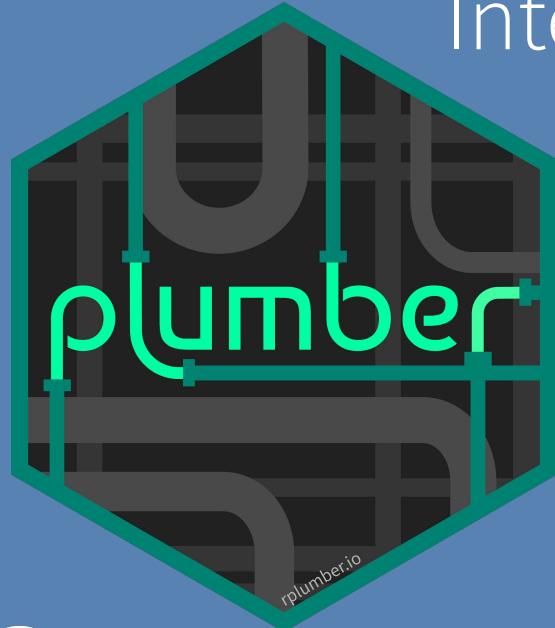


Expanding R horizons

Integrating R with Plumber APIs



James Blair
October 28, 2020

Outline

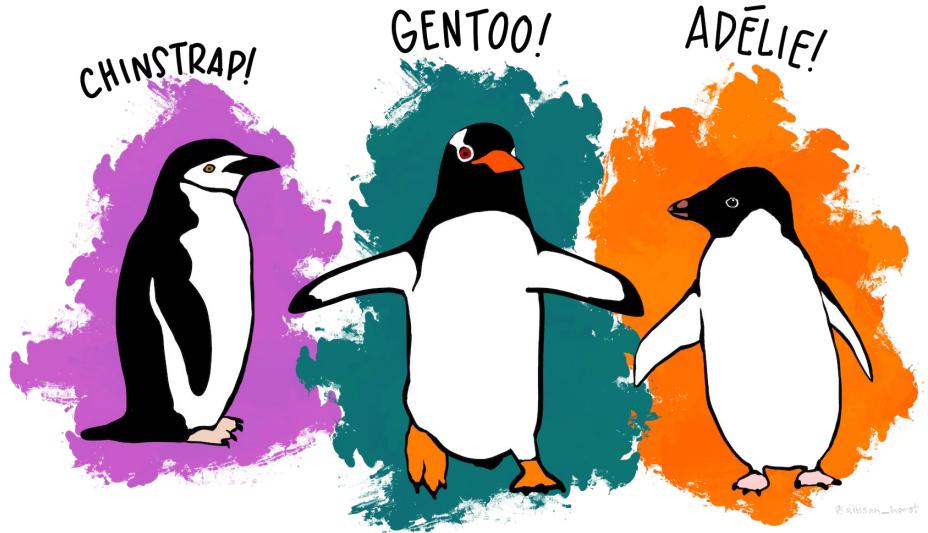
- Set the stage
- What is an API?
- Introduction to APIs with Plumber
- New Plumber features
- API Deployment
- Additional Resources



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Meet the Palmer Penguins

- [allisonhorst/palmerpenguins](#)
- 344 observations for 3 different penguin species
- Simple classification model using a random forest



species	island	bill_length_mm	bill_depth_mm	flipper_length_mm	body_mass_g	sex	year
Adelie	Torgersen	39.1	18.7	181	3750	male	2007
Adelie	Torgersen	39.5	17.4	186	3800	female	2007
Adelie	Torgersen	40.3	18.0	195	3250	female	2007
Adelie	Torgersen	NA	NA	NA	NA	NA	2007
Adelie	Torgersen	36.7	19.3	193	3450	female	2007
Adelie	Torgersen	39.3	20.6	190	3650	male	2007
Adelie	Torgersen	38.9	17.8	181	3625	female	2007
Adelie	Torgersen	39.2	19.6	195	4675	male	2007
Adelie	Torgersen	34.1	18.1	193	3475	NA	2007
Adelie	Torgersen	42.0	20.2	190	4250	NA	2007

Do the data science (build the model)

The screenshot shows the RStudio interface with the file "model-fit.Rmd" open in the Source Editor. The code is written in R and uses the parsnip and ranger packages to build a classification model. The output pane displays the results of the model fit, including the engine used, fit time, and the ranger call.

```
plumber-webinar - main - RStudio Source Editor
model-fit.Rmd x
Preview | Run | A
31 ## Model Fit
32 ````{r}
33 model <- rand_forest() %>%
34   set_engine("ranger") %>%
35   set_mode("classification") %>%
36   fit(species ~ bill_length_mm + bill_depth_mm + flipper_length_mm + body_mass_g, data = filtered_penguins)
37 ````

Engine set to `ranger`.

38
39 ````{r}
40 model
41 ````

parsnip model object

Fit time: 77ms
Ranger result

Call:

ranger::ranger(formula = species ~ bill_length_mm + bill_depth_mm + flipper_length_mm + body_mass_g, data = data,
num.threads = 1, verbose = FALSE, seed = sample.int(10^5, 1), probability = TRUE)

32:7 | C Chunk 6 | R Markdown
```

Wait.
Now what?



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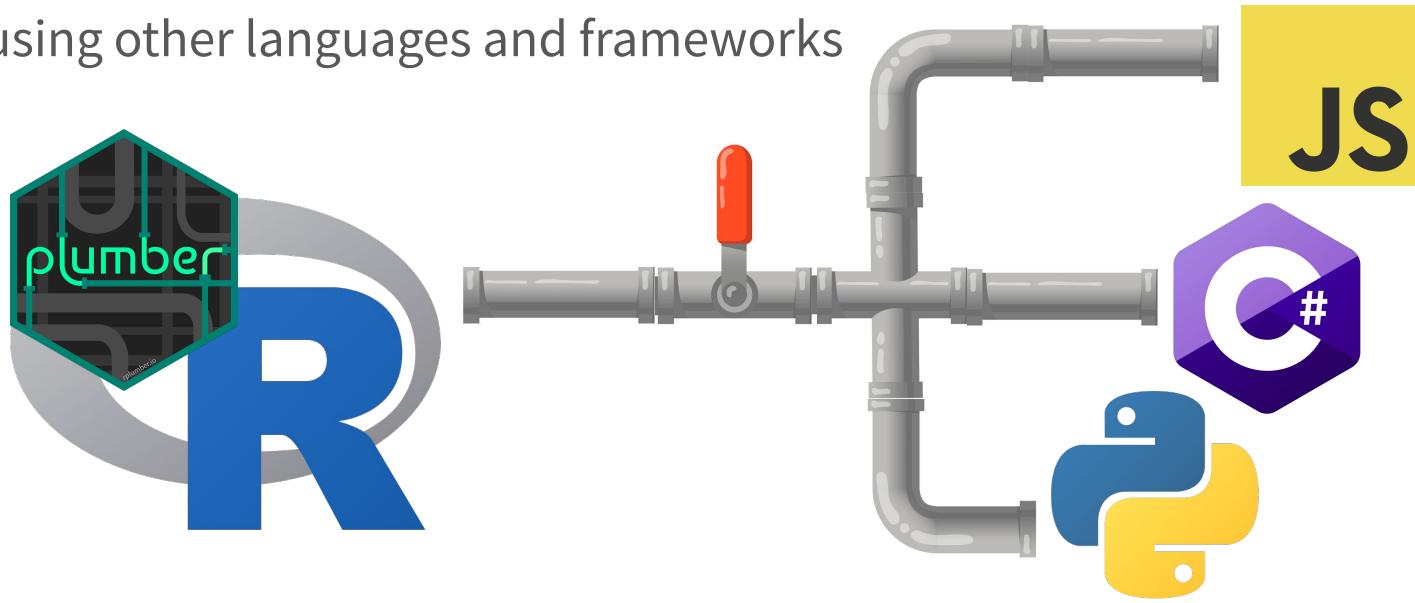
What is an API?

- Application Programming Interface
- A standardized way for different computers to communicate
- A client sends a request, a server sends a response
- Web browsers make API calls to every website you visit



Why do I care?

- APIs allow your work to be used by a wide range of tools and technologies, not just R
- Dramatically reduces the handoff between work done in R and tools built using other languages and frameworks



Introduction to APIs with Plumber

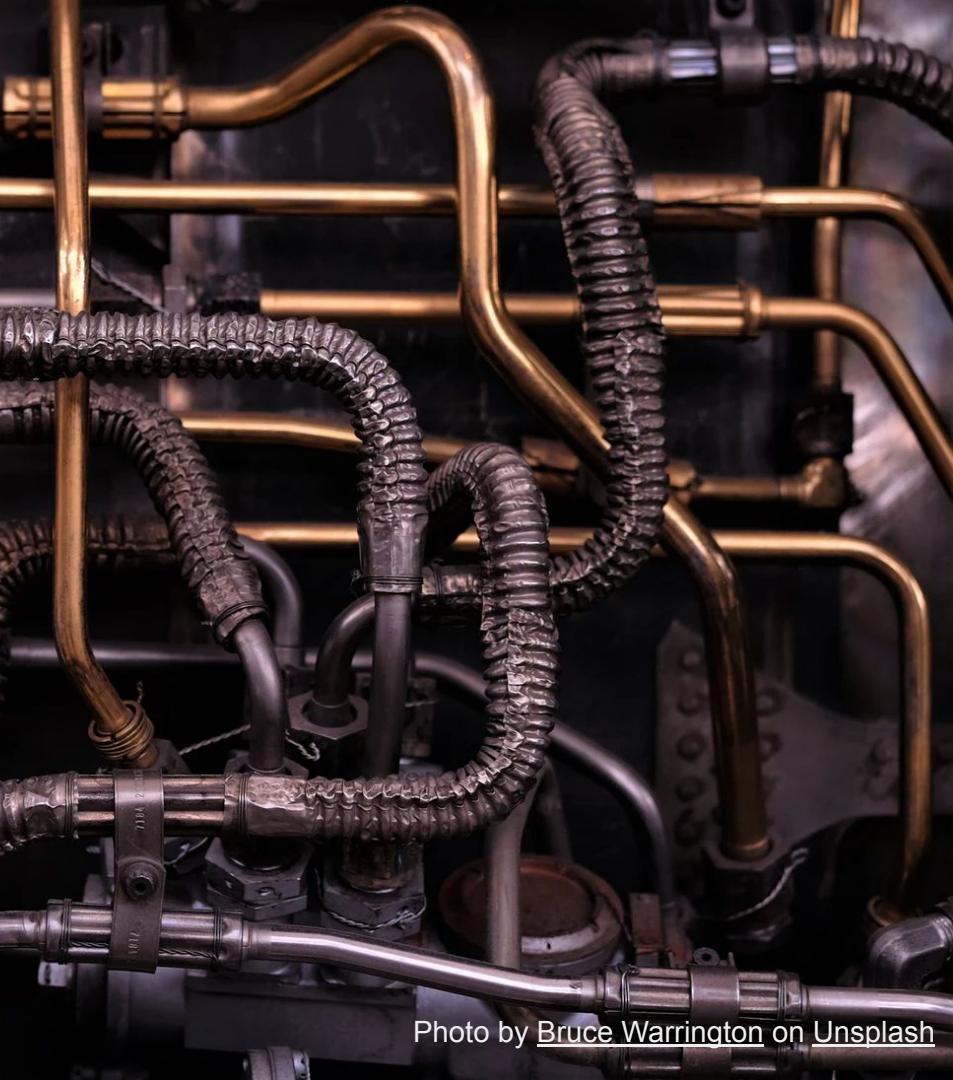


Photo by [Bruce Warrington](#) on [Unsplash](#)

```
plumberExamples - master - RStudio Source Editor
plumber.R x
11 library(plumber)
12
13 /* @apiTitle Plumber Example API
14
15 /* Echo back the input
16 /* @param msg The message to echo
17 /* @get /echo
18 function(msg = "") {
19   list(msg = paste0("The message is: '", msg, "'"))
20 }
21
22 /* Plot a histogram
23 /* @serializer png
24 /* @get /plot
25 function() {
26   rand <- rnorm(100)
27   hist(rand)
28 }
29
30 /* Return the sum of two numbers
31 /* @param a The first number to add
32 /* @param b The second number to add
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```



- Write standard R functions
- Use special comments (#*) and tags (@apiTitle)
- Plumb it!

The screenshot shows the RStudio IDE interface with the following components:

- Top Bar:** Includes icons for file operations (New, Open, Save, Print, Find, Go to file/function), Addins dropdown, Local dropdown, and a project dropdown for "plumberExamples".
- Left Panel:** Contains the "plumber.R" script editor. The code is as follows:

```
11 library(plumber)
12
13 #* @apiTitle Plumber Example API
14
15 #* Echo back the input
16 #* @param msg The message to echo
17 #* @get /echo
18 function(msg = "") {
19   list(msg = paste0("The message is: '", msg, "'"))
20 }
21
22 #* Plot a histogram
```

The code includes annotations for API endpoints: `@apiTitle` at line 13, `@param` at line 16, and `@get` at line 17.

- Environment Tab:** Shows tabs for Environment, History, Connections, Build, Git, and Tutorial. The Environment tab is active.
- Files Tab:** Shows tabs for Files, Plots, Packages, Help, and Viewer. The Files tab is active.
- Console Tab:** Shows the path ~Documents/RStudio/repos/plumberExamples/. The console tab is active.
- Terminal Tab:** Shows the path ~Documents/RStudio/repos/plumberExamples/.
- Jobs Tab:** Shows a list of running jobs.
- Launcher Tab:** Shows a list of recent projects.
- Bottom Right:** The R Studio logo.

Penguin API



Photo by  Claudio Schwarz | @purzbaum on [Unsplash](#)

New Plumber features

- Tidy interface
- Body parsing
- New serializers
- Open API Specification
- Custom UI
- New logo



Deployment



Photo by [Dieter K](#) on [Unsplash](#)

Deployment options

- [RStudio Connect](#)
- [Docker](#)
- [DigitalOcean](#)
- [pm2](#)

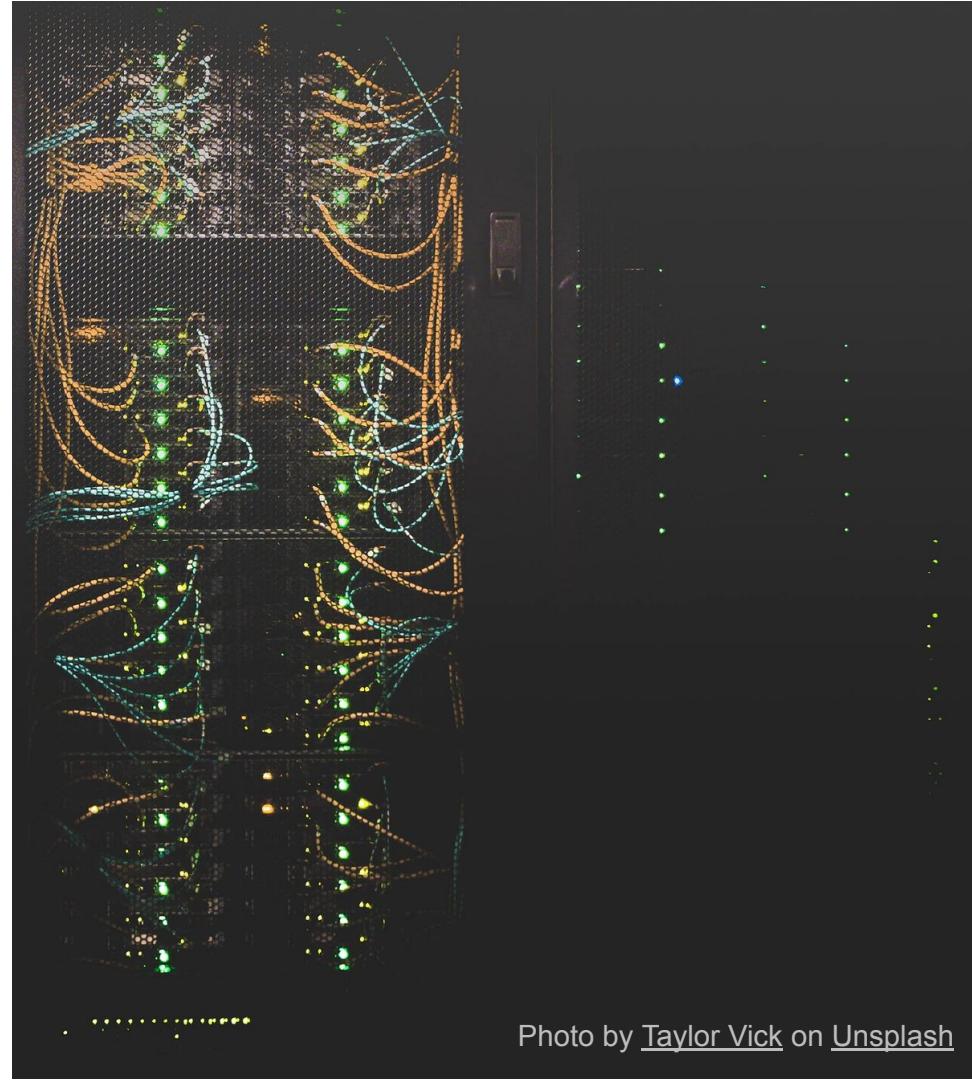


Photo by [Taylor Vick](#) on [Unsplash](#)

RStudio Connect

- Push button deployment
- Dependency management
- Scalability
- Git integration
- Authentication and permission controls
- Publish and share RMarkdown, Shiny, Plumber, Jupyter notebooks, Flask, Dash, Streamlit
- rstudio.com/products/connect

The screenshot shows the RStudio Connect interface for a service named "Penguin Predictions" version 1.0.0. The top navigation bar includes links for "Content / predict-penguins", "Info", "Access", "Runtime", "Schedule", "Tags", "Vars", and "Logs".

The main content area displays two API endpoints:

- health-check**: A GET endpoint at `/health-check`.
- predict**: A POST endpoint at `/predict`.

On the right side, there are sharing settings, a search bar, and sections for "Who can view or change this API" (listing "James Blair james") and "Who runs this content on the server" (set to "The default user rstudio-connect"). The "Content URL" is listed as `/predict-penguins/`, with a "Copy" button next to it.

Resources



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Additional Resources

- <https://www.rplumber.io/>
- <https://github.com/rstudio/plumber>
- <https://github.com/sol-eng/plumberExamples>
- <https://github.com/meztez/plumberDeploy>
- <https://github.com/meztez/rapidoc>
- <https://github.com/rstudio/webinars>
- <https://community.rstudio.com/>
- <https://rstudio.com/conference/>



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Thank You



Photo by [Victor Garcia](#) on [Unsplash](#)