Shiny : : CHEATSHEET

Build 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).

🤖 Build with AI assistance:
gallery.shinyapps.io/assistant

💡 Get inspiration & examples:

- **shiny.posit.co/r/gallery**
- **shinylive.io/r/examples**
- **`runExample()`** in R console

The UI is a collection of input, output, and layout elements

The server determines how to render outputs given inputs

An app is a combination of UI and server logic

```
# app.R
library(shiny)

ui <- bslib::page_fluid(
  sliderInput(
    "n", "Sample size", 0, 100, 25
  ),
  plotOutput("hist")
)

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

shinyApp(ui, server)
```

Create `*Input()` UI and read with `input$<id>`

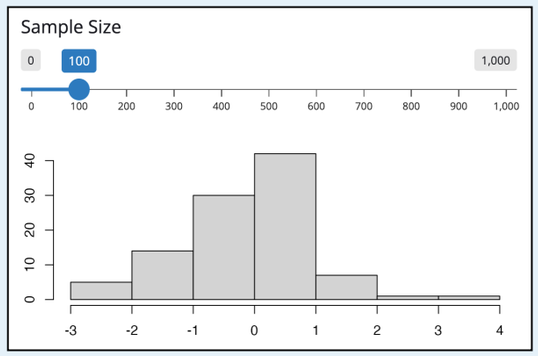
Match `*Output()` with `render*()` to add R output

Save `shinyApp()` to **app.R**

Optionally include supporting code, images, etc. in R/ and www/ folders

app-name
- app.R
- R/
- www/

Launch an **app.R** with **`runApp("path/to/app-name")`**.



Inputs

Collect values from the user.

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

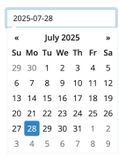
Action — **`actionButton(`**`id, label, …`**`)`

Action — **`actionLink(`**`id, label, …`**`)`

- [x] Choice 1
- [x] Choice 2
- [ ] Choice 3

`checkboxGroupInput(`
`id, label, choices, selected, …`**`)`**

☑ Check me — **`checkboxInput(`**
`id, label, value, …`**`)`**



`dateInput(``id, label, value, …`**`)`**
`dateRangeInput(`
`id, label, start, end, …`**`)`**

Choose File — **`fileInput(`**`id, label, …`**`)`**

1 — **`numericInput(`**
`id, label, value, …`**`)`**

- ( ) Option 1
- (•) Option 2
- ( ) Option 3

`radioButtons(`
`id, label, choices, selected, …`**`)`**

Choice 1A
- Choice 1A
- Choice 1B

`selectInput(`
`id, label, choices, selected, multiple, …`**`)`**
Also **`selectizeInput()`**

0 — 50 — 100 — **`sliderInput(`**
`id, label, min, max, value, …`**`)`**

Enter text... — **`textInput(`**`id, label, value, …`**`)`**
Also **`textAreaInput()`**

More from the **bslib** package:

`input_dark_mode(``id, mode`**`)`**

`input_switch(`
`id, label, value, …`**`)`**

Processing... — **`input_task_button(`**
`id, label, value, …`**`)`**

See input gallery at **shiny.posit.co/r/components**

Outputs

Reactively render R outputs

`plotOutput(``id, width, height,…`**`)`**
`renderPlot(``expr, …`**`)`**

Species	Island	Bill Length (mm)	Body Mass (g)
Chinstrap	Dream	45.70	3650
Chinstrap	Dream	55.80	4000
Chinstrap	Dream	43.50	3400
Chinstrap	Dream	49.60	3775

`tableOutput(``id, …`**`)`**
`renderTable(``expr, striped, …`**`)`**

```
  area    peri     shape perm
1 4990 2791.90 0.0903296  6.3
2 7002 3892.60 0.1486220  6.3
3 7558 3930.66 0.1833120  6.3
4 7352 3869.32 0.1170630  6.3
```

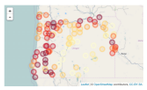
`verbatimTextOutput(``id, …`**`)`**
`renderPrint(``expr, …`**`)`**

Current value: 30 — **`textOutput(`**`id, …`**`)`**
`renderText(``expr, …`**`)`**

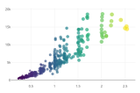
Current *value*: **30** — **`uiOutput(`**`id, …`**`)`**
`renderUI(``expr, …`**`)`**

`imageOutput(``id, …`**`)`**
`renderImage(``expr, …`**`)`**

More from **htmlwidgets.org** ecosystem



`leafletOutput(``id, …`**`)`**
`renderLeaflet(``expr, …`**`)`**



`plotlyOutput(``id, …`**`)`**
`renderPlotly(``expr, …`**`)`**

See output gallery at **shiny.posit.co/r/components**

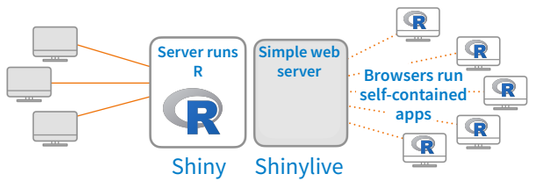
Share

Share your app in four 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/app-name"`**`)`**
2. **Purchase Posit Connect**, a publishing platform for R and Python. **posit.co/connect**
3. **Host your own Shiny Server** **posit.co/products/open-source/shinyserver**
4. **Export to shinylive**, a technology for running apps entirely in the browser. **posit-dev.github.io/r-shinylive**

Shinylive

Shinylive apps use WebAssembly to run entirely in a browser–no need for a server to run R.



- Edit and/or host apps at **shinylive.io/r**
- Export an app to Shinylive with `shinylive::export("app-name", "site")` Then deploy to a hosting site like Github or Netlify
- Embed Shinylive apps in Quarto sites, blogs, etc

```
---
filters:
 - shinylive
---
An embedded Shinylive app:
```{shinylive-r}
#| standalone: true
# [App.py code here…]
```
```

To embed a Shinylive app in a Quarto doc, include the bold syntax.

More from the **bslib** package:

`input_dark_mode(``id, mode`**`)`**

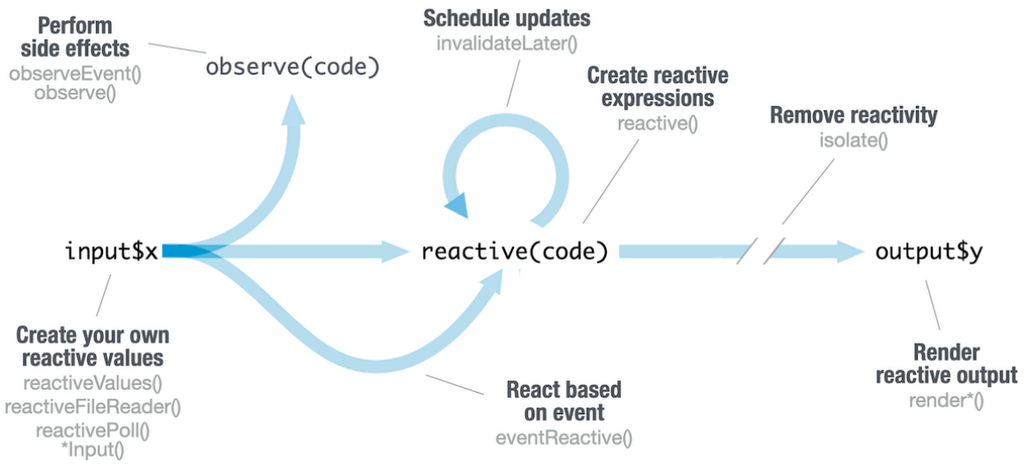
`input_switch(`
`id, label, value, …`**`)`**

Processing... — **`input_task_button(`**
`id, label, value, …`**`)`**

See input gallery at **shiny.posit.co/r/components**

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 REACTIVE VALUES

```
ui <- bslib::page_fluid(
  textInput("a", "", "A")
)

server <- \(input, output){
  print(isolate(input$a))

  rv <- reactiveVal(NULL)
  print(isolate(rv()))
}

shinyApp(ui, server)
```

`*Input()` functions

Create a reactive value `input$<id>` from user input.

`reactiveVal(value)`

Create a reactive value from a given value. Useful for managing state.

RENDER REACTIVE OUTPUT

```
ui <- bslib::page_fluid(
  textInput("a", "", "A"),
  textOutput("b")
)

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

shinyApp(ui, server)
```

`render*()` functions

Produces results for a corresponding `*Output()` UI container. A re-render occurs when reactive dependencies change.

Save the results to `output$<id>`.

CREATE REACTIVE EXPRESSIONS

```
ui <- bslib::page_fluid(
 textInput("a", "", "A"),
 textInput("z", "", "Z"),
 textOutput("b"))

server <- \(input, output){
 re <- reactive({
  paste(input$a, input$z)
 })
 output$b <- renderText({
  re()
 })
}

shinyApp(ui, server)
```

`reactive(x)`

Calculate a (reactive) value based on other reactive values.

Useful for encapsulating reactive logic needed across multiple outputs.

PERFORM SIDE EFFECTS

```
ui <- bslib::page_fluid(
  textInput("a", "", "A"),
  actionButton("go", "Go")
)

server <- \(input, output){
  observe(print(input$a))

  observeEvent(input$go, {
   print(input$a)
 })
}

shinyApp(ui, server)
```

`observe(x)`

Observe changes to reactive values

`observeEvent(eventExpr, handlerExpr)`

Runs code in 2nd argument when 1st argument changes.

REACT BASED ON EVENT

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

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

shinyApp(ui, server)
```

`eventReactive(eventExpr, valueExpr)`

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

REMOVE REACTIVE DEPENDENCIES

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

server <- \(input, output){

 output$b <- renderText({
   input$go
   isolate(input$a)
  })

}

shinyApp(ui, server)
```

`isolate(expr)`

Prevent reactive values from invalidating a reactive expression.

User Interfaces (UI)

Design delightful UI with the **bslib** package. It provides layouts, components, themes, & more.

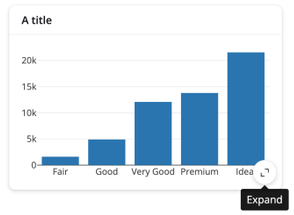
PAGE LAYOUTS

`page_sidebar()`	Screen-filling sidebar layout
`page_fillable()`	Screen-filling page layout
`page_fixed()`	Constrained width page
`page_fluid()`	Basic full-width page
`page_navbar()`	Multi-page app with a top nav bar

CARDS

Visually group UI elements together with the `card()` component.

```
card(full_screen = T,
  card_header("A title"),
  plotOutput("my_output"),
  card_footer("A footer")
)
```



UI LAYOUTS

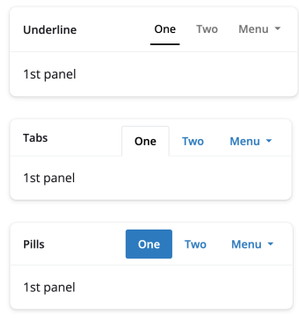
Multiple columns

`layout_columns()`	Bootstrap's 12-column grid
`layout_column_wrap()`	Equal-width columns
`layout_sidebar()`	Resizable 2-column layout

Multiple panels

Navigate a set of `nav_panel()`s in various ways with `navset_card_[underline/tab/pill]()`

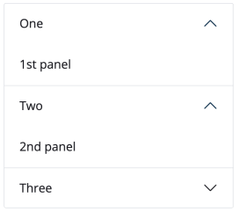
```
navset_card_underline(
  title = "Underline",
  nav_panel(
    "One", "1st panel"
  ),
  nav_panel(
    "Two", "2nd panel"
  ),
  nav_menu(
    "Menu",
    nav_panel(
      "Three",
      "3rd panel"
    )
  )
)
```



ACCORDIONS

Combine with **sidebar()** to group similar inputs

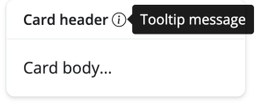
```
accordion(
 open = c("One", "Two"),
 accordion_panel(
   "One", "1st panel"
 ),
 accordion_panel(
   "Two", "2nd panel"
 ),
 accordion_panel(
   "Three", "3rd panel"
 ),
)
```



TOOLTIPS

Provide UX hints and additional context on demand

```
tooltip(
  icon("info-circle"),
  "Tooltip message"
)
```



Custom UI

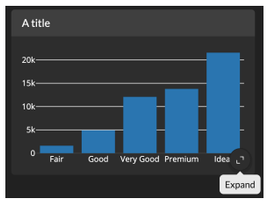
THEMES

Breathe some personality into your app with help from **bslib.**

Bootswatch

Choose from over a dozen pre-packaged themes

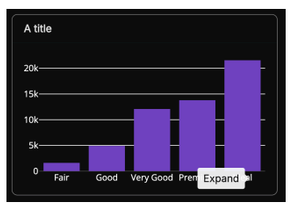
```
library(bslib)
theme <- bs_theme(
  bootswatch="darkly"
)
ui <- page_fluid(
  theme=theme, ...
)
```



Custom themes

Quickly change main colors and fonts. Change in real-time by adding **bs_themer()** to your UI.

```
bs_theme(
  bg = "#222",
  fg = "white",
  primary = "purple",
  base_font =
font_google("Inter")
)
```



CUSTOM HTML

Shiny UI is powered by HTML, CSS, and JS:

```
page_fluid(class = "pt-3")
#> <div class="container-fluid pt-3"></div>
```

If you know these web technologies, you can customize UI to your heart's content. Start small by modifying/authoring HTML and including CSS/JS snippets. Or, go fully custom with `htmlTemplate()`

HTML Add HTML elements with `tags`, a list of functions that parallel common HTML tags, e.g. `tags$a()`. Unnamed arguments are treated as children and named arguments become HTML attributes.

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(href = "<file
name>", rel = "stylesheet"))
```

JS To include JS, 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>")`