```r
}

data_props <- combine_data_props(x$marks)
data_ids <- names(data_props)
data_table <- x$data[data_ids]

# Collapse each list of scale objects into one scale object.
x <- collapse_scales(x)
scale_data_table <- scale_domain_data(x)

# Wrap each of the reactive data objects in another reactive which returns
# only the columns that are actually used, and adds any calculated columns
# that are used in the props.
data_table <- active_props(data_table, data_props)

# From an environment containing data_table objects, get static data for the
# specified ids.
```

Values

data_ids	"diamonds0/bin1/stack2"
data_props	List of 1
dynamic	FALSE

Show internals

Traceback

```
as.vega.ggvis(x, FALSE) at vega.R:29
as.vega(x, FALSE) at vega.R:11
view_static(x, ...) at print.R:67
print.ggvis(c("list()", "list(diamonds0 = function () \nstatic_data)", "li
```

Console ~/r/ggvis/

Next Continue Stop

```
> ggvis(diamonds, x = ~price, y = ~color)
Guessing layer_histograms()
Guessing binwidth = 1
Called from: eval(expr, envir, enclos)
Browse[1]> n
debug at /Users/jmcphers/r/ggvis/R/vega.R#29: data_table <- x$data[data_ids]
Browse[2]>
```

DASHBOARDS

Shiny from RStudio

OUTLINE

- What is in a dashboard?
- Server
  - reactiveFileReader
  - reactivePoll
- UI
  - Static vs. dynamic dashboards
  - flexdashboard
  - Shiny pre-rendered
  - shinydashboard

What is in a dashboard?

DASHBOARDS

- Automatically updating
  - Not just based on user gestures
  - But also when data source changes
- Many viewers looking at the same data
- May or may not be interactive

Server

MOTIVATION

- You have new data coming in — constantly, continuously, or on a schedule
- When new data comes in, it’s automatically received, and transformed, aggregated, summarized, etc.
- May want to call attention to exceptional results

EXERCISE

- Why might this not be a good idea?

```r
dataset <- reactive({
  result <- read.csv(“data.csv")
  invalidateLater(5000)
  result
})

output$plot <- renderPlot({
  plot(dataset()) # or whatever
})
```

SOLUTION

Lots of overhead!

reactiveFileReader

REACTIVEFILEREADER

- Reads the given file (`"data.csv"`) using the given function (`read.csv`)
- Periodically reads the last-modified time of the file
- If the timestamp changes, then (and only then) re-reads the file

```
dataset <- reactiveFileReader(
  intervalMillis = 1000,
  session = session,
  filePath = "data.csv",
  readFunc = read.csv
)

output$plot <- renderPlot({
  plot(dataset()) # or whatever
})
```

Single file, on disk
(not database or web API)

Must have data path as first argument

REACTIVEFILEREADER

```
dataset <- reactiveFileReader(
  intervalMillis = 1000,
  session = session,
  filePath = "data.csv",
  readFunc = read.csv,
  stringsAsFactors = FALSE
)

output$plot <- renderPlot({
  plot(dataset()) # or whatever
})
```

Add any named arguments

reactivePoll

REACTIVEPOLL

- `reactiveFileReader` is limited to files on disk. It doesn't work for non-file-based data sources like databases or web APIs
- `reactivePoll` is a generalization of reactiveFileReader
  - `checkFunc`: A function that can execute quickly, and merely determine if anything has changed
    - Should be fast as it will block the R process while it runs! The slower it is, the greater you should make the polling interval.
    - Should not return **TRUE** or **FALSE** for changed/unchanged. Instead, just return a value (like the timestamp, or the count); it's `reactivePoll`'s job, not yours, to keep track of whether that value is the same as the previous value or not.
  - `valueFunc`: A function with the (potentially expensive) logic for actually reading the data

UI

Static vs. dynamic dashboards

STATIC VS. DYNAMIC

- Static:
  - R code runs once and generates an HTML page
  - Generation of this HTML can be scheduled
- Dynamic:
  - Client web browser connects to an R session running on server
  - User input causes server to do things and send information back to client
  - Interactivity can be on client and server
  - Can update data in real time
  - User potentially can do anything that R can do

FLEX VS. SHINY DASHBOARD

flexdashboard	shinydashboard
R Markdown	Shiny UI code
Super easy	Not quite as easy
Static or dynamic	Dynamic
CSS flexbox layout	Bootstrap grid layout

flexdashboard

DEMO

something.R

EXERCISE

- `library(flexdashboard)`
- File → New file → R Markdown → From Template
- Create three plots that go in each of the panes using built-in R datasets or any data we have used in the worksho (or your own data)

3m 00s

EXERCISE

- Open `apps/dashboards/flexdashboard_01.Rmd`
- How is it different than Shiny apps we have been building so far, how is it similar?
- Make a change to the layout of the dashboard, see http://rmarkdown.rstudio.com/flexdashboard/using.html#layout for help
- Change the theme of the dashboard, see http://rmarkdown.rstudio.com/flexdashboard/using.html#appearance for help

5m 00s

SHINY DOCUMENTS

- Add runtime: shiny to header.
- Add `inputs` in code chunks.
- Add `renderXyz` functions in code chunks.
  - No need for `output$x <-` assignment, or for `xyzOutput` functions.

EXERCISE

- Continue working on `apps/dashboards/flexdashboard_01.Rmd`
- Add another UI widget, a radioButton, that allows the user to select whether the plot used to visualize the distribution of weight should be histogram or a violin plot

3m 00s

SOLUTION

Sample solution at `apps/dashboards/flexdashboard_02.Rmd`

SHINY DOCUMENT DRAWBACKS

- Start-up time: knits document every time someone visits it
- Resizing can trigger re-knit
- Auto-reconnection doesn't work (i.e. client browsers cannot automatically reconnect afer being disconnected due to network problems)

- **The solution:** Pre-rendered Shiny Documents

Shiny

pre-rendered

SHINY PRE_RENDERED

- **Rendering phase:** UI code (and select other code) is run once, before users connect.
- **Serving phase:** Server code is run once for each user session.
- Each phase is run in a separate R sessions and can't access variables from the other phase.

CONTEXTS FOR SHINY_PRERENDERED

- `"render"`: Runs in rendering phase (like `ui`)
- `"server"`: Runs in serving phase (like `server`)
- Additional contexts:
  - `"setup"`: Runs in both phases (like `global.R`)
  - `"data"`: Runs in rendering phase (any variables are saved to a file, and available to serving phase, useful for data preprocessing)
  - `"server-start"`: Runs once in serving phase, when the Shiny document is first run and is not re-executed for each new user of the document, appropriate for
    - establishing shared connections to remote servers (e.g. databases, Spark contexts, etc.)
    - creating reactive values to be shared across sessions (e.g. with `reactivePoll`, `reactiveFileReader`)

EXERCISE

- Start with `apps/dashboards/flexdashboard_02.Rmd`
- Turn your document into `runtime: shiny_prerendered`
- *Note:* You will need to use `output$x <-` assignment and `xyzOutput` functions

5m 00s

SOLUTION

Sample solution at `apps/dashboards/flexdashboard_03.Rmd`

shinydashboard

SHINYDASHBOARD

- The UI for Shiny is built on the Bootstrap web framework
- Shinydashboard is a theme for Shiny, built on top of Bootstrap
- See http://rstudio.github.io/shinydashboard/ for more

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Guessing layer_histograms()
Guessing binwidth = 1
Called from: eval(expr, envir, enclos)
Browse[1]> n
debug at /Users/jmcphers/r/ggvis/R/vega.R#29: data_table <- x$data[data_ids]
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DASHBOARDS

Shiny from RStudio