R Markdown Cheat Sheet

learn more at rmarkdown.rstudio.com

RStudio

.Rmd files

An R Markdown (.Rmd) file is a record of your research. It contains the code that a scientist needs to reproduce your work along with the narration that a reader needs to understand your work.

Reproducible Research

At the click of a button, or the type of a command, you can rerun the code in an R Markdown file to reproduce your work and export the results as a finished report.

Dynamic Documents

You can choose to export the finished report as a html, pdf, MS Word, ODT, RTF, or markdown document; or as a html or pdf based slide show.

Workflow

1 Open a new .Rmd file at File ▸ New File ▸ R Markdown. Use the wizard that opens to pre-populate the file with a template

2 Write document by editing template

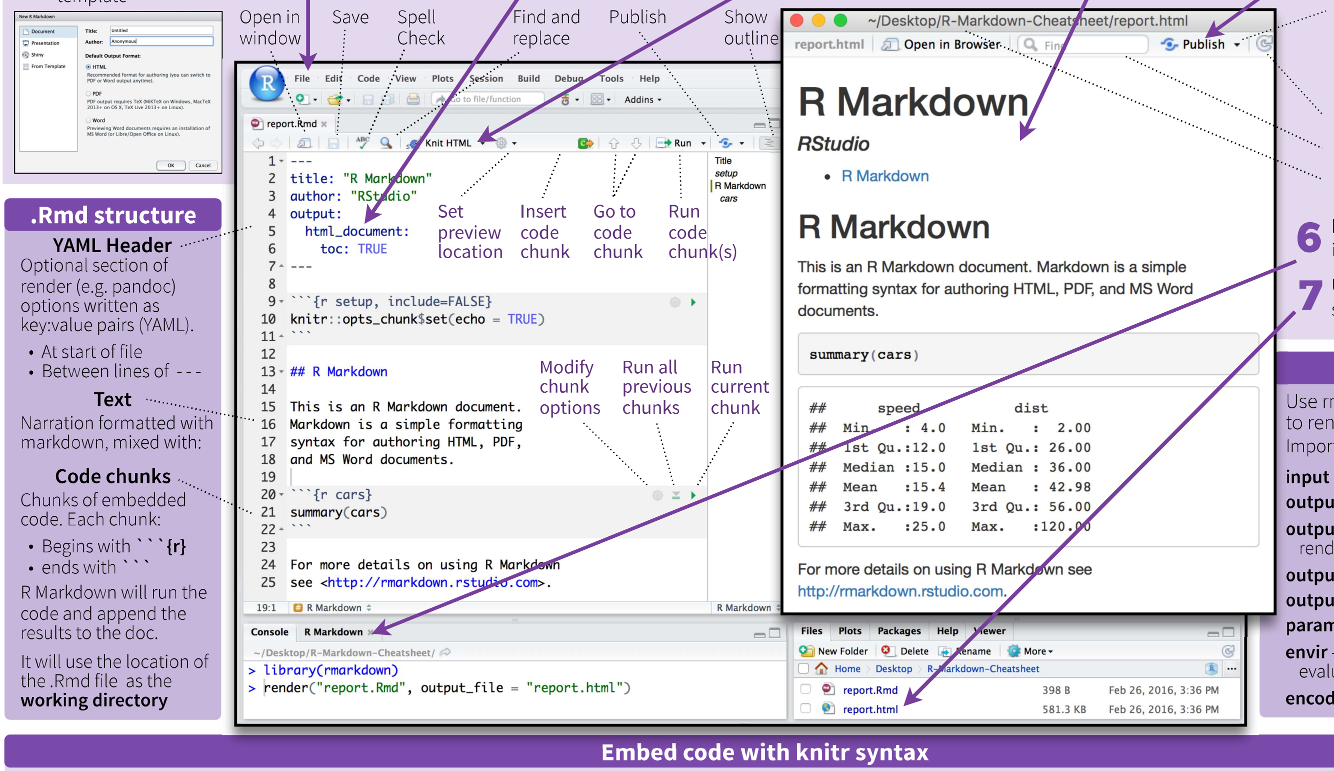
3 Knit document to create report Use knit button or **render()** to knit

4 Preview Output in IDE window

5 Publish (optional) to web or server

6 Examine build log in R Markdown console

7 Use output file that is saved alongside .Rmd



~~~
---
title: "R Markdown"
author: "RStudio"
output:
  html_document:
    toc: TRUE
---

```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
~~~

R Markdown

This is an R Markdown document.
Markdown is a simple formatting
syntax for authoring HTML, PDF,
and MS Word documents.

```{r cars}
summary(cars)
```

For more details on using R Markdown
see <http://rmarkdown.rstudio.com>.
```

```
> library(rmarkdown)
> render("report.Rmd", output_file = "report.html")
```

R Markdown

RStudio

- R Markdown

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents.

```
summary(cars)
```

```
##      speed           dist
##  Min.   : 4.0   Min.   :  2.00
##  1st Qu.:12.0   1st Qu.: 26.00
##  Median :15.0   Median : 36.00
##  Mean   :15.4   Mean   : 42.98
##  3rd Qu.:19.0   3rd Qu.: 56.00
##  Max.   :25.0   Max.   :120.00
```

For more details on using R Markdown see http://rmarkdown.rstudio.com.

report.Rmd	398 B	Feb 26, 2016, 3:36 PM
report.html	581.3 KB	Feb 26, 2016, 3:36 PM

.Rmd structure

YAML Header

Optional section of render (e.g. pandoc) options written as key:value pairs (YAML).

- At start of file
- Between lines of - - -

Text

Narration formatted with markdown, mixed with:

Code chunks

Chunks of embedded code. Each chunk:

- Begins with ```{r}
- ends with ```

R Markdown will run the code and append the results to the doc.

It will use the location of the .Rmd file as the **working directory**

render()

Use rmarkdown::**render()** to render/knit at cmd line. Important args:

input - file to render

output_format

output_options - List of render options (as in YAML)

output_file

output_dir

params - list of params to use

envir - environment to evaluate code chunks in

encoding - of input file

Interactive Documents

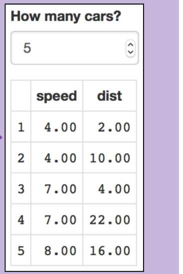
Turn your report into an interactive Shiny document in 4 steps

1. Add **runtime: shiny** to the YAML header.
2. Call Shiny **input** functions to embed input objects.
3. Call Shiny **render** functions to embed reactive output.
4. Render with rmarkdown::**run** or click **Run Document** in RStudio IDE

```
---
output: html_document
runtime: shiny
---

```{r, echo = FALSE}
numericInput("n",
  "How many cars?", 5)

renderTable({
  head(cars, input$n)
})
```
```



How many cars?

5

	speed	dist
1	4.00	2.00
2	4.00	10.00
3	7.00	4.00
4	7.00	22.00
5	8.00	16.00

Embed a complete app into your document with shiny::shinyAppDir()

* *Your report will rendered as a Shiny app, which means you must choose an html output format, like **html_document**, and serve it with an active R Session.*

Embed code with knitr syntax

Inline code

Insert with `` `r <code>` ``. Results appear as text without code.

```
Built with
`r getRversion()`
```

Built with 3.2.3

Code chunks

One or more lines surrounded with ```` ```{r} ```` and ```` ``` ````. Place chunk options within curly braces, after **r**. Insert with

````
```{r echo=TRUE}
getRversion()
```
~~~

```
getRversion()
## [1] '3.2.3'
```

### Global options

Set with knitr::**opts_chunk$set()**, e.g.

~~~
```{r include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```
~~~

### Important chunk options

**cache** - cache results for future knits (default = FALSE)

**cache.path** - directory to save cached results in (default = "cache/")

**child** - file(s) to knit and then include (default = NULL)

**collapse** - collapse all output into single block (default = FALSE)

**comment** - prefix for each line of results (default = '##')

**dependson** - chunk dependencies for caching (default = NULL)

**echo** - Display code in output document (default = TRUE)

**engine** - code language used in chunk (default = 'R')

**error** - Display error messages in doc (TRUE) or stop render when errors occur (FALSE) (default = FALSE)

**eval** - Run code in chunk (default = TRUE)

**fig.align** - 'left', 'right', or 'center' (default = 'default')

**fig.cap** - figure caption as character string (default = NULL)

**fig.height, fig.width** - Dimensions of plots in inches

**highlight** - highlight source code (default = TRUE)

**include** - Include chunk in doc after running (default = TRUE)

**message** - display code messages in document (default = TRUE)

**results** (default = 'markup')
'asis' - passthrough results
'hide' - do not display results
'hold' - put all results below all code

**tidy** - tidy code for display (default = FALSE)

**warning** - display code warnings in document (default = TRUE)

Options not listed above: R.options, aniopts, autodep, background, cache.comments, cache.lazy, cache.rebuild, cache.vars, dev, dev.args, dpi, engine.opts, engine.path, fig.asp, fig.env, fig.ext, fig.keep, fig.lp, fig.path, fig.pos, fig.process, fig.retina, fig.scap, fig.show, fig.showtext, fig.subcap, interval, out.extra, out.height, out.width, prompt, purl, ref.label, render, size, split, tidy.opts

## Parameters

Parameterize your documents to reuse with different inputs (e.g., data sets, values, etc.)

**1 Add parameters**
Create and set parameters in the header as sub-values of **params**

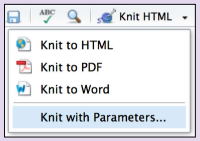
```
---
params:
  n: 100
  d: !r Sys.Date()
---
```

Indent 2 spaces

**2 Call parameters**
Call parameter values in code as **params$<name>**

```
Today's date
is `r params$d`
```

**3 Set parameters**
Set values wth **Knit with parameters** or the params argument of render():



```
render("doc.Rmd",
  params = list(n = 1, d = as.Date("2015-01-01"))
```

RStudio® is a trademark of RStudio, Inc. • CC BY RStudio • info@rstudio.com • 844-448-1212 • rstudio.com     More cheat sheets at http://www.rstudio.com/resources/cheatsheets/     Learn more at **rmarkdown.rstudio.com** • RStudio IDE 0.99.879 • Updated: 02/16
~~~

## Pandoc's Markdown

Write with syntax on the left to create effect on right (after render)

```
Plain text
End a line with two spaces
to start a new paragraph.
*italics* and **bold**
`verbatim code`
sub/superscript^2^~2~
~~strikethrough~~
escaped: \* \_ \\
endash: --, emdash: ---
equation: $A = \pi*r^{2}$
equation block:

$$E = mc^{2}$$

> block quote

# Header1  {#anchor}

## Header 2  {#css_id}

### Header 3  {.css_class}

#### Header 4

##### Header 5

###### Header 6

<!--Text comment-->

\textbf{Tex ignored in HTML}
<em>HTML ignored in pdfs</em>

<http://www.rstudio.com>
[link](www.rstudio.com)
Jump to [Header 1](#anchor)
image:

![Caption](smallorb.png)

* unordered list
    + sub-item 1
    + sub-item 2
        - sub-sub-item 1

* item 2

    Continued (indent 4 spaces)

1. ordered list
2. item 2
    i) sub-item 1
         A.  sub-sub-item 1

(@)  A list whose numbering

continues after

(@)  an interruption

Term 1

:   Definition 1

| Right | Left | Default | Center |
|------:|:-----|---------|:------:|
|   12  |  12  |    12   |   12   |
|  123  |  123 |   123   |  123   |
|    1  |    1 |     1   |    1   |

- slide bullet 1
- slide bullet 2

(>- to have bullets appear on click)

horizontal rule/slide break:

***

A footnote [^1]

[^1]: Here is the footnote.
```

Plain text

End a line with two spaces to start a new paragraph.

*italics* and **bold**

`verbatim code`

sub/superscript$^2$$_2$

~~strikethrough~~

escaped: * _ \

endash: –, emdash: —

equation: $A = \pi * r^2$

equation block:

$$E = mc^2$$

> block quote

Header1

Header 2

Header 3

Header 4

Header 5

Header 6

*HTML ignored in pdfs*

http://www.rstudio.com

link

Jump to Header 1

image:

Caption

- unordered list
  - sub-item 1
  - sub-item 2
    - sub-sub-item 1
- item 2

  Continued (indent 4 spaces)

1. ordered list
2. item 2
   i. sub-item 1
      A. sub-sub-item 1

1. A list whose numbering

continues after

2. an interruption

Term 1

Definition 1

| Right | Left | Default | Center |
|---:|:---|---|:---:|
| 12 | 12 | 12 | 12 |
| 123 | 123 | 123 | 123 |
| 1 | 1 | 1 | 1 |

- slide bullet 1
- slide bullet 2

(>- to have bullets appear on click)

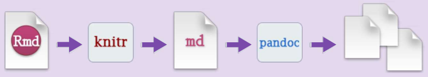
horizontal rule/slide break:

A footnote [1]

1. Here is the footnote.↩

## Set render options with YAML

When you render, R Markdown
1. runs the R code, embeds results and text into .md file with knitr
2. then converts the .md file into the finished format with pandoc



Set a document's default output format in the YAML header:

```
---
output: html_document
---
# Body
```

| output value | creates |
|---|---|
| html_document | html |
| pdf_document | pdf (requires Tex ) |
| word_document | Microsoft Word (.docx) |
| odt_document | OpenDocument Text |
| rtf_document | Rich Text Format |
| md_document | Markdown |
| github_document | Github compatible markdown |
| ioslides_presentation | ioslides HTML slides |
| slidy_presentation | slidy HTML slides |
| beamer_presentation | Beamer pdf slides (requires Tex) |

Customize output with sub-options (listed at right):

```
---
output:
  html_document:
    code_folding: hide
    toc_float: TRUE
---
# Body
```

Indent 2 spaces

Indent 4 spaces

### html tabsets

Use .tabset css class to place sub-headers into tabs

```
# Tabset {.tabset .tabset-fade .tabset-pills}
## Tab 1
text 1
## Tab 2
text 2
### End tabset
```

Tabset

Tab 1 Tab 2

text 1

End tabset

| sub-option | description | html | pdf | word | odt | rtf | md | gituhb | ioslides | slidy | beamer |
|---|---|---|---|---|---|---|---|---|---|---|---|
| citation_package | The LaTeX package to process citations, natbib, biblatex or none | | X | | | | X | | | | X |
| code_folding | Let readers to toggle the display of R code, "none", "hide", or "show" | X | | | | | | | | | |
| colortheme | Beamer color theme to use | | | | | | | | | | X |
| css | CSS file to use to style document | X | | | | | | | X | X | |
| dev | Graphics device to use for figure output (e.g. "png") | X | X | | | | X | X | X | X | X |
| duration | Add a countdown timer (in minutes) to footer of slides | | | | | | | | | X | |
| fig_caption | Should figures be rendered with captions? | X | X | X | X | | | | X | X | X |
| fig_height, fig_width | Default figure height and width (in inches) for document | X | X | X | X | X | X | X | X | X | X |
| highlight | Syntax highlighting: "tango", "pygments", "kate","zenburn", "textmate" | X | X | X | | | | | | X | X |
| includes | File of content to place in document (in_header, before_body, after_body) | X | X | | X | | X | X | X | X | X |
| incremental | Should bullets appear one at a time (on presenter mouse clicks)? | | | | | | | | X | X | X |
| keep_md | Save a copy of .md file that contains knitr output | X | | X | X | X | | | X | X | |
| keep_tex | Save a copy of .tex file that contains knitr output | | X | | | | | | | | X |
| latex_engine | Engine to render latex, "pdflatex", "xelatex", or "lualatex" | | X | | | | | | | | X |
| lib_dir | Directory of dependency files to use (Bootstrap, MathJax, etc.) | X | | | | | | | X | X | |
| mathjax | Set to local or a URL to use a local/URL version of MathJax to render | X | | | | | | | X | X | |
| md_extensions | Markdown extensions to add to default definition or R Markdown | X | X | X | X | X | X | X | X | X | X |
| number_sections | Add section numbering to headers | X | X | | | | | | | | |
| pandoc_args | Additional arguments to pass to Pandoc | X | X | X | X | X | X | X | X | X | X |
| preserve_yaml | Preserve YAML front matter in final document? | | | | | | X | | | | |
| reference_docx | docx file whose styles should be copied when producing docx output | | | X | | | | | | | |
| self_contained | Embed dependencies into the doc | X | | | | | | | X | X | |
| slide_level | The lowest heading level that defines individual slides | | | | | | | | | | X |
| smaller | Use the smaller font size in the presentation? | | | | | | | | X | | |
| smart | Convert straight quotes to curly, dashes to em-dashes, … to ellipses, etc. | X | | | | | | | X | X | |
| template | Pandoc template to use when rendering file | X | X | | X | | | | | X | X |
| theme | Bootswatch or Beamer theme to use for page | X | | | | | | | | | X |
| toc | Add a table of contents at start of document | X | X | X | | X | X | X | | | X |
| toc_depth | The lowest level of headings to add to table of contents | X | X | X | | X | X | X | | | |
| toc_float | Float the table of contents to the left of the main content | X | | | | | | | | | |

Options not listed: extra_dependencies, fig_crop, fig_retina, font_adjustment, font_theme, footer, logo, html_preview, reference_odt, transition, variant, widescreen

## Create a Reusable template

1 **Create a new package** with a inst/rmarkdown/templates directory

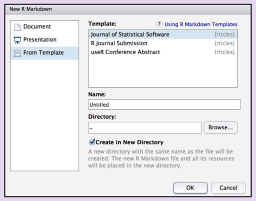
2 In the directory, **Place a folder** that contains:
- **template.yaml** (see below)
- **skeleton.Rmd** (contents of the template)
- any supporting files

3 **Install the package**

4 **Access template** in wizard at File ▸ New File ▸ R Markdown

template.yaml

```
---
name: My Template
---
```



Journal of Statistical Software {rticles}
R Journal Submission {rticles}
useR Conference Abstract {rticles}

Name: Untitled

Directory: ~

☑ Create in New Directory

A new directory with the same name as the file will be created. The new R Markdown file and all its resources will be placed in the new directory.

## Table suggestions

Several functions format R data into tables

Table with kable

| eruptions | waiting |
|---:|---:|
| 3.600 | 79 |
| 1.800 | 54 |
| 3.333 | 74 |
| 2.283 | 62 |

| | eruptions | waiting |
|---|---:|---:|
| 1 | 3.60 | 79.00 |
| 2 | 1.80 | 54.00 |
| 3 | 3.33 | 74.00 |
| 4 | 2.28 | 62.00 |

Table with xtable

Table with stargazer

| | eruptions | waiting |
|---|---|---|
| 1 | 3.600 | 79 |
| 2 | 1.800 | 54 |
| 3 | 3.333 | 74 |
| 4 | 2.283 | 62 |

data <- faithful[1:4, ]

~~~
```{r results = 'asis'}
knitr::kable(data, caption = "Table with kable")
```
~~~

~~~
```{r results = "asis"}
print(xtable::xtable(data, caption = "Table with xtable"),
  type = "html", html.table.attributes = "border=0"))
```
~~~

~~~
```{r results = "asis"}
stargazer::stargazer(data, type = "html",
  title = "Table with stargazer")
```
~~~

Learn more in the **stargazer**, **xtable**, and **knitr** packages.

## Citations and Bibliographies

Create citations with .bib, .bibtex, .copac, .enl, .json, .medline, .mods, .ris, .wos, and .xml files

1 **Set bibliography file** and CSL 1.0 Style file (optional) in the YAML header

```
---
bibliography: refs.bib
csl: style.csl
---
```

2 **Use citation keys in text**

```
Smith cited [@smith04].
Smith cited without author [-@smith04].
@smith04 cited in line.
```

3 **Render.** Bibliography will be added to end of document

Smith cited (Joe Smith 2004).
Smith cited without author (2004).
Joe Smith (2004) cited in line.