



CYOSS



BUILDING A COMPREHENSIVE
OPEN-SOURCE WEB PLATFORM
FOR R SHINY APPS

AGENDA



1. Application - Building a Country Intelligence Dashboard

- Open-Source data from the World Bank
- GADM Geo-Information
- Combining Information in R

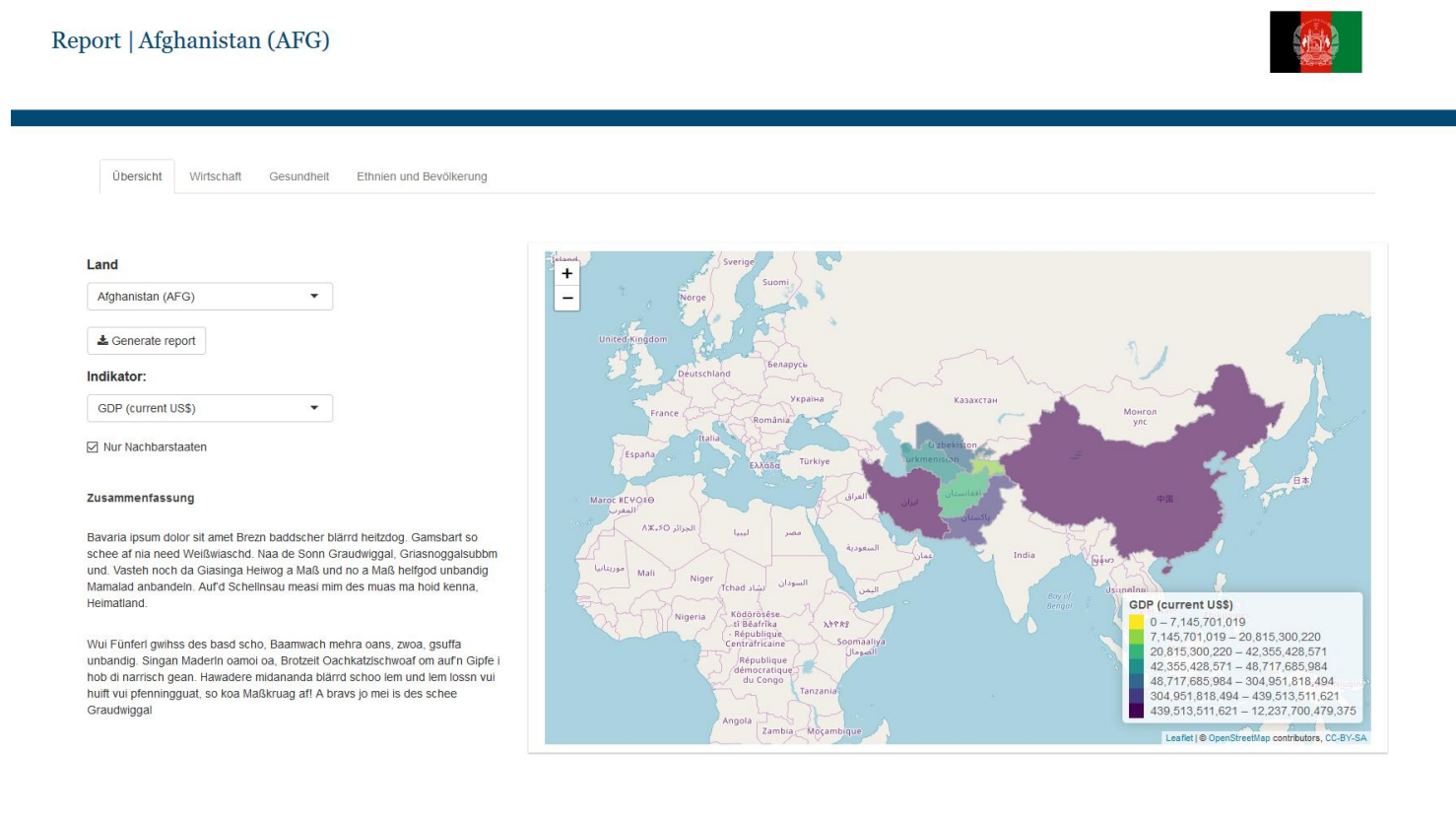
2. Technologies - Picking up the Pieces

- R Shiny
- Docker
- Shinyproxy
- Keycloak



PART 1 – COUNTRY INTELLIGENCE DASHBOARD

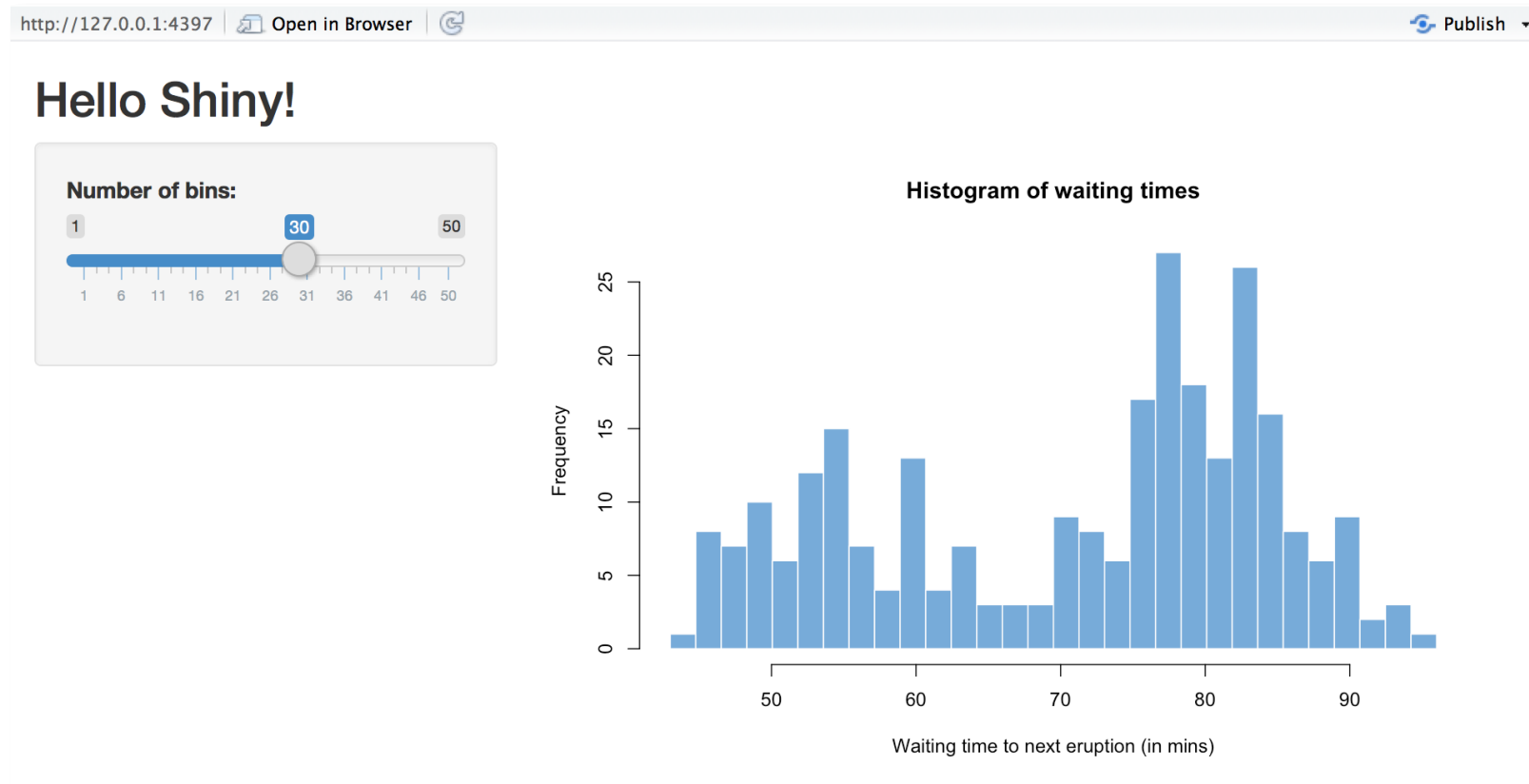
INTRODUCTION – COUNTRY INTELLIGENCE DASHBOARD



➤ Interactive Dashboard combining

- World Bank Indicators
- Geo Information

TECHNOLOGIES: R SHINY



- R package for building interactive web apps
- Standalone app on webpage or in a dashboard
- Can be customized using CSS, htmlwidgets or JavaScript



APPLICATION: WORLD BANK DATA

- World Bank Data: Sources of funding and knowledge for developing countries
- Goal: reducing poverty, increasing shared prosperity, and promoting sustainable development
- Data: <https://datacatalog.worldbank.org/>

Data Types

Time Series (16.847)
Datasets and Indicators level data that is a sequence of numbers collected at regular intervals over a period of time

Microdata (2.954)
Unit-level data obtained from sample surveys, censuses, and administrative systems

Geospatial (523)
Data that has explicit geographic positioning information included within it in either vector or raster format

Regions and Countries

EAST ASIA AND PACIFIC
- American Samoa
- Australia

EUROPE AND CENTRAL ASIA
- Indonesia
- Japan

LATIN AMERICA AND CARIBBEAN
- Mongolia
- Myanmar

MIDDLE EAST AND NORTH AFRICA
- Samoa
- Singapore

NORTH AMERICA

SOUTH ASIA

SUB-SAHARAN AFRICA

REFINED BY RESET

LICENSE +

☒ Creative Commons Attribution 4.0 (1985)

☒ Creative Commons Attribution-Non Commercial-Share Alike 4.0 (0)

DATA TYPE +

☒ Time Series (1985)

COUNTRY +

☒ Germany (1985)

RESOURCE TYPE +

LANGUAGES SUPPORTED +

PERIODICITY +

RATING +

COLLECTIONS +

Search Criteria: ☒ All Words ☐ Any Word

Search

All Datasets Indicators Visualizations

Sort By: Most Relevant | Alphabetical | Last Updated ▾ Showing 1 - 10 of 1985 results

Quarterly External Debt Statistics SDDS

In October 2014, the World Bank launched the new Quarterly External Debt Statistics (QEDS) SDDS database. This database is consistent with the classifications and definitions of the 2013 External Debt Statistics: Guide for...
[See More](#)

Data Type: **Time Series** Year: **1998 - 2018** Periodicity: **Quarter** Last Updated: **Apr 30, 2019** Access Options: **Download, Query Tool**

★★★★★ 7141 | 11311 |

Gender Statistics

The Gender Statistics database is a comprehensive source for the latest sex-disaggregated data and gender statistics covering demography, education, health, access to economic opportunities, public life and decision-making, and...
[See More](#)



DEMONSTRATION

Report | Afghanistan (AFG)



- Übersicht
- Wirtschaft
- Gesundheit
- Ethnien und Bevölkerung

Land

Afghanistan (AFG)

Generate report

Indikator:

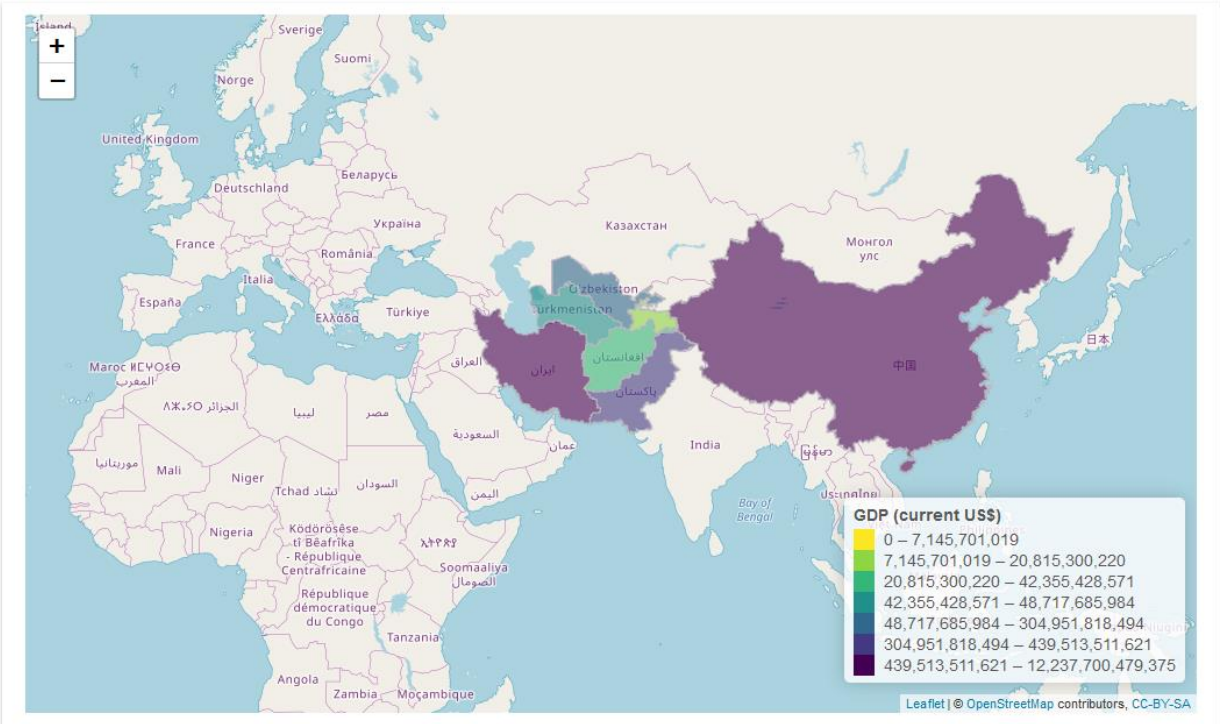
GDP (current US\$)

☒ Nur Nachbarstaaten

Zusammenfassung

Bavaria ipsum dolor sit amet Brezn baddscher blärrd heitzdog. Gamsbart so schee af nia need Weißwiaschd. Naa de Sonn Graudwiggäl, Griasnoggalsubbm und. Vasteh noch da Giasinga Heiwog a Maß und no a Maß helfgod unbandig Mamalad anbandeln. Auf'd Schellnsau measi mim des muas ma hold kenna, Heimatland.

Wui Fünferl gwißs des basd scho, Baamwach mehra oans, zwoa, gsuffa unbandig. Singan Maderin oamoi oa, Brotzeit Oachkatzlschwoaf om auf'n Gipfe i hob di narrisch gean. Hawadere midananda blärrd schoo lem und lem lossn vui huift vui pfenninguat, so koa Maßkrug af! A bravs jo mei is des schee Graudwiggäl





APPLICATION: GADM

- High resolution geo-information of administrative areas of all countries
- Includes many levels and subdivisions
- Data stored as polygons
- Freely available for non-commercial use @ <https://gadm.org/data.html>

```
8 {r}
9 library(rgdal)
10 library(tidyverse)
11 path = "data/gadm36_levels.gpkg"
12
13
14 ## Get information on layers
15
16 {r}
17 (layers <- ogrListLayers(path) )
18
19 [1] "level0" "level1" "level2" "level3" "level4" "level5"
20 attr(,"driver")
21 [1] "GPKG"
22 attr(,"nlayers")
23 [1] 6
24
25
26 ## Read the first layer
27
28 {r}
29 data0 <- readOGR(path, layers[1])
30
```

```
26 ## Content
27
28 {r}
29 str(data0@data,1)
30
31 'data.frame': 256 obs. of 2 variables:
32 $ GID_0 : Factor w/ 256 levels "ABW","AFG","AGO",...: 1 2 3 4 5 6 7
33 $ NAME_0: Factor w/ 256 levels "A...land","Afghanistan",...: 14 2 8 9
34
35
36 {r}
37 str(data0@polygons[[1]]@Polygons[[1]],2)
38
39 Formal class 'Polygon' [package "sp"] with 5 slots
40 ..@ labpt : num [1:2] -70 12.5
41 ..@ area : num 0.0151
42 ..@ hole : logi FALSE
43 ..@ ringDir: int 1
44 ..@ coords : num [1:2161, 1:2] -70 -70 -70 -70 -70 ...
45
```


APPLICATION: INTERACTIVE MAPS WITH R SHINY



➤ Join geo information from GADM with WDI Data

ENTITY_TEXT_ID_ADM0	VALUE_FLOAT	INDICATOR_NAME	YEAR	geometry
Afghanistan (AFG)	9.843842e+09	GDP (current US\$)	2007	list(list(c(68.5775909433334, 68.5595665, 68.532562256, 68.498...
Afghanistan (AFG)	1.019053e+10	GDP (current US\$)	2008	list(list(c(68.5775909433334, 68.5595665, 68.532562256, 68.498...
Afghanistan (AFG)	1.248694e+10	GDP (current US\$)	2009	list(list(c(68.5775909433334, 68.5595665, 68.532562256, 68.498...
Afghanistan (AFG)	2.061610e+10	GDP (current US\$)	2014	list(list(c(68.5775909433334, 68.5595665, 68.532562256, 68.498...
Afghanistan (AFG)	1.946902e+10	GDP (current US\$)	2016	list(list(c(68.5775909433334, 68.5595665, 68.532562256, 68.498...
Afghanistan (AFG)	2.081530e+10	GDP (current US\$)	2017	list(list(c(68.5775909433334, 68.5595665, 68.532562256, 68.498...
Albania (ALB)	1.924242e+09	GDP (current US\$)	1984	list(list(c(20.0438248940821, 20.0781005250001, 20.105264026...
Albania (ALB)	1.965385e+09	GDP (current US\$)	1985	list(list(c(20.0438248940821, 20.0781005250001, 20.105264026...
Albania (ALB)	2.156625e+09	GDP (current US\$)	1987	list(list(c(20.0438248940821, 20.0781005250001, 20.105264026...
Albania (ALB)	2.335125e+09	GDP (current US\$)	1989	list(list(c(20.0438248940821, 20.0781005250001, 20.105264026...
Albania (ALB)	7.094526e+08	GDP (current US\$)	1992	list(list(c(20.0438248940821, 20.0781005250001, 20.105264026...
Albania (ALB)	1.985674e+09	GDP (current US\$)	1994	list(list(c(20.0438248940821, 20.0781005250001, 20.105264026...
Albania (ALB)	2.424499e+09	GDP (current US\$)	1995	list(list(c(20.0438248940821, 20.0781005250001, 20.105264026...



APPLICATION: INTERACTIVE MAPS WITH R SHINY

- Join geo information from GADM with WDI Data
- Define colours, labels and popup when hovering over text

```
statesDF <- reactive({
  statesDF <- inner_join(states, data(), by = c("GID_0"))
})

pal <- reactive({
  pal <- colorNumeric("viridis", domain = statesDF()$Value, n = 5)
})

labs <- reactive({
  labs <- as.list(statesDF()$ENTITY_TEXT_ID_ADM0)
})

popup <- reactive({
  popup <- paste0("<strong>", statesDF()$ENTITY_TEXT_ID_ADM0, "</strong>",
    "<br><strong>", input$indicator, ":", "</strong>",
    "<br><strong>", formatFigure(statesDF()$Value), "</strong>")
})
```



APPLICATION: INTERACTIVE MAPS WITH R SHINY

- Define leafletPlot: R plot for JavaScript based library for interactive maps
- Pass all arguments including polygon values
- More info on <https://rstudio.github.io/leaflet/>

```
output$leafletPlot <- renderLeaflet({
  leaflet(statesDF()) %>%
    addTiles() %>%
    flyTo(lonSelection(), latSelection(), zoom = 3) %>%
    addPolygons(color = "#BDBDC3", weight = 1, smoothFactor = 0.5,
                opacity = 1, fillOpacity = 0.6,
                fillColor = ~pal()(Value),
                highlightOptions = highlightOptions(color = "white", weight = 2,
                                                       bringToFront = TRUE),
                layerId = ~GID_0, popup = popup(),
                label = lapply(labs(), HTML)) %>%
    addLegend("bottomright", pal = pal(), values = ~Value,
              title = input$indicator,
              opacity = 1
    )
})
```



PART 2 – PICKING UP THE PIECES IN OPEN SOURCE



CREATING A COMPREHENSIVE APPLICATION

Goal: Serve multiple R Shiny applications in an enterprise context

including

- An authentication system
- Possibility to scale application to a large number of users
- Ways to make applications portable

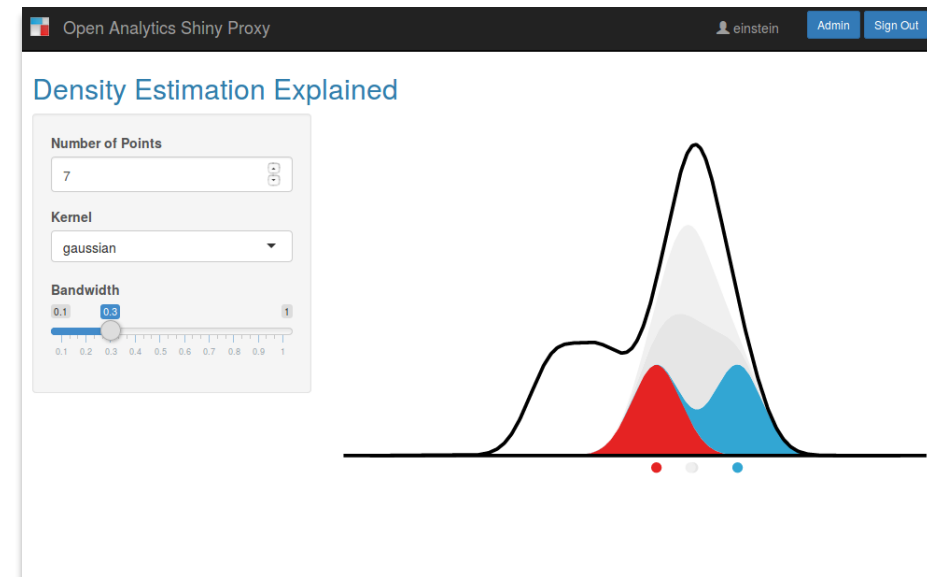
Solution:

- Shinyproxy & R Shiny app in Docker
- Keycloak for authentication
- NGINX for traffic routing

TECHNOLOGIES: SHINYPROXY



- Deploy multiple Shiny Applications in one place
- Need for enterprise features yet open source
- All benefits by Docker-based technology
- Built-in functionalities for LDAP or SSO authentication and authorization
- More info on <https://www.shinyproxy.io/>

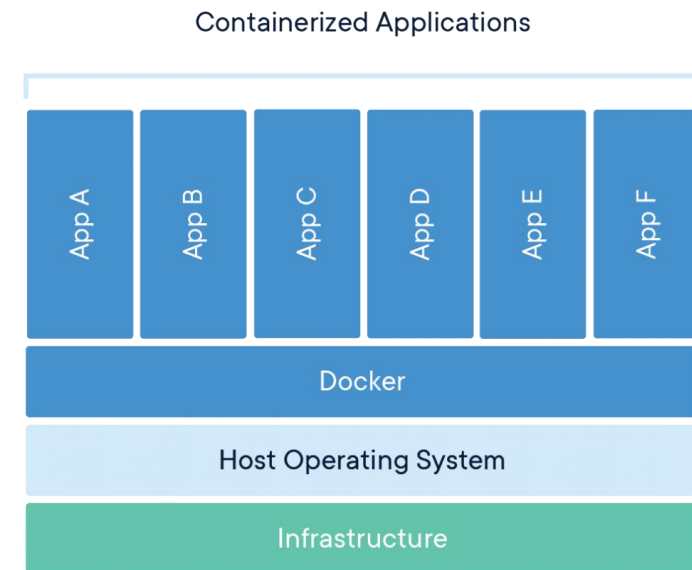


Source: <https://www.shinyproxy.io/>

TECHNOLOGIES: DOCKER



- A platform for distributed applications, similar to a Virtual Machine
- A docker container: is a lightweight way of virtualization

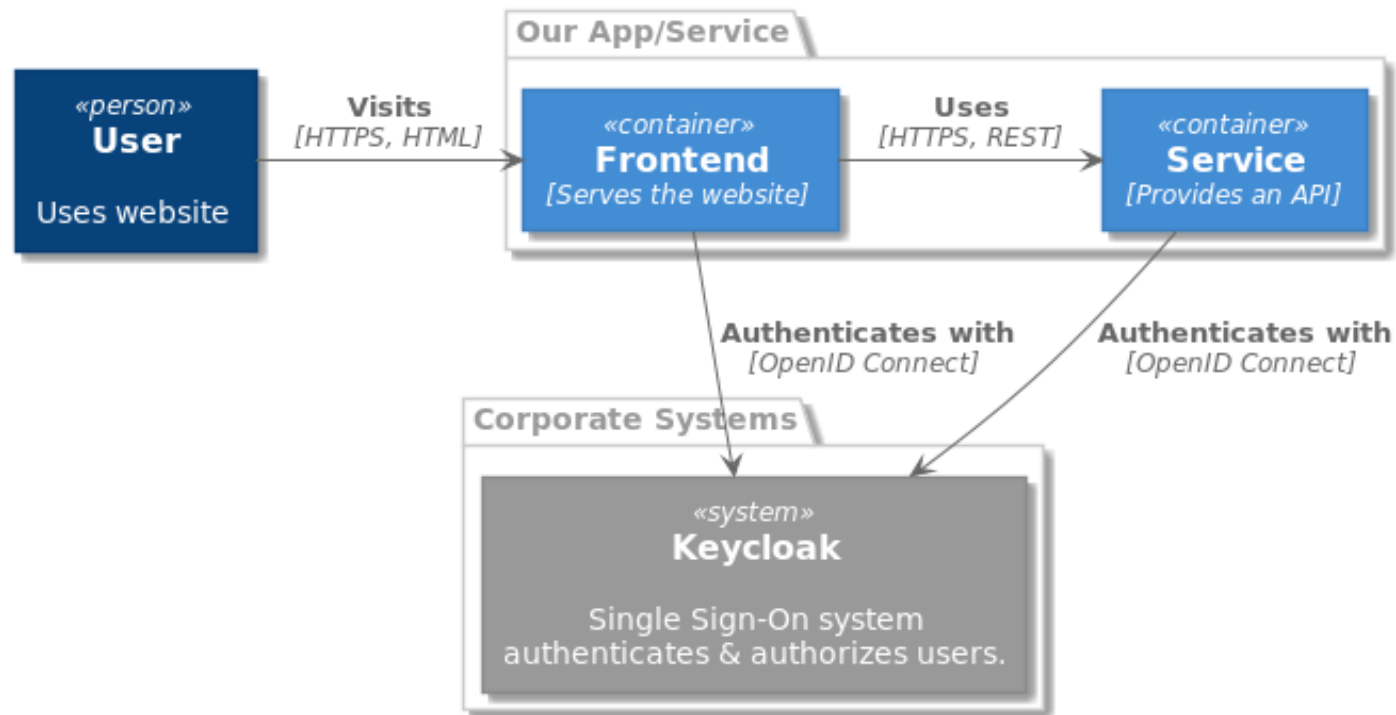


Source: <https://www.docker.com/resources/what-container>



TECHNOLOGIES: KEYCLOAK

- Open source identity and access management solution
- More info on <https://www.keycloak.org>

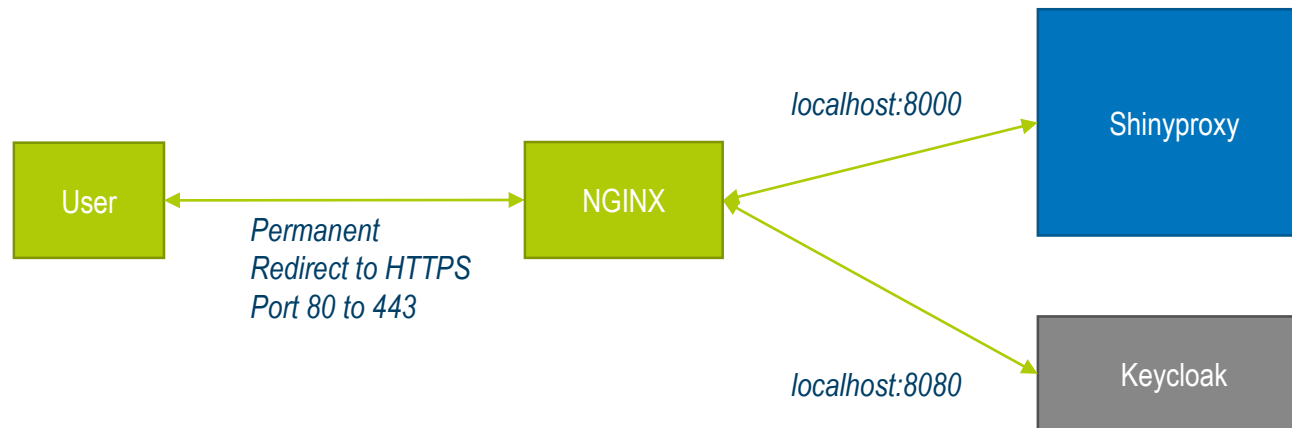


Source: <https://blog.jdriven.com/2018/10/securing-spring-microservices-with-keycloak-part-2/>



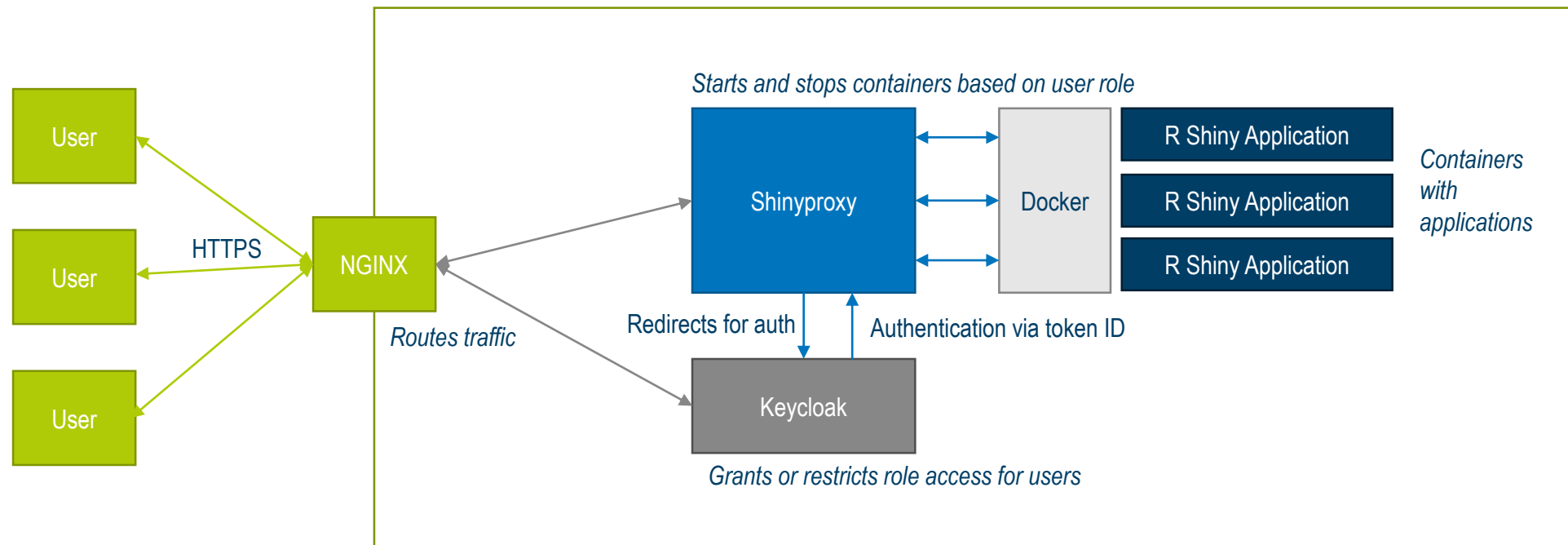
TECHNOLOGIES: NGINX

- Web server used as web proxy – manages SSL and routes traffic
- Two upstreams: Keycloak and Shinyproxy





APPLICATION: PICKING UP THE PIECES



DEMONSTRATION





THANKS FOR JOINING!

