A FIERY APPROACH TO R WEB SERVICES

Exposing your models as web services in R...

@quintindk
https://github.com/quintindk
https://linkedin.com/in/quintindk
Quinton de Kock is a South African professional cricketer who plays for the Titans at the domestic level and the South African national team. He also plays for Mumbai Indians in Indian Premier League. He was named the Cricketer of the Year at Cricket South Africa's 2017 Annual Awards. Wikipedia

Born: 17 December 1992 (age 26 years), Johannesburg

ODI debut (cap 105): 19 January 2013 v New Zealand

Last ODI: 16 March 2019 v Sri Lanka

Test debut (cap 317): 20 February 2014 v Australia

T20I debut (cap 54): 21 December 2012 v New Zealand

Spouse: Sasha Hurly (m. 2016)

Stats
Wicketkeeper
ABOUT ME...

• I’m a proud father and husband.
• I’ve been in the technology industry for 20 years.
• Of that 20 years, almost 11 years have been at Netstar.
• My background is software development; .NET, JS, Python, R, Scala, Java.
• My interests outside of Technology are reading of which I enjoy mostly psychology, philosophy and anthropology.
Fiery Web Services

- ProjectTemplate - http://projecttemplate.net/
- Fiery - https://github.com/thomasp85/fiery
- Docker - https://www.docker.com
ProjectTemplate is a system for automating the thoughtless parts of a data analysis project...

- Organizing the files in your project.
- Loading all the R packages you’ll use.
- Loading all of your data sets into memory.
- Munging and preprocessing your data into a form that’s suitable for analysis.

http://projecttemplate.net
Platform: x86_64-pc-linux-gnu (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
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Natural language support but running in an English locale

R is a collaborative project with many contributors.
Type 'contributors()' for more information
and 'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> setwd("~/Repos")
> install.packages("ProjectTemplate")
Installing package into '/home/quintink/R/x86_64-pc-linux-gnu-library/3.4' (as 'lib' is unspecified)
trying URL 'https://cloud.r-project.org/src/contrib/ProjectTemplate_0.9.0.tar.gz'
Content type 'application/x-gzip' length 234224 bytes (228 KB)

* installing *source* package 'ProjectTemplate' ...
** package 'ProjectTemplate' successfully unpacked and MD5 sums checked
** inst
** preparing package for lazy loading
** help
** installing help indices
** building package indices
** testing if installed package can be loaded
* DONE (ProjectTemplate)

The downloaded source packages are in
'/tmp/RtmpOs2Yis/downloaded_packages'
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`help.start()` for an HTML browser interface to help.
Type `q()` to quit R.

```r
> setwd("~/Repos")
> install.packages("ProjectTemplate")
Installing package into ‘/home/quintindk/R/x86_64-pc-linux-gnu-library/3.4’
(as ‘lib’ is unspecified)
trying URL ‘https://cloud.r-project.org/src/contrib/ProjectTemplate_0.9.0.tar.gz’
Content type ‘application/x-gzip’ length 234224 bytes (228 KB)

downloaded 228 KB
```

* installing *source* package ‘ProjectTemplate’ ...
  ** package ‘ProjectTemplate’ successfully unpacked and MDS sums checked
  ** R
  ** inst
  ** preparing package for lazy loading
  ** help
  ** installing help indices
  ** building package indices
  ** testing if installed package can be loaded
  ** DONE (ProjectTemplate)

The downloaded source packages are in
/tmp/Rtmp0vZV1s/downloaded_packages'

```r
> library(ProjectTemplate)
> ?create.project()
> ```

Create a new project.

**Description**

This function will create all of the scaffolding for a new project. It will set up all of the relevant directories and their initial contents. For those who only want the minimal functionality, the template argument can be set to minimal to create a subset of ProjectTemplate’s default directories. For those who want to dump all of ProjectTemplate’s functionality into a directory for extensive customization, the dump argument can be set to TRUE.

**Usage**

```r
create.project(project.name = "new-project", template = "full",
   dump = FALSE, merge.strategy = c("require.empty",
   "allow.mon.conflict"), rstudio.project = FALSE)
```
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'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> setwd("~/Repos")
> install.packages("ProjectTemplate")
Installing package into '/home/quintindk/R/x86_64-pc-linux-gnu-library/3.4'
(as 'lib' is unspecified)
trying URL 'https://cloud.r-project.org/src/contrib/ProjectTemplate_0.9.0.tar.gz'
Content type 'application/x-gzip' length 234224 bytes (228 KB)
--------------------------------------------------------------------------------
downloaded 228 KB
^ installing *source* package 'ProjectTemplate' ...
** package 'ProjectTemplate' successfully unpacked and MD5 sums checked
** R
** inst
** preparing package for lazy loading
** help
** installing help indices
** building package indices
** testing if installed package can be loaded
DONE (ProjectTemplate)

The downloaded source packages are in
'~/Rtmp0bZY1s/downloaded_packages'

> library(ProjectTemplate)
> ?create.project()
> create.project(project.name = 'demo1', template = 'minimal', rstudio.project = TRUE)
> |
global.dcf

1 version: 0.9.0
2 data_loading: TRUE
3 data_loading_header: TRUE
4 data_ignore:
5 cache_loading: TRUE
6 recursive_loading: FALSE
7 munging: TRUE
8 logging: FALSE
9 logging_level: INFO
10 load_libraries: TRUE
11 libraries: dplyr, ggvis, caret, jsonlite, flare, routr
12 as_factors: TRUE
13 tables_type: data.frame
14 attach_internal_libraries: FALSE
15 cache_loaded_data: TRUE
16 sticky_variables: NONE

17

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Type 'demo()' for some demos, 'help()' for on-line help, or 'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.
R version 3.4.4 (2018-03-15) -- "Someone to Lean On"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platforms: x86_64-pc-linux-gnu (64-bit)
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Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> library(ProjectTemplate)
> load.project()
Project name: demo2
Loading project configuration
Autoloading packages
Loading package: dplyr
Loading required package: dplyr
Installing package into '/home/quintinlk/R/x86_64-pc-linux-gnu-library/3.4'
(as 'lib' is unspecified)
also installing the dependencies 'utf8', 'cli', 'crayon', 'fansi', 'pillar', 'purrr', 'assertthat', 'glue', 'magrittr', 'pkgconfig', 'R6', 'Rcpp', 'rlang', 'tibble', 'tidyselect', 'BH', 'plogr'

trying URL 'https://cloud.r-project.org/src/contrib/utf8_1.1.4.tar.gz'
Attaching package: ‘dplyr’

The following objects are masked from ‘package:stats’:
  filter, lag

The following objects are masked from ‘package:base’:
  intersect, setdiff, setequal, union

Loading package: ggvis
Loading required package: ggvis
Loading package: caret
Loading required package: caret
Loading required package: lattice
Loading required package: ggplot2

Attaching package: ‘ggplot2’

The following object is masked from ‘package:ggvis’:
  resolution

Loading package: jsonlite
Loading required package: jsonlite
Loading package: fiery
Loading package: routr
Loading required package: routr
Autoloading helper functions
  Running helper script: fallback_handler.R
  Running helper script: formatting_handler.R
  Running helper script: predict_handler.R
Autoloading data
  Loading cached data set: iris
  Running preprocessing script: 01-colnames.R

>
Fiery

- This package maintained by the infamous Thomas Lin Pedersen @thomasp85 (think gganimate) is a framework for web servers in R.

Fiery is a flexible and lightweight framework for building web servers in R. It is relatively unopinionated about how you chose to build your server logic and supports many use cases, from serving static files to being used as a base for a model-view-controller based setup.

https://github.com/thomasp85/fiery
```r
library(fliry)

# Create a New App
app <- FireNdxw()

appSon('request', function(server, request, ...) {
  response <- request$respond()
  response$status <- 200L
  response$body <- paste0('<h1>Hello World</h1>')</n  response$type <- 'html'
})

# Assign ports
appPort = 8090

# Start
appIgnite()
```

```
app

# Object containing active binding
```

```
Files
-- 
New Folder Delete Rename More ...

- app.R
- demo.R
- fiery.R
- fiery_routes.R
- routes.R

---

Console
> appSon('request', function(server, request, ...) {
>   response <- request$respond()
>   response$status <- 200L
>   response$body <- paste0('<h1>Hello World</h1>')</n>   response$type <- 'html'
> })
> # Assign ports
> appPort = 8090
> # Start
> appIgnite()
```

Fire started at 127.0.0.1:8090
Hello World
routr...

- Middleware that delegates the HTTP request to the handler function
- Delegation is URL based.

```r
library(rroutr)
route <- Route$new()

fallback <- function(request, response, keys, ...) {
  response$status <- 200L
  response$type <- 'html'
  response$body <- '<h1>I\'m not saying hello to you</h1>'
  return(FALSE)
}
route$add_handler('get', '/*', fallback)

hellow <- function(request, response, keys, ...) {
  response$status <- 200L
  response$type <- 'html'
  response$body <- paste0('<h1>Hello ', keys$who, '!</h1>')
  return(FALSE)
}
route$add_handler('get', '/hello/:who/', hellow)

router <- RouteStack$new()
router$add_route(route, 'test')
```
library(flery)
library(route)

# Create a New App
app <- FireSnow()
route <- RouteSnow()

fallback <- function(request, response, keys, ...) {
  response$status <- 288L
  response$type <- 'html'
  response$body <- '<h1>I’m not saying hello to you</h1>'
  return(FALSE)
}

route$add_handler('get', '/*', fallback)

hellow <- function(request, response, keys, ...) {
  response$status <- 288L
  response$type <- 'html'
  response$body <- paste0('<h1>Hello ', keys$who, '!</h1>')
  return(FALSE)
}

route$add_handler('get', '/hello/:who/', hellow)

router <- RouteStackSnow()
router$add_route(route, 'test')

app$attach(router)

# Assign ports
app$port = 8890

# Start
app$listen()
I'm not saying hello to you
Hello satrdays!
ProjectTemplate and Fiery

- Model View Controller pattern...
```r
if (!require(ProjectTemplate)) {
  install.packages("ProjectTemplate")
  library(ProjectTemplate)
}
load.project()

router <- RouteStackNew()
fallback <- RouteNew()
prediction <- RouteNew()
formatting <- RouteNew()

fallbackAddHandler("get", "/", fallback_handler)
predictionAddHandler("post", "/predict", prediction_handler)
formattingAddHandler("post", "/formatting", formatting_handler)
routerAddRoute(fallback, "Fallback")
routerAddRoute(formatting, "formatting")
routerAddRoute(prediction, "prediction")

app <- FireNew(port = 8890)
```
```r
load.project()

router <- RouteStack$new()
fallback <- Route$new()
prediction <- Route$new()

fallback$add_handler("get", "/", fallback_handler)

formattin$add_handler("post", "/", formatting_handler)

router$add_route(fallback, "fallback")

router$add_route(formattin, "formatting")

router$add_route(prediction, "prediction")

events <- Fire$new(port = 8890)
events$attach(router)
events$ignite(block = TRUE)
```

Fire started at 127.0.0.1:8890
Bad request. Please ensure you use the correct method and path.
```json
```
Docker

is a system for virtualizing software at an OS level...

• Docker was open sourced in 2014
• Containers take away the complexity of installation at scale
• Stephan Fabel (Product Manager at Canonical) is quoted as saying “The containerization craze shows no signs of abating”

https://www.docker.com/
FROM r-base:3.5.3

LABEL maintainer="Quintin de Kok quitnindk@netstar.co.za"

RUN apt-get update
RUN apt-get install -y libcurl4-openssl-dev libxml2-dev libssl-dev libgeos-dev

RUN mkdir -p app/cache
RUN mkdir -p app/data
RUN mkdir -p app/lib
RUN mkdir -p app/src
COPY app/config app/config
COPY install.R tmp/
RUN Rscript /tmp/install.R

COPY app app

EXPOSE 8090
WORKDIR /app
CMD ["Rscript", "src/app.R"]
FROM r-base:3.5.3

LABEL maintainer="Quintin de Kok quitnindk@netstar.co.za"

RUN apt-get update
RUN apt-get install -y libcurl4-openssl-dev libxml2-dev libssl-dev libgeos-dev

RUN mkdir -p app/cache
RUN mkdir -p app/data
RUN mkdir -p app/lib
RUN mkdir -p app/src
COPY app/config app/config
COPY install.R tmp/
RUN Rscript /tmp/install.R
COPY app app

EXPOSE 8090
WORKDIR /app
CMD ["Rscript", "src/app.R"]
FROM r-base:3.5.3

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RUN apt-get update
RUN apt-get install -y libcurl4-openssl-dev libxml2-dev libssl-dev libgeos-dev

RUN mkdir -p app/cache
RUN mkdir -p app/data
RUN mkdir -p app/lib
RUN mkdir -p app/src
COPY app/config app/config
COPY install.R tmp/
RUN Rscript /tmp/install.R
COPY app app

EXPOSE 8090
WORKDIR /app
CMD ["Rscript", "src/app.R"]
FROM r-base:3.5.3

LABEL maintainer="Quintin de Kok quitnindk@netstar.co.za"

RUN apt-get update
RUN apt-get install -y libcurl4-openssl-dev libxml2-dev libssl-dev libgeos-dev

RUN mkdir -p app/cache
RUN mkdir -p app/data
RUN mkdir -p app/lib
RUN mkdir -p app/src
COPY app/config app/config
COPY install.R tmp/
RUN Rscript /tmp/install.R

COPY app app

EXPOSE 8090

WORKDIR /app

CMD ["Rscript", "src/app.R"]
```
if (!require(ProjectTemplate)) {
  install.packages("ProjectTemplate")
  library(ProjectTemplate)
}
setwd("/app/")
load.project()
```
quintindk@quintindk-VirtualBox:~/repos/demo2$ cd docker/
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ mkdir app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ rm -r app/*
rm: cannot remove 'app/*': No such file or directory
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r /cache app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r /config app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r /data app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r /deployment app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r /lib app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r /maven app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r /src app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r /src app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ docker build -t r-prediction-apl:0.0.1
3.5.3: Pulling from library/r-base
3.5.3: Pulling from library/r-base
Sending build context to Docker daemon 65.02kB
Step 1/15: FROM r-base:3.5.3
Steps 2/5: FROM r-base:3.5.3
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd docker/
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ mkDIR app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ rm -r app/*
rm: cannot remove 'app/*': No such file or directory
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r ../cache app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r ../config app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r ../data app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r ../llib app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r ../mungo app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r ../src app
quintindk@quintindk-VirtualBox:~/repos/demo2/docker$ cd -r ../../app
Sending build context to Docker daemon.
55.20KB
Step 1/15: FROM r-base:3.5.3
3.5.3: Pulling from library/r-base
266561da04f88: Pull complete
368c2965f897: Pull complete
6f87d5659aee: Pull complete
955983173d38: Pull complete
b995e6f4ac35: Pull complete
75341b13f6bb: Pull complete
Digest: sha256:4522ca6d9a7531df4faba4681d8b2189d365b64fabb41cc071c855f1f438
Status: Downloaded newer image for r-base:3.5.3
----> 62c848eeb175
Step 2/15: LABEL maintainer="Quintin de Kok quintindk@netstar.co.za"
----> Running ln 292e0d82ac4
Removing intermediate container 292e0d82ac4
----> ad9e1cc0d28
Step 3/15: RUN apk get update
----> Running ln 14af21c6885a
Get:1 http://cdn-fastly.deb.debian.org/debian testing InRelease [158 kB]
Get:2 http://cdn-fastly.deb.debian.org/debian sld InRelease [242 kB]
Get:3 http://cdn-fastly.deb.debian.org/debian/testing/main amd64 Packages [7,887 kB]
Get:4 http://cdn-fastly.deb.debian.org/debian/sld/main amd64 Packages [7,277 kB]

Setting up llbsl-dev:amd64 (1.1.1b-1) ...
Setting up llbgeos-c11s:amd64 (3.7.1-1) ...
Setting up llbxml2:amd64 (2.9.4dfsg1-7+b3) ...
Setting up llbxml2-dev:amd64 (2.9.4dfsg1-7+b3) ...
Setting up llbgeos-dev (3.7.1-1) ...
Processing triggers for libc-bin (2.28-8) ...
Removing intermediate container e7db1a54db9e
---> 9ee9f6b80883
Step 5/15: RUN mkdir -p app/cache
   --> Running in 33df3df6f1c1
Removing intermediate container 33df3df6f1c1
   --> 07a92d21a20e
Step 6/15: RUN mkdir -p app/data
   --> Running in c88b30bf7f13
Removing intermediate container c88b30bf7f13
   --> dbac19b8d1d0
Step 7/15: RUN mkdir -p app/lib
   --> Running in 03725955a592
Removing intermediate container 03725955a592
   --> 36f4e7bf6a6d
Step 8/15: RUN mkdir -p app/src
   --> Running in 5041874f6c6b
Removing intermediate container 5041874f6c6b
   --> ea29a9bcea5
Step 9/15: COPY app/config app/config
   --> Running in 30587540523
Step 10/15: COPY install.R tmp/
   --> Running in 5d2d21a87e1
Loading required package: ProjectTemplate
Installing package into '/usr/local/lib/R/site-library'
(as 'lib' is unspecified)
trying URL 'https://cloud.r-project.org/src/contrib/ProjectTemplate_0.0.1.tar.gz'
Content type 'application/x-zlib' length 234224 bytes (228 KB)
Downloaded 228 KB
$90.03:0.08$ docker run --name=r-prediction --publish 0.8.0.0:8

Loading required package: ProjectTemplate

Loading project configuration
Autoloading packages

Loading package: dplyr
Loading required package: dplyr

Attaching package: ‘dplyr’

The following objects are masked from ‘package:stats’:

filter, lag

The following objects are masked from ‘package:base’:

intersect, setdiff, setequal, union

Loading package: ggvis
Loading required package: ggvis

Loading package: caret
Loading required package: caret

Loading required package: lattice
Loading required package: ggplot2

Attaching package: ‘ggplot2’

The following object is masked from ‘package:ggvis’:

resolution
THANK YOU

@quintindk
https://github.com/quintindk
https://linkedin.com/in/quintindk
https://www.rstudio.com/
http://projecttemplate.net/
https://github.com/thomasp85/fiery
https://github.com/thomasp85/routr
https://www.datacamp.com/community/tutorials/machine-learning-in-r

https://github.com/quintindk/satRday-demo-2019

@quintindk
https://github.com/quintindk
https://linkedin.com/in/quintindk