Run Linux R on Windows 10 with WSL2 and RStudio Server

Dr. Jeffrey Girard, *University of Kansas*

Who is this speaker?

Background

- Asst. Professor in Psychology at *University of Kansas*
- Postdoc in Computer Science at *Carnegie Mellon University*
- PhD in Clinical Psychology at *University of Pittsburgh*

Interests

- Emotions and Facial Behavior
- Psychological Assessment
- Applied Statistics and ML
- Bayesian Multilevel Modeling
- *circumplex* R package (CRAN)
- *agreement* R package (GitHub)

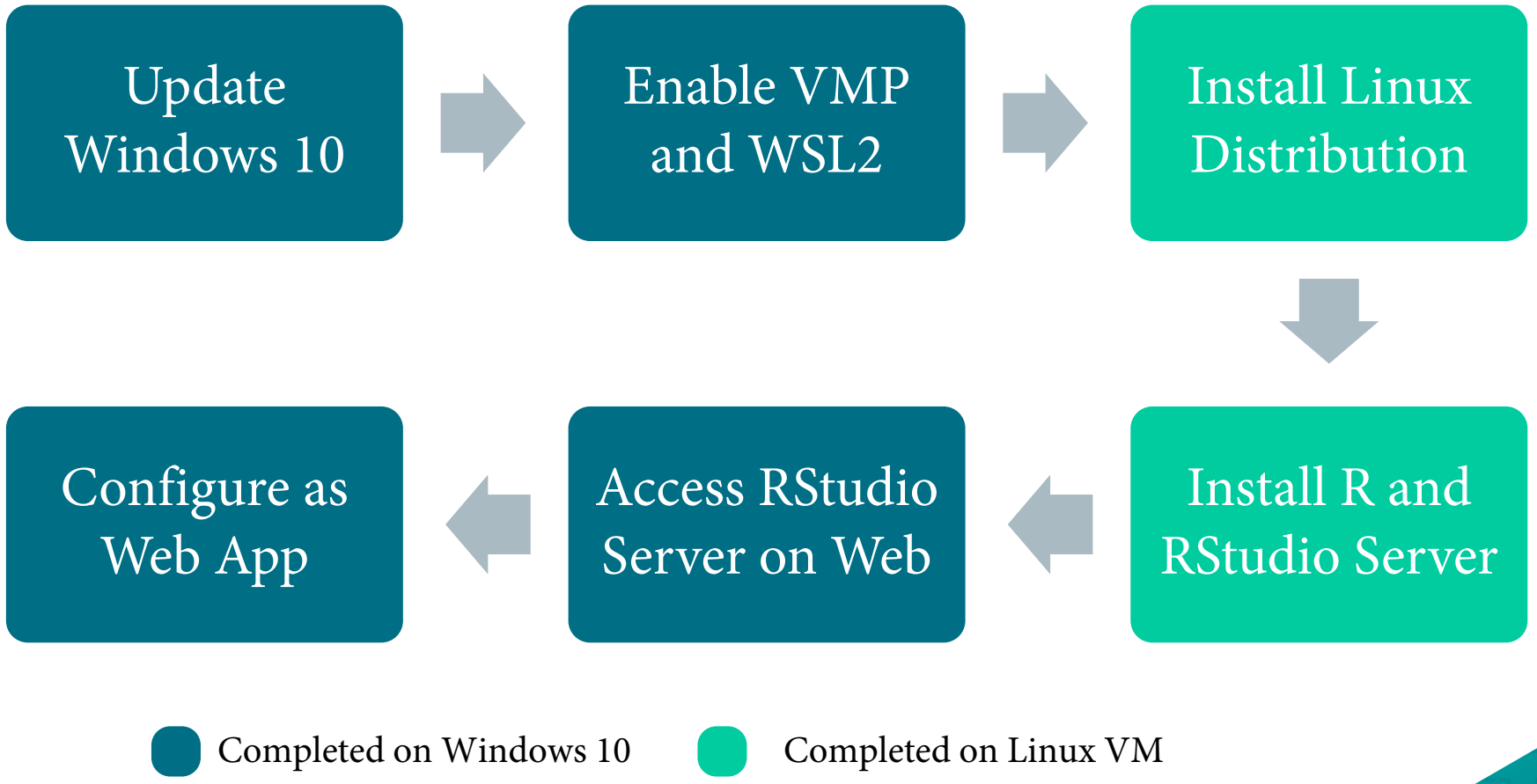
What is Linux and why should I care?

- Linux is an *operating system*: it manages hardware ↔ software
- It is *free* and *open-source*
- It is *lightweight* and *customizable*
- It is great for *programming*
- It offers various "distributions"

Why run Linux R on Windows 10?

- **Take advantage of features and benefits specific to Linux**
  - Fewer issues with package compilation (no Rtools needed)
  - More stability due to many package developers using Linux
  - More parallelization options and better memory management
- **Facilitate cross-platform development of R code and packages**
  - CRAN requires your packages to run on Windows, MacOS, and Linux
  - Troubleshooting errors on a platform you aren't using is really hard
- **Ease the process of learning about or transitioning to Linux**

Roadmap for the Setup Process



Update Windows 10 to version 1903-18362 (or higher) and then open Microsoft PowerShell

PowerShell Copy

```
dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart
```

PowerShell Copy

```
dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart
```

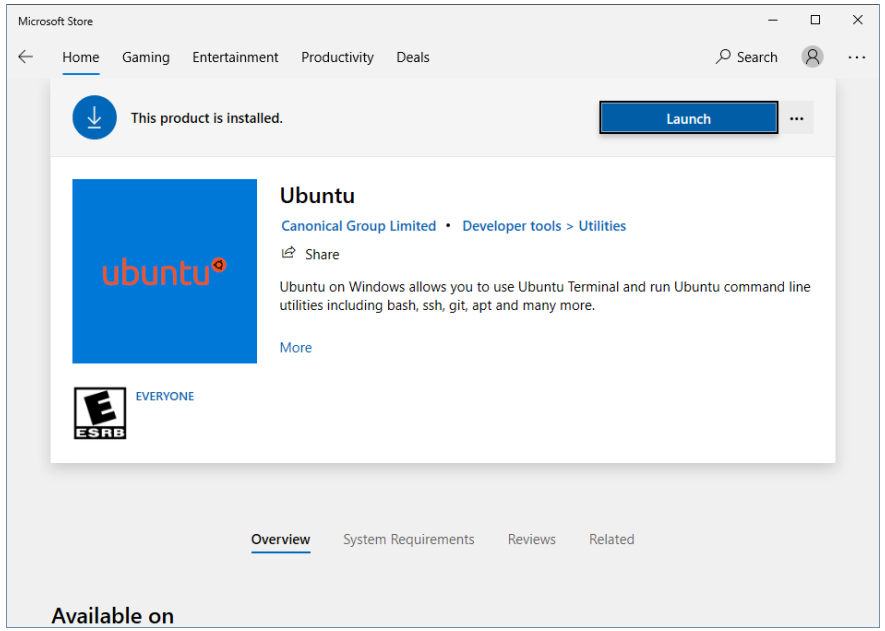
Restart computer and then download and install WSL2 from https://aka.ms/wsl2kernel

PowerShell Copy

```
wsl --set-default-version 2
```

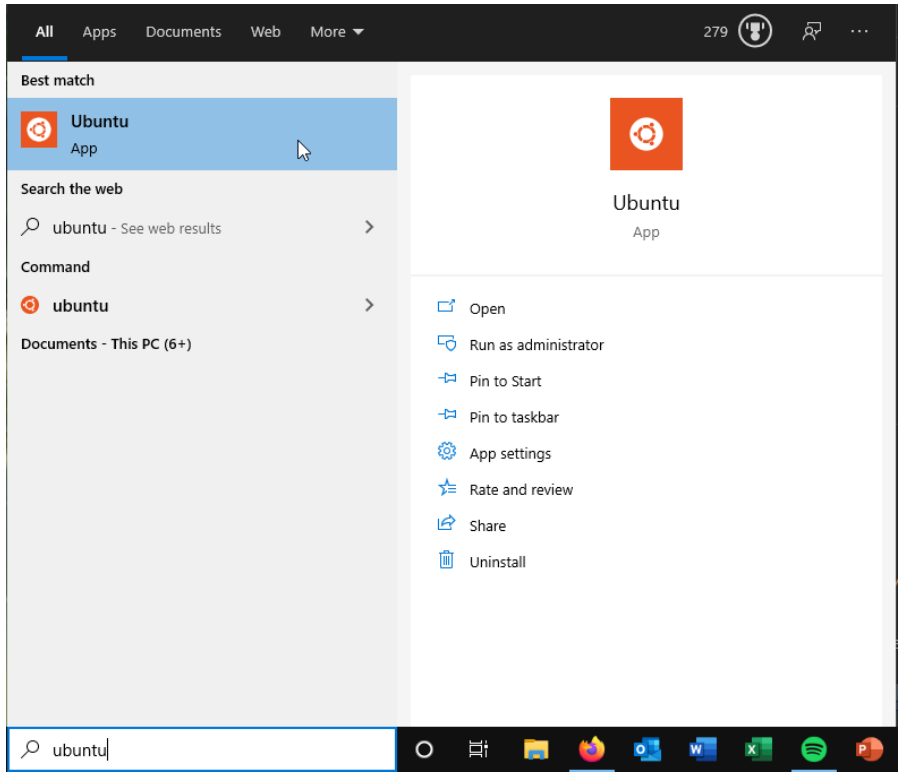
Steps to enable WSL and VMP and update to WSL2

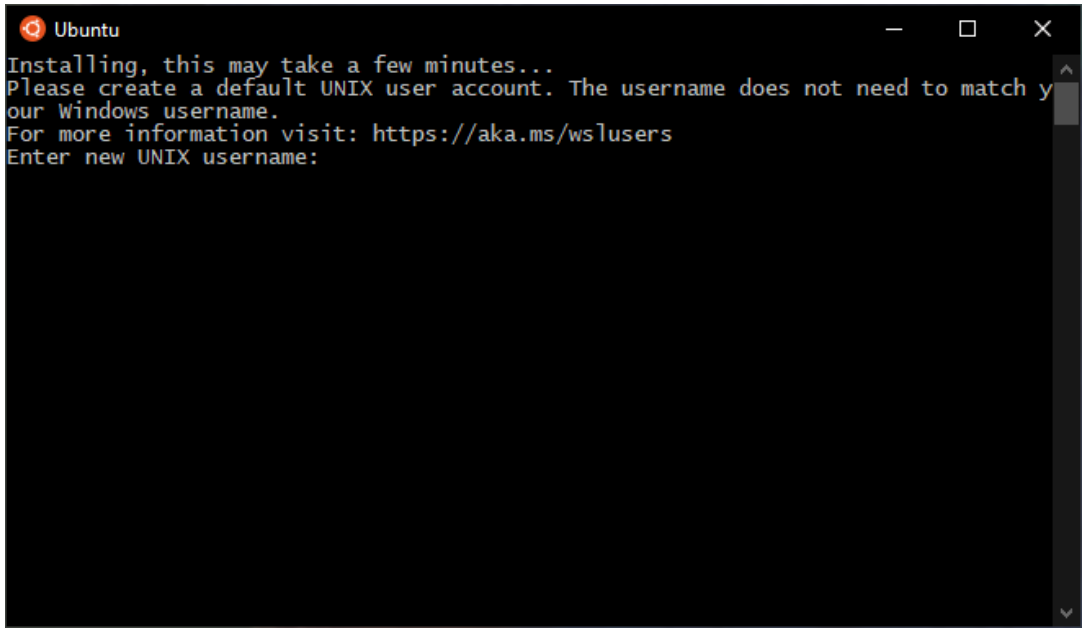
Install your desired Linux distribution from https://aka.ms/wslstore



Steps to install Linux distribution (e.g., Ubuntu)

Run your Linux distribution as a Windows app and create a default UNIX user account

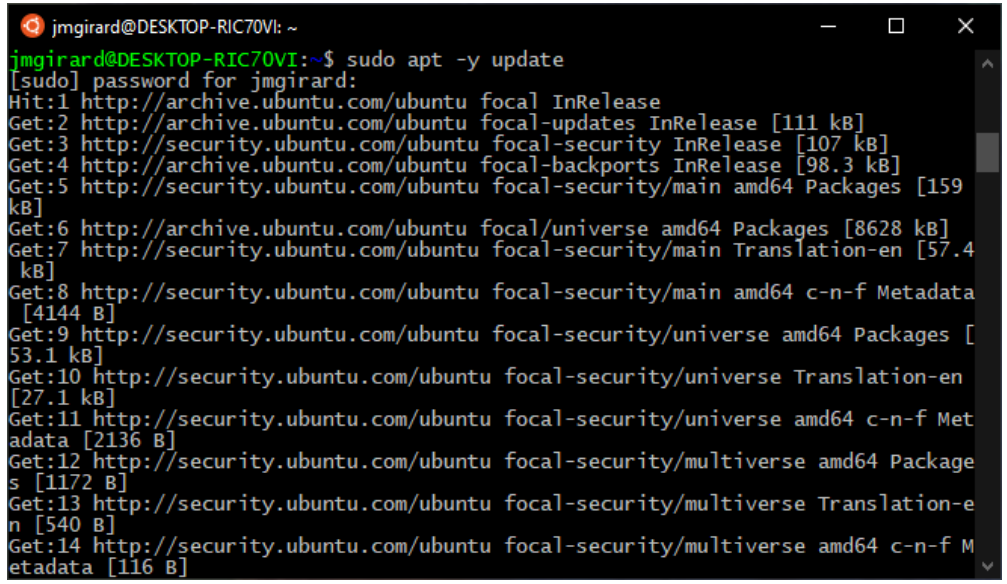


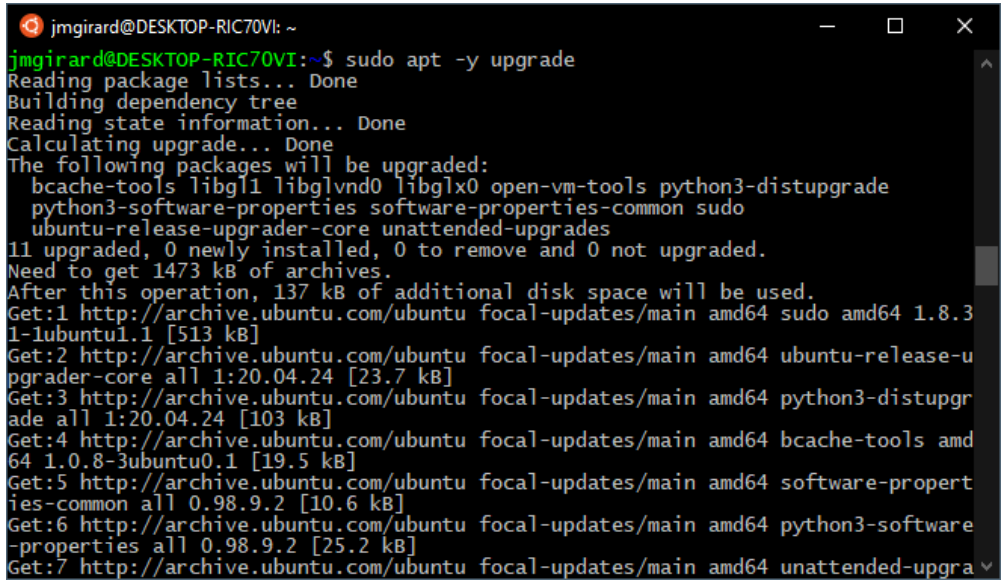


Steps to launch and configure Linux distribution (e.g., Ubuntu)

Update your Linux distribution to the newest versions *(Note: code may vary by distribution)*

```
sudo apt update
sudo apt upgrade -y
```

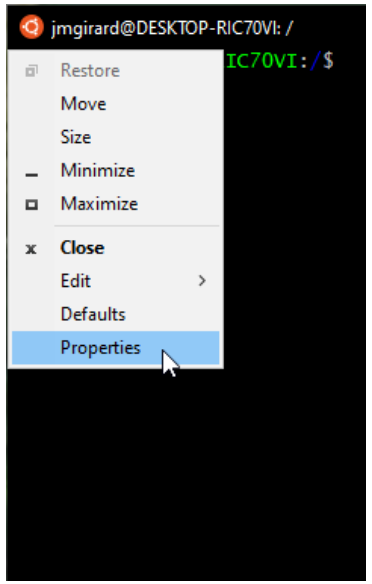


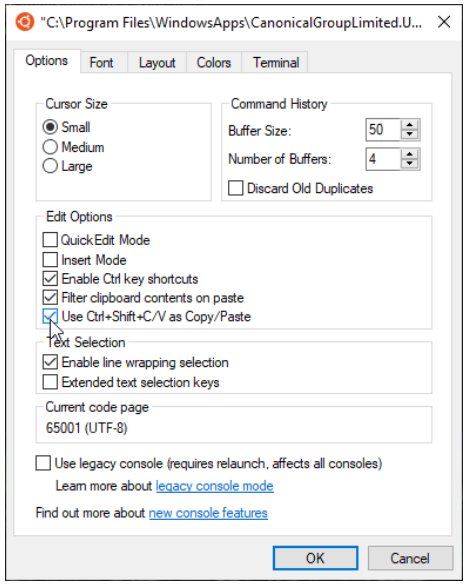


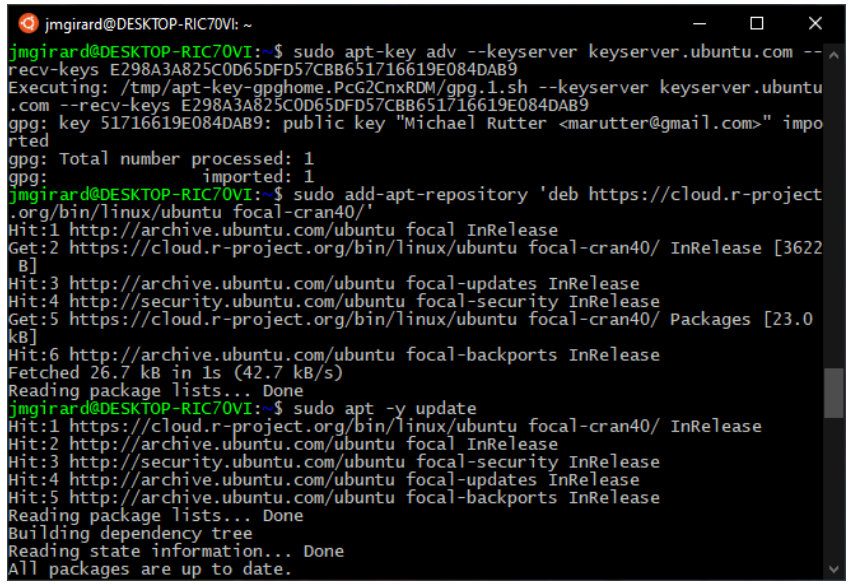
Steps to update your Linux distribution (e.g., Ubuntu)

Install (or update) R on your Linux virtual machine *(Tip: enable copy-paste into terminal)*

```
sudo apt-key adv --keyserver keyserver.ubuntu.com --recv-keys E298A3A825C0D65DFD57CBB651716619E084DAB9
sudo add-apt-repository 'deb https://cloud.r-project.org/bin/linux/ubuntu focal-cran40/'
sudo apt update
sudo apt install -y r-base r-base-core r-recommended r-base-dev gdebi-core build-essential libcurl4-gnutls-dev libxml2-dev libssl-dev
```





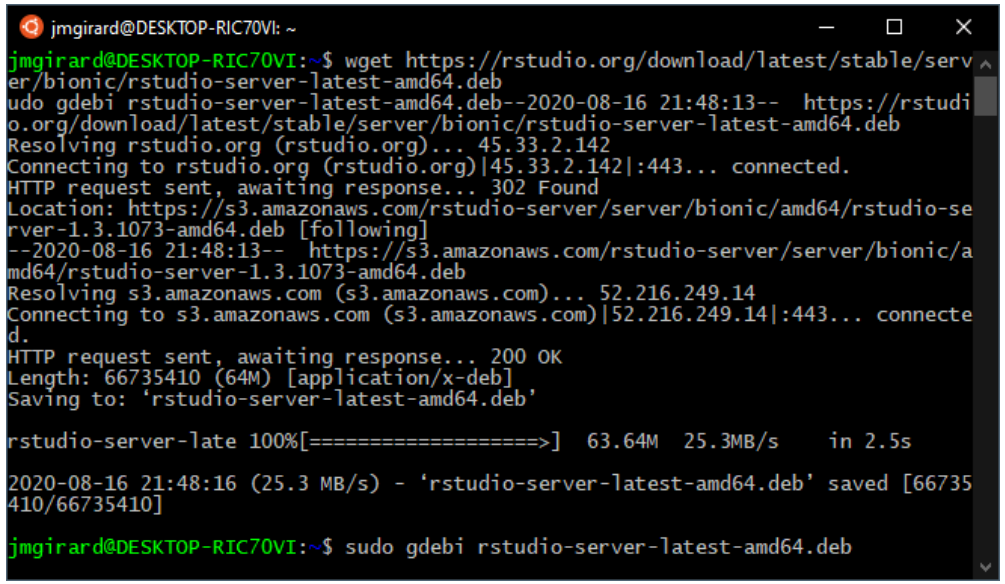


Steps to install and update R on Linux (e.g., Ubuntu)

Install RStudio Server on your Linux virtual machine and then start the service

```
wget https://rstudio.org/download/latest/stable/server/bionic/rstudio-server-latest-amd64.deb
sudo gdebi rstudio-server-latest-amd64.deb
```

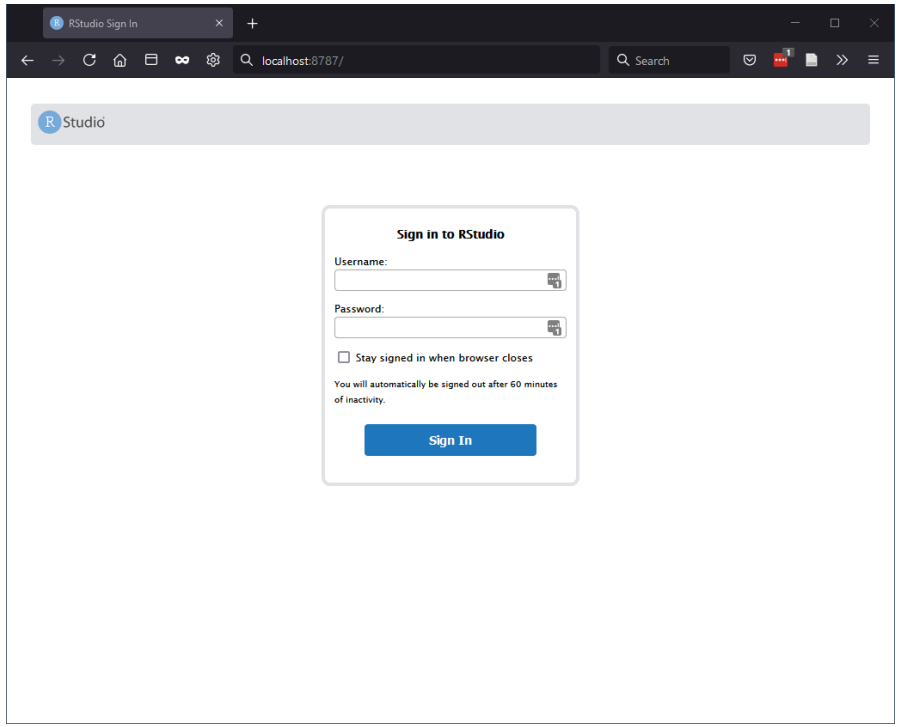
```
sudo rstudio-server start
```

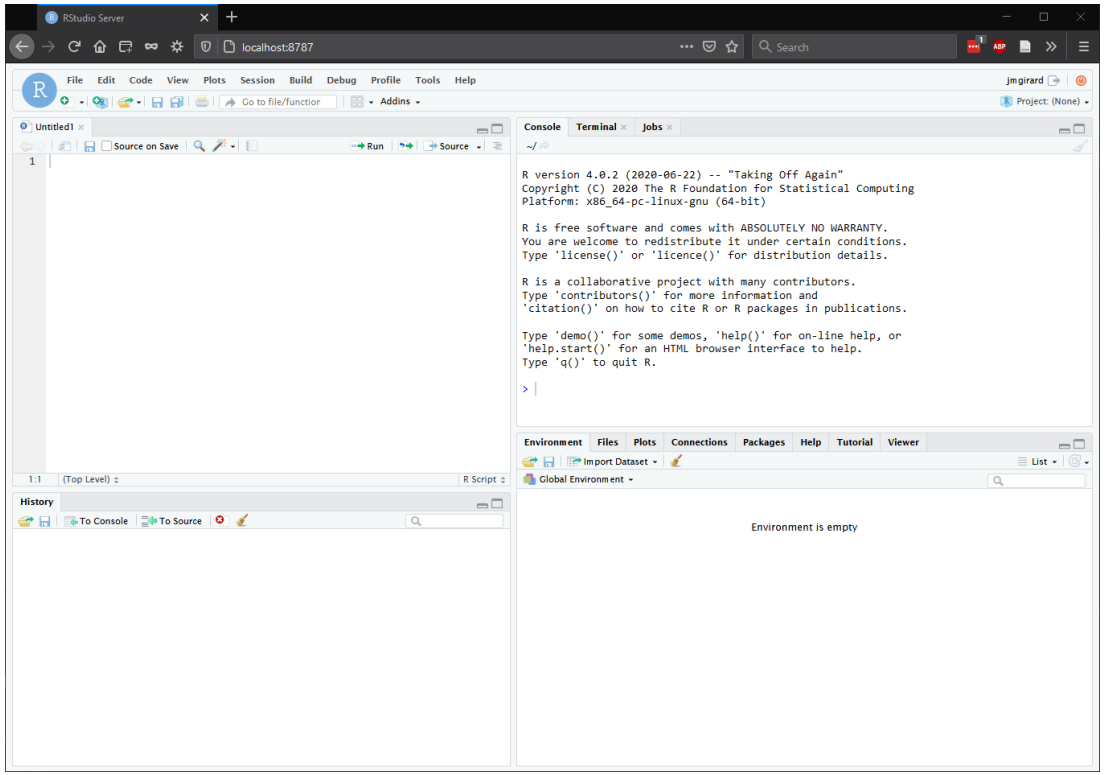


Steps to install and start RStudio Server on Linux (e.g., Ubuntu)

Access the RStudio Server via a Windows web browser at http://localhost:8787

Log in to your RStudio Server using your recently created UNIX user account

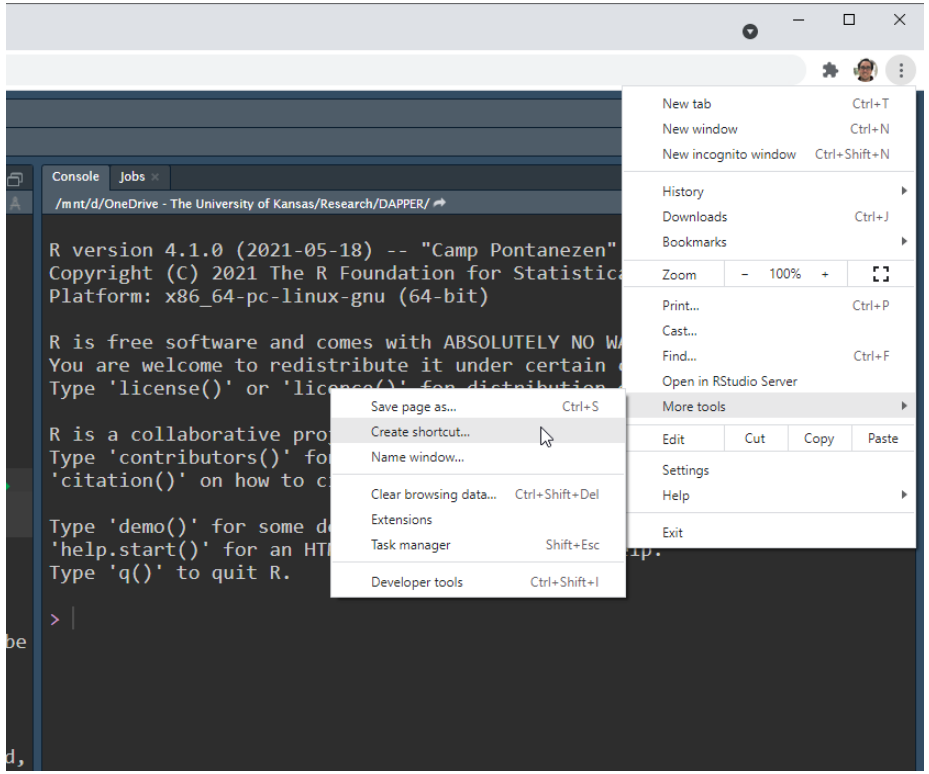


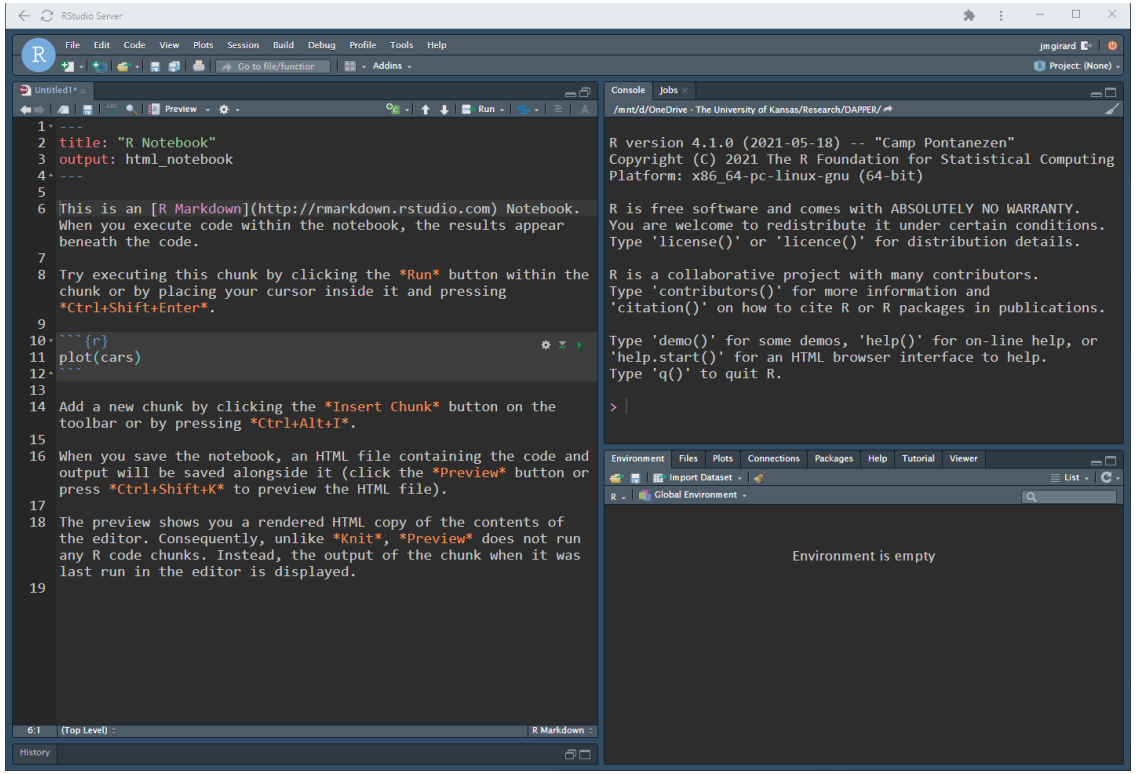


Steps to access the Linux RStudio Server from Windows

Navigate to RStudio Server in Chrome on Windows via http://localhost:8787

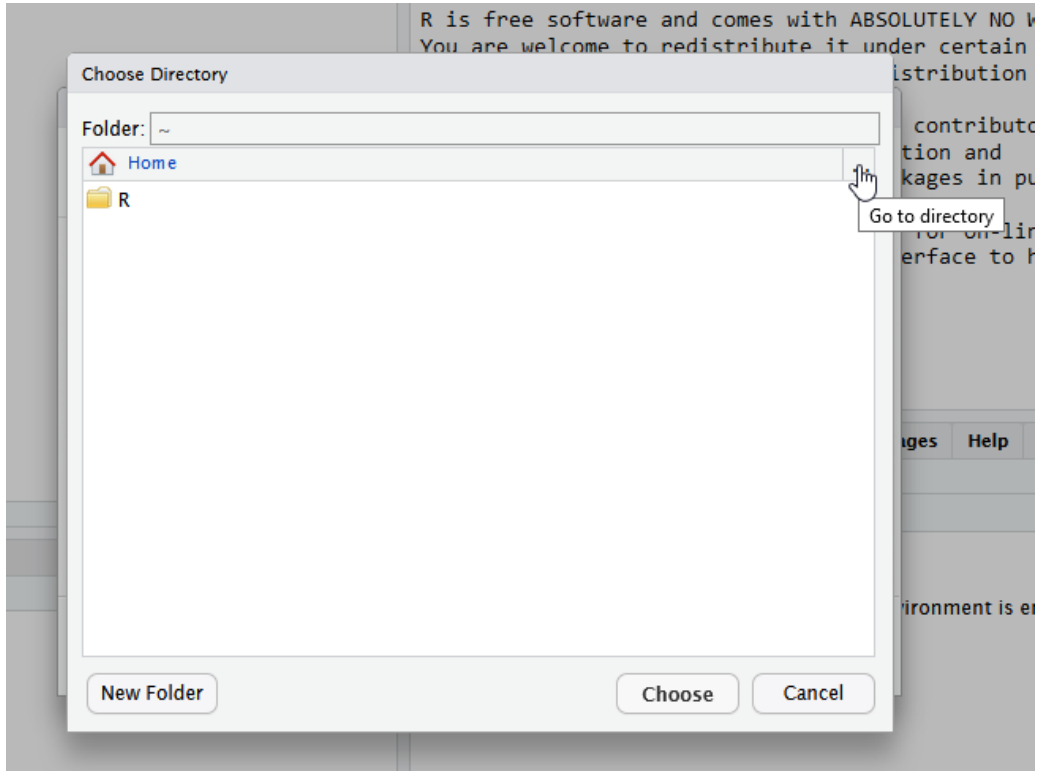
Click ⋮ then *More tools* then *Create shortcut...* and check *Open in New Window*

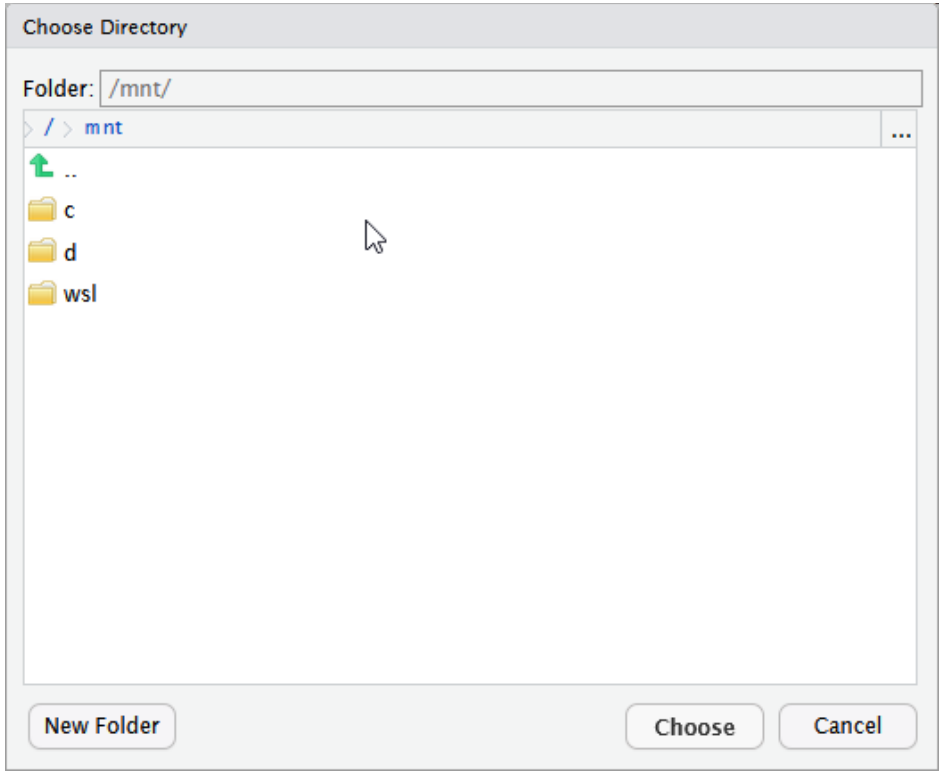




Steps to run RStudio Server as a "web app" in Google Chrome

Create or open a new RStudio project on the Windows file system via `/mnt/`



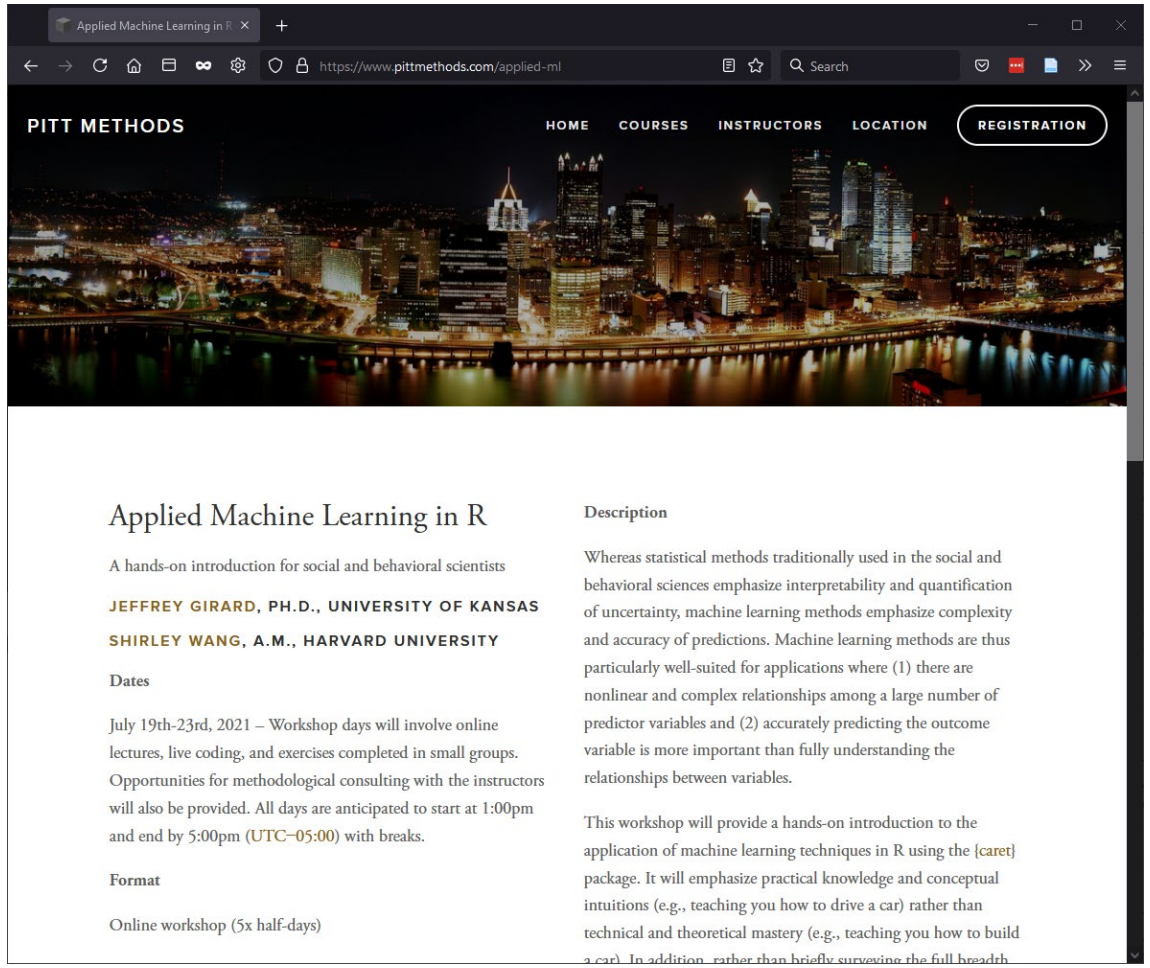


Steps to access Windows files on the Linux virtual machine

Troubleshooting and Questions

- Some R packages have dependencies to install via Linux
- Stop/Start RStudio Server before/after restarting Windows
  e.g., `sudo rstudio-server stop` and `sudo rstudio-server start`
- Use *genie* if you run into error messages about *systemd*
  https://github.com/arkane-systems/genie
- Can we share access to RStudio Server via the Windows network?
- When will WSL support graphical user interfaces in Linux?

More detailed instructions for every step are on my website: www.jmgirard.com/rstudio-wsl2



Applied Machine Learning in R

Jeffrey Girard, PhD, *University of Kansas*
Shirley Wang, AM, *Harvard University*

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