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()
server <- function(input, output){}
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 - in three ways:

1. Host it on shinyapps.io, a cloud based service from RStudio. To do so:
   - Create a free or professional account at http://shinyapps.io
   - Click the Publish icon in RStudio IDE, or run: rsconnect::deployApp("<path to directory>")
2. Purchase RStudio Connect, a publishing platform for R and Python. www.rstudio.com/products/connect/
3. Build your own Shiny Server https://rstudio.com/products/shiny/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:

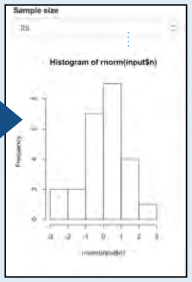
1. Refer to outputs with output$<id>
2. Refer to inputs with input$<id>
3. Wrap code in a render*() function before saving to output

```
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")
)
```

ui.R contains everything you would save to ui.

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

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

No need to call shinyApp().

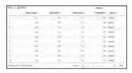
Save each app as a directory that holds an app.R file (or a server.R file and a ui.R file) plus optional extra files.

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

Launch apps with runApp(<path to directory>)

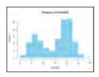
Outputs - render*() and *Output() functions work together to add R output to the UI

works with



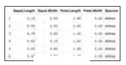
DT::renderDataTable(expr, options, callback, escape, env, quoted) — dataTableOutput(outputId, icon, …)

renderImage(expr, env, quoted, deleteFile) — imageOutput(outputId, width, height, click, dblclick, hover, hoverDelay, inline, hoverDelayType, brush, clickId, hoverId)



renderPlot(expr, width, height, res, …, env, quoted, func) — plotOutput(outputId, width, height, click, dblclick, hover, hoverDelay, inline, hoverDelayType, brush, clickId, hoverId)

renderPrint(expr, env, quoted, func, width) — verbatimTextOutput(outputId)



renderTable(expr,…, env, quoted, func) — tableOutput(outputId)

foo

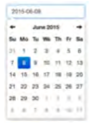
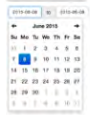
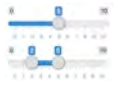
renderText(expr, env, quoted, func) — textOutput(outputId, container, inline)

renderUI(expr, env, quoted, func) — uiOutput(outputId, inline, container, …) & htmlOutput(outputId, inline, container, …)

Inputs

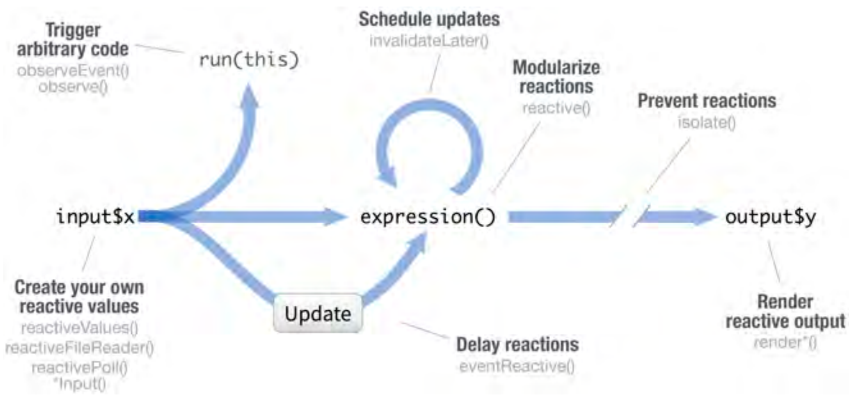
collect values from the user

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

Action	actionButton(inputId, label, icon, …)
Link	actionLink(inputId, label, icon, …)
✓ Choice 1 ✓ Choice 2 ☐ Choice 3	checkboxGroupInput(inputId, label, choices, selected, inline)
✓ 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)
Choose File	fileInput(inputId, label, multiple, accept)
1	numericInput(inputId, label, value, min, max, step)
••••••••	passwordInput(inputId, label, value)
● Choice A ○ Choice B ○ Choice C	radioButtons(inputId, label, choices, selected, inline)
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)
Apply Changes	submitButton(text, icon) (Prevents reactions across entire app)
Enter text	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
}
```

*Input() functions
(see front page)

reactiveValues(…)

Each input function creates a reactive value stored as input$<inputId>

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

RENDER 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>

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.

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, labe, 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 ha 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()
 })
}
```

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>
```

Returns HTML

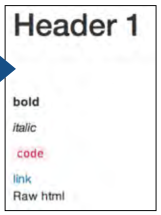
HTML

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.

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$hr	tags$optgroup	tags$summary
tags$aside	tags$dfn	tags$HTML	tags$option	tags$sup
tags$audio	tags$div	tags$i	tags$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$eventsource	tags$kbd	tags$q	tags$th
		tags$keygen	tags$ruby	tags$thead
tags$body	tags$fieldset	tags$label	tags$rp	tags$time
tags$br	tags$figcaption	tags$legend	tags$rt	tags$title
tags$button	tags$figure	tags$li	tags$s	tags$tr
tags$canvas	tags$footer	tags$link	tags$samp	tags$track
tags$caption	tags$form	tags$mark	tags$script	tags$u
tags$cite	tags$h1	tags$map	tags$section	tags$ul
tags$code	tags$h2	tags$menu	tags$select	tags$var
tags$col	tags$h3	tags$meta	tags$small	tags$video
tags$colgroup	tags$h4	tags$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>")
)
```



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>"))
```

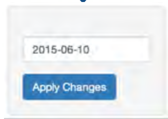
IMAGES

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

Layouts

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

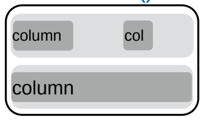
```
wellPanel(dateInput("a", ""),
   submitButton()
)
```



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

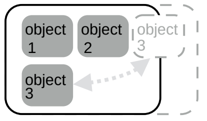
Organize panels and elements into a layout with a layout function. Add elements as arguments of the layout functions.

fluidRow()



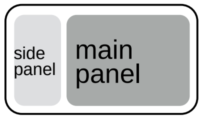
```
ui <- fluidPage(
  fluidRow(column(width = 4),
     column(width = 2,  offset = 3)),
  fluidRow(column(width = 12))
)
```

flowLayout()



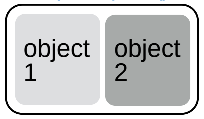
```
ui <- fluidPage(
  flowLayout( # object 1,
              # object 2,
              # object 3
  )
)
```

sidebarLayout()



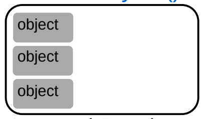
```
ui <- fluidPage(
  sidebarLayout(
     sidebarPanel(),
     mainPanel()
  )
)
```

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( 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"))
```