NYC DATA SCIENCE ACADEMY

Introduction to Shiny

Outline of today's class

- Shiny introduction
- Design the User-interface
- Control Widgets
- Build reactive output
- Use datatable in Shiny Apps

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  - Design the User-interface
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What is Shiny

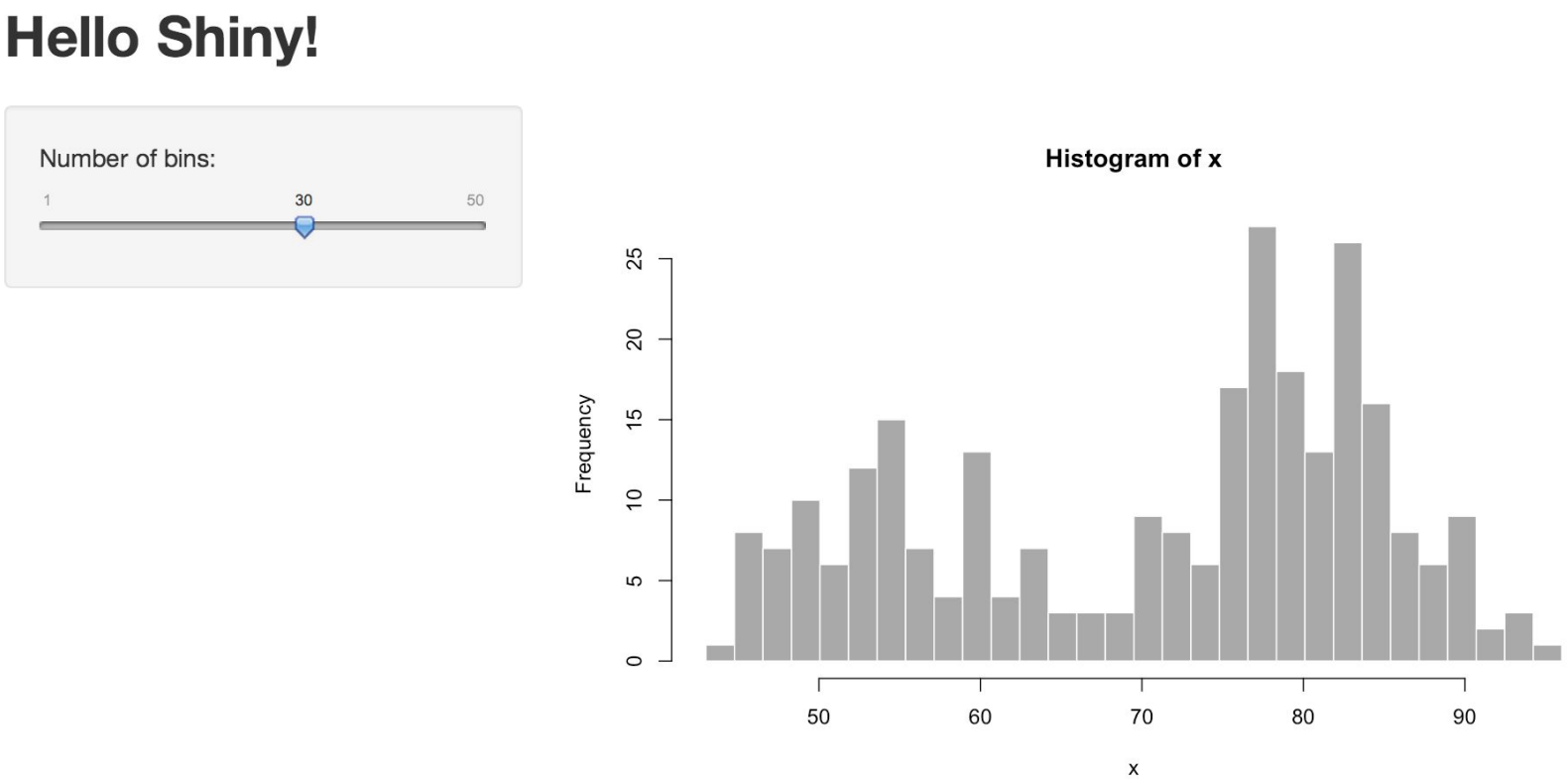
- A web application framework for R.
- Turn your analyses into interactive web applications.
- NO HTML, CSS, or JavaScript knowledge required.

Shiny Features

- Shiny makes it super simple for R users to turn analyses into interactive web applications that anyone can use.
- Let your users choose input parameters using friendly controls like sliders, dropdowns, and text fields.
- Easily incorporate any number of outputs like plots, tables, and summaries.
- If you have some experience with R, you're just minutes away from combining the statistical power of R with the simplicity of a web page.

Example: Hello Shiny!

```
library(shiny)
runExample("01_hello")
```



Structure of a Shiny App

- Shiny apps have two components:
  - A user-interface script
    - Store in ui.R script
    - Control the layout and appearance
  - A server script
    - Store in server.R script
    - Instructions computer needs to build app

Structure of a Shiny App

- User-interface script
  - Defined in a source script named ui.R
  - Controls the layout and appearance of your app

ui.R Script for Hello Shiny Example

```
shinyUI(fluidPage(
  # Application title
  titlePanel("Hello Shiny!"),
  # Sidebar with a slider input for the number of bins
  sidebarLayout(
    sidebarPanel(
      sliderInput("bins",
                  "Number of bins:",
                  min = 1,
                  max = 50,
                  value = 30)
    ),
    # Show a plot of the generated distribution
    mainPanel(
      plotOutput("distPlot")
    )
  )
))
```

Structure of a Shiny App

- Server script
  - Defined in a source script named server.R.
  - Contains instructions that your computer needs to build your app.

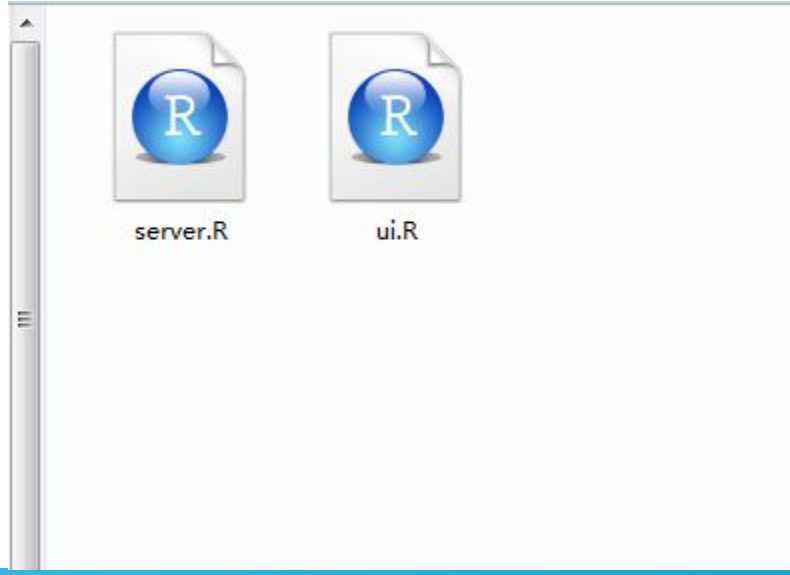
server.R Script for Hello Shiny Example

```
shinyServer(function(input, output) {
  # Expression that generates a histogram. The expression is
  # wrapped in a call to renderPlot to indicate that:
  #
  #  1) It is "reactive" and therefore should re-execute
automatically
  #     when inputs change
  #  2) Its output type is a plot
  output$distPlot <- renderPlot({
    x    <- faithful[, 2]  # Old Faithful Geyser data
    bins <- seq(min(x), max(x), length.out = input$bins + 1)

    # draw the histogram with the specified number of bins
    hist(x, breaks = bins, col = 'darkgray', border = 'white')
  })
})
```

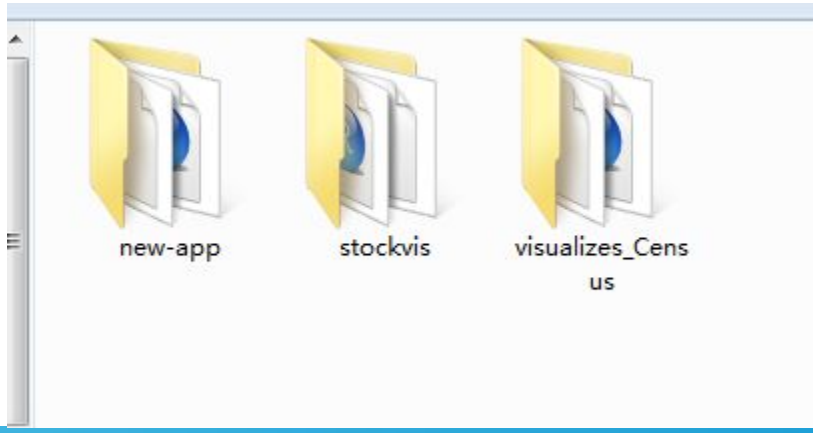
Running an App

- Every Shiny app has the same structure: two R scripts saved together in a directory.
- At a minimum, a Shiny app has ui.R and server.R files.



Running an App

- Create a Shiny app by making a new directory and saving a ui.R and server.R file inside it.
- Each app will need its own unique directory.



Running an App

- Run a Shiny app by giving the name of its directory to the function runApp.
- For example :
  - If your Shiny app is in a directory called my_app, run it with the following code:

```
library(shiny)
runApp("~/my_app")
```

  - The first argument of runApp is the app's directory.

Running an App

- More examples without coding

```
library(shiny)
runExample("01_hello") # a histogram
runExample("02_text") # tables and data
frames
runExample("03_reactivity") # a reactive
expression
runExample("04_mpg") # global variables
runExample("05_sliders") # slider bars
runExample("06_tabsets") # tabbed panels
runExample("07_widgets") # help text and submit buttons
...
```

Outline of today's class

- Shiny introduction
- **Design the User-interface**
- Control Widgets
- Build reactive output
- Use datatable in Shiny Apps

Create an Empty App

- Edit the scripts to match the ones below:
  - ui.R

```
shinyUI(fluidPage(
))
```

  - server.R

```
shinyServer(function(input, output) {
})
```

- This code is the bare minimum needed to create a Shiny app.
- The result is an empty app with a blank user-interface, an appropriate starting point for this lesson.

Layout

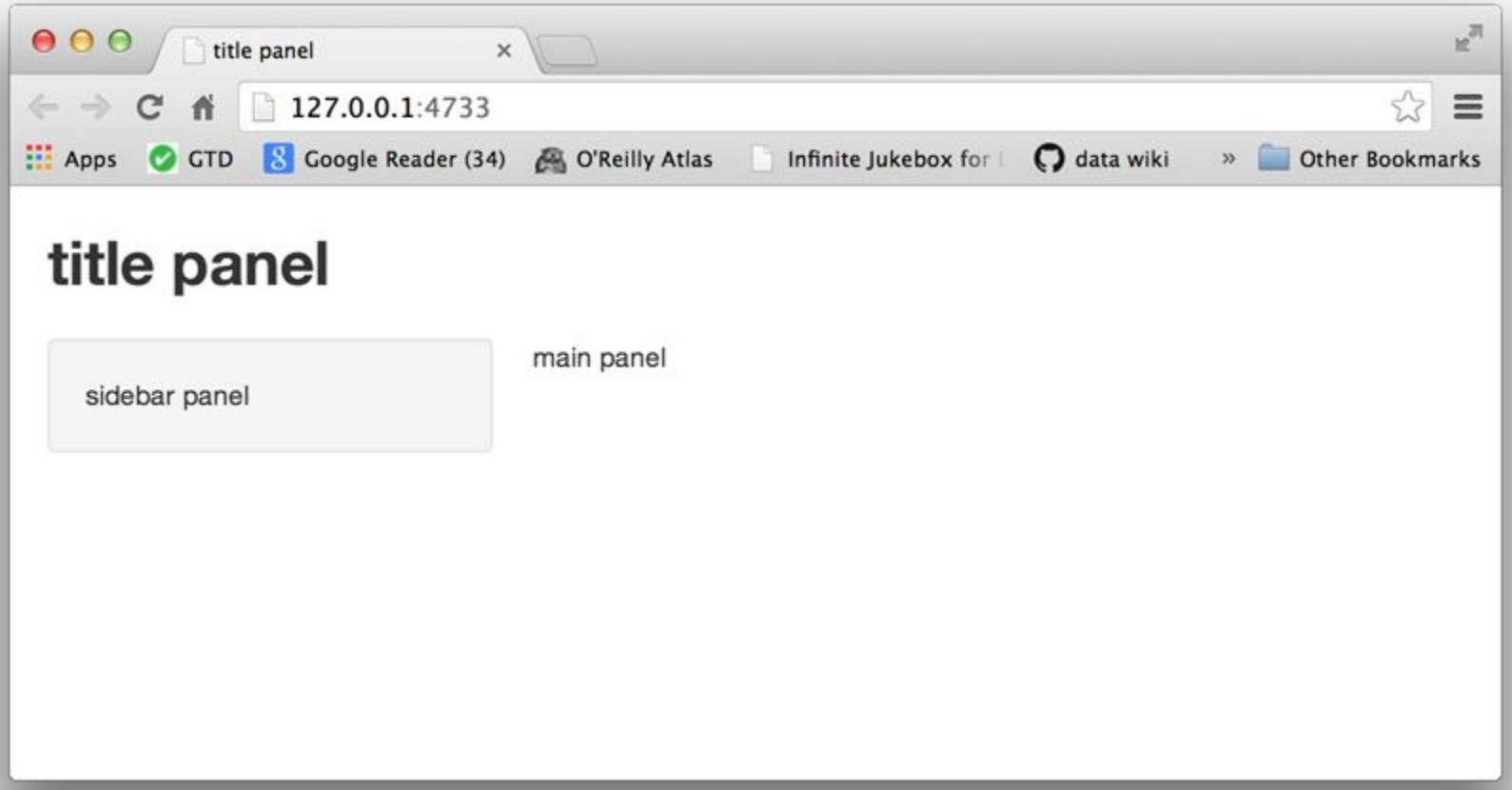
- ui.R scripts use the function fluidPage to create a display that automatically adjusts to the dimensions of your user's browser window.
- Lay out your app by placing elements in the function fluidPage .

```
# ui.R
shinyUI(fluidPage(
  titlePanel("title panel"),

  sidebarLayout(
    sidebarPanel( "sidebar panel"),
    mainPanel("main panel")
  )
))
```

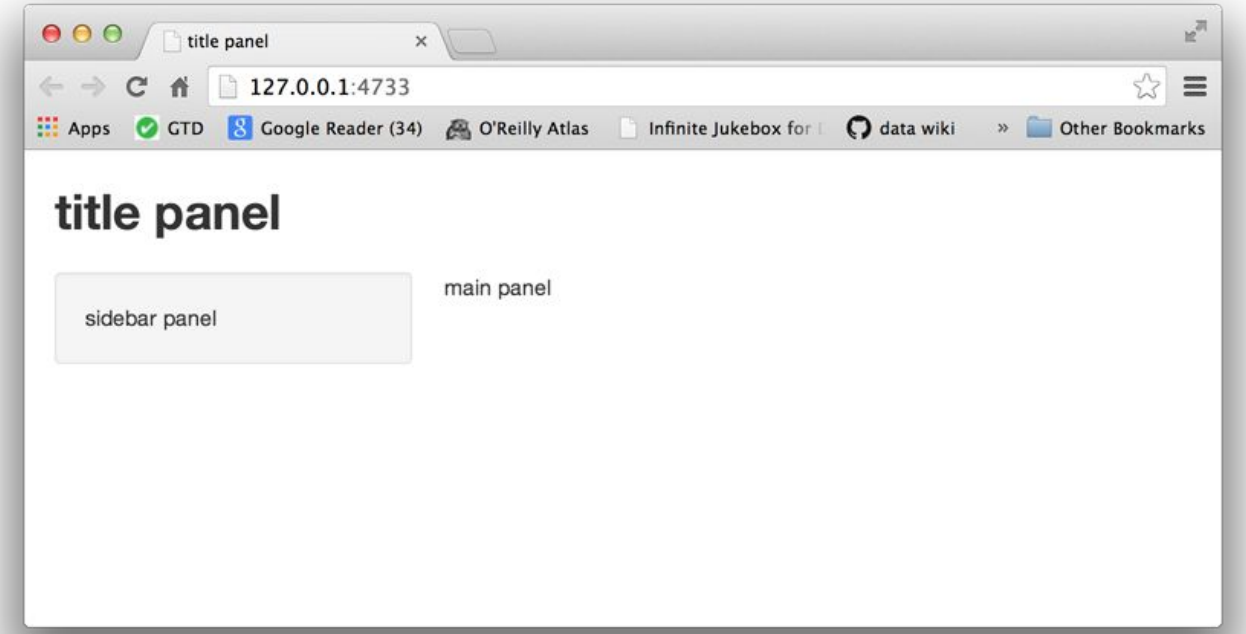
Layout

- It creates a UI with 3 titles:



Layout

- Add elements to fluidPage
  - titlePanel and sidebarLayout
    - The two most popular elements to add to fluidPage.
    - Create a basic Shiny app with a sidebar.



Layout

- titlePanel show the head title.
- sidebarLayout always takes two arguments:
  - sidebarPanel function output
    - default:left
  - mainPanel function output

```
# ui.R
shinyUI(fluidPage(
  titlePanel("title panel"),
## Title  of the shiny.
  sidebarLayout(
    sidebarPanel( "sidebar panel"), ## SideBar panel title
    mainPanel("main panel")         ## Main panel title
  )
))
```

Layout

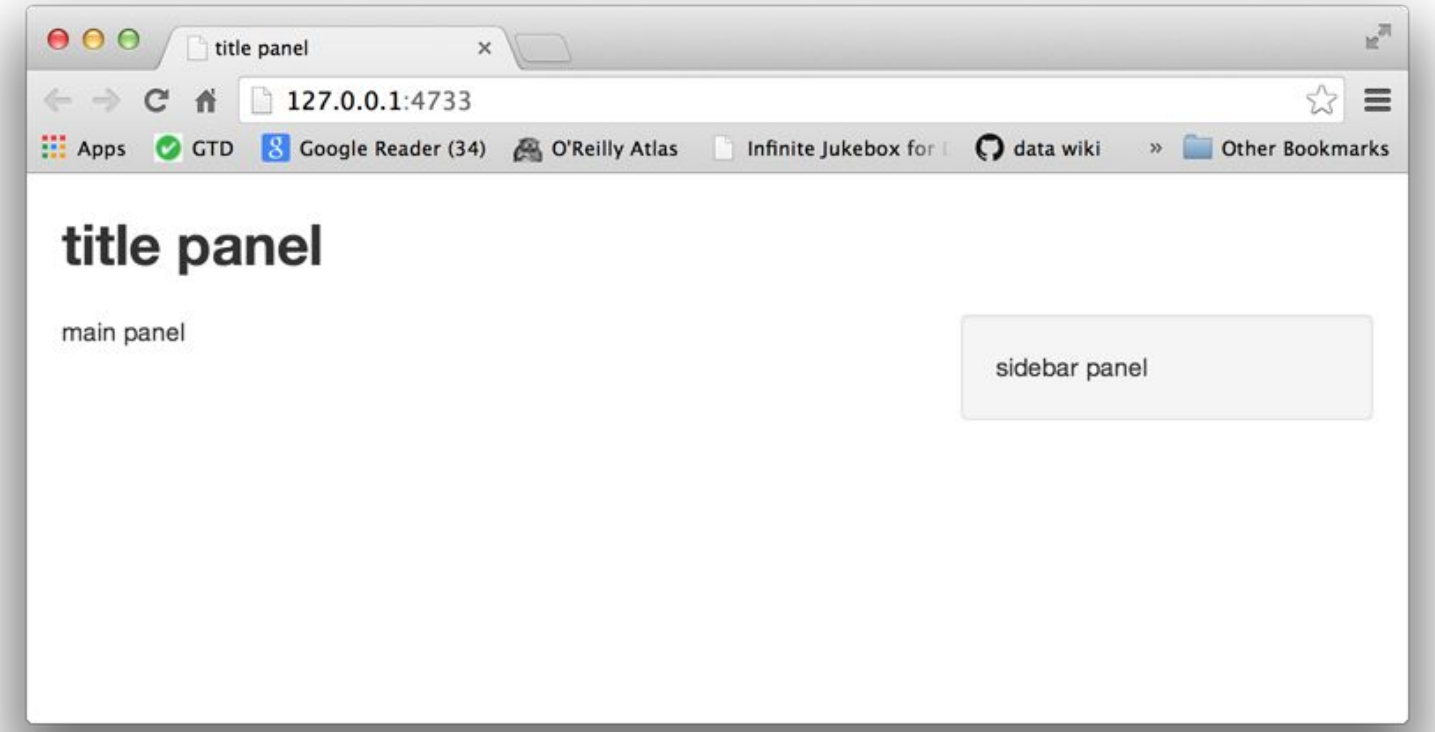
- Switch sidebar Panel to right
  - Add argument: position="right"

```
shinyUI(fluidPage(
  titlePanel("title panel"),

  sidebarLayout(position = "right",
    sidebarPanel( "sidebar panel"),
    mainPanel("main panel")
  )
))
```

Layout

- Switch sidebar Panel to right
  - Add argument: position="right"



Layout

- More layout design
  - Grid Layout
  - Tabsets
  - Navlists
  - Navbar Pages
  - etc. http://shiny.rstudio.com/articles/layout-guide.html

HTML Content

- Add content to your Shiny app by placing it inside a *Panel function.
- For example:
  - Add the character string to the sidebarPanel function

```
# ui.R

shinyUI(fluidPage(
  titlePanel("title panel"),

  sidebarLayout(
    sidebarPanel( "sidebar panel"),
    mainPanel("main panel")
  )
))
```

HTML Content

- Function for HTML5
  - Use one of Shiny's HTML tag functions to add more advanced content.
  - These functions parallel common HTML5 tags.

SHINY FUNCTION	HTML5	CREATES
p	<p>	A paragraph of text
h1	<h1>	A first level header
h2	<h2>	A second level header
...	...	...
h6	<h6>	A sixth level header
a	<a>	A hyper link

HTML Content

SHINY FUNCTION	HTML5	CREATES
`br`	` `	A line break (e.g. a blank line)
`div`	`<div>`	A division of text with a uniform style
`span`	`<span>`	An in-line division of text with a uniform style
`pre`	`<pre>`	Text 'as is' in a fixed width font
`code`	`<code>`	A formatted block of code
`img`	`<img>`	An image
`strong`	`<strong>`	Bold text
`em`	`<em>`	Italicized text

Headers

- To create a header element:
  - Select a header function (e.g., h1 or h5)
  - Give it the text you want to see in the header

```
library(shiny)
h1("my title")
```

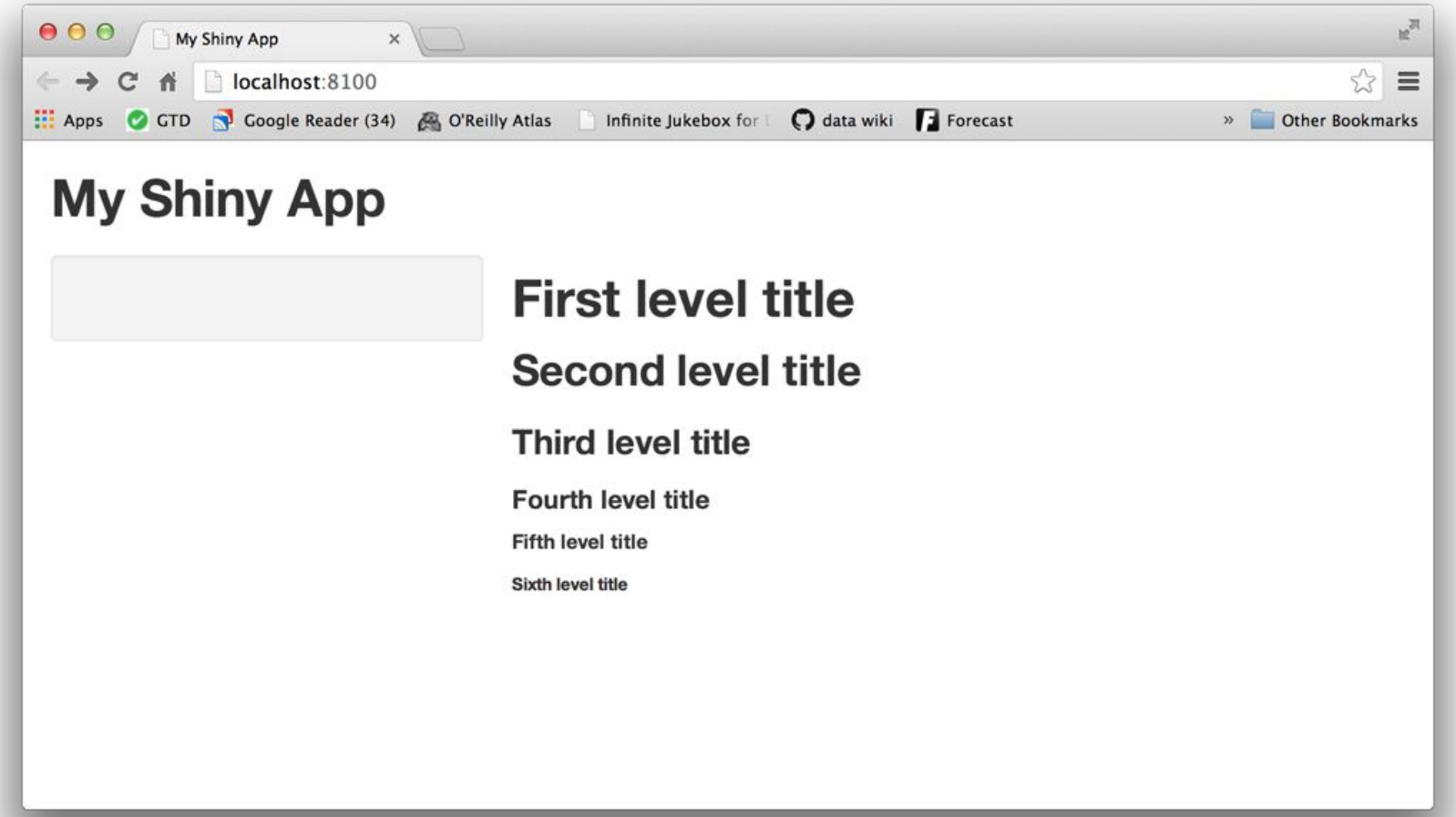
my title

Headers

- Pass h1("my title") to titlePanel, sidebarPanel, or mainPanel
- Put the code in your ui.R and runApp().

```
# ui.R
shinyUI(fluidPage(
  titlePanel("My Shiny App"),
  sidebarLayout(
    sidebarPanel(),
    mainPanel(
      h1("First level title"),
      h2("Second level title"),
      h3("Third level title"),
      h4("Fourth level title"),
      h5("Fifth level title"),
      h6("Sixth level title")
    )
  )
))
```

Headers


My Shiny App
localhost:8100
Apps
GTD
Google Reader (34)
O'Reilly Atlas
Infinite Jukebox for
data wiki
Forecast
Other Bookmarks
My Shiny App
First level title
Second level title
Third level title
Fourth level title
Fifth level title
Sixth level title

Headers

- align = "center" can be used to make the title place center

```
h2("My Title",align="center")
```

My Title

```
h3("h3 title in the center.",align="center")
```

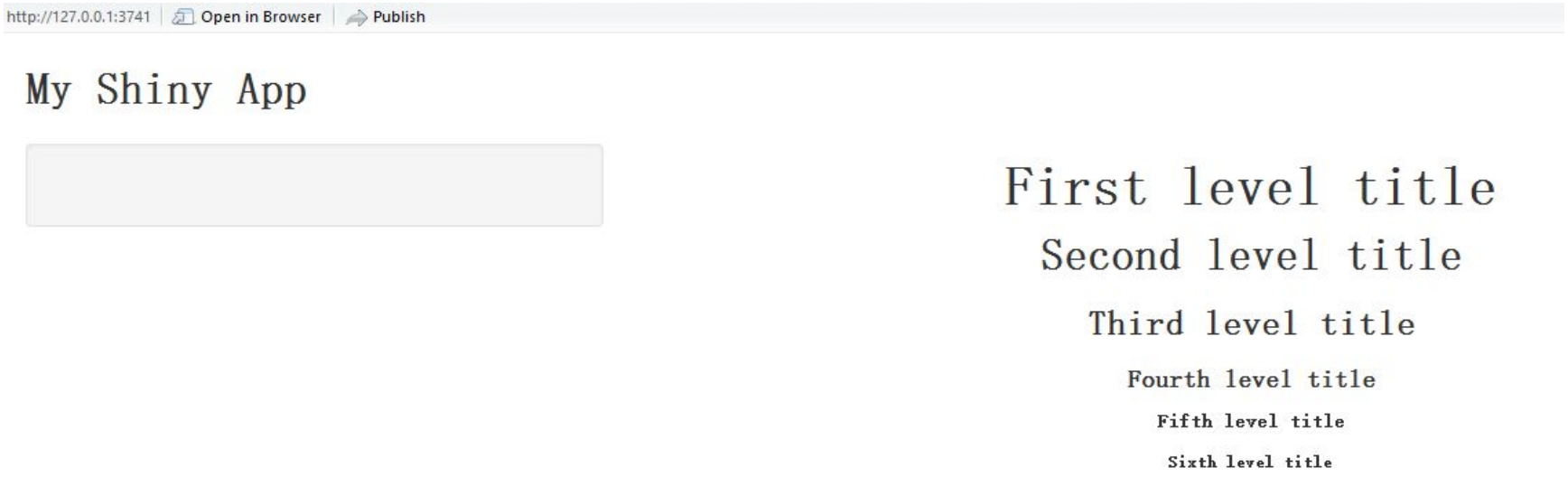
h3 title in the center.

Headers: Example

- align = "center" can be used to make the title place center
  - Put the code in your ui.R and runApp().

```
# ui.R
shinyUI(fluidPage(
  titlePanel("My Shiny App"),
  sidebarLayout(
    sidebarPanel(),
    mainPanel(
      h1("First level title",align = "center"),
      h2("Second level title",align = "center"),
      h3("Third level title",align = "center"),
      h4("Fourth level title",align = "center"),
      h5("Fifth level title",align = "center"),
      h6("Sixth level title",align = "center")
    )
  )
))
```

Headers: Example



Formatted Text

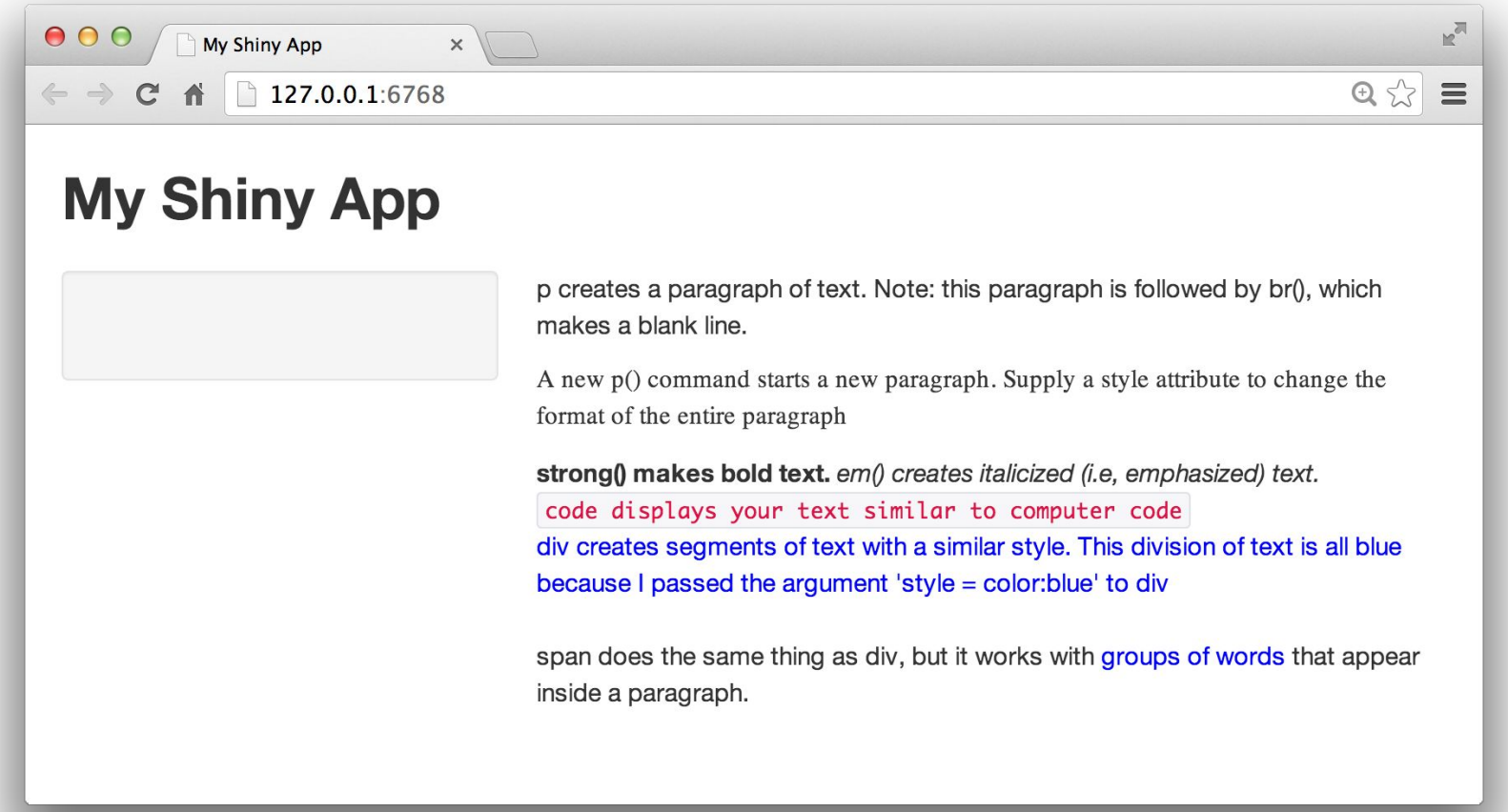
- Maybe you want:
  - some content bold
  - Need a line break
  - Put script into special type
  - Different color
- Time to use other functions

Formatted Text

- Put the code in your ui.R and runApp().

```
shinyUI(fluidPage(
  titlePanel("My Shiny App"),
  sidebarLayout( sidebarPanel(),
    mainPanel(
      p("p creates a paragraph of text. Note: this paragraph is followed by br(),
        which makes a blank line."),
      p("A new p() command starts a new paragraph. Supply a style attribute to change
        the format of the entire paragraph",
        style = "font-family: 'times'; font-si16pt"),
      strong("strong() makes bold text."),
      em("em() creates italicized (i.e, emphasized) text."),
      br(),
     code("code displays your text similar to computer code"),
      div("div creates segments of text with a similar style. This division of text
          is all blue because I passed the argument 'style = color:blue' to div",
          style = "color:blue"),
      br(),
      p("span does the same thing as div, but it works with",
        span("groups of words", style = "color:blue"),
        "that appear inside a paragraph.")
    )
  )
))
```

Formatted Text



Images

- Put a image in UI
- Download an image from here:
  - http://shiny.rstudio.com/tutorial/lesson2/www/bigorb.png
- Use the function img()

Images

- To insert an image, give the img() function the name of your image file as the src argument

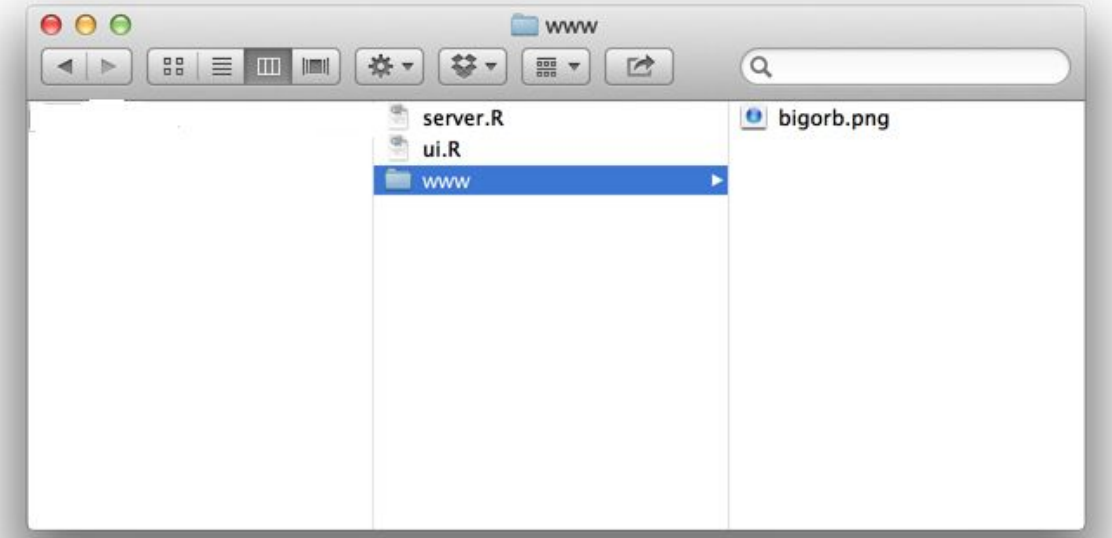
```
img(src = "my_image.png")
```

- Must spell out this argument since img passes your input to an HTML tag, and src is what the tag expects.
- Change the size by:

```
img(src = "my_image.png",height = 72, width = 72)
```

Images

- The image must be in a folder named www in the same directory as the ui.R script.
  - Put the image into folder www
  - So if you want to use an image named bigorb.png, your www directory should look like this one:



Images

- Put images into *Panel
  - Put the code in your ui.R and runApp().

```
# ui.R
shinyUI(fluidPage(
  titlePanel("My Shiny App"),
  sidebarLayout(
    sidebarPanel(),
    mainPanel(
      img(src="bigorb.png", height = 400, width = 400)
    )
  )
))
```

Images


My Shiny App
localhost:8100
Apps
GTD
Google Reader (34)
O'Reilly Atlas
Infinite Jukebox for
data wiki
Forecast
Other Bookmarks
My Shiny App
R

Summary

- In this section we've learned
  - How to build a ui.R.
  - How to add different titles.
  - How to write different types of content.
  - How to add an image to your UI.

Outline of today's class

- Shiny introduction
- Design the User-interface
- **Control Widgets**
- Build reactive output
- Use datatable in Shiny Apps

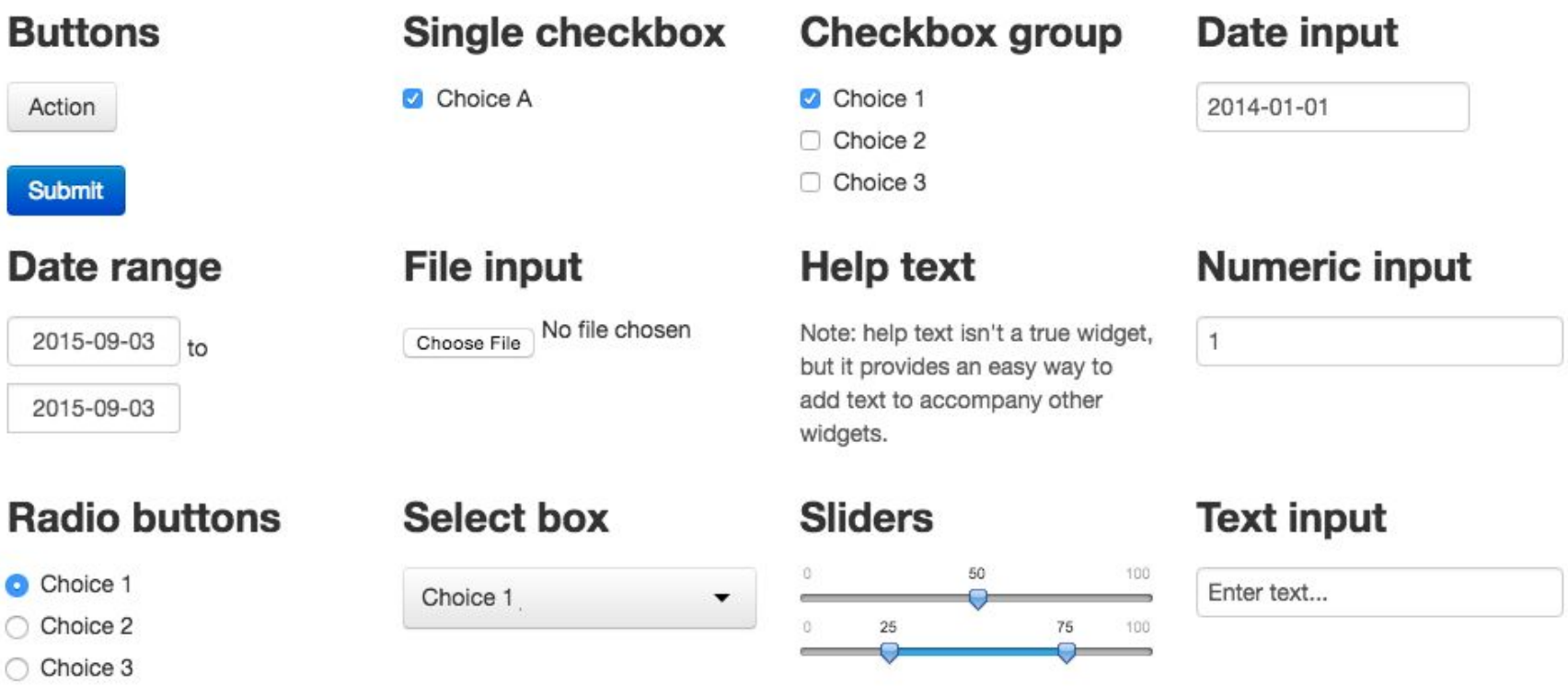
What's a Widget?

- A web element that users can interact with.
  - Widgets provide a way for users to send messages to the Shiny app.
- Shiny widgets collect a value from user.
  - When a user changes the widget, the value will change as well.
- These widgets come from the Twitter Bootstrap project, a popular open source framework for building user-interfaces.

The Standard Shiny Widgets

FUNCTION	WIDGET
`actionButton`	Action Button
`checkboxGroupInput`	A group of check boxes
`checkboxInput`	A single check box
`dateInput`	A calendar to aid date selection
`dateRangeInput`	A pair of calendars for selecting a date range
`fileInput`	A file upload control wizard
`helpText`	Help text that can be added to an input form
`numericInput`	A field to enter numbers
`radioButtons`	A set of radio buttons
`selectInput`	A box with choices to select from
`sliderInput`	A slider bar
`submitButton`	A submit button
`textInput`	A field to enter text

The Standard Shiny Widgets



Adding Widgets

- Add a widget to your app
  - place a widget function in sidebarPanel or mainPanel in your ui.R file.
- Each widget function requires several arguments.
  - The first two arguments for each widget are:
    - A name for the widget.
    - label.

Adding Widgets

- Example : actionButton

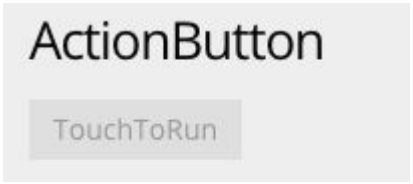
```
actionButton(inputId, label, icon = NULL, ...)
```

  - inputId:
    - Specifies the input slot that will be used to access the value.
  - label:
    - The contents of the button or link-usually a text label, but you could also use any other HTML, like an image.
  - icon:
    - An optional icon to appear on the button

Adding Widgets

- Example : actionButton
  - Action Button may look like this:

```
sidebarPanel(h3("ActionButton"),
       actionButton(1, "TouchToRun")
   )
```



Adding Widgets

- Example : checkboxGroupInput

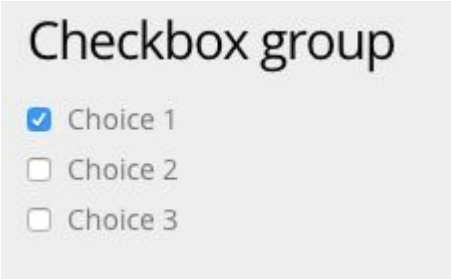
```
checkboxGroupInput(inputId, label, choices, selected = NULL)
```

  - inputId:
    - Input variable to assign the control's value to.
  - label:
    - Display label for the control.
  - choices:
    - List of values to show checkboxes for. If elements of the list are named then the name rather than the value is displayed to the user.
  - selected: The values that should be initially selected, if any.

Adding Widgets

- Example : checkboxGroupInput
  - Checkbox Group Input may look as this:

```
sidebarPanel(checkboxGroupInput("checkGroup",
                label = h3("Checkbox group"),
                choices = list("Choice 1" = 1,
                               "Choice 2" = 2,
                               "Choice 3" = 3),selected = 1))
```



Adding Widgets

- Example : checkboxInput

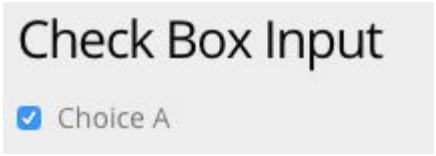
```
checkboxInput(inputId, label, value = FALSE)
```

  - inputId
    - Input variable to assign the control's value to.
  - label
    - Display label for the control.
  - value
    - Initial value (TRUE or FALSE).

Adding Widgets

- Example : checkboxInput
  - Checkbox Input may look as this:

```
checkboxInput("checkbox", label = "Choice A", value =TRUE)
```



Adding Widgets

- Example : dateInput

```
dateInput(inputId, label, value = NULL, min = NULL, max = NULL,
  format = "yyyy-mm-dd", startview = "month", weekstart = 0,
  language = "en")
```

  - value:
    - The starting date. Either a Date object, or a string in yyyy-mm-dd format.
  - min/max:
    - The minimum/maximum allowed date. Either a Date object, or a string in yyyy-mm-dd format.
  - format (Defaults: "yyyy-mm-dd"):
    - The format of the date to display in the browser.

Adding Widgets

- Example : dateInput

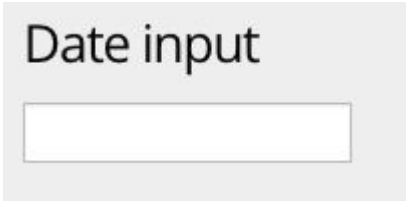
```
dateInput(inputId, label, value = NULL, min = NULL, max = NULL,
  format = "yyyy-mm-dd", startview = "month", weekstart = 0,
  language = "en")
```

  - startview:
    - The date range shown when the input object is first clicked. "month" , "year", or "decade".
  - weekstart:
    - Which day is the start of the week.
  - language:
    - The language used for month and day names.

Adding Widgets

- Example : dateInput

```
dateInput("date",
          label = h3("Date input"))
```



Adding Widgets

- Example : dateRangeInput

```
dateRangeInput(inputId, label, start = NULL,
end = NULL,separator = " to ",...)
```

  - start:
    - The initial start date. Either a Date object, or a string in yyyy-mm-dd format.
  - end:
    - The initial end date. Either a Date object, or a string in yyyy-mm-dd format.
  - separator:
    - String to display between the start and end input boxes.
  - args are same as dateInput

Adding Widgets

- Example : dateRangeInput

```
dateRangeInput("dates", label = h3("Date range"))
```

Adding Widgets

- Example : fileInput

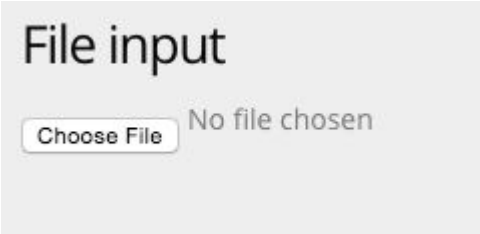
```
fileInput(inputId, label, multiple = FALSE, accept = NULL)
```

  - multiple:
    - Whether the user should be allowed to select and upload multiple files at once.
  - accept:
    - A character vector of MIME types; gives the browser a hint of what kind of files the server is expecting.

Adding Widgets

- Example : fileInput

```
fileInput("file", label = h3("File input"))
```



Adding Widgets

- Example : helpText

```
helpText(...)
```

  - One or more help text strings (or other inline HTML elements)

Adding Widgets

- Example : helpText

```
sidebarPanel(
  h3("Help text"),
      helpText("Note: help text isn't a true widget,",
        "but it provides an easy way to add text to",
        "accompany other widgets."))
```

Adding Widgets

- Example : numericInput

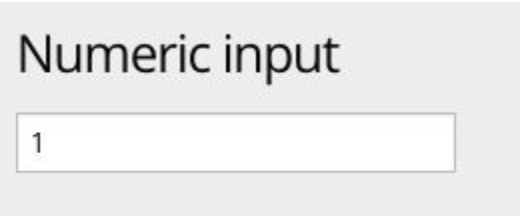
```
numericInput(inputId, label, value, min = NA,max = NA,step = NA)
```

  - value:
    - Initial value
  - min:
    - Minimum allowed value
  - max:
    - Maximum allowed value
  - step:
    - Interval to use when stepping between min and max

Adding Widgets

- Example : numericInput

```
numericInput("num",
        label = h3("Numeric input"),
        value = 1)
```



Adding Widgets

- Example : radioButtons

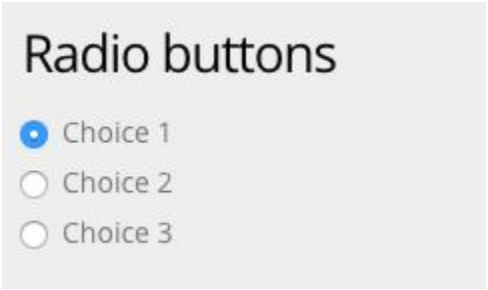
```
radioButtons(inputId, label, choices, selected = NULL)
```

  - choices:
    - List of values to select from (if elements of the list are named then that name rather than the value is displayed to the user)
  - selected:
    - The initially selected value (if not specified then defaults to the first value)

Adding Widgets

- Example : radioButtons

```
radioButtons("radio", label = h3("Radio buttons"),
        choices = list("Choice 1" = 1, "Choice 2" = 2,
                       "Choice 3" = 3),selected = 1)
```



Adding Widgets

- Example : selectInput

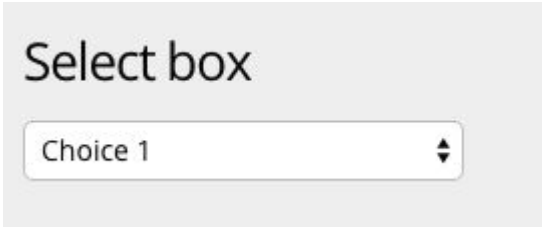
```
selectInput(inputId, label, choices, selected = NULL,
multiple = FALSE, selectize = TRUE, ...)
```

  - choices:
    - List of values to select from.
  - selected:
    - The initially selected value (or multiple values if multiple = TRUE).
  - multiple:
    - Is selection of multiple items allowed?
  - selectize:
    - Whether to use selectize.js or not

Adding Widgets

- Example : selectInput

```
selectInput("select", label = h3("Select box"),
        choices = list("Choice 1" = 1, "Choice 2" = 2,
                       "Choice 3" = 3), selected = 1)
```



Adding Widgets

- Example : sliderInput

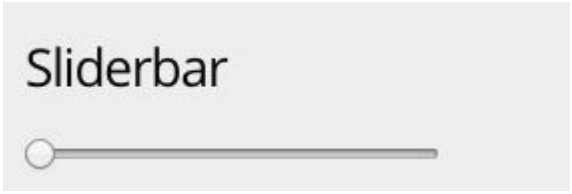
```
sliderInput(inputId, label, min, max, value, step = NULL,
        round = FALSE,...)
```

  - min/max:
    - The minimum/maximum value (inclusive) that can be selected.
  - value:
    - The initial value of the slider.
  - step:
    - Specifies the interval between each selectable value on the slider (NULL means no restriction).
  - round:
    - TRUE to round all values to the nearest integer; FALSE if no rounding is desired; or an integer to round to that number of digits .

Adding Widgets

- Example : sliderInput

```
sidebarPanel(
    sliderInput("obs","Sliderbar", 0, 1000, 0)
 )
```



Adding Widgets

- Example : submitButton

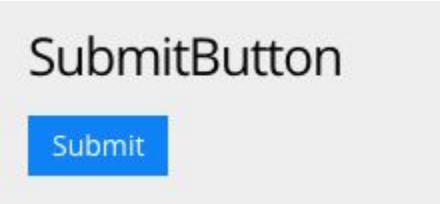
```
submitButton(text = "Apply Changes", icon = NULL, ...)
```

  - text:
    - Button caption
  - icon:
    - Optional icon to appear on the button

Adding Widgets

- Example : submitButton

```
submitButton("Submit")
```



Adding Widgets

- Example : textInput

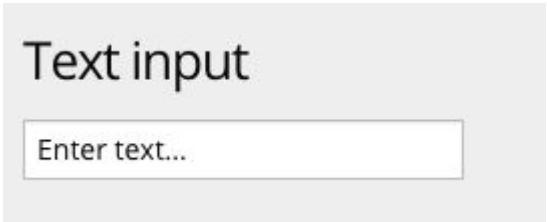
```
textInput(inputId, label, value = "", ...)
```

  - inputId:
    - Input variable to assign the control's value to
  - label:
    - Display label for the control
  - value:
    - Initial value

Adding Widgets

- Example : textInput

```
textInput("text", label = h3("Text input"),
          value = "Enter text...")
```

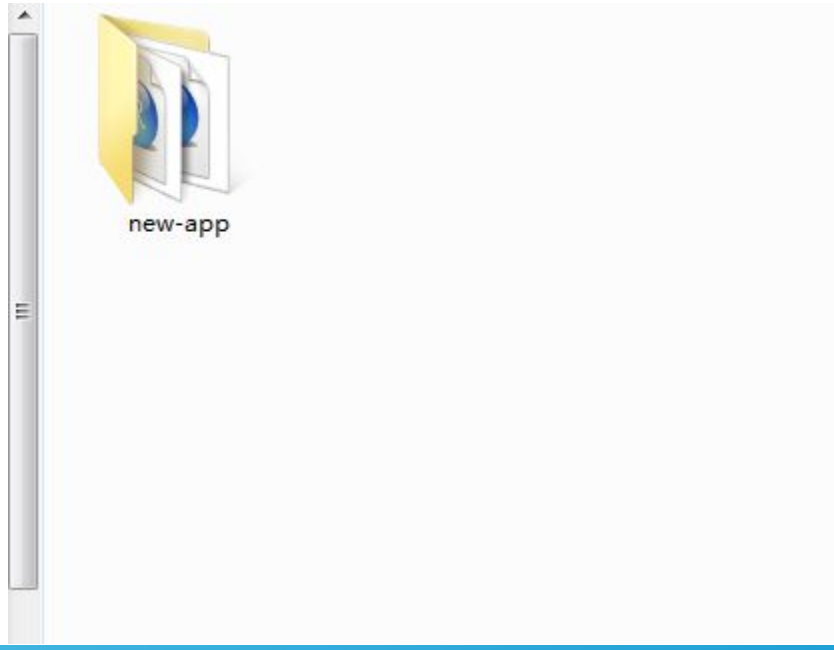


Outline of today's class

- Shiny introduction
- Design the User-interface
- Control Widgets
- **Build reactive output**
- Use datatable in Shiny Apps

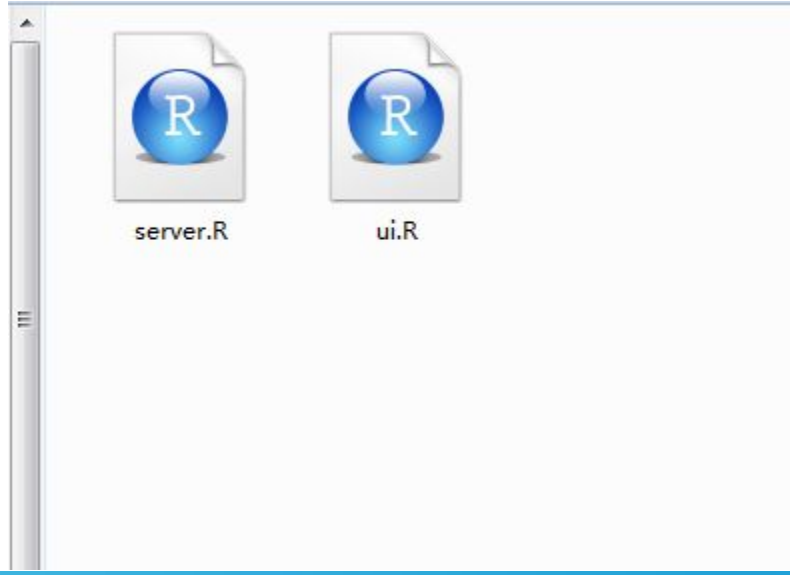
Preparation

- Create a folder in your working directory named new_app.
- Save the ui.R and server.R files that you make in this section in new_app.



Two Steps

- You can create reactive output with a two step process.
  - Add an R object to your user-interface with ui.R.
  - Tell Shiny how to build the object in server.R.
  - The object will be reactive if the code that builds it calls a widget value.



Create UI

- There are several output functions for creating different type of outputs.

OUTPUT FUNCTION	CREATES
htmlOutput	raw HTML
imageOutput	image
plotOutput	plot
tableOutput	table
textOutput	text
uiOutput	raw HTML
verbatimTextOutput	text

- Place the output function inside sidebarPanel or mainPanel in the ui.R script.

Add R Objects to ui.R

- Example for ui.R
  - Use helpText, selectInput, sliderInput to input values

```
shinyUI(fluidPage(
  titlePanel("RATE ME!"),
    sidebarLayout(
      sidebarPanel(
        helpText("What do you think about this app?"),
        selectInput("var",
                    label = "Choose one to display",
                    choices = c("awesome", "fantastic",
                       "admirable", "wonderful"),
                     selected = "awesome"),
        sliderInput("range",
                    label = "Percent:",
                    min = 90, max = 100, value = 100)
    ),
```

Add R Objects to ui.R

- Example for ui.R

```
mainPanel(
      textOutput("text1")
    )
  )
))
```

  - Use textOutput in mainPanel to show where to place the output.
  - Each of the *Output functions require a single argument:
  - a character string that Shiny will use as the name of your reactive element.
  - Your users will not see this name, but you will use it later.

Build the Object in server.R

- Placing a function *Output in ui.R tells Shiny where to display your object.
- Provide R code to build the object in server.R.
- Place the R code in the unnamed function that appears inside shinyServer in your server.R script.

Build the Object in server.R

- Code in the unnamed function that appears inside shinyServer.

```
# server.R

shinyServer(function(input, output) {

     output$text1 <- renderText({
          "You have selected this"
     })

  }
)
```

Build the Object in server.R

- Make sure the element name match the name of the reactive element that you created in ui.R.
  - e.g. output$text1 matches textOutput("text1") in ui.R.

```
# server.R

shinyServer(function(input, output) {

     output$text1 <- renderText({
          "You have selected this"
     })

  }
)
```

render* Function

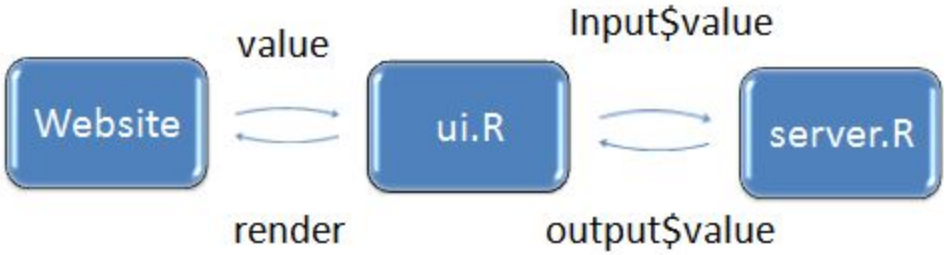
- Each entry to output should contain the output of one of Shiny's render* functions.

RENDER FUNCTION	CREATES
renderImage	images (saved as a link to a source file)
renderPlot	plots
renderPrint	any printed output
renderTable	data frame, matrix, other table like structures
renderText	character strings
renderUI	a Shiny tag object or HTML

- Each render* function takes a single argument: an R expression surrounded by braces, {}.

Make Your Text Reactive

- Make your text reactive by asking Shiny to call a widget value.
- Use input and output in ui.R



- output stores instructions for building the R objects in your app.
- input stores the current values of all of the widgets in your app.

Make Your Text Reactive

- Example : build a reactive text
- Assumed our app has two widgets: var and range.

```
# server.R

shinyServer(function(input, output) {

  output$text1 <- renderText({
    paste("This app is",input$range,"%",input$var,"!!!")
  })
  }
)
```

- Use runApp() to show your app

Outline of today's class

- Shiny introduction
- Design the User-interface
- Control Widgets
- Build reactive output
- **Use datatable in Shiny Apps**

Use Datatable in Shiny Apps

- renderDataTable()
  - The DataTables application demonstrates HTML tables using the jQuery library DataTables.
  - The basic usage:
  - To create an output element in the UI using

```
output$foo <- renderDataTable({ data })
```

  - Render a table on the server side using

```
dataTableOutput(id = 'foo')
```

A Simple Example for renderDataTable

The mtcars data

25 records per page

Search:

mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
21	6	160	110	3.9	2.62	16.46	0	1	4	4
21	6	160	110	3.9	2.875	17.02	0	1	4	4
22.8	4	108	93	3.85	2.32	18.61	1	1	4	1
21.4	6	258	110	3.08	3.215	19.44	1	0	3	1
18.7	8	360	175	3.15	3.44	17.02	0	0	3	2
18.1	6	225	105	2.76	3.46	20.22	1	0	3	1
14.3	8	360	245	3.21	3.57	15.84	0	0	3	4
24.4	4	146.7	62	3.69	3.19	20	1	0	4	2
22.8	4	140.8	95	3.92	3.15	22.9	1	0	4	2
19.2	6	167.6	123	3.92	3.44	18.3	1	0	4	4
17.8	6	167.6	123	3.92	3.44	18.9	1	0	4	4
16.4	8	275.8	180	3.07	4.07	17.4	0	0	3	3
17.3	8	275.8	180	3.07	3.73	17.6	0	0	3	3

A Simple Example for renderDataTable

- The script is as follows:

  (It's so simple that you don't need to create ui.R,server.R)

```
runApp(list(
  ui = basicPage(
    h2('The mtcars data'),
    dataTableOutput('mytable')
  ),
  server = function(input, output) {
    output$mytable = renderDataTable({
      mtcars
    })
  }
))
```

A Complete Example for renderDataTable

```
# ui.R
library(shiny)
library(ggplot2)  # for the diamonds dataset
shinyUI(pageWithSidebar(
  headerPanel('Examples of DataTables'),
  sidebarPanel(
    checkboxGroupInput('show_vars', 'Columns in diamonds to show:',
names(diamonds),
                       selected = names(diamonds)),
   helpText('For diamonds data, we can select variables to show in the table;
             for the mtcars example, we use bSortClasses = TRUE so that sorted
             columns are colored since they have special CSS classes attached;
             for the iris data, we customize the length menu so we can display 5
             rows per page.')
    ),
  mainPanel(
    tabsetPanel(
      tabPanel('diamonds', dataTableOutput("mytable1")),
      tabPanel('mtcars', dataTableOutput("mytable2")),
      tabPanel('iris', dataTableOutput("mytable3"))
    )
  )
))
```

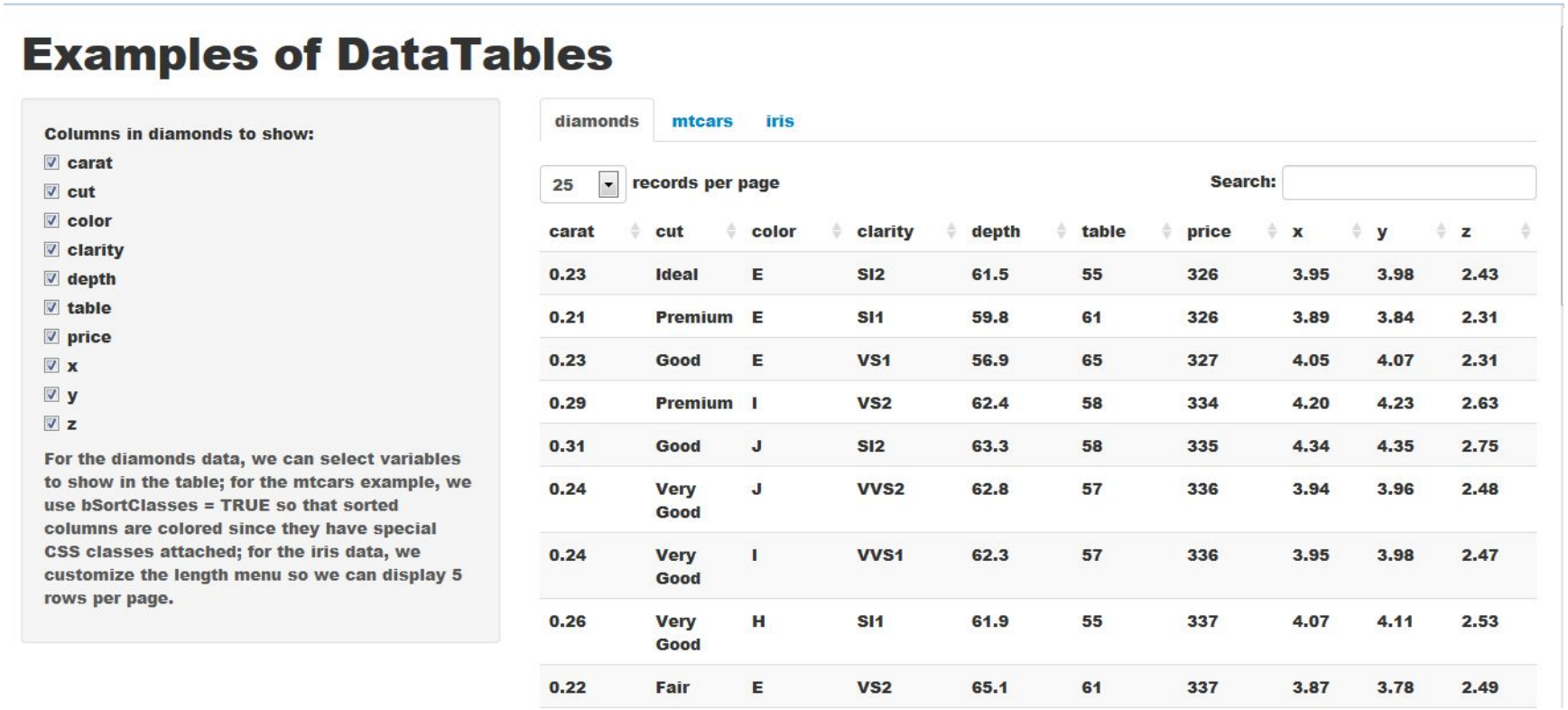
A Complete Example for renderDataTable

- Script of server.R
  - Argument in renderDataTable() can take a list (literally an R list) of options, and pass them to DataTables when the table is initialized.
  - For the mtcars data, we pass bSortClasses = TRUE to DataTables so that the sorted columns will have CSS classes attached on them (this is disabled by default).
  - For the iris data, we pass the options aLengthMenu and iDisplayLength to customize the drop down menu, which has items [10, 25, 50, 100] by default.
  - In iris now the menu has three items [5, 30, 50], and 5 is selected as the default value.

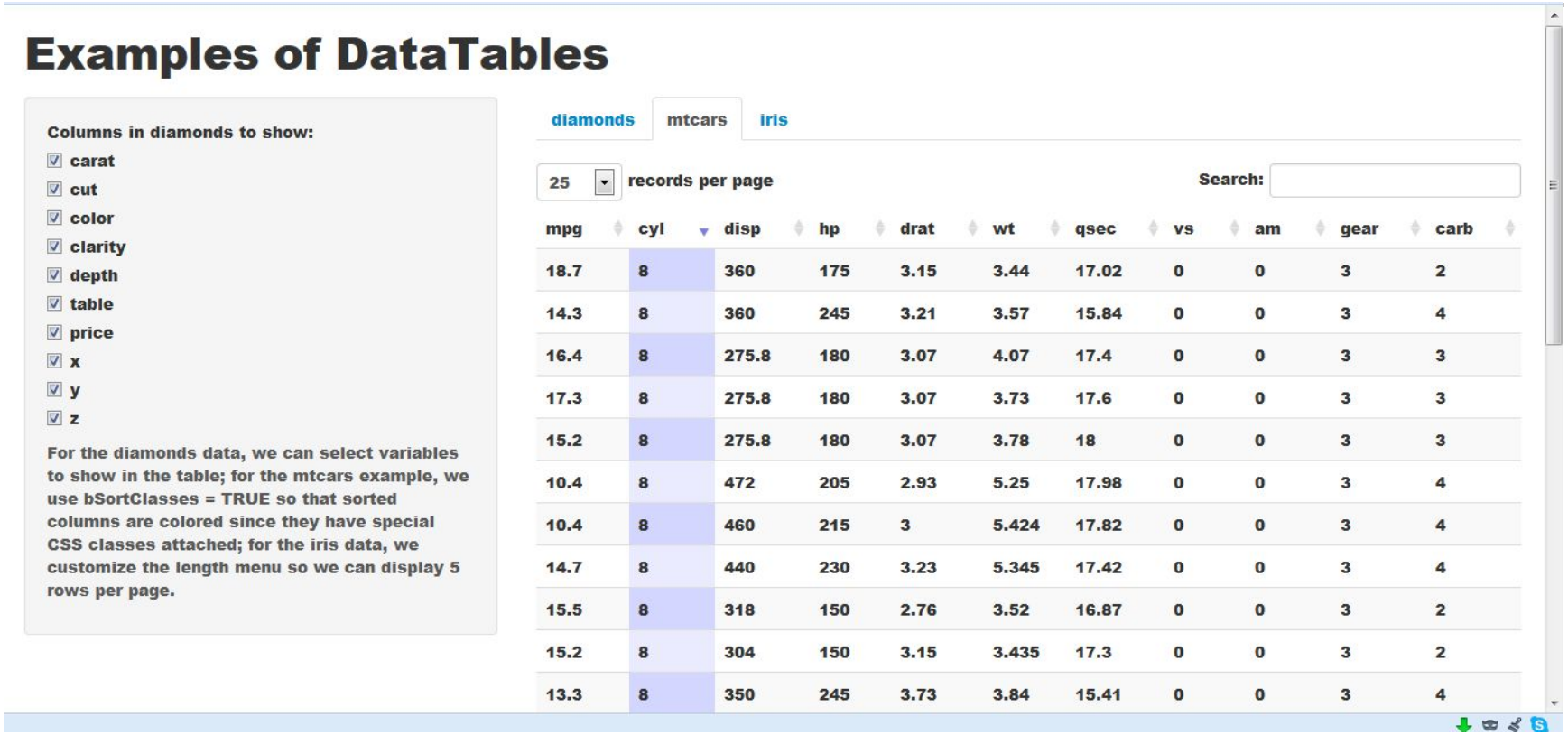
A Complete Example for renderDataTable

```
shinyServer(function(input, output) {
  # a large table, reactive to input$show_vars
  output$mytable1 = renderDataTable({
    library(ggplot2)
    diamonds[, input$show_vars, drop = FALSE]
  })
  # sorted columns are colored now because CSS are attached to
them
  output$mytable2 = renderDataTable({
    mtcars
  }, options = list(bSortClasses = TRUE))
  # customize the length drop-down menu; display 5 rows per page
by default
  output$mytable3 = renderDataTable({
    iris
  }, options = list(aLengthMenu = c(5, 30, 50), iDisplayLength =
5))
```

A Complete Example for renderDataTable



A Complete Example for renderDataTable



A Complete Example for renderDataTable

Summary

- In this section, you created your first reactive Shiny app. Including:
  - use an *Output function in the ui.R script to place reactive objects in your Shiny app.
  - use a render* function in the server.R script to tell Shiny how to build your objects.
  - surround R expressions by braces, {}, in each render* function.
  - save your render* expressions in the output list, with one entry for each reactive object in your app.
  - create reactivity by including an input value in a render* expression.