ICO Workshop R & RStudio

Part 2

Markdown & Quarto

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23th - 25th November, 2022

Overview

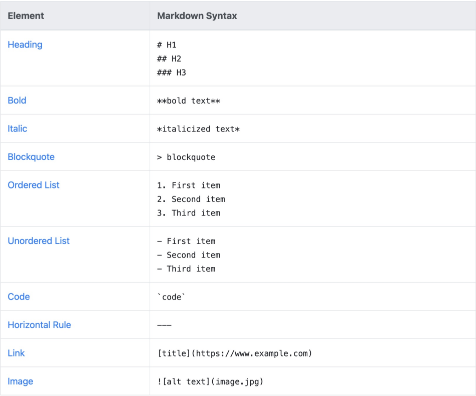
- What is markdown --- (Go to that section)
- Integrating Markdown and R code --- (Go to that section)
- Creating a basic Quarto document --- (Go to that section)

1. What is markdown?

Markdown

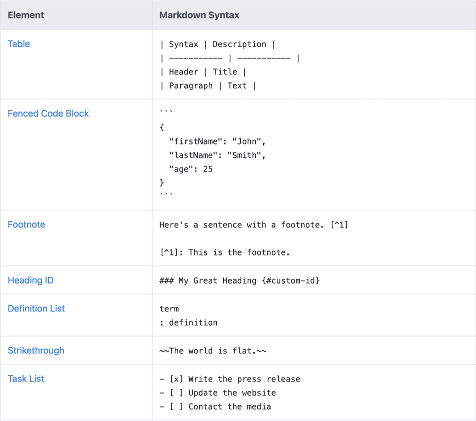
- 'low end' text editor system
- make content that can be read on different systems
- mainly easy way to generate **html** files
- you write in 'plain text' and an interpreter generates an nice edited version

Basic syntax



Element	Markdown Syntax
Heading	# H1 ## H2 ### H3
Bold	**bold text**
Italic	*italicized text*
Blockquote	> blockquote
Ordered List	1. First item 2. Second item 3. Third item
Unordered List	- First item - Second item - Third item
Code	`code`
Horizontal Rule	---
Link	[title](https://www.example.com)
Image	![alt text](image.jpg)

Extension



<table>
<tr><th>Element</th><th>Markdown Syntax</th></tr>
<tr><td>Table</td><td>| Syntax	Description
Header	Title
Paragraph	Text |</td></tr>
<tr><td>Fenced Code Block</td><td>```
{
  "firstName": "John",
  "lastName": "Smith",
  "age": 25
}
```</td></tr>
<tr><td>Footnote</td><td>Here's a sentence with a footnote. [^1]

[^1]: This is the footnote.</td></tr>
<tr><td>Heading ID</td><td>### My Great Heading {#custom-id}</td></tr>
<tr><td>Definition List</td><td>term
: definition</td></tr>
<tr><td>Strikethrough</td><td>~~The world is flat.~~</td></tr>
<tr><td>Task List</td><td>- [x] Write the press release
- [ ] Update the website
- [ ] Contact the media</td></tr>
</table>

2. Integrating Markdown and R code

Rmarkdown & Quarto

Two roads with the same destination, but...

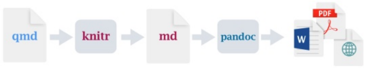
Rmarkdown

- developed 10 years ago by RStudio company
- an R package
- only works in RStudio
- still supported but no major advances in development
- generates pdf, html and word-docs

Quarto

- recently developed by RStudio company
- stand alone software
- integrates with RStudio but also with other software
- cross-language platform (python, Julia, Observable, ...)
- all new cool new stuff will be implemented in Quarto
- generates pdf, html, word, open-office, ppt, ePub, Observable JS, Jira Wiki, websites, online books, etc
- CEO of RStudio company anounced the development of an online editing application (like google docs)

How Quarto works...



Quarto info

If you want to learn more about Quarto, a lot of information is available at

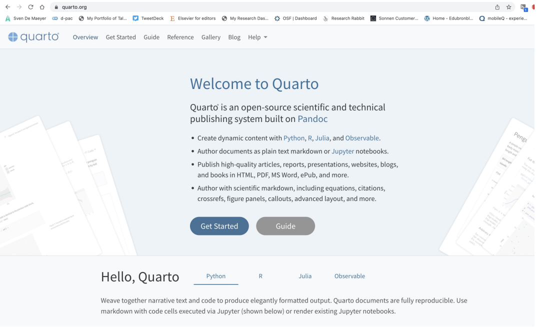
https://quarto.org/docs/guide/

AND

there are great extensions!

see: https://quarto.org/docs/extensions/

Installing Quarto



Welcome to Quarto

Quarto is an open-source scientific and technical publishing system built on Pandoc

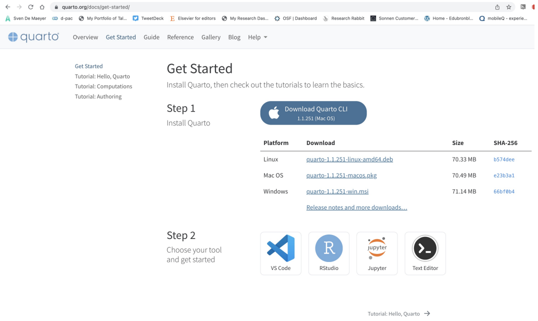
- Create dynamic content with Python, R, Julia, and Observable.
- Author documents as plain text markdown or Jupyter notebooks.
- Publish high-quality articles, reports, presentations, websites, blogs, and books in HTML, PDF, MS Word, ePub, and more.
- Author with scientific markdown, including equations, citations, crossrefs, figure panels, callouts, advanced layout, and more.

Hello, Quarto

Weave together narrative text and code to produce elegantly formatted output. Quarto documents are fully reproducible. Use markdown with code cells executed via Jupyter (shown below) or render existing Jupyter notebooks.

Click on GET STARTED

Installing Quarto



Get Started

Install Quarto, then check out the tutorials to learn the basics.

Step 1

Install Quarto

Platform	Download	Size	SHA-256
Linux	quarto-1.1.251-linux-amd64.deb	70.33 MB	b574dee
Mac OS	quarto-1.1.251-macos.pkg	70.49 MB	e23b3a1
Windows	quarto-1.1.251-win.msi	71.14 MB	66bf0b4

Release notes and more downloads...

Step 2

Choose your tool and get started

Choose the correct version for your pc

Install the software and restart RStudio

Check the installation

You should see the option to open a new "Quarto document" in RStudio

3. Creating a basic Quarto document

A first basic hands-on exploration of Quarto

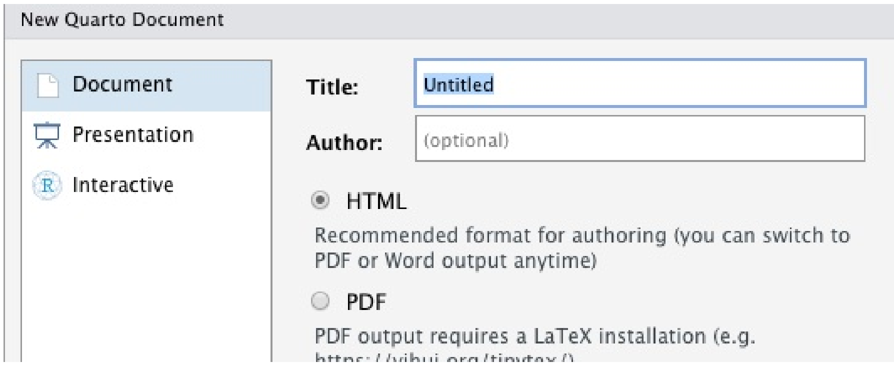
</> Let's create a first Quarto Document…

The following slides are some screen shots of what we all did together, hands-on 😊

Open a New File

- Click on **File**
- Choose **New File**
- Choose **Quarto Document…**

Result:



New Quarto Document

Title: Untitled

Author: (optional)

● HTML

Recommended format for authoring (you can switch to PDF or Word output anytime)

○ PDF

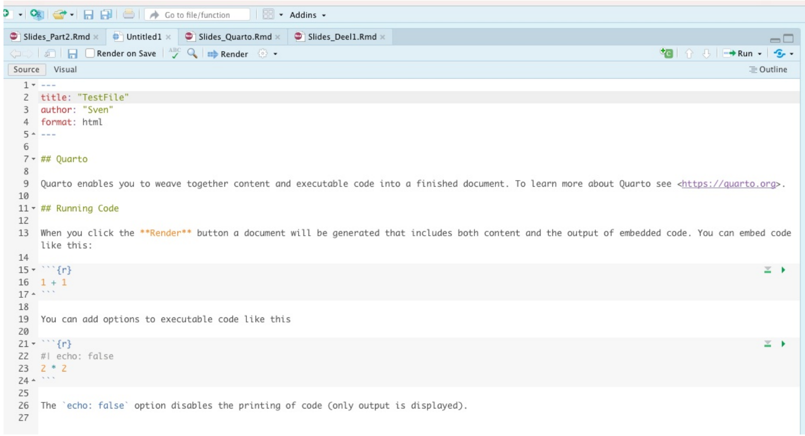
PDF output requires a LaTeX installation (e.g. https://yihui.org/tinytex/)

Fill in some basic info

- Fill in a **title** and an **author**
- Click on **Create**

Two different views

Source editor



~~~
---
title: "TestFile"
author: "Sven"
format: html
---

## Quarto

Quarto enables you to weave together content and executable code into a finished document. To learn more about Quarto see <https://quarto.org>.

## Running Code

When you click the **Render** button a document will be generated that includes both content and the output of embedded code. You can embed code like this:

```{r}
1 + 1
~~~

You can add options to executable code like this

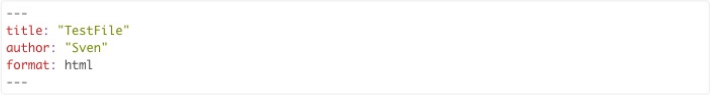
```{r}
#| echo: false
2 * 2
```

The `echo: false` option disables the printing of code (only output is displayed).

```
```

Two parts of a Quarto document

YAML



```
---
title: "TestFile"
author: "Sven"
format: html
---
```

To set some of the parameters (aka **Metadata**)

Your narrative:

Titles +

text +

code +

output +

tables +

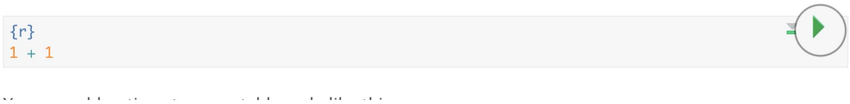
figures (generated by code) +

Code chunks

All R-code can be written in **Code chunks**

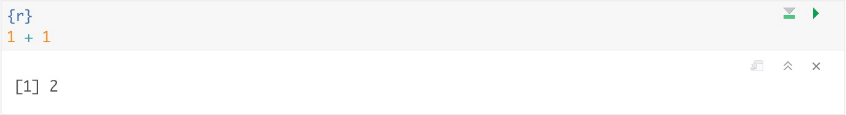
While constructing your Quarto document you can RUN code chunks

Click the green arrow (top-right corner of code chunk)



```
{r}
1 + 1
```

As a result you get the output printed in your Quarto document



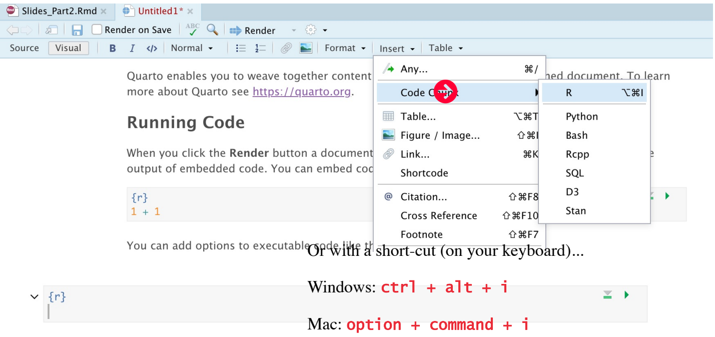
```
{r}
1 + 1
```

```
[1] 2
```

Code chunks

ATTENTION!: The order of code chunks do matter. If you want to run all the code in the code chunks before a certain code chunk, you can click on the button aside of the green arrow (downward green arrow)

Adding a new code chunk



Quarto enables you to weave together content ned document. To learn more about Quarto see https://quarto.org.

Running Code

When you click the Render button a document e output of embedded code. You can embed coc

```
{r}
1 + 1
```

You can add options to executable code like th

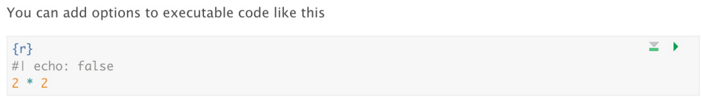
```
{r}
```

Or with a short-cut (on your keyboard)...

Windows: `ctrl + alt + i`

Mac: `option + command + i`

Code chunk options



You can add options to executable code like this

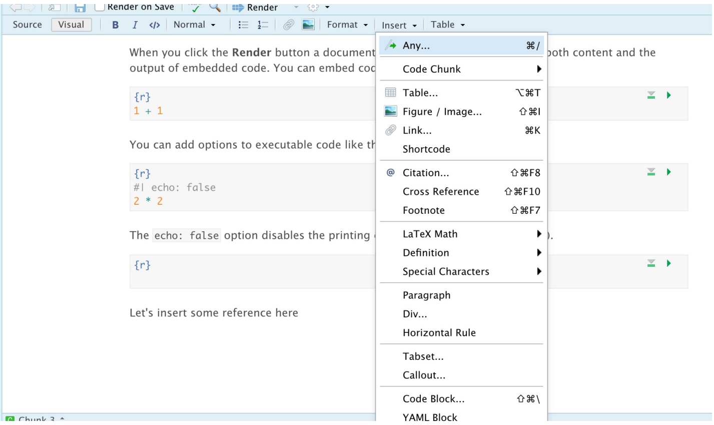
```
{r}
#| echo: false
2 * 2
```

- `#| include: false` */rightarrow* code and output (result) are hidden but code is executed
- `#| echo: false`: only results are printed, code is hidden
- `#| message: false` hides messages coming from R related to running the code
- `#| warning: false` hides warnings coming from running the code
- `#| error: false` hides error messages coming rom running the code
- `#| fig.cap = "..."` adds a caption for a figure created

More detailed information: https://yihui.org/knitr/options/

Inserting references

You can easily insert citations and references



When you click the **Render** button a document … oth content and the output of embedded code. You can embed coc

```
{r}
1 + 1
```

You can add options to executable code like th

```
{r}
#| echo: false
2 * 2
```

The `echo: false` option disables the printing …).

```
{r}
```

Let's insert some reference here

Inserting references

If you work with Zotero there is an easy integration! (https://www.zotero.org/)

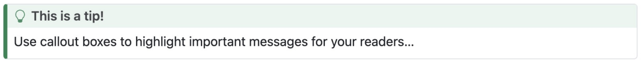
Search references based on DOI

Easy to find and insert citations of R packages installed on your computer

Inserting a callout

To highlight some specific piece of text you can use a callout

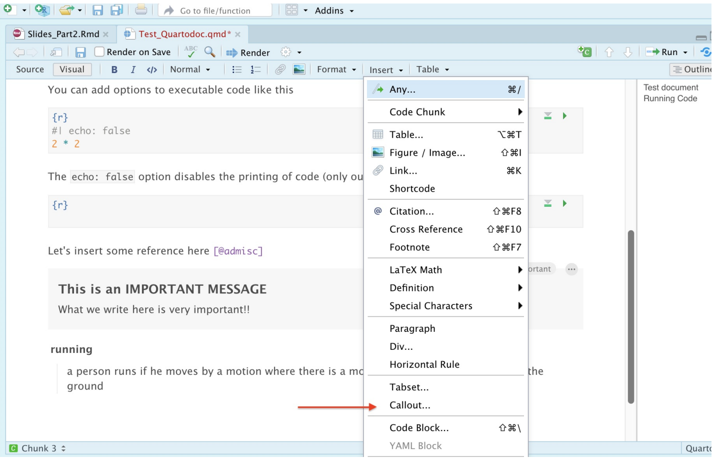
It will generate something like this in your final html document:



This is a tip!

Use callout boxes to highlight important messages for your readers...

Inserting a callout



You can add options to executable code like this

```
{r}
#| echo: false
2 * 2
```

The `echo: false` option disables the printing of code (only ou

```
{r}
```

Let's insert some reference here [@admisc]

This is an IMPORTANT MESSAGE

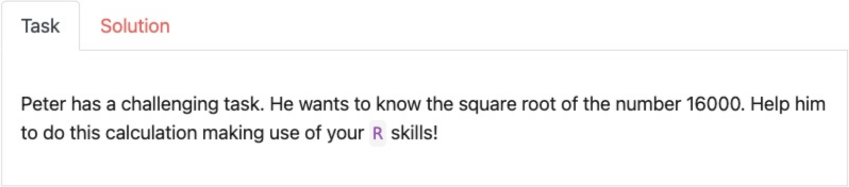
What we write here is very important!!

running

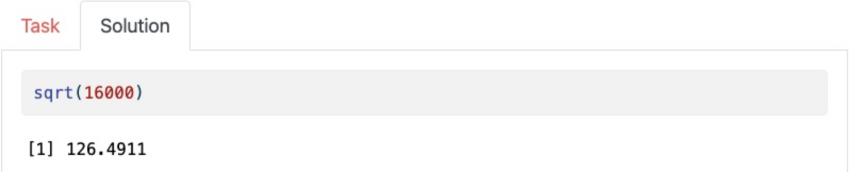
> a person runs if he moves by a motion where there is a mo the ground

Adding a Tabset

In an html file you can also add Tabsets... They look like this in the resulting html file:



Peter has a challenging task. He wants to know the square root of the number 16000. Help him to do this calculation making use of your `R` skills!

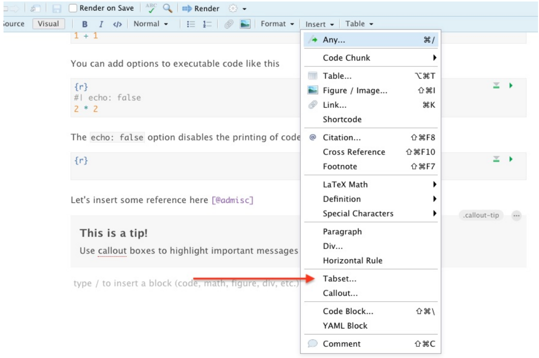


```
sqrt(16000)
```

```
[1] 126.4911
```

Adding a Tabset

Go to **Insert** and choose **Tabset**



```
1 + 1
```

You can add options to executable code like this

```
{r}
#| echo: false
2 * 2
```

The `echo: false` option disables the printing of code

```
{r}
```

Let's insert some reference here [@admisc]

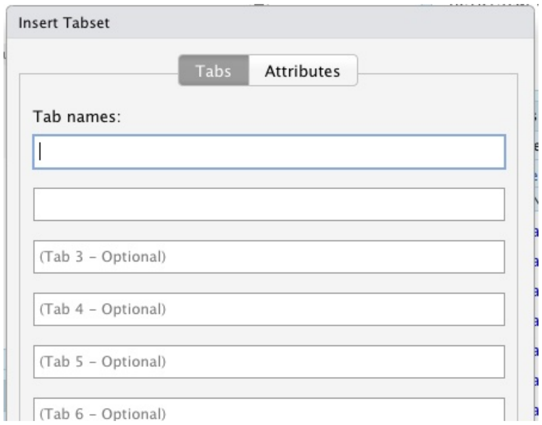
This is a tip!

Use callout boxes to highlight important messages

type / to insert a block (code, math, figure, div, etc.)

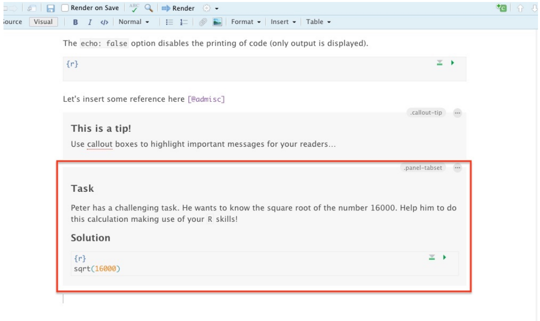
Adding a Tabset

This opens the following menu:



Adding a Tabset

In the Quarto document you now have a section to make content for each tab in the Tabset:



The `echo: false` option disables the printing of code (only output is displayed).

```
{r}
```

Let's insert some reference here [@admisc]

This is a tip!

Use callout boxes to highlight important messages for your readers...

Task

Peter has a challenging task. He wants to know the square root of the number 16000. Help him to do this calculation making use of your `R` skills!

Solution

```
{r}
sqrt(16000)
```

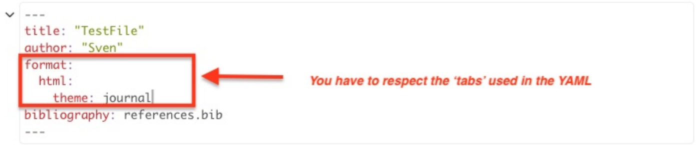
Changing your theme

If you don't like the formatting of the rendered html file, there are some other themes that can be used!

See: https://quarto.org/docs/output-formats/html-themes.html

This is something you can tweak in the YAML of the file

For instance, let's choose the formatting according to the `journal` theme



```
---
title: "TestFile"
author: "Sven"
format:
  html:
    theme: journal
bibliography: references.bib
---
```

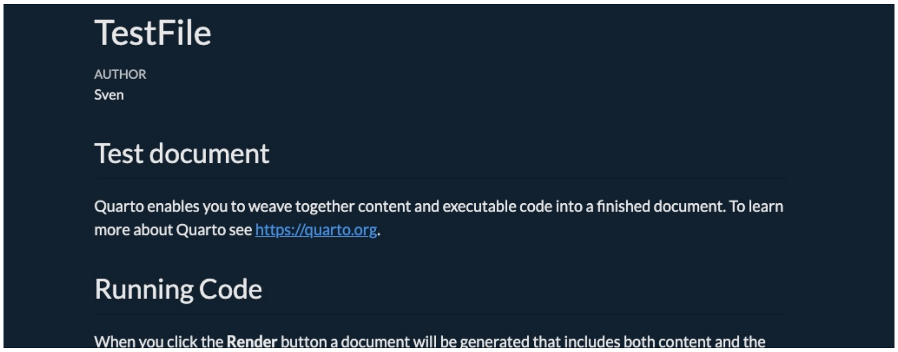
You have to respect the 'tabs' used in the YAML

Changing your theme

Let's try another one: `superhero`!

This one is clearly different from the default theme.

Of course, if you feel adventurous you can build your own theme (e.g., to meet the branding of your university)



TestFile

AUTHOR

Sven

Test document

Quarto enables you to weave together content and executable code into a finished document. To learn more about Quarto see https://quarto.org.

Running Code

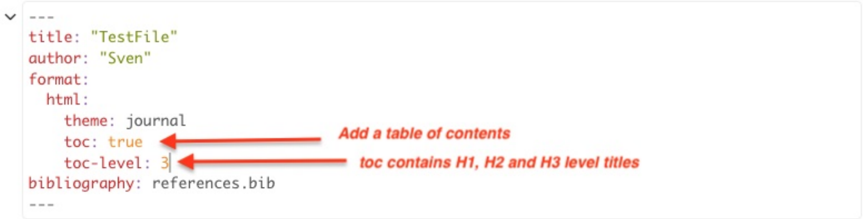
When you click the **Render** button a document will be generated that includes both content and the

Tweaking your theme in the YAML

Some elements of formatting can be easily added in the YAML

See https://quarto.org/docs/output-formats/html-basics.html

For instance, let's also add a *table of contents* (toc) that contains all headers up till level 3



```
---
title: "TestFile"
author: "Sven"
format:
  html:
    theme: journal
    toc: true
    toc-level: 3
bibliography: references.bib
---
```

Add a table of contents

toc contains H1, H2 and H3 level titles

TestFile

AUTHOR

Table of contents

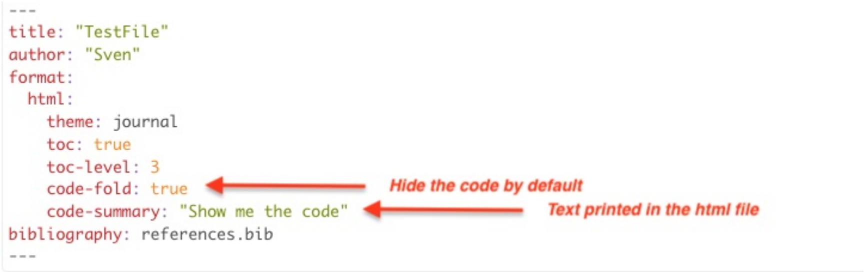
Test document

Running Code

Code folding

By default all the code is shown for code chunks that have not set the option `#| echo: false`

This behaviour can be changed in the YAML by introducing the `code-fold: true` option



```yaml
---
title: "TestFile"
author: "Sven"
format:
  html:
    theme: journal
    toc: true
    toc-level: 3
    code-fold: true
    code-summary: "Show me the code"
bibliography: references.bib
---
```

Hide the code by default

Text printed in the html file