bslib

Lecture 20

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Shiny & bootstrap

The interface provided by Shiny is based on the html elements, styling, and javascript provided by the Bootstrap library.

As we've seen so far, knowing the specifics of Bootstrap are not needed for working with Shiny - but understanding some of its conventions goes a long way to helping you customize the elements of your app (via custom CSS and other components).

This is not the only place that Bootstrap shows up in the R ecosystem - e.g. both RMarkdown and Quarto html documents use Bootstrap for styling as well.

bslib

The bslib R package provides a modern UI toolkit for Shiny, R Markdown, and Quarto based on Bootstrap.

It facilitates:

- Custom theming of Shiny apps and R Markdown documents.
  - Apps can even be themed interactively in real-time.
- Use of modern versions of Bootstrap and Bootswatch
  - Shiny and R Markdown currently default to Bootstrap 3 and will likely continue to do so for backwards compatibility.
- Creation of delightful and customizable Shiny dashboards
  - Provides a number of useful UI components (e.g., cards, value boxes, sidebars, etc) for organizing your app

bslib components

Cards

> Cards are a common organizing unit for modern user interfaces (UI). At their core, they're just rectangular containers with borders and padding. However, when utilized properly to group related information, they help users better digest, engage, and navigate through content. This is why most successful dashboard/UI frameworks make cards a core feature of their component library.

```
card(
  card_header(
    "A header"
  ),
  card_body(
    shiny::markdown(
      "Some text with a [link](https://githu
    )
  )
)
```

More options

```
card(
  max_height = 225,
  card_header(
    "A long, scrolling, description",
    class = "bg-dark"
  ),
  card_body(
    lorem::ipsum(
      paragraphs = 3,
      sentences = 5
    )
  )
)
```

```
card(
  max_height = 225,
  card_header(
    "A leaflet map",
    class = "bg-success"
  ),
  card_body(
    class = "p-0",
    leaflet::leaflet() |>
      leaflet::addTiles()
  )
)
```

Multiple card bodies

```
card(
  max_height = 500,
  card_header(
    "A long, scrolling, description",
    class = "bg-dark"
  ),
  card_body(
    leaflet::leaflet() |>
      leaflet::addTiles()
  ),
  card_body(
    lorem::ipsum(paragraphs = 1, sentences =
  )
)
```

Value boxes

These are simplified cards that are designed to show basic numeric or text values.

```
library(bsicons)
library(htmltools)

value_box(
  title = "I got",
  value = "99 problems",
  showcase = bs_icon("music-note-beamed"),
  theme = "cyan",
  p("bslib ain't one", bs_icon("emoji-smile"
  p("hit me", bs_icon("suit-spade"))
)
```

Multiple value boxes

```
library(bsicons)
library(htmltools)

page_fillable(
  value_box(
    title = "1st value",
    value = "123",
    theme = "",
    showcase = bs_icon("bar-chart"),
    p("The 1st detail")
  ),
  value_box(
    title = "2nd value",
    value = "456",
    showcase = bs_icon("graph-up"),
    theme = "danger",
    p("The 2nd detail"),
    p("The 3rd detail")
  )
)
```

Layouts

Fixed layout

```
library(leaflet)
page_fillable(
  card(
    max_height = 200,
    card_header("Card 1"),
    lorem::ipsum(1,3)
  ),
  card(
    max_height = 100,
    card_header("Card 2"),
    "This is it."
  ),
  card(
    max_height = 200,
    card_header("Card 3"),
    leaflet() |> addTiles()
  )
)
```

Column layout

```
library(leaflet)
page_fillable(
  layout_columns(
    height = 200,
    card(
      card_header("Card 1"),
      lorem::ipsum(1,3)
    ),
    card(
      card_header("Card 2"),
      "This is it."
    )
  ),
  layout_columns(
    height = 300,
    card(
      card_header("Card 3"),
      leaflet() |> addTiles()
    )
  )
)
```

Column layout

Column widths layout

```
library(leaflet)
page_fillable(
  layout_columns(
    col_widths = c(8, 4, -1, 10, -1),
    row_heights = c("200px", "300px"),
    card(
      card_header("Card 1"),
      lorem::ipsum(1,3)
    ),
    card(
      card_header("Card 2"),
      "This is it."
    ),
    card(
      card_header("Card 3"),
      leaflet() |> addTiles()
    )
  )
)
```

Column widths layout

Dynamic layouts

```
library(leaflet)
layout_column_wrap(
  width = 1/2,
  card(
    max_height = 250,
    card_header("Card 1"),
    lorem::ipsum(1,3)
  ),
  card(
    max_height = 250,
    card_header("Card 2"),
    "This is it."
  ),
  card(
    max_height = 250,
    card_header("Card 3"),
    leaflet() |> addTiles()
  )
) |>
  anim_width("100%", "33%")
```

Dynamic layouts

Responsive columns

```
library(leaflet)
layout_column_wrap(
  width = "200px",
  card(
    max_height = 250,
    card_header("Card 1"),
    lorem::ipsum(1,3)
  ),
  card(
    max_height = 250, fill=FALSE,
    card_header("Card 2"),
    "This is it."
  ),
  card(
    max_height = 250,
    card_header("Card 3"),
    leaflet() |> addTiles()
  )
) |>
  anim_width("100%", "33%")
```

Responsive columns

Nested Layouts

```
library(leaflet)
layout_column_wrap(
  width = 1/2,
  card(
    card_header("Card 1"),
    lorem::ipsum(1,3)
  ),
  layout_column_wrap(
    width = 1,
    heights_equal = "row",
    card(
      card_header("Card 2"),
      "This is it."
    ),
    card(
      max_height = 300,
      card_header("Card 3"),
      leaflet() |> addTiles()
    )
  )
)
```

Nested Layouts

Theming

Bootswatch

Due to the ubiquity of Bootstrap a large amount of community effort has gone into developing custom themes - a large free collection of these are available at bootswatch.com/.

`bs_theme()`

Provides a high level interface to adjusting the theme for an entire Shiny app,

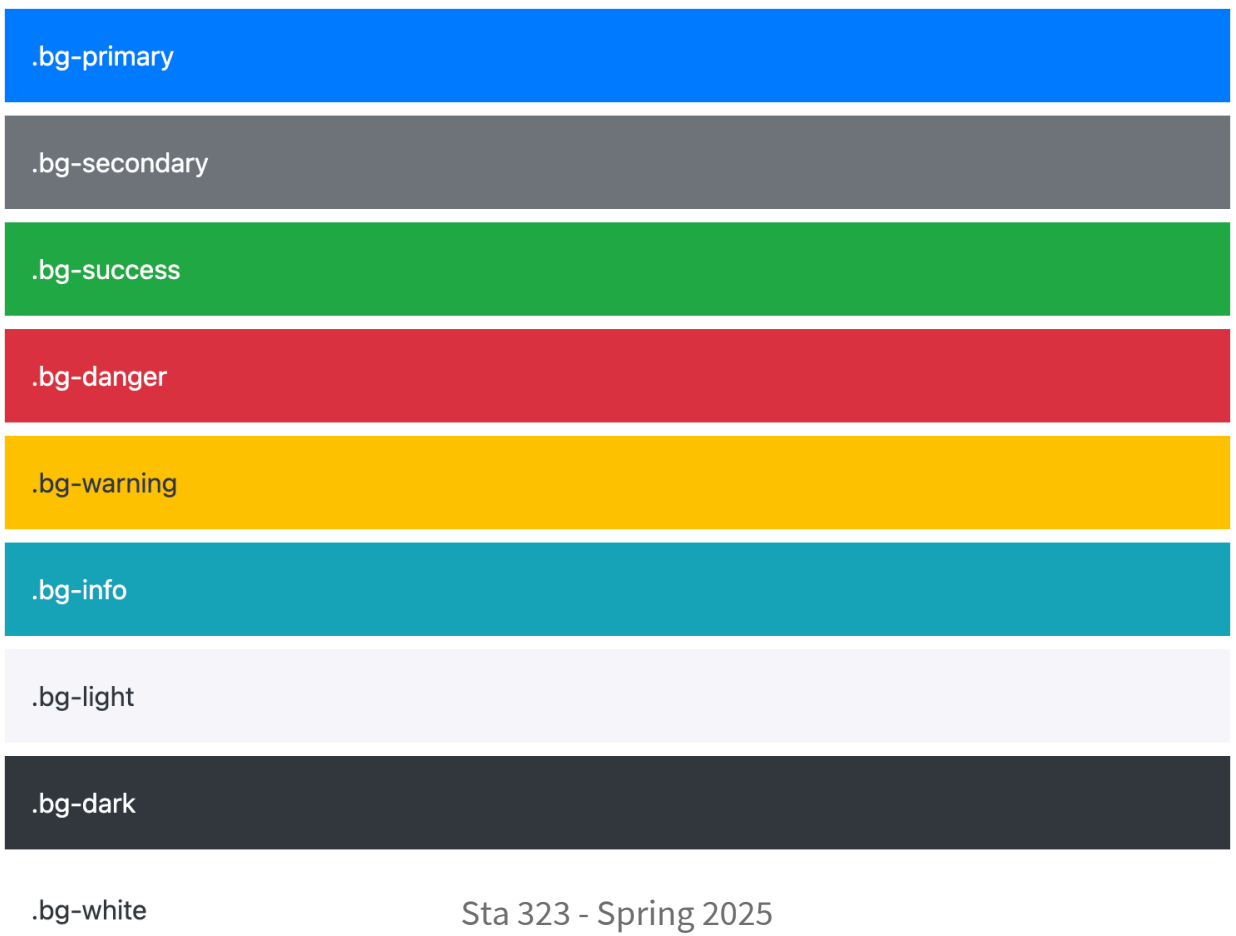
- Change bootstrap version via `version` argument
- Pick a bootswatch theme via `bootswatch` argument
- Adjust basic color palette (`bg`, `fg`, `primary`, `secondary`, etc.)
- Adjust fonts (`base_font`, `code_font`, `heading_font`, `font_scale`)
- and more

The object returned by `bs_theme()` can be passed to the `theme` argument of `fluidPage()` and similar page UI elements.

In a Shiny app dynamic theming can be enabled by including `bs_themer()` in the server function of your app.

Bootstrap colors palettes

Bootstrap provides a large number of built-in colors for styling html elements via CSS. Within these colors, a smaller subset are selected to create a color palette that is the basis for most themes and is used for the default styling of Bootstrap components.



Bootstrap color usage

From the Bootstrap documentation the following are the general use cases for each of these colors,

- *Primary* - Main theme color, used for hyperlinks, focus styles, and component and form active states.
- *Secondary* - used to complement the primary color without drawing too much attention, used for less prominent UI elements.
- *Success* - used for positive or successful actions and information.
- *Danger* - used for errors and dangerous actions.
- *Warning* - used for non-destructive warning messages.
- *Info* - used for neutral and informative content.
- *Light* - Additional theme option for less contrasting colors.
- *Dark* - Additional theme option for higher contrasting colors.

Bootstrap theme colors with Shiny

These theme colors can be specifically applied to some Shiny elements using the `class` argument.

```
1 actionButton("primary", "Primary", class = "btn-primary")
```

```
1 actionButton("primary", "Danger", class = "btn-danger")
```

```
1 actionLink("danger", "Danger", class = c("link-info","bg-success"))
```

Note - bootstrap classes make use of prefixes to help specialize the behavior to specific types of html elements.

thematic

is a package that provides a way of simplifying the process of theming ggplot2, lattice, and base R graphics. However, it also provides a way to automatically integrate these themes with Shiny apps, RMarkdown and Quarto documents.

While it is not perfect, it can do much of the heavy lifting and can get you close to a working theme with a minimal amount of intervention.

In order to enable this automatic theming, just include `thematic_shiny()` in your R script before you call `shinyApp()`.