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**

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

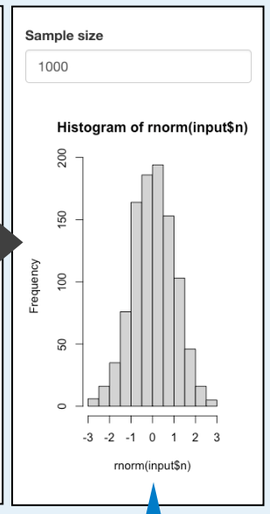
Refer to UI inputs with **input$<id>** and outputs with **output$<id>**

```
# 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)
```



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

```
app-name
  app.R
  DESCRIPTION
  README
  R/
  www/
```

The directory name is the app name

(optional) used in showcase mode

(optional) directory of supplemental .R files that are sourced automatically, must be named "**R**"

(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.

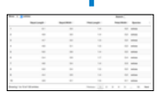
Share

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.

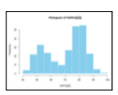


DT::**renderDataTable(**expr, options, searchDelay, callback, escape, env, quoted, outputArgs**)**

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**)**

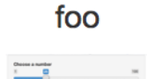
plotOutput(outputId, width, height, click, dblclick, hover, brush, inline**)**

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**)**



renderText(expr, env, quoted, outputArgs, sep**)**

textOutput(outputId, container, inline**)**

renderUI(expr, env, quoted, outputArgs**)**

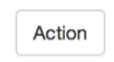
uiOutput(outputId, inline, container, …**)**
htmlOutput(outputId, inline, container, …**)**

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

Inputs

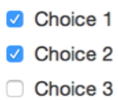
Collect values from the user.

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

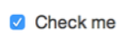


actionButton(inputId, label, icon, width, …**)**

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



checkboxGroupInput(inputId, label, choices, selected, inline, width, choiceNames, choiceValues**)**



checkboxInput(inputId, label, value, width**)**

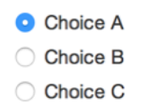
dateInput(inputId, label, value, min, max, format, startview, weekstart, language, width, autoclose, datesdisabled, daysofweekdisabled**)**

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

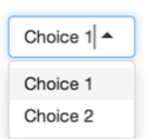
fileInput(inputId, label, multiple, accept, width, buttonLabel, placeholder**)**

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

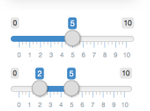
passwordInput(inputId, label, value, width, placeholder**)**



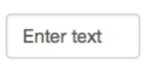
radioButtons(inputId, label, choices, selected, inline, width, choiceNames, choiceValues**)**



selectInput(inputId, label, choices, selected, multiple, selectize, width, size**)** Also **selectizeInput()**



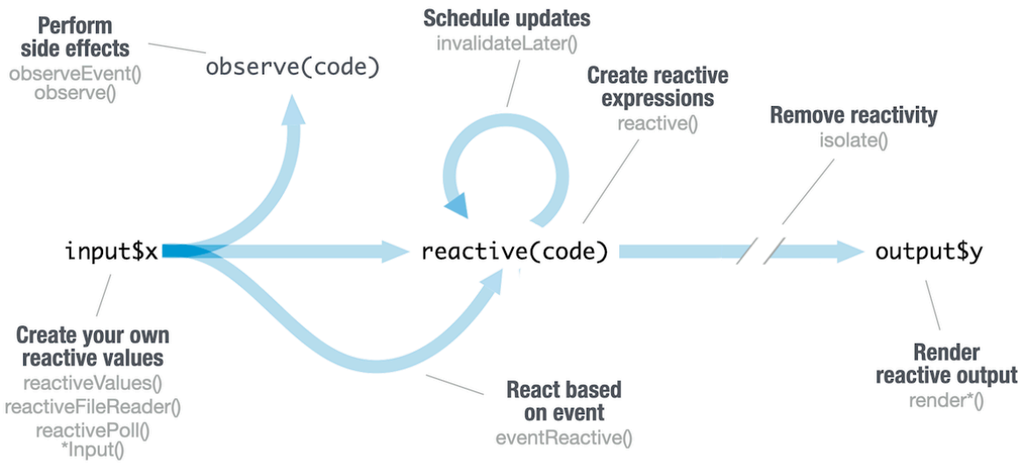
sliderInput(inputId, label, min, max, value, step, round, format, locale, ticks, animate, width, sep, pre, post, timeFormat, timezone, dragRange**)**



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

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")
)
```

```
#reactiveVal example

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

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

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()
 })
}

shinyApp(ui, server)
```

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

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>")
)
```

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>"))
```

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

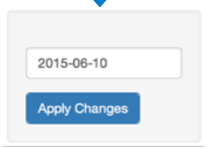
```
tags$head(tags$script(src = "<file name>"))
```

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

Layouts

Combine multiple elements into a "single element" that has its own properties with a panel function, e.g.

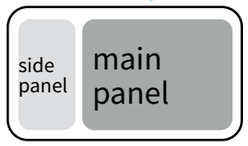
```
wellPanel(
  dateInput("a", ""),
  submitButton()
)
```



absolutePanel()
conditionalPanel()
fixedPanel()
headerPanel()
inputPanel()
mainPanel()
navlistPanel()
sidebarPanel()
tabPanel()
tabsetPanel()
titlePanel()
wellPanel()

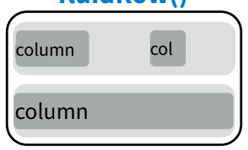
Organize panels and elements into a layout with a layout function. Add elements as arguments of the layout functions.

sidebarLayout()




```
ui <- fluidPage(
  sidebarLayout(
    sidebarPanel(),
    mainPanel()
  )
)
```

fluidRow()




```
ui <- fluidPage(
  fluidRow(column(width = 4),
    column(width = 2, offset = 3)),
  fluidRow(column(width = 12))
)
```

Also **flowLayout()**, **splitLayout()**, **verticalLayout()**, **fixedPage()**, **and fixedRow()**.

Layer tabPanels on top of each other, and navigate between them, with:

```
ui <- fluidPage( tabsetPanel(
    tabPanel("tab 1", "contents"),
    tabPanel("tab 2", "contents"),
    tabPanel("tab 3", "contents")))
```

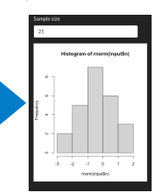
```
ui <- fluidPage( navlistPanel(
    tabPanel("tab 1", "contents"),
    tabPanel("tab 2", "contents"),
    tabPanel("tab 3", "contents")))
```

```
ui <- navbarPage(title = "Page",
    tabPanel("tab 1", "contents"),
    tabPanel("tab 2", "contents"),
    tabPanel("tab 3", "contents"))
```

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",
    ...
  )
)
```

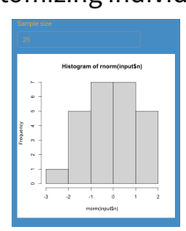


bootswatch_themes() Get a list of themes.

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.