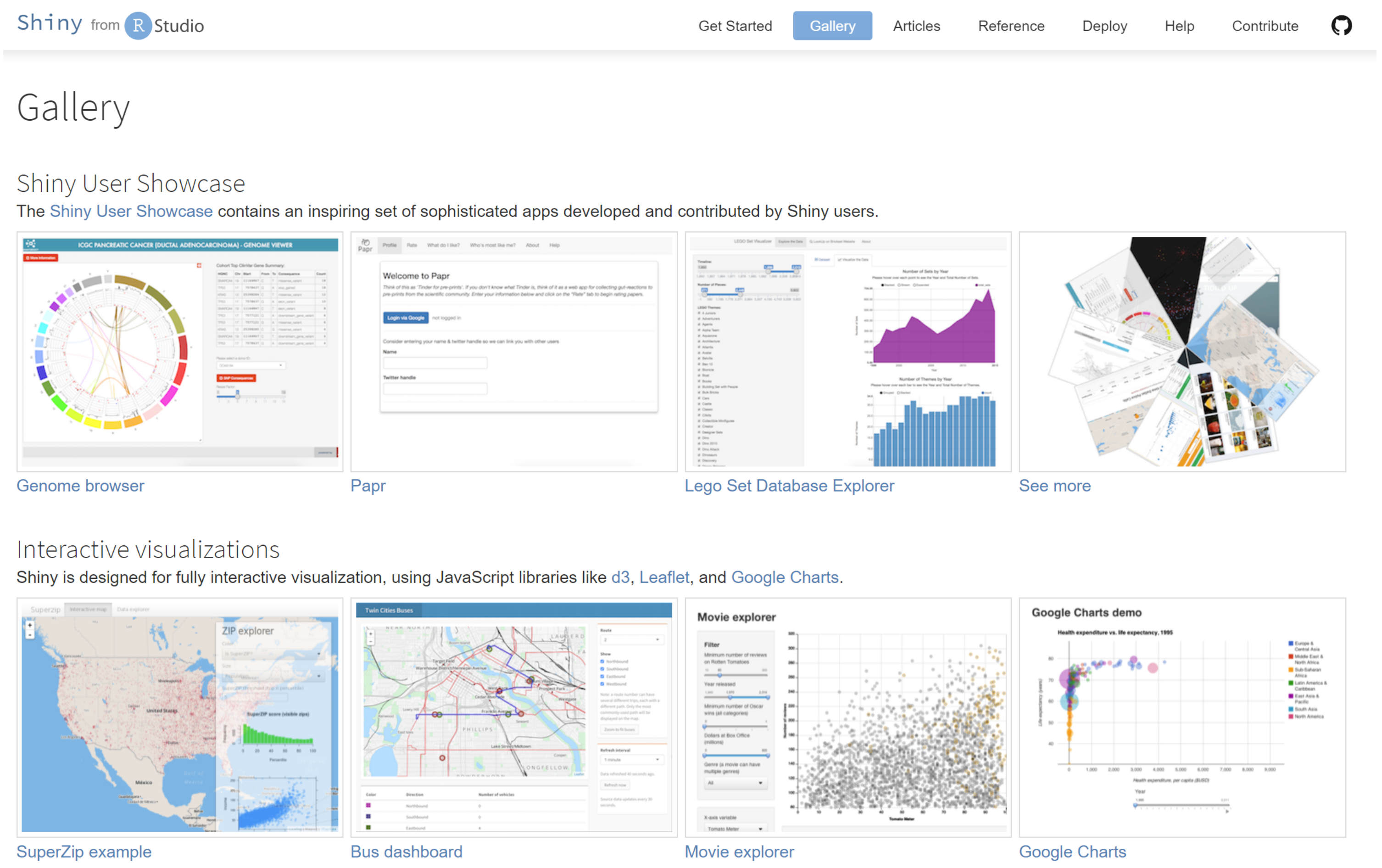
Let's make a shiny dashboard

Aurora & Lene

2019-02-04

What is shiny?



Shiny from R Studio

Get Started · Gallery · Articles · Reference · Deploy · Help · Contribute

Gallery

Shiny User Showcase

The Shiny User Showcase contains an inspiring set of sophisticated apps developed and contributed by Shiny users.

Genome browser · Papr · Lego Set Database Explorer · See more

Interactive visualizations

Shiny is designed for fully interactive visualization, using JavaScript libraries like d3, Leaflet, and Google Charts.

SuperZip example · Bus dashboard · Movie explorer · Google Charts

https://shiny.rstudio.com

Plan for today:

- Step-by-step creation of a shiny dashboard
- A little bit on how shiny works
- Some nice extra features

Code instructions:

```
# This is code you need to add
```

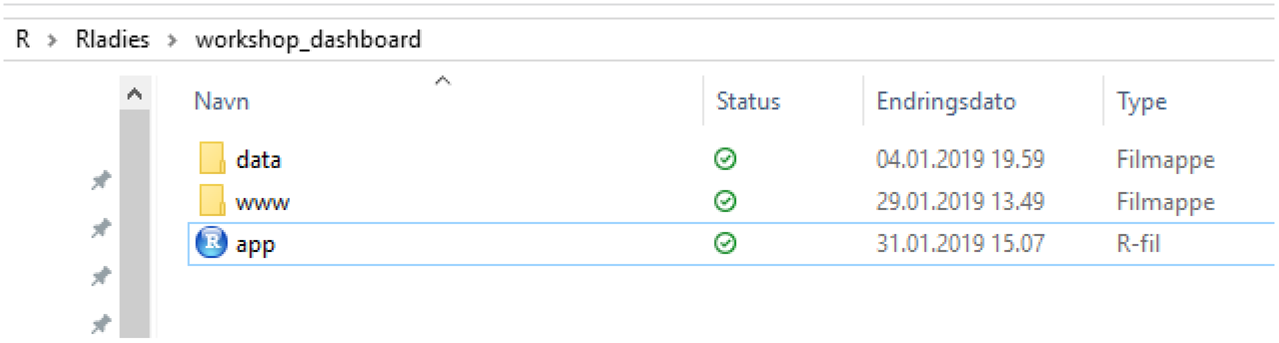
Setup

We need these packages:

```r
install.packages('shiny')
install.packages('shinydashboard')
install.packages('gapminder')
install.packages('tidyverse')
install.packages('DT')
install.packages('plotly')
```

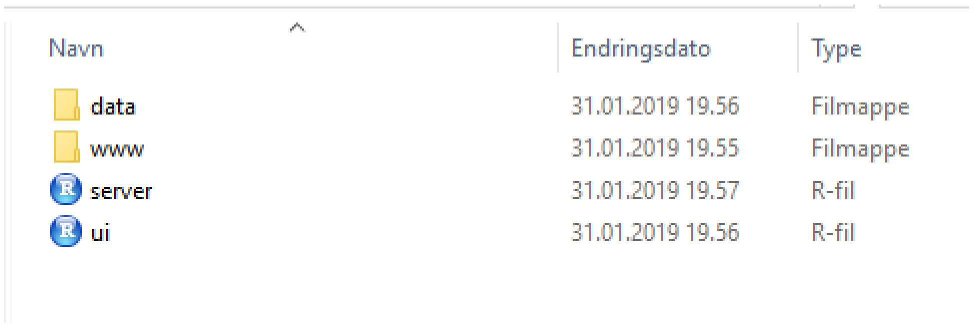
File structure

We will use the upper file structure:



R › Rladies › workshop_dashboard

Navn	Status	Endringsdato	Type
data	✓	04.01.2019 19.59	Filmappe
www	✓	29.01.2019 13.49	Filmappe
app	✓	31.01.2019 15.07	R-fil



Navn	Endringsdato	Type
data	31.01.2019 19.56	Filmappe
www	31.01.2019 19.55	Filmappe
server	31.01.2019 19.57	R-fil
ui	31.01.2019 19.56	R-fil

Starter code

- https://rstudio.github.io/shinydashboard/get_started.html or
- https://github.com/rladies/meetup-presentations_oslo -> shiny-workshop/starter_kit

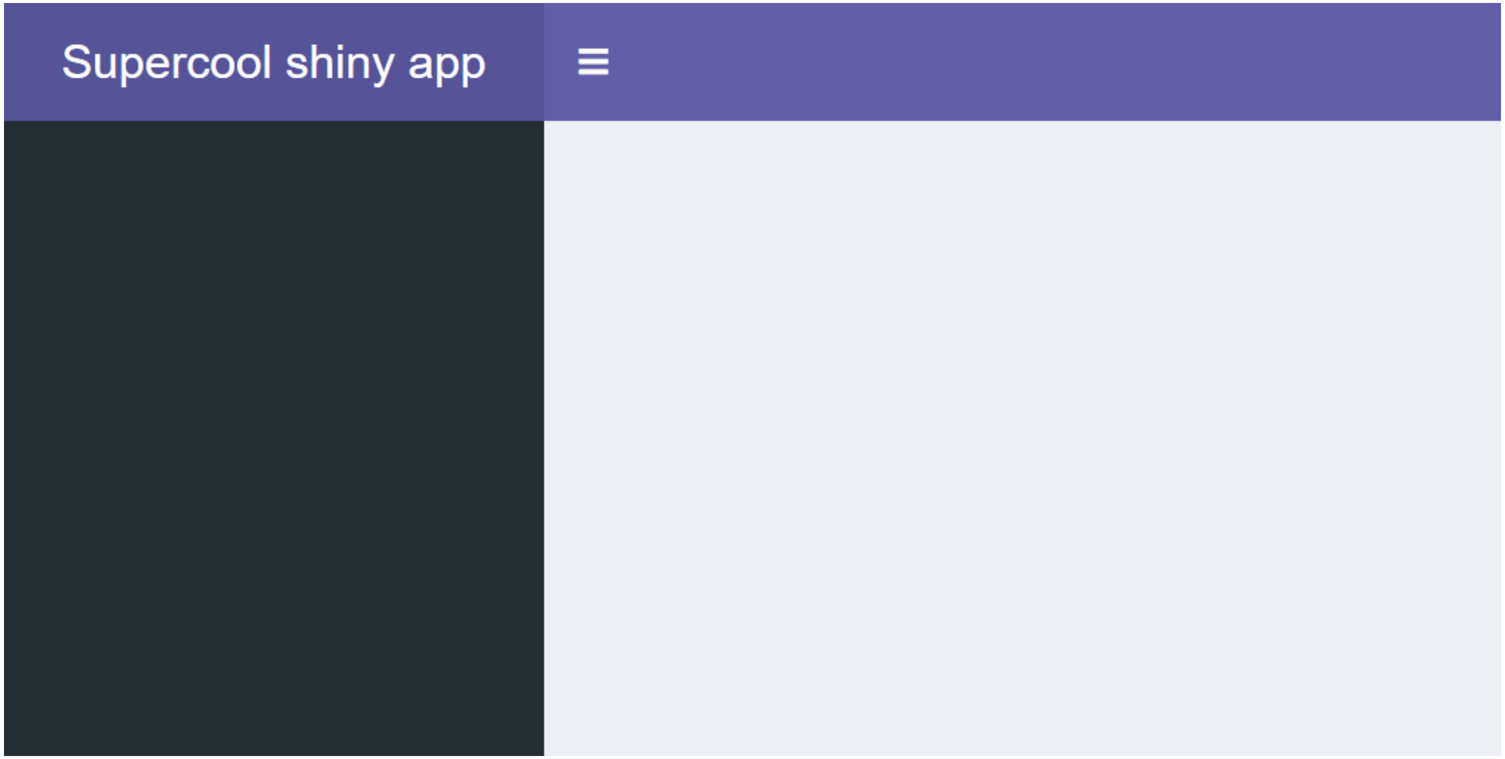
Starter code

- https://rstudio.github.io/shinydashboard/get_started.html or
- https://github.com/rladies/meetup-presentations_oslo -> shiny-workshop/starter_kit

```r
library(shiny)
library(shinydashboard)

# User interface:
ui <- dashboardPage(
  dashboardHeader(),
  dashboardSidebar(),
  dashboardBody()
)

# R code goes here:
server <- function(input, output) {

}

# Run the application
shinyApp(ui = ui, server = server)
```

Title and color

```r
ui <- dashboardPage(skin = "purple",
  dashboardHeader(title = "Supercool shiny app"),
  dashboardSidebar(),
  dashboardBody()
)
```



Create tabs and menu

```
ui <- dashboardPage(skin = "purple",
  dashboardHeader(title = "Supercool shiny app"),
  dashboardSidebar(
    sidebarMenu(
       menuItem("Table", tabName = "table_tab", icon=icon("chart-bar")),
      menuItem("Plot", tabName = "plot_tab", icon=icon("object-group"))
    )
  ),
  dashboardBody(
    tabItems(
      tabItem(tabName = "table_tab", h2("Data table")),
      tabItem(tabName = "plot_tab", h2("First plot"))
    )
  )
)
```

Icons: https://shiny.rstudio.com/reference/shiny/0.14/icon.html

Reactivity = magic?

Connect ui and server

```r
ui <- dashboardPage(
  dashboardHeader(),
  dashboardSidebar(),
  dashboardBody()
)
```

ui: “render” HTML

- Use widgets to create input
- Show output such as text, plots..

```r
server <- function(input, output) {




}
```

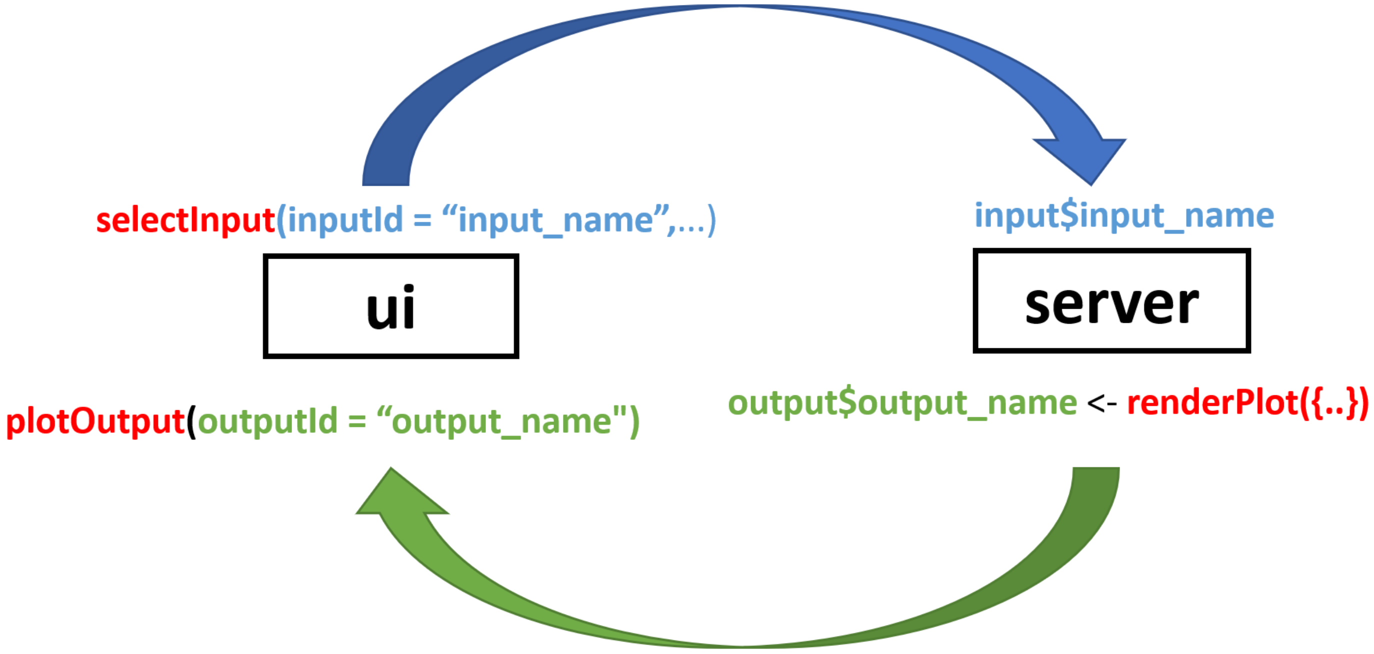
server: run R code

Connect ui and server

```r
ui <- dashboardPage(
  dashboardHeader(),
  dashboardSidebar(),
  dashboardBody(
    selectInput("input_name"),
    plotOutput("output_name")
  )
)
```

```r
server <- function(input, output) {

  output$output_name <- renderPlot({
    #' use input$input_name
    #' to make plot
  })
}
```

Connect ui and server


selectInput(inputId = “input_name”,...)
input$input_name
ui
server
plotOutput(outputId = “output_name")
output$output_name <- renderPlot({..})

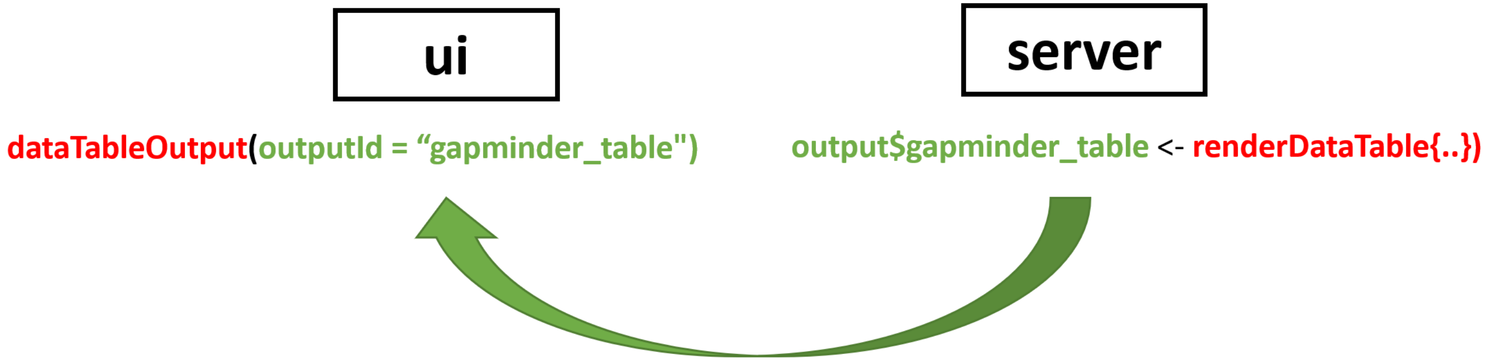
https://shiny.rstudio.com/articles/reactivity-overview.html

Gapminder data

```r
library(tidyverse)
library(gapminder)

gapminder %>%
  head() %>%
  knitr::kable("html")
```

country	continent	year	lifeExp	pop	gdpPercap
Afghanistan	Asia	1952	28.801	8425333	779.4453
Afghanistan	Asia	1957	30.332	9240934	820.8530
Afghanistan	Asia	1962	31.997	10267083	853.1007
Afghanistan	Asia	1967	34.020	11537966	836.1971
Afghanistan	Asia	1972	36.088	13079460	739.9811
Afghanistan	Asia	1977	38.438	14880372	786.1134

First output: Data table



```
dataTableOutput(outputId = “gapminder_table")
```

```
output$gapminder_table <- renderDataTable{..})
```

First output: Data table

```r
library(gapminder)
library(DT)
```

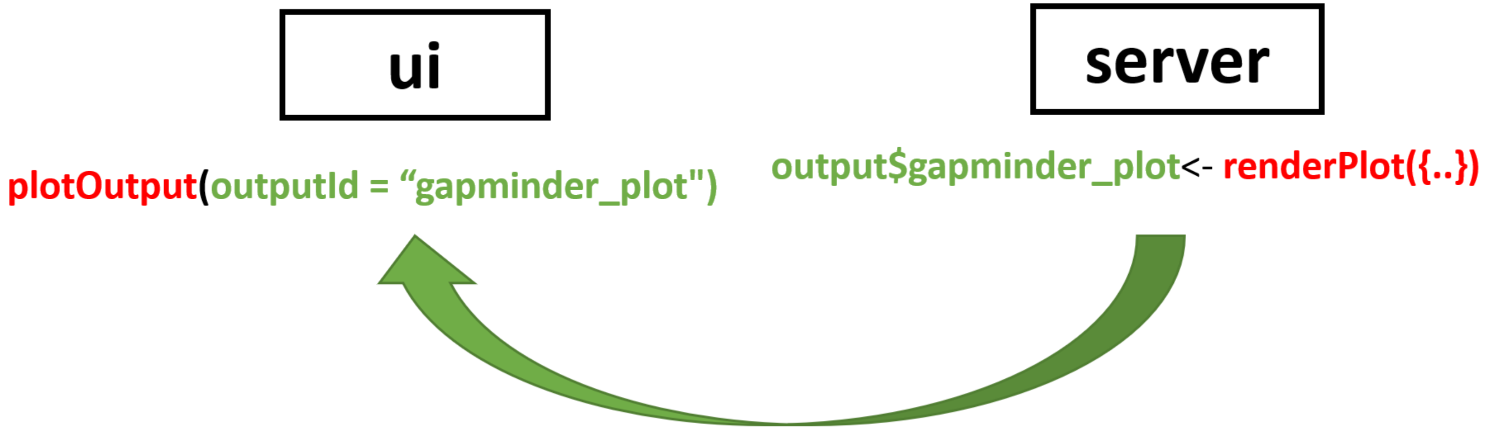
Add the output object under the tab in the ui

```r
tabItem(tabName = "table_tab", h2("Data table"),
  dataTableOutput(outputId = "gapminder_table")
)
```

Create the table on the server side

```r
server <- function(input, output) {
  output$gapminder_table <- renderDataTable(datatable(
    data = gapminder,
    filter = ('top')
  ))
}
```

Plots: renderPlot and plotOutput



```
plotOutput(outputId = “gapminder_plot")
```

```
output$gapminder_plot<- renderPlot({..})
```

Plots: renderPlot and plotOutput

```
library(tidyverse)
```

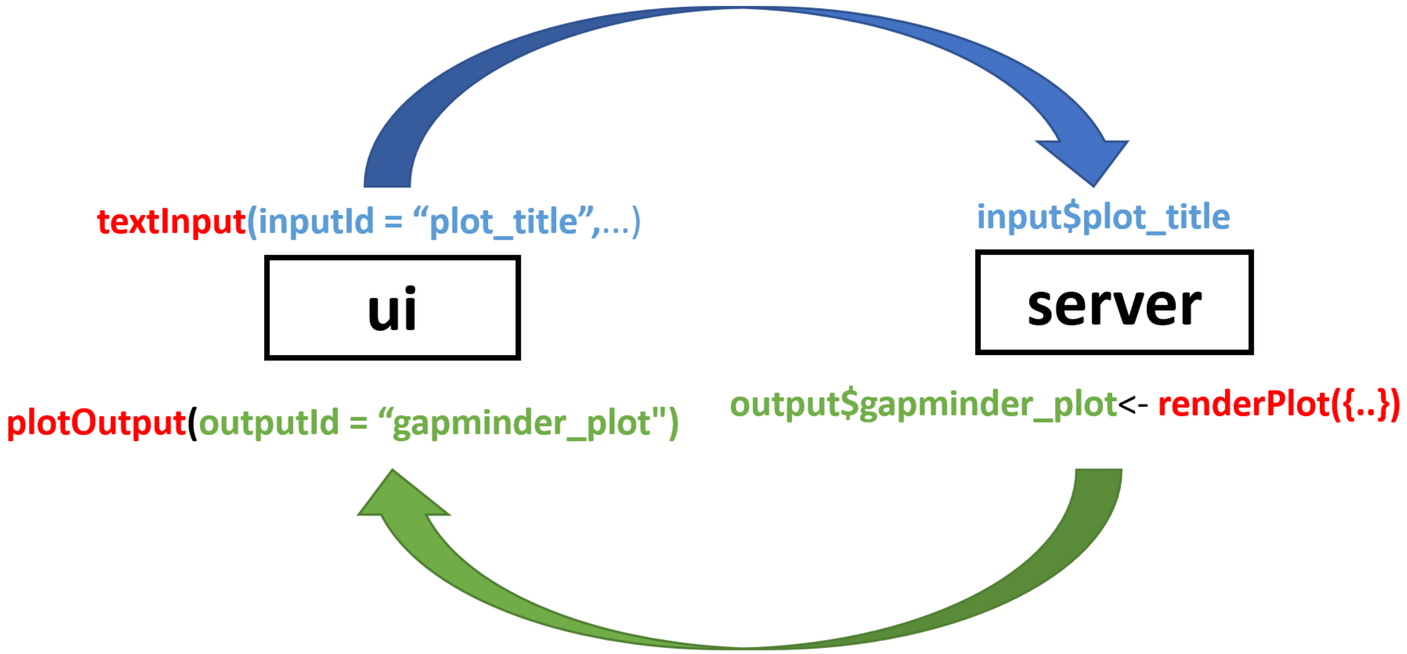
Create a row and a box and a plotOutput in the UI

```
tabItem(tabName = "plot_tab", h2("First plot"),
        fluidRow(
          box(plotOutput("gapminder_plot"))
        )
)
```

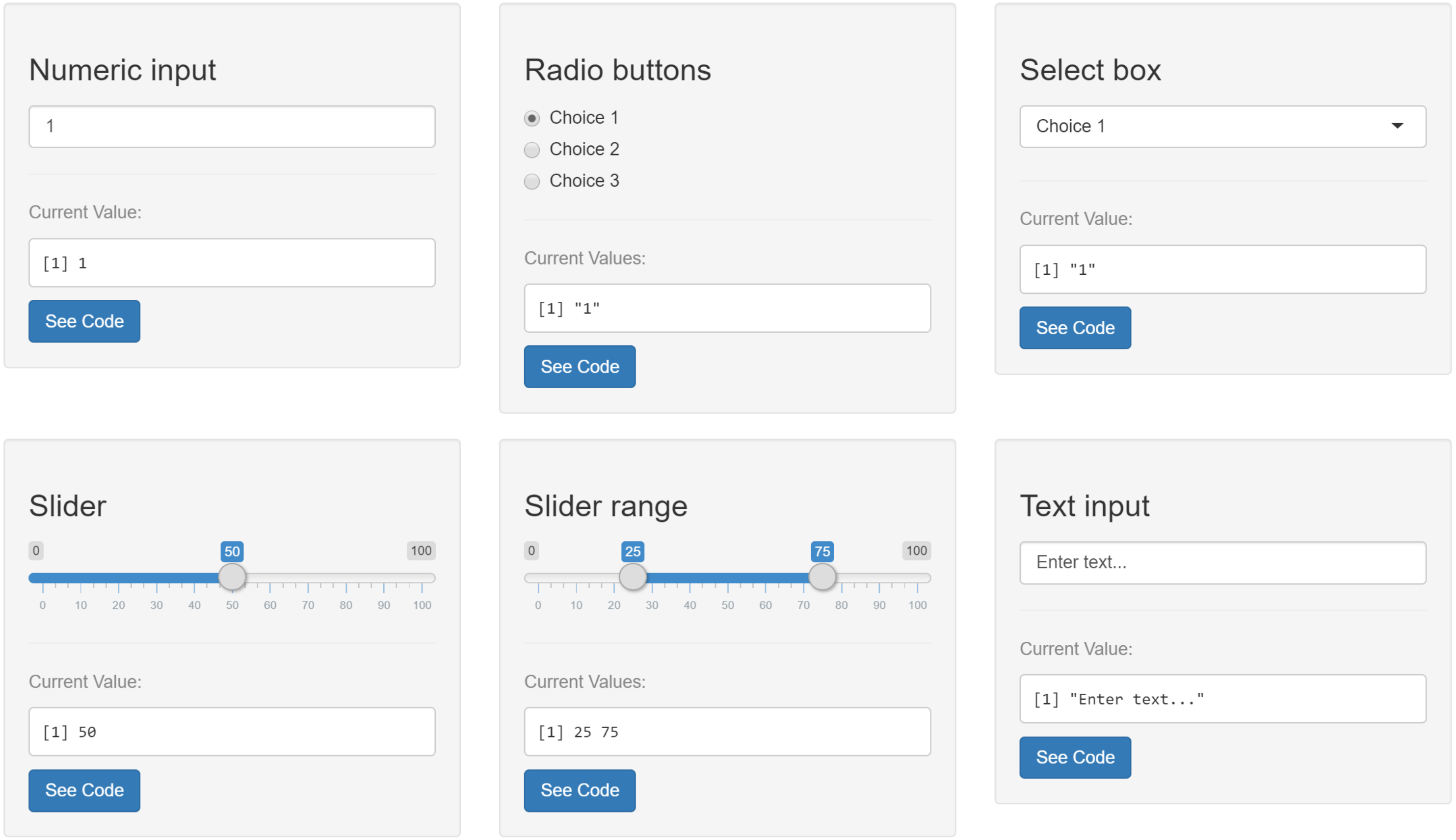
Generate the plot on the server side

```
server <- function(input, output) {
  output$gapminder_plot <- renderPlot({
    ggplot(data = gapminder, aes(x = year, y = lifeExp, color = country)) +
      geom_line() +
      geom_point() +
      scale_colour_manual(values = country_colors) +
      theme(legend.position="none")
  })
}
```

Use widgets to interact with the plot


textInput(inputId = “plot_title”,...)
input$plot_title
ui
server
plotOutput(outputId = “gapminder_plot")
output$gapminder_plot<- renderPlot({..})

Input widgets:



```
[1] 1
```

```
[1] "1"
```

```
[1] "1"
```

```
[1] 50
```

```
[1] 25 75
```

```
[1] "Enter text..."
```

https://shiny.rstudio.com/gallery/widget-gallery.html

First widget: TextInput

Add another box for the widgets

```
fluidRow(
  box(
    textInput(
      inputId = "plot_title",
      label = "Select title for plot:",
      value = "GDP vs life expectancy")
  ),
  box(plotOutput("gapminder_plot"))
)
```

First widget: TextInput

Connect the widget to the plot on the server side

```
server <- function(input, output) {

  output$gapminder_plot <- renderPlot({
    ggplot( data = gapminder, aes(x = year, y = lifeExp, color = country)) +
      geom_line() +
      geom_point() +
      scale_colour_manual(values = country_colors) +
      theme(legend.position="none") +
      ggtitle(input$plot_title)
  })
}
```

Filter the data using a sliderInput

Add the widget in the same box

```
sliderInput(inputId = "year_limits", label = "Select years",
            min = min(gapminder$year), max = max(gapminder$year),
            value = c(1977, 2002)
            )
```

Add a filter inside renderPlot on the server side

```
#remember to rename from gapminder to gapminder_data in the plot
gapminder_data <- gapminder %>%
  filter(year >= input$year_limits[1] & year <= input$year_limits[2])
```

Use selectInput widget to pick continents

Add another widget in the same box

```
selectInput(inputId = "continents", label = "Continents",
            choices = levels(gapminder$continent),
            multiple = TRUE,
            selected = "Europe")
```

And connect it on the server

```
gapminder_data <- gapminder %>%
  filter(
    year >= input$year_limits[1] & year <= input$year_limits[2],
    continent %in% input$continents
    )
```

Exercise: create a numeric input widget to set the point size

- inputId = "point_size"
- label = "Point size"
- value = 2

ui inside box:

```
#
```

server inside renderPlot:

```
#
```

Exercise: create a numeric input widget to set the point size

The widget goes in the ui

```
numericInput(inputId = "point_size", label = "Point size", value = 2, min = 1)
```

The input$point_size goes into renderPlot

```
ggplot(
  data = gapminder_data,
  aes(x = year, y = lifeExp, color = country)
) +
  geom_line() +
  geom_point(size = input$point_size) +
  scale_colour_manual(values = country_colors) +
  theme(legend.position="none") +
  ggtitle(input$plot_title)
```

Make it pretty using CSS

Cascading Style Sheets - the "makeup" of your app

Create a new file custom.css under www:

```
.skin-purple .main-header .navbar {background-color: #88398a;}
.skin-purple .main-header .logo {background-color: #88398a;}
.skin-purple .main-header .logo:hover {background-color: #88398a;}
```

Include it in your app under dashboardBody

```
dashboardBody(
  includeCSS("www/custom.css"),
```

Advanced css: download the Rladies stylesheet we made for you from

https://github.com/rladies/meetup-presentations_oslo/tree/master/shiny-workshop/workshop_dashboard/www

```
includeCSS("www/rladies_stylesheet.css"),
```

Rladies logo

Download the logo from

https://github.com/rladies/meetup-presentations_oslo/tree/master/shiny-workshop/workshop_dashboard/www

into your app's www folder and add code.

After dashboard title:

```
dashboardHeader(title = "Supercool shiny app",
  tags$li(a(href = 'https://rladies.org/',
            img(src = 'logo.png',
                title = "Rladies Home", height = "30px"),
            style = "padding-top:10px; padding-bottom:10px;"),
          class = "dropdown"))
```

Use plotly for animation

Include plotly

```r
library(plotly)
```

Create a new menu item

```r
menuItem("Animated chart", tabName = "animated_tab", icon = icon("spinner"))
```

Create a new tab

```r
tabItem(
        tabName = "animated_tab",
        h2("The best stats you've ever seen"),
        box(
          plotlyOutput("animated_plot")
        )
      )
```

Use plotly for animation

Create the plot:

```r
output$animated_plot <- renderPlotly({

    gapminder_data <- gapminder %>%
      filter(
        year >= input$year_limits[1] & year <= input$year_limits[2],
        continent %in% input$continents
      )

    p <- ggplot(
      data = gapminder_data,
      aes(x = gdpPercap, y = lifeExp, color = country, frame = year)
    ) +
      geom_point() +
      scale_colour_manual(values = country_colors) +
      theme(legend.position="none")

    ggplotly(p)
  })
```

Some cool extras

Actionbuttons can do lot's of things for example change tabs

Add button under the widgets in the lot tab

```
actionButton(
  inputId = 'animate_button',
  label = 'Animate this selection'
  )
```

Special: To change tabs we need to name the menu

```
sidebarMenu(id = 'menu',...)
```

Actionbuttons can do lot's of things for example change tabs

Use **observeEvent** to listen to the button

```
observeEvent(input$animate_button, {
    updateTabItems(session, 'menu', 'animated_tab')
  })
```

Special: add **session** to the server arguments

```
server <- function(input, output, session) { }
```

ColourInput

```r
#install.packages('colourpicker')
library(colourpicker)
```

ui inside box:

```r
colourInput(inputId="colour", label="Point colour", value = "#88398a")
```

server inside renderPlot:

```r
ggplot(
      data = gapminder_data,
      aes(x = year, y = lifeExp, color = country)
    ) +
      geom_line() +
      geom_point(size = input$point_size, color = input$colour) +
      scale_colour_manual(values = country_colors) +
      theme(legend.position="none") +
      ggtitle(input$plot_title)
```

What next - Shiny in production

- Control reactivity: next topic to learn
- Responsivity:
  - Done for you
  - App scales size on any gadget (short demo)
- Scaling to many users:
  - Shinyloadtest - testing synthetic load of many users
  - Profvis - what part of code is slow
  - Keynote talk by Joe Cheng @ rstudioconf:2019: https://resources.rstudio.com/rstudio-conf-2019/shiny-in-production-principles-practices-and-tools-joe-cheng
- Deployment:
  - shiny server
  - shinyapps.io
  - RstudioConnect

Next meetup: 18 March!

Bayesian methods for rank and preference data - from recommendation systems to cancer genomics - https://www.meetup.com/rladies-oslo/events/256566088/

See also Oslo useR! on Wednesday: https://www.meetup.com/Oslo-useR-Group/events/256805098/