Joining data & communicating results with Quarto

CVEN 5837 - Summer 2022

Lars Schöbitz

https://cven5837-ss22.github.io/website/

Mortenson Center in Global Engineering
UNIVERSITY OF COLORADO BOULDER

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Learning Objectives (for this week)

1. Learners can use Quarto and Netlify to publish an HTML file
2. Learners can add literature references to Quarto files using the navigation menu of RStudio visual editor
3. Learners can cross-reference figures and tables within an Quarto file
4. NA

Part 1: Joining data

We...

…have multiple data frames

…want to bring them together

```
professions <- read_csv(here::here("data/scientists/professions.csv"))
dates <- read_csv(here::here("data/scientists/dates.csv"))
works <- read_csv(here::here("scientists/works.csv"))
```

Data: Women in science

Information on 10 women in science who changed the world

name
Ada Lovelace
Marie Curie
Janaki Ammal
Chien-Shiung Wu
Katherine Johnson
Rosalind Franklin
Vera Rubin
Gladys West
Flossie Wong-Staal
Jennifer Doudna

Source: Discover Magazine

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Inputs

professions | dates | works

```
# A tibble: 10 × 2
   name                profession
   <chr>               <chr>
 1 Ada Lovelace        Mathematician
 2 Marie Curie         Physicist and Chemist
 3 Janaki Ammal        Botanist
 4 Chien-Shiung Wu     Physicist
 5 Katherine Johnson   Mathematician
 6 Rosalind Franklin   Chemist
 7 Vera Rubin          Astronomer
 8 Gladys West         Mathematician
 9 Flossie Wong-Staal Virologist and Molecular Biologist
10 Jennifer Doudna     Biochemist
```

Desired output

```
# A tibble: 10 × 5
   name                profession                birth_year death_year
known_for
   <chr>               <chr>                          <dbl>      <dbl> <chr>
 1 Ada Lovelace        Mathematician                     NA         NA first
co…
 2 Marie Curie         Physicist and Chemist             NA         NA
theory o…
 3 Janaki Ammal        Botanist                        1897       1984
hybrid s…
 4 Chien-Shiung Wu     Physicist                       1912       1997
confim a…
 5 Katherine Johnson   Mathematician                   1918       2020
calculat…
 6 Rosalind Franklin   Chemist                         1920       1958 <NA>
```

Inputs, reminder

```
1 names(professions)
```

```
[1] "name"       "profession"
```

```
1 names(dates)
```

```
[1] "name"       "birth_year"
"death_year"
```

```
1 names(works)
```

```
[1] "name"       "known_for"
```

```
1 nrow(professions)
```

```
[1] 10
```

```
1 nrow(dates)
```

```
[1] 8
```

```
1 nrow(works)
```

```
[1] 9
```

Joining data frames

Joining data frames

```
1 something_join(x, y)
```

- `left_join()`: all rows from x
- `right_join()`: all rows from y
- `full_join()`: all rows from both x and y
- ...

Setup

For the next few slides…

```r
x <- tibble(
  id = c(1, 2, 3),
  value_x = c("x1", "x2", "x3")
  )
```

```r
x
```

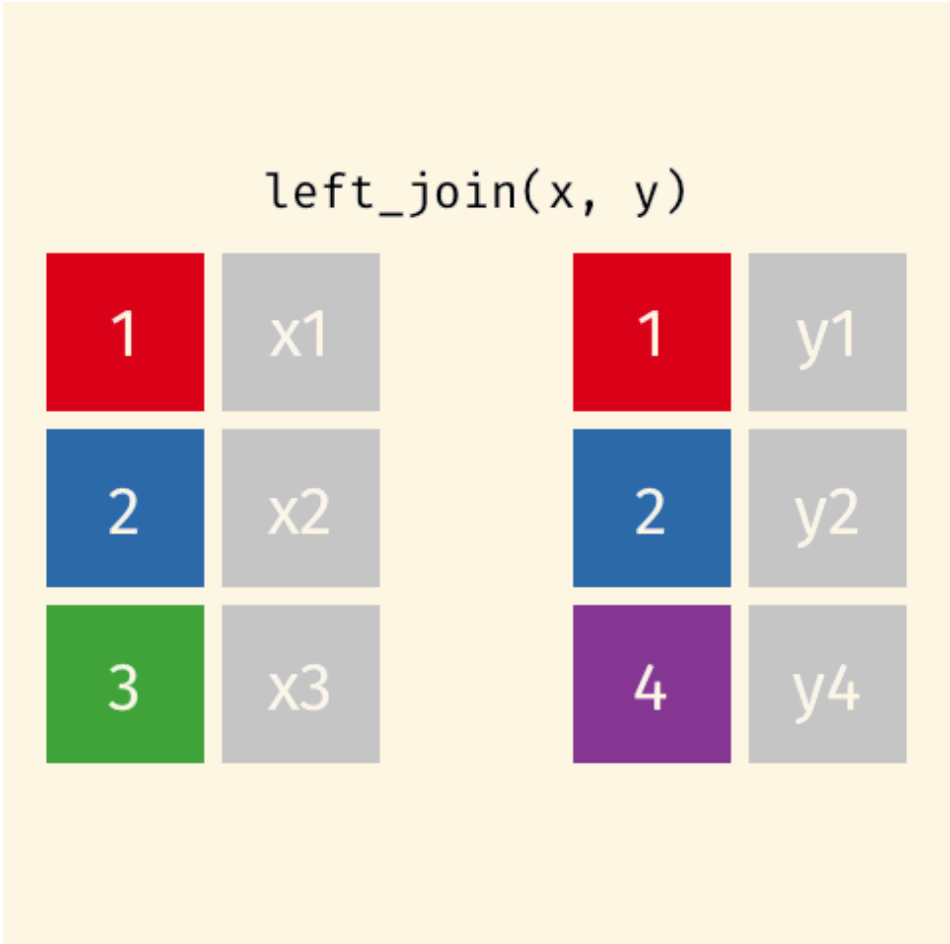
```
# A tibble: 3 × 2
     id value_x
  <dbl> <chr>
1     1 x1
2     2 x2
3     3 x3
```

```r
y <- tibble(
  id = c(1, 2, 4),
  value_y = c("y1", "y2", "y4")
  )
```

```r
y
```

```
# A tibble: 3 × 2
     id value_y
  <dbl> <chr>
1     1 y1
2     2 y2
3     4 y4
```

left_join()




```
  1  left_join(x, y)
```

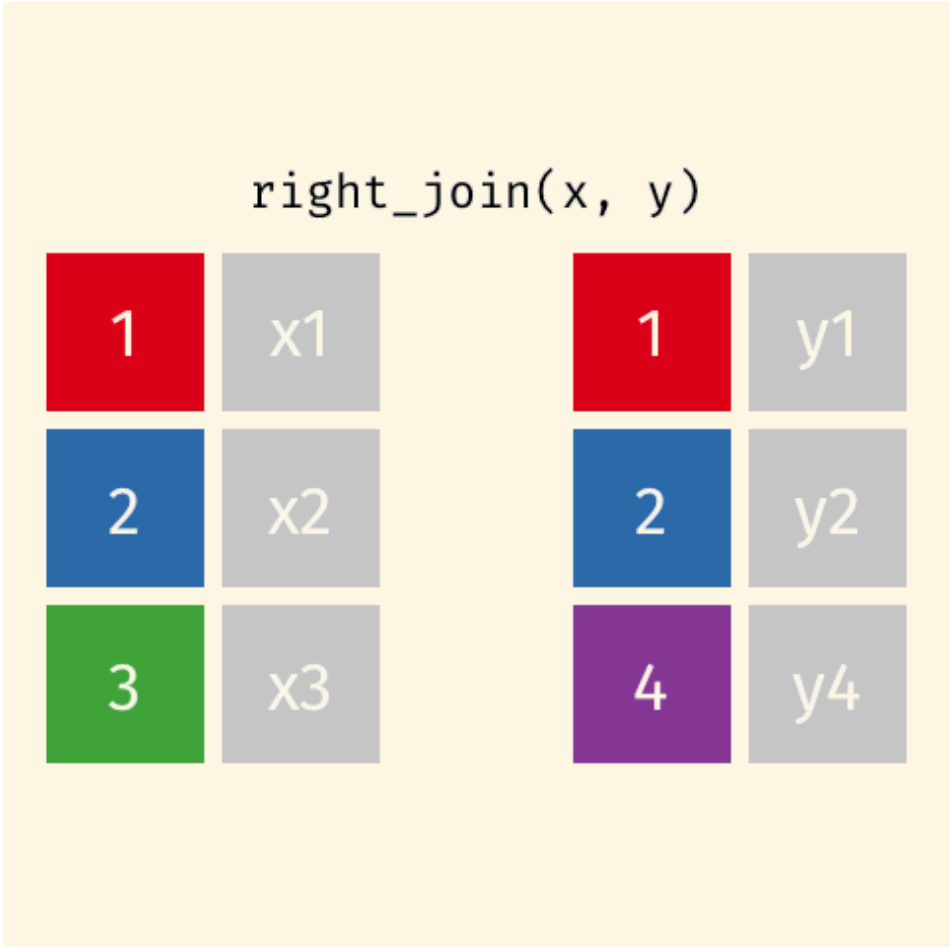
```
# A tibble: 3 × 3
     id value_x value_y
  <dbl> <chr>   <chr>
1     1 x1      y1
2     2 x2      y2
3     3 x3      <NA>
```

left_join()

```
professions %>%
  left_join(dates)
```

```
# A tibble: 10 × 4
   name                profession                birth_year
death_year
   <chr>               <chr>                          <dbl>
<dbl>
 1 Ada Lovelace        Mathematician                     NA
NA
 2 Marie Curie         Physicist and Chemist             NA
NA
 3 Janaki Ammal        Botanist                        1897
1984
 4 Chien-Shiung Wu     Physicist                       1912
1997
 5 Katherine Johnson   Mathematician                   1918
2020
```

right_join()




```
  1  right_join(x, y)
```

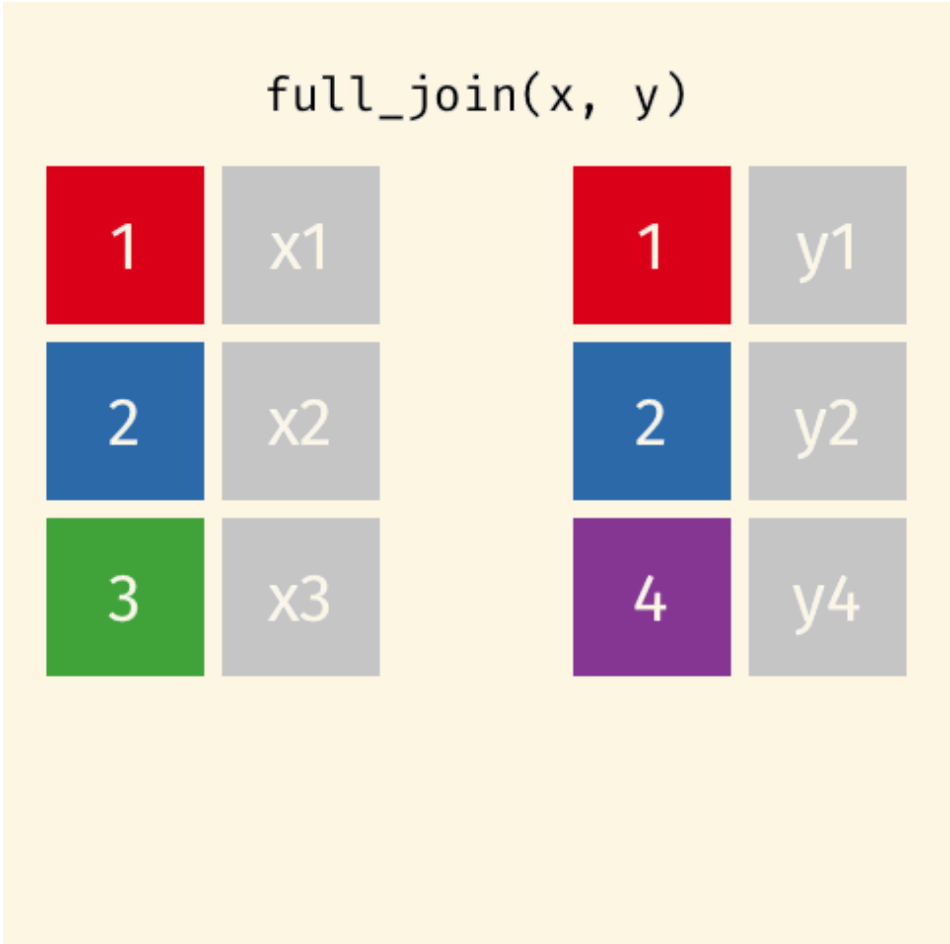
```
# A tibble: 3 × 3
     id value_x value_y
  <dbl> <chr>   <chr>
1     1 x1      y1
2     2 x2      y2
3     4 <NA>    y4
```

right_join()

```
professions %>%
  right_join(dates)
```

```
# A tibble: 8 × 4
  name              profession                birth_year
death_year
  <chr>             <chr>                          <dbl>
<dbl>
1 Janaki Ammal      Botanist                        1897
1984
2 Chien-Shiung Wu   Physicist                       1912
1997
3 Katherine Johnson Mathematician                   1918
2020
4 Rosalind Franklin Chemist                         1920
1958
5 Vera Rubin        Astronomer                      1928
2016
```

full_join()




```
  1  full_join(x, y)
```

```
# A tibble: 4 × 3
     id value_x value_y
  <dbl> <chr>   <chr>
1     1 x1      y1
2     2 x2      y2
3     3 x3      <NA>
4     4 <NA>    y4
```

full_join()

```
1 dates %>%
2   full_join(works)
```

```
# A tibble: 10 × 4
   name                birth_year death_year known_for
   <chr>                    <dbl>      <dbl> <chr>
 1 Janaki Ammal              1897       1984 hybrid species, biodiversity
protec…
 2 Chien-Shiung Wu           1912       1997 confim and refine theory of
radioac…
 3 Katherine Johnson         1918       2020 calculations of orbital
mechanics c…
 4 Rosalind Franklin         1920       1958 <NA>
 5 Vera Rubin                1928       2016 existence of dark matter
 6 Gladys West               1930         NA mathematical modeling of the
shape …
 7 Flossie Wong-Staal        1947         NA first scientist to clone HIV and
cr…
```

Putting it altogether

```
professions %>%
  left_join(dates) %>%
  left_join(works)
```

```
# A tibble: 10 × 5
   name              profession              birth_year death_year known_for
   <chr>             <chr>                        <dbl>      <dbl> <chr>
 1 Ada Lovelace      Mathematician                   NA         NA first co…
 2 Marie Curie       Physicist and Chemist           NA         NA theory o…
 3 Janaki Ammal      Botanist                      1897       1984 hybrid s…
 4 Chien-Shiung Wu   Physicist                     1912       1997 confim a…
 5 Katherine Johnson Mathematician                 1918       2020 calculat…
 6 Rosalind Franklin Chemist                       1920       1958 <NA>
```

Part 2: Communicate results with Quarto

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What is Quarto?

- Next generation version of R Markdown from RStudio
- Multi-language (Python, R, Julia, Observable)
- Authoring in plain text markdown or Jupyter notebooks

Editing documents

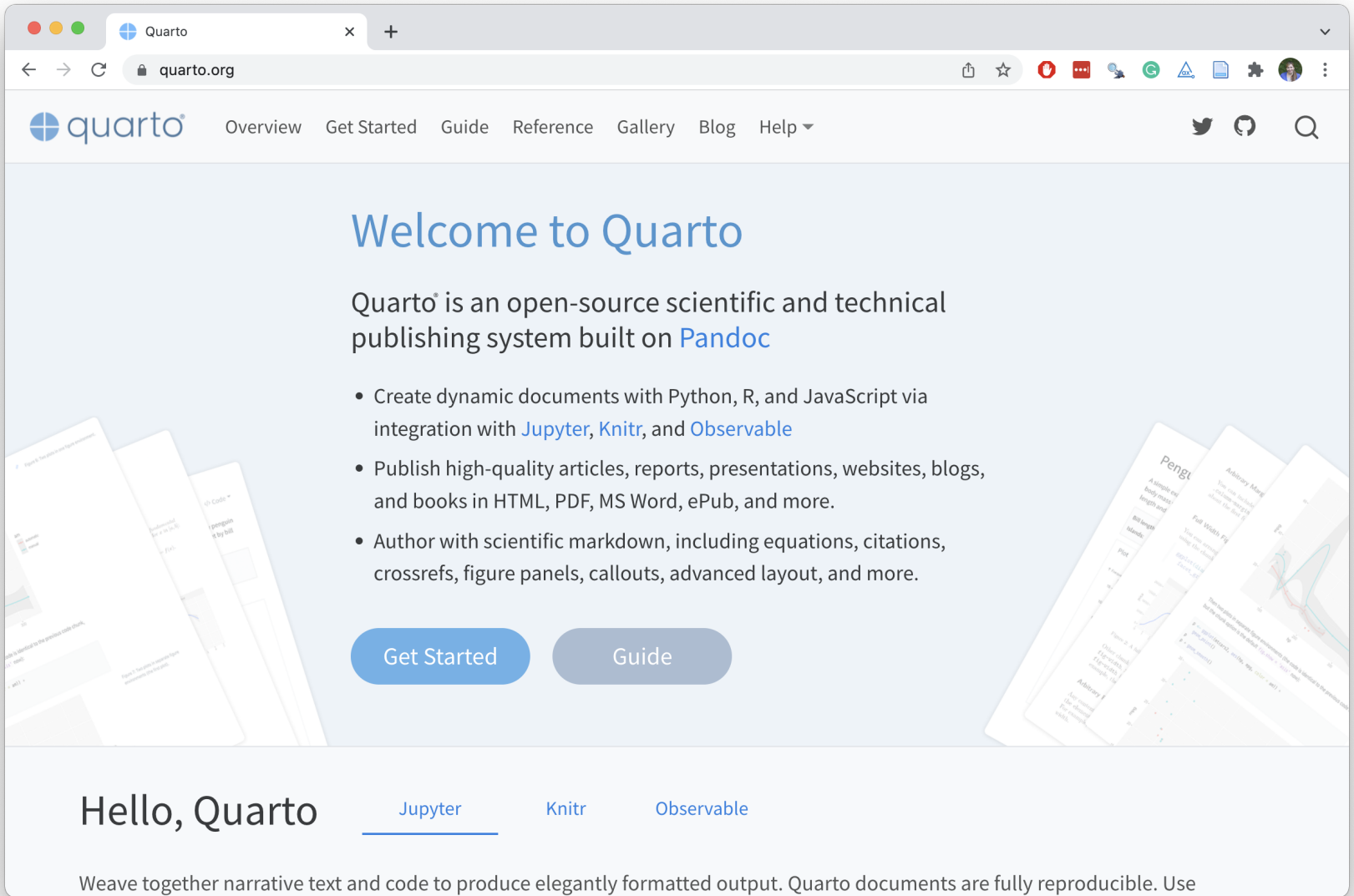
You're not limited to RStudio for editing Quarto documents…

- JupyterLab
- VS Code
- Text Editors

Authoring

- Technical 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.

Documentation



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Live Coding Exercise: Build a website

https://cven5837-ss22.github.io/website/

live-05a-communicate

1. Head over to rstudio.cloud
2. Open the workspace for the course (cven5837-ss22)
3. Open “Projects”
4. Open the “course-materials” project
5. Follow along with me

Break

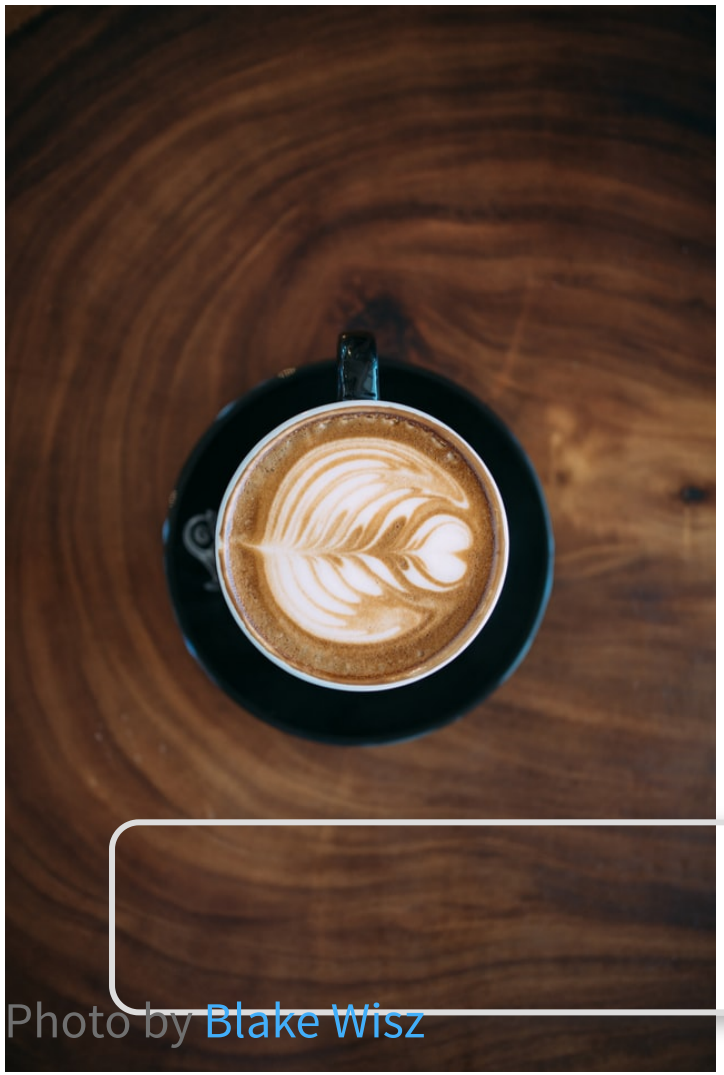

Photo by Blake Wisz

10:00

Cross-references

- no space between `{r}` and `#| tbl-cap: "A table"`
- spelling tbl not tab
- no spaces (use dashes in `label`)

See Table 1…

````
```{r}
#| tbl-cap: "A table"
#| label: tbl-simple-table

tibble(
  id = c(1, 2, 3),
  name = c("X", "Y", "Z")
) %>%
  knitr::kable()
```
````

Table 1: A table

id	name

id	name
1	X
2	Y
3	Z

Homework week 5

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Homework due dates

- All material on course website
- Homework assignment due: Friday, 5th August
- Learning reflection due: Monday, 8th August

What comes next?

https://cven5837-ss22.github.io/website/

Get out the cloud

Install software on your computer:

- R: https://cran.r-project.org/
- RStudio IDE: https://www.rstudio.com/products/rstudio/download/
- Quarto CLI: https://quarto.org/docs/get-started/

Start a project

- Guidance: https://r4ds.had.co.nz/workflow-projects.html
- Learn about project oriented workflows: https://www.tidyverse.org/blog/2017/12/workflow-vs-script/

Stay in touch

- Email: lars@lse.de
- Data Science for WASH Slack Community: Slack invite link

Thanks! 

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Slides created via revealjs and Quarto: https://quarto.org/docs/presentations/revealjs/ Access slides as PDF on GitHub

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