

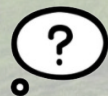
# R SHINY

## Building Interactive Web Applications with R

**JEREMY BUHLER, DATA LIBRARIAN**

**ALBINA GIBADULLINA, GRADUATE ACADEMIC ASSISTANT**

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# WORKSHOP PREREQUISITES

## Software requirements:

- Have **R** installed
- Have **R Studio** installed

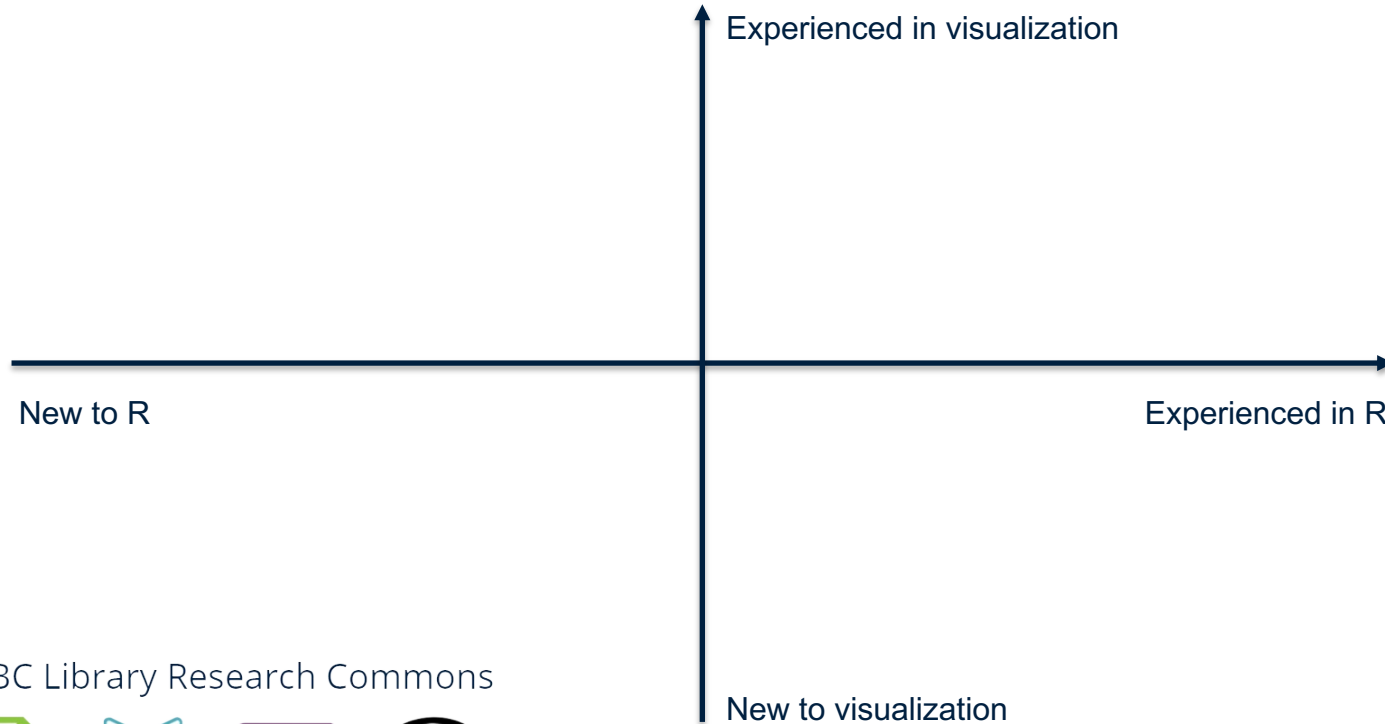
## Assumed prior knowledge:

- Have some experience developing visualizations or manipulating data in R (e.g. knowledge of **ggplot2** and **dplyr**)

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# YOUR EXPERIENCE WITH R AND VISUALIZATION



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# LEARNING OBJECTIVES

1. Become familiar with ***shiny*** package for making web applications
2. Learn how to make a simple shiny app in R
3. Learn how to expand on your app with more advanced features

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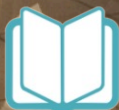




# INTRODUCTION TO SHINY



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# WHAT IS SHINY?

Shiny from R Studio

Get Started

Gallery

Articles

App Stories

Reference

Deploy

Help

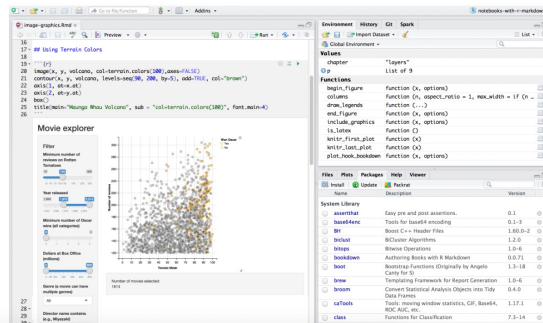
Contribute



Interact. Analyze. Communicate.

Take a fresh, interactive approach to telling your data story with Shiny. Let users interact with your data and your analysis. And do it all with R.

Shiny is an R package that makes it easy to build interactive web apps straight from R. You can host standalone apps on a webpage or embed them in R Markdown documents or build dashboards. You can also extend your Shiny apps with [CSS themes](#), [htmlwidgets](#), and JavaScript actions.



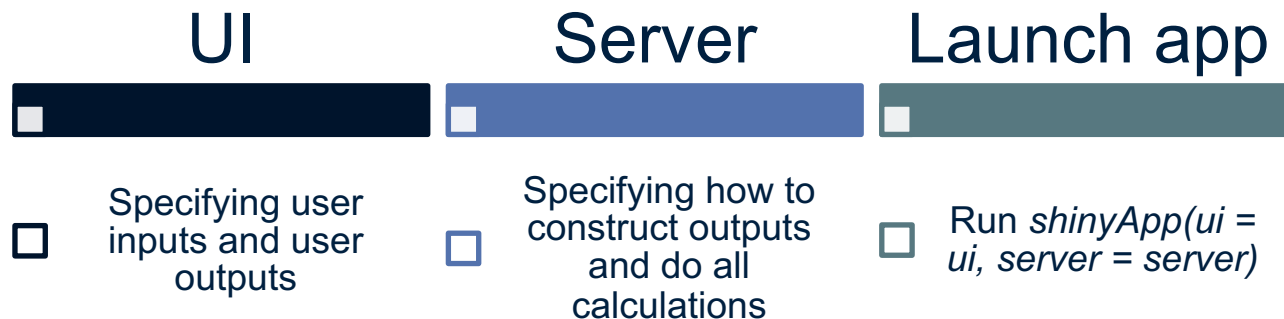
## WHAT IS SHINY USED FOR?

1. Developing interactive visualizations/tables (which can be incorporated on your website, in R markdown file, or in Tableau)
2. Developing data-oriented web applications
3. Developing full websites





# STRUCTURE OF A SHINY APP



Note: previously you would have two separate files: ***UI.r*** and ***server.r***, now there is a combined ***app.R*** file

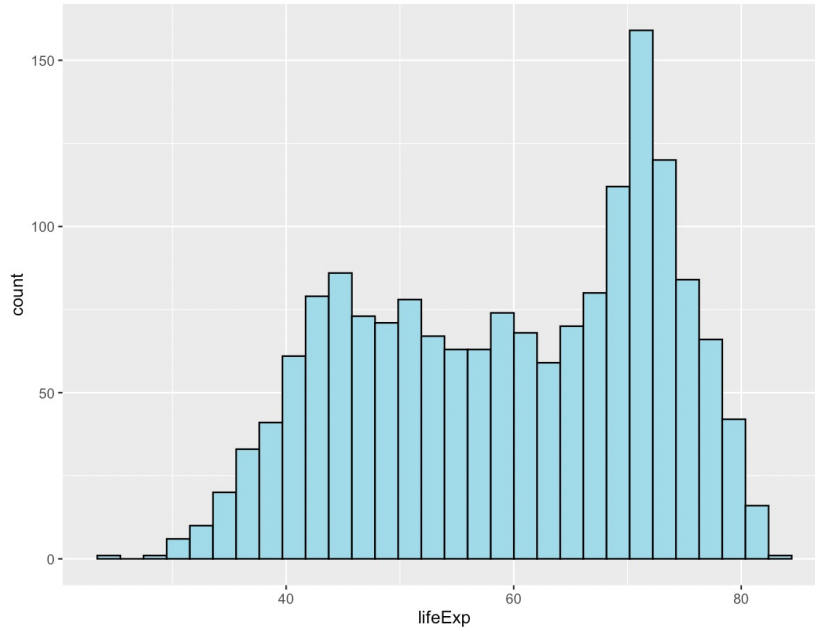
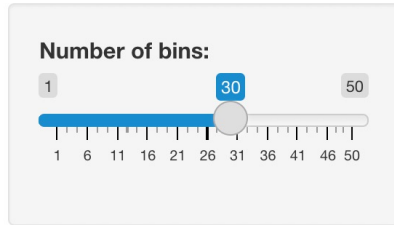
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# TIME TO SEE OUR FIRST SHINY APP!

## Life expectancy data



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# Shiny Widgets Gallery

For each widget below, the Current Value(s) window displays the value that the widget provides to shinyServer. Notice that the values change as you interact with the widgets.

## Action button

Action

Current Value:

```
[1] 0  
attr(,"class")  
[1] "integer" "shinyActionButtonValue"
```

[See Code](#)

## Single checkbox

☒ Choice A

Current Value:

```
[1] TRUE
```

[See Code](#)

## Checkbox group

☒ Choice 1  
☐ Choice 2  
☐ Choice 3

Current Values:

```
[1] "1"
```

[See Code](#)

## Date input

2014-01-01

Current Value:

```
[1] "2014-01-01"
```

[See Code](#)

## Date range

2022-03-26

to

2022-03-26

Current Values:

```
[1] "2022-03-26" "2022-03-26"
```

[See Code](#)

## File input

[Browse...](#) No file selected

Current Value:

```
NULL
```

[See Code](#)

## Numeric input

1

Current Value:

```
[1] 1
```

[See Code](#)

## Radio buttons

☒ Choice 1  
☐ Choice 2  
☐ Choice 3

Current Values:

```
[1] "1"
```

[See Code](#)

## Select box

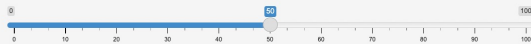
Choice 1

Current Value:

```
[1] "1"
```

[See Code](#)

## Slider



Current Value:

```
[1] 50
```

## Slider range



Current Values:

```
[1] 25 75
```

## Text input

Enter text...

Current Value:

```
[1] "Enter text..."
```



# ADDITIONAL WIDGETS OFFERED BY SHINYWIDGETS

shinyWidgets

Overview

switchInput

Pretty Checkboxes & Radios

Awesome Checkboxes & Radios

checkboxGroup Buttons

radio Buttons

materialSwitch

pickerInput

sliderText

progressBar

btn

dropdowns & sweetalert

## shinyWidgets Overview

Awesome checkbox Group

Checkboxes with status

☐ A ☐ B ☐ C

Value :  
NULL

Show code

More examples

Awesome Radio Buttons

Radio with status

☐ A ☒ B ☐ C

Value :  
[1] "B"

Show code

More examples

Radio Group Buttons

Choices

Choice 1 Choice 2 Choice 3

Value :  
[1] "Choice 1"

Show code

Awesome checkbox

A single checkbox

Value :  
[1] TRUE

Show code

More examples

Material Design Switch

Primary switch

Value :  
[1] FALSE

Show code

More examples

Bootstrap Switch

ON

Value :  
[1] TRUE

Show code

More examples

Select Picker

With plain HTML

Badge danger

Value :  
[1] "Badge danger"

Show code

More examples

Search field

Click search icon to update or hit 'Enter'

A placeholder

Value :  
[1] ""

Show code

Multi.js

Countries :

Search...

France

United Kingdom

Germany

United States of America

Belgium

China

Value :  
NULL

Show code

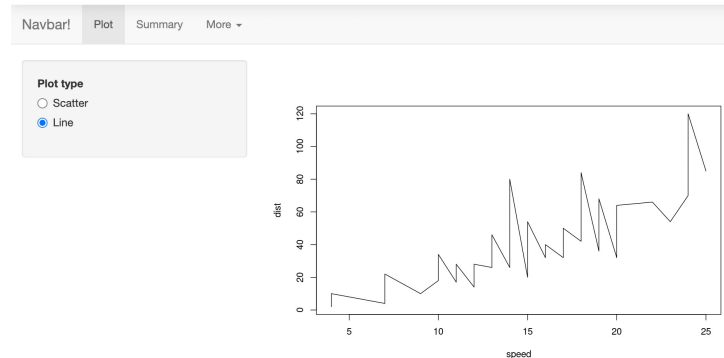
11

# FOUR APPLICATION LAYOUTS

## Horizontal/vertical layering

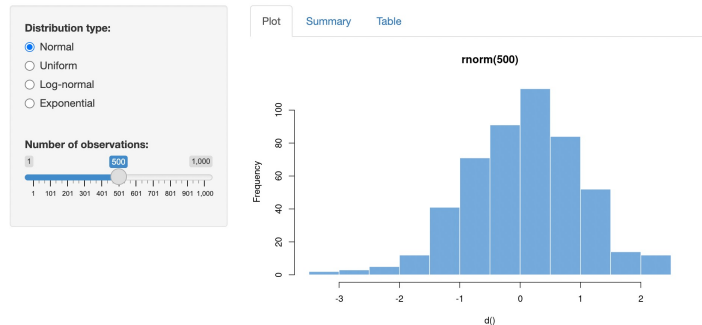


## Navbar

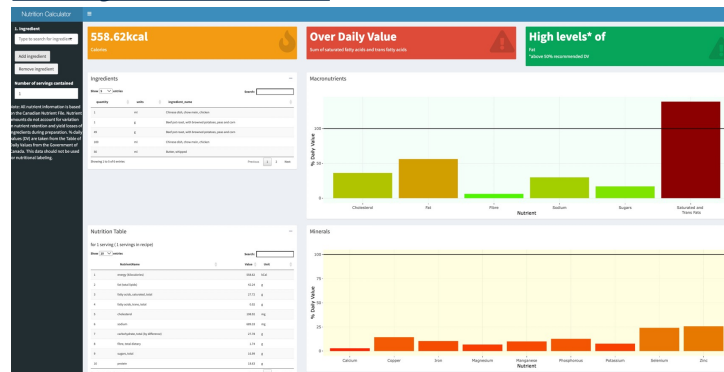


## Tabsets

### Tabsets



## ShinyDashboard





# Gallery

Welcome to the Shiny Gallery! Below you can find a myriad of Shiny apps to be inspired by and to learn from. We have organized the apps in two main categories:

- **Shiny User Showcase** comprised of contributions from the Shiny app developer community.
- **Shiny Demos** that are designed to highlight specific features of shiny, the package.

## Shiny User Showcase

The Shiny User Showcase is comprised of contributions from the Shiny app developer community. The apps are categorized into application areas and presented with a brief description, tags, and for many, the source code. Note that many of these apps are winners and honorable mentions of our [annual Shiny contest](#)!

### Education

Apps designed for teaching



Didactic modeling process: Linear regression



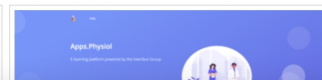
R/Shiny package to learn immune response modeling



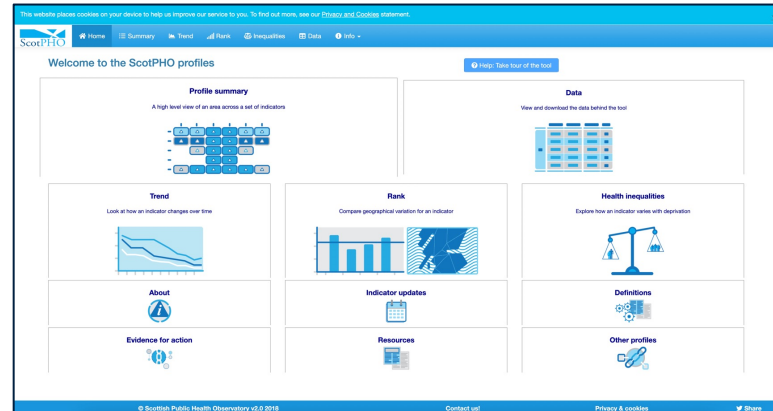
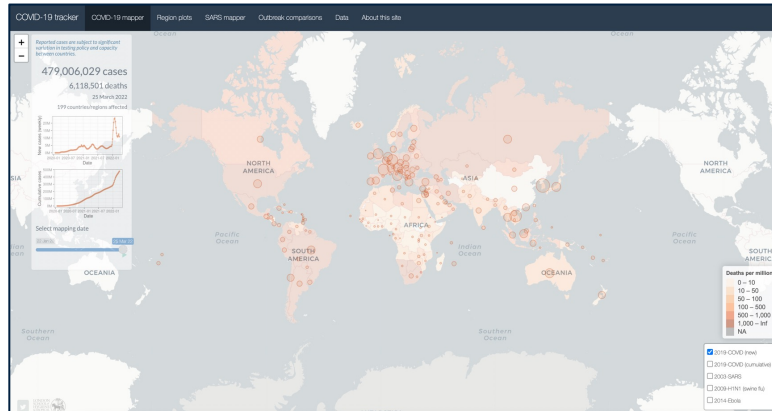
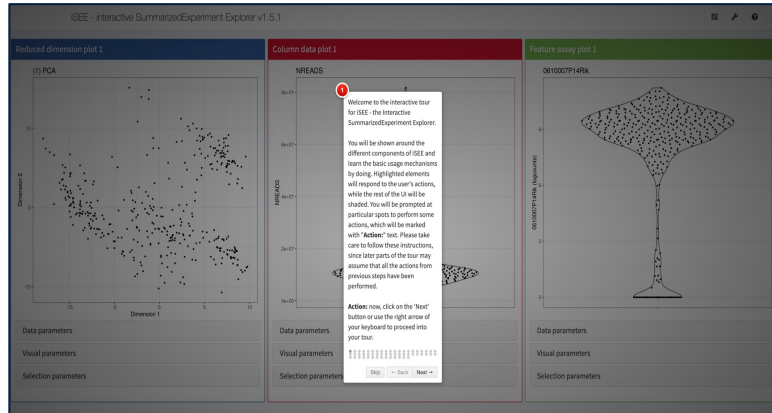
NCAA Swimming Team Finder for Incoming College Athletes



Radiant - A shiny app for statistics and machine learning



# SHINY APP EXAMPLES



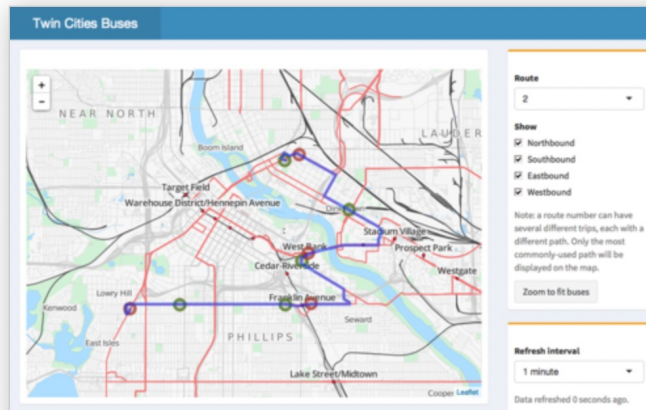
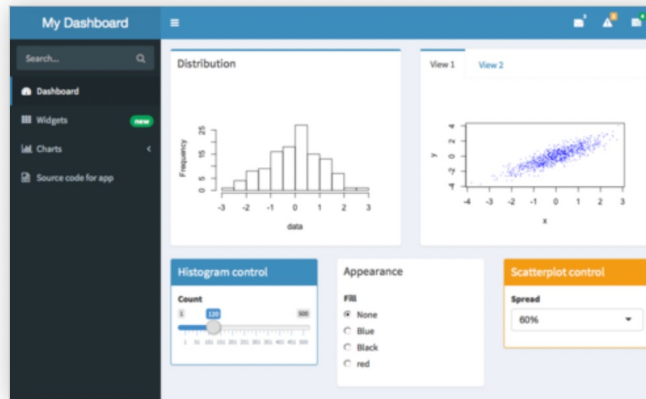
# MODIFYING THE APP FURTHER

WITH

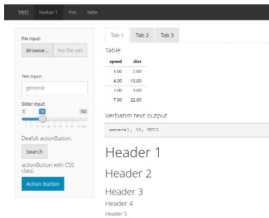
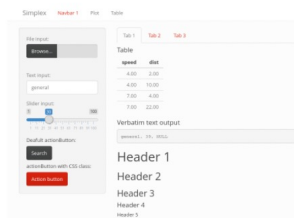
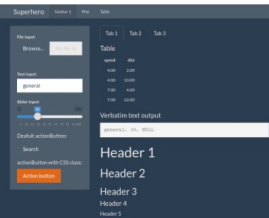
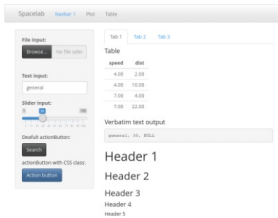
# SHINY DASHBOARD

Dashboard

**shinydashboard** makes it easy to use [Shiny](#) to create dashboards like these:



# WITH CSS THEMES





# MODIFYING THE APP FURTHER

WITH

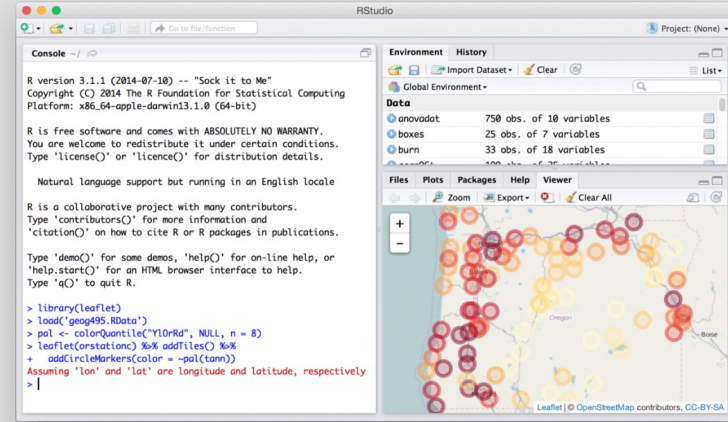
# HTML WIDGETS

## Bring the best of JavaScript data visualization to R

Use JavaScript visualization libraries at the R console, just like plots

Embed widgets in R Markdown documents and Shiny web applications

Develop new widgets using a framework that seamlessly bridges R and JavaScript

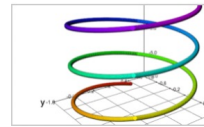
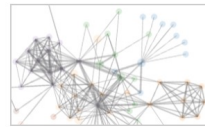
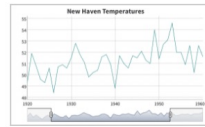


At the R console

In R Markdown docs

In Shiny apps

## Widgets in action



Just a line or two of R code can be used to create interactive visualizations. See the featured widgets in the [showcase](#) and browse over 50 available widgets in the [gallery](#).


[See the showcase »](#)

MODIFYING  
THE APP  
FURTHER

WITH

JAVA  
SCRIPT

OverviewQuick StartExampleAdvancedExtendHelp



# shinyjs

Easily improve the user experience of your Shiny apps in seconds

[DEMO](#)[GET STARTED](#)

Created by Dean Attali [View on GitHub](#)

## What is shinyjs?

shinyjs lets you perform common useful JavaScript operations in Shiny apps that will greatly improve your apps.  
*Without having to know any JavaScript.*



## Hosting and deployment

When it's time to put your Shiny app on the web, you can choose to deploy on your own servers or on our hosting service.



### Deploy to the cloud

#### Shinyapps.io

Host your Shiny apps on the web in minutes with Shinyapps.io. It is easy to use, secure, and scalable. No hardware, installation, or annual purchase contract required. Free and paid options available.

[Learn more](#)[FAQ](#)

### Deploy on-premises or in your VPC (open source)

#### Shiny Server

Deploy your Shiny apps and interactive documents on-premises with open source Shiny Server, which offers features such as multiple apps on a single server and deployment of apps behind firewalls.

[Learn more](#)

### Deploy on-premises or in your VPC (commercial)

#### RStudio Connect

RStudio Connect is our flagship publishing platform for the work your teams create in R. With RStudio Connect, you can share Shiny applications, R Markdown reports, dashboards and plots, as well as Python-based content, including Flask, Dash, Streamlit and Bokeh, in one convenient place with push-button publishing from the RStudio IDE. Features include scheduled execution of reports and flexible security policies to bring the power of data science to your entire enterprise.

[Learn more](#)[FAQ](#)

**THREE  
WAYS TO  
LAUNCH  
YOUR  
SHINY APP**



# DEPLOYING IT ON SHINYAPPS.IO

shinyapps.io by RStudio

[Home](#) [Features](#) [Pricing](#) [Support](#) [Log in](#)

## FREE

**\$0** /month

New to Shiny? Deploy your applications for FREE.

5 Applications

25 Active Hours

✔ Community Support

❌ RStudio Branding

[Sign Up Now](#)

## STARTER

**\$9** /month  
( or \$100/year )

More applications. More active hours!

25 Applications

100 Active Hours

✔ Premium Email Support

[Sign Up Now](#)

## BASIC

**\$39** /month  
( or \$440/year )

Take your users to the next level!

Unlimited Applications

500 Active Hours

✔ Performance Boost

✔ Premium Email Support

[Sign Up Now](#)

## STANDARD

**\$99** /month  
( or \$1,100/year )

Password protection? Authenticate your users!

Unlimited Applications

2,000 Active Hours

✔ Authentication

✔ Performance Boost

✔ Premium Email Support

[Sign Up Now](#)

## PROFESSIONAL

**\$299** /month  
( or \$3,300/year )

Professional has it all! Personalize your domains.

Unlimited Applications

10,000 Active Hours

✔ Authentication

✔ Account Sharing

✔ Performance Boost

✔ Custom Domains

✔ Premium Email Support

[Sign Up Now](#)





# BENEFITS OF SHINY APPS

- Expansive interactivity
  - ✓ Great for data that should be presented interactively
- Breath and depth of content you can include
  - ✓ A project can have its own web page with multiple pages
- Diversity of features
  - ✓ From simple graphs and tables to networks and maps
- Works very well with many R packages
  - ✓ Shiny developers are constantly expanding shiny functionality
- Open-source and mostly free
- Lots of available educational resources, code examples you can use
  - ✓ Very active global community of R Shiny users and [annual Shiny contests](#)



# “COSTS” OF SHINY APPS

- Requires a basic-intermediate understanding of coding
  - ✓ Significant time commitment
- Restrictions on publishing the app and using it for free
  - E.g. 25 free user hours/month
- Getting to 90% of what you want is easy, the other 10% can take forever
- Sadly doesn't work with all R packages
- Things can take a long time to load and process
  - Depending on the size of your data and what you are visualizing



# WHAT DO YOU NEED TO KNOW TO BUILD SHINY APPS?

## **MUST know:**

- Making basic and static visualizations in R (e.g. knowledge *ggplot2* package)
- Cleaning/manipulating your data in R (e.g. knowledge of *dplyr*, *tidyr* packages)
- Writing out simple Shiny syntax

## **OPTIONAL but USEFUL to know:**

- Making interactive visualizations in R (e.g. *plotly*, *chorddiag*, *visNetwork*, *tmap* packages)
- Knowing some *html* and *css* to modify various visual aspects of the app
- Some prior experience in non-R coding can be helpful (but not necessary)

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# LET'S MAKE OUR FIRST SHINY APP!

## Gapminder Shiny App

**Country**

Afghanistan, Albania, Algeria, Angola, Argenti ▼

**Continent**

☒ Africa ☒ Americas ☒ Asia ☐ Europe  
☐ Oceania


**Life Expectancy**

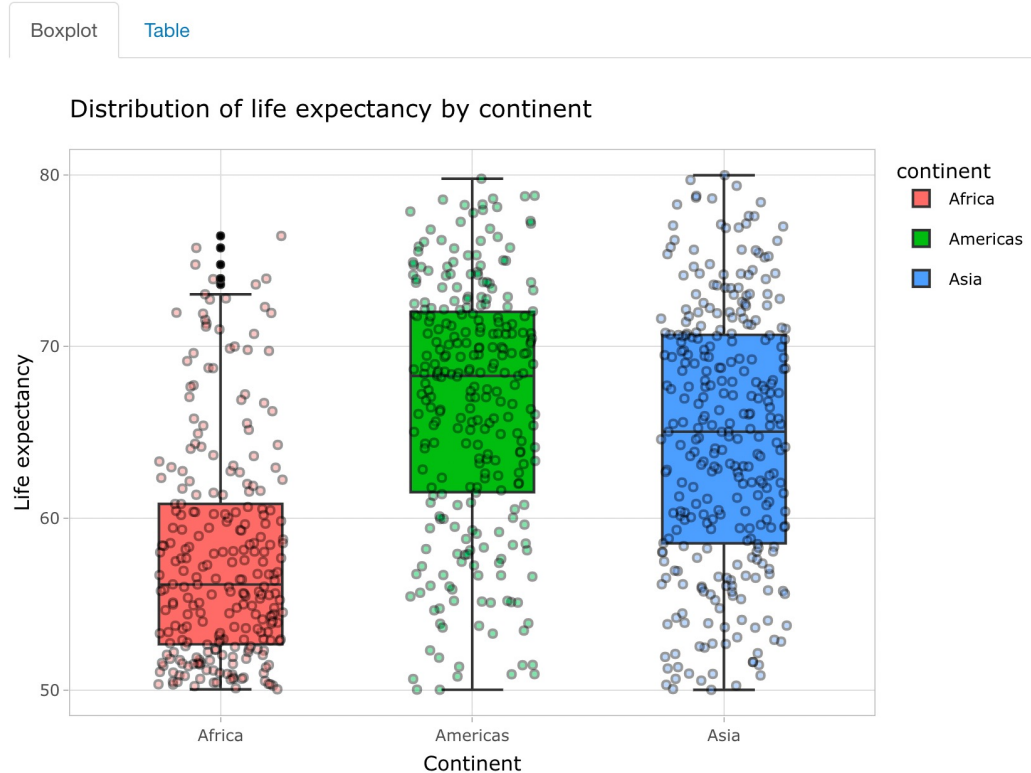
20 50 80

20 27 34 41 48 55 62 69 76 83

**Year**

1952, 1957, 1962, 1967, 1972, 1977, 1982, 1! ▼

 Reset all inputs



# ADDING MORE FEATURES TO OUR SHINY APP

## Gapminder Shiny App

**GAPMINDER**

Country  
AFGHANISTAN, ALBANIA, ALGERIA, ANGOLA, ARGENTINA, AUSTRALIA

Continent  
☒ Africa ☒ Americas ☒ Asia ☒ Europe ☐ Oceania

Year  
1951 to 2008

Life Expectancy  
20 40 80

Population  
10,000,000 1,000,000,000

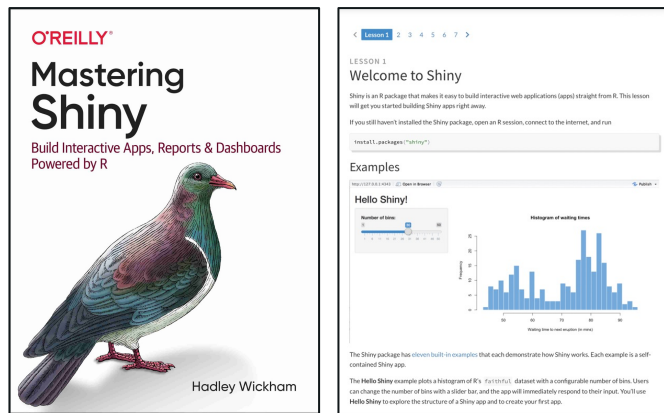
GDP per Capita  
500 100,000


RESET ALL INPUTS





# SHINY RESOURCES





## Building Web Applications WITH SHINY

**WELCOME!**  
GETTING PRACTICE  
RUNNING THE APP  
LOCALLY  
READY, STEADY, GO!  
QUESTIONS?

**Welcome!**  
This is a short course that will introduce you to Shiny.  
The course is organized into four modules, which you can access with the navigation bar above.


- Module 1: Hello Shiny! - Architecture of a shiny app
- Module 2: Reactive flow - Inputs to rendering functions to outputs
- Module 3: Reactivity essentials - Diving deeper into reactive programming
- Module 4: Customizing UI - Understanding how to build a user interface

Shiny from R Studio

Get Started Gallery Articles App Stories Reference Deploy Help Contribute

## How to Start Shiny tutorial

The How to Start Shiny video series will take you from R programmer to Shiny developer. Watch the complete tutorial, or jump to a specific chapter by clicking a link below. The entire tutorial is two hours and 25 minutes long. Download the slides and exercises [here](#).

 **How to Start Shiny (Complete)**  
from RStudio, Inc.

2700 University Ave., Boston, MA 02215  
Phone: 617.444.1232

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# How to start with Shiny, Part 1

## How to build a Shiny App

Choice 1

Choice 1

Choice 2

Choice 3

Garrett Grolemond

2:25:34

R Studio

### Part 1 - How to build a Shiny app

1. Introduction
2. R
3. App architecture
4. App template
5. Inputs and outputs
6. The server function
7. Sharing apps
8. Shinyapps.io
9. Shiny servers
10. Recap - Part 1

### Part 2 - How to customize reactions

11. Introduction
12. Review of Part 1
13. Reactivity
14. Reactive values
15. Reactive functions
16. render()
17. reactive()
18. isolate()
19. observeEvent()
20. eventReactive()
21. reactiveValues()
22. Recap - Part 2
23. Parting tips

### Part 3 - How to customize appearance

24. Introduction
25. Review of Parts 1 and 2
26. HTML UI
27. Adding static content
28. Building layouts
29. Panels and tabssets
30. Prepackaged layouts
31. CSS
32. Recap - Part 3

# THANK YOU FOR ATTENDING!

Please fill out a short feedback survey 😊



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