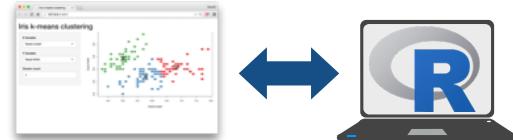




# Shiny :: CHEAT SHEET

## Basics

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).

## APP TEMPLATE

Begin writing a new app with this template. Preview the app by running the code at the R command line.

```
library(shiny)
ui <- fluidPage(
  numericInput(inputId = "n",
    "Sample size", value = 25),
  plotOutput(outputId = "hist"))
server <- function(input, output) {
  output$hist <- renderPlot({
    hist(rnorm(input$n))
  })
}
shinyApp(ui = ui, server = server)
```

- **ui** - nested R functions that assemble an HTML user interface for your app
- **server** - a function with instructions on how to build and rebuild the R objects displayed in the UI
- **shinyApp** - combines **ui** and **server** into an app. Wrap with **runApp()** if calling from a sourced script or inside a function.

## SHARE YOUR APP

The easiest way to share your app is to host it on shinyapps.io, a cloud based service from RStudio

1. Create a free or professional account at <http://shinyapps.io>
2. Click the **Publish** icon in the RStudio IDE or run:  
`rsconnect::deployApp("<path to directory>")`

**Build or purchase your own Shiny Server**  
at [www.rstudio.com/products/shiny-server/](http://www.rstudio.com/products/shiny-server/)



## Building an App

Complete the template by adding arguments to `fluidPage()` and a body to the server function.

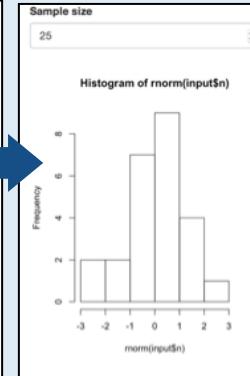
Add inputs to the UI with `*Input()` functions

Add outputs with `*Output()` functions

Tell server how to render outputs with R in the server function. To do this:

1. Refer to outputs with `output$<id>`
2. Refer to inputs with `input$<id>`
3. Wrap code in a `render*>()` function before saving to output

```
library(shiny)
ui <- fluidPage(
  numericInput(inputId = "n",
    "Sample size", value = 25),
  plotOutput(outputId = "hist"))
server <- function(input, output) {
  output$hist <- renderPlot({
    hist(rnorm(input$n))
  })
}
shinyApp(ui = ui, server = server)
```



Save your template as **app.R**. Alternatively, split your template into two files named **ui.R** and **server.R**.

```
library(shiny)
ui <- fluidPage(
  numericInput(inputId = "n",
    "Sample size", value = 25),
  plotOutput(outputId = "hist"))
server <- function(input, output) {
  output$hist <- renderPlot({
    hist(rnorm(input$n))
  })
}
shinyApp(ui = ui, server = server)
```

```
# ui.R
fluidPage(
  numericInput(inputId = "n",
    "Sample size", value = 25),
  plotOutput(outputId = "hist"))

# server.R
function(input, output) {
  output$hist <- renderPlot({
    hist(rnorm(input$n))
  })
}
```

**ui.R** contains everything you would save to ui.

**server.R** ends with the function you would save to server.

No need to call **shinyApp()**.

Save each app as a directory that holds an **app.R** file (or a **server.R** file and a **ui.R** file) plus optional extra files.

● ● ● **app-name**

- app.R
- global.R
- DESCRIPTION
- README
- <other files>
- www

- The directory name is the name of the app
- (optional) defines objects available to both ui.R and server.R
- (optional) used in showcase mode
- (optional) data, scripts, etc.
- (optional) directory of files to share with web browsers (images, CSS, .js, etc.) Must be named "www"

Launch apps with  
`runApp(<path to directory>)`

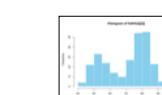
## Outputs - `render*`() and `*Output()` functions work together to add R output to the UI



`DT::renderDataTable(expr, options, callback, escape, env, quoted)`



`renderImage(expr, env, quoted, deleteFile)`



`renderPlot(expr, width, height, res, ..., env, quoted, func)`



`renderPrint(expr, env, quoted, func, width)`

`renderTable(expr, ..., env, quoted, func)`

`renderText(expr, env, quoted, func)`

`renderUI(expr, env, quoted, func)`

works with

`dataTableOutput(outputId, icon, ...)`

`imageOutput(outputId, width, height, click, dblclick, hover, hoverDelay, inline, hoverDelayType, brush, clickId, hoverId)`

`plotOutput(outputId, width, height, click, dblclick, hover, hoverDelay, inline, hoverDelayType, brush, clickId, hoverId)`

`verbatimTextOutput(outputId)`

`tableOutput(outputId)`

`textOutput(outputId, container, inline)`

`uiOutput(outputId, inline, container, ...)`

`htmlOutput(outputId, inline, container, ...)`

## Inputs

collect values from the user

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

Action

Link

- Choice 1
- Choice 2
- Choice 3
- Check me

`checkboxInput(inputId, label, value)`

`dateInput(inputId, label, value, min, max, format, startview, weekstart, language)`

`dateRangeInput(inputId, label, start, end, min, max, format, startview, weekstart, language, separator)`

`fileInput(inputId, label, multiple, accept)`

1

`numericInput(inputId, label, value, min, max, step)`

`passwordInput(inputId, label, value)`

`radioButtons(inputId, label, choices, selected, inline)`

`selectInput(inputId, label, choices, selected, multiple, selectize, width, size) (also selectizeInput())`

.....

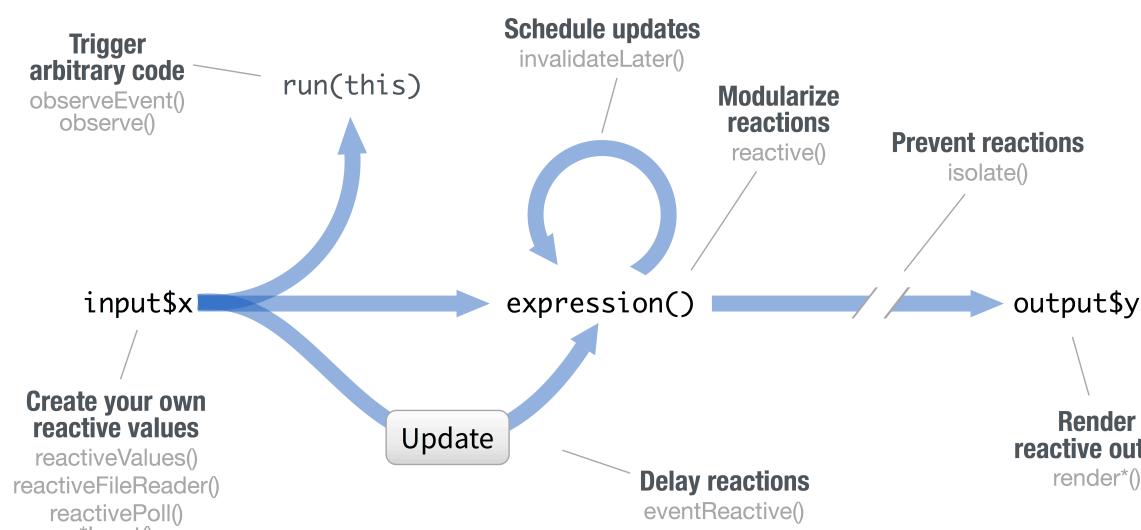
`sliderInput(inputId, label, min, max, value, step, round, format, locale, ticks, animate, width, sep, pre, post)`

`submitButton(text, icon) (Prevents reactions across entire app)`

`textInput(inputId, label, value)`

# 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

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

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

reactiveValues() creates a
list of reactive values
whose values you can set.
```

## PREVENT REACTIONS

```
library(shiny)
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.

## RENDERS REACTIVE OUTPUT

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

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

shinyApp(ui, server)
```

**render\*() functions**  
(see front page)

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>**

## TRIGGER ARBITRARY CODE

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

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

shinyApp(ui, server)
```

**observeEvent(eventExpr, handlerExpr, event.env, event.quoted, handler.env, handler.quoted, label, suspended, priority, domain, autoDestroy, ignoreNULL)**

Runs code in 2nd argument when reactive values in 1st argument change. See **observe()** for alternative.

## MODULARIZE REACTIONS

```
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)**  
Creates a **reactive expression** that  

- caches its value to reduce computation
- can be called by other code
- notifies its dependencies when it has been invalidated

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

## DELAY REACTIONS

```
library(shiny)
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)**

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

## 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>
```



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.

tags\$a	tags\$data	tags\$h6	tags\$nav	tags\$span
tags\$abbr	tags\$datalist	tags\$head	tags\$noscript	tags\$strong
tags\$address	tags\$dd	tags\$header	tags\$object	tags\$style
tags\$area	tags\$del	tags\$hgroup	tags\$ol	tags\$sub
tags\$article	tags\$details	tags\$hrt	tags\$optgroup	tags\$summary
tags\$aside	tags\$dfn	tags\$HTML	tags\$option	tags\$sup
tags\$audio	tags\$div	tags\$si	tags\$output	tags\$table
tags\$b	tags\$dl	tags\$iframe	tags\$p	tags\$tbody
tags\$base	tags\$dt	tags\$img	tags\$param	tags\$td
tags\$bdi	tags\$em	tags\$input	tags\$pre	tags\$textarea
tags\$bdo	tags\$embed	tags\$ins	tags\$progress	tags\$tfoot
tags\$blockquote	tags\$eventsouce	tags\$kbd	tags\$q	tags\$th
tags\$body	tags\$fieldset	tags\$keygen	tags\$ruby	tags\$thead
tags\$br	tags\$figcaption	tags\$label	tags\$rp	tags\$time
tags\$button	tags\$figure	tags\$legend	tags\$rt	tags\$title
tags\$canvas	tags\$footer	tags\$li	tags\$ss	tags\$tr
tags\$caption	tags\$form	tags\$link	tags\$amp	tags\$track
tags\$cite	tags\$h1	tags\$mark	tags\$script	tags\$u
tags\$code	tags\$h2	tags\$map	tags\$section	tags\$ul
tags\$col	tags\$h3	tags\$menu	tags\$select	tags\$var
tags\$colgroup	tags\$h4	tags\$meta	tags\$small	tags\$video
tags\$command	tags\$h5	tags\$meter	tags\$source	tags\$wbr

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>"))
```

**Header 1**

**bold**  
**italic**  
**code**  
**link**  
Raw html



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>"))
```



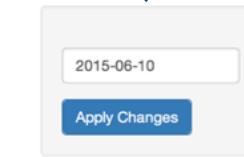
To include an image  
1. Place the file in the **www** subdirectory  
2. Link to it with **img(src=<file name>")**

## 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.

**fluidRow()**

```
ui <- fluidPage(
  fluidRow(column(4),
    column(8))
)
```



**flowLayout()**

```
ui <- fluidPage(
  flowLayout(object 1,
    object 2,
    object 3)
)
```



**sidebarLayout()**

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



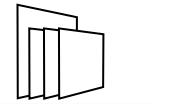
**splitLayout()**

```
ui <- fluidPage(
  splitLayout(object 1,
    object 2)
)
```



**verticalLayout()**

```
ui <- fluidPage(
  verticalLayout(object 1,
    object 2,
    object 3)
)
```



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

```
ui <- fluidPage( tabsPanel(
  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"))
```