Data Analytics
CS301
Tools for Working with Data

Week 1: 26th August
Fall 2021
Oliver BONHAM-CARTER

To install for this class

- `ClassDocs` – all class material
- `Git` - to work with GitHub
- `Atom` – an editor
- `Docker` – run programs in a virtual environment (container) on your computer
- `RStudio` – Used for programming in R
  - Two ways to install this:
    - Locally
    - Using Docker

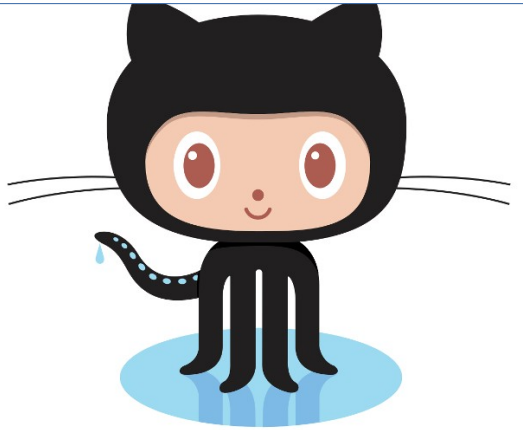
Notes to install each software are below

ClassDocs: All Class Materials

- We will be using GitHub to manage all class material. The links below are used to *pull* over your to `classDocs` repository to get slides and labs.

- **HTTP based repository pull**: works in absence of installed ssh keys.
  - `git clone https://github.com/Allegheny-Computer-Science-301-F2021/classDocs.git`
- **SSH based repository pull**: uses installed ssh keys.
  - `git clone git@github.com:Allegheny-Computer-Science-301-F2021/classDocs.git`

GitHub



git

Installing Git

- **MacOS**: go to your *Terminal*, type in "`git`" and if not installed, MacOS will offer to install the free *Xcode* software development suit from Apple that contains `git`.
- **Ubuntu**: `Git` may already be installed. If not, use the command, `sudo apt install git` to install `git`. You will need your password.
  - Good ref: https://www.digitalocean.com/community/tutorials/how-to-install-git-on-ubuntu-20-04
- **Windows**: Git does not come with the Windows OS and so it must be installed. Please visit https://gitforwindows.org/ to install and learn more.

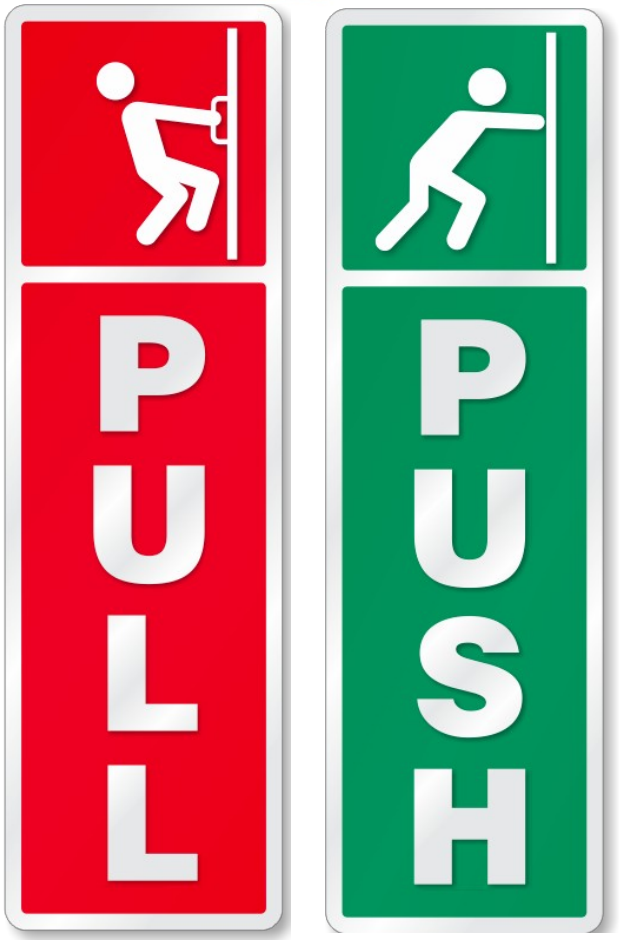
Git and Your Class Repositories

- **PULL** your classDocs before class (cloud data sent to you).

```
git pull
```

- **PUSH** assignment repos to submit homework (your data sent to the cloud)

```
git add -A
git commit -m "My commit mesg"
git push
```

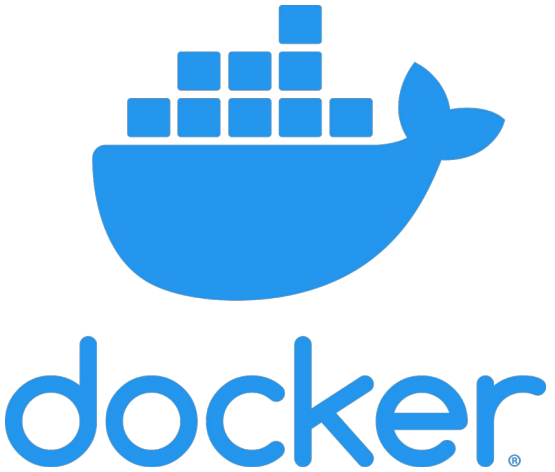


The Atom Editor: Suggested for Programming

- We will be programming and Atom facilitates this task
- If you do not already have it, please download it from: https://atom.io/

Docker for Running Software

- A container in which to run programs in isolation.
- Please be sure that you machine will work with the regular Docker, **not** Docker ToolBox.
- Verify: www.cs.allegheny.edu/canirundocker



Yes!

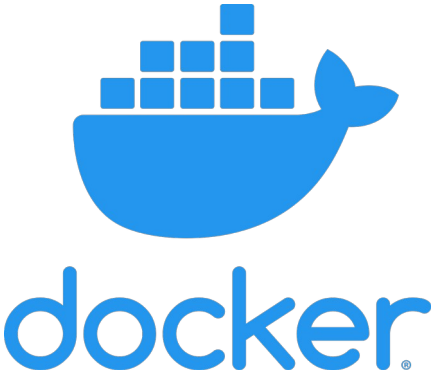
Check the docker docs for more information about the Linux system requirements and installation procedure.

No / Maybe

- Windows: Purchase a Windows Enterprise activation key
- Dual boot: Linux and Windows
- Use another computer

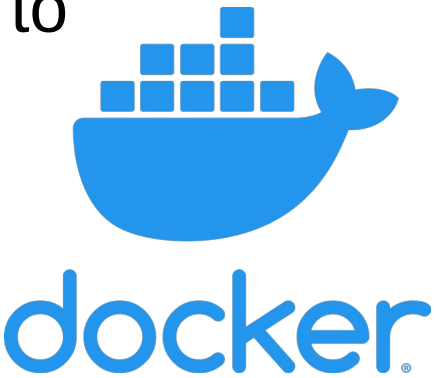
Get Started With Docker

- Running and Testing Programs with Docker and GatorGrader (Dr. Jumadinova):
  - https://www.youtube.com/watch?v=iceAgNEORCA
- Main site
  - https://www.docker.com/
- Downloads
  - https://www.docker.com/get-started
- Tutorial
  - https://www.docker.com/101-tutorial



Learning About Docker

- Play-with-Docker
  - https://www.docker.com/play-with-docker
- Once Docker has been installed, you can play with it.
- First, build a work container:
  - `docker run -dp 80:80 docker/getting-started`
- Then, to learn more use your browser to go to the url:
  - http://localhost/



Please Install Your Software

- We will be using Git and GitHub. Please setup your account **by next class** at https://github.com/ and also download a Git client software from https://git-scm.com/downloads (All OS's) or https://gitforwindows.org/ (Windows only)
- We will also be using the Atom editor to write code. Please download and install your editor from https://atom.io/
- For some labs, we may be using Docker. Please download and install your Docker Desktop installation (note: not the Docker ToolBox) from https://www.docker.com/. Help: https://hub.docker.com/
- If necessary, please help each other to install this software.

Links to download sites are above!

R programming:
A Local Install

Click The image

Install directly on your machine

RStudio Desktop 1.4.1717 - Release Notes

1. Install R. RStudio requires R 3.0.1+.

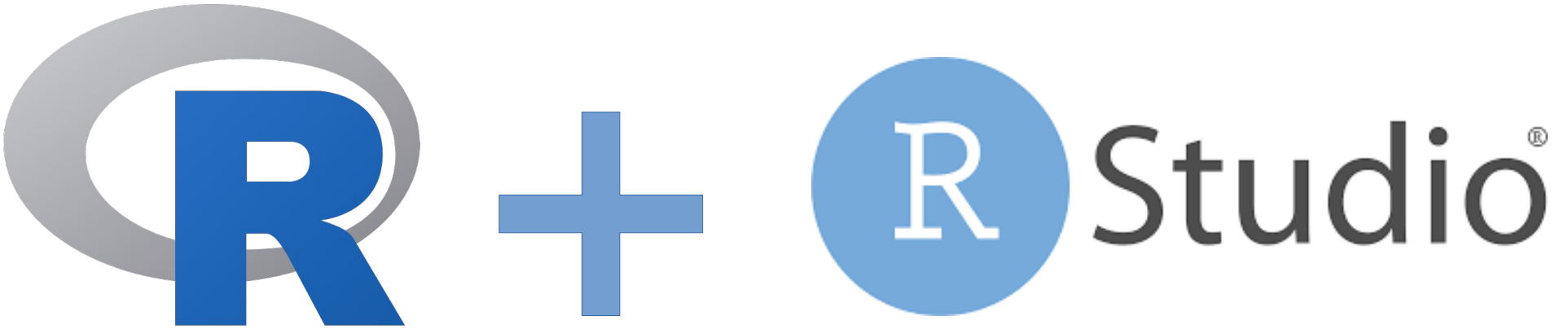
2. Download RStudio Desktop. Recommended for your system:

DOWNLOAD RSTUDIO FOR MAC
1.4.1717 | 203.06MB

Requires macOS 10.14+ (64-bit)

https://www.rstudio.com/products/rstudio/download/#download

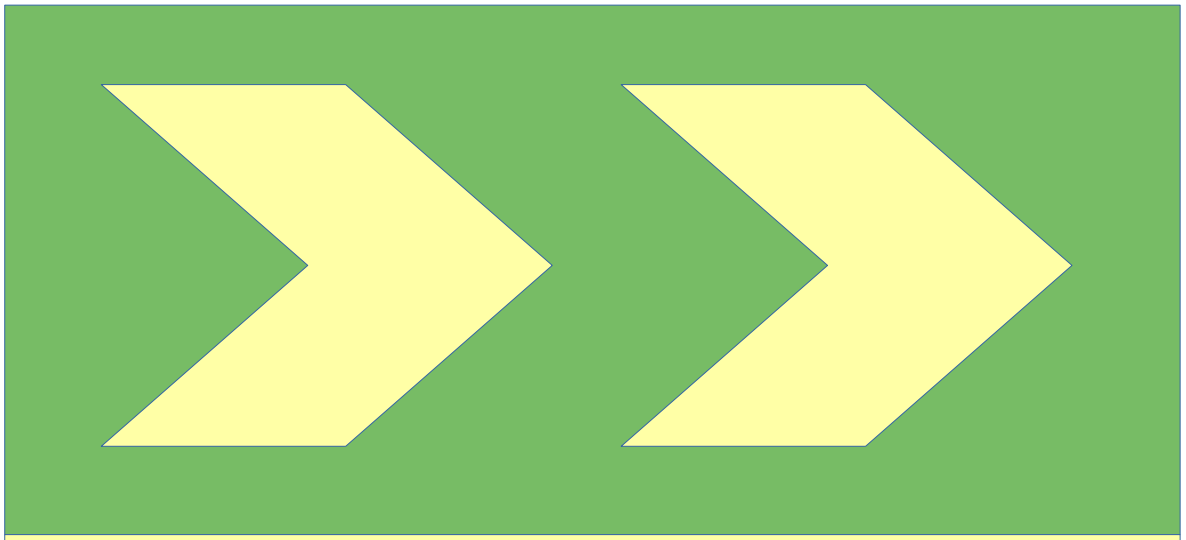
A Local Install of rStudio



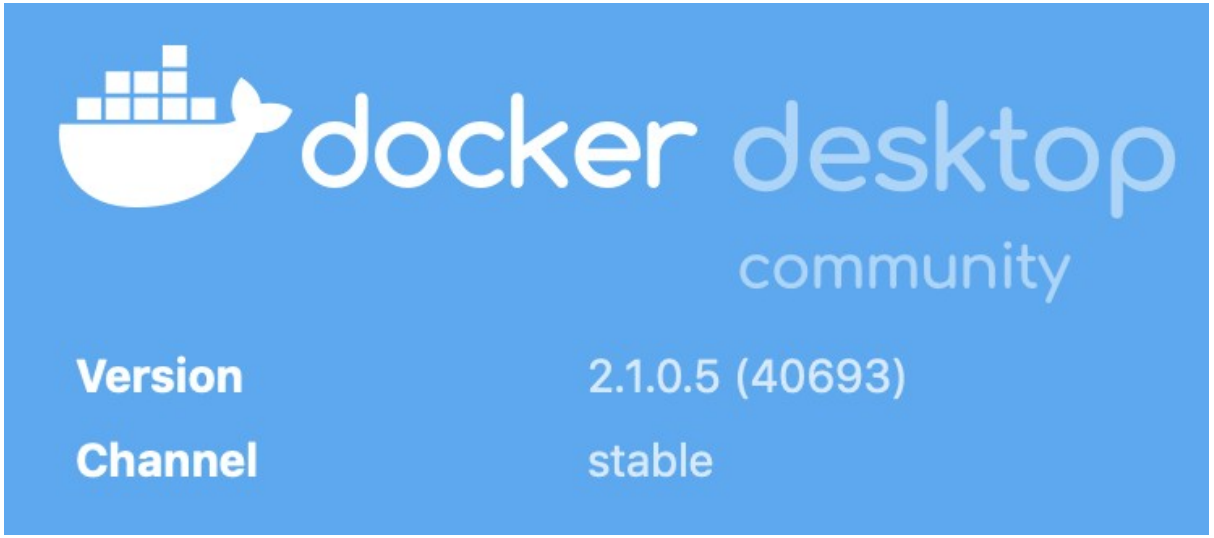
- **You must first install R and then rStudio**
  - The R programming language
    - https://cran.rstudio.com/
  - Rstudio
    - https://rstudio.com/products/rstudio/download/

If you install these, you may not need to use Docker containers for your R programming.

RStudio With Docker



FYI: Using containers



Docker Alternative of: R Programming at Bash

Note: the directory where you run this becomes your local directory in the container.

```
R version 3.6.1 (2019-07-05) -- "Action of the Toes"
Copyright (C) 2019 The R Foundation for Statistical Computing
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.
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.
```

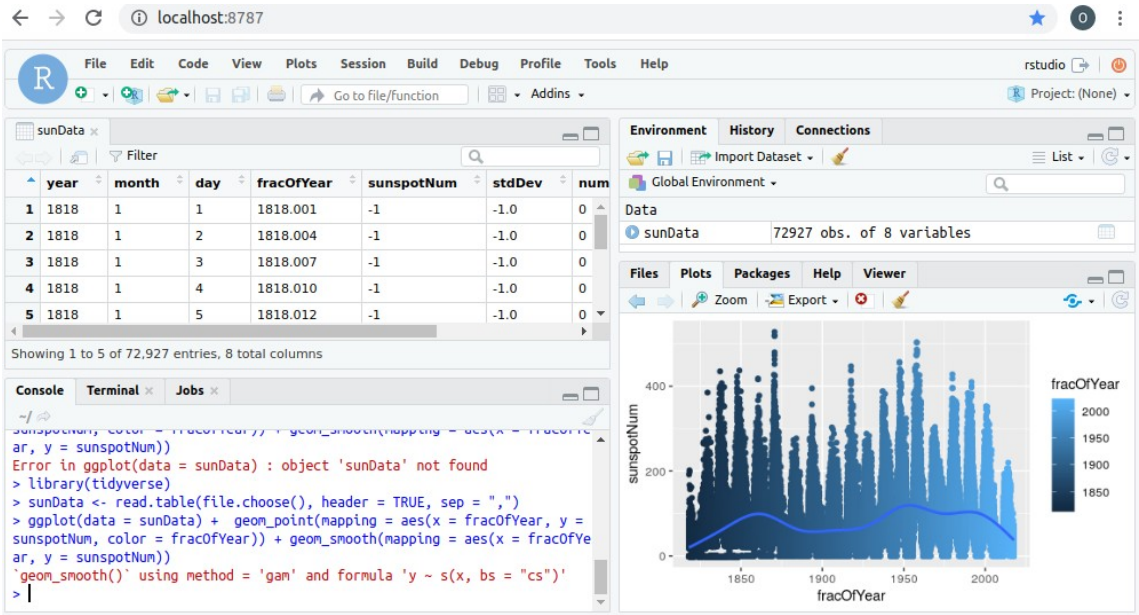
- Build and run container:
  - docker run -ti --rm r-base

- Linux, Mac; Build, mount local drive and run container :
  - sudo docker run -ti --rm -v "$PWD":/home/docker -w /home/docker -u docker r-base
- Windows; Build, mount local drive and run container :
  - docker run -ti --rm -v /home/docker -w /home/docker -u docker r-base

Docker Container Setup: rStudio

Note: the directory where you run this becomes your local directory in the container.

Username: *rstudio*
Password: *letmein*



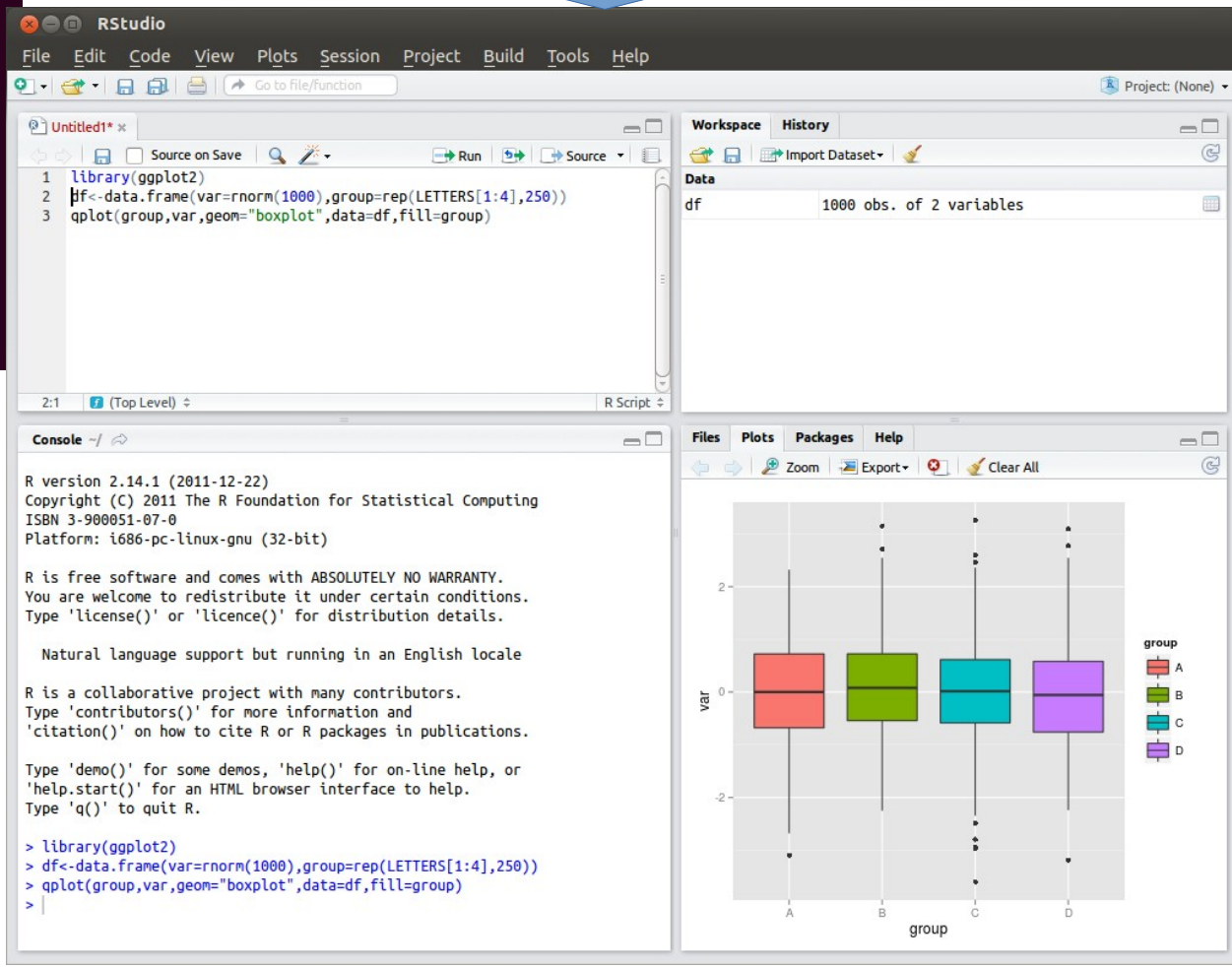
- Linux, Mac; Build, mount local drive and run container:
  sudo docker run --rm -e PASSWORD=letmein -p 8787:8787 -v $PWD:/home/rstudio/ rocker/verse
- Windows; Build, mount local drive and run container:
  docker run --rm -e PASSWORD=letmein -p 8787:8787 -v $PWD:/home/rstudio/ rocker/verse
- Browser:
  URL: Use Browser address: http://localhost:8787/

Programming in R
R and RStudio

ALLEGHENY COLLEGE

To run:
Find its icon or type *rstudio at terminal*

```
R version 3.2.2 (2015-08-14) -- "Fire Safety"
Copyright (C) 2015 The R Foundation for Statistical Computing
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.
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.

>
```



To run:
Type "*R*" at terminal

R by Jdoodle

- https://www.jdoodle.com/execute-r-online