No-Code Data Analysis and Dashboards with {blockr}

John Coene (The Y Company) and David Granjon (cynkra GmbH)

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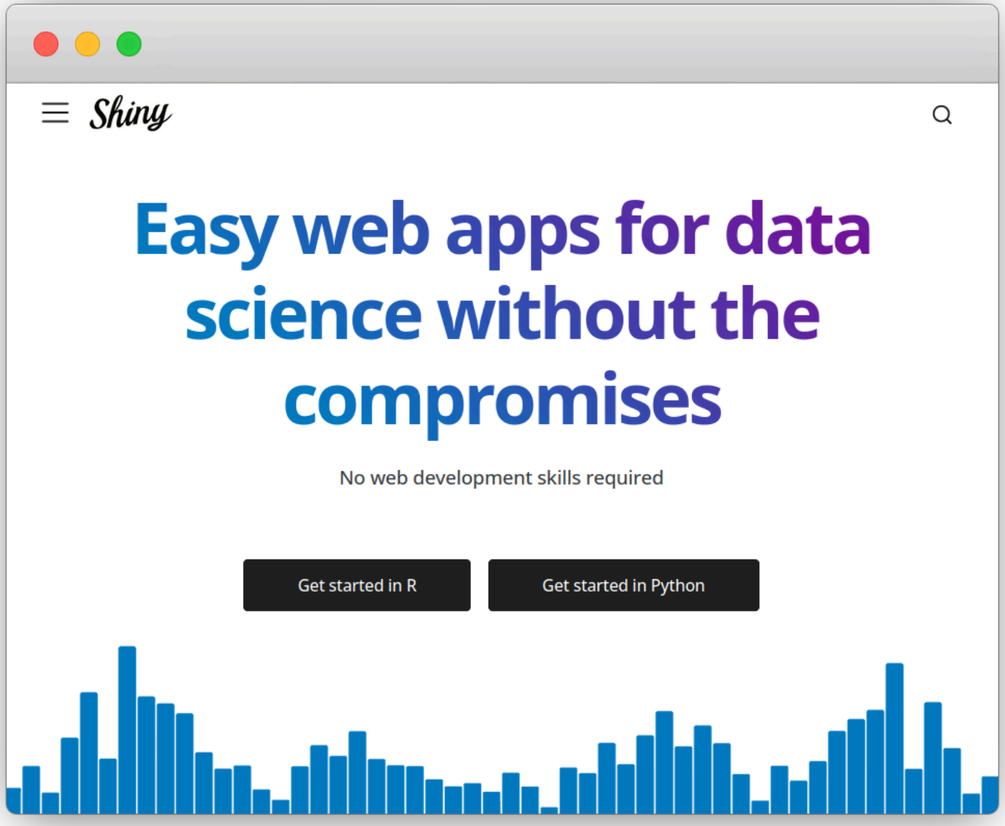

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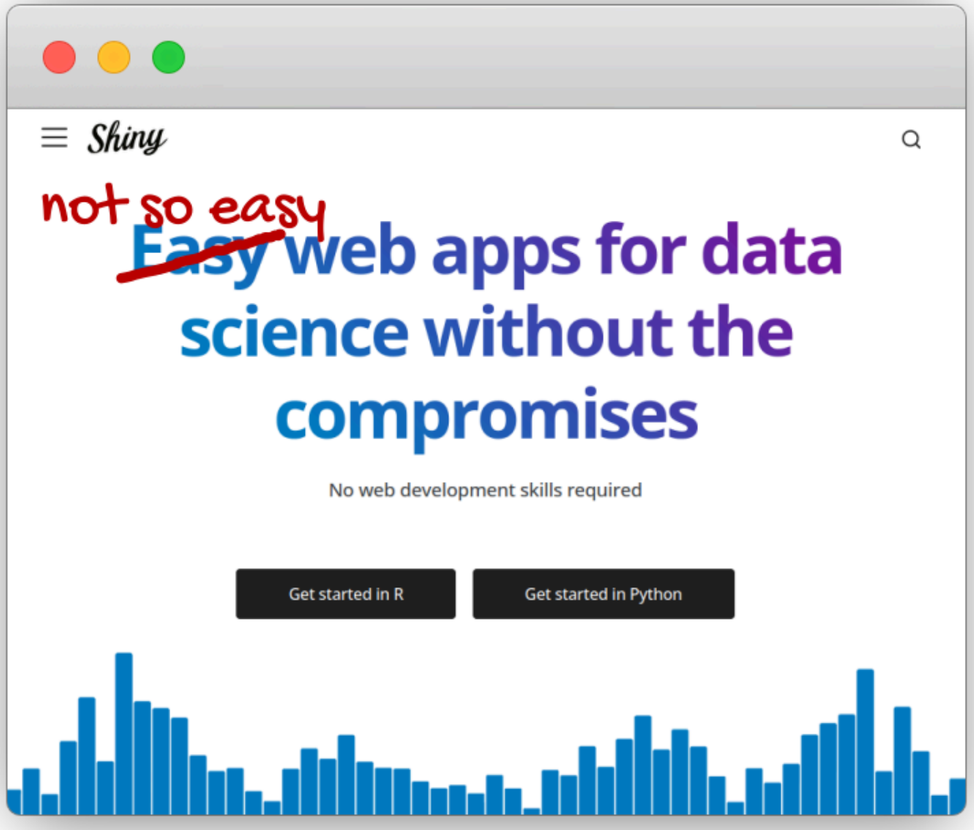

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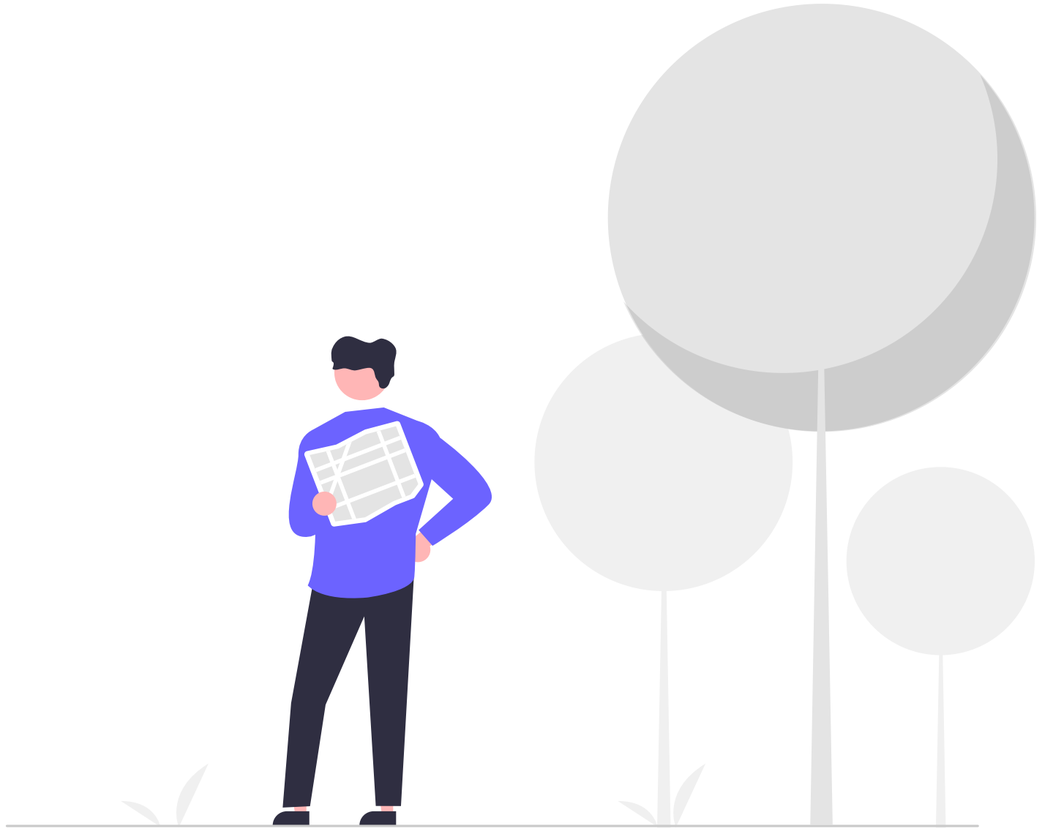
Developing enterprise-grade dashboards isn’t easy



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💡 Introducing {blockr}

- **Supermarket** for data analysis with R.
- **No-Code** Dashboard builder, “Shiny’s WordPress” …
- … **Extendable** by developers.
- Reproducible code.

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blockr 101

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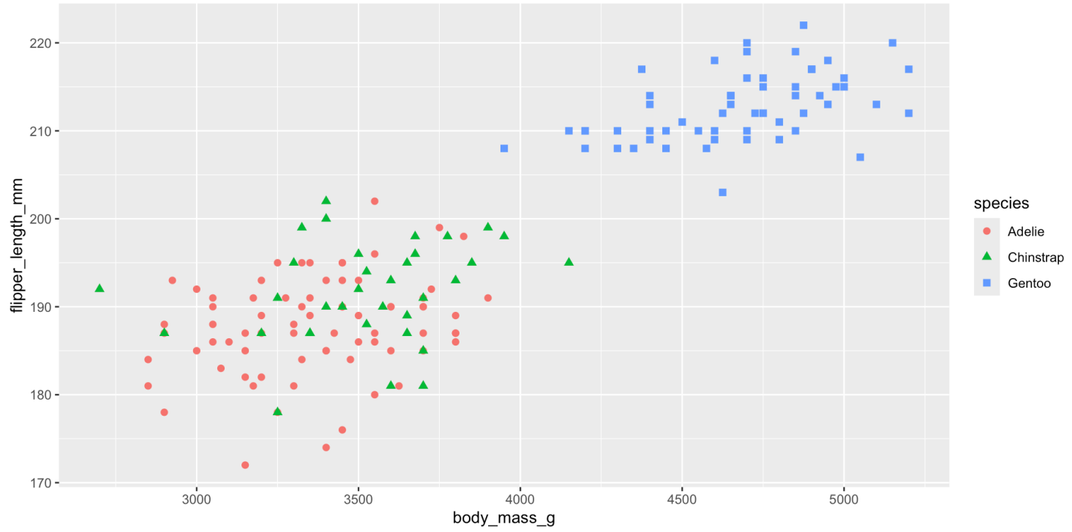
Palmer penguins plot

What penguin species has the largest flippers?

```
penguins |>
  filter(sex == "female") |>
  ggplot(
    aes(
      x = body_mass_g,
      y = flipper_length_mm
    )
  ) +
  geom_point(
    aes(
      color = species,
      shape = species
    ),
    size = 2
  )
```



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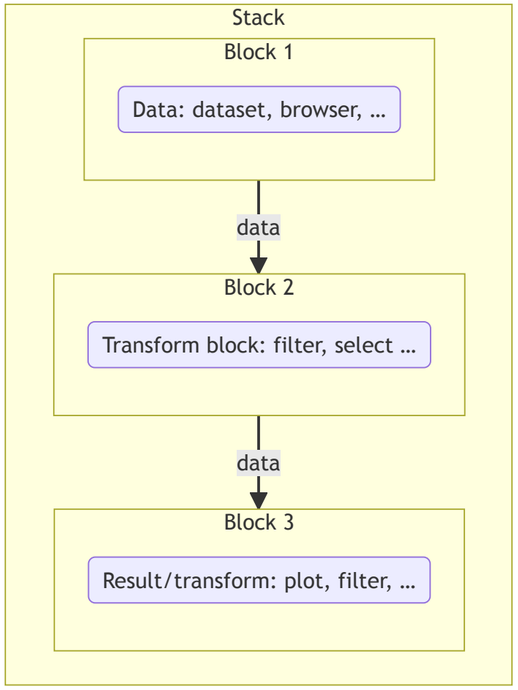
The stack: a data analysis recipe



Collection of instructions, **blocks**, from **data import** to **wrangling/visualization**.

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Stack

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How much code would it take with Shiny?

```r
library(shiny)
library(bslib)
library(ggplot2)
library(palmerpenguins)

shinyApp(
  ui = page_fluid(
    layout_sidebar(
      sidebar = sidebar(
        radioButtons("sex", "Sex", unique(penguins$sex), "female"),
        selectInput(
          "xvar",
          "X var",
          colnames(dplyr::select(penguins, where(is.numeric))),
          "body_mass_g"
        ),
        selectInput(
          "yvar",
          "Y var",
          colnames(dplyr::select(penguins, where(is.numeric))),
          "flipper_length_mm"
        ),
        selectInput(
          "color",
          "Color and shape",
          colnames(dplyr::select(penguins, where(is.factor))),
          "species"
        )
      ),
      plotOutput("plot")
    )
  ),
  server = function(input, output, session) {
    output$plot <- renderPlot({
      penguins |>
        filter(sex == !!input$sex) |>
        ggplot(aes(x = !!input$xvar, y = !!input$yvar)) +
        geom_point(aes(color = !!input$color, shape = !!input$color), size = 2)
    })
  }
)
```

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It’s much easier with blockr

```
1 library(blockr)
2 new_stack(
3   data_block = new_dataset_block("penguins", "palmerpenguins"),
4   filter_block = new_filter_block("sex", "female"),
5   plot_block = new_ggplot_block("body_mass_g", "flipper_length_mm"),
6   layer_block = new_geompoint_block("species", "species")
7 )
8 serve_stack(stack)
```

① ②

③ ④

⑤

① Create the stack.

② Import data.

③ Create the plot.

④ Add it a layer.

⑤ Serve a Shiny app.

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Connecting stacks: towards a dinner party

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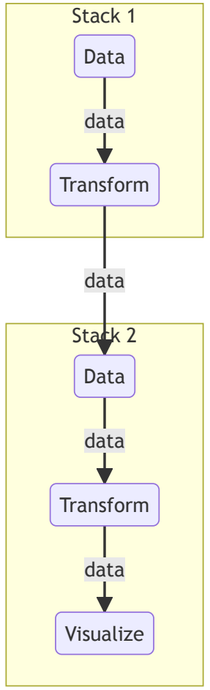
The workspace



Collection of **recipes** (stacks) to build a **dashboard**.

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+ Add stack | Clear all | Save

Stack

Stack

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How do I create a workspace?

```
1 library(blockr)
2 # Creates an empty workspace
3 set_workspace(
4   stack_1 = new_stack()
5   stack_2 = new_stack()
6 )
7 serve_workspace()
```

① ②

③

① Initialise.

② Optional: add stacks.

③ Serve Shiny app.

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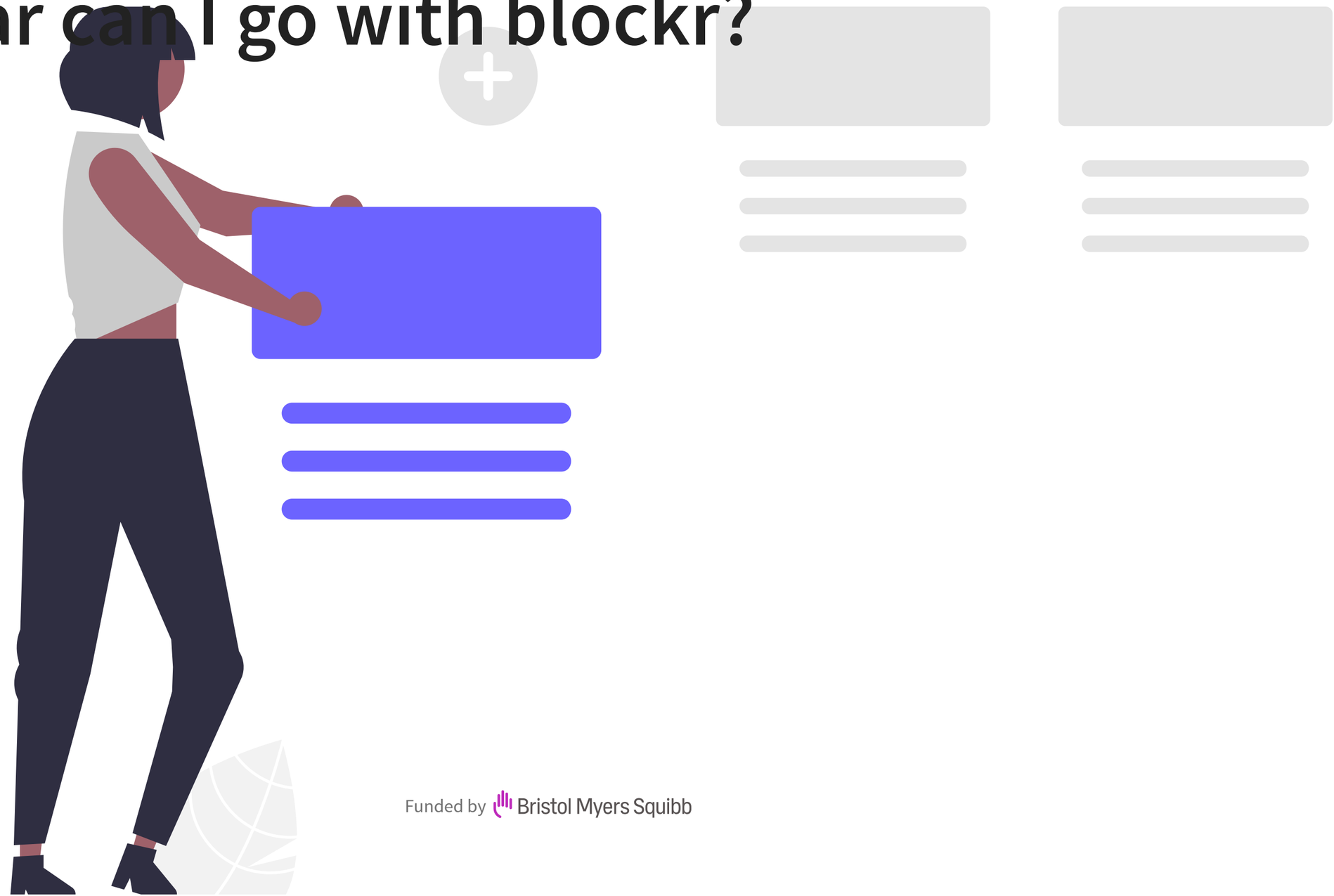
How far can I go with blockr?



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Create your own blocks supermarket

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Today's mission

Create a new **lm()** block:

```
lm(bill_length_mm ~ flipper_length_mm, data = penguins)
```

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Create new blocks: lm block 1/4

```
1 new_lm_block <- function(y = character(), predictor = character(), ...) {
2
3 }
```

① Create the `constructor`.

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Create new blocks: lm block 2/4

```
1  new_lm_block <- function(y = character(), predictor = character(), ...) {
2
3    all_cols <- function(data) colnames(data)
4
5    fields <- list(
6      y = new_select_field(y, all_cols, type = "name"),
7      predictor = new_select_field(predictor, all_cols, type = "name")
8    )
9
10   new_block(
11     fields = fields,
12
13   )
14 }
```

② Construct columns dynamically.

③ Add field(s): **y** and **predictor** columns (`type` allows to pass in cols as name instead of strings.)

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Create new blocks: lm block 3/4

```
1  new_lm_block <- function(y = character(), predictor = character(), ...) {
2
3    all_cols <- function(data) colnames(data)
4
5    fields <- list(
6      y = new_select_field(y, all_cols, type = "name"),
7      predictor = new_select_field(predictor, all_cols, type = "name")
8    )
9
10   new_block(
11     fields = fields,
12     expr = quote({
13       model <- lm(data = data, formula = .(y) ~ .(predictor))
14       broom::tidy(model)
15     }),
```

④

④ Provide expression: use `quote` and pass field name with `.(field_name)`.[1]

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Create new blocks: lm block 4/4

```
new_lm_block <- function(y = character(), predictor = character(), ...) {

  all_cols <- function(data) colnames(data)

  fields <- list(
    y = new_select_field(y, all_cols, type = "name"),
    predictor = new_select_field(predictor, all_cols, type = "name")
  )

  new_block(
    fields = fields,
    expr = quote({
      model <- lm(data = data, formula = .(y) ~ .(predictor))
      broom::tidy(model)
    }),
```

5. Give it the correct classes: `transform_block` + a custom class.

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Testing our new block

Stack

Show 5 entries Search:

	term	estimate	std.error	statistic	p.value
1	(Intercept)	26.89887242359857	1.269147797726379	21.19443651226964	3.85943569185437e-64
2	body_mass_g	0.004051416583945235	0.0002967114032441113	13.65440134638857	3.808282842017802e-34

Showing 1 to 2 of 2 entries Previous 1 Next

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How do we make custom blocks available to users?

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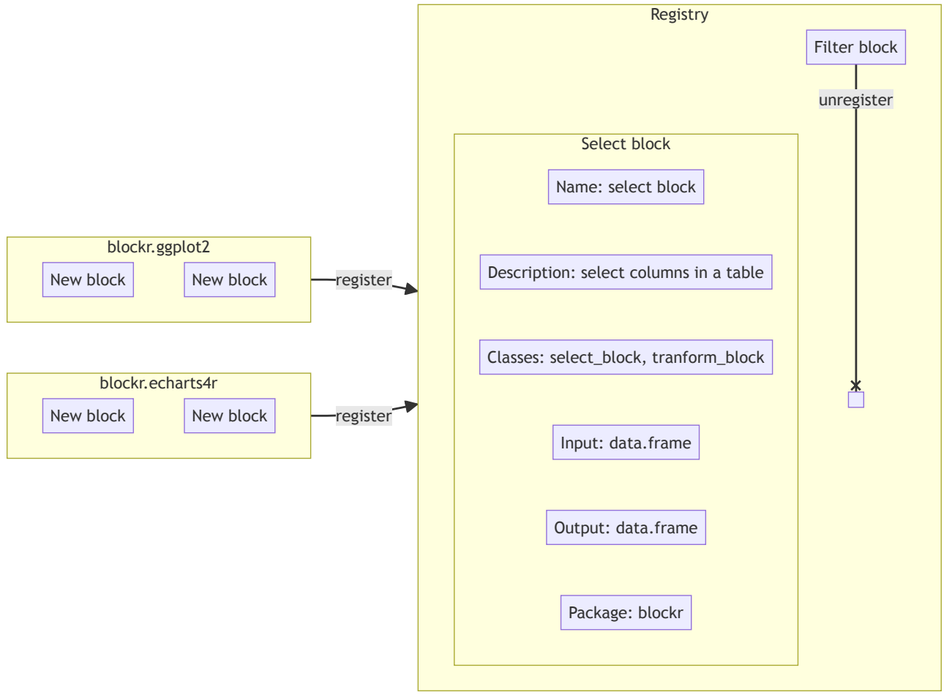
The registry: the blocks supermarket



- **Information** about blocks.
- **Shared** between block packages.

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Filling the supermarket with block

```r
register_lm_block <- function(pkg) {
  register_block(
    constructor = new_lm_block,
    name = "lm block",
    description = "Create a linear model block",
    classes = c("lm_block", "transform_block"),
    input = "data.frame",
    output = "data.frame",
    package = pkg
  )
}

# Put in zzz.R
.onLoad <- function(libname, pkgname) {
  register_lm_block(pkgname)
```

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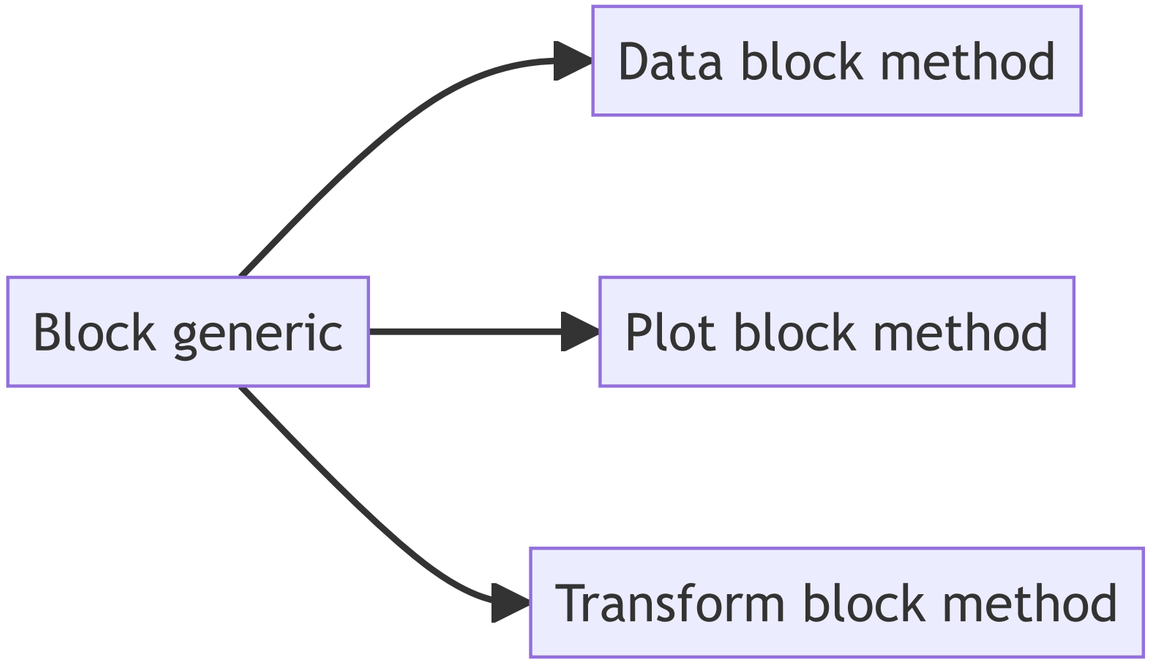
Customize blockr



S3 OO system[1]**: customize** behavior depending on object **class**.

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We need you!

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Getting started

1. Install

```
pak::pak("blockr-org/blockr")

library(blockr)
serve_stack(new_stack())
```

2. Read the doc at https://blockr-org.github.io/blockr/index.html.

3. Enjoy!

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Use blocks and build dashboards

Share dashboards with your teams to **speed up** data analysis

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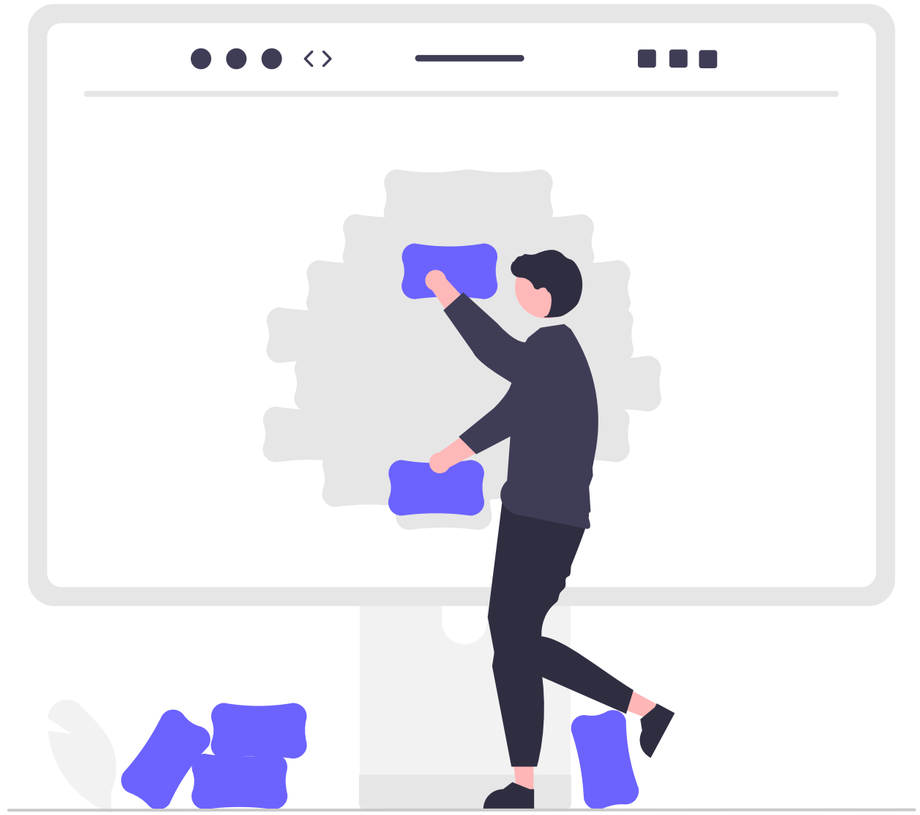
Create blocks to help your data scientists



You're an **advanced** R developer, you can **extend** blockr!

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Our team

Karma Tarap

Bristol Myers Squibb

https://www.bms.com/

John Coene

The Y Company

https://the-y-company.com/

Nicolas Bennett, Christoph Sax, David Granjon

cynkra

https://cynkra.com/

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Appendix

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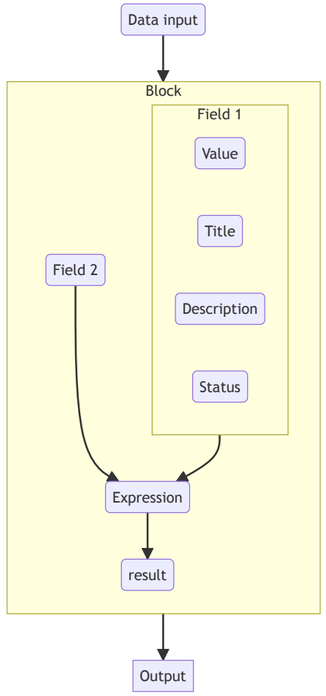
Zoom on blocks and fields 🥦 🥚



- **Fields** are **ingredients**.
- A **block** is a recipe **step**.

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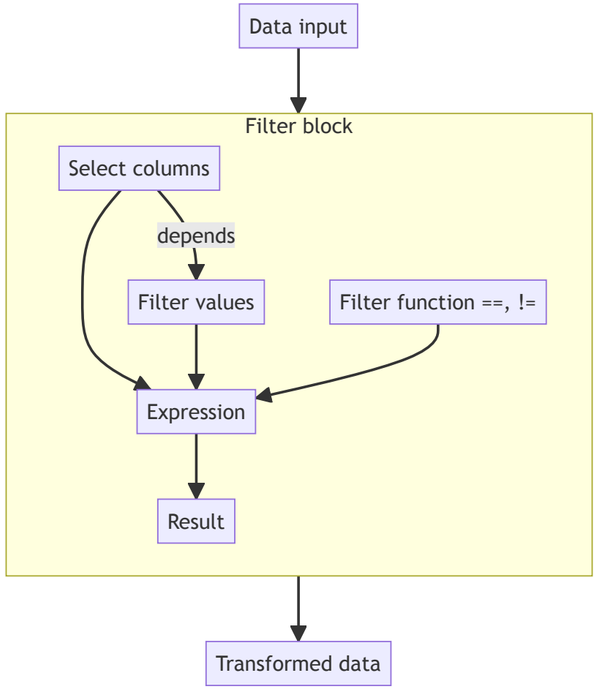
How to build a `dplyr::filter` block?




```
1 data |> filter(<C
2
3 # data |> filter(
```

3 fields:

- `<COLNAME>`
- `<FILTER_FUNC>`
- `<FILTER_VALUE>`: depends on `<COLNAME>`

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blockr: add block demo

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Stack

Show 5 entries

Search:

	species	island	bill_length_mm	bill_depth_mm	flipper_length_mm	body_mass_g	sex	year
1	Adelie	Torgersen	39.1	18.7	181	3750	male	2007
2	Adelie	Torgersen	39.5	17.4	186	3800	female	2007
3	Adelie	Torgersen	40.3	18	195	3250	female	2007
4	Adelie	Torgersen						2007
5	Adelie	Torgersen	36.7	19.3	193	3450	female	2007

Showing 1 to 5 of 344 entries

Previous 1 2 3 4 5 ... 69 Next

blockr: workspace demo

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+ Add stack | Clear all | Save

Stack

Stack

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