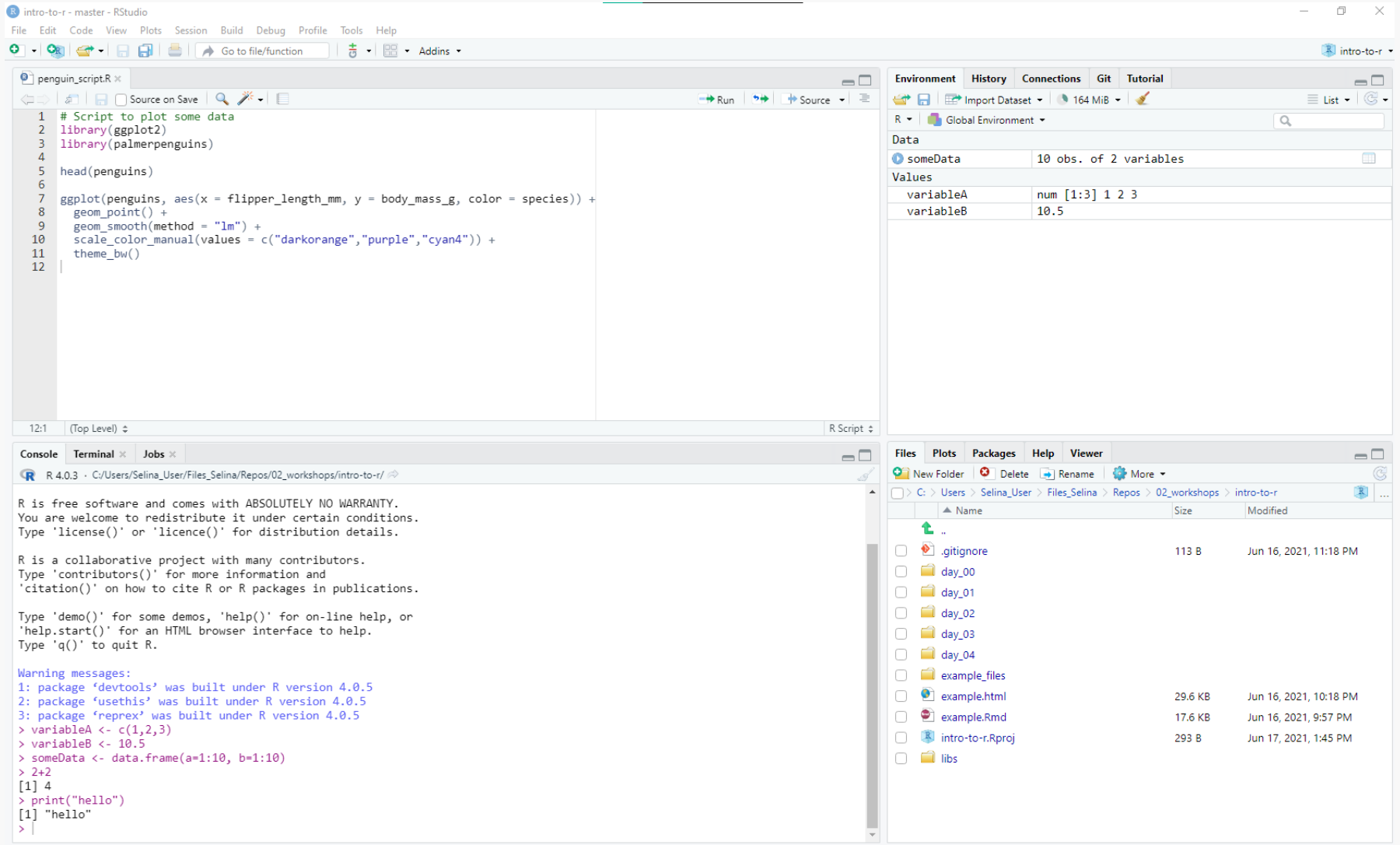
Summary

You can use R without RStudio but RStudio without R would be of little use

Basic idea of writing code for data analysis

- Break down your process into small steps
- Write precise instructions telling the computer what to do in each step
  - For this you can use the programming language R
- Tell R to execute these instructions
  - R will return the result of your instructions (or an error message)
- You can do all of this inside RStudio

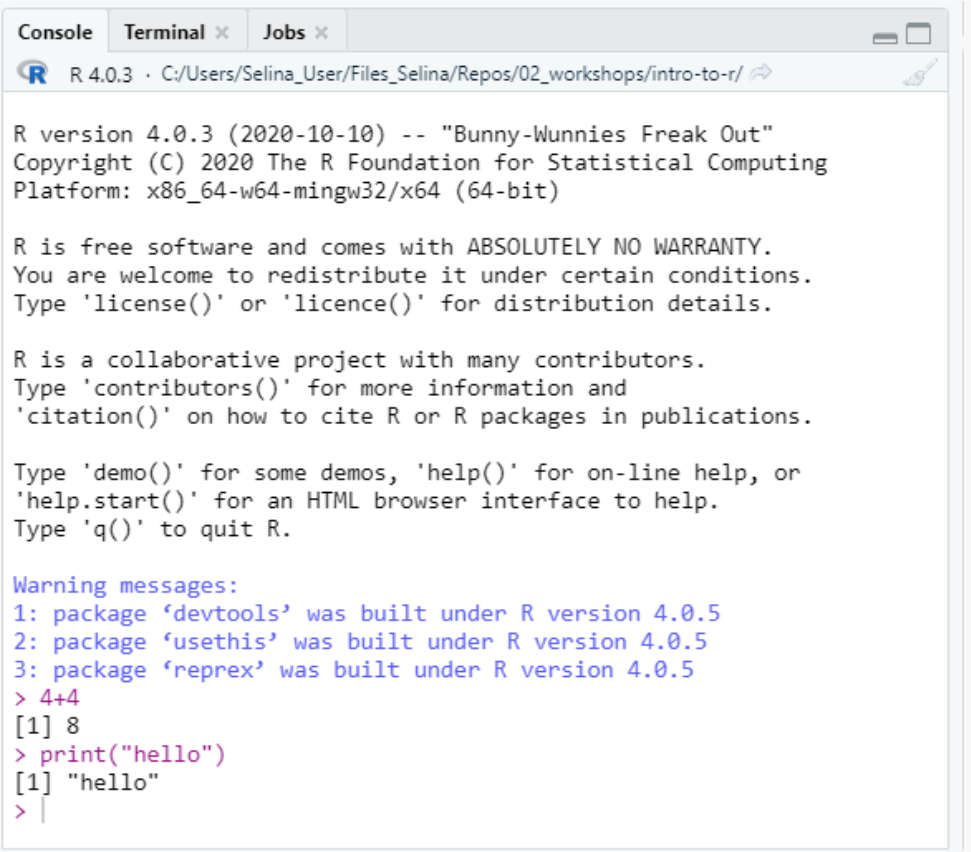
A quick tour around RStudio



Console pane

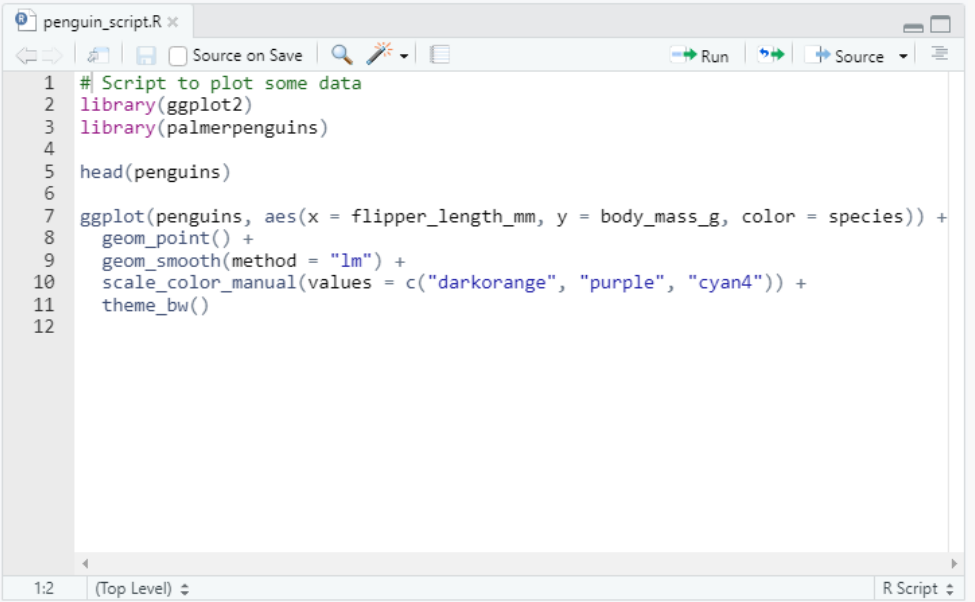
- Execute R code
- Output from R code in scripts is printed there
- Type a command into the console and execute with `Enter/Return`

> **Tip**
>
> Use arrow keys to bring back last commands



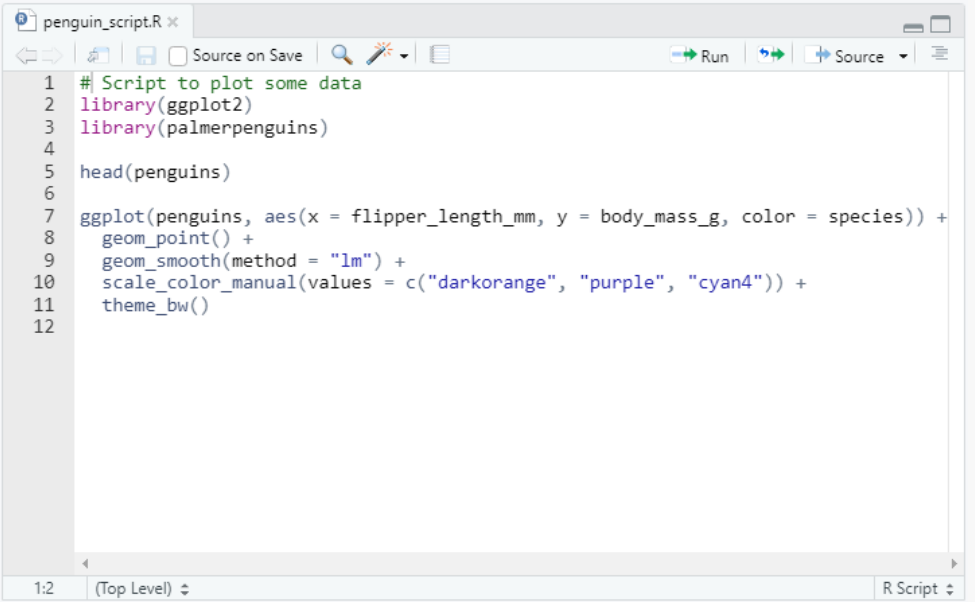
Script pane

- Write scripts with R code
  - Scripts are text files with R commands (file ending `.R`)
  - Use scripts to save commands for reuse



Script pane

- Create a new R script:
  File -> New File -> R Script
- Save an R script:
  File->Save (Ctrl/Cmd + S)
- Run code line by line with **Run button (Ctrl+Enter/Cmd+Return)**
- You can open multiple scripts

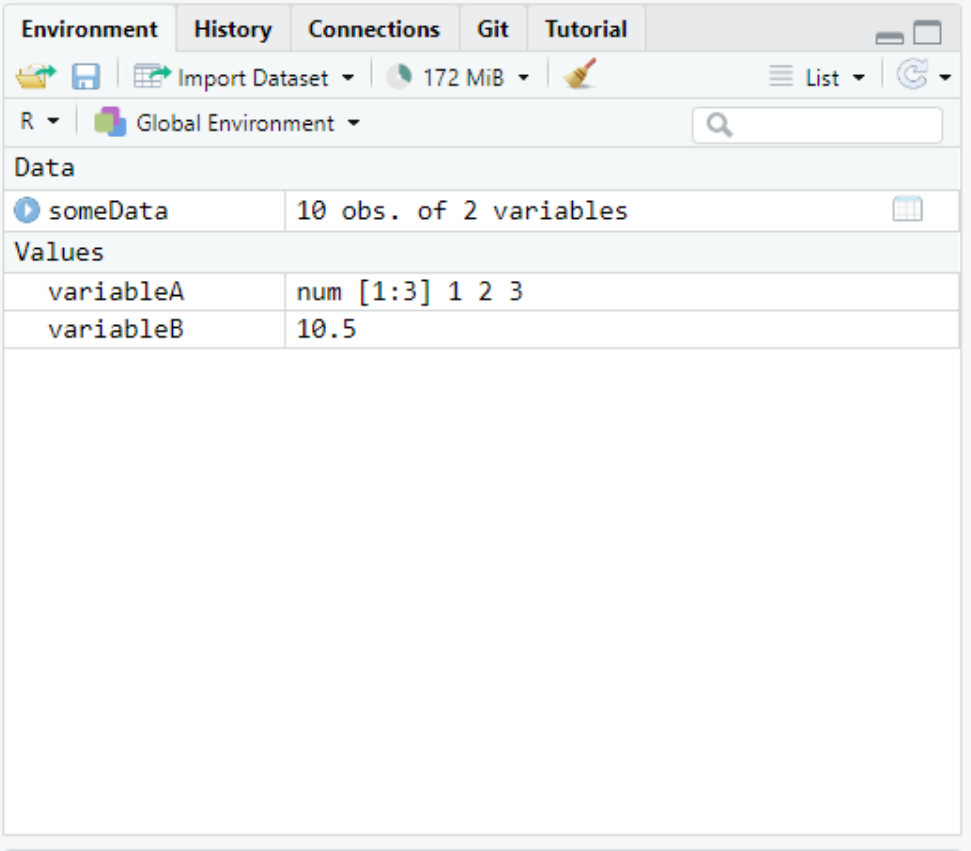


Summary

Use **scripts** for all your analysis and for commands that you want to save.
Use **console** for temporary commands, e.g. to test something.

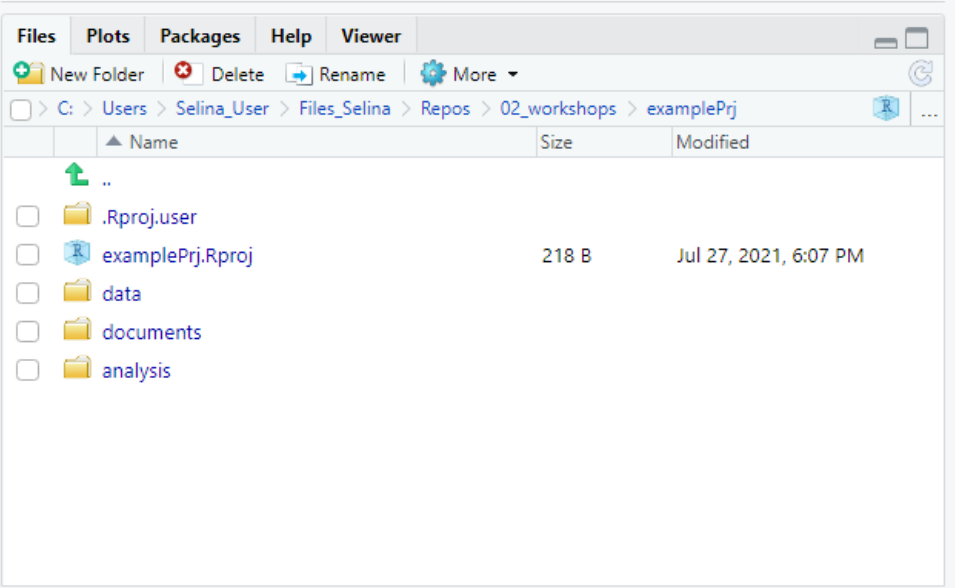
Environment pane

- Shows objects currently present in the R session
- Is empty if you start R



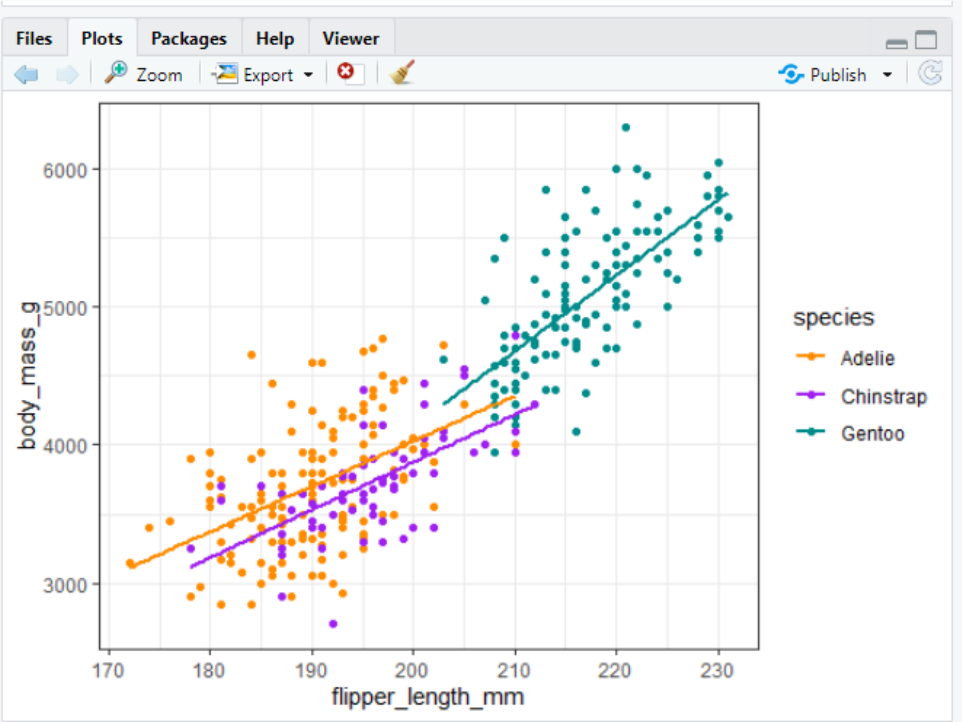
Files pane

- Similar to Explorer/Finder
- Browse project structure and files
  - Find and open files
  - Create new folders
  - Delete files
  - Rename files
  - …
- Practical if you don't want to switch between File Explorer and RStudio all the time



Plot pane

- Plots that are created with R will be shown here



Project oriented workflow

- One directory with all files relevant for project
  - Scripts, data, plots, documents, ...

```
Project
|
|- data
|
|- documents
|    |
|    |- notes
|    |
|    |- reports
|
|- analysis
|    |
|    |- clean_data.R
|    |
|    |- statistics.R
|
|
```

Example project structure

Project oriented workflow

- One directory with all files relevant for project
  - Scripts, data, plots, documents, …
- An RStudio project is just a normal directory with an **.Rproj** file

```
Project
|
|- data
|
|- documents
|    |
|    |- notes
|    |
|    |- reports
|
|- analysis
|    |
|    |- clean_data.R
|    |
|    |- statistics.R
|
|- *.RProj
```

Example R Studio project structure

Project oriented workflow

Advantages of using RStudio projects

- Easy to navigate in R Studio (**File pane**)
- Easy to find and access scripts and data in RStudio
- Project root is working directory
- Open multiple projects simultaneously in separate RStudio instances

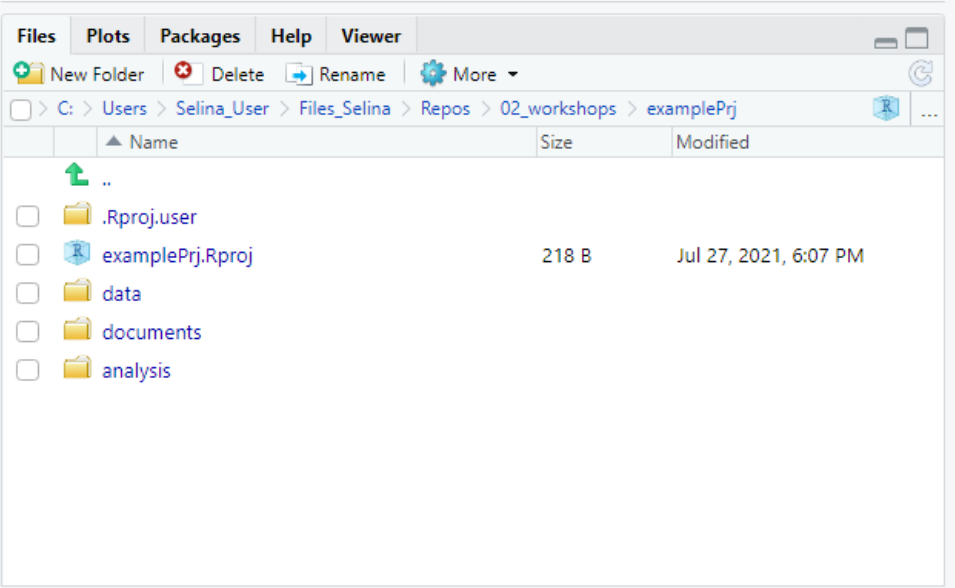
```
Project
|
|- data
|
|- documents
|    |
|    |- notes
|    |
|    |- reports
|
|- analysis
|    |
|    |- clean_data.R
|    |
|    |- statistics.R
|
|- *.RProj
```

Example R Studio project structure

Create an RStudio project

Create a project from scratch:

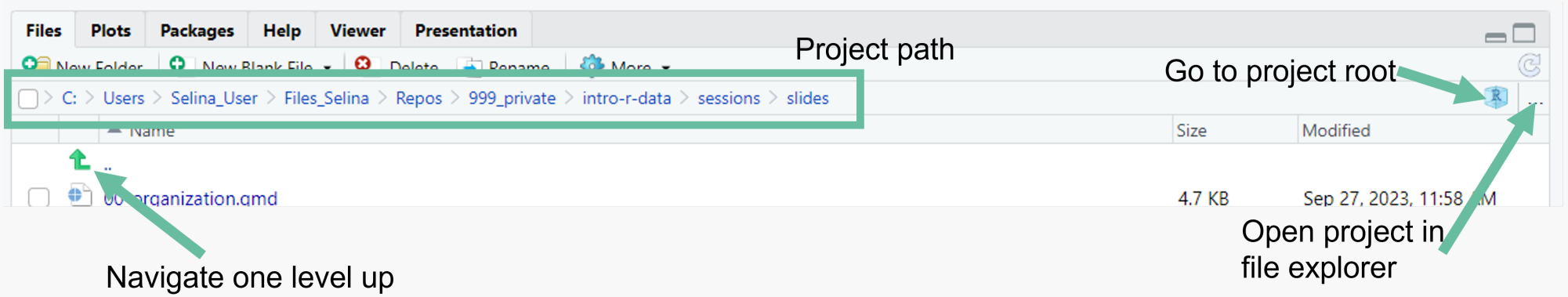
1. **File -> New Project -> New Directory -> New Project**
2. Enter a directory name (this will be the name of your project)
3. Choose the Directory where the project should be initiated
4. **Create Project**



Example project structure in RStudio

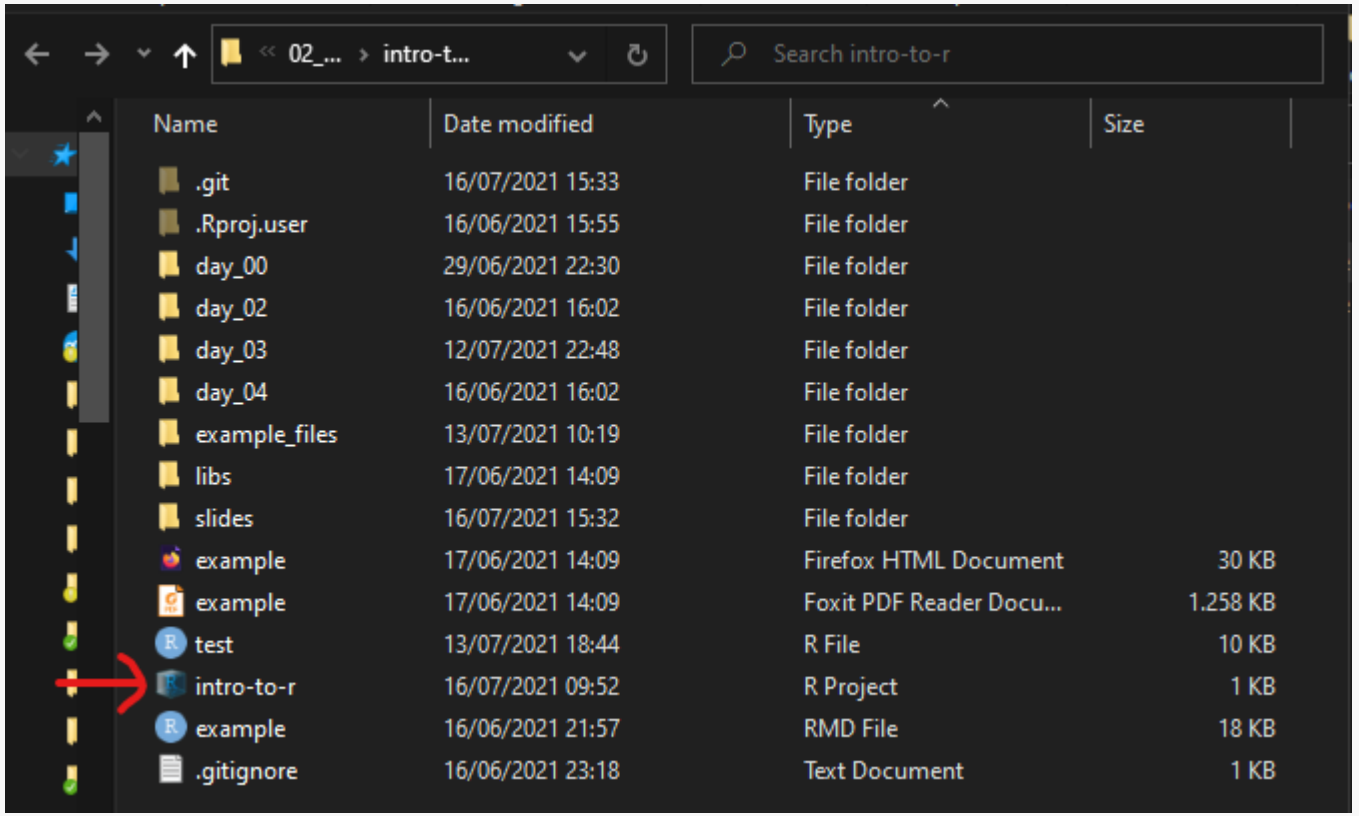
RStudio will now create and open the project for you.

Navigate an RStudio project



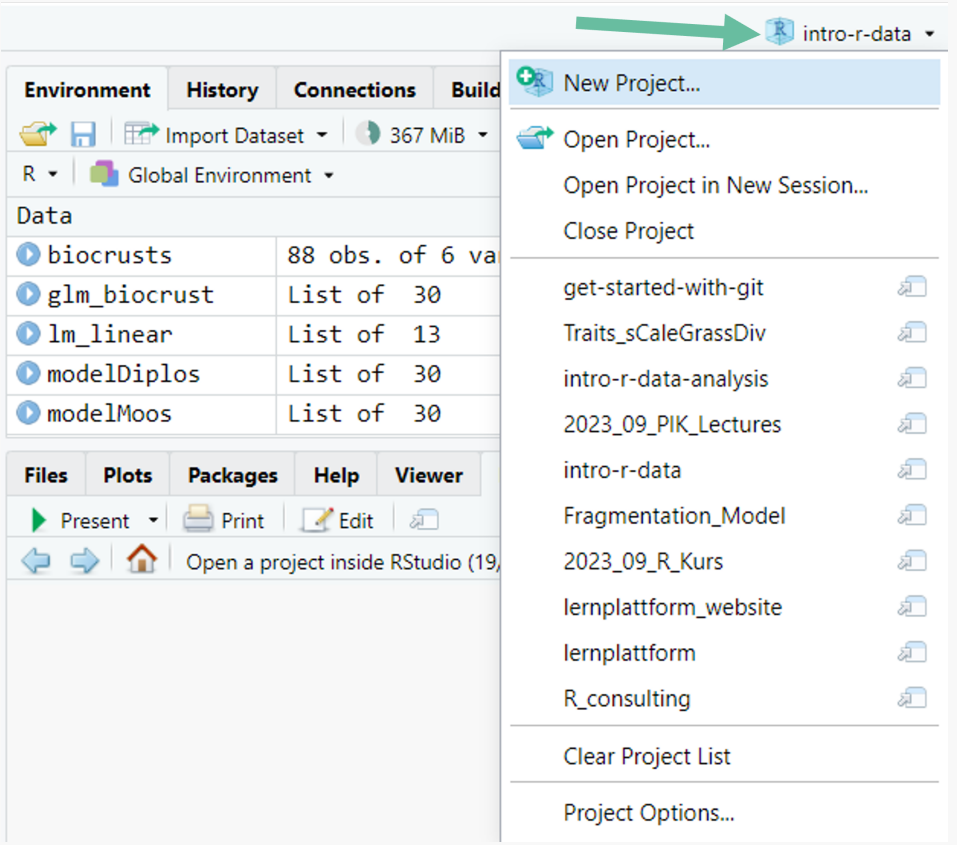
Open a project from outside RStudio

To open an RStudio project from your file explorer/finder, just double click on the .Rproj file



Open a project inside RStudio

To open an RStudio project from RStudio, click on the project symbol on the top right of R Studio and select the project from the list.



A tip before we get started

Learn the most important keyboard shortcuts of R Studio.

Find all shortcuts under **Tools -> Keyboard Shortcuts Help**

- Save active file: Ctrl/Cmd + S
- Run current line: Ctrl/Cmd + Enter
- Create new R Script: Ctrl/Cmd + N
- Undo: Ctrl/Cmd + Z
- Redo: Ctrl/Cmd + Y
- Copy/Paste: Ctrl/Cmd + C/V

Now you

Task 1 (25 min)

Set up your own RStudio project for this workshop

Find the task description here