



Introduction to R-Markdown for a reproducible research

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Creating an Rmarkdown project

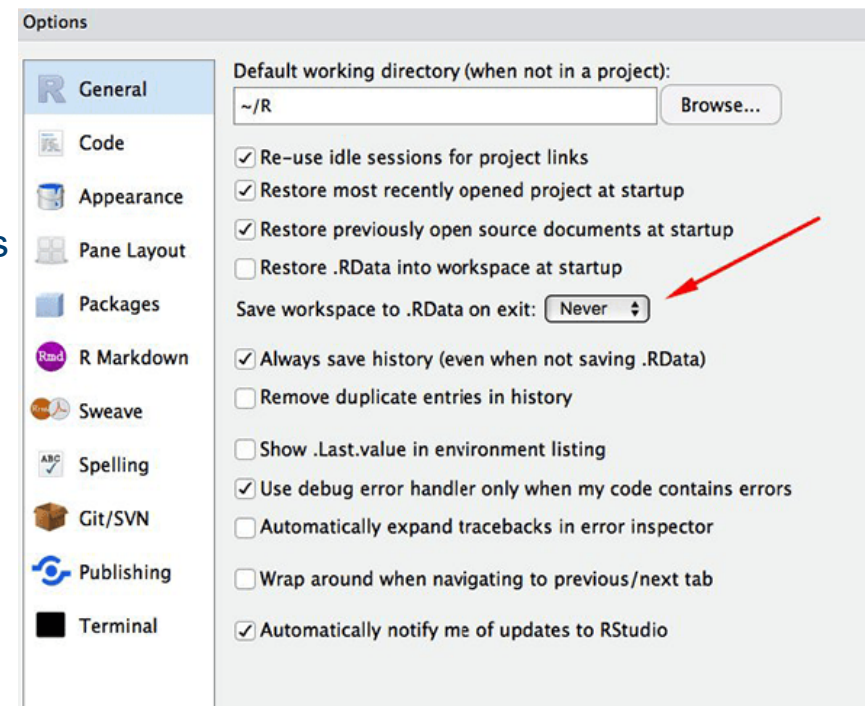
INTRODUCTION

Markdown is a text-to-HTML conversion tool

File -> New Project -> New Directory -> Simple Rmarkdown website.

Specify where you would like to create your project. This would be your **working directory**.

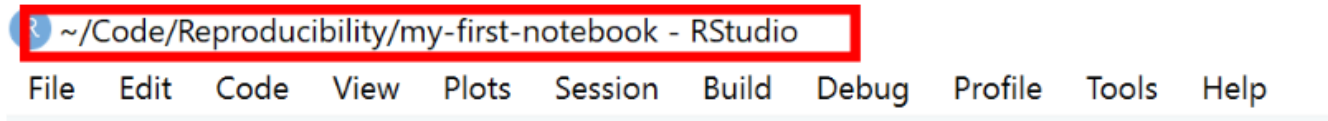
Click **Create Project**.



Working directory

Absolute vs Relative paths examples

- Relative path: data/dataset1.txt ***
- Absolute path: C:/Users/User1/Documents/R/my-first-project/data/dataset1.txt



`getwd()`

Set As Working Directory

`setwd("/path/to/working/directory")` (not recommend)


Rmarkdown

An Rmarkdown file is made up of 3 basic components:

- ✓ header
- ✓ markdown
- ✓ R code chunks

Rmarkdown header

```
---  
title: "My first notebook"  
author: Alexia Cardona  
date: 1 October 2019  
---
```

Press the  button to see how the report will look like after you make changes to the .Rmd file.

Header

Heading 1

Heading 1

Heading 2

Heading 2

Heading 3

Heading 3

Heading 4

Heading 4

Inline text formatting

To make text **bold** use `**double asterisks**` or `__double underscores__` .

To make text *italic* use `*asterisks*` or `_underscores_` .


To make text ^{superscript} use `^caret^` .

To make text _{subscript} use `~tilde~` .

To mark text as inline code use ``backticks`` .

To ~~strike through~~ text use `~~double tilde~~` .

Line breaks

- To create a line break, put more than 2 spaces at the end of a sentence or place `\` in a new line followed by a new line .

Links

Linking text to Headers

To link text to a header you would need to specify an identification tag next to a header as follows:

```
# Markdown {#markdown-header}
```

Then to link text to this header use `[link to header](#markdown-header)` . This will be rendered as [link to header](#).

Linking text to a webpage

To create a link to a webpage use

```
[text of link](https://training.cam.ac.uk/bioinformatics/event-timetable)
```

 . This is rendered as [text of link](https://training.cam.ac.uk/bioinformatics/event-timetable).

Footnotes

To indicate a footnote use `[^1]` and, for example, indicate another one as `[^2]` and then specify the wordings of the footnotes as:

`[^1]: This is the first footnote.`

`[^2]: This is the second footnote.`

Lists

Ordered lists

To create an ordered list use the following syntax:

- ```
1. Item 1
2. Item 2
3. Item 3
```

This is rendered as:

1. Item 1
2. Item 2
3. Item 3

Use 4 spaces to indent an item if you would like to have sub-lists:

- ```
1. Item 1  
2. Item 2  
3. Item 3  
    a. Item 3a  
        i. Item 3ai  
        ii. Item 3aii  
    b. Item 3b  
    c. Item 3c  
4. Item 4
```

1. Item 1
2. Item 2
3. Item 3
 - a. Item 3a
 - i. Item 3ai
 - ii. Item 3aii
 - b. Item 3b
 - c. Item 3c
4. Item 4

Lists

Unordered lists

In an unordered bulleted list, each item begins with `*`, `+` or `-`. Example:

```
* Item 1
* Item 2
* Item 3
  * Item 3a
    * Item 3ai
    * Item 3aai
  * Item 3b
  * Item 3c
* Item 4
```

Will be rendered as:

- Item 1
- Item 2
- Item 3
 - Item 3a
 - Item 3ai
 - Item 3aai
 - Item 3b
 - Item 3c
- Item 4

Tasks list

Tasks list can be done using the following syntax:

- [] an unchecked task list item
- [x] checked item

This will be rendered as:

- ☐ an unchecked task list item
- ☒ checked item

Inserting images

To insert an image use the following syntax: `![Figure caption](path to image)` . Example:

```
![R Logo](img/Rlogo.png)
```

Will be rendered as:



R Logo

Tables

Use `|` and `-` to create a table as follows:

```
| Column 1 | Column 2 |  
|-----|-----|  
| Item 1,1 | Item 1,2 |  
| Item 2,1 | Item 2,2 |
```

This is rendered as:

Column 1	Column 2
Item 1,1	Item 1,2
Item 2,1	Item 2,2

Table alignments can be done using the following syntax:

```
| Left align | Center align | Right align |  
| :---      | :---:      | ---:      |  
| Item 1,1  | Item 1,2   | Item 1,3   |  
| Item 2,1  | Item 2,2   | Item 2,3   |
```

This is rendered as:

Left align	Center align	Right align
Item 1,1	Item 1,2	Item 1,3
Item 2,1	Item 2,2	Item 2,3

Blocks

Blocks in the notebook can be created by using the `>` sign as follows:

```
> Example of a block
```

This is rendered as:

```
Example of a block
```

If you would like to add **code blocks**, use `'''` before and after the code as follows:

```
'''  
print("Hello world")  
x <- 1+2  
print(x)  
'''
```

This will be rendered as:

```
print("Hello world")  
x <- 1+2  
print(x)
```

Adding a table of contents

```
output:  
  html_document:  
    toc: true
```

```
output:  
  html_document:  
    toc: true  
    toc_depth: 4
```

Adding References

```
bibliography: references.bib  
link-citations: yes
```

Your YAML header should now look like:

```
---  
title: "My first notebook"  
author: Alexia Cardona  
date: 1 October 2019  
bibliography: references.bib  
link-citations: yes  
---
```

[Bibliographies and Citations](#)

To cite a reference use the @ together with the ID of the reference. Example:

```
Citation to my paper @cardona2014 and @cardona2019
```

Will be rendered as:

Citation to my paper Cardona (2014) and Cardona et al. (2019)

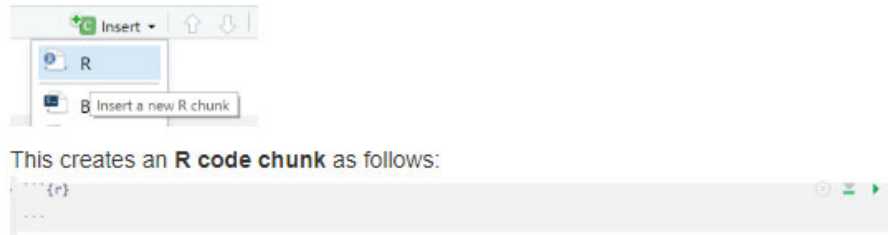
To add the bibliography at the end of the report add a References heading at the end of the report:

```
# References
```

See [references](#) at the end of the report.

https://rmarkdown.rstudio.com/authoring_bibliographies_and_citations.html

R code chunks



The dataset

```
download.file(url="https://github.com/cambiotraining/reproducibility-  
training/blob/master/data/gapminder_data.csv", destfile="data/gapminder_data.csv")
```

Chunk options

- `include = FALSE` do not display the code and results in the page after it is knitted. The R code however still runs and therefore the variables or results in this code chunk can be used by the other chunks.
- `echo = FALSE` does not display the code, but it displays the results in the rendered file.
- `message = FALSE` does not display an messages that are generated by the code chunk in the rendered file.
- `warning = FALSE` does not display warnings that are generated by code chunk in the rendered file.
- <https://www.rstudio.com/wp-content/uploads/2015/03/rmarkdown-reference.pdf>

Tables in Rmarkdown

- ktable function
- If you have a very long table to display, the best way would be to use pagination where the contents of the table are split into multiple tabs. The function *paged_table* in the rmarkdown library can be used to do this.

Summary

- **Limitations:**
- Some limitations that Rmarkdown has:
- Figure and table numbering is not supported. There is still a way around this, by using third-party packages e.g., [captioner](#).

Useful Web based hands-on

- <https://daringfireball.net/projects/markdown/dingus>
- <https://daringfireball.net/projects/markdown/>

Thank you very much for your kind guidance! 😊



www.flyingdutchmanpat.com