



R MAC SETUP

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Abstract

This is an “article” formatted version of the slides, which are available in the same folder as this article as “47.mac_R_setup-slides.pdf”. The content is exactly the same. The only difference is that the result is reformatted and, possibly, more convenient for inspection by users.

Outline

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1 Overview

Overview

- R (R Core Team, 2018) is a statistical computing framework that is offered for Windows, Macintosh, Linux, and other operating systems.
- The R package does not provide all of the components needed to use R fully.
- On our Mac systems, we install these programs that complement R.
 - Xcode:** provides general programming tools that R packages might use
 - XQuartz:** An X11 display layer that some graphics programs in R will use
 - clang:** A C compiler that will be needed to install/run some packages (such as Rstan)
 - gfortran:** A fortran compiler that will be needed to install some packages
- On Windows, the equivalent additions would be found in the R-Tools package and Mingw.
- R for Macintosh Operating System (macOS) includes an editor called R.app, which has many nice features.
- Other editors are also widely used, namely

1. Rstudio
2. Emacs

CRMDA Web References

- The R tool page for macOS describes these more fully:
<https://cran.r-project.org/bin/macosx/tools/>
- The CRMDA computer maintenance page, <https://crmda.ku.edu/setup>
 - If there is an update for the guide you are reading now, it should be found at that address
- Guide index, <https://crmda.ku.edu/guides-index>

2 Getting Started

Make sure your macOS is up to date

- R is generally designed to work with the most recent updates for the macOS. Bring your computer up to date before attempting to do the rest of this work.
- If your system is more than one update behind schedule, apply pending updates
 - App Store... then Updates
- As usual, while doing major updates,
 - plug in the computer's power supply, and
 - use a fast Ethernet connection (wired, if available)

2.1 Frequently Encountered Problems

The "Unidentified Developer" Problem

When you install software from 3rd party sites, as we do below, the macOS will try to prevent you from moving forward.

During the installation, it is likely you will receive a warning like this:

“The software can't be opened because it is from an unidentified developer”.

When we installed clang (`clang-6.0.0.pkg`), for example, that warning appears.

It appears that the warning appears in slightly different ways when the user clicks on the `dmg` package to initiate the install.

To solve the warning about a `dmg` installer file, one easy fix is the following.

Shortcut method to avoid the “unidentified developer” warning

1. Use the Finder to locate the `dmg` file.
2. Don't double click the `dmg` installer file.
3. Do hold down the `control` key and click on the `dmg` file.
4. Choose Open, and then choose Open again.

There is another method that we have used while preparing these notes

Use Apple Menu to allow unidentified developer:

1. Open "System Preferences"

2. Open "Security & Privacy"
3. Click on the "Open Anyway" next to the warning message about the program under consideration
4. Follow (or "Continue") through the Installer steps to finish installing.

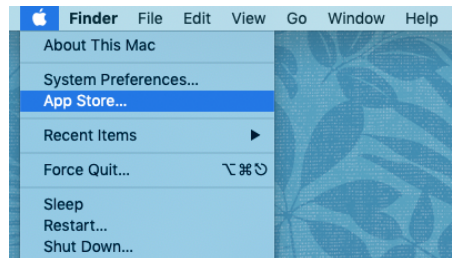
This solution applies to all the software installations illustrated in this document.

3 Recommended Software

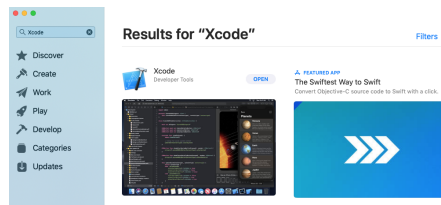
Step 1 - Xcode

Xcode has general purpose tools that any hacker will need. It is the easiest to install because it is in the familiar Apple App Store.

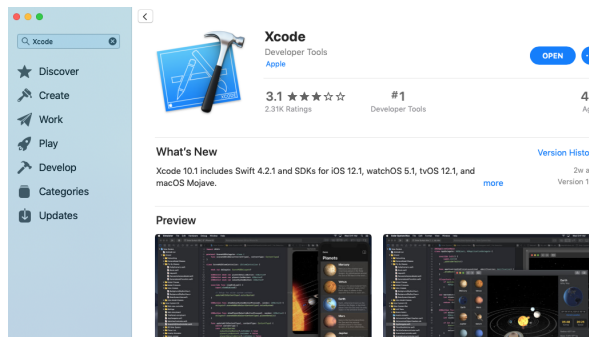
A) Open App Store



B) The search bar, on the upper left corner, type in "Xcode"

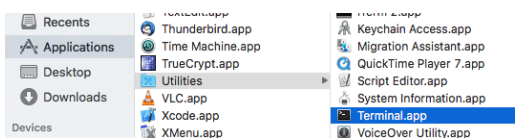


C) Click "Install" on the upper right corner



Reminder: Use fast Ethernet connection if possible (it is a 6.10GB download)

D) Accept the Xcode license. For a first-time installation, the Xcode package tools will not work correctly until the user accepts their legal restrictions. To do so, open a terminal (go to the "Utilities" under "Applications", double click the "Terminal.app")



and run the following command in the terminal window

```
$ sudo xcodebuild -license accept
```

The `sudo` command will require your user password; this will succeed only if the user has an Admin account on the computer.

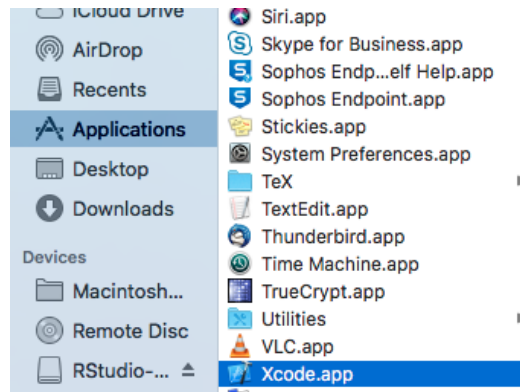
After running the above command, there should not be any feedback (or warning) messages. But, in case users do see any error messages, run the following command in the terminal to reset Xcode

```
$ sudo xcode-select -r --reset
```

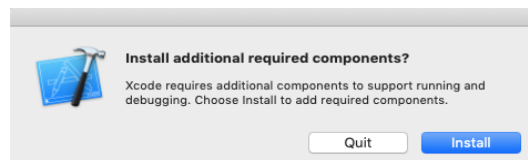
then, re-run

```
$ sudo xcodebuild -license accept
```

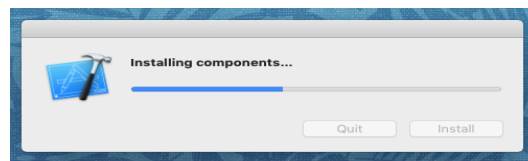
E) Make sure Xcode does run. Go to “Applications” and double click the “Xcode.app”.



If the following message comes up, choose “Install”



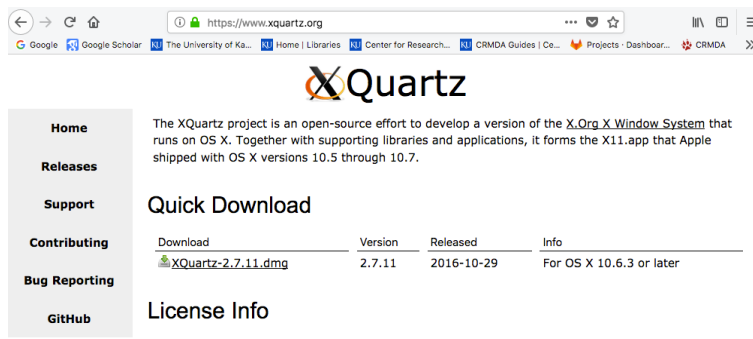
and get the additional required software.



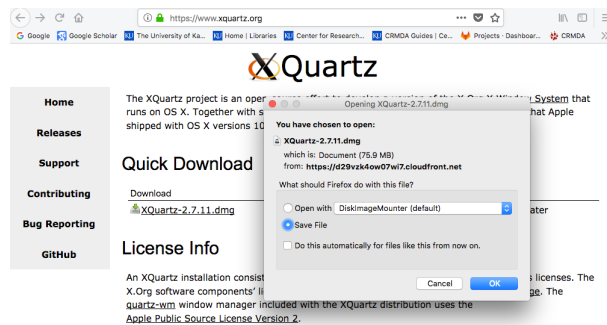
Once the installation finished, double click the “Xcode.app” again to see if it is runnable.

Step 2 - XQuartz

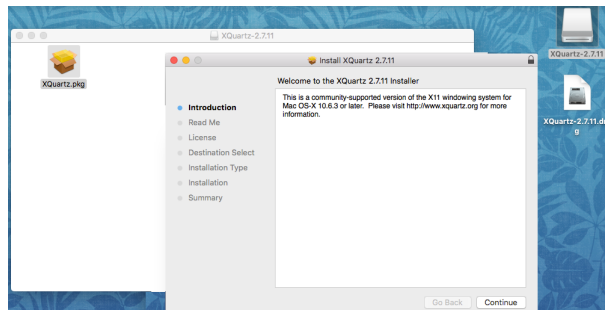
A) Browse the XQuartz website <https://www.xquartz.org>



B) Download **XQuartz-2.7.11.dmg** (the current latest version is 2.7.11; this number may change)



C) Double click the .dmg file to expose the contents within, which include a png file. Then double click the .pkg file to begin installation.



Once the installation is completed, you can delete the .dmg file.

Step 3 - clang

The next 3 steps start with downloads from the R worldwide network.

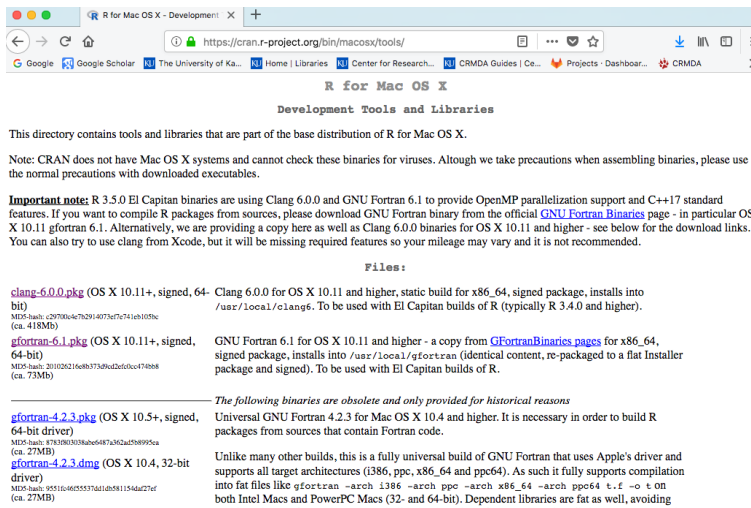
To reduce the *wear and tear* on the internet, it is suggested that you should:

Find a CRAN Mirror server that is close to you.

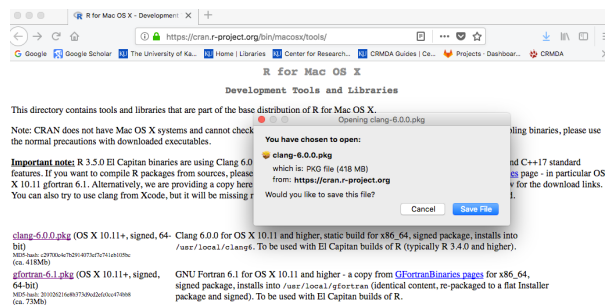
- The KU Mirror is <https://rweb.crmda.ku.edu/cran>.
- A full list of Mirrors is available <http://r-project.org/mirrors.html>.

The **clang** package includes C libraries and a compiler needed for use of packages such as Rcpp and Rstan. While not strictly necessary for basic R use, it is necessary for most interesting uses of R

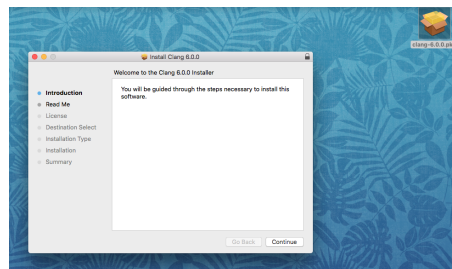
A) Browse nearby mirror of the [CRAN macosx tools page](#)



B) Download clang (Here we have “clang-6.0.0.pkg”)



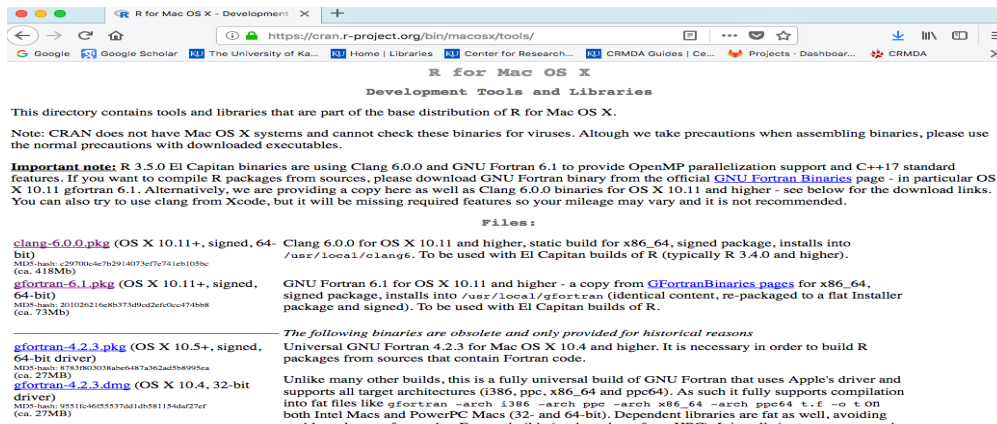
C) Double click the .pkg file to begin installing clang.



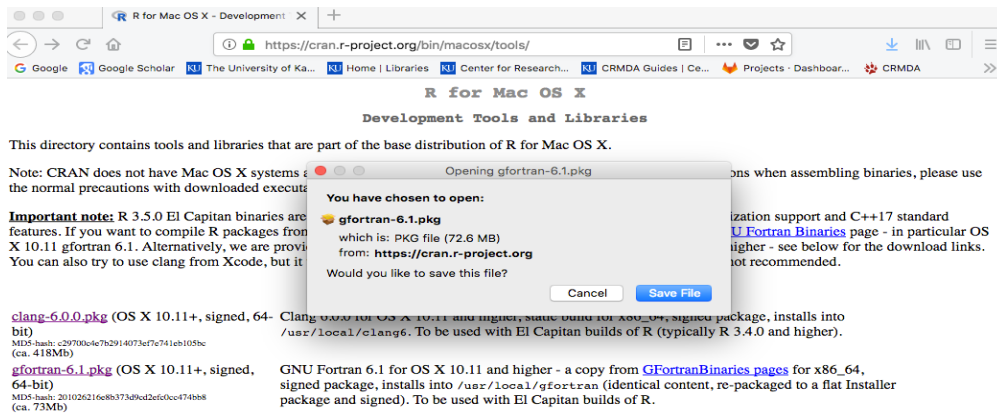
This will provoke the “unidentified developer” security feature mentioned in Slide number 5. This .pkg file can be removed/deleted following the installation

Step 4 - gfortran

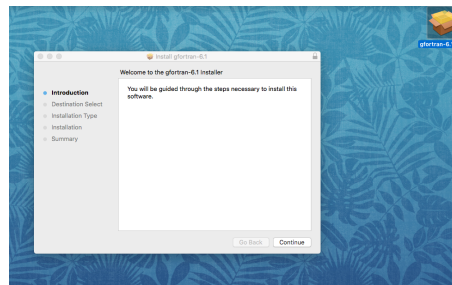
A) Begin (again) at the CRAN macosx tools page, or the CRMDA mirror.



B) Download **gfortran-6.1.pkg** (the current latest version is 6.1; this number may change)



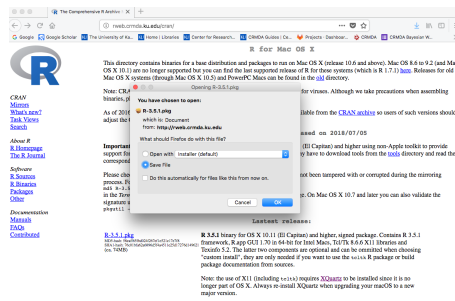
C) Double click the .pkg file to begin installing gfortran.



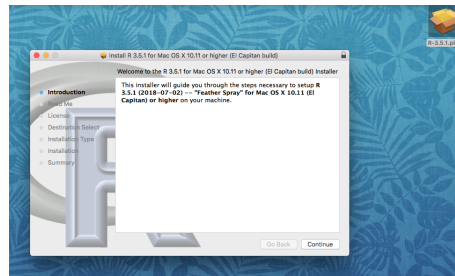
This .pkg file can be removed/deleted following the installation

Step 5 - R

- Browse a [CRAN](#) mirror near you
- Click **Download R for (Mac) OS X**
- Versions of R will be displayed, from newest to oldest. Choose the newest R package and download it (version **R-3.5.1.pkg** shown here).



- Double click the .pkg file to begin installing R.



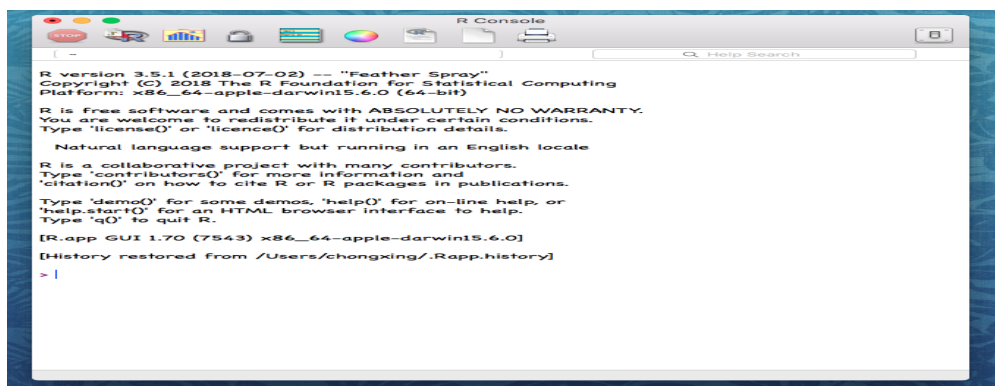
This .pkg file can be deleted following the installation

- Make sure the installation succeeded. The R editor's icon (R.app) should appear in "Applications" menu

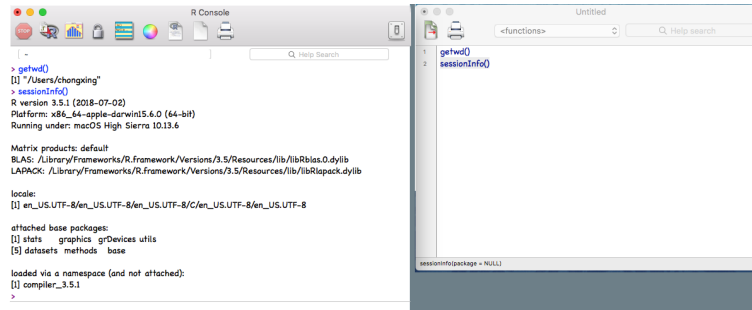
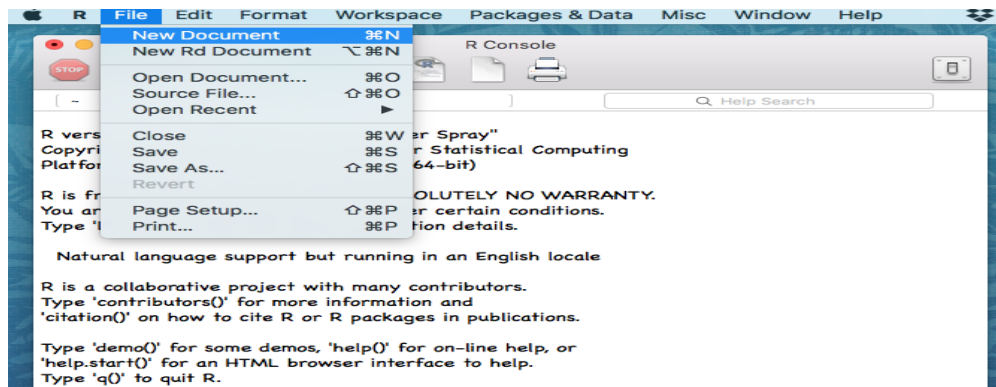


- To test R, launch R.app.

- Launching R.app will open the "R Console" window. This window is interactive (users can type and execute R code here).



- In the usual situation, the author will also open an R editor window for writing and saving R code. To open an editor window, go to "File" and choose "New Document".



- Authors can type R commands in the editor window and “send them” into the R session
- The keyboard shortcut to send code from the editor to the R session is: `command` + `return`
- In this example, we have run `getwd()` and `sessionInfo()` in the editor window on the right side and the output appears in the R session on the left.

4 Install Editors (Optional)

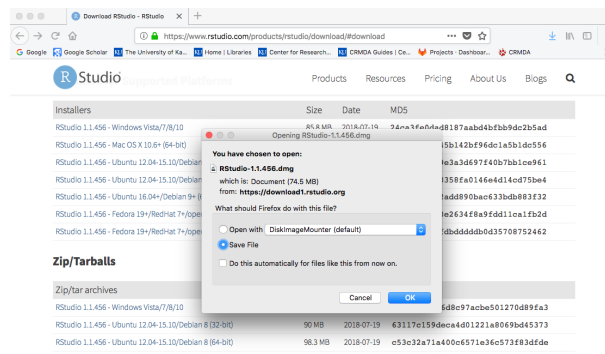
Additional Editors are Optional

- R.app is a perfectly functional editing environment.
- It is not truly necessary to install additional editors in order to be productive on your Mac, and yet...
- Many R users do prefer to use other editors on a Macintosh

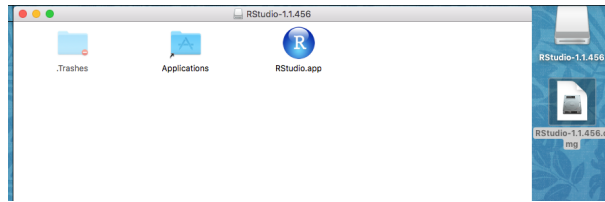
Editor 1 - Rstudio

Rstudio is a popular editor that can interact with an R session.

Visit <http://www.rstudio.com>, choose Download Rstudio, look for the Free RStudio Desktop license. When we prepared this demonstration, we found RStudio-1.1.456.dmg.



- Double click the .dmg file, then an installer panel will appear:



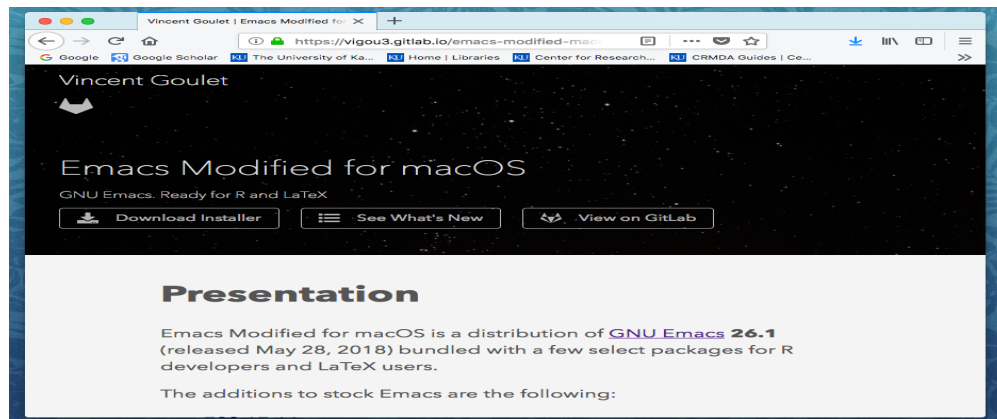
- Drag “RStudio.app” to “Applications” to begin installation
- Rstudio has some special (seemingly-always-under-development) features that require 3rd party software
 - Example: Pandoc <https://pandoc.org>. The Rstudio team now includes a snapshot of Pandoc along with Rstudio itself. Mainly for this reason, we do not (anymore) include Pandoc as one of the prerequisite programs for R that should be installed separately.

Be cautious how you launch RStudio

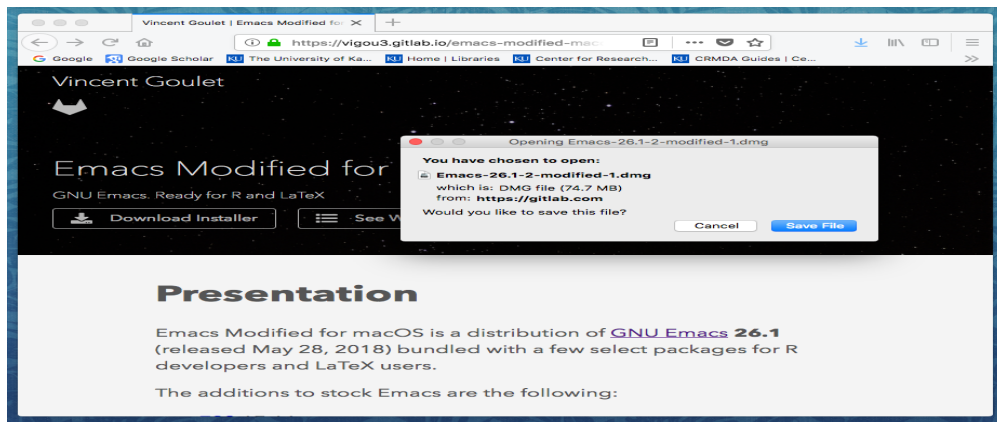
- Click the icon: the R working directory is not set correctly
- Suggestion: right click on an R file, then “Open With R”
- To run R commands: `command` + `return`

Editor 2 - Emacs

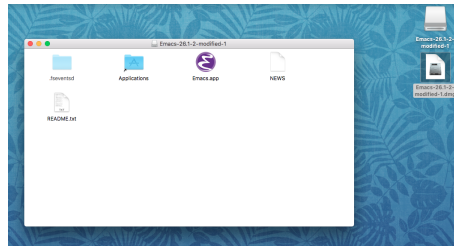
Browse the Emacs Modified for macOS package on Professor Vincent Goulet’s Emacs website, <https://vigou3.gitlab.io/emacs-modified-macos/>



Choose “Download Installer”, that pulls download the .dmg file



Double click the .dmg file.



An installer panel will appear. Drag `Emacs.app` to `Applications` to begin installation

Consider customizing Emacs

- Emacs default settings are “bare bones.” The user can include valuable customizations in a settings file called `init.el`. See “Emacs has no learning curve”, some lecture notes about customizing Emacs.
- A reasonably up-to-date `init.el` that Professor Johnson uses is available in <http://pj.freefaculty.org/Software/favoriteEmacsFiles>
- Emacs/ESS default keystroke to run R commands is `command` + `return`
 - PJ’s `init.el` will change that to: `shift` + `return`

5 Other Miscellaneous Installs

Other Useful Software

We will not provide detailed information on installation, but users should keep in mind some other steps that are worth keeping in mind.

1. Install a LaTeX distribution, such as MacTeX <http://www.tug.org/mactex>.
2. The version of the BASH shell provided with macOS is outdated. To fix that, install the Homebrew software package framework and use it to obtain a new version of BASH.
3. See:
 - (a) Upgrade to bash 4 in Mac OS X for a bare bones description
 - (b) The Good (Tweak), the Bad (Mac), and the Ugly (Terminal) for a considerably more elaborate discussion
4. Pandoc is a universal document converter. It is also available for macOS <https://pandoc.org/installing.html>.

6 References

References

References

R Core Team. (2018). R: A language and environment for statistical computing (Version 3.5.1) [Computer software manual]. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from <https://cran.r-project.org/doc/manuals/r-release/fullrefman.pdf>