

R Markdown and Interactive Dashboards

Publishing Outputs



Introduction and R Markdown Basics

Learning Objectives

Infrastructure: RStudio.cloud

Components

Headers and Text

Links and Images

Math text

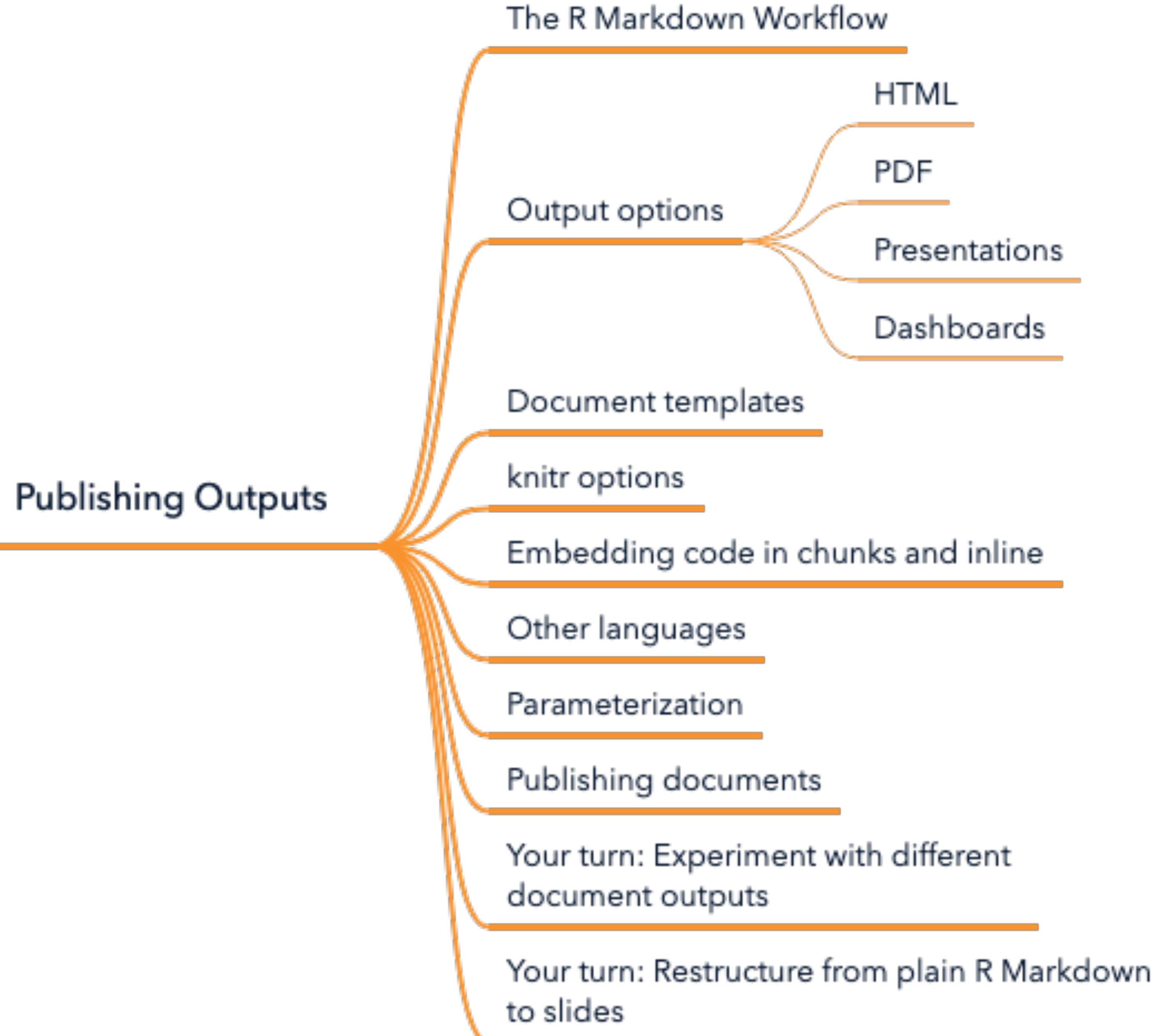
Tables

The Markdown Quick Reference

Your turn: embellish plain text

Your turn: publish your report

Your turn: deploy your first dashboard



REVIEW QUIZ

- R Markdown is a language for creating _____ documents.
- Metadata for an R Markdown document is written at the top of the document in _____
- Name one or more types of information that we learned how to include in an R Markdown document.

*R Markdown is a system for
creating structured
computational documents*

**STAGE DOOR
BAND AND CREW
ONLY**

R Markdown Relies On A Toolchain

Document



R Markdown Relies On A Toolchain

Document



Package

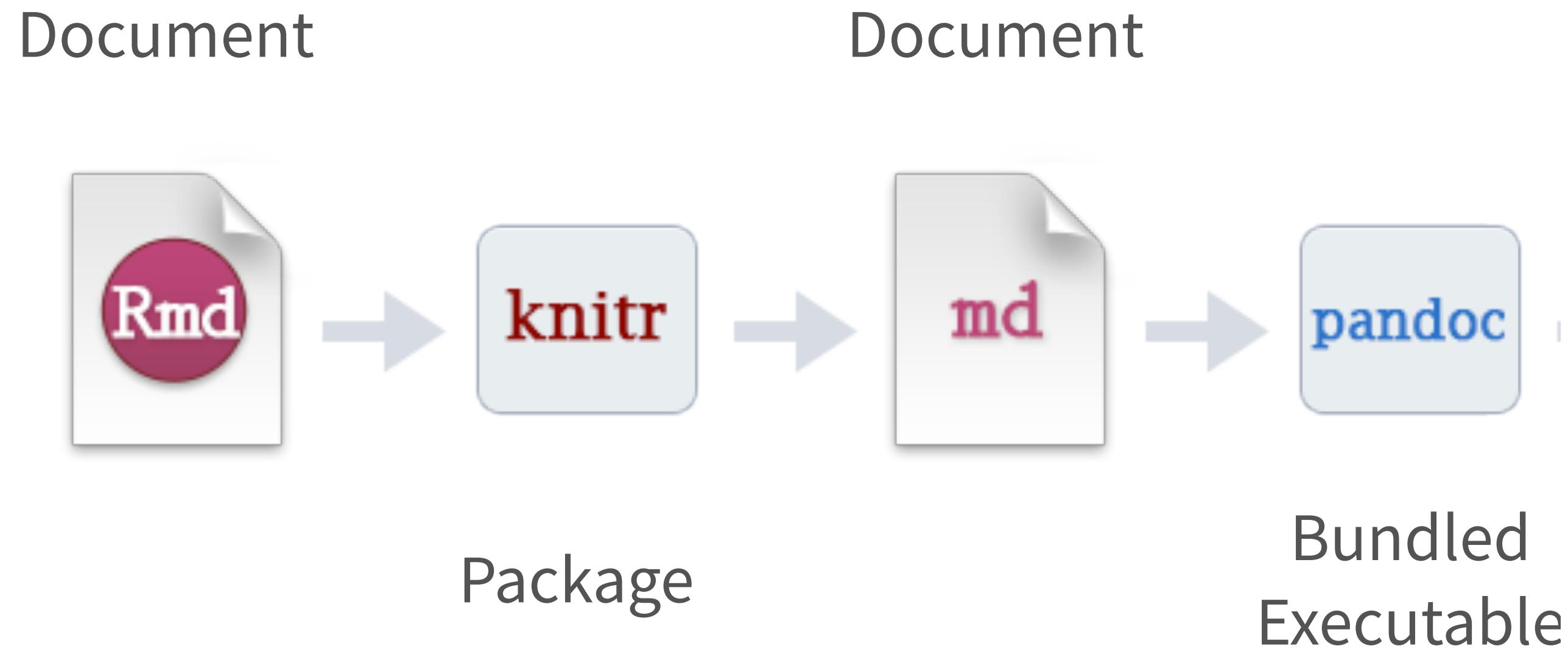
R Markdown Relies On A Toolchain

Document

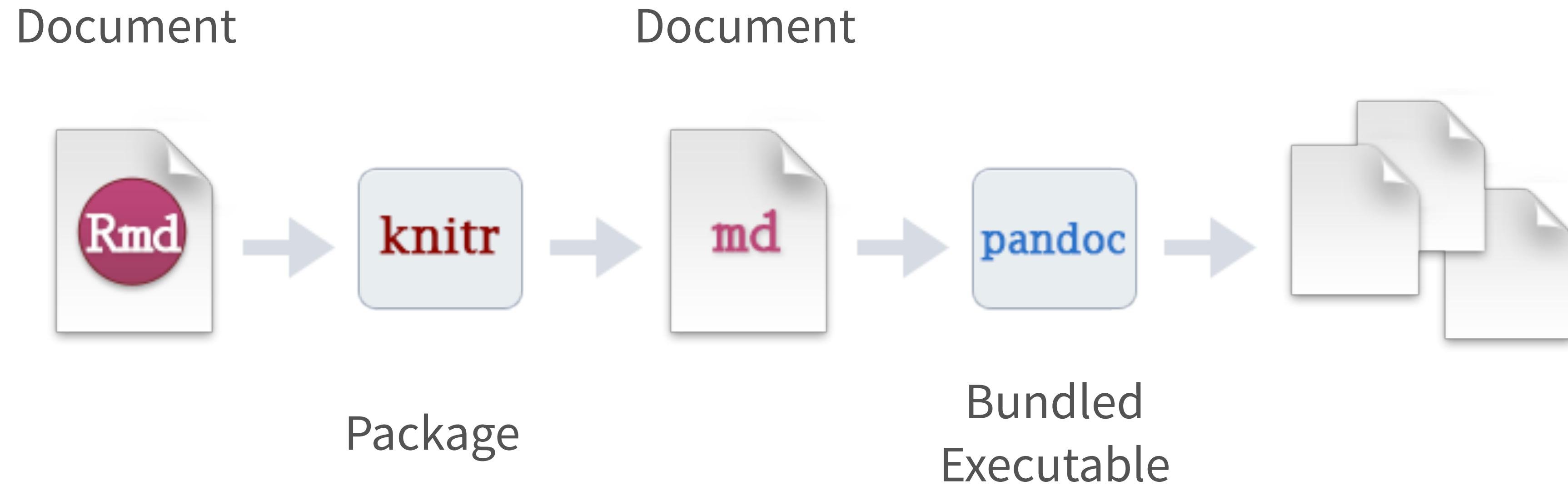


Package

R Markdown Relies On A Toolchain



R Markdown Relies On A Toolchain



*R Markdown can knit to many
document types*



We've Mostly Focused on HTML Output

Document



knitr

Document



pandoc

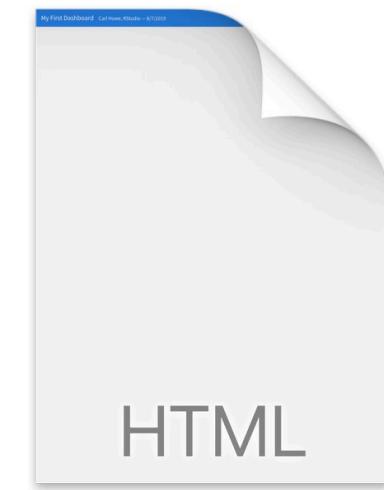
Reports



Slides



Dashboards



Web Sites



Package

Bundled Executable



And many many more....

EXERCISE 21

(Don't be concerned that you missed a bunch of exercises.
Each module has its own unique exercise numbers, but exercise
numbers aren't consecutive between modules)

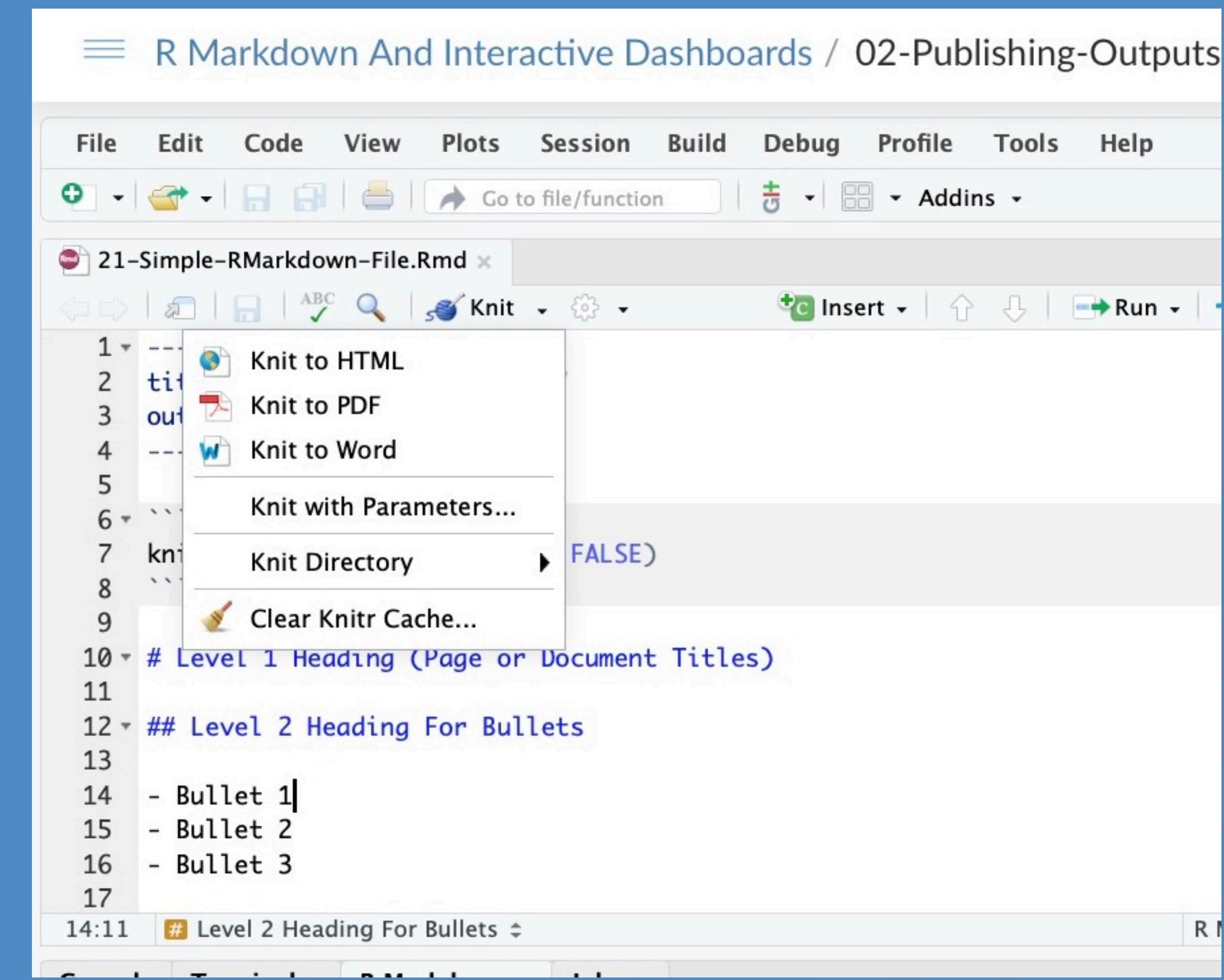
rstudio::conf

Knit to Different Formats

1. Open project **02-Publishing-Outputs**
2. Click on **21-Simple-RMarkdown-File.Rmd** in the Files pane to open that file
3. Click on the arrow next to Knit, and select **Knit to HTML**
4. Now click on the arrow next to Knit and select **Knit to PDF**, and **Knit to Word** to view different outputs

WARNING: you may need to disable your browser pop-up blocker to see the result

3m 00s



YAML* Header Data About Your Document (Metadata)

*YAML: Yet Another Markdown Language

- Different values in the document type will create different outputs
- Various Document output types may require you to add more parameters and sub-parameters in the YAML header

```
---
```

```
title: "My First R Markdown Document"
author: "Carl Howe, RStudio"
date: "8/26/2019"
output: html_document
---
```

Incomplete Document Type Map

YAML Output String	Additional Packages Required	Output Type	Output Document Extension
html_document	None	Report	HTML
pdf_document	None	Report	PDF
word_document	None	Report	.DOCX File
ioslides_presentation	None	Presentation	HTML
xaringan::moon_reader	xaringan	Presentation	HTML
powerpoint_presentation	None	Presentation	.PPTX File
flex_dashboard	flexdashboard	Dashboard	HTML

And there are many more: <https://rmarkdown.rstudio.com/lesson-9.html>

Select Your Output File Type Using YAML Statements

```
---
```

```
title: "Simple Markdown File"
output: html_document
```

```
---
```

```
---
```

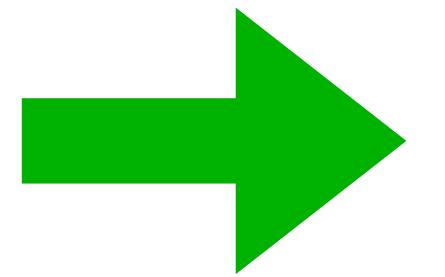
```
title: "Simple Markdown File"
output: pdf_document
```

```
---
```

```
---
```

```
title: "Simple Markdown File"
output: word_document
```

```
---
```



Simple Markdown File

Level 1 Heading (Page or Document Titles)

Level 2 Heading For Bullets

- Bullet 1
- Bullet 2
- Bullet 3

Level 2 Table Output

Here's a Level 2 table

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

Level 2: An Equation

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

A Level 2 Plot

Here's a Level 2 plot



Simple Markdown File

Level 1 Heading (Page or Document Titles)

Level 2 Heading For Bullets

- Bullet 1
- Bullet 2
- Bullet 3

Level 2 Table Output

Here's a Level 2 table

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

Level 2: An Equation

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

A Level 2 Plot

Here's a Level 2 plot

Simple Markdown File

Level 1 Heading (Page or Document Titles)

Level 2 Heading For Bullets

- Bullet 1
- Bullet 2
- Bullet 3

Level 2 Table Output

Here's a Level 2 table

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

Level 2: An Equation

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

A Level 2 Plot

Here's a Level 2 plot

1

Level 3 Heading (Subheads or Tab Titles)

This just illustrates how level 3 subsections are rendered

Select Your Output Format Using YAML Statements

```
---
```

```
title: "Simple Markdown File"
output: html_document
```

```
---
```

```
---
```

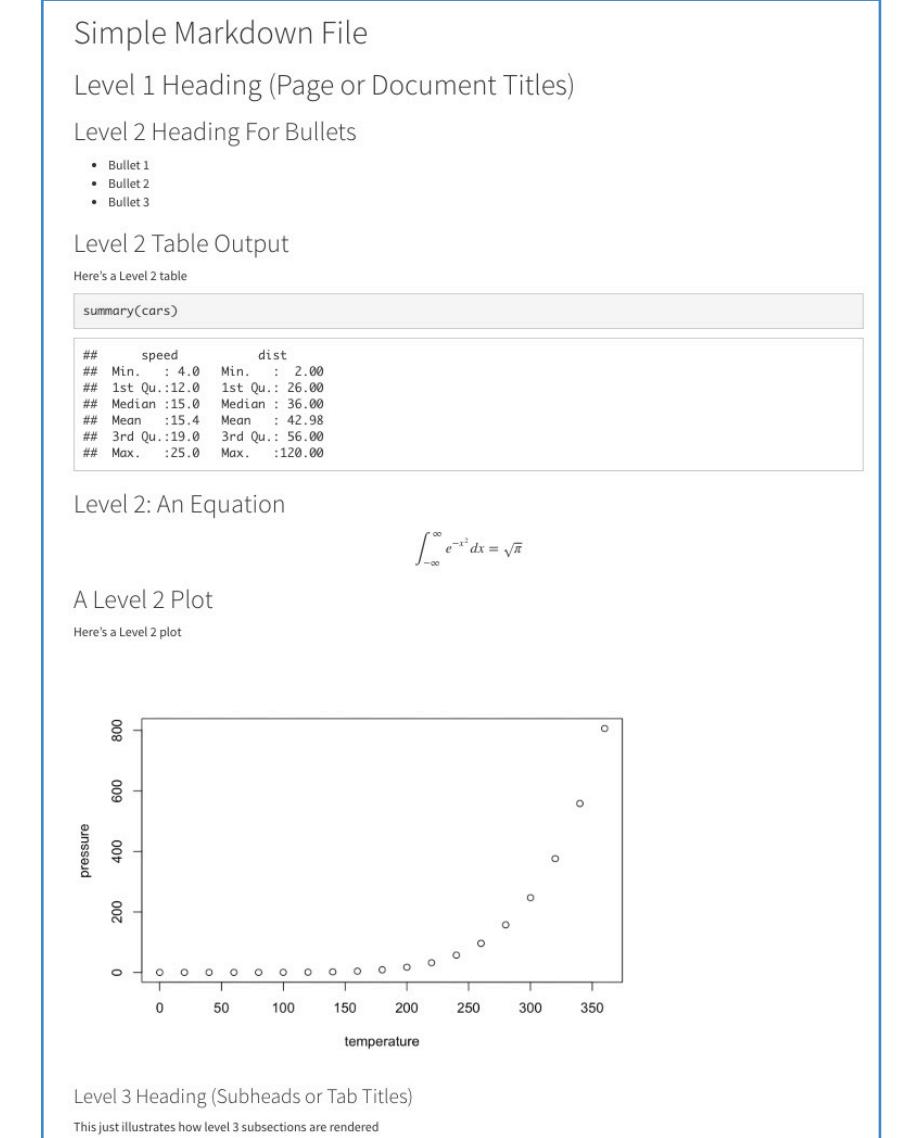
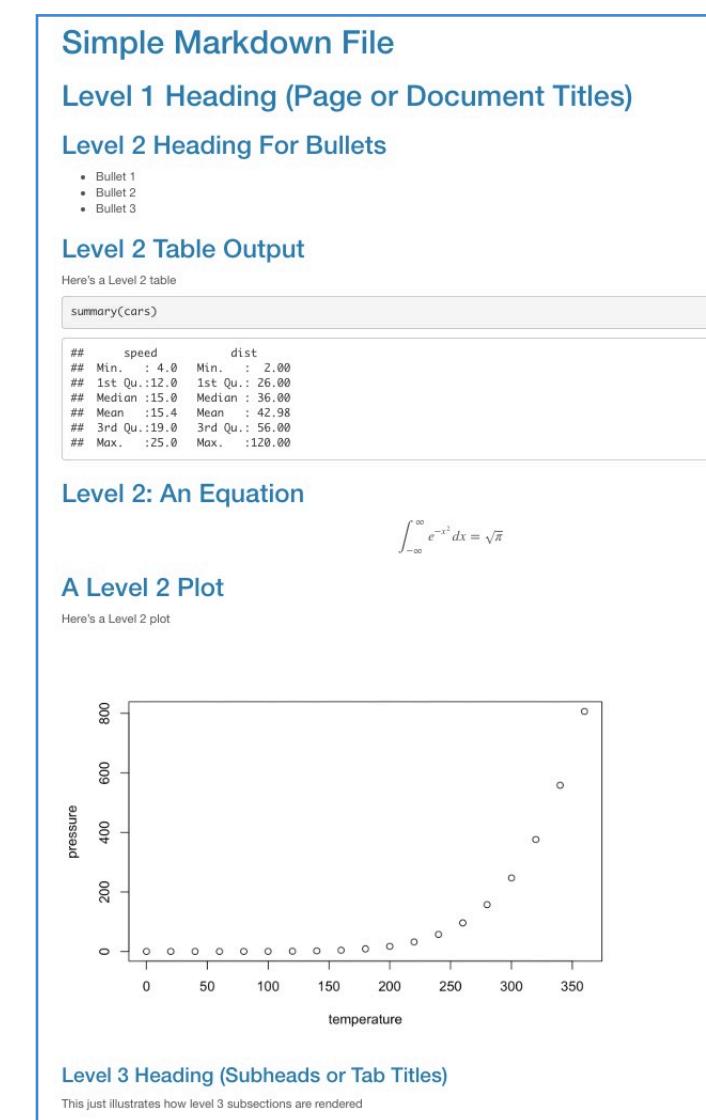
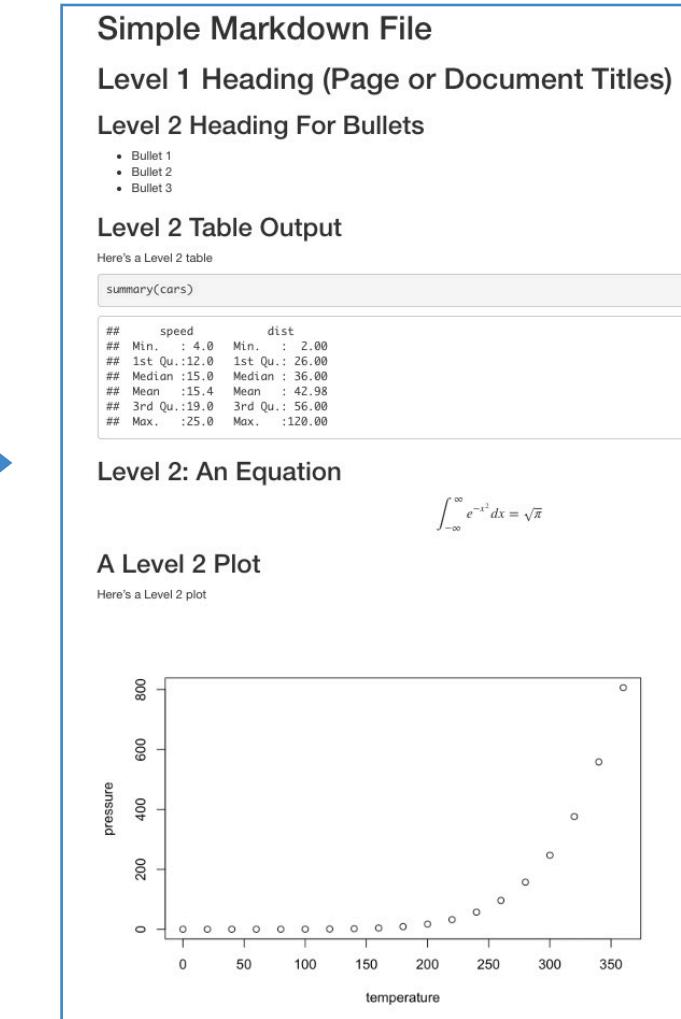
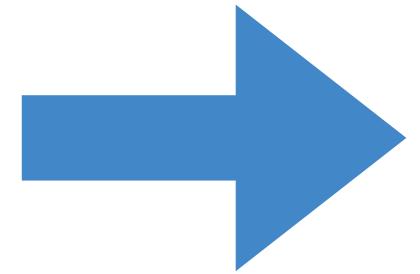
```
title: "Simple Markdown File"
output:
  html_document:
    theme: cosmo
```

```
---
```

```
---
```

```
title: "Simple Markdown File"
output:
  html_document:
    theme: cerulean
```

```
---
```



Some `html_document` Themes

Default `html_document` themes

- default
- cerulean
- journal
- flatly
- darkly
- readable
- spacelab
- united
- cosmo
- lumen
- paper
- sandstone
- simplex
- yeti

Packages offering more document themes

`tufte::tufte_html`

`prettydoc::html_pretty`

YAML Parameters

- We went from

```
---
```

```
title: "Simple Markdown File"
```

```
output: html_document
```

```
---
```

To

```
---
```

```
title: "Simple Markdown File"
```

```
output:
```

```
  html_document:
```

```
    theme: cerulean
```

```
---
```

Look what changed:

- We put **html_document** on its own line under **output** and indented it 2 spaces.
- We added a colon to the end of **html_document** when we added the **theme** parameter
- We indented **theme** another 2 spaces

Your Turn

When we added themes, we went from

```
---
```

```
title: "Simple Markdown File"
```

```
output: html_document
```

```
---
```

To

```
---
```

```
title: "Simple Markdown File"
```

```
output:
```

```
  html_document:
```

```
    theme: cerulean
```

```
---
```

In your groups, discuss:

1. Why is `output: html_document` now split across two lines?
2. What you think the indentation indicates?
3. Why is there no colon at the end of `cerulean`?



YAML Indentation Defines Relationships

```
---
```

```
title: "Simple Markdown File"
```

```
output:
```

```
    html_document:
```

```
        theme: cerulean
```

```
---
```

1. `title` and `output` are top level parameters.
2. `html_document`'s indentation under `output` indicates it is a parameter of `html_document`.
3. `theme`'s indentation under `html_document` indicates it is a sub-parameter of `html_document`

Using Parameters In YAML

- We're now going to use `html_document` parameters to explore tables of contents
- We'll modify the following YAML code to see what happens

```
---
```

```
title: "Simple Markdown File"
output:
  html_document:
    theme: cerulean
    number_sections: true
    toc: true
    toc_depth: 3
    toc_float: false
---
```

EXERCISE 22

rstudio::conf

Create A Table of Contents

1. Click on **22-Simple-RMarkdown-File.Rmd** in the Files pane to open that file
2. Experiment with different values for the parameters for `html_document`
3. Once you have a feel for how the table of contents works, replace

```
toc_float: false
```

with

```
toc_float:  
collapse: true  
smooth_scroll: true
```

4. Prepare to explain what those new sub-parameters do

```
---
```

```
title: "Simple Markdown File"
```

```
output:
```

```
  html_document:
```

```
    theme: cerulean
```

```
    number_sections: true
```

```
    toc: true
```

```
    toc_depth: 3
```

```
    toc_float: false
```

```
---
```



So What Did These Parameters Do?

•

```
---
```

```
title: "Simple Markdown File"
output:
  html_document:
    theme: cerulean
    number_sections: true
    toc: true
    toc_depth: 3
    toc_float:
      collapse: true
      smooth_scroll: true
---
```

Create A Presentation

1. Click on **23-ioslides-presentation.Rmd** in the Files pane to open that file
2. Change the YAML header to look like the one to the right.
3. Knit and step through the result in your preview pane (or launch in your browser)

```
---
```

```
title: "ioslides Presentation"
```

```
output:
```

```
  ioslides_presentation:
```

```
    widescreen: true
```

```
---
```

3m 00s

Document Type Drives R Markdown Symbol Interpretations

R Markdown Symbol	Alternate Symbol	Document Meaning	Presentation Meaning
#	==	Header 1	New Section
##	----	Header 2	New Slide
###		Header 3	Slide Subhead

Try A Different Presentation Framework

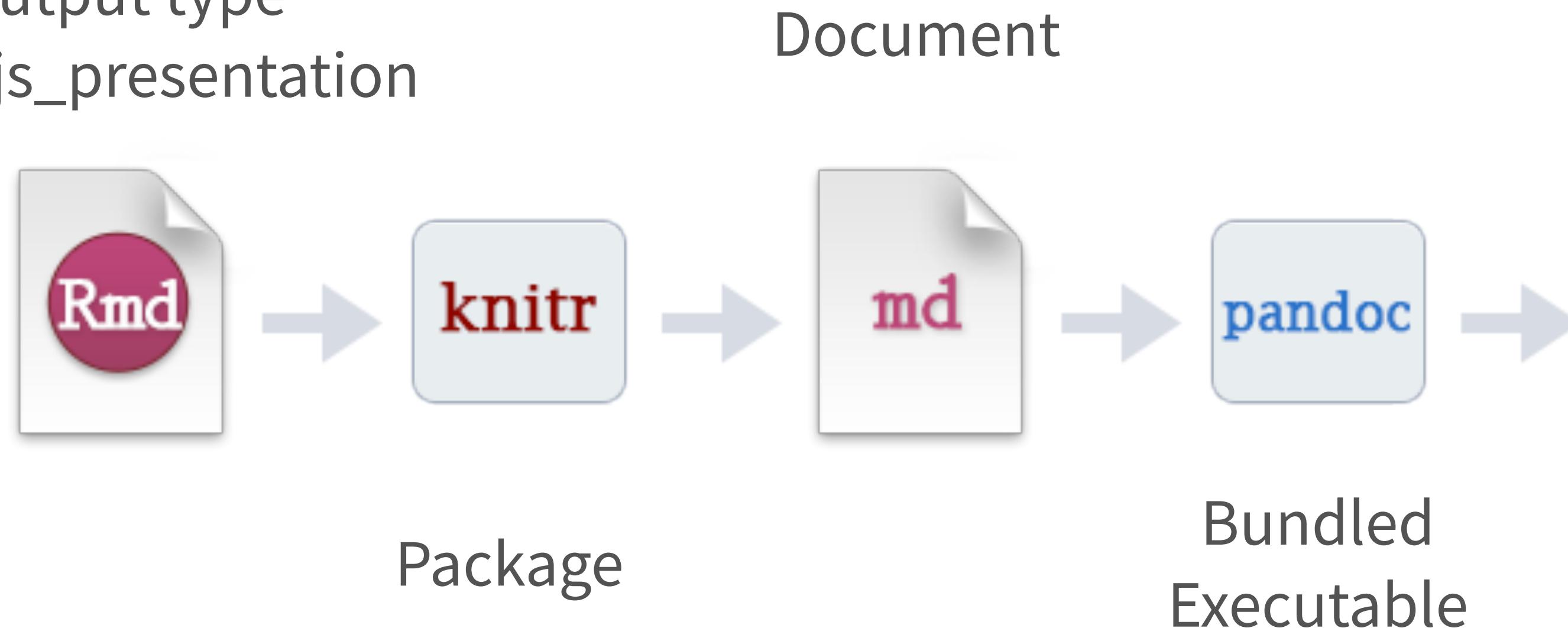
1. Click on **23-revealjs-presentation.Rmd** in the Files pane
2. Knit and step through the result in your preview pane (or launch in your browser)
3. What has changed from our prior HTML presentation?

3m 00s

How Could You Use This Presentation Without RStudio.Cloud?

- HTML Presentations are

Output type
revealjs_presentation



23-revealjs-Presentation.html

*HTML-based R Markdown
documents can be shared
using the publish button in
the RStudio IDE*

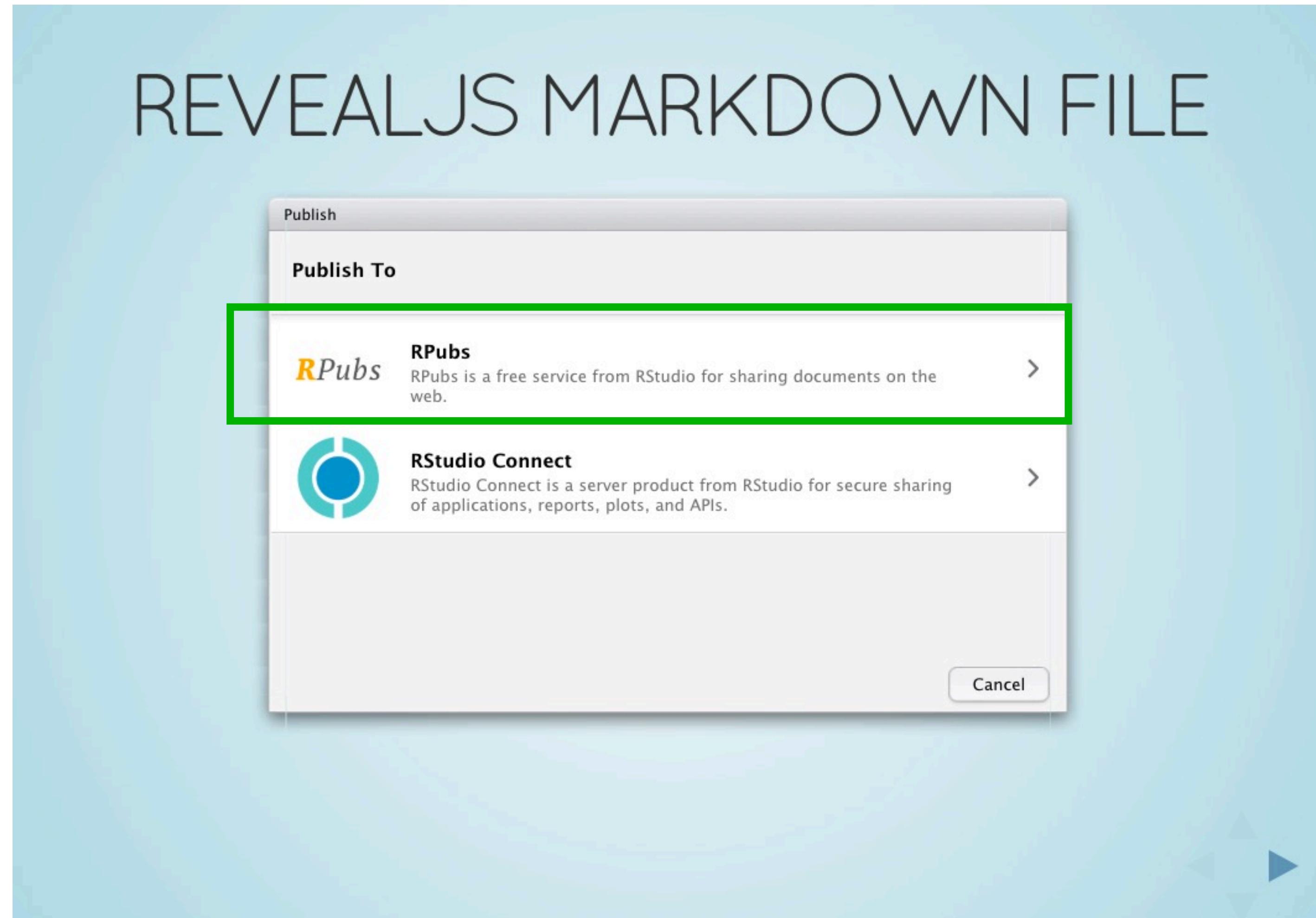
Let's Publish Our Slides Together

1. Knit **23-revealjs-presentation.Rmd** and click the Publish button at the top.



Let's Publish Our Slides Together

2. Click on RPubs

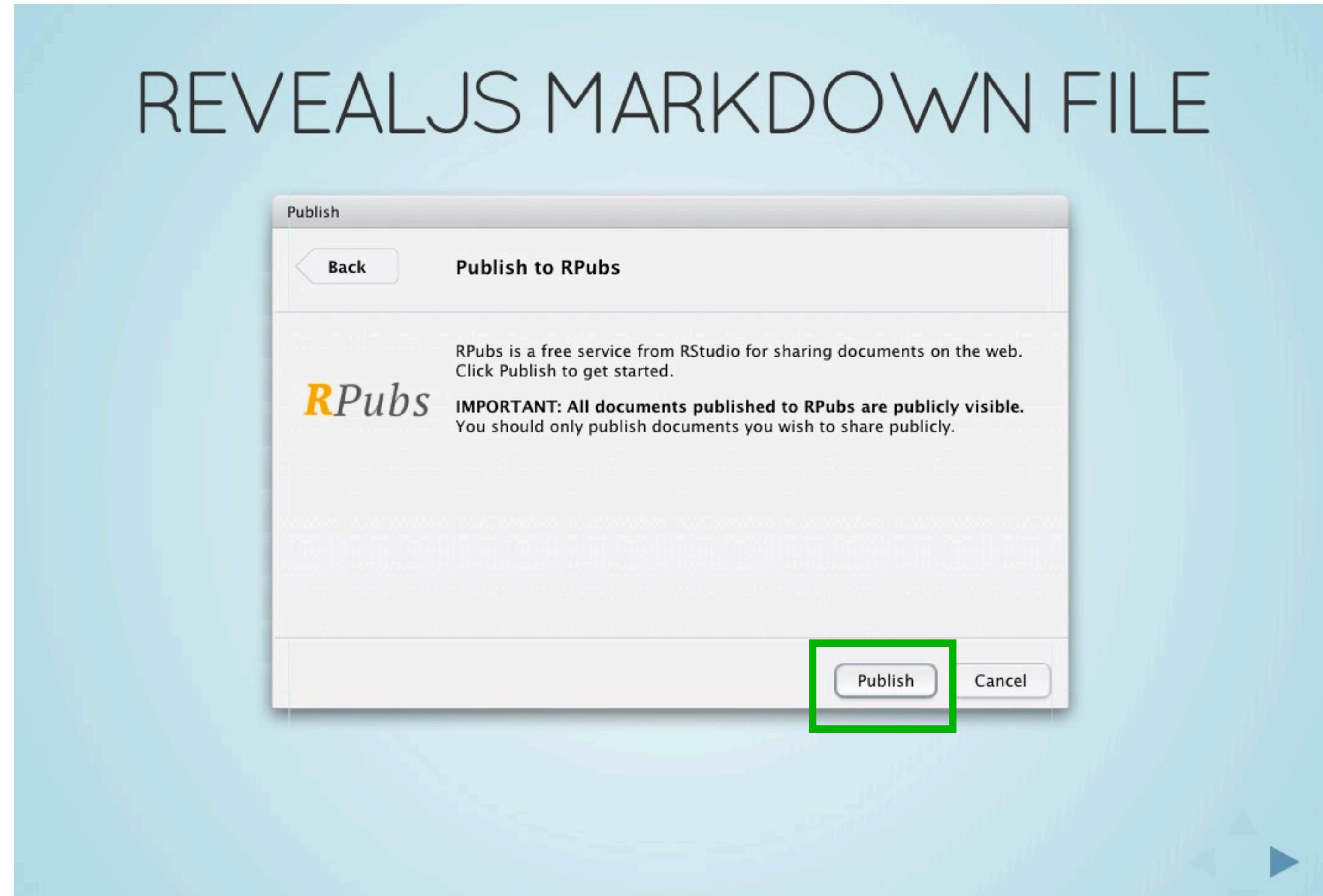


Github repo: rstd.io/conf20-rmd-dash

rstudio.cloud workspace: rstd.io/RMAID

Let's Publish Our Slides Together

3. Click Publish

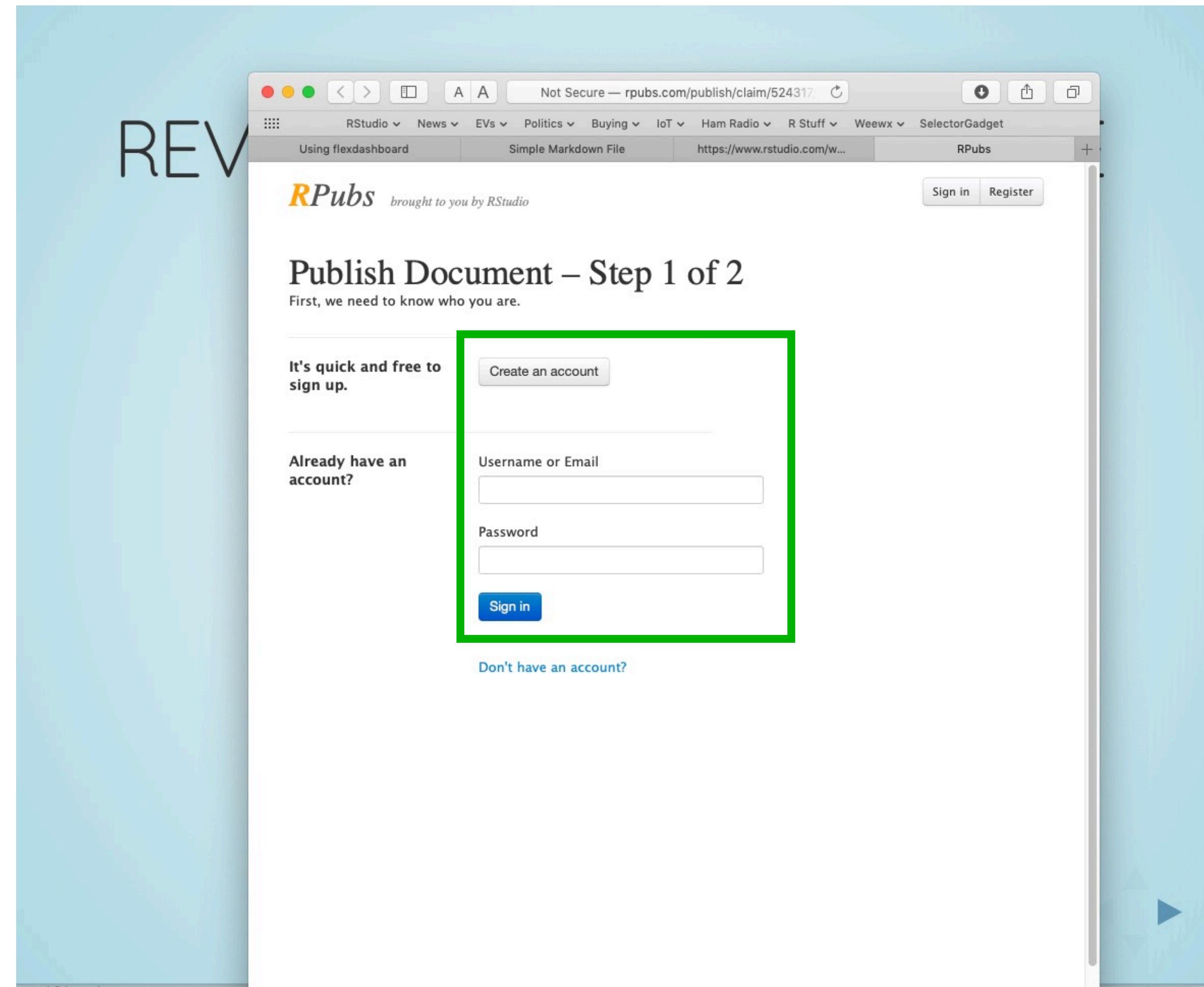


[Github repo: rstd.io/conf20-rmd-dash](#)

[rstudio.cloud workspace: rstd.io/RMAID](#)

Let's Publish Our Slides Together

4. Create an account on RPubs if you don't already have one. If you do, log in.



Let's Publish Our Slides Together

5. Enter your document details

The screenshot shows a web browser window for RPubs. The title bar reads "Not Secure — rpubs.com/cdhowe/524317/edit". The main content is a form titled "Document Details — Step 2 of 2". The form has three input fields highlighted with a green border: "Title" (containing "Carl's revealjs presentation"), "Description" (an empty text area), and "Slug" (containing "http://rpubs.com/cdhowe/"). Below the form is a blue "Continue" button.

RPubs brought to you by RStudio

cdhowe

Document Details — Step 2 of 2

Title: Carl's revealjs presentation

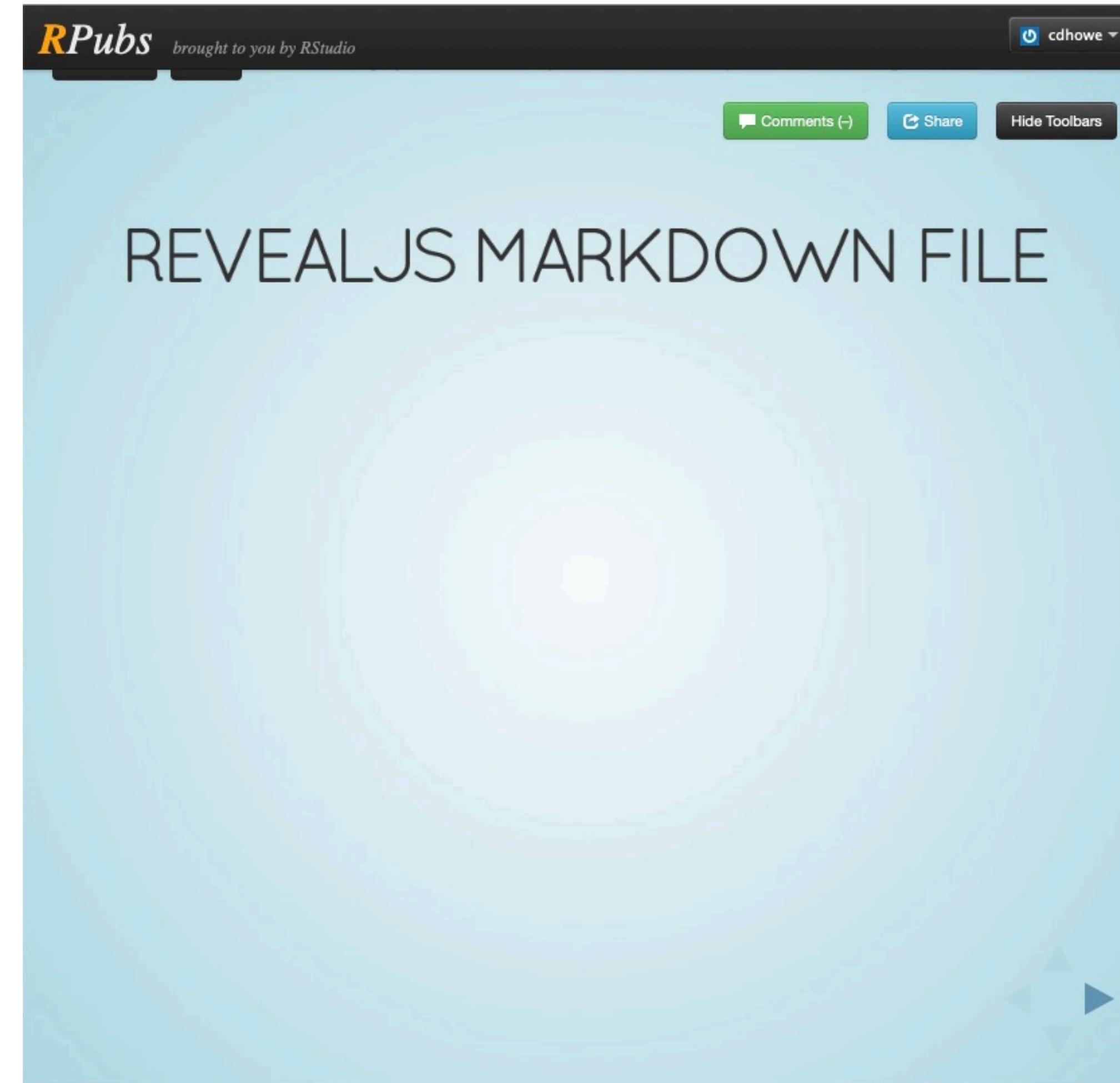
Description:

Slug: http://rpubs.com/cdhowe/

Continue

Let's Publish Our Slides Together

6. Our document is now published and live



[Github repo: rstd.io/conf20-rmd-dash](#)

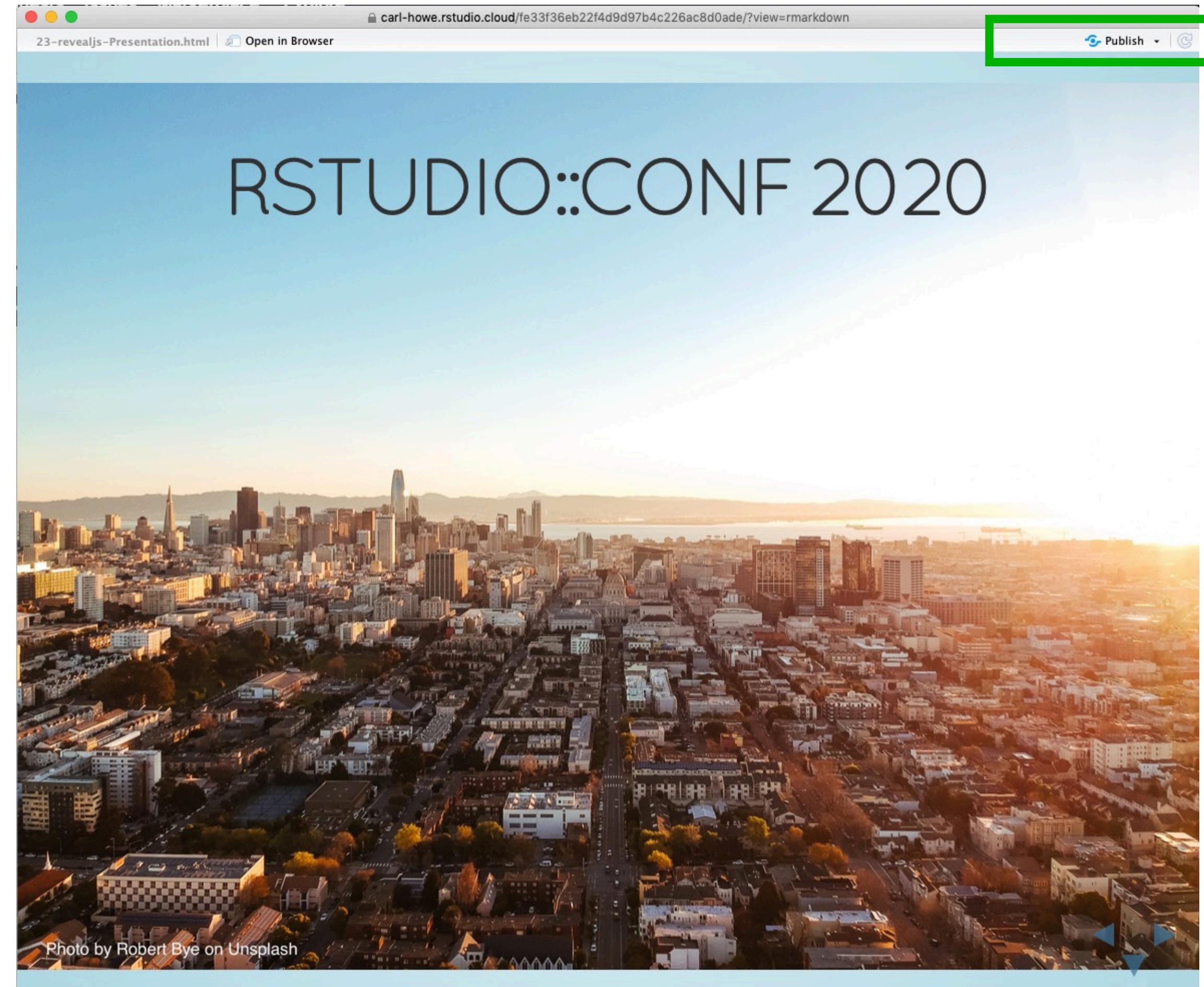
[rstudio.cloud workspace: rstd.io/RMAID](#)

Publish Can Share HTML Docs And Shiny Apps

- [RPubs.com](#) will be our destination for HTML documents
- [shinyapps.io](#) will be our destination for Shiny apps
- We will also use an RStudio Connect server that can handle both types of output.
- We'll discuss the differences between the two types of documents and interactivity in our next module.

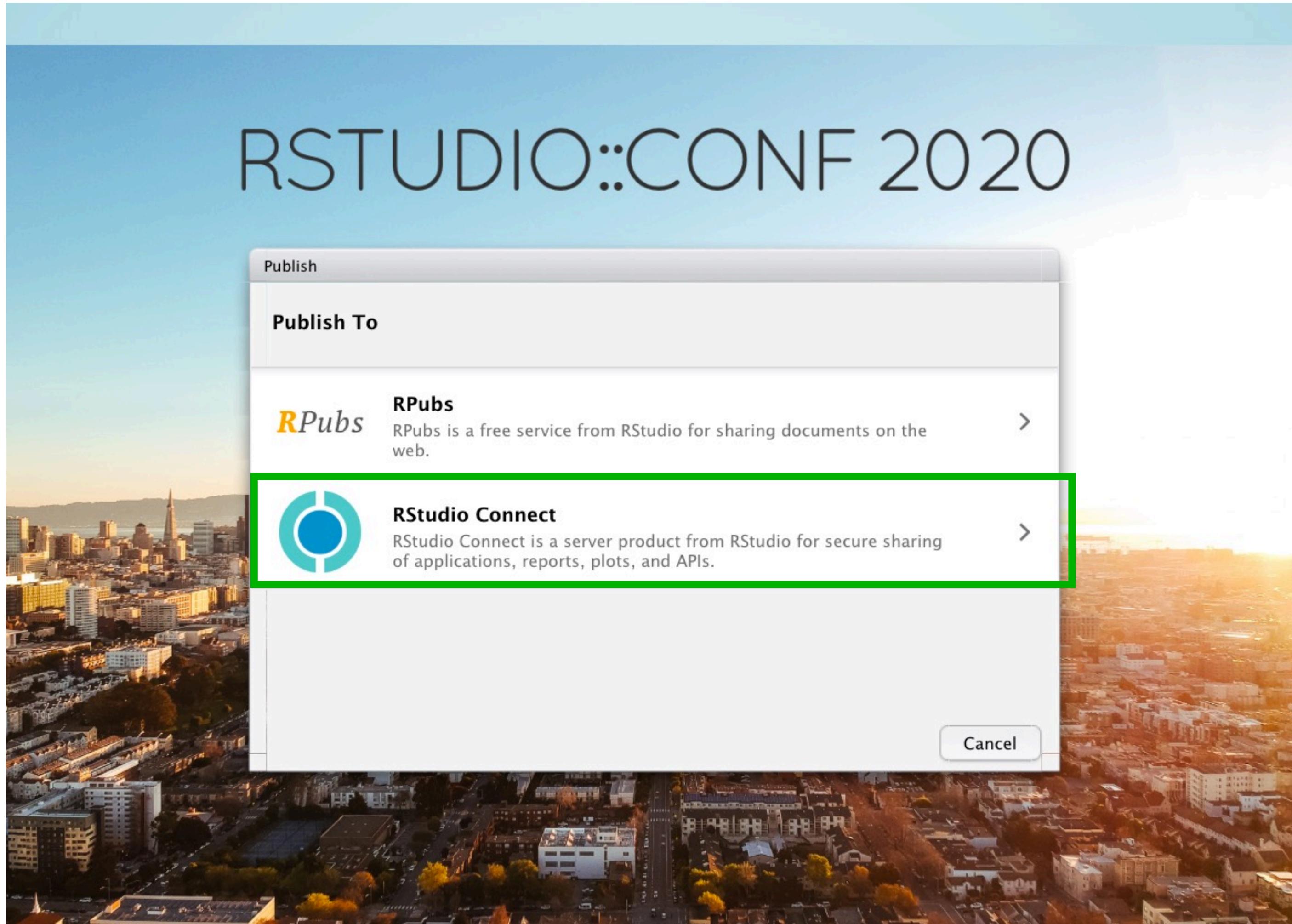
Publishing on RStudio Connect

1. Knit **23-revealjs-presentation.Rmd** and click the Publish button at the top.



Publishing on RStudio Connect

2. Click on RStudio Connect

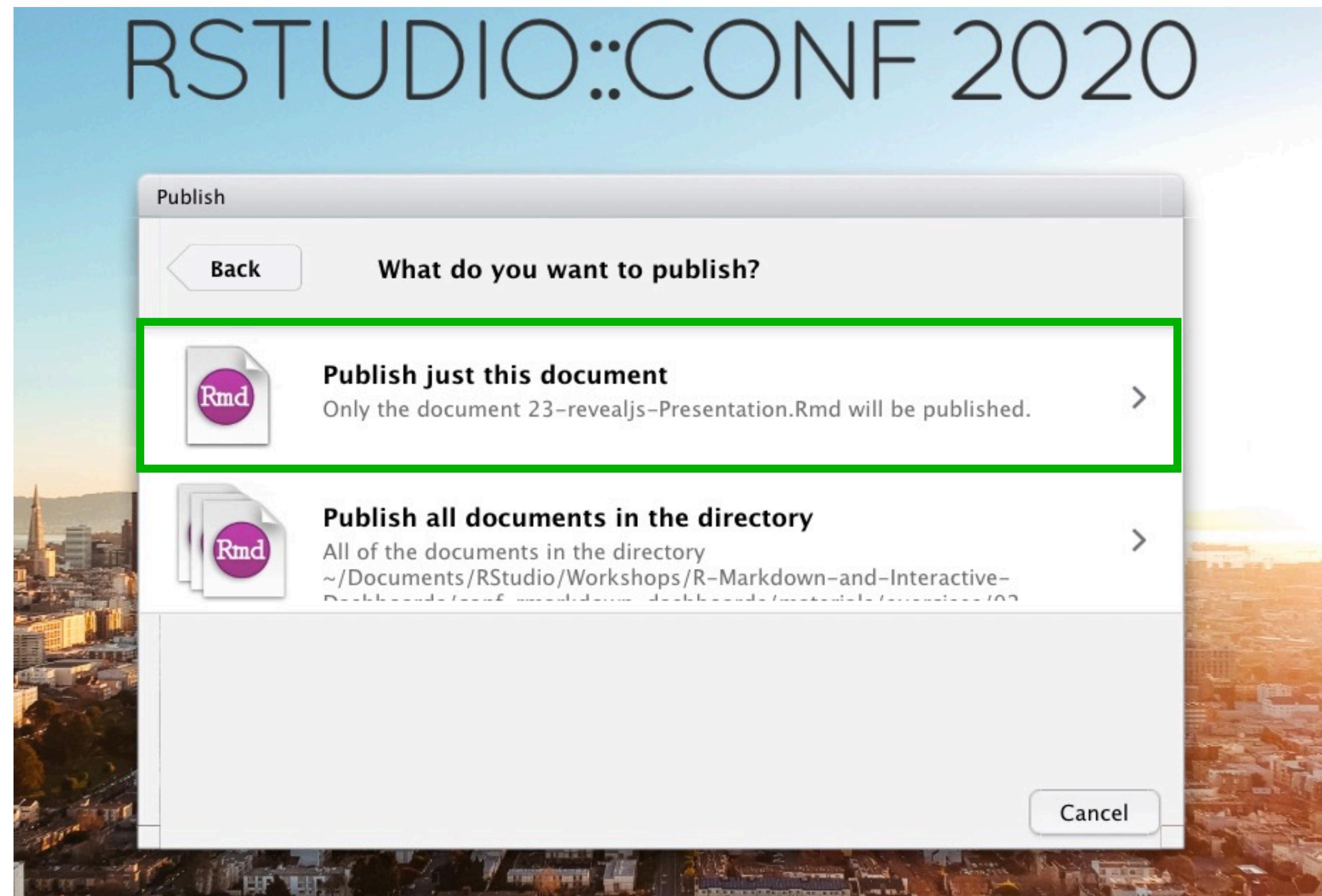


[Github repo: rstd.io/conf20-rmd-dash](#)

[rstudio.cloud workspace: rstd.io/RMAID](#)

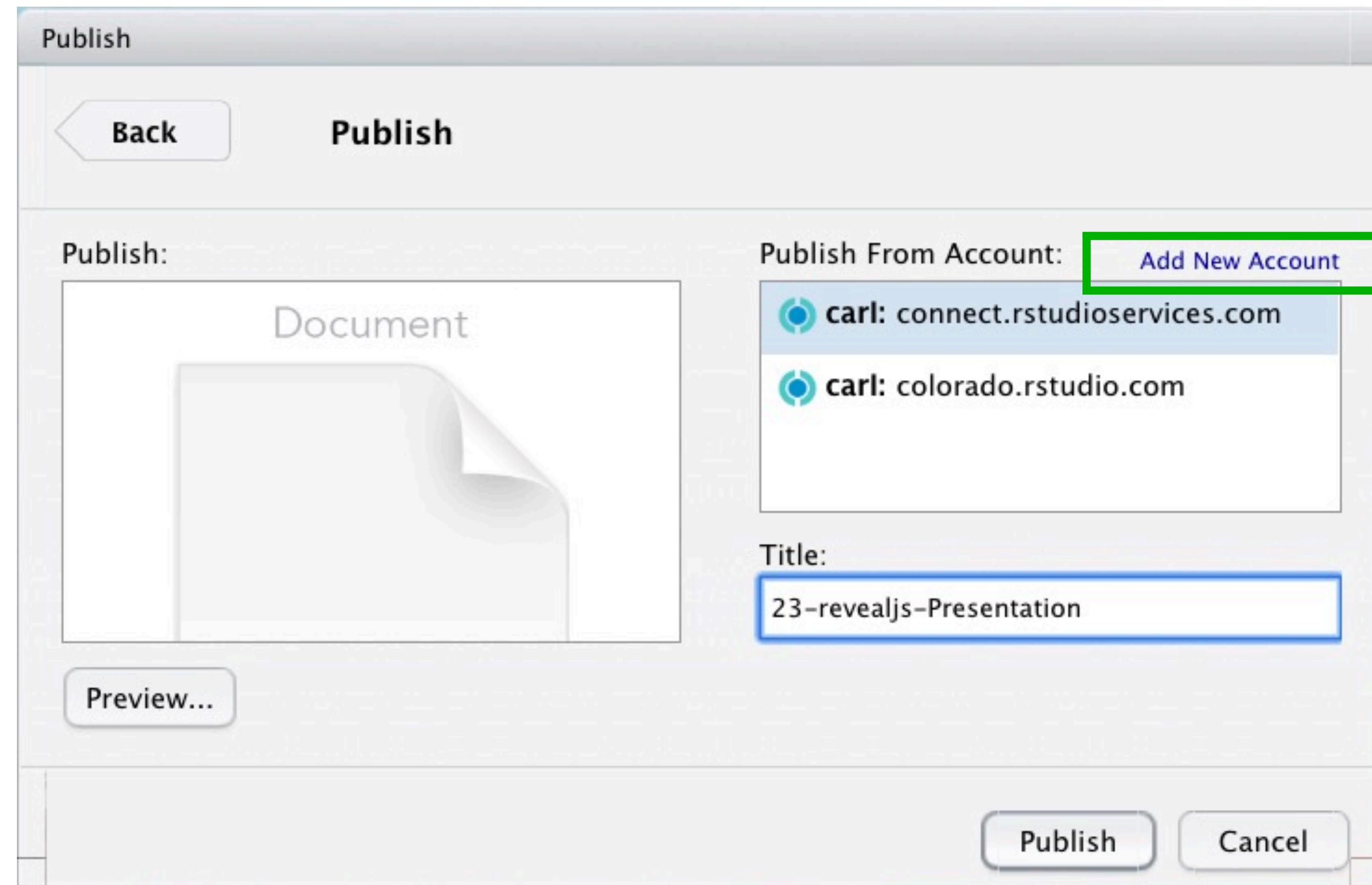
Publishing on RStudio Connect

3. Click on Publish just this document



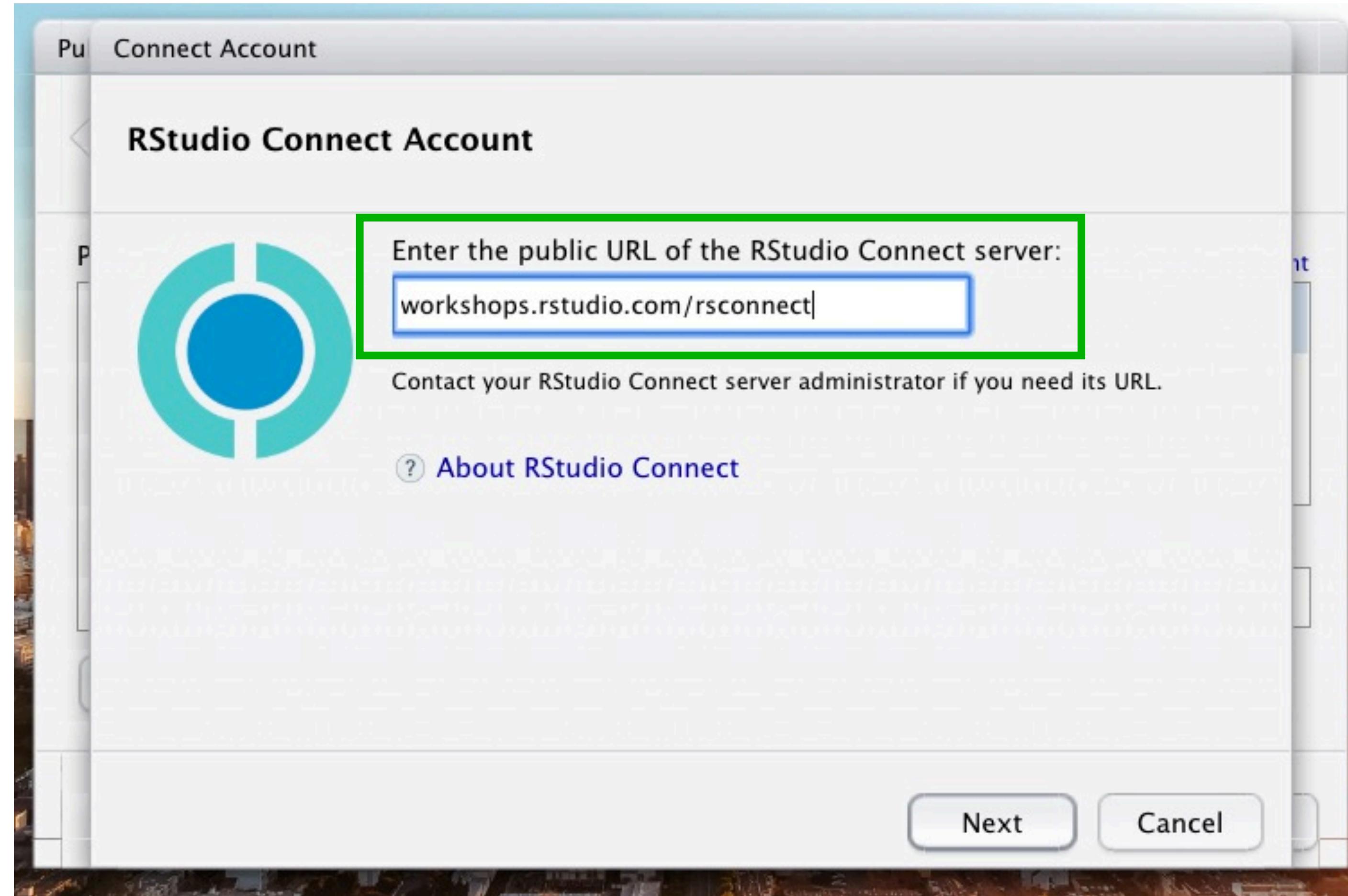
Publishing on RStudio Connect

4. Click on Add New Account



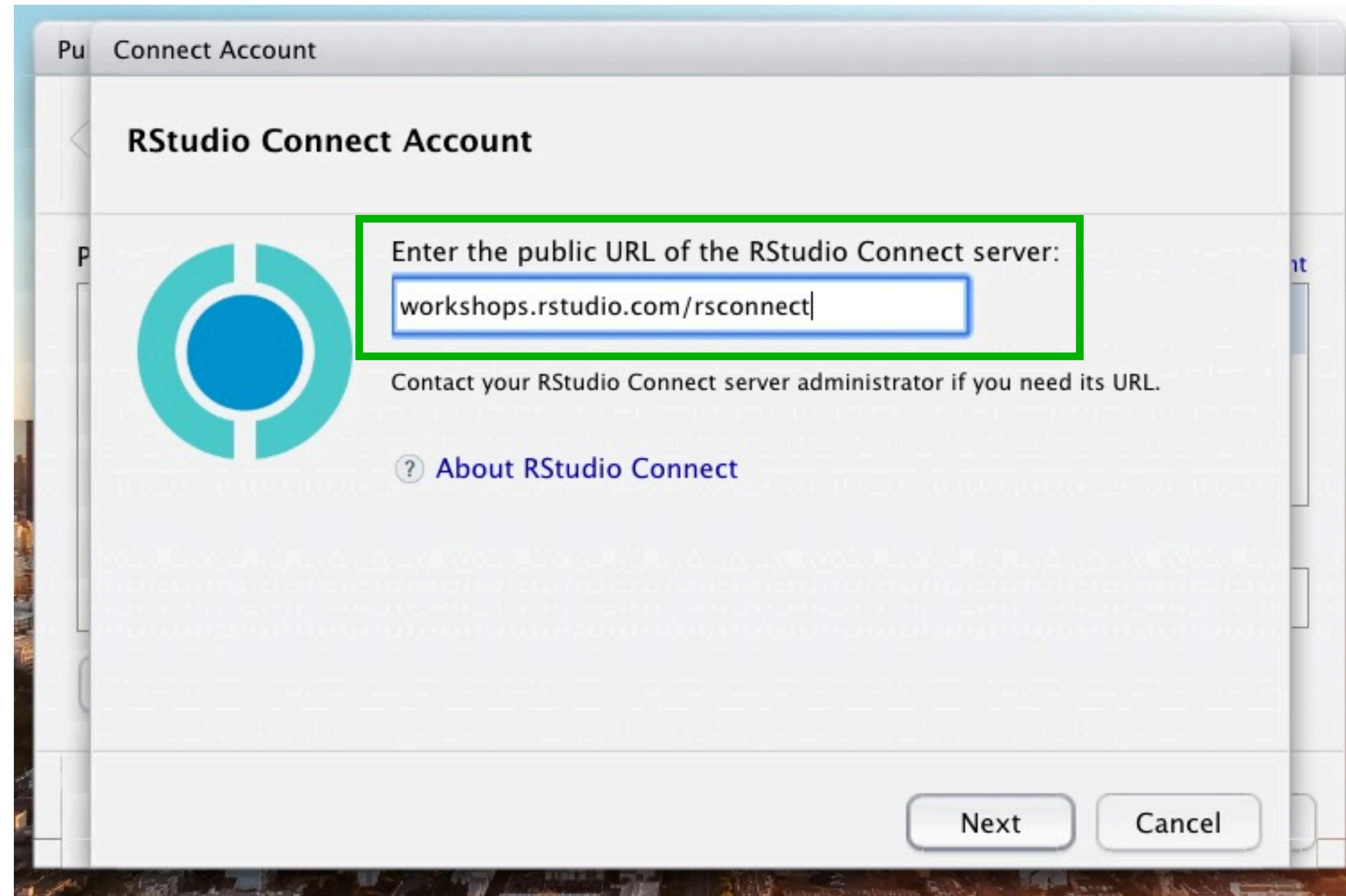
Publishing on RStudio Connect

5. Enter "workshops.rstudio.com/rsconnect" as the Connect URL



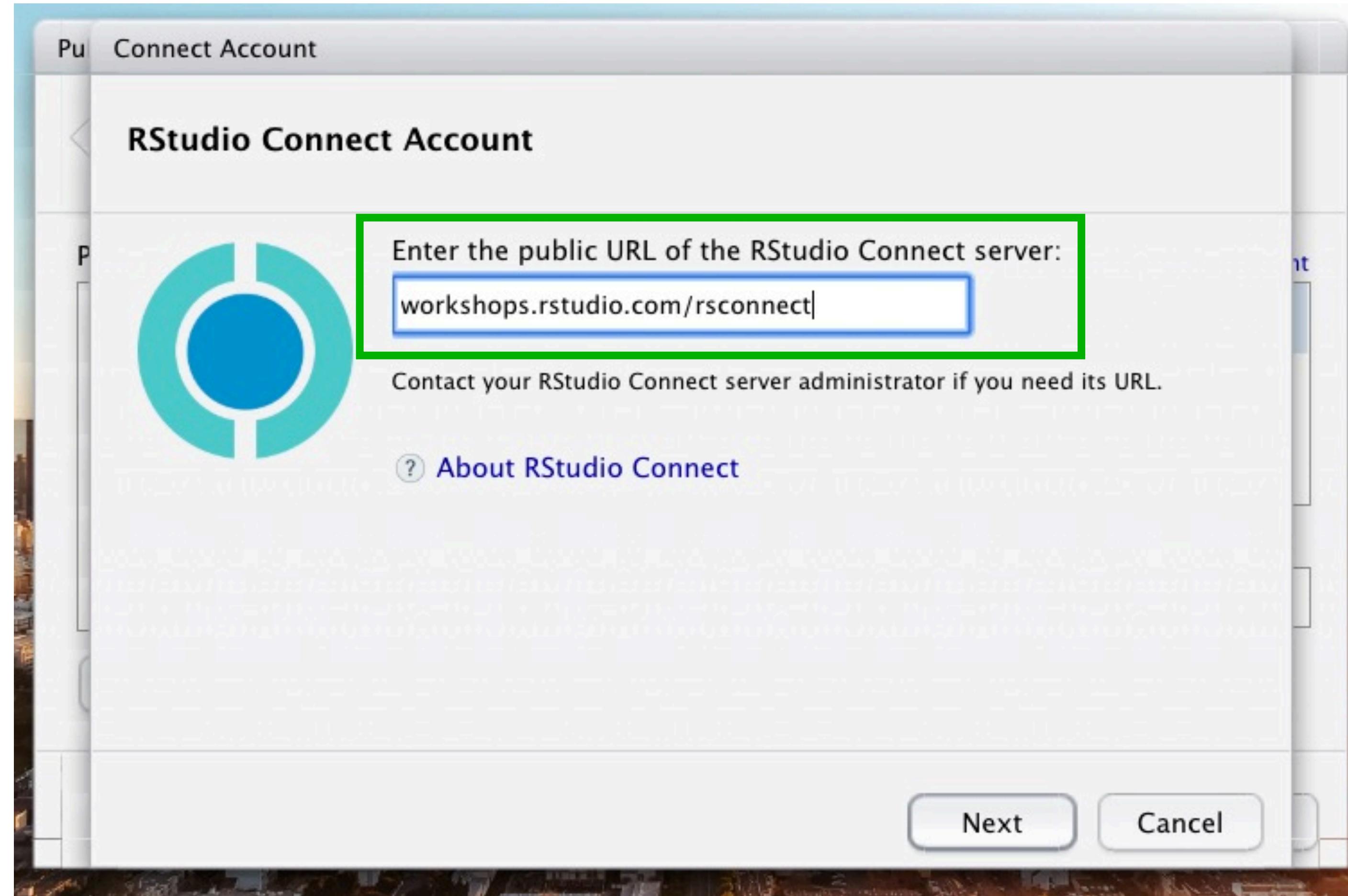
Publishing on RStudio Connect

5. Enter "workshops.rstudio.com/rsconnect" as the Connect URL



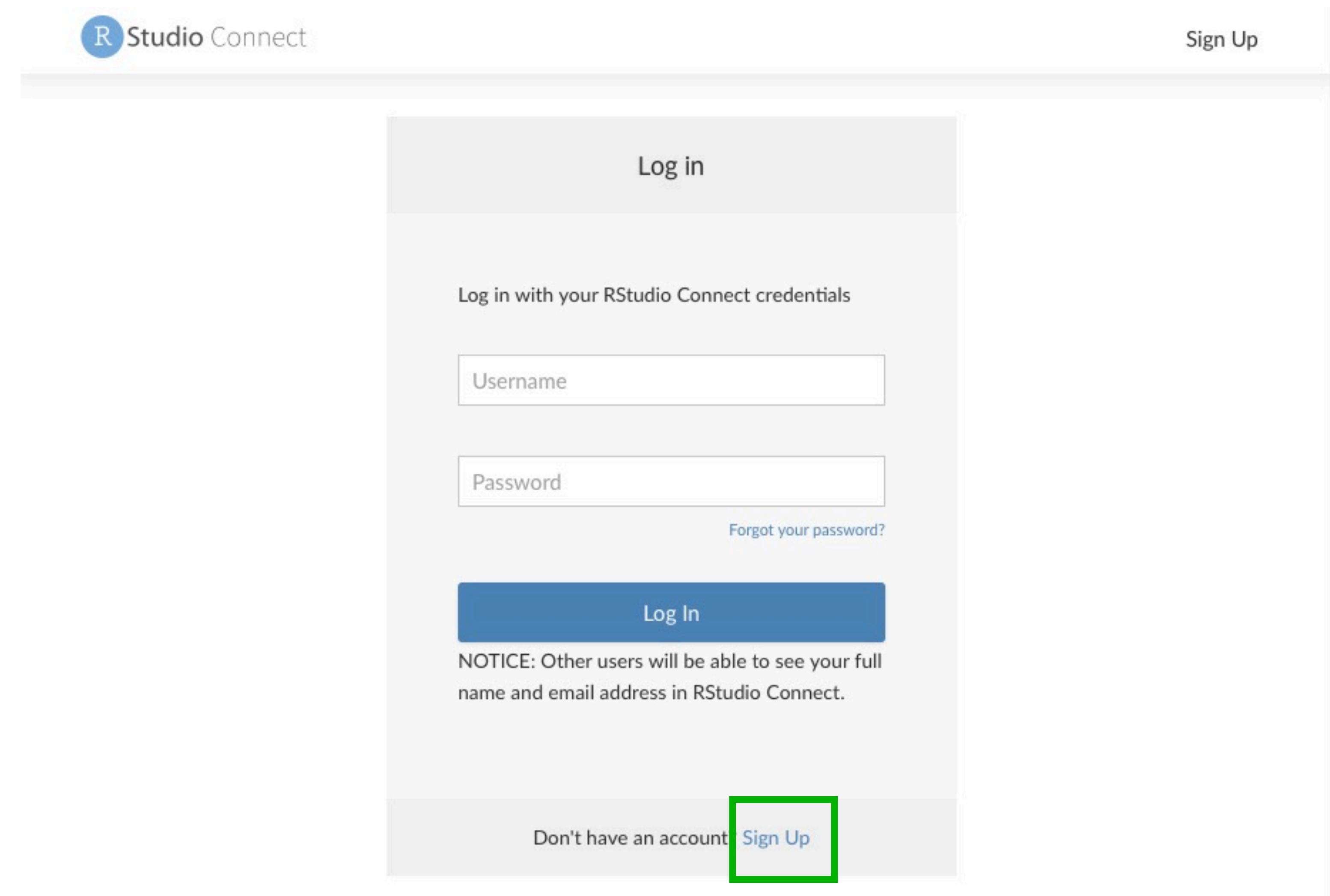
Publishing on RStudio Connect

6. Enter "workshops.rstudio.com/rsconnect" as the Connect URL



First Time only: Register for your account

7. Click on Sign Up



First Time only: Register for your account

8. Fill in your details (not mine)

Sign Up

Username

First Name

Last Name

Email

Password

Password (Again)

[Sign Up](#)

NOTICE: Other users will be able to see your full name and email address in RStudio Connect.

Already have an account? [Log In](#)

First Time only: Register for your account

9-10. Confirm your signup by clicking on the email link sent, and then clicking on Connect

The screenshot shows two pages from the RStudio Connect interface. The top part is titled "Awaiting Confirmation" and includes a message about confirming the account via email, a "Resend Confirmation Email" button, and a user profile icon. The bottom part is titled "Connect to R" and asks to confirm package connection, with a "Connect" button highlighted by a green box.

R Studio Connect

Awaiting Confirmation

You need to confirm your account before proceeding. You should have received an email with a link that will allow you to confirm your account.

It may take a few minutes for the email to arrive; you might also need to check your Spam or Junk folder.

Resend Confirmation Email

CH

Connect to R

Confirm package connection.

You're almost done configuring R to publish content to RStudio Connect. Click the Connect button below to link your RStudio Connect account (`carlhowe`) to the `rsconnect` R package.

If you didn't reach this screen by initiating an account link from the RStudio IDE or in R via `rsconnect::connectUser`, click Cancel.

Cancel

Connect

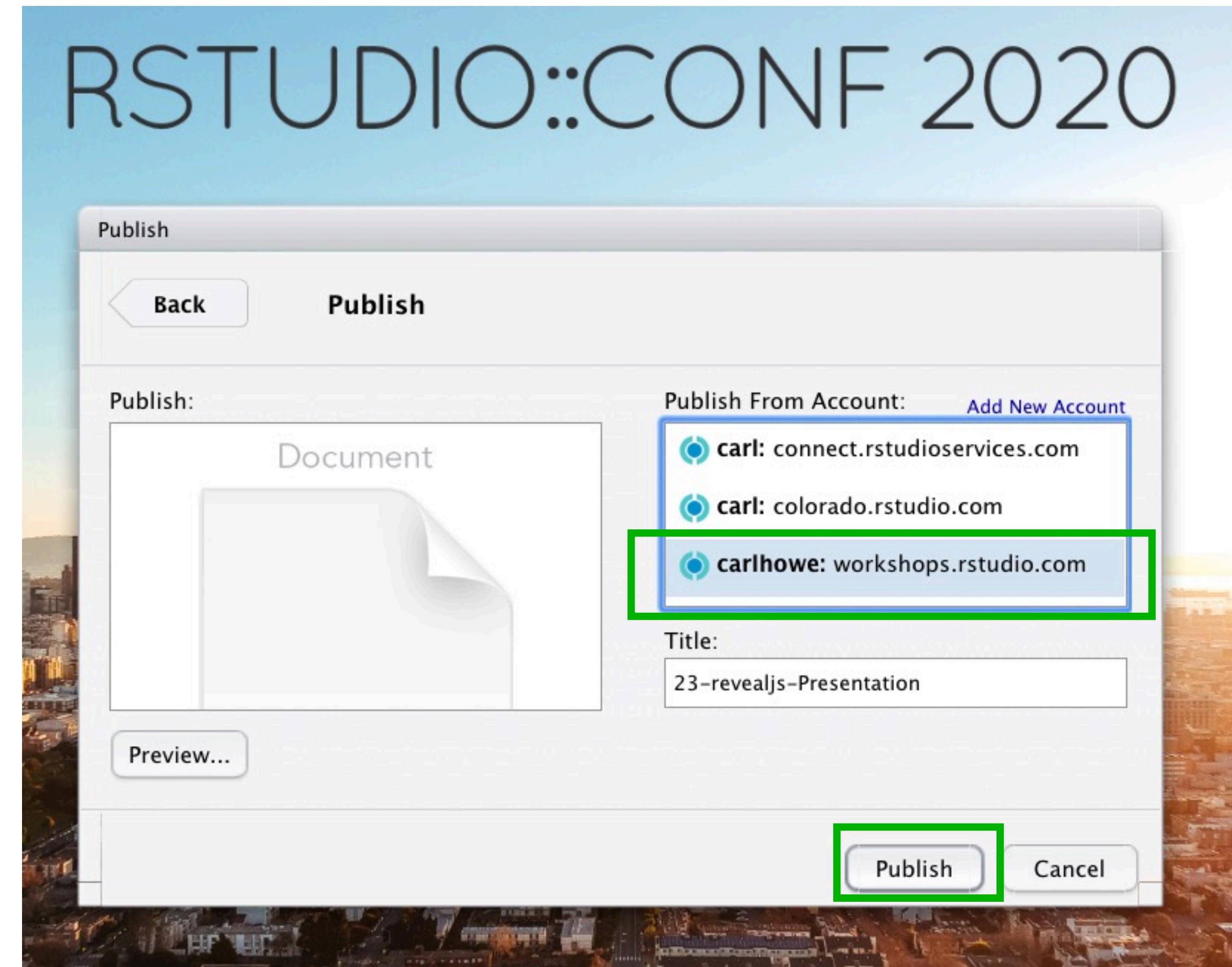
First Time only: Register for your account

11. Finally connect
your account to
RStudio.cloud



Back to publishing: Select your Connect account

12. Select your Connect account and click Publish

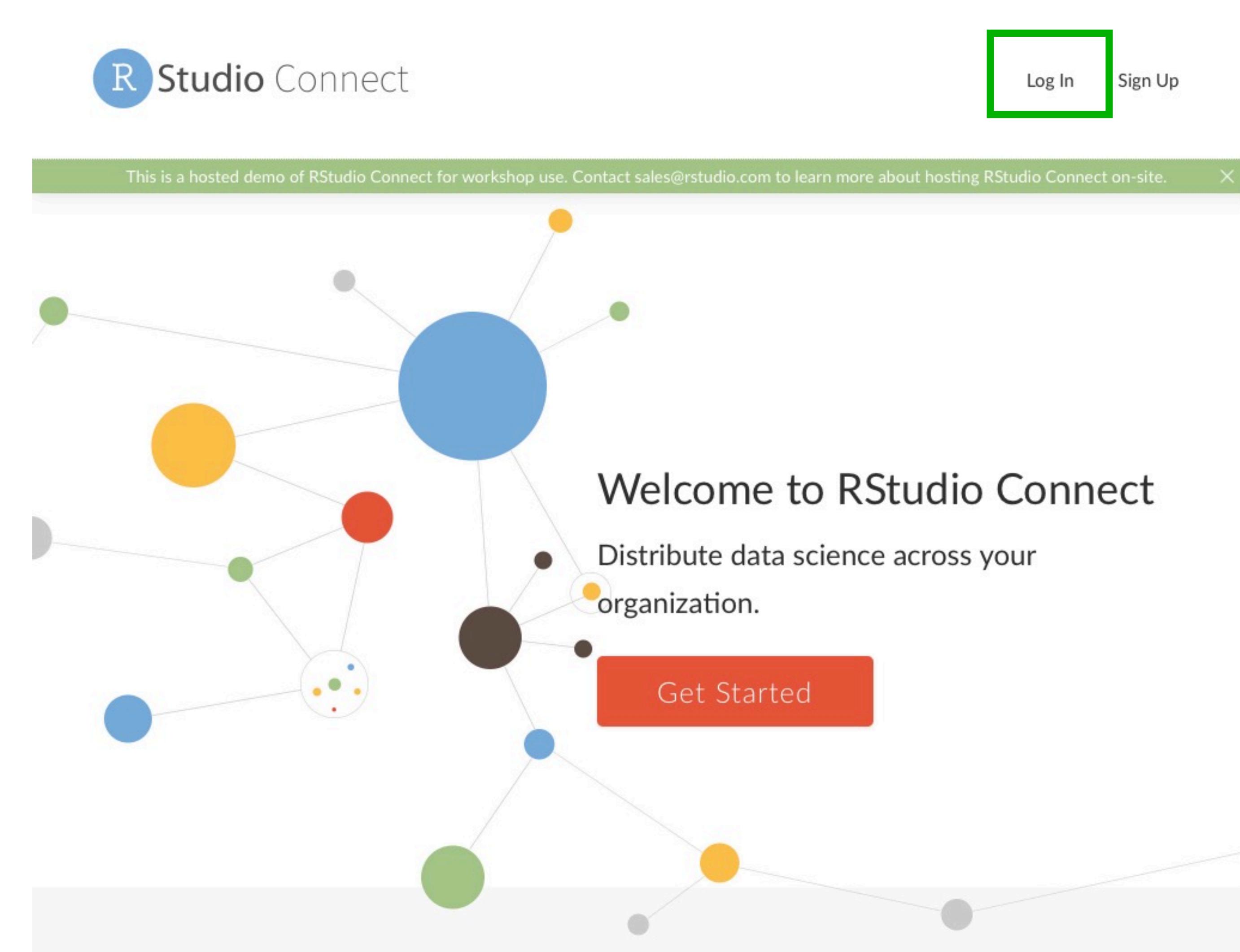


Viewing published outputs on RStudio Connect



Browse to workshops.rstudio.com/rsconnect

Log in with the account you created when you published your content



Browse to workshops.rstudio.com/rsconnect

Log in with the account you created when you published your content

Log in

Log in with your RStudio Connect credentials

Username

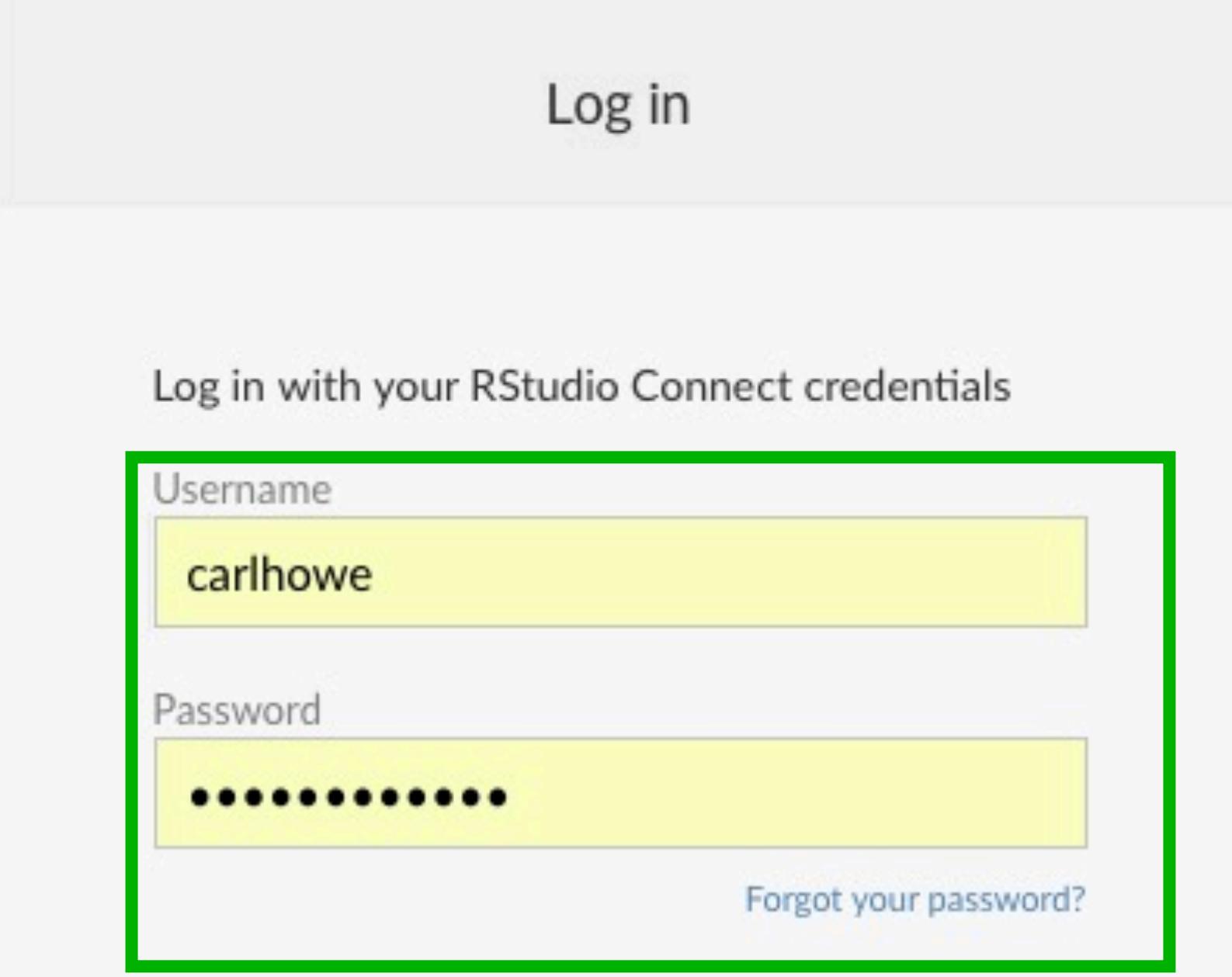
Password

[Forgot your password?](#)

[Log In](#)

NOTICE: Other users will be able to see your full name and email address in RStudio Connect.

[Don't have an account? Sign Up](#)



You now see the most recent content published

View published documents and click Options

The screenshot shows the RStudio Connect 'Content' page. At the top, there's a navigation bar with the RStudio Connect logo and a user icon (CH). Below the navigation is a toolbar with icons for list view, grid view, 'Publish', and 'Options'. A message box at the top states: 'Please remember this is only a preview of RStudio Connect. This server will be decommissioned after rstudio::conf 2020. Contact sales@rstudio.com to learn more about hosting RStudio Connect on-site.' Two documents are listed: '23-revealjs-Presentation' by carlhowe (Type: Document, Deployed: Today at 10:38 AM) and '01-My-First-Dashboard' by carlhowe (Type: Document, Deployed: Today at 10:21 AM). The 'Options' button for the first document is highlighted with a green box.

Document Name	Author	Type	Deployed
23-revealjs-Presentation	carlhowe	Document	Today at 10:38 AM
01-My-First-Dashboard	carlhowe	Document	Today at 10:21 AM

You now see the most recent content published

Select Yours to ignore documents published by others

R Studio Connect

Content

Please remember this is only a preview of RStudio Connect. This server will be decommissioned after sales@rstudio.com to learn more about hosting RStudio Connect on-site.

23-revealjs-Presentation
carlhowe
Type: Document Deployed: Today at 10:38 AM

01-My-First-Dashboard
carlhowe
Type: Document Deployed: Today at 10:21 AM

23-revealjs-Presentation
carlhowe
Type: Document Deployed: Today at 9:36 AM

03-Links-and-images
carlhowe
Type: Document Deployed: Yesterday at 1:34 PM

Options Publish

Search for a name...

Owner All Yours

Content Type All

- Applications
- Documents & Reports
- Plots
- Pins
- APIs
- TensorFlow Model APIs

Info

You have created 4 documents. Learn how to deploy Shiny applications, plots, pins, APIs and TensorFlow Model APIs.

There are 3 applications, 9 documents and 1 API published to this server.

Now you'll only see your documents

Select just your documents

The screenshot shows the 'Your Content' page in RStudio Connect. At the top right, there are 'Options' (grid icon), 'Publish' (dropdown), and a search bar ('Search for a name...'). Below the search bar is a 'Reset all filters' button. On the right side, there are two filter sections: 'Owner' and 'Content Type'. The 'Owner' section has a radio button for 'All' (unchecked) and one for 'Yours' (checked and highlighted with a green box). The 'Content Type' section has a radio button for 'All' (checked) and several other options: 'Applications', 'Documents & Reports', 'Plots', 'Pins', 'APIs', and 'TensorFlow Model APIs'. At the bottom right is an 'Info' button.

Your Content

Please remember this is only a preview of RStudio Connect. This server will be decommissioned after sales@rstudio.com to learn more about hosting RStudio Connect on-site.

Options Publish Reset all filters

Owner

All Yours

Content Type

All Applications Documents & Reports Plots Pins APIs TensorFlow Model APIs

Info

Try A Powerpoint Presentation

1. Click on **23-Powerpoint-presentation.Rmd** in the Files pane
2. Knit the result
3. Unfortunately, rstudio.cloud has no way to view Powerpoint
4. Feel free to download and view your Powerpoint output if you have that software
5. Please note: Powerpoint documents can use .pptx files for formatting, but they must have very specific slide masters.
6. Also, Powerpoint documents aren't easily published unless you use a service such as Office 365

3m 00s

Knit A Flex Dashboard

1. Click on **24-Simple-Flexdashboard.Rmd** in the Files panel
2. Knit the result
3. Try to figure out how our header types match the output

3_m 00_s

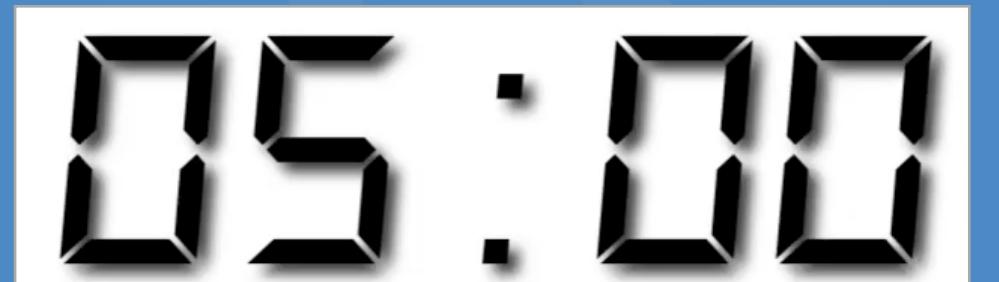
Knit a Tufte Handout Using Templates

1. `install.packages('tufte')`
2. `library(tufte)`
3. Use New File > R Markdown > From Template
4. Choose the Tufte Handout (HTML or PDF) template
5. Save the file as "tufte.Rmd"
6. Knit the result

3_m 00_s

Knit a Xaringan Slide Deck Using Templates

1. `install.packages('xaringan')`
2. `library(xaringan)`
3. Use New File > R Markdown > From Template
4. Choose the **ninja presentation** template
5. Save the file as "xaringan.Rmd"
6. Knit the result
7. Publish the result to Connect
8. View the presentation on Connect



EXERCISE 27

Load package `rticles` and Knit a Royal Society Open Science Article

1. `install.packages('rticles')`
2. `library(rticles)`
3. Use New File > R Markdown > From Template
4. Choose the Journal of Open Source Software template
5. Knit the result

3_m 00_s

*R Markdown similar to that
for reports and slides can also
generate dashboards.*

Document Type Drives R Markdown Symbol Interpretations

R Markdown Symbol	Alternate Symbol	Document Meaning	Presentation Meaning	Dashboard Meaning
#	==	Header 1	New Section	Top level page
##	----	Header 2	New Slide	New layout section
###		Header 3	Slide Subhead	Layout subsection

We'll discuss layouts more when we get to Flexdashboards

Knit a FlexDashboard

1. Open 28-Simple-Flexdashboard.Rmd
2. Knit the result
3. Publish it to Connect

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Summary

R Markdown

- Is a system for creating structured computational documents
- Can knit to many document types
- Can be shared using the publish button in the RStudio IDE
- Used for reports and slides can also generate dashboards.