

# WEBR, AND THE FUTURE OF BUILDING WEB APPLICATIONS WITH R

COLIN FAY - USER! 2024

2024-07-09

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# 2024 BE LIKE

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# RATING OF PERCEIVED EXERTION

<b>1</b> RESTING	<b>2</b> MINIMUM ACTIVITY	<b>3</b> LIGHT ACTIVITY	<b>4</b> LIGHT ACTIVITY	<b>5</b> MODERATE ACTIVITY	<b>6</b> MODERATE ACTIVITY	<b>7</b> HARD ACTIVITY	<b>8</b> HARD ACTIVITY	<b>9</b> VERY HARD ACTIVITY	<b>10</b> MAXIMUM EXERTION
No Exertion	Barrest Exertion	Comfortable; Slight Difficulty Breathing	Breaking A Sweat; Comfortable Breathing	Speaking Is Easy; Light Sweating	Moderate Sweating; Able To Speak	Heavy Sweating; Difficulty Speaking	Difficulty Breathing; Unable To Speak	Barely Breathing; Unsustainable	Cannot Push Any Harder





**Time in minutes x RPE = Foster's Training Load**



# WHY?

**Acute load** = sum( Daily load over 7 days )

**Chronic load** = mean( Acute load over 4 weeks )

**Load ratio** = Acute load / Chronic load

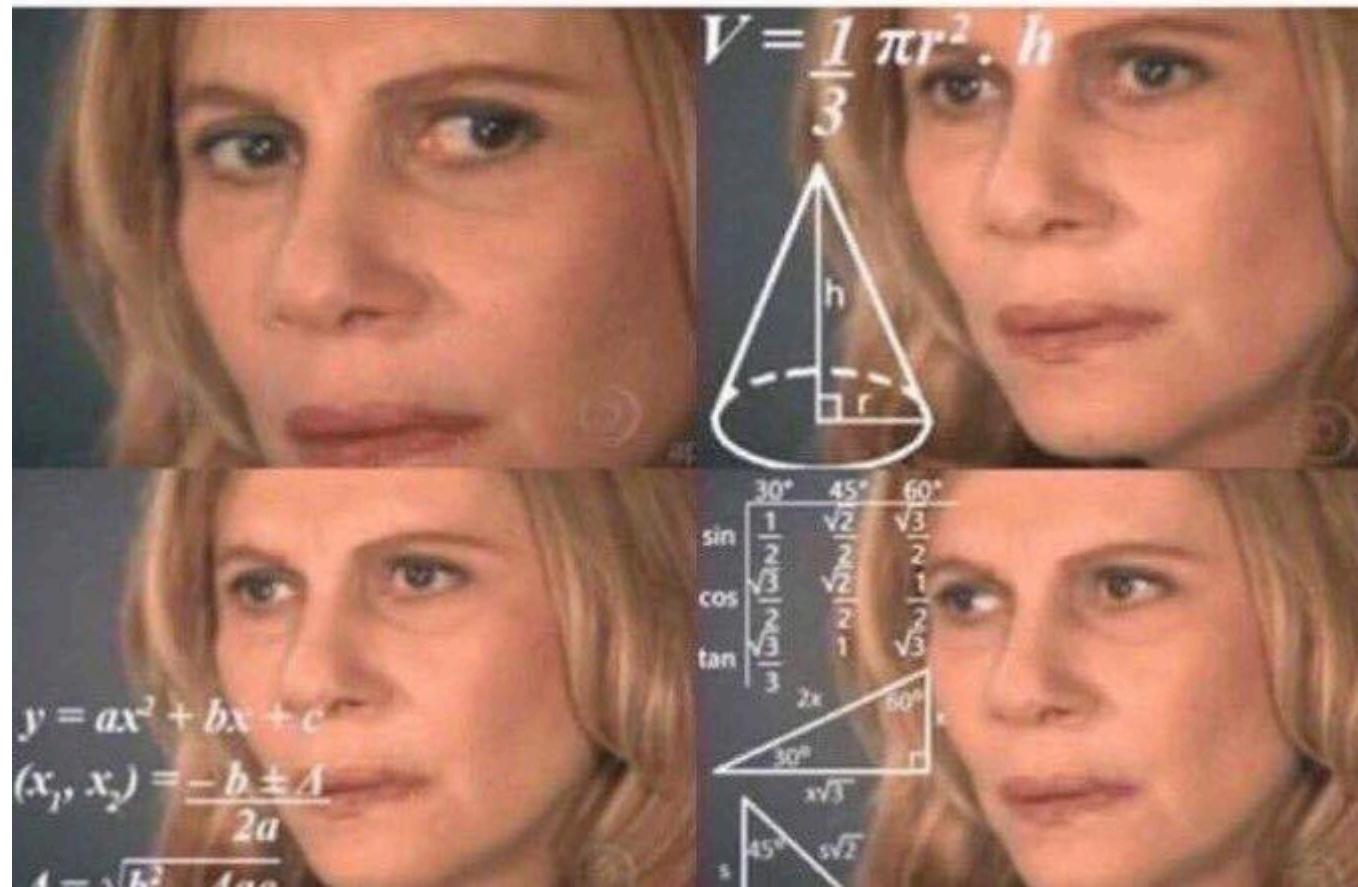
**Monotony** = mean( Weekly load ) / sd( Weekly load )

**Strain** = Weekly load × Monotony

**Fitness** = Load - Strain



# THAT'S ENOUGH MATHS ✓



# WHAT IS MY COACH DOING?

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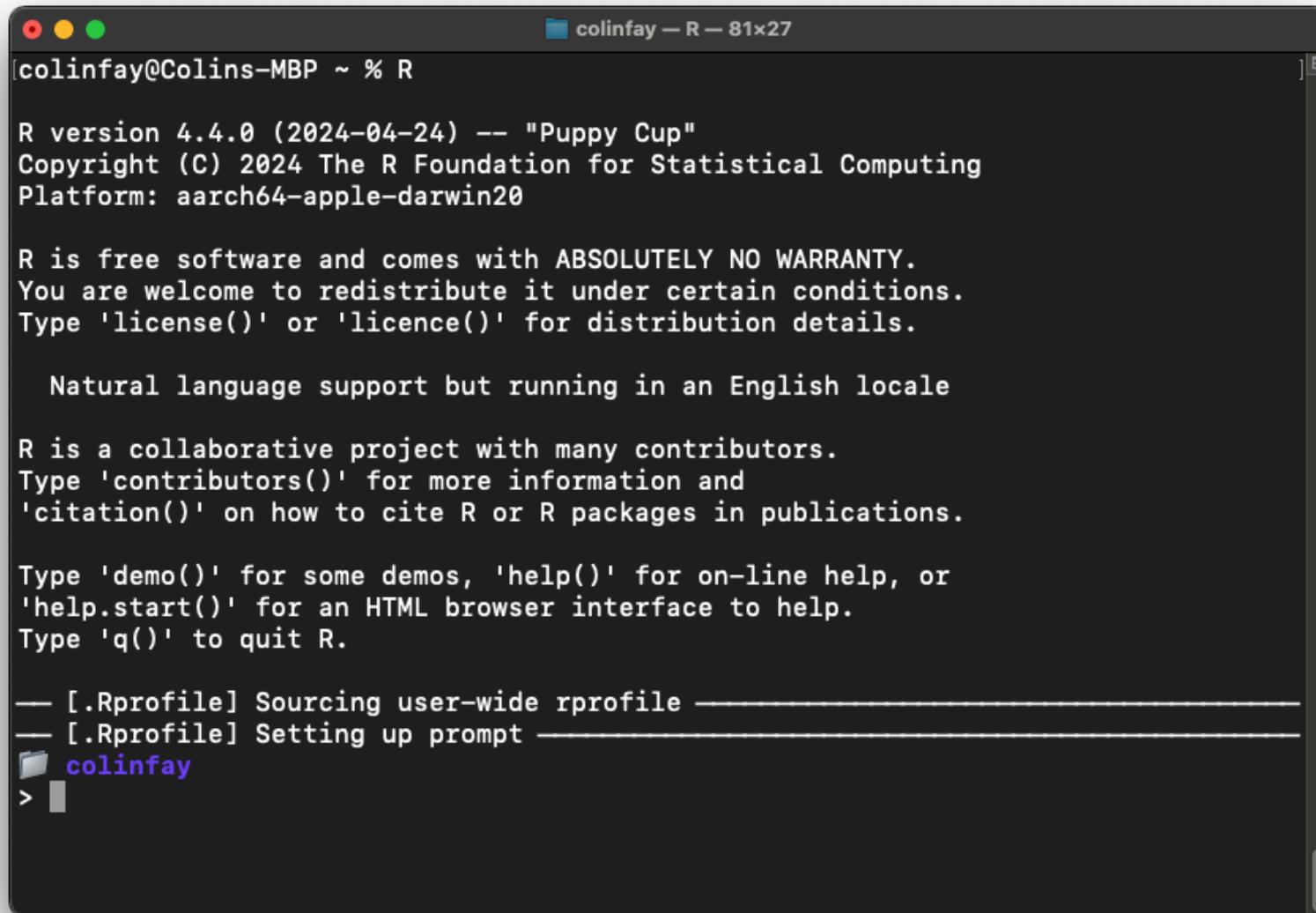


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# BUT I'M A NERD



A screenshot of a dark-themed OS X terminal window titled "colinfay — R — 81x27". The window displays the standard R 4.4.0 startup message, which includes information about the version, copyright, platform, license, natural language support, collaborative nature, and help resources. The message ends with a prompt indicating the sourcing of a user-wide rprofile and the setting up of the prompt, followed by the user's name "colinfay" and a greater-than sign ">".

```
[colinfay@Colins-MBP ~ % R

R version 4.4.0 (2024-04-24) -- "Puppy Cup"
Copyright (C) 2024 The R Foundation for Statistical Computing
Platform: aarch64-apple-darwin20

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

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.

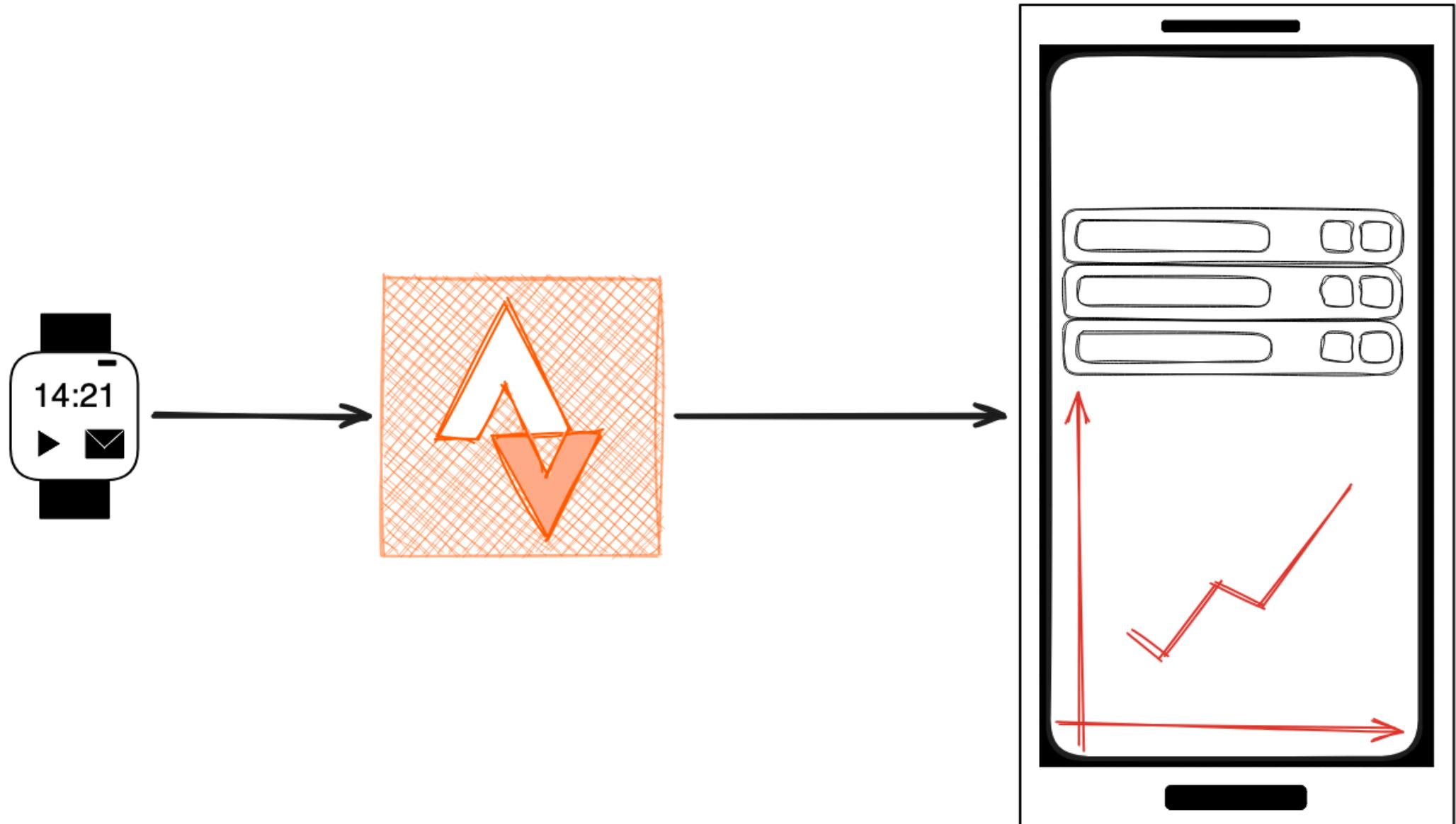
Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

-- [ .Rprofile ] Sourcing user-wide rprofile --
-- [ .Rprofile ] Setting up prompt --
> colinfay
>
```

**(AND VERY BAD WITH GOOGLE SHEETS)**



# LET'S MAKE AN APP



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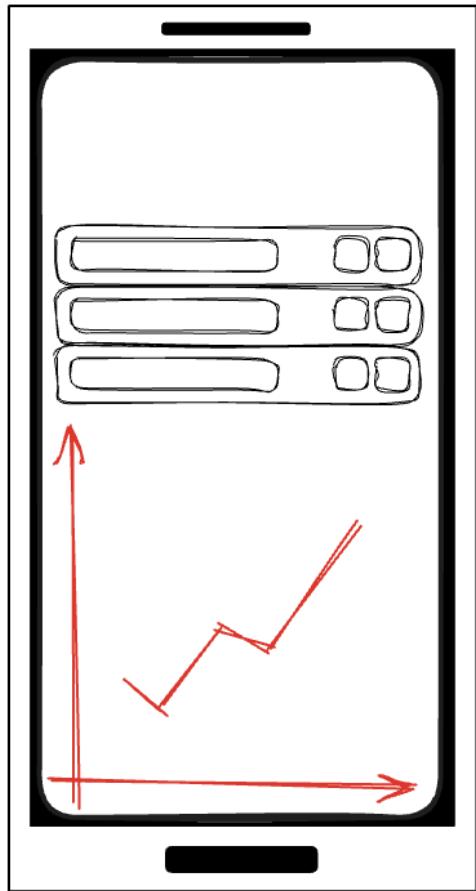
WHEN EVERYTHING YOU HAVE IS A HAMMER...



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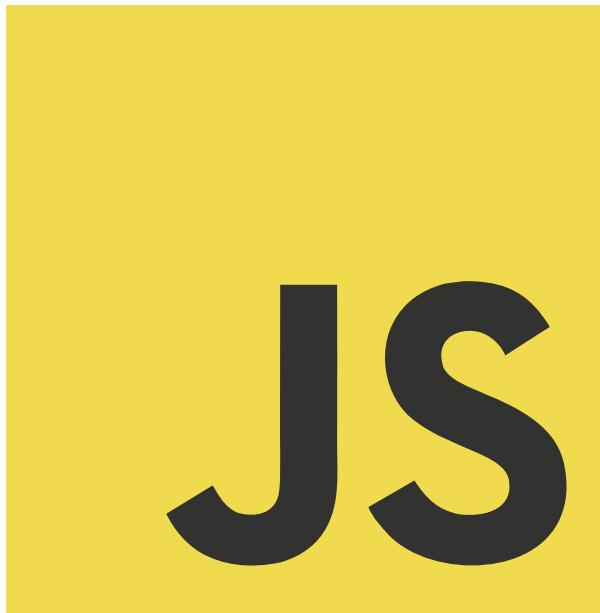
# LET'S MAKE AN APP



## Specifications

- 😊 Nice UI / Mobile Friendly
- 🔒 Login & Password
- 🏃 Crunching Strava Data
- 💬 User inputs
- 📊 Metrics
- 📈 Graphs

# WHAT TECHNO SHOULD I USE?



# WHAT TECHNO SHOULD I USE?



- 😁 Nice UI / Mobile Friendly ⚡
- 🔒 Login & Password ⚡
- 🏃 Crunching Strava Data ⚡
- 💬 User inputs ⚡
- 📈 Metrics ⚡
- 📊 Graphs ⚡ / ⚡

# WHY CHOOSE?



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# WEBR

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*WebR is a version of the statistical language R compiled for the browser and Node.js using WebAssembly, via Emscripten.*

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# WAT?

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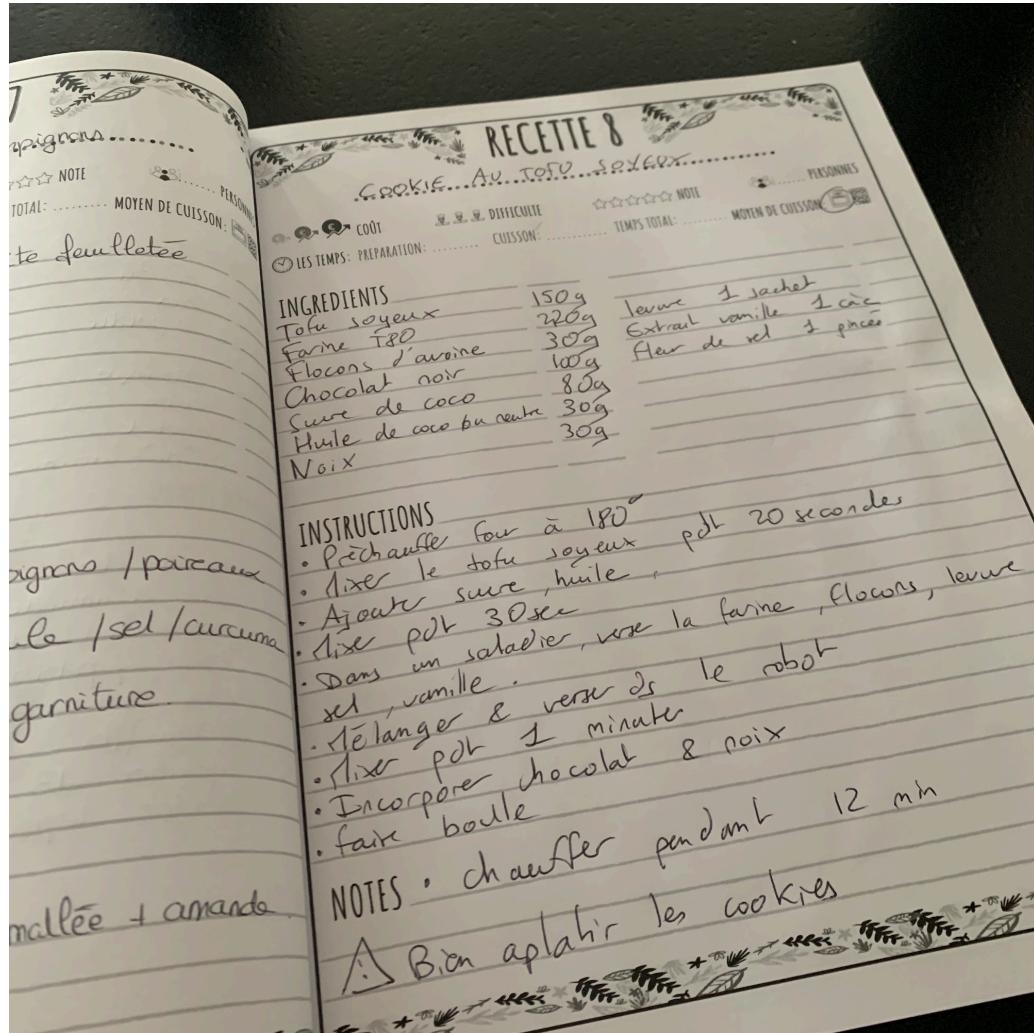


# FROM CODE TO EXECUTION

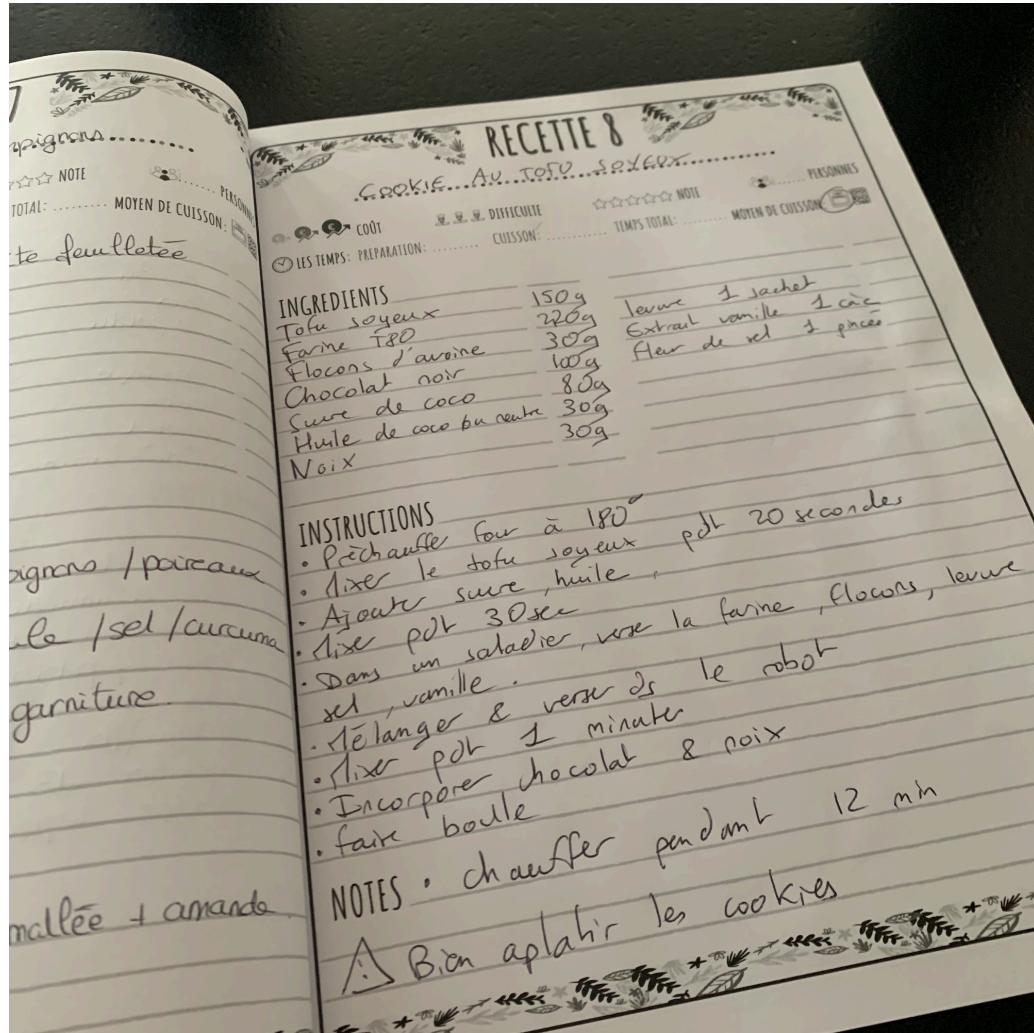
<https://connect.thinkr.fr/webr-user-2024/>



# FROM CODE TO EXECUTION



# FROM CODE TO EXECUTION



# FROM CODE TO EXECUTION

## R Sources

### Official releases

Official releases of R source code are most likely what you want if you are looking for the sources of R (both Unix and Windows).

- The latest release (2024-04-24, Puppy Cup): [R-4.4.0.tar.gz](#)  
Changes to the previous version are documented in the file [NEWS](#) (also contained in the sources).
- Older releases are available [here](#).

### Snapshots

Snapshots of R sources for development and patched release versions can be obtained as gzipped and bzipped tar files from <https://stat.ethz.ch/R/daily/>:

- Sources of [R alpha and beta releases](#) (daily snapshots, created only in time periods before a planned release).
- The latest patched release: [R-patched.tar.gz](#), [R-patched.tar.xz](#) (read [what's new](#) in the latest patched version).
- The latest development release: [R-devel.tar.gz](#), [R-devel.tar.xz](#) (read [what's new](#) in the latest devel version).

After downloading the R sources you should also download the recommended packages by entering the R source tree and running

```
tools/rsync-recommended
```

from a shell command line.

The above archives are created automatically from the Subversion tree, hence might not even compile on your platform and can contain any number of bugs. They will probably work, but maybe not. Use them to verify whether a bug you're tracking has been fixed or a new feature you always wanted has already been implemented.

CRAN itself does no longer mirror source snapshots (as of 2001-11-14), because it makes only limited sense to propagate archives that change on a daily basis through a network of mirror sites. When a snapshot reaches one of the final nodes in the mirroring process, there are already 2 newer versions available at the orginal sites.

```
colinfay@Colins-MBP ~ % R
R version 4.4.0 (2024-04-24) -- "Puppy Cup"
Copyright (C) 2024 The R Foundation for Statistical Computing
Platform: aarch64-apple-darwin20

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

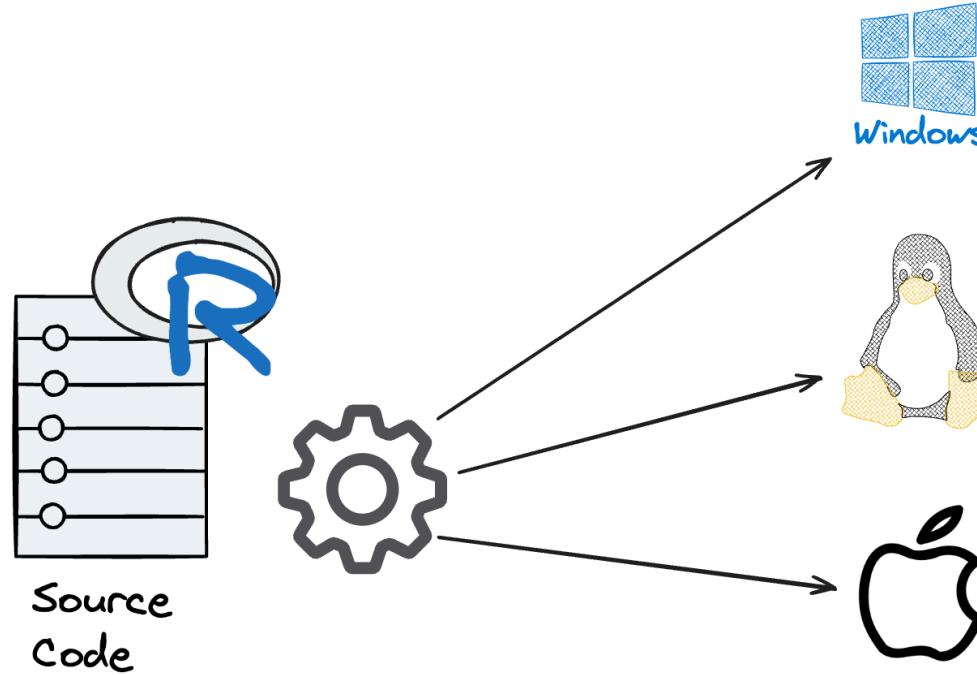
Natural language support but running in an English locale

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.

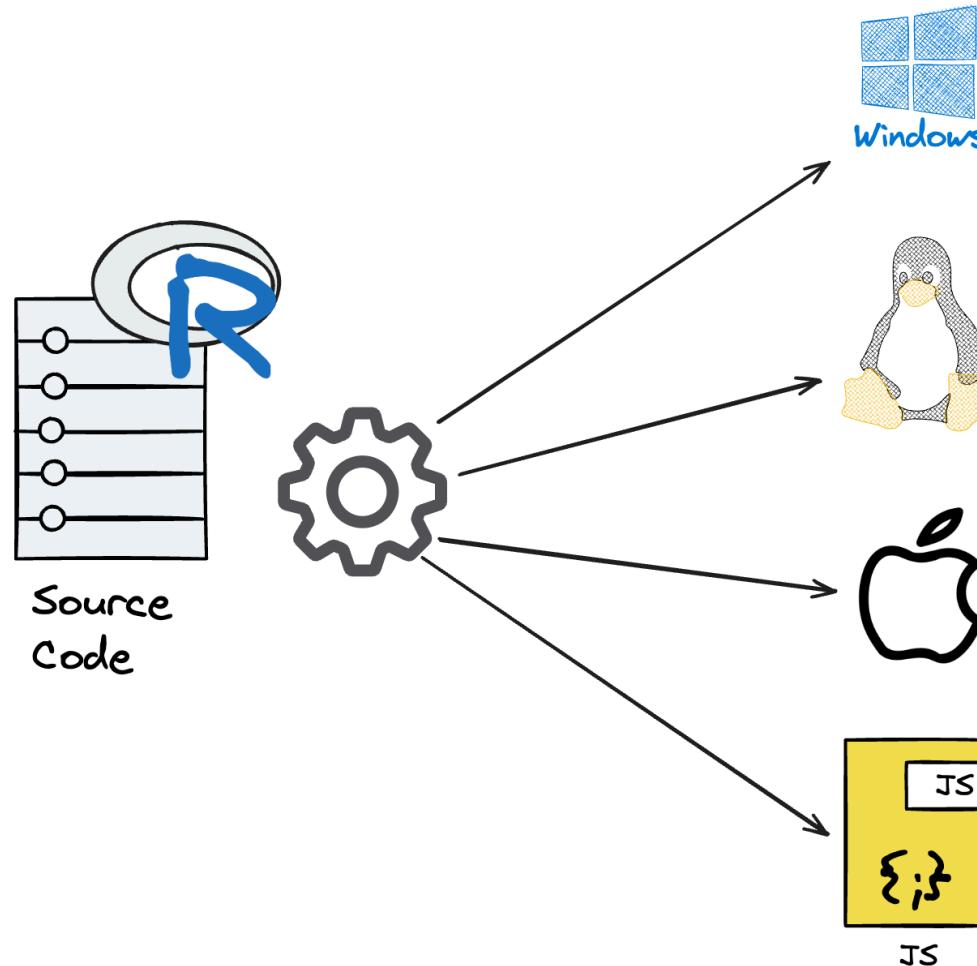
Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

-- [Rprofile] Sourcing user-wide rprofile --
-- [Rprofile] Setting up prompt --
> |
```

# FROM CODE TO EXECUTION



# FROM CODE TO EXECUTION



# WEBR : R “IN” JAVASCRIPT

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# R “IN” JAVASCRIPT

```
1 <div id = "webrdiv"></div>
2
3 <script type="module" >
4   // REDACTED - import webR here
5
6   let result = await webR.evalR('paste("Sample:", sample(1:1000, 1))');
7
8   let output = await result.toJs();
9
10  document.getElementById("webrdiv").innerText = output.values;
11
12 </script>
```



Sample: 641

# AND A CONSOLE

```
R version 4.4.1 (2024-06-14) -- "Race for Your Life"  
Copyright (C) 2024 The R Foundation for Statistical Computing  
Platform: wasm32-unknown-emscripten (32-bit)
```

```
R is free software and comes with ABSOLUTELY NO WARRANTY.  
You are welcome to redistribute it under certain conditions.  
Type 'license()' or 'licence()' for distribution details.
```

```
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.
```

```
>
```

```
sample(1:x, 1)
```

```
Run the code
```



# BUT WAIT...

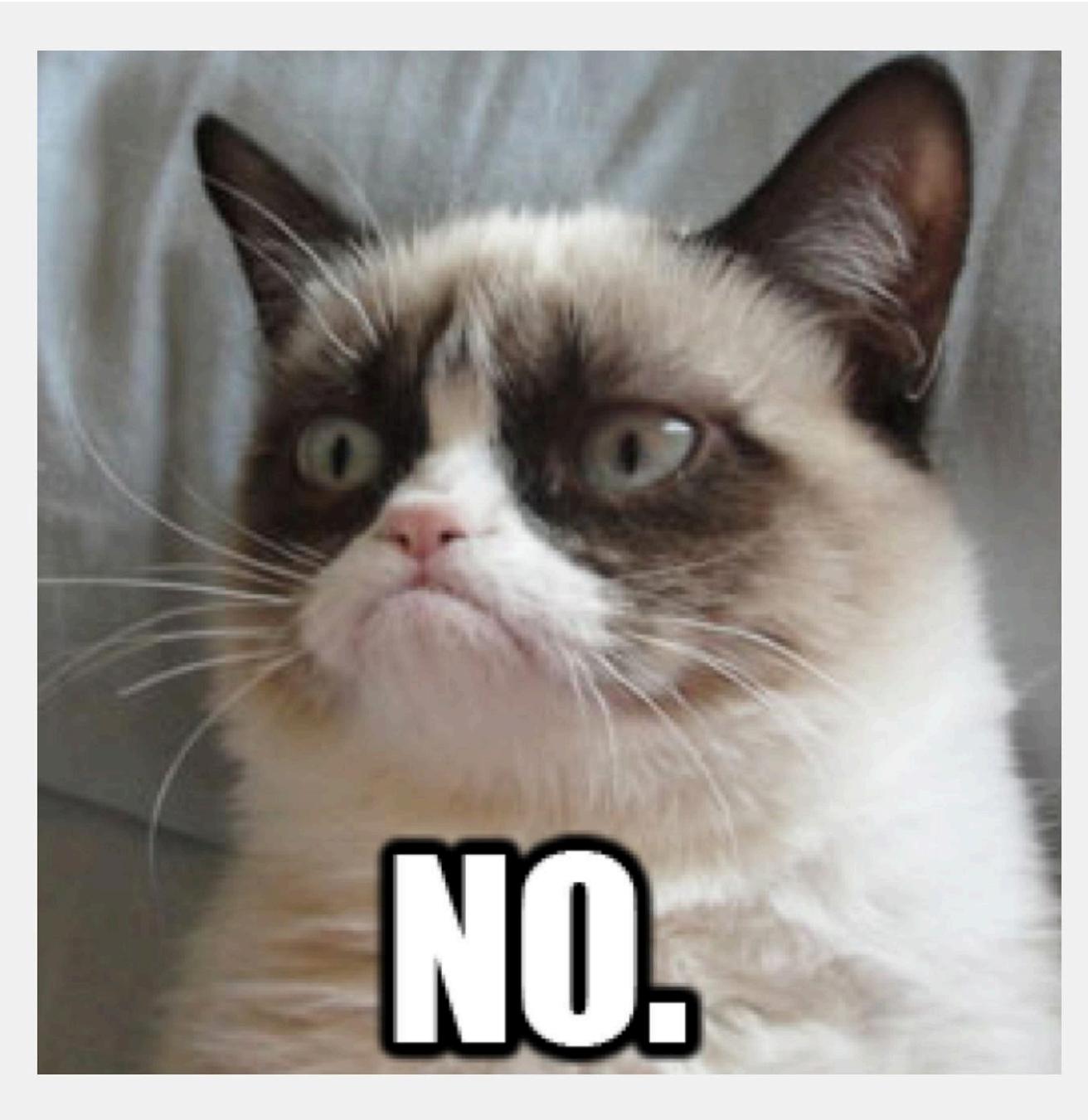
<https://connect.thinkr.fr/webr-user-2024/>



# IS IT THE END OF SERVER-SIDE ?

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# NOT NAVIGATEUR FRIENDLY

-  Server only
  -  Packages
  -  Secrets (Token / Data...)
  - ...
-  Computation
  -  Heavy simulations...
  -  “Big Data”
  - ...

# SHINYLIVE

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# SHINYLIVE (OR NOT)

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# BUT GOOD NEWS!

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# WEBR WORKS...

... IN YOUR BROWSER (LIKE NOW)



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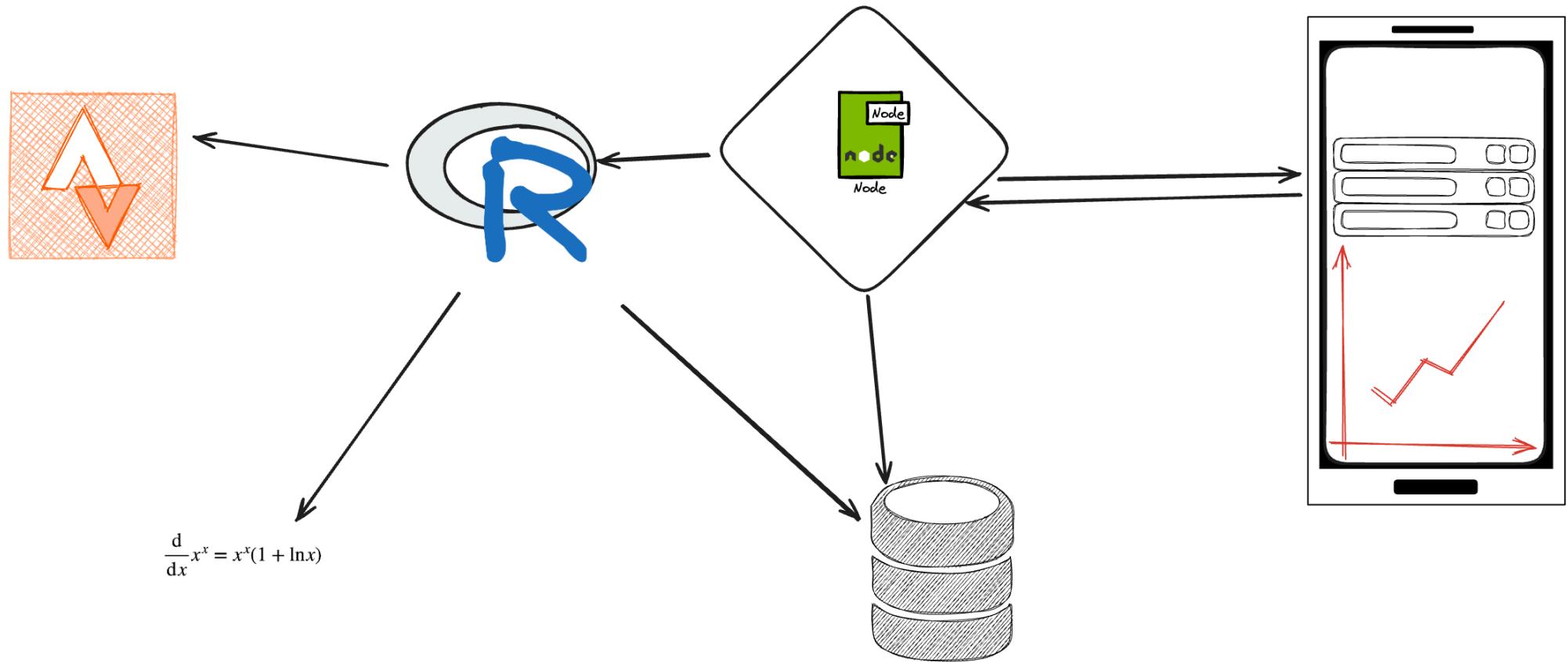
# WEBR WORKS...

... ON THE BACKEND



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# MY “DREAM STACK”



# WEBR IN NODEJS, WHAT DOES IT LOOK LIKE?

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# WEBR.EVALR()

```
1 const { WebR } = require('webr');
2
3 (async () => {
4   globalThis.webR = new WebR();
5
6   await globalThis.webR.init();
7
8   await globalThis.webR.evalR( 'install.packages("readr")' );
9
10  let result = await globalThis.webR.evalR(
11    'library(readr)',
12    'weekly_load <- read_csv("...");' +
13    'mean(weekly_load[1:4])/sd(weekly_load[1:4])' )
14  );
15
16  let output = await result.toJs();
17
18  console.log(output)
19})();
```

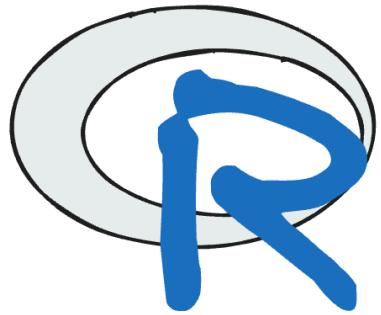


# IN A PERFECT WORLD...

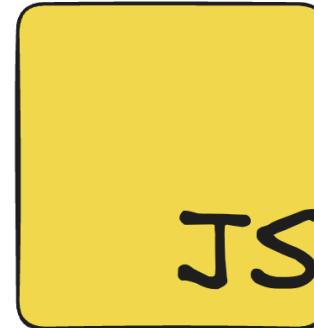
<https://connect.thinkr.fr/webr-user-2024/>



# R 🤝 JAVASCRIPT



```
> result <- rfun::hello_world()  
> print(result)  
[1] "Hello, world!"
```



```
> result = rfun.hello_world()  
> console.log(result)  
"Hello, world!"
```

**AND NOT ONLY THAT...**

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# FOR A PRODUCTION APP

-  Project skeleton
-  CRAN packages
-  My R package
-  My deps in NodeJS
-  My R package in NodeJS
-  My R fonctions in NodeJS

# WEBRCLI & SPIDYR

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# Project skeleton

```
webrcli init myproject
```



## Install from webR CRAN

```
webrcli install janitor
```





# My R package

```
$ (pwd)/rfuns
```





# My deps in NodeJS

```
await initSpidyr()
```



# My deps in NodeJS (and how to use them)

```
await library("janitor")
```





# My R package in NodeJS

```
mountLocalPackage("./rfuns");
```





# My R fonctions in NodeJS

```
await rfun.s.hello_world()
```



# HOW ABOUT THIS?

```
1 const { initSpidyr, mountLocalPackage } = require('spidyr');
2
3 (async () => {
4
5   await initSpidyr()
6
7   const rfun = await mountLocalPackage("./rfuns");
8
9   const hw = await rfun.monotony(4)
10
11   console.log(hw.values);
12 })();
```



# TO SUM UP

-  is awesome for Data Science
-  is awesome for Web Apps
-  Good practices exist in both worlds
-  Let's mix!



Thanks 🙏

- 🔑 <https://webr.r-wasm.org/>
- ⚡ [/colinfay/webrcli](https://github.com/colinfay/webrcli) & ⚡ [/colinfay/spidyr](https://github.com/colinfay/spidyr)
- 🤝 Let's chat
- ✉ [colin@thinkr.fr](mailto:colin@thinkr.fr)
- Questions?



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