{shinytest2}

Unit testing for Shiny applications

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Slides: https://bit.ly/jnj22-shinytest2

Raise a hand✋ if…

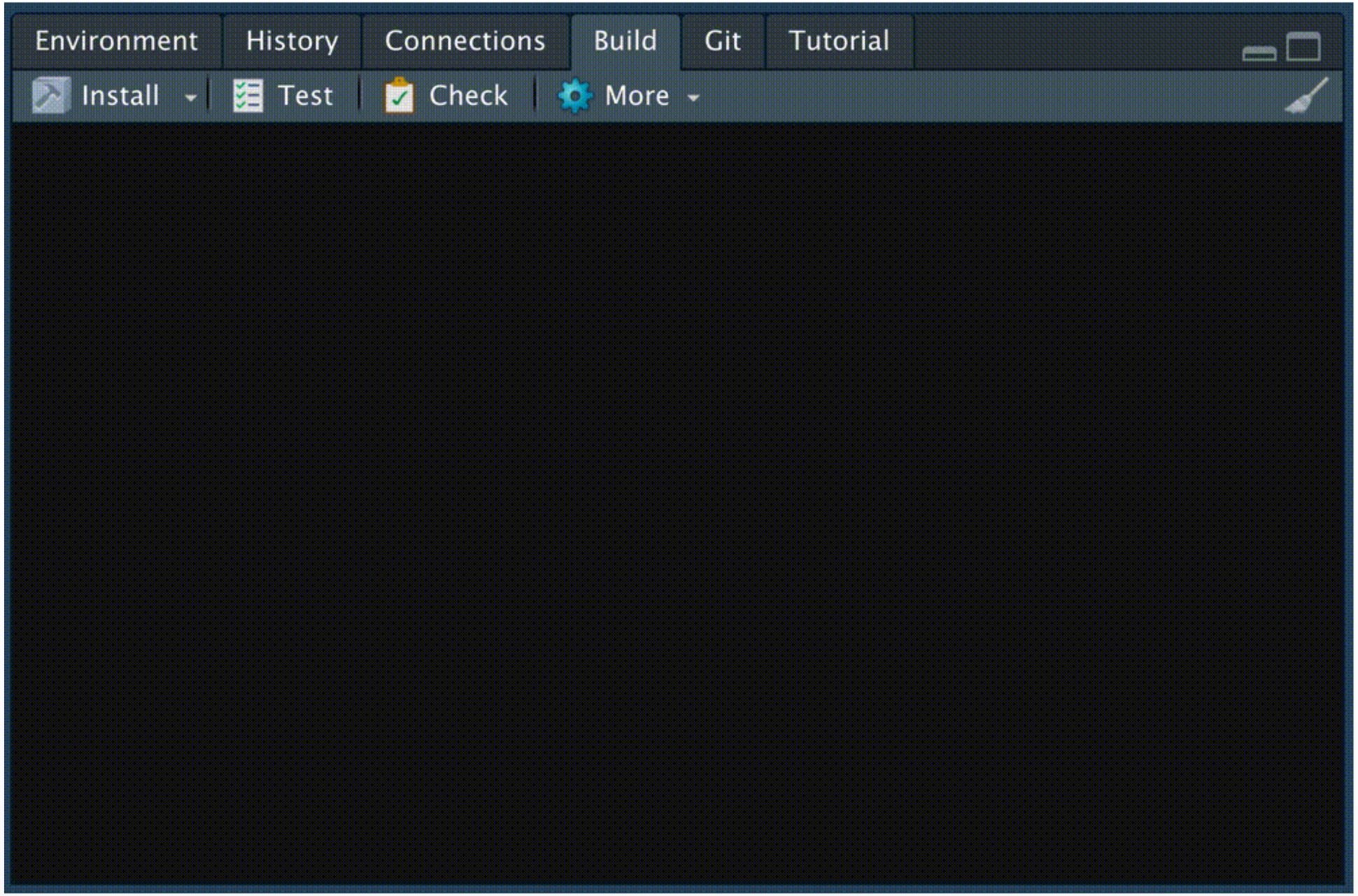
You have written a Shiny App

Raise a hand🖐 if…

You remember all of your App’s features

Raise a hand🖐 if…

You would feel comfortable having a coworker rewrite part of your App



5x playback speed


Shiny
www.rstudio.com

- Quickly build full-stack interactive web apps

- Executes reactive expressions
  - When a reactive value is changed… All downstream reactive values are invalidated and re-calculated

All too familiar Shiny workflow

1. Add / adjust some reactivity

2. Click "Run App”

3. Manually experiment with
   new feature to see if it works

4. Rinse and repeat

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Shiny
www.rstudio.com

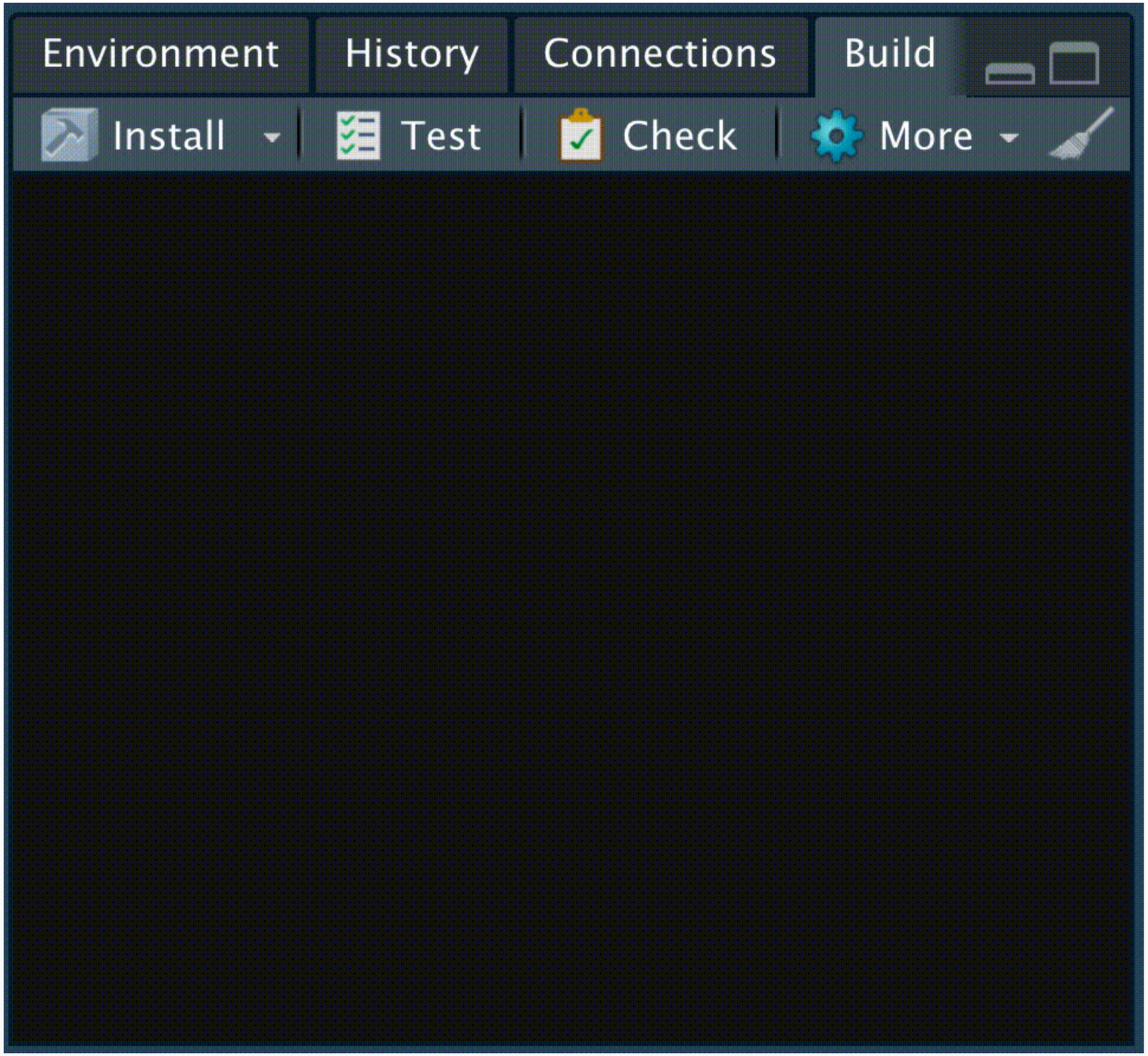

test
that
www.rstudio.com

- Unit Testing for R
- Executes **formal** unit tests
- Goals
  - Fewer bugs
  - Robust code
  - Better code structure
  - Call to action

```r
# File: tests/testthat/test-example.R

test_that("examples work", {
  expect_equal(2 * 2, 4)
  expect_equal(2 * NA, NA_integer_)

  ex_file <- make_file()
  expect_snapshot_file(ex_file)
})
```


Environment
History
Connections
Build
Install
Test
Check
More


Shiny
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test
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test
that
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- **Unit testing** for Shiny applications

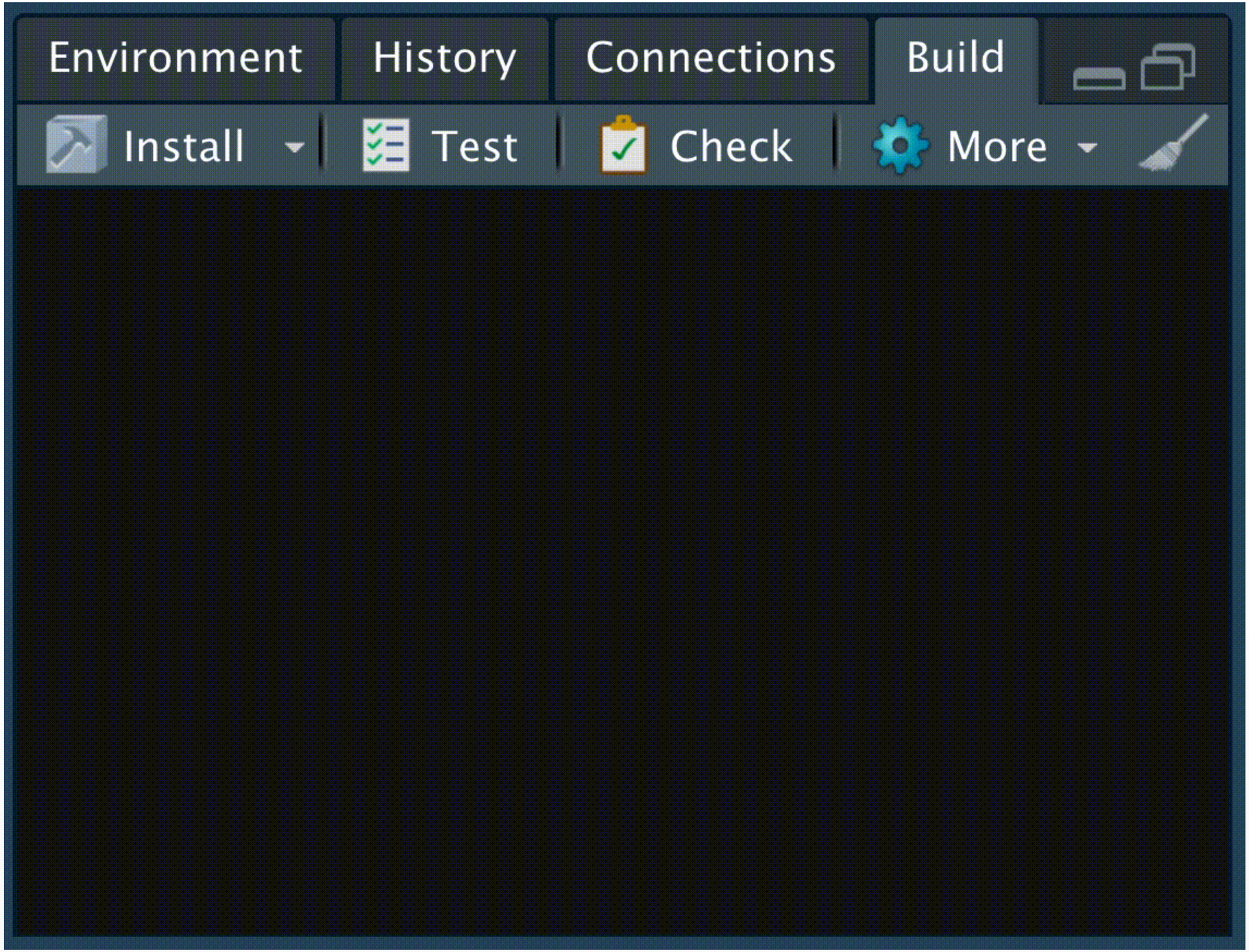
- **Regression testing** for Shiny applications
  - Testing that **existing App behavior** is consistent over time
- Executes within `{testthat}` tests
  - `{shinytest2}` expectation methods leverage `testthat::expect_snapshot_file()`
- Built on `{chromote}`
  - View live test App in Chrome browser
  - Familiar debugging tools in Chrome browser

- What about `{shinytest}`?
  - Entering **maintenance** mode
  - Headless browser reached **E**nd-**O**f-**L**ife
  - Not compatible with Bootstrap v5+
- `{shinytest2}`
  - Different headless browser
  - Different file API
  - Different R API


127.0.0.1:5608
127.0.0.1:5608
What is your name?
Greet

```r
# File: tests/testthat/test-hello.R
library(shinytest2)

test_that("App says hello Barret", {
  app <- AppDriver$new(name = "say-hello")
  app$set_inputs(name = "Barret")
  app$click("greet")
  app$expect_values()
})
```


Environment
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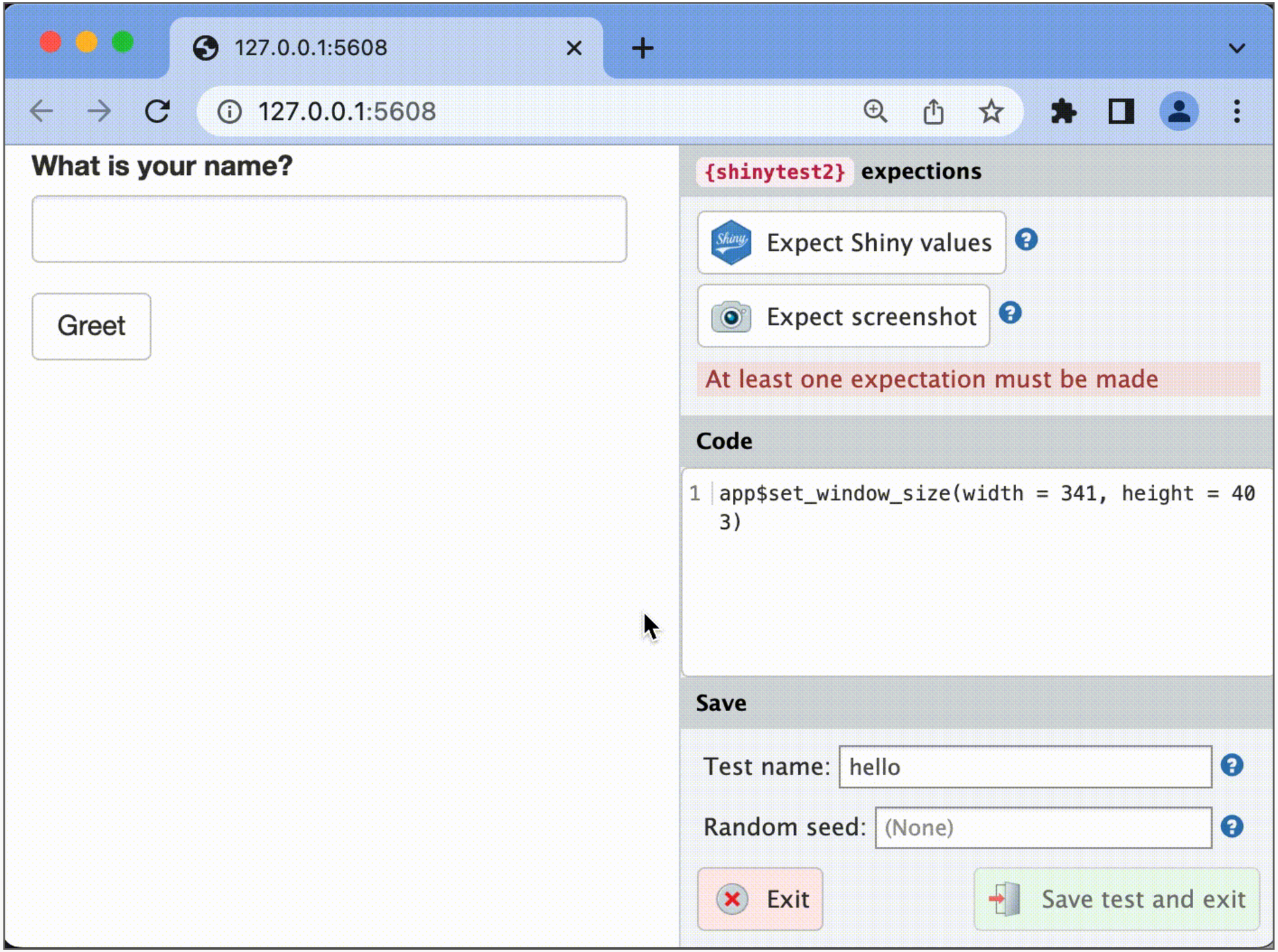
Check
More

“But writing tests is hard!”

- Everyone except Hadley

“But writing tests is hard!” - Everyone except Hadley

- `record_test()`
  - Captures all **Shiny interactions** as a `{testthat}` test
- *“If you have time to test, you have time to record a test”*

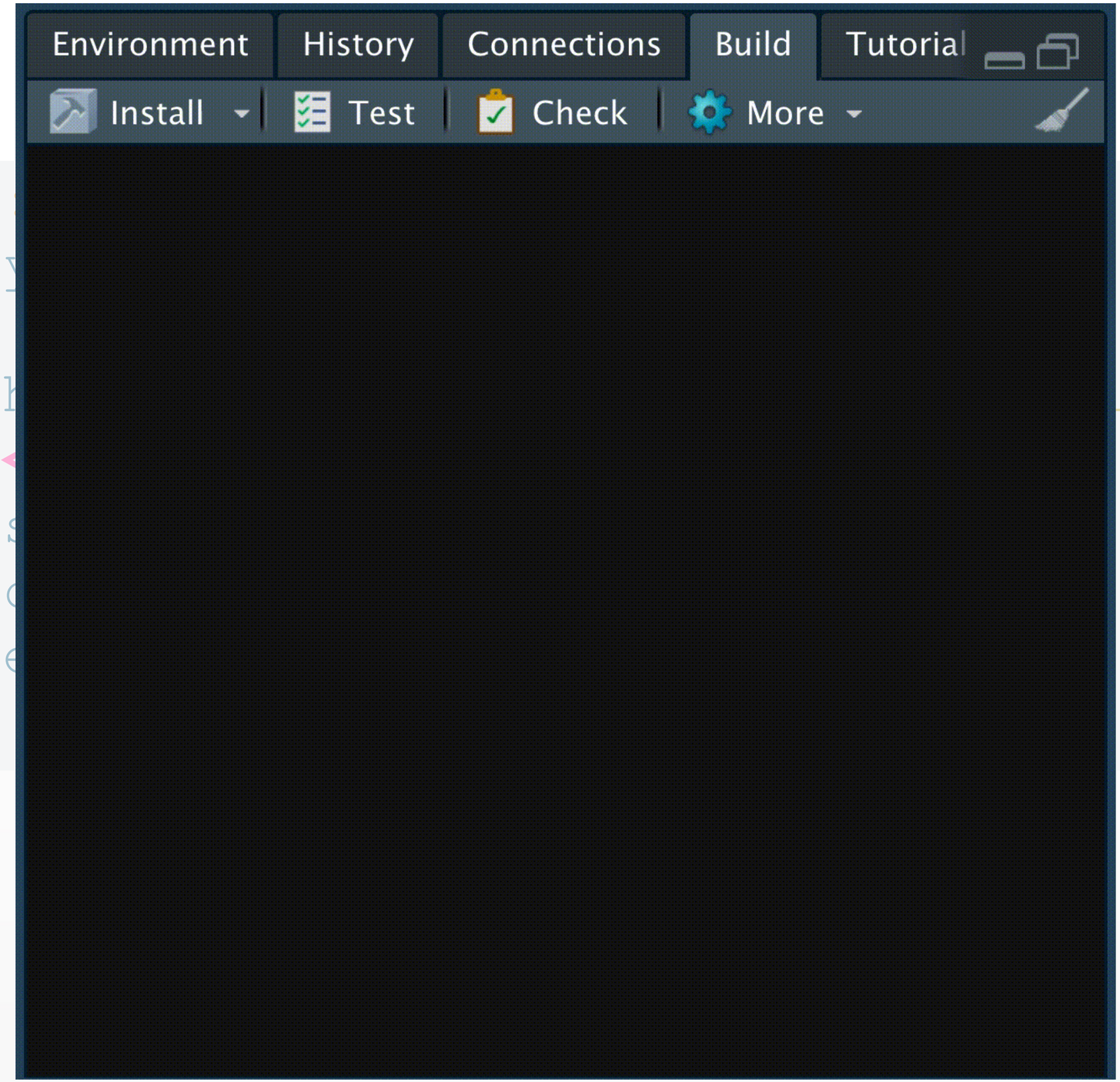

127.0.0.1:5608
127.0.0.1:5608
What is your name?
Greet
{shinytest2} expections
Expect Shiny values
Expect screenshot
At least one expectation must be made
Code
app$set_window_size(width = 341, height = 403)
Save
Test name: hello
Random seed: (None)
Exit
Save test and exit

```r
# File: tests/testthat/test-shinytest2.R
library(shinytest2)

test_that("{shinytest2} recording: hello", {
  app <- AppDriver$new(name = "hello")
  app$set_inputs(name = "Barret")
  app$click("greet")
  app$expect_values()
})
```

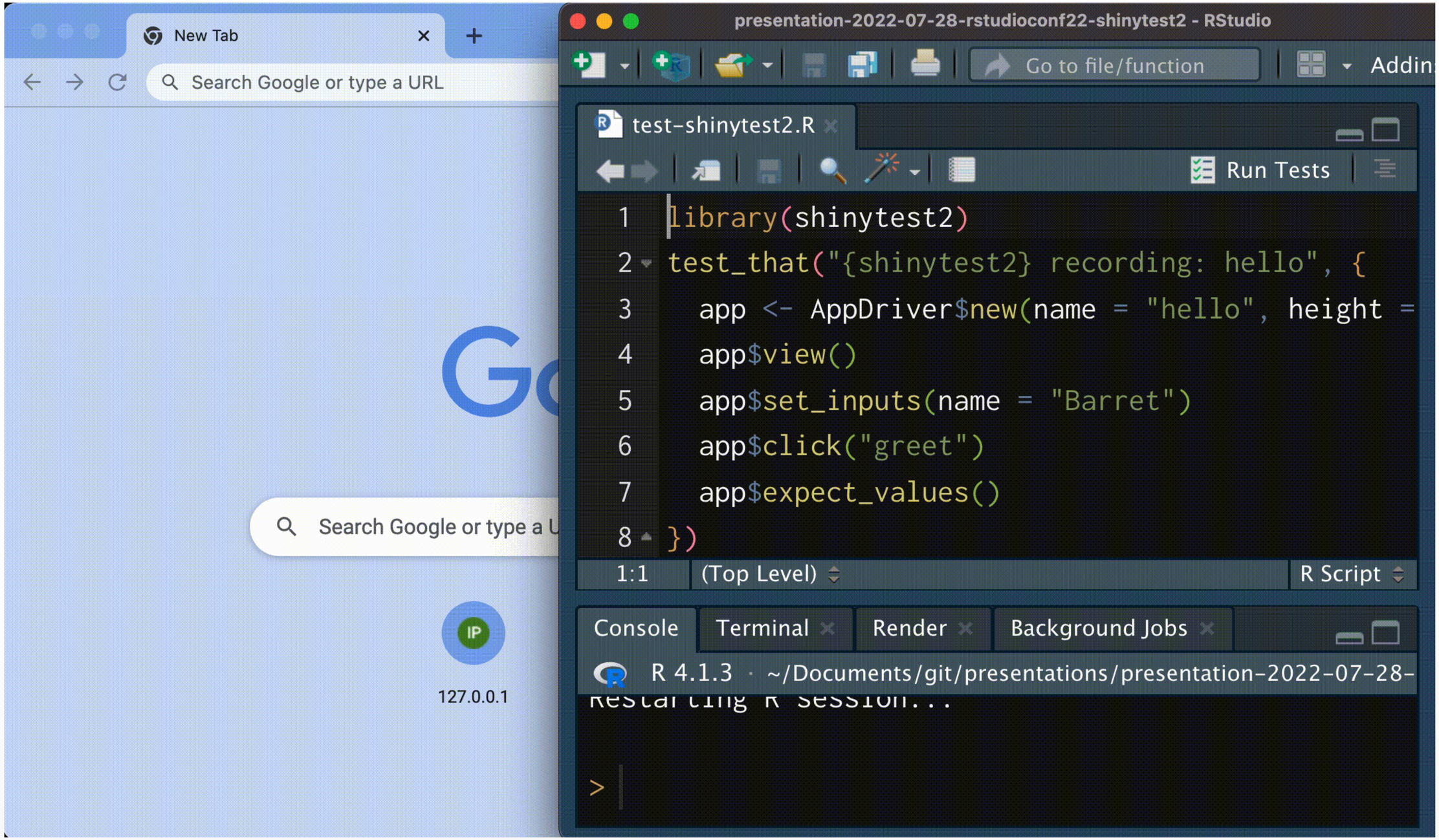
```
# File
library

test_th
  app <
  app$s
  app$c
  app$e
})
```



```r
# File: tests/testthat/test-shinytest2.R
library(shinytest2)

test_that("{shinytest2} recording: hello", {
  app <- AppDriver$new(name = "hello")
  app$view()
  app$set_inputs(name = "Barret")
  app$click("greet")
  app$expect_values()
})
```


New Tab
Search Google or type a URL
Search Google or type a U
127.0.0.1
presentation-2022-07-28-rstudioconf22-shinytest2 - RStudio
Go to file/function
Addin
test-shinytest2.R
Run Tests
library(shinytest2)
test_that("{shinytest2} recording: hello", {
app <- AppDriver$new(name = "hello", height =
app$view()
app$set_inputs(name = "Barret")
app$click("greet")
app$expect_values()
})
1:1
(Top Level)
R Script
Console
Terminal
Render
Background Jobs
R 4.1.3 · ~/Documents/git/presentations/presentation-2022-07-28-
Restarting R session...
>

Suggestions…

- Use `shiny::exportTestValues()`
  - Limit testing to objects under your control
- Initial snapshot file contents **must be verified** by hand
  - Use explicit expectations when possible (`expect_equal()`)
- Minimize number of screenshot expectations
  - **Brittle tests** and **cannot compare screenshots** across Operating Systems or R versions

Recap

- Regression testing for Shiny Apps
- *"If you have time to rest,*
  you have time to record a test"
- Interactively `$view()` your live App

{shinytest2}:

Regression testing for Shiny applications

- Website: https://rstudio.github.io/shinytest2/
  - *Getting Started* and many more articles!
- Slides: https://bit.ly/jnj22-shinytest2

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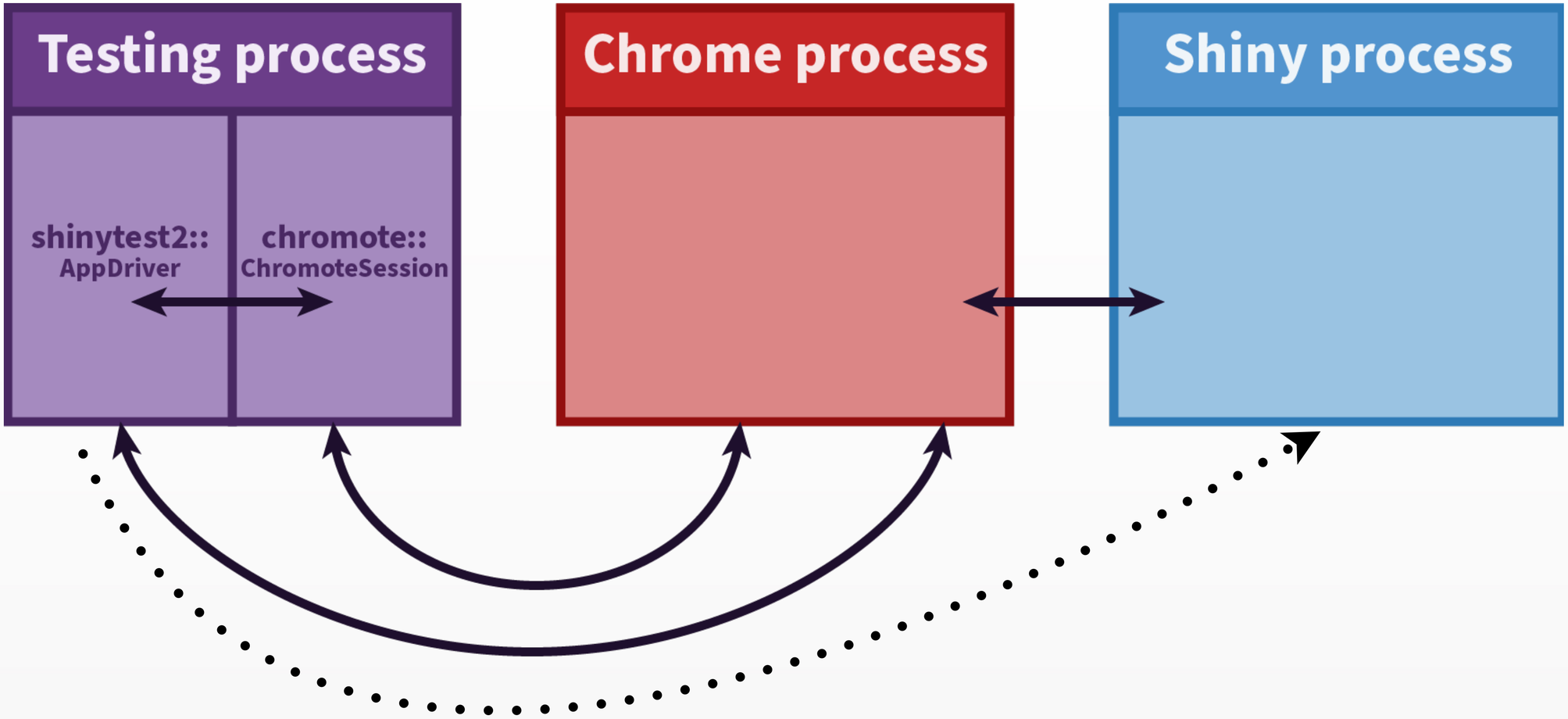
Questions?

```r
# File: ./tests/testthat/test-questions.R
library(shinytest2)

test_that("Questions are answered", {
  app <- AppDriver$new(name = "questions")
  app$set_inputs(ready = TRUE)
  app$click("ask")
  if (interactive()) app$view()
  expect_true(
    app$get_value(export = "has_answer")
  )
})
```

How does {shinytest2} orchestrate everything?



`Shiny` App development

- Core
  - `{shinyuieditor}`: Visual tool for organizing Shiny UI
  - `{bslib}`: Custom Bootstrap Sass themes for {shiny} and {rmarkdown}
  - `{shinytest2}`: Unit testing for R Shiny Apps
- Debug
  - `{profvis}`: R Shiny App profiler
  - `{reactlog}`: R Shiny reactivity visualizer
- Performance
  - `shiny::bindCache()` & `{cachem}`: Cache and store any reactive output
  - `{promises}` & `{future}`: Async code execution
- Admin
  - `{shinyloadtest}`: Load testing for R Shiny Apps
- Extra credit
  - `{plumber}`: R web API
  - `{shinymeta}`: Expose Shiny app logic using meta-programming

Shiny performance workflow

From Joe Cheng's Shiny in Production keynote…

1. Use `{shinyloadtest}` to see if it's fast enough
2. If not, use `{profvis}` to see what's making it slow
3. Optimize
    a. Move work outside of `{shiny}` (very often)
    b. Make code faster (very often)
    c. Use caching (sometimes)
    d. Use async (occasionally)
4. Repeat!