Shiny for R : : CHEATSHEET

Building an App

A **Shiny** app is a web page (**ui**) connected to a computer running a live R session (**server**).

Users can manipulate the UI, which will cause the server to update the UI's displays (by running R code).

Save your template as **app.R**. Keep your app in a directory along with optional extra files.

To generate the template, type **shinyapp** and press **Tab** in the RStudio IDE or go to **File > New Project > New Directory > Shiny Application**

```r
# app.R
library(shiny)

ui <- fluidPage(
  numericInput(inputId = "n",
    "Sample size", value = 25),
  plotOutput(outputId = "hist")
)

server <- function(input, output, session) {
  output$hist <- renderPlot({
    hist(rnorm(input$n))
  })
}

shinyApp(ui = ui, server = server)
```

In **ui** nest R functions to build an HTML interface

Customize the UI with **Layout Functions**

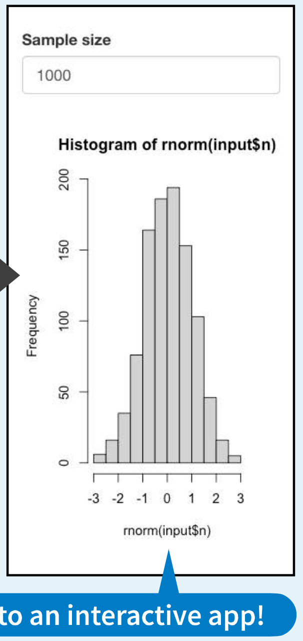
Add Inputs with ***Input() functions**

Add Outputs with ***Output() functions**

Tell the **server** how to render outputs and respond to inputs with R

Wrap code in **render*() functions** before saving to output

Refer to UI inputs with **input$<id>** and outputs with **output$<id>**



Call shinyApp() to combine ui and server into an interactive app!

- app-name — The directory name is the app name
  - app.R
  - DESCRIPTION — (optional) used in showcase mode
  - README — (optional) used in showcase mode
  - R/ — (optional) directory of supplemental .R files that are sourced automatically, must be named "**R**"
  - www/ — (optional) directory of files to share with web browsers (images, CSS, .js, etc.), must be named "**www**"

Launch apps stored in a directory with **runApp(**<path to directory>**)**.

See annotated examples of Shiny apps by running **runExample(**<example name>**)**. Run **runExample()** with no arguments for a list of example names.

Share

Share your app in three ways:

1. **Host it on shinyapps.io**, a cloud based service from Posit. To deploy Shiny apps:

   Create a free or professional account at **shinyapps.io**

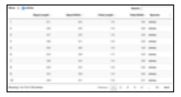
   Click the Publish icon in RStudio IDE, or run: **rsconnect::deployApp(**"<path to directory>"**)**

2. **Purchase Posit Connect**, a publishing platform for R and Python. **posit.co/products/enterprise/connect/**

3. **Build your own Shiny Server** **posit.co/products/open-source/shinyserver/**

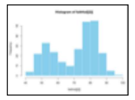
Outputs

render*() and *Output() functions work together to add R output to the UI.



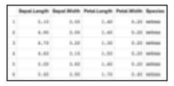
DT::**renderDataTable(**expr, options, searchDelay, callback, escape, env, quoted, outputArgs**)** — **dataTableOutput(**outputId**)**

renderImage(expr, env, quoted, deleteFile, outputArgs**)** — **imageOutput(**outputId, width, height, click, dblclick, hover, brush, inline**)**



renderPlot(expr, width, height, res, …, alt, env, quoted, execOnResize, outputArgs**)** — **plotOutput(**outputId, width, height, click, dblclick, hover, brush, inline**)**

renderPrint(expr, env, quoted, width, outputArgs**)** — **verbatimTextOutput(**outputId, placeholder**)**



renderTable(expr, striped, hover, bordered, spacing, width, align, rownames, colnames, digits, na, …, env, quoted, outputArgs**)** — **tableOutput(**outputId**)**

foo

renderText(expr, env, quoted, outputArgs, sep**)** — **textOutput(**outputId, container, inline**)**

renderUI(expr, env, quoted, outputArgs**)** — **uiOutput(**outputId, inline, container, …**)**
htmlOutput(outputId, inline, container, …**)**

These are the core output types. See **htmlwidgets.org** for many more options.

Inputs

Collect values from the user.

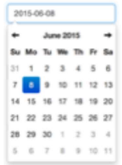
Access the current value of an input object with **input$<inputId>**. Input values are **reactive**.

Action — **actionButton(**inputId, label, icon, width, …**)**

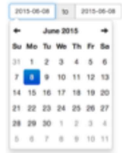
Link — **actionLink(**inputId, label, icon, …**)**

☑ Choice 1 ☑ Choice 2 □ Choice 3 — **checkboxGroupInput(**inputId, label, choices, selected, inline, width, choiceNames, choiceValues**)**

☑ Check me — **checkboxInput(**inputId, label, value, width**)**



dateInput(inputId, label, value, min, max, format, startview, weekstart, language, width, autoclose, datesdisabled, daysofweekdisabled**)**



dateRangeInput(inputId, label, start, end, min, max, format, startview, weekstart, language, separator, width, autoclose**)**

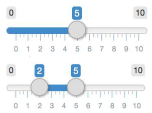
Choose File — **fileInput(**inputId, label, multiple, accept, width, buttonLabel, placeholder**)**

1 — **numericInput(**inputId, label, value, min, max, step, width**)**

•••••••• — **passwordInput(**inputId, label, value, width, placeholder**)**

● Choice A ○ Choice B ○ Choice C — **radioButtons(**inputId, label, choices, selected, inline, width, choiceNames, choiceValues**)**

Choice 1 / Choice 1 / Choice 2 — **selectInput(**inputId, label, choices, selected, multiple, selectize, width, size**)** Also **selectizeInput()**



sliderInput(inputId, label, min, max, value, step, round, format, locale, ticks, animate, width, sep, pre, post, timeFormat, timezone, dragRange**)**

Enter text — **textInput(**inputId, label, value, width, placeholder**)** Also **textAreaInput()**

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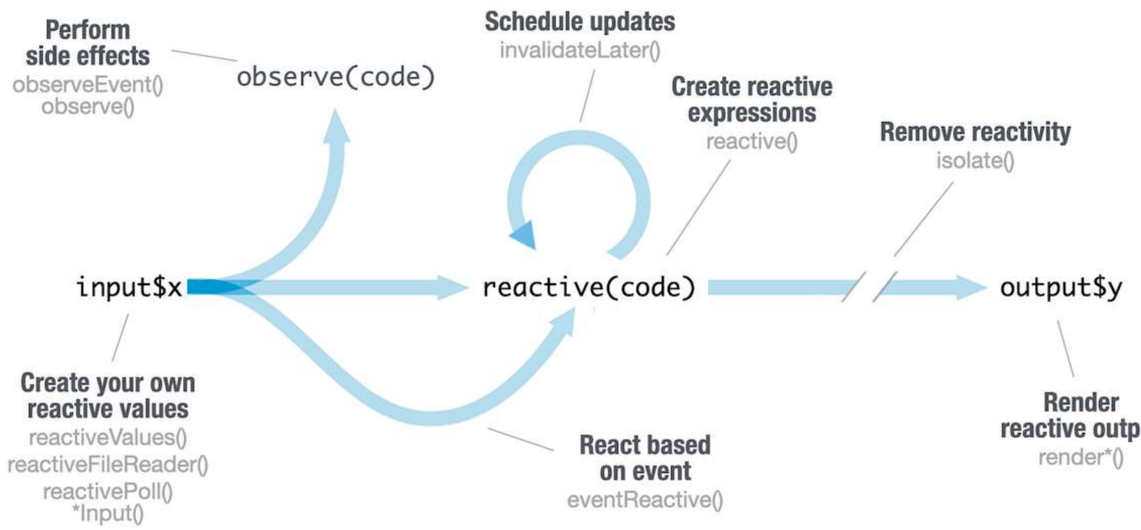
Reactivity

Reactive values work together with reactive functions. Call a reactive value from within the arguments of one of these functions to avoid the error **Operation not allowed without an active reactive context.**



CREATE YOUR OWN REACTIVE VALUES

```
# *Input() example
ui <- fluidPage(
 textInput("a","","A")
)
```

***Input() functions**
Each input function creates a reactive value stored as **input$<inputId>**.

```
#reactiveVal example
server <- function(input,output){
 rv <- reactiveVal()
 rv$number <- 5
}
```

reactiveVal(…)
Creates a single reactive values object.

reactiveValues(…)
Creates a list of names reactive values.

CREATE REACTIVE EXPRESSIONS

```
ui <- fluidPage(
 textInput("a","","A"),
 textInput("z","","Z"),
 textOutput("b"))

server <- function(input,output){
 re <- reactive({
  paste(input$a,input$z)
 })
 output$b <- renderText({
  re()
 })
}
shinyApp(ui, server)
```

reactive(x, env, quoted, label, domain**)**

Reactive expressions:
- **cache** their value to reduce computation
- can be called elsewhere
- notify dependencies when invalidated

Call the expression with function syntax, e.g. re().

REACT BASED ON EVENT

```
ui <- fluidPage(
 textInput("a","","A"),
 actionButton("go","Go"),
 textOutput("b")
)

server <- function(input,output){
 re <- eventReactive(
  input$go,{input$a}
 )
 output$b <- renderText({
  re()
 })
}
```

eventReactive(eventExpr, valueExpr, event.env, event.quoted, value.env, value.quoted, ..., label, domain, ignoreNULL, ignoreInit**)**

Creates reactive expression with code in 2nd argument that only invalidates when reactive values in 1st argument change.

RENDER REACTIVE OUTPUT

```
ui <- fluidPage(
 textInput("a","","A"),
 textOutput("b")
)

server <- function(input,output){
 output$b <-
  renderText({
   input$a
  })
}

shinyApp(ui, server)
```

render*() functions

Builds an object to display. Will rerun code in body to rebuild the object whenever a reactive value in the code changes.

Save the results to **output$<outputId>**.

PERFORM SIDE EFFECTS

```
ui <- fluidPage(
 textInput("a","","A"),
 actionButton("go","Go")
)

server <- function(input,output){
 observeEvent(
  input$go,{
  print(input$a)
  }
 )
}

shinyApp(ui, server)
```

observe(x, env**)**
Creates an observer from the given expression.

observeEvent(eventExpr, handlerExpr, event.env, event.quoted, handler.env, handler.quoted, ..., label, suspended, priority, domain, autoDestroy, ignoreNULL, ignoreInit, once**)**
Runs code in 2nd argument when reactive values in 1st argument change.

REMOVE REACTIVITY

```
ui <- fluidPage(
 textInput("a","","A"),
 textOutput("b")
)

server <- function(input,output){
 output$b <-
  renderText({
   isolate({input$a})
  })
}

shinyApp(ui, server)
```

isolate(expr**)**

Runs a code block. Returns a **non-reactive** copy of the results.

UI - An app's UI is an HTML document.

Use Shiny's functions to assemble this HTML with R.

```
fluidPage(
 textInput("a","")
)
## <div class="container-fluid">
##  <div class="form-group shiny-input-container">
##    <label for="a"></label>
##    <input id="a" type="text"
##       class="form-control" value=""/>
##  </div>
## </div>
```

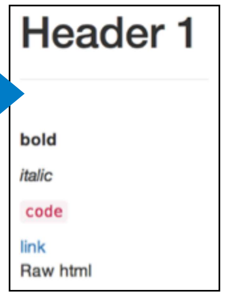
Returns HTML

HTML Add static HTML elements with **tags**, a list of functions that parallel common HTML tags, e.g. **tags$a()**. Unnamed arguments will be passed into the tag; named arguments will become tag attributes.

Run **names(tags)** for a complete list.
`tags$h1("Header") -> <h1>Header</h1>`

The most common tags have wrapper functions. You do not need to prefix their names with **tags$**

```
ui <- fluidPage(
 h1("Header 1"),
 hr(),
 br(),
 p(strong("bold")),
 p(em("italic")),
 p(code("code")),
 a(href="", "link"),
 HTML("<p>Raw html</p>")
)
```



CSS To include a CSS file, use **includeCSS()**, or
1. Place the file in the **www** subdirectory
2. Link to it with:

```
tags$head(tags$link(rel = "stylesheet",
 type = "text/css", href = "<file name>"))
```

JS To include JavaScript, use **includeScript()** or
1. Place the file in the **www** subdirectory
2. Link to it with:

```
tags$head(tags$script(src = "<file name>"))
```

IMAGES To include an image:
1. Place the file in the **www** subdirectory
2. Link to it with img(src="<file name>")

Layouts

Use the **bslib** package to lay out the your app and its components.

PAGE LAYOUTS

Dashboard layouts

page_sidebar() A sidebar page
page_navbar() Multi-page app with a top navigation bar
page_fillable() A screen-filling page layout

Basic layouts

page() **page_fluid()** **page_fixed()**

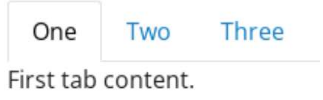
USER INTERFACE LAYOUTS

Multiple columns

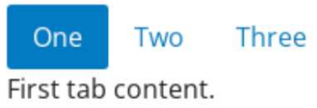
layout_columns()	Organize UI elements into Bootstrap's 12-column CSS grid
layout_column_wrap()	Organize elements into a grid of equal-width columns

Multiple panels

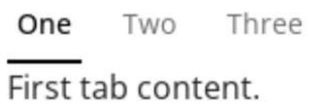
navset_tab()



navset_pill()



navset_underline()



nav_panel()	Content to display when given item is selected
nav_menu()	Create a menu of nav items
nav_item()	Place arbitrary content in the nav panel
nav_spacer()	Add spacing between nav items

Also dynamically update nav containers with **nav_select()**, **nav_insert()**, **nav_remove()**, **nav_show()**, **nav_hide()**.

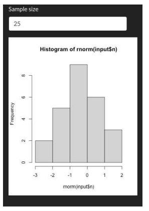
Sidebar layout

sidebar() **layout_sidebar()** **toggle_sidebar()**

Themes

Use the **bslib** package to add existing themes to your Shiny app ui, or make your own.

```
library(bslib)
ui <- fluidPage(
 theme = bs_theme(
  bootswatch = "darkly",
  ...
 )
)
```

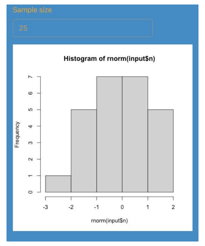


bootswatch_themes() Get a list of themes.

Build your own theme by customizing individual arguments.

```
bs_theme(bg = "#558AC5",
         fg = "#F9B02D",
         ...)
```

?bs_theme for a full list of arguments.



bs_themer() Place within the server function to use the interactive theming widget.