Getting Started with R – Part I

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Who am I?

About Perry

- Motivates, mobilizes, and connects cross-functional teams with technical solutions and support
- Provides customer-focused Computer Professional services with Data Science / Systems Engineering experience in commercial and non-profit industries.
- Delivers system, network, and security support in a wide variety of business and home environments.
- Partners with clients for training and end-developer support efforts, especially in the areas of configuration management, operating system integration.

How am I going about learning about R?

Project Overview

- Download R
- Download Rstudio
  - Download tidyverse package
- Compile everything.

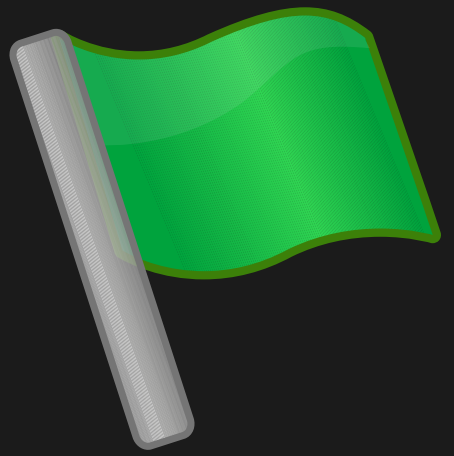
Observations

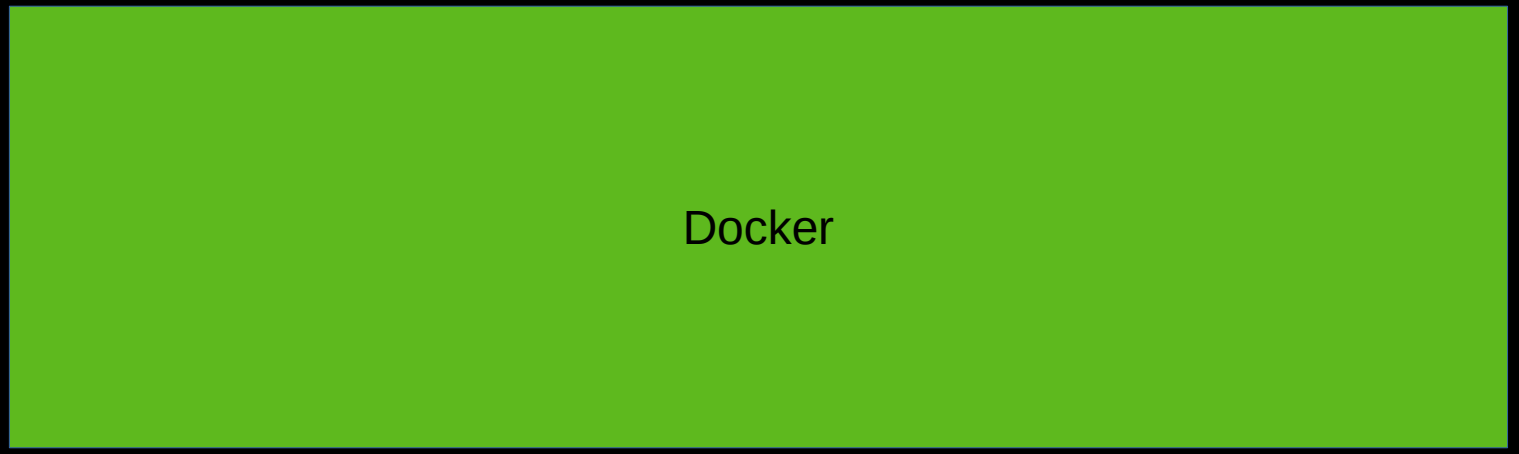
- Long compile times
- Aging laptop kept shutting off because Linux kept overclocking during compilation and system kept overheating
- Sooooo many dependencies and compilation issues/errors

Project Overview (Revised)

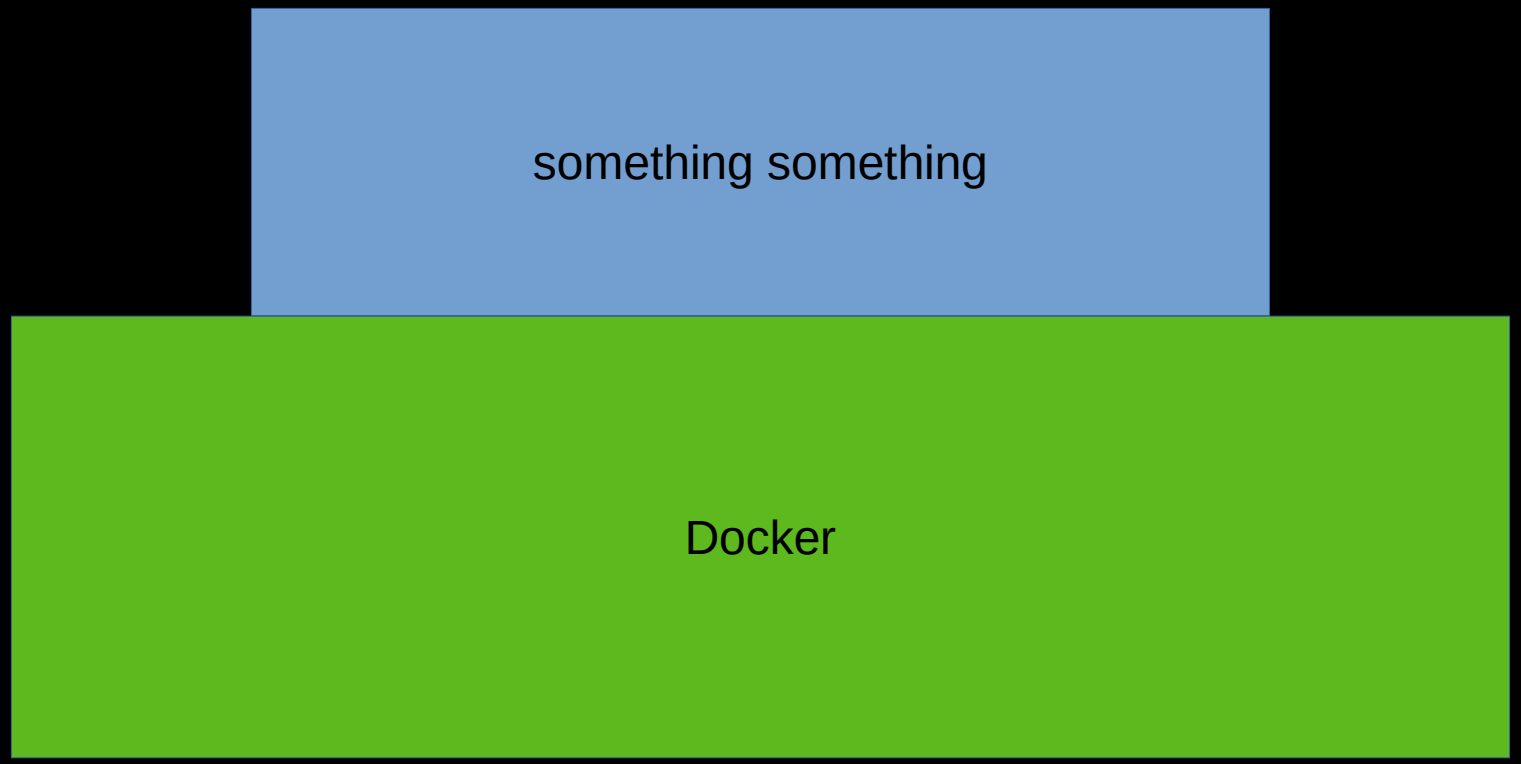
- Download R
- Download Rstudio
  - Download tidyverse package
- Compile everything.

- Download Docker
- docker run *something something*
- Done!

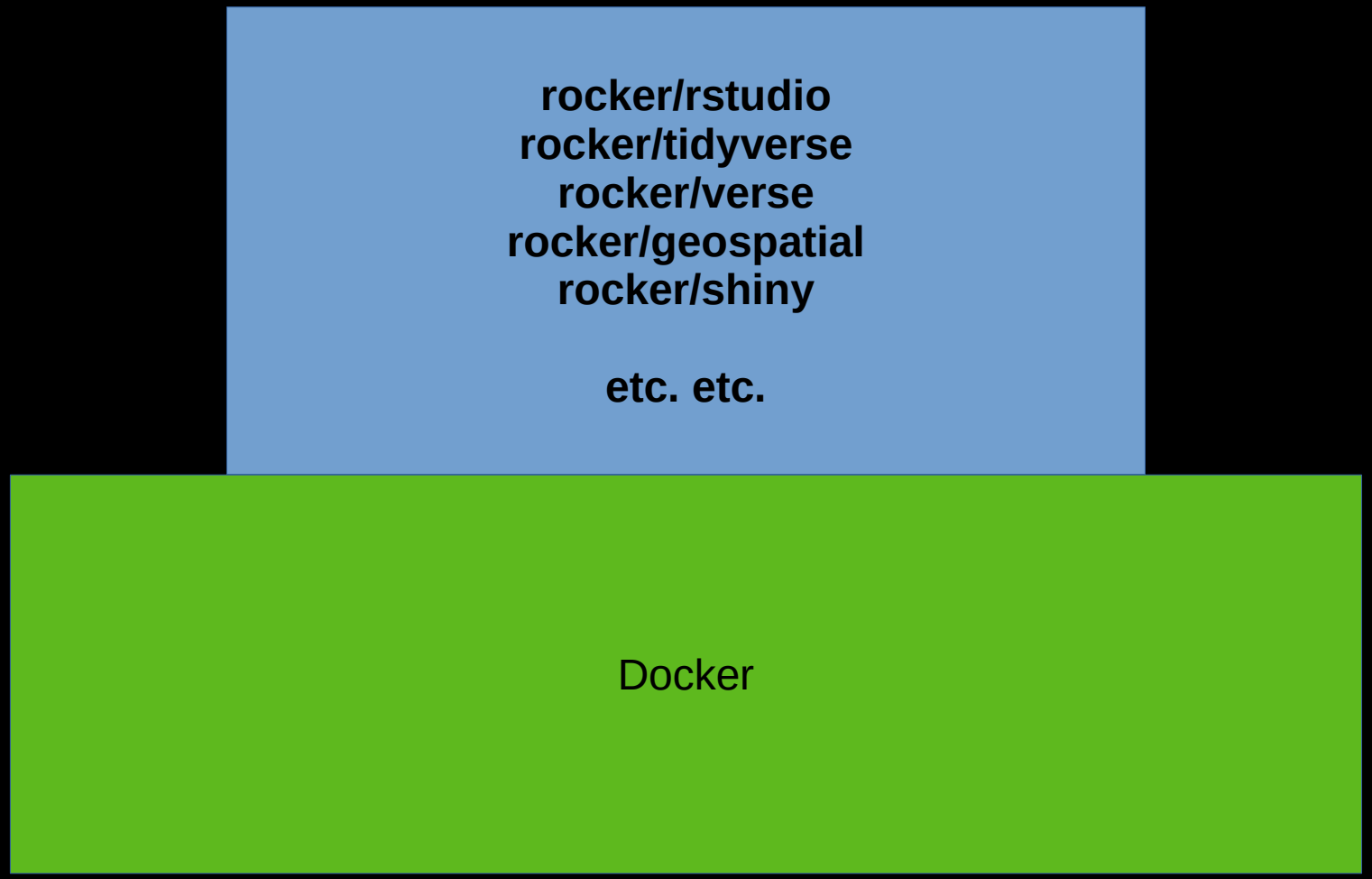




Overview



Overview


rocker/rstudio
rocker/tidyverse
rocker/verse
rocker/geospatial
rocker/shiny
etc. etc.
Docker

Docker at 50,000 Feet

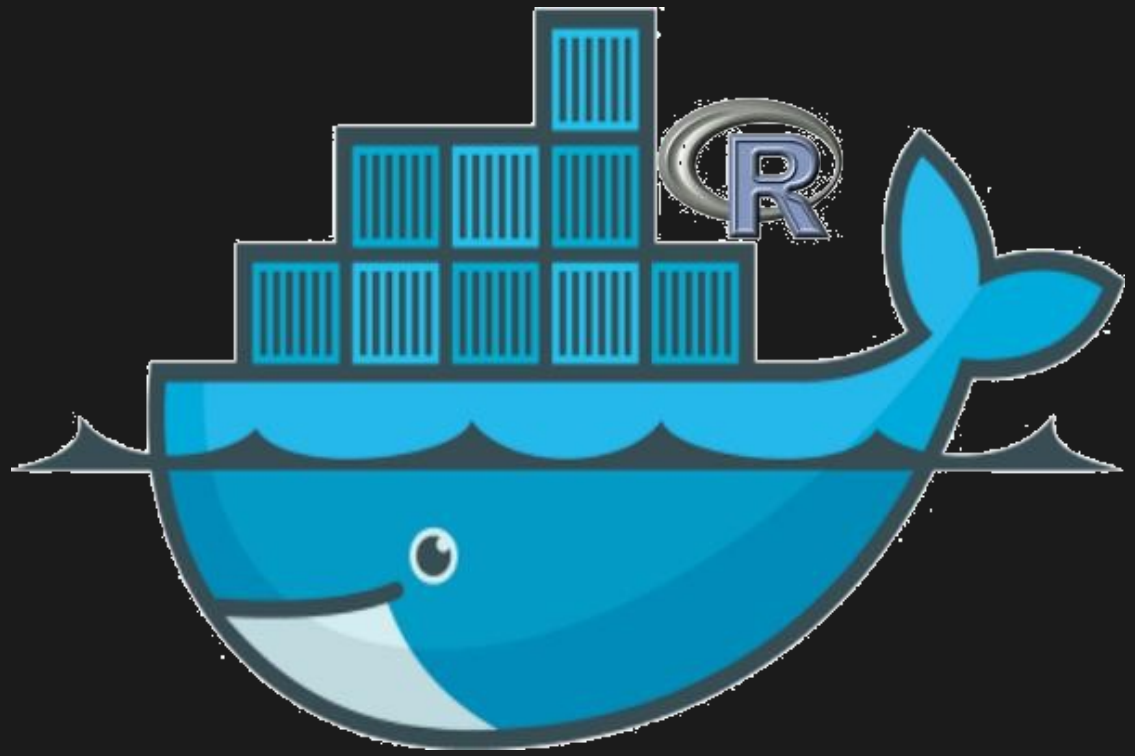
- Runs software packages called containers
- Developers can package up applications, including libraries and dependencies into a container
- We'll be using the docker run command to facilitate pulling and running of images from the Internet

R at 50,000 Feet

- Programming language for statistical computing
- Created by Ross Ihaka and Robert Gentleman
  (R's in their first names!)
- Interpreted language
- Used for modeling and analysis

Rocker at 50,000 Feet

- R on Docker = Rocker
- https://www.rocker-project.org/images/
- R with libraries and dependencies in nifty containers
- TidyVerse is a collection of packages that facilitates our visualizations



RStudio at 50,000 Feet

- An open-source, free integrated development environment (IDE) for R on Docker = Rocker
- Software Engineer JJ Allaire, Founder
  - Created ColdFusion language
  - LoseIt! - Weight Tracking App

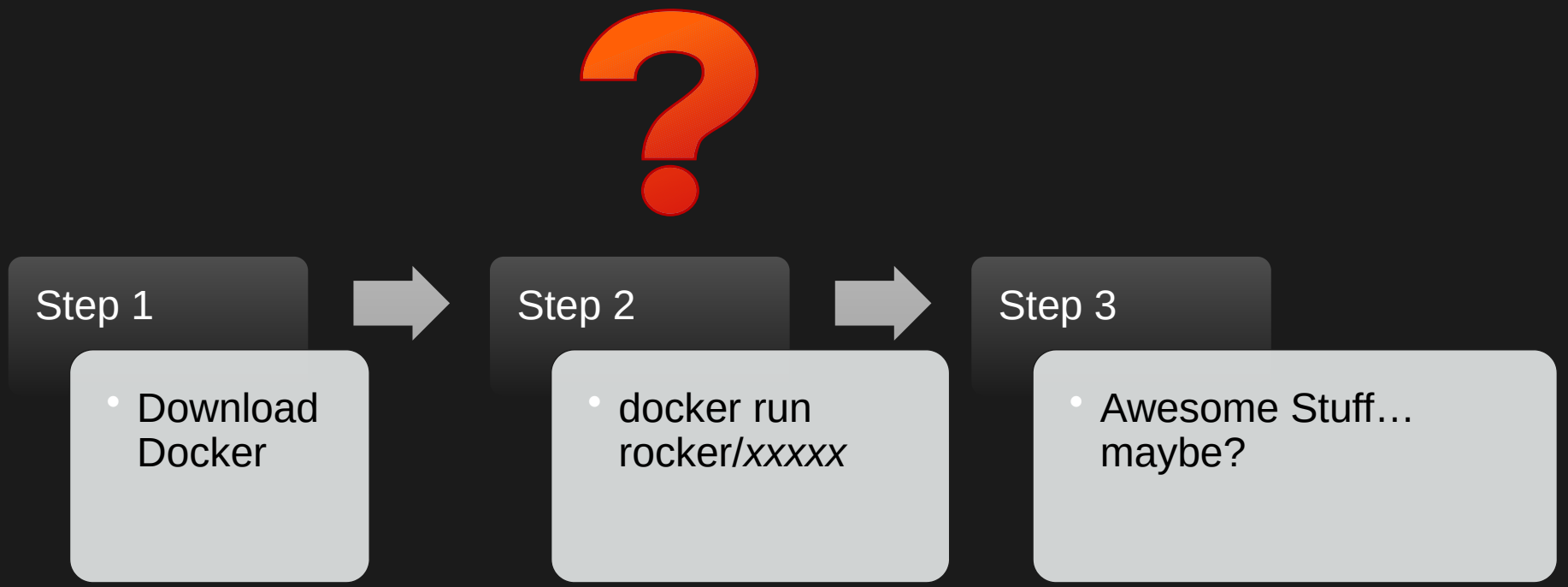
Some Images in the Rocker Universe…

- https://www.rocker-project.org/images/

Image	Comments
r-ver	• Minimal
rstudio	• Adds rstudio. Great mid-sized container. Sans tidyverse
tidyverse	• Adds tidyverse. Great mid-sized container. Includes ggplot2 (data visualization stuff)
verse	• Adds TeX and publishing
geospatial	• Adds geospatial libraries. Large image

How do I download Docker?

Procedure


Step 1
Download Docker
Step 2
docker run rocker/xxxxx
Step 3
Awesome Stuff… maybe?

Setting Up Docker (Part 1 of 2)

- https://docs.docker.com/
- Left Navigation Menu > Get Docker > Docker CE > Linux (or MacOS or …?)
- For Fedora:
  - https://docs.docker.com/install/linux/docker-ce/fedora/
  - sudo dnf -y install dnf-plugins-core
  - sudo dnf config-manager --add-repo https://download.docker.com/linux/fedora/docker-ce.repo
  - sudo dnf install docker-ce docker-ce-cli containerd.io
  - dnf list docker-ce --showduplicates | sort -r

Setting Up Docker (Part 2 of 2)

- For Fedora:
  - Enable docker daemon, start it, and add your username to sudo’ers
    - sudo systemctl enable docker
    - sudo systemctl start docker
    - sudo groupadd docker
    - sudo usermod -aG docker $USER
- Test basic functionality:
  - docker run hello-world

Setting Up Rocker

- Pick an image:
  - Did you want r-ver, rstudio, tidyverse, etc.?
- Invoke docker (replace rstudio with the desired image):
  - docker run -e PASSWORD=SHHH --rm -p 8787:8787 rocker/tidyverse
    - Replace SHHH with your own password.
      Note: don’t use rstudio for PASSWORD
    - --rm provides clean-up of the container when you’re done.
    - -p is the port number
    - Last argument (rocker/tidyverse, etc.) is the desired image

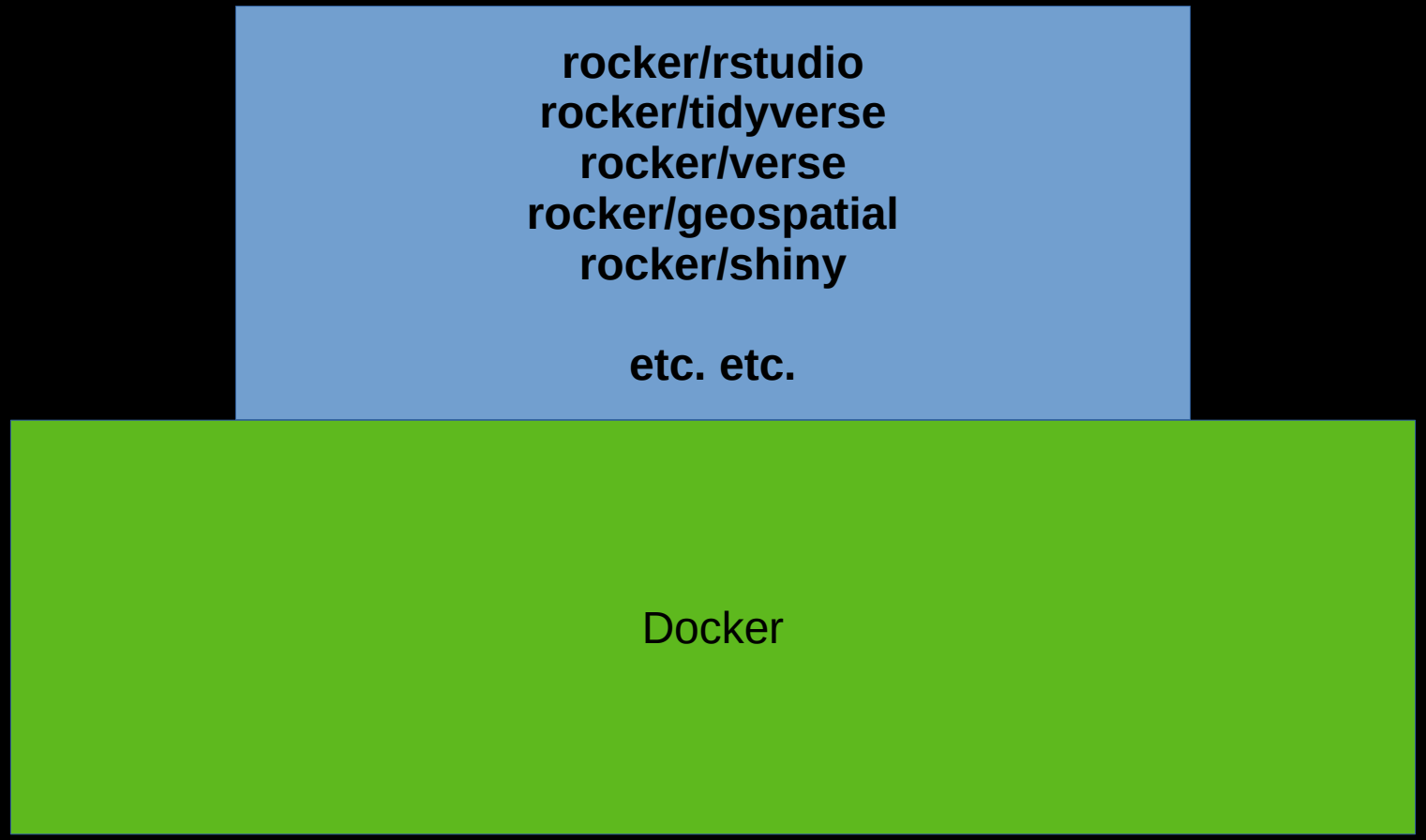
Post-configuration Docker (Part 1 of 2)

- Open up a browser
- Browse to:
  - localhost:8787

Post-configuration Docker (Part 2 of 2)

- ~~In the console window, type:~~
  - ~~docker pull rocker/tidyverse~~
- In rstudio:
  - library(tidyverse)
  - library(devtools)
  - install.packages(ggfortify) [or install_github('sinhrks/ggfortify')]
  - install.packages(“zoo”)
  - library(ggfortify)
  - autoplot(AirPassengers)

How Do I Save My Stuff?


rocker/rstudio
rocker/tidyverse
rocker/verse
rocker/geospatial
rocker/shiny
etc. etc.
Docker

Uh Oh...There’s a Problem!

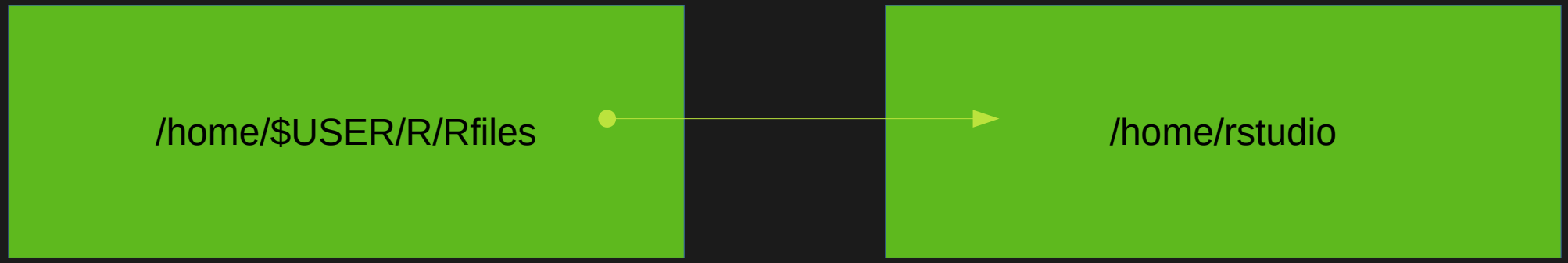
- Without the -v switch, can’t save to the host operating system.
- So... use the -v switch

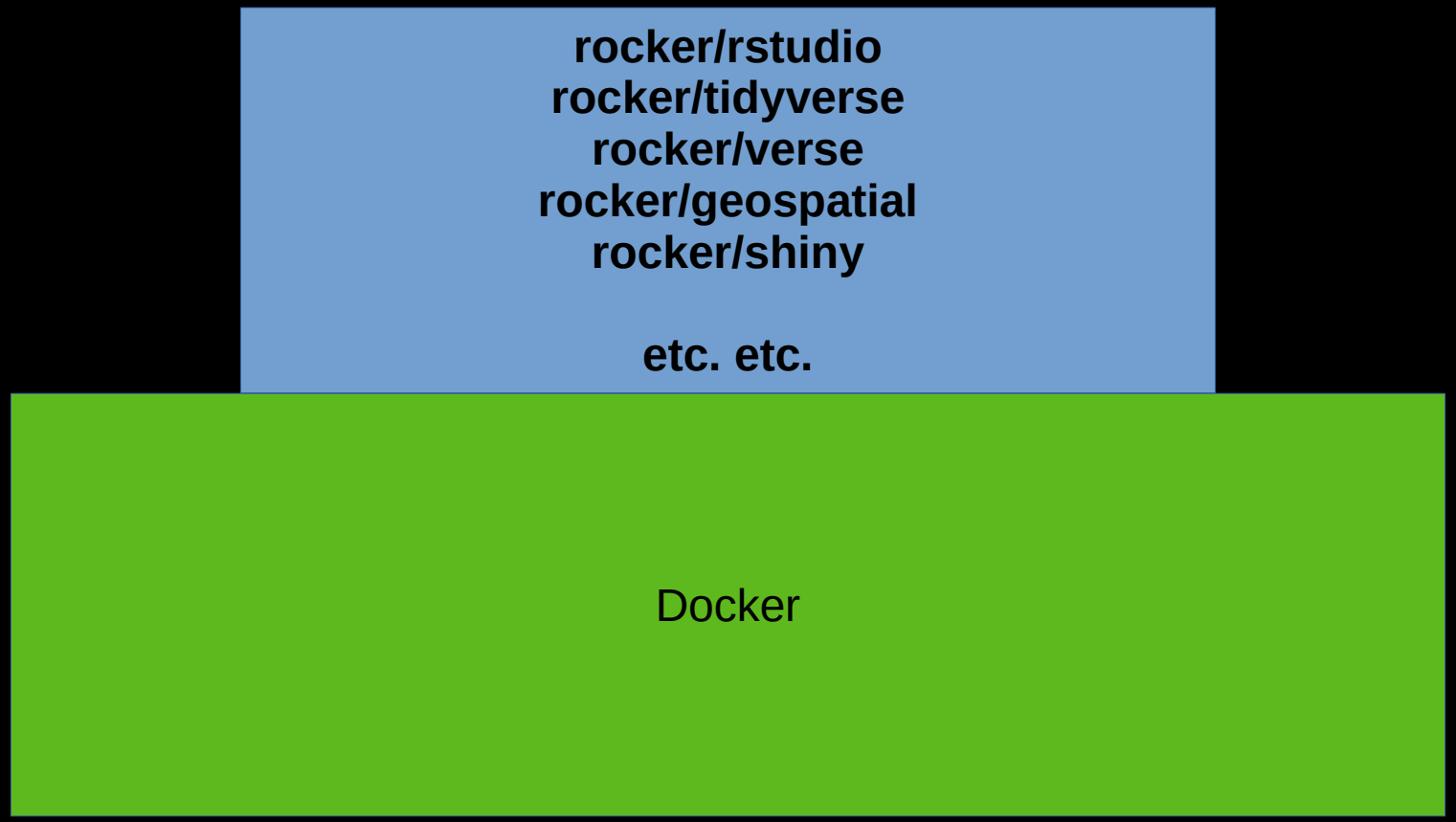
Setup Considerations...

- Be sure to mkdir a directory, similar to:
  - /home/$USER/R/Rfiles
  - **Back that directory tree up somewhere!**
- So... the revised command is now...
  - docker run -e PASSWORD=SHHH -v /home/$USER/R/Rfiles:/home/rstudio --rm -p 8787:8787 rocker/tidyverse

What the heck is /home/rstudio??

- When the developers created this general-use image, they made the home directory of your Rocker image /home/rstudio.
- So... let docker know where the source files come from using the docker run -v switch
- The /home/$USER/R/Rfiles host directory gets bind mounted to /home/rstudio in the container

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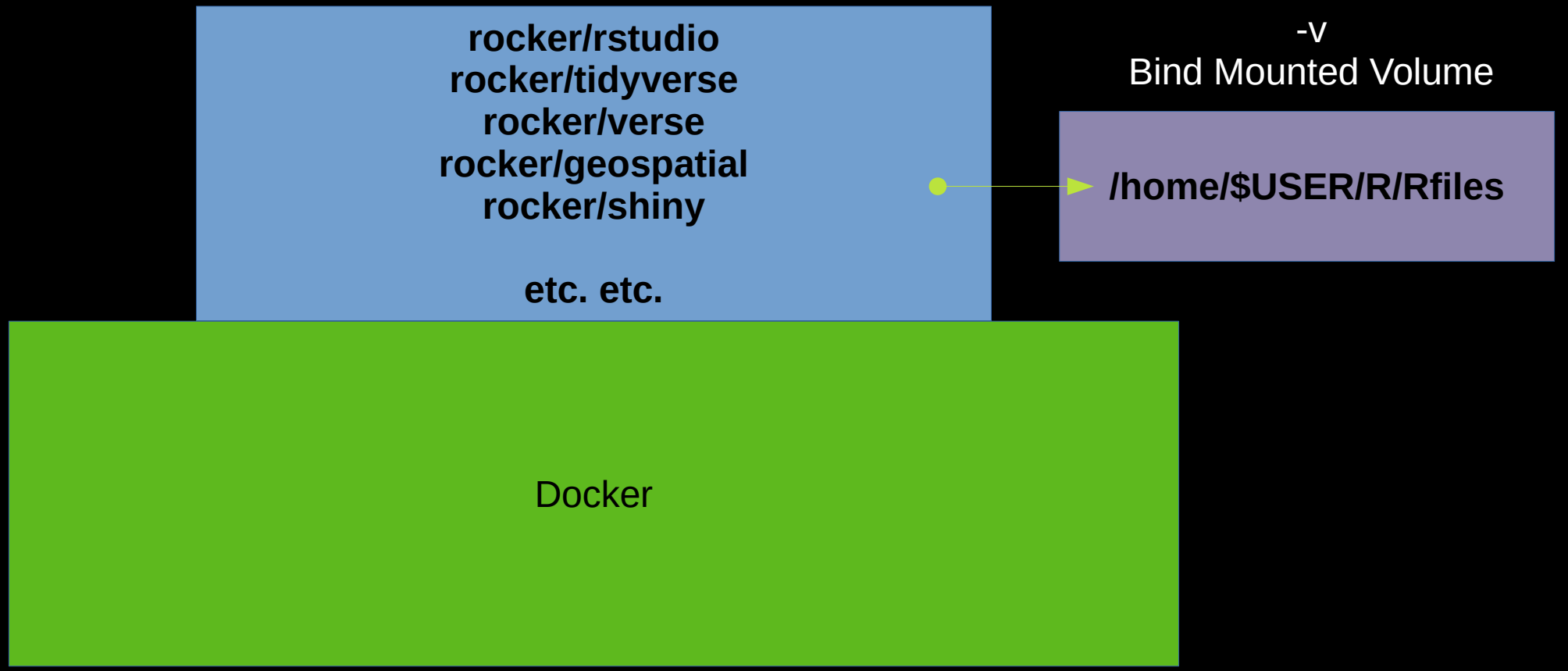
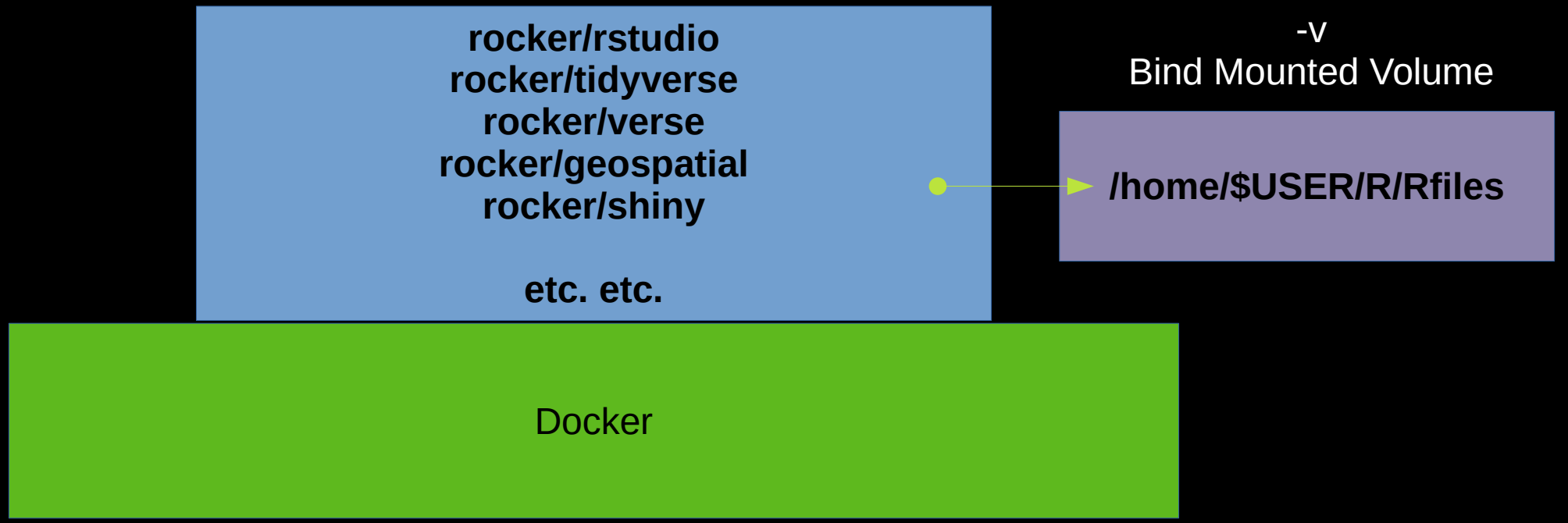
etc. etc.
Docker

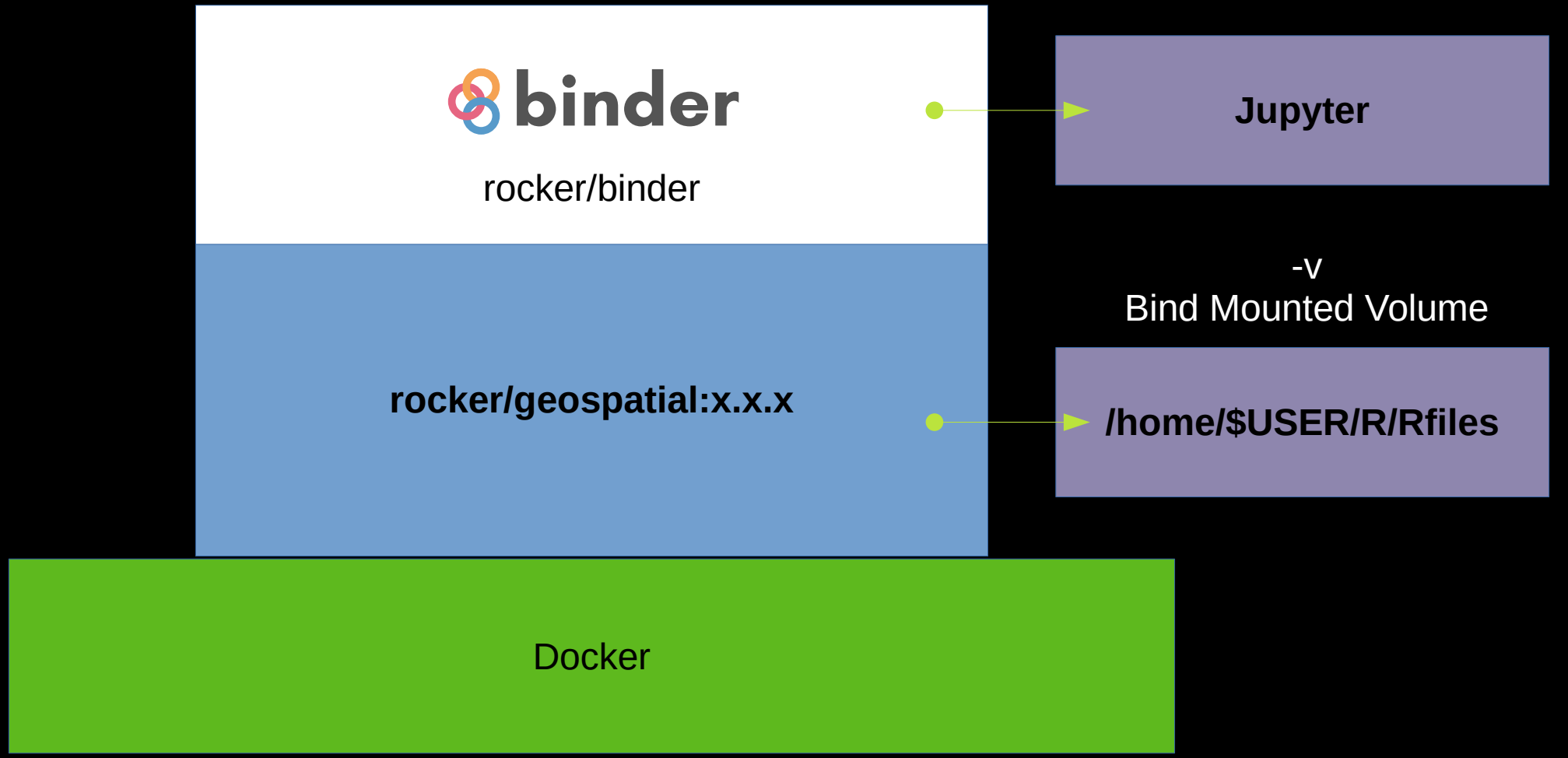

rocker/rstudio
rocker/tidyverse
rocker/verse
rocker/geospatial
rocker/shiny
etc. etc.
-v
Bind Mounted Volume
/home/$USER/R/Rfiles
Docker

What Next?

New Problem!

- How do we use R from Jupyter Notebook?
- Solution:
  - https://github.com/rocker-org/binder
- Binder facilitates docker'd (is that a word?) R within Jupyter
- Fix the problem by:
  - docker pull rocker/binder
  - docker run -ti --rm -e PASSWORD=SHHHHH
    -v /home/$USER/R/Rfiles:/home/rstudio -p 8888:8888 rocker/binder
    - New switch: -ti pseudo-tty and interactive shell


rocker/rstudio
rocker/tidyverse
rocker/verse
rocker/geospatial
rocker/shiny
etc. etc.
-v
Bind Mounted Volume
/home/$USER/R/Rfiles
Docker


binder
rocker/binder
Jupyter
-v
Bind Mounted Volume
rocker/geospatial:x.x.x
/home/$USER/R/Rfiles
Docker

Caveat Emptor!

- When you run the command:
  - docker run -ti --rm -e PASSWORD=SHHHHH -v /home/$USER/R/Rfiles:/home/rstudio -p 8888:8888 rocker/binder
  - Be sure to copy and paste that token generated in the URL you paste into the browser.

Live Demo Maybe?

What Resources Are Available?

Websites

Site	Description	Link
Rocker Project	Rocker Image Information	https://www.rocker-project.org/
Rocker Tidyverse on Github	Rocker/Tidyverse Image Information	https://hub.docker.com/r/rocker/tidyverse/
Rocker Binder	Rocker Binder	https://github.com/rocker-org/binder

Questions???

Recap

- Reviewed installation considerations for the R Studio environment
- Discussed Docker and why it can be useful for quick setup
- Discovered Rocker Projects (tidyverse, binder) that include ready-to-go containers to meet immediate needs

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- LinkedIn: @pvrconsulting

- Slides:
  - https://tinyurl.com/yxe3q23y
- Github:
  - https://github.com/perryrivera/r_development_presentation

Thank You!

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