

Introduction to R & RStudio

Previous Class

- Instructor-Student introduction
- Trends and Value of Big Data
- Scope of the course
- Course Logistics
- Assessment components and their weightage
- All vital **date(s) (& time)** on assessment components are in syllabus file

Today's Agenda

- Setup R & RStudio software in your machine
- Software interface and demonstration
- Sources of software online help and documentation
- Brief introduction to programming

“Programming is like kicking yourself in the face; sooner or later, your nose will bleed.”

- Kyle Woodbury

R



- Language for Data Analysis and Graphics
- Open-source software
- First appeared in August 1993 (~ 29 years ago)
- Designed by Ross Ihaka & Robert Gentleman, University of Auckland, New Zealand
- Applications
 - Data preprocessing, Cleaning, Web Scraping, Visualization.....
 - Computational Statistics, Econometrics, Optimization, Natural Language Processing.....
- Sample of organizations who use R
 - Google, Facebook, New York Times, Twitter, Etsy, Department of Defense.....

Installing R

- Go to <https://cran.r-project.org/>

The screenshot shows the official website for The Comprehensive R Archive Network (CRAN). The page features a large 'R' logo on the left and a navigation bar at the top with categories like Apps, Personal, Professional, UO, Entertainment, Health, Financials, Misc, and Media. The main content area has several sections:

- Download and Install R**: This section provides links for precompiled binary distributions for Linux (Debian, Fedora/Redhat, Ubuntu), macOS, and Windows.
- Source Code for all Platforms**: This section contains a list of items for Windows and Mac users, including the latest release (R-4.1.2.tar.gz), alpha and beta releases, daily snapshots, and source code for older versions.
- Questions About R**: This section provides instructions for users with questions about R, pointing them to the answers to frequently asked questions.

What are R and CRAN?

R is ‘GNU S’, a freely available language and environment for statistical computing and graphics which provides a wide variety of statistical and graphical techniques: linear and nonlinear modelling, statistical tests, time series analysis, classification, clustering, etc. Please consult the [R project homepage](#) for further information.

CRAN is a network of ftp and web servers around the world that store identical, up-to-date, versions of code and documentation for R. Please use the CRAN [mirror](#) nearest to you to minimize network load.

Windows Users

■ Click “Download R for Windows”

The screenshot shows a web browser displaying the CRAN homepage (cran.r-project.org). The main content area is titled "The Comprehensive R Archive Network". A large red circle highlights the "Download and Install R" section, which contains three links: "Download R for Linux (Debian, Fedora/Redhat, Ubuntu)", "Download R for macOS", and "Download R for Windows". Below this section, a note states: "R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above." To the left of the main content, there is a sidebar with various navigation links such as "CRAN Mirrors", "What's new?", "Task Views", "Search", "About R", "R Homepage", "The R Journal", "Software", "R Sources", "R Binaries", "Packages", "Other", "Documentation", "Manuals", "FAQs", and "Contributed".

Download and Install R

Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:

- [Download R for Linux \(Debian, Fedora/Redhat, Ubuntu\)](#)
- [Download R for macOS](#)
- [Download R for Windows](#)

R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

Source Code for all Platforms

Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!

- The latest release (2021-11-01, Bird Hippie) [R-4.1.2.tar.gz](#), read [what's new](#) in the latest version.
- Sources of [R alpha and beta releases](#) (daily snapshots, created only in time periods before a planned release).
- Daily snapshots of current patched and development versions are [available here](#). Please read about [new features and bug fixes](#) before filing corresponding feature requests or bug reports.
- Source code of older versions of R is [available here](#).
- Contributed extension [packages](#)

Questions About R

- If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email.

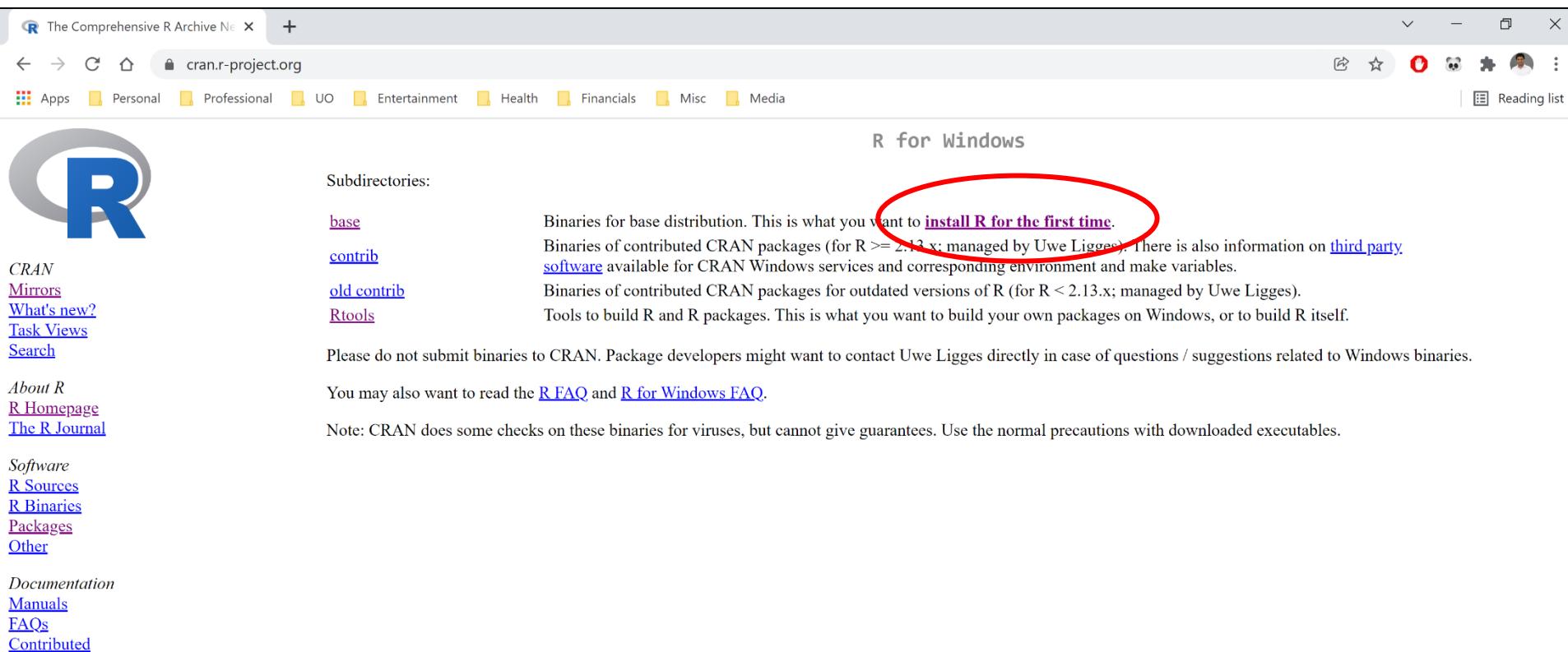
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CRAN is a network of ftp and web servers around the world that store identical, up-to-date, versions of code and documentation for R. Please use the CRAN [mirror](#) nearest to you to minimize network load.

Windows users

- Click “install R for the first time”



The screenshot shows a web browser window with the URL cran.r-project.org. The page title is "R for Windows". On the left, there's a large CRAN logo and a sidebar with links like CRAN, Mirrors, What's new?, Task Views, Search, About R, R Homepage, and The R Journal. The main content area has a heading "Subdirectories:" followed by a list:

- [base](#) Binaries for base distribution. This is what you want to [install R for the first time](#).
- [contrib](#) Binaries of contributed CRAN packages (for R >= 2.13.x; managed by Uwe Ligges). There is also information on [third party software](#) available for CRAN Windows services and corresponding environment and make variables.
- [old contrib](#) Binaries of contributed CRAN packages for outdated versions of R (for R < 2.13.x; managed by Uwe Ligges).
- [Rtools](#) Tools to build R and R packages. This is what you want to build your own packages on Windows, or to build R itself.

Below the list, there are instructions: "Please do not submit binaries to CRAN. Package developers might want to contact Uwe Ligges directly in case of questions / suggestions related to Windows binaries." and "You may also want to read the [R FAQ](#) and [R for Windows FAQ](#)". A note at the bottom says: "Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables."

Windows users

- Click “Download R X.X.X for Windows”

The screenshot shows a web browser window with the URL cran.r-project.org. The page title is "R-4.1.2 for Windows (32/64 bit)". On the left, there's a large R logo and a sidebar with various links like "CRAN Mirrors", "What's new?", "Task Views", "Search", "About R", "R Homepage", "The R Journal", "Software", "R Sources", "R Binaries", "Packages", "Other", "Documentation", "Manuals", "FAQs", and "Contributed". The main content area has a heading "R-4.1.2 for Windows (32/64 bit)". Below it is a button labeled "Download R 4.1.2 for Windows (80 megabytes, 32/64 bit)" which is circled in red. There are also links for "Installation and other instructions" and "New features in this version". A note below says: "If you want to double-check that the package you have downloaded matches the package distributed by CRAN, you can compare the [md5sum](#) of the .exe to the [fingerprint](#) on the master server. You will need a version of md5sum for windows: both [graphical](#) and [command line versions](#) are available." Below this is a "Frequently asked questions" section with links to "Does R run under my version of Windows?", "How do I update packages in my previous version of R?", and "Should I run 32-bit or 64-bit R?". A note below says: "Please see the [R FAQ](#) for general information about R and the [R Windows FAQ](#) for Windows-specific information." Another section titled "Other builds" lists "Patches to this release are incorporated in the [r-patched snapshot build](#)", "A build of the development version (which will eventually become the next major release of R) is available in the [r-devel snapshot build](#)", and "[Previous releases](#)". A note for webmasters says: "Note to webmasters: A stable link which will redirect to the current Windows binary release is <CRAN MIRROR>/bin/windows/base/release.html". At the bottom, it says "Last change: 2021-11-01".

- Run the downloaded installer file

Mac Users

■ Click “Download R for macOS”

The screenshot shows a web browser displaying the CRAN (Comprehensive R Archive Network) website at cran.r-project.org. The page title is "The Comprehensive R Archive Network". The main content area is titled "Download and Install R". It says: "Precompiled binary distributions of the base system and contributed packages, Windows and Mac users most likely want one of these versions of R:". Below this, there is a list of three download links:

- [Download R for Linux \(Debian, Fedora/Redhat, Ubuntu\)](#)
- [Download R for macOS](#) (This link is circled in red)
- [Download R for Windows](#)

Below the list, it says: "R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above." There are three sections below this:

- Source Code for all Platforms**: "Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!"
 - The latest release (2021-11-01, Bird Hippie) [R-4.1.2.tar.gz](#), read [what's new](#) in the latest version.
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- Questions About R**: "If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email."

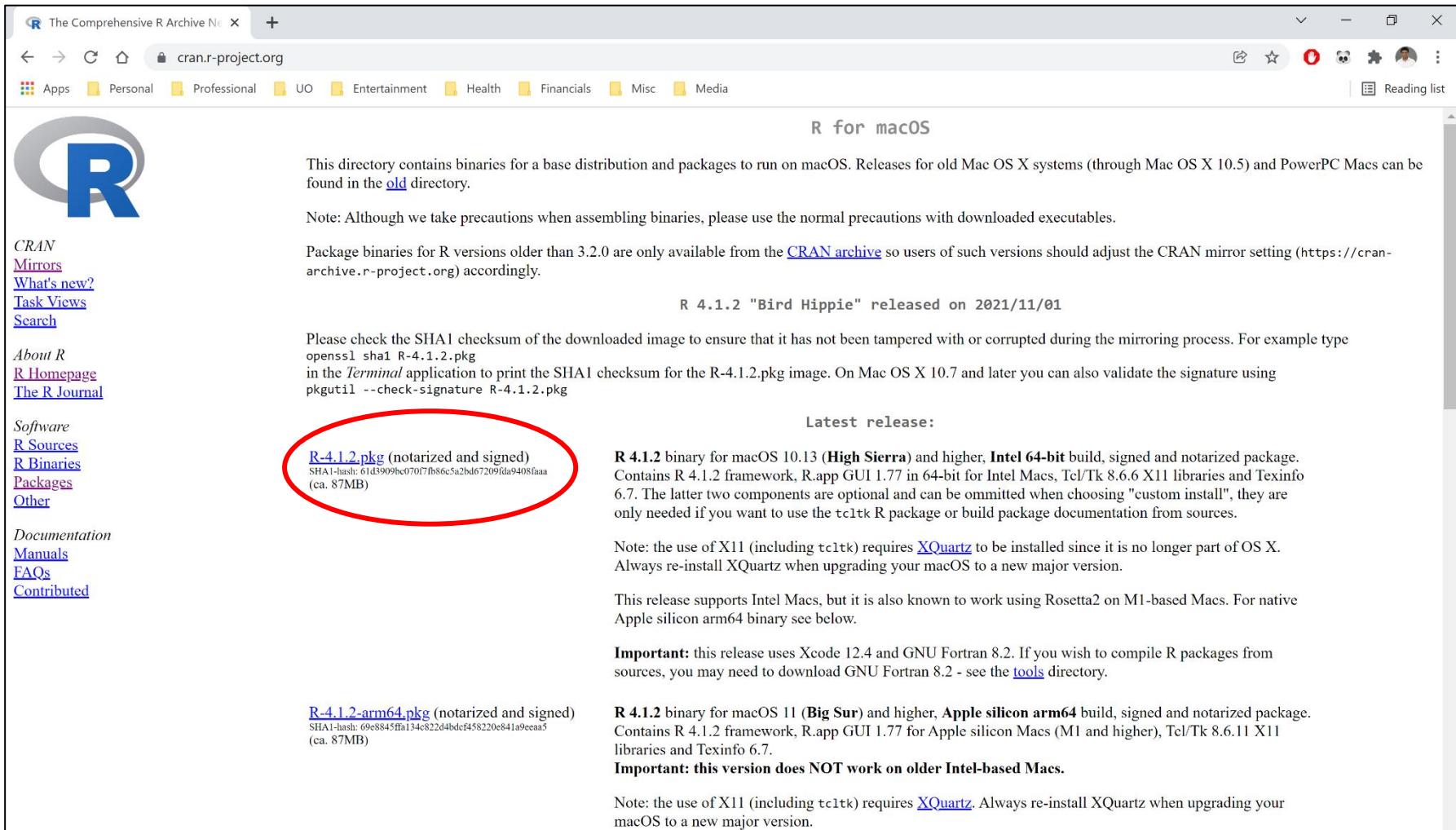
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CRAN is a network of ftp and web servers around the world that store identical, up-to-date, versions of code and documentation for R. Please use the CRAN [mirror](#) nearest to you to minimize network load.

Mac Users

- Click “R-X.X.X.pkg”



The Comprehensive R Archive Network

cran.r-project.org

Apps Personal Professional UO Entertainment Health Financials Misc Media

R for macOS

This directory contains binaries for a base distribution and packages to run on macOS. Releases for old Mac OS X systems (through Mac OS X 10.5) and PowerPC Macs can be found in the [old](#) directory.

Note: Although we take precautions when assembling binaries, please use the normal precautions with downloaded executables.

Package binaries for R versions older than 3.2.0 are only available from the [CRAN archive](#) so users of such versions should adjust the CRAN mirror setting (<https://cran-archive.r-project.org>) accordingly.

R 4.1.2 "Bird Hippie" released on 2021/11/01

Please check the SHA1 checksum of the downloaded image to ensure that it has not been tampered with or corrupted during the mirroring process. For example type `openssl sha1 R-4.1.2.pkg` in the *Terminal* application to print the SHA1 checksum for the R-4.1.2.pkg image. On Mac OS X 10.7 and later you can also validate the signature using `pkutil --check-signature R-4.1.2.pkg`

Latest release:

R-4.1.2.pkg (notarized and signed)
SHA1-hash: 61d3909bc070f7fb86c5a2bd672091da94081aaa
(ca. 87MB)

R 4.1.2 binary for macOS 10.13 (High Sierra) and higher, Intel 64-bit build, signed and notarized package.
Contains R 4.1.2 framework, R.app GUI 1.77 in 64-bit for Intel Macs, Tcl/Tk 8.6.6 X11 libraries and Texinfo 6.7. The latter two components are optional and can be omitted when choosing "custom install", they are only needed if you want to use the `tc1tk` R package or build package documentation from sources.

Note: the use of X11 (including `tc1tk`) requires [XQuartz](#) to be installed since it is no longer part of OS X. Always re-install XQuartz when upgrading your macOS to a new major version.

This release supports Intel Macs, but it is also known to work using Rosetta2 on M1-based Macs. For native Apple silicon arm64 binary see below.

Important: this release uses Xcode 12.4 and GNU Fortran 8.2. If you wish to compile R packages from sources, you may need to download GNU Fortran 8.2 - see the [tools](#) directory.

R-4.1.2-arm64.pkg (notarized and signed)
SHA1-hash: 69e8845ffab134c822d4bdef458220e841a9eeaa5
(ca. 87MB)

R 4.1.2 binary for macOS 11 (Big Sur) and higher, Apple silicon arm64 build, signed and notarized package.
Contains R 4.1.2 framework, R.app GUI 1.77 for Apple silicon Macs (M1 and higher), Tcl/Tk 8.6.11 X11 libraries and Texinfo 6.7.

Important: this version does NOT work on older Intel-based Macs.

Note: the use of X11 (including `tc1tk`) requires [XQuartz](#). Always re-install XQuartz when upgrading your macOS to a new major version.

- Run the downloaded file and follow the instructions in the installer

Mac & Windows users

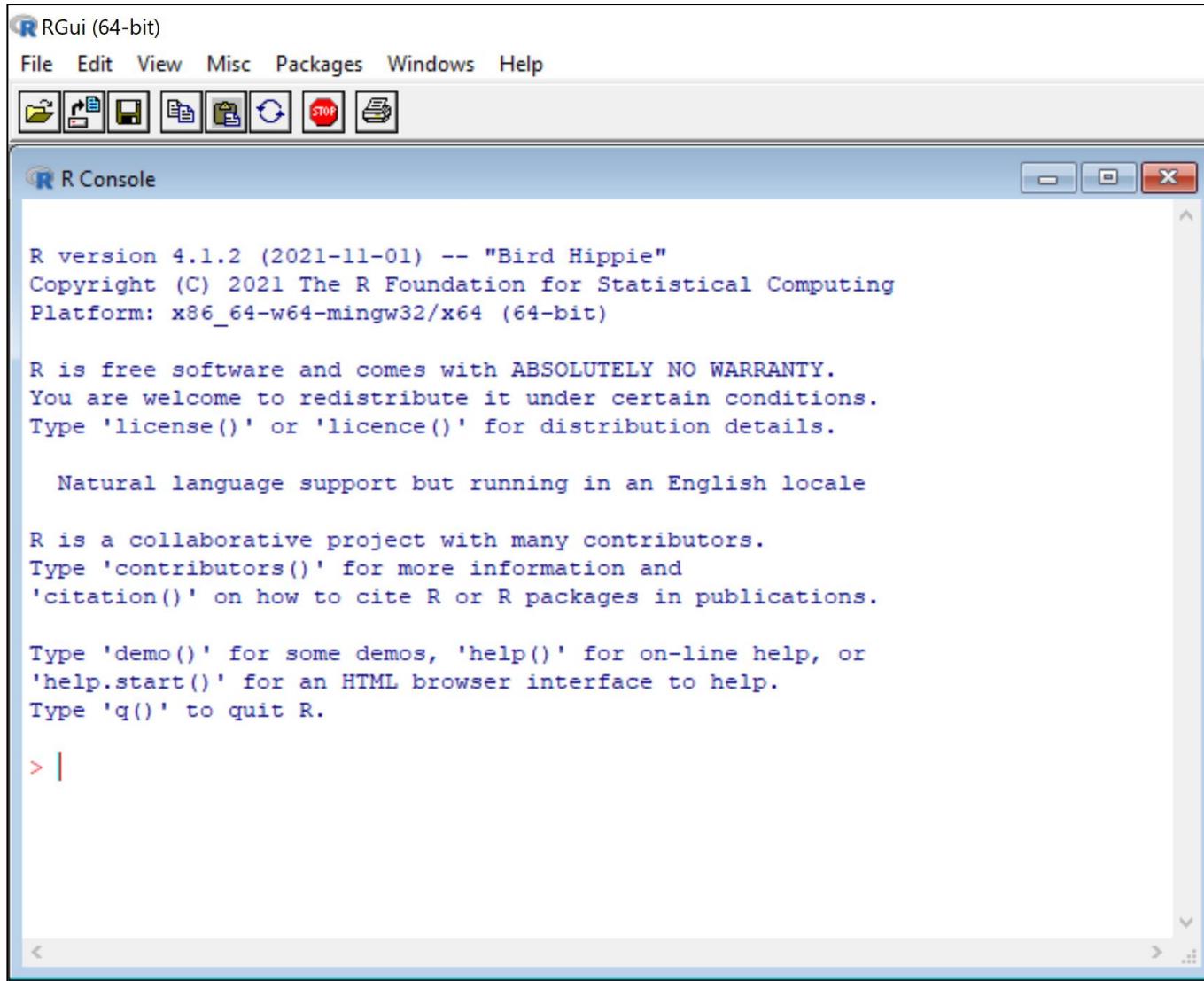
- Select 32-bit or 64-bit depending on your machine configuration
- Do you want to customize the startup options?
 - Select “**No (accept defaults)**”
- Continue to finish the installation process
- Double click the following shortcut placed on your machine desktop



R x64 4.1.3

Mac & Windows users

- User Interface not intuitive



User Interface

- “R” interface is not a popular one among data scientists
- Open-source user interfaces
 - **RStudio**
 - Emacs
 - Microsoft R Open
 - Notepad++
 -
- **RStudio** is the most popular one in the market

Installing RStudio

- Go to <https://www.rstudio.com/products/rstudio/download/>

The screenshot shows the RStudio download page. At the top, there's a banner with hexagonal icons representing various R packages like tidyverse, purrr, dplyr, and lubridate. Below the banner, the text "Download the RStudio IDE" is displayed. The main section is titled "Choose Your Version". It describes the RStudio IDE as a set of integrated tools for productivity with R and Python, mentioning features like a console, syntax-highlighting editor, direct code execution, plotting, history viewing, debugging, and workspace management. A blue button labeled "LEARN MORE ABOUT THE RSTUDIO IDE" is present. To the right, there's a graphic of overlapping colored lines and a "R Studio Team" logo. Text below the graphic states: "RStudio's recommended professional data science solution for every team. RStudio Team is a bundle of RStudio's popular professional software for data analysis, package management, and sharing data products." A blue link "Learn more about RStudio Team" is provided. The bottom section lists four versions: RStudio Desktop (Free, Open Source License), RStudio Desktop Pro (\$995/year, Commercial License), RStudio Server (Free, Open Source License), and RStudio Workbench (\$4,975/year, Commercial License for 5 Named Users). Each version has a "DOWNLOAD" or "BUY" button and a "Learn more" link.

Download the RStudio IDE

Choose Your Version

The RStudio IDE is a set of integrated tools designed to help you be more productive with R and Python. It includes a console, syntax-highlighting editor that supports direct code execution, and a variety of robust tools for plotting, viewing history, debugging and managing your workspace.

[LEARN MORE ABOUT THE RSTUDIO IDE](#)

RStudio's recommended professional data science solution for every team. **RStudio Team** is a bundle of RStudio's popular professional software for data analysis, package management, and sharing data products.

[Learn more about RStudio Team](#)

RStudio Desktop	RStudio Desktop Pro	RStudio Server	RStudio Workbench <small>1</small>
Open Source License	Commercial License	Open Source License	Commercial License
Free	\$995 /year	Free	\$4,975 /year (5 Named Users)
DOWNLOAD	BUY	DOWNLOAD	BUY

1 Evaluation license included with purchase

[Learn more](#) [Learn more](#) [Learn more](#) [Evaluation | Learn more](#)

Windows & Mac Users

- Click “Download” option as shown

The screenshot shows the RStudio IDE download page. At the top, it says "Download the RStudio IDE". Below that, a section titled "Choose Your Version" contains a description of the IDE and a "LEARN MORE ABOUT THE RSTUDIO IDE" button. To the right, there's a graphic of colored lines converging towards a central point with the "R Studio Team" logo. Below this graphic, text describes the RStudio Team bundle as a recommended professional data science solution for every team, mentioning it includes RStudio's popular professional software for data analysis, package management, and sharing data products. A "Learn more about RStudio Team" link is provided.

RStudio Desktop	RStudio Desktop Pro	RStudio Server	RStudio Workbench
Open Source License	Commercial License	Open Source License	Commercial License
Free	\$995 /year	Free	\$4,975 /year (5 Named Users)
DOWNLOAD	BUY	DOWNLOAD	BUY

A red oval highlights the "DOWNLOAD" button for RStudio Desktop. Below each button are "Learn more" links.

Windows Users

- Click “RStudio X.X.XXXX.exe”

RStudio Desktop 2021.09.1+372 - [Release Notes ↗](#)

1. Install R. RStudio requires [R 3.0.1+ ↗](#).
2. Download RStudio Desktop. Recommended for your system:

 [DOWNLOAD RSTUDIO FOR WINDOWS](#)
2021.09.1+372 | 156.89MB

Requires Windows 10 (64-bit)



All Installers

Linux users may need to [import RStudio's public code-signing key ↗](#) prior to installation, depending on the operating system's security policy.

RStudio requires a 64-bit operating system. If you are on a 32 bit system, you can use an [older version of RStudio](#).

OS	Download	Size	SHA-256
Windows 10	 RStudio-2021.09.1-372.exe	156.89 MB	1c3d27f5
macOS 10.14+	 RStudio-2021.09.1-372.dmg	203.00 MB	daec6a40
Ubuntu 18/Debian 10	 rstudio-2021.09.1-372-amd64.deb	117.89 MB	921b4f23
Fedora 19/Red Hat 7	 rstudio-2021.09.1-372-x86_64.rpm	133.83 MB	f1be5848

- Run the downloaded file and follow the instructions in the installer

Mac Users

- Click “RStudio X.X.XXX.dmg”

RStudio Desktop 2021.09.1+372 - [Release Notes ↗](#)

1. Install R. RStudio requires [R 3.0.1+ ↗](#).
2. Download RStudio Desktop. Recommended for your system:

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OS	Download	Size	SHA-256
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macOS 10.14+	RStudio-2021.09.1-372.dmg	203.00 MB	daec6a40
Ubuntu 18/Debian 10	rstudio-2021.09.1-372-amd64.deb	117.89 MB	921b4f23
Fedora 19/Red Hat 7	rstudio-2021.09.1-372-x86_64.rpm	133.83 MB	f1be5848

- Run the downloaded file and follow the instructions in the installer

Mandatory Steps

- Choose a **location** on your machine where you want to access the materials for this course
- Create a folder named as “**oba_455_555_ddpm_r**”

Creating a Project

■ Open the RStudio software

The screenshot shows the RStudio interface with the following sections:

- Console:** Displays the R startup message and basic usage instructions.
- Environment:** Shows the Global Environment tab with a message: "Environment is empty".
- Plots:** Not visible in the screenshot.
- Packages:** Not visible in the screenshot.
- Help:** Shows the R Resources section with links to Learning R Online, CRAN Task Views, R on StackOverflow, and Getting Help with R. It also shows the RStudio section with links to IDE Support, Community Forum, Cheat Sheets, Tip of the Day, Packages, and Products.

Creating a Project

■ File → New Project

The screenshot shows the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. The 'File' menu is open, with 'New Project...' highlighted. The main workspace shows an empty Environment pane with the message 'Environment is empty'. Below the workspace are tabs for Files, Plots, Packages, Help, and Viewer. A search bar and a 'Refresh Help Topic' button are also present. On the right side, there's a sidebar with links to R Resources (Learning R Online, CRAN Task Views, R on StackOverflow, Getting Help with R), Manuals (An Introduction to R, Writing R Extensions, R Data Import/Export), Reference, Packages, and Search Engine & Keywords. The status bar at the bottom indicates '© Pradeep Pendem'.

RStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

New File Ctrl+N
New Project...
Open File... Ctrl+O
Open File in New Column...
Recent Files
Open Project...
Open Project in New Session...
Recent Projects
Import Dataset
Save Ctrl+S
Save As...
Save All Ctrl+Alt+S
Publish...
Print...
Close Ctrl+W
Close All Ctrl+Shift+W
Close All Except Current Ctrl+Alt+Shift+W
Close Project
Quit Session... Ctrl+Q

Hippie" r Statistical Computing it)
LUTELY NO WARRANTY.
er certain conditions.
tribution details.
contributors.
tion and
kages in publications.
for on-line help, or
erface to help.

Environment History Connections Tutorial

Import Dataset Mem Global Environment

Environment is empty

Files Plots Packages Help Viewer

Home Find in Topic Refresh Help Topic

R Resources

Learning R Online
CRAN Task Views
R on StackOverflow
Getting Help with R

Manuals

An Introduction to R
Writing R Extensions
R Data Import/Export

Reference

Packages

The R Language Definition
R Installation and Administration
R Internals

Search Engine & Keywords

© Pradeep Pendem

Creating a Project

- Click “New Directory”

The screenshot shows the RStudio interface with the 'Create Project' dialog box open. The dialog has three options: 'New Directory', 'Existing Directory', and 'Version Control'. The 'New Directory' option is selected. The RStudio environment is shown with an empty Global Environment and a 'Viewer' panel on the right.

R version 4.1.2 (2021-11-01) -- "Bird Hippie"
Copyright (C) 2021 The R Foundation for Statistical computing
Platform: x86_64-w64-mingw32/x64 (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.

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,
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

New Project Wizard

Create Project

- New Directory**
Start a project in a brand new working directory
- Existing Directory**
Associate a project with an existing working directory
- Version Control**
Checkout a project from a version control repository

Cancel

Environment History Connections Tutorial

Import Dataset Mem

R Global Environment

Environment is empty

Viewer Refresh Help Topic

RStudio

RStudio IDE Support
RStudio Community Forum
RStudio Cheat Sheets
RStudio Tip of the Day
RStudio Packages
RStudio Products

An Introduction to R
Writing R Extensions
R Data Import/Export

The R Language Definition
R Installation and Administration
R Internals

Reference

Packages

Search Engine & Keywords

Creating a Project

- Click “New Project”

The screenshot shows the RStudio interface with the 'New Project Wizard' dialog box open. The dialog is titled 'Project Type' and lists several options:

- New Project (selected)
- R Package
- Shiny Application
- R Package using Rcpp
- R Package using RcppArmadillo
- R Package using RcppEigen
- R Package using devtools

At the bottom right of the dialog is a 'Cancel' button. The background of the RStudio window shows the console output of R version 4.1.2, the environment pane, and the help viewer.

Environment
R version 4.1.2 (2021-11-01) -- "Bird Hippie"
Copyright (c) 2021 The R Foundation for Statistical computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

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Type 'q()' to quit R.

Environment
Environment is empty

Viewer
RStudio IDE Support
RStudio Community Forum
RStudio Cheat Sheets
RStudio Tip of the Day
RStudio Packages
RStudio Products

Manuals
An Introduction to R
Writing R Extensions
R Data Import/Export

Reference

Packages

Search Engine & Keywords

Creating a Project

- Enter Directory name as “rproject”

The screenshot shows the RStudio interface with the 'Create New Project' dialog box open. The 'Directory name:' field contains 'rproject', which is circled in red. The 'Create project as subdirectory of:' field shows the path 'C:/Users/prade/Desktop/oba_455_555_ddpm_r'. The 'Use renv with this project' checkbox is unchecked. At the bottom left of the dialog, there is a checked checkbox for 'Open in new session'. On the right side of the dialog, there are 'Create Project' and 'Cancel' buttons. The background of the RStudio window shows the console output of R version 4.1.2, the environment tab, and the global environment tab.

R version 4.1.2 (2021-11-01) -- "Bird Hippie"
Copyright (C) 2021 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
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R is a collaborative project with many contributors.
Type 'contributors()' for more information and
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Type 'demo()' for some demos, 'help()' for on-line help,
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

New Project Wizard

Create New Project

Back

Directory name:

rproject

Create project as subdirectory of:

C:/Users/prade/Desktop/oba_455_555_ddpm_r

Use renv with this project

Open in new session

Create Project Cancel

Environment History Connections Tutorial

Import Dataset Mem

Global Environment

Environment is empty

Viewer

RStudio

RStudio IDE Support

RStudio Community Forum

RStudio Cheat Sheets

RStudio Tip of the Day

RStudio Packages

RStudio Products

An Introduction to R

Writing R Extensions

R Data Import/Export

Manuals

The R Language Definition

R Installation and Administration

R Internals

Reference

Packages

Search Engine & Keywords

Creating a Project

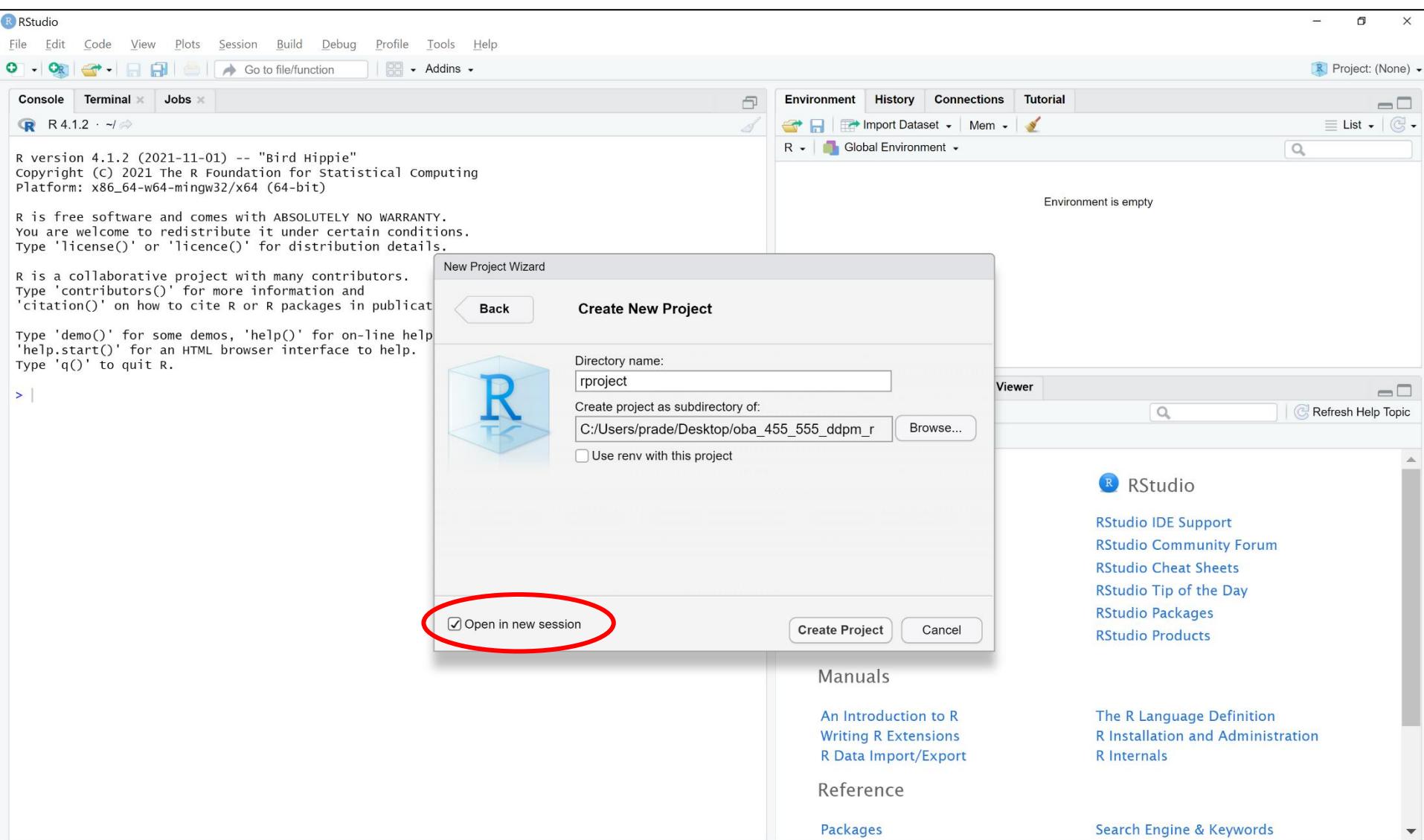
- Click “Browse” and select the folder that was created

The screenshot shows the RStudio interface with the following details:

- Top Bar:** RStudio, File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help.
- Left Sidebar:** Console (R 4.1.2), Terminal, Jobs.
- Right Sidebar:** Environment (Global Environment), History, Connections, Tutorial, Import Dataset, Mem, Global Environment, Environment is empty.
- Bottom Right:** Viewer, Refresh Help Topic, RStudio logo, RStudio IDE Support, RStudio Community Forum, RStudio Cheat Sheets, RStudio Tip of the Day, RStudio Packages, RStudio Products.
- Central Area:** A modal dialog titled "New Project Wizard" is open, specifically the "Create New Project" step. It contains the following fields:
 - Directory name: rproject (highlighted with a red oval).
 - Create project as subdirectory of: C:/Users/prade/Desktop/oba_455_555_ddpm_r (highlighted with a red oval).
 - Use renv with this project.
 - Open in new session.
 - Create Project button.

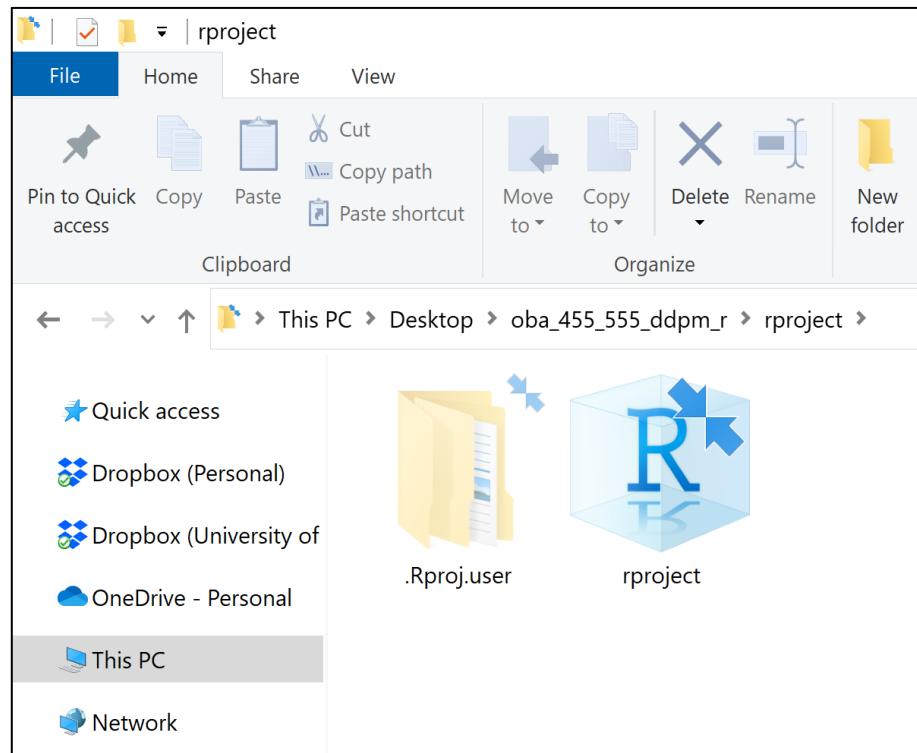
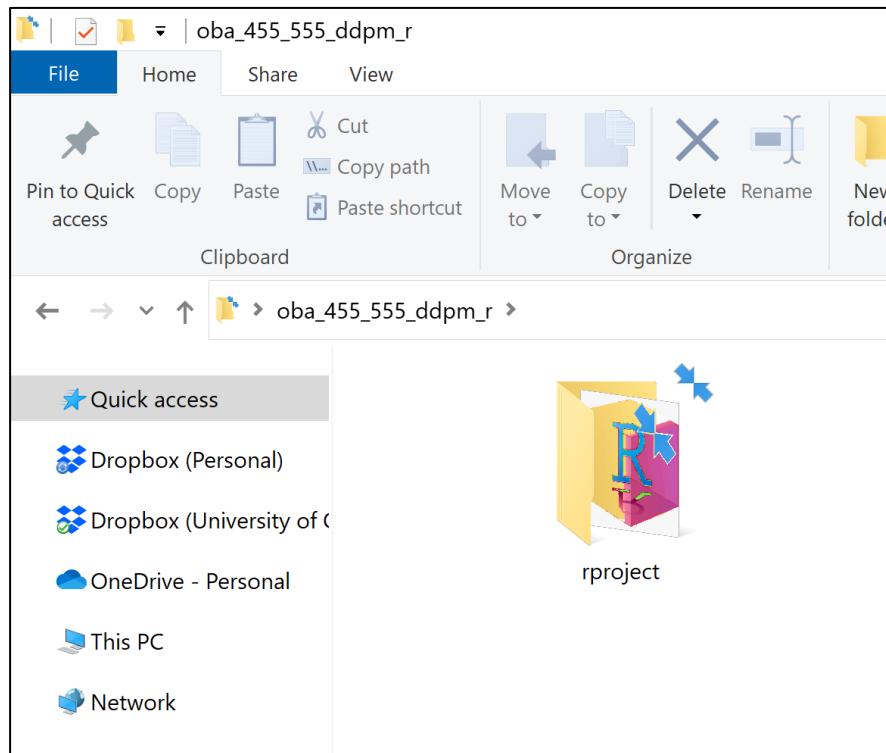
Creating a Project

- Check “Open in new session” and Click “Create Project”



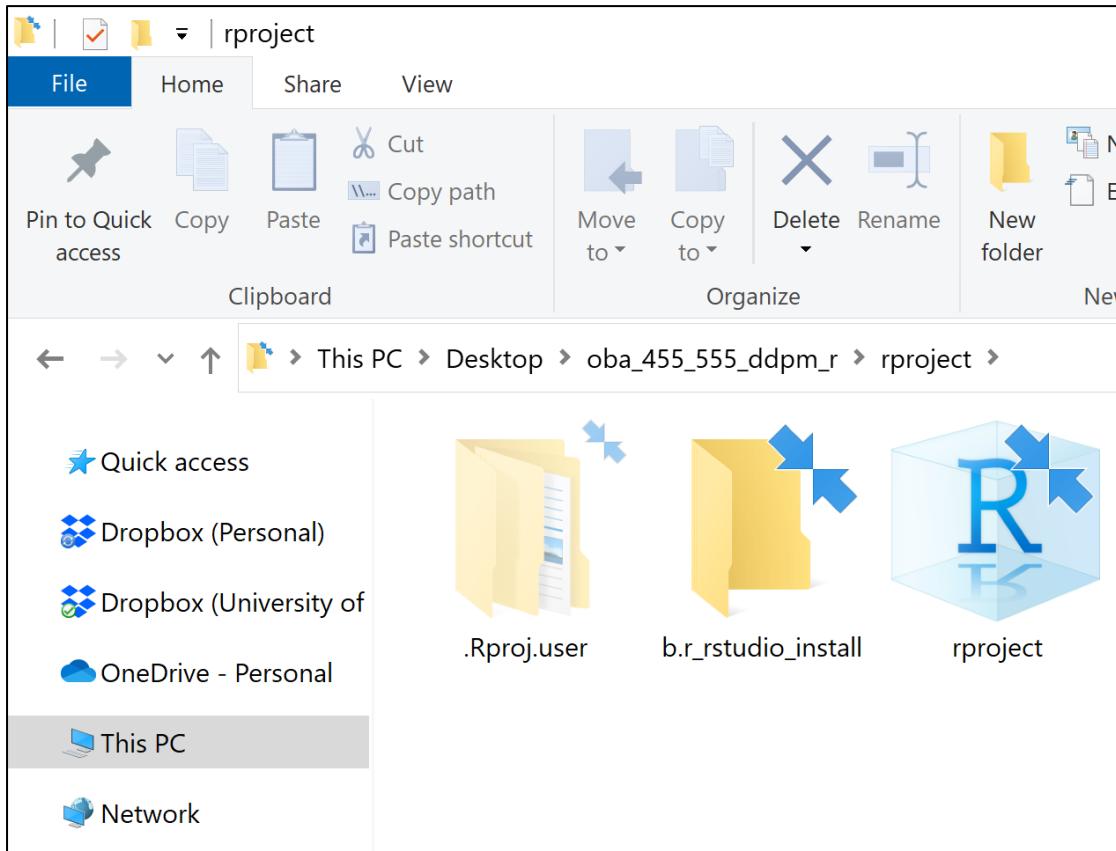
Mandatory Steps

- Close all **RStudio** windows
- A new folder “**rproject**” is created within “**oba_455_555_ddpm_r**”
- Two files are created within the “**rproject**” folder



Mandatory Steps

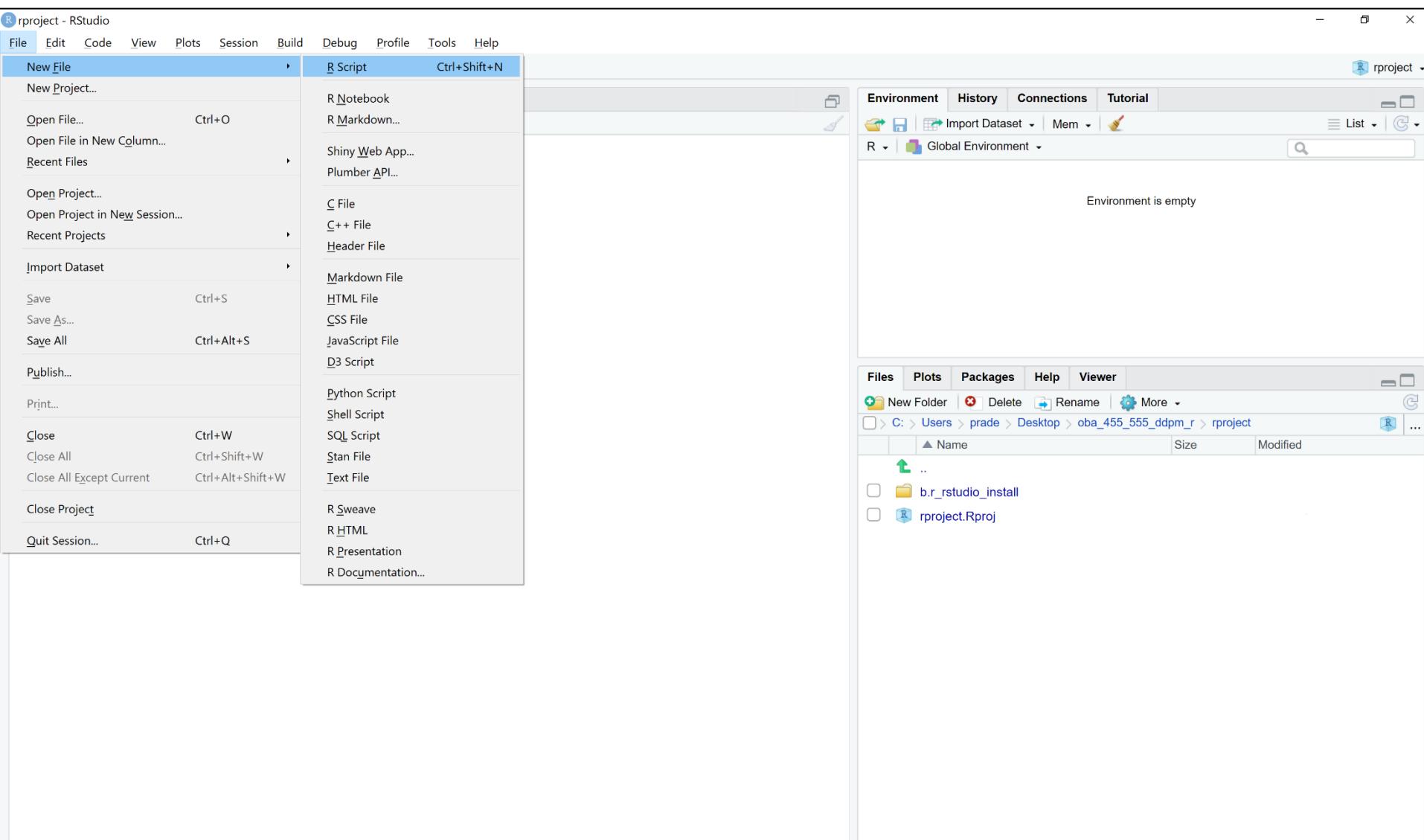
- Create a new folder “**b.r_studio_install**” within in “**rproject**” folder



- Double click the “**rproject**” icon

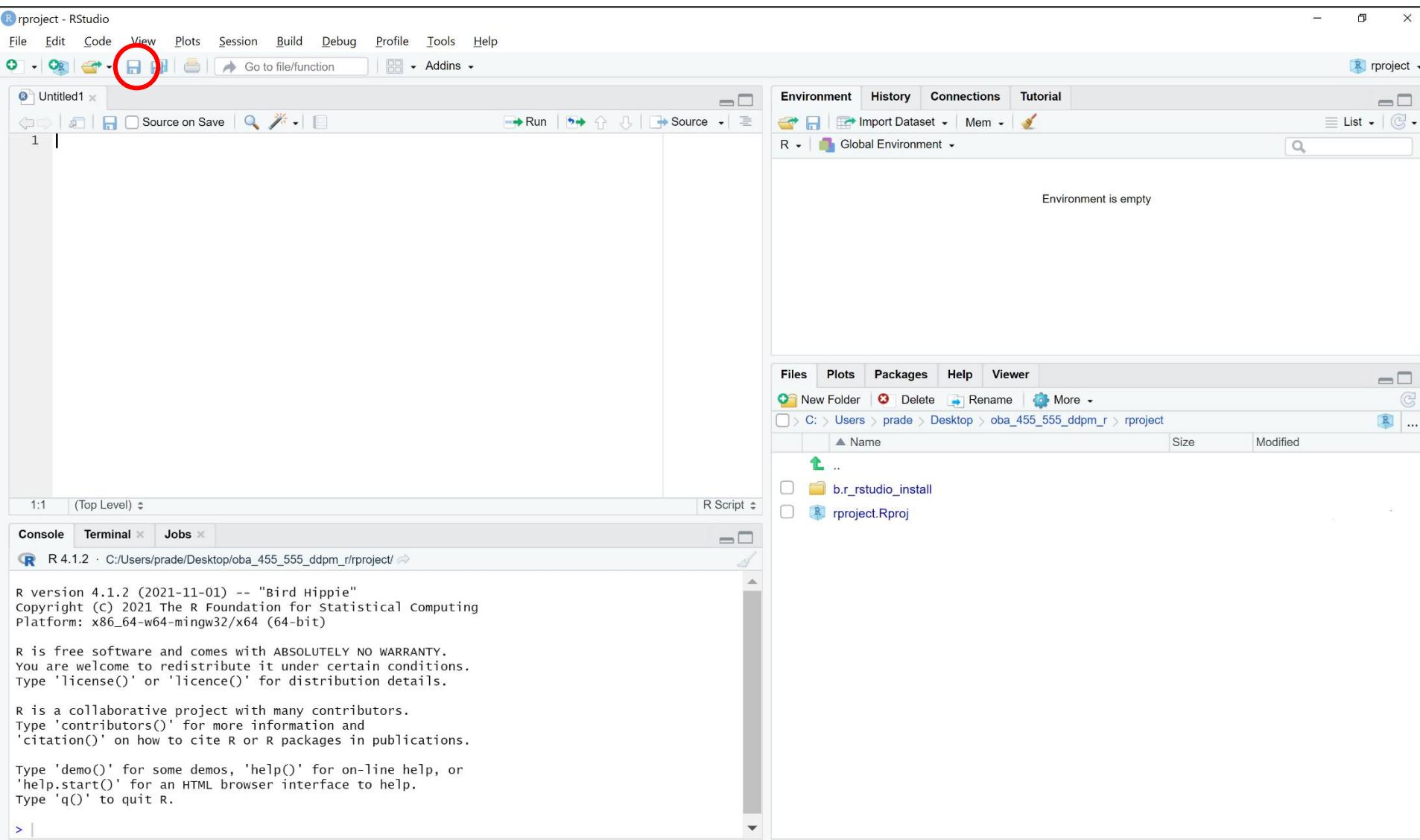
Creating a new R script

- File → New File → R Script



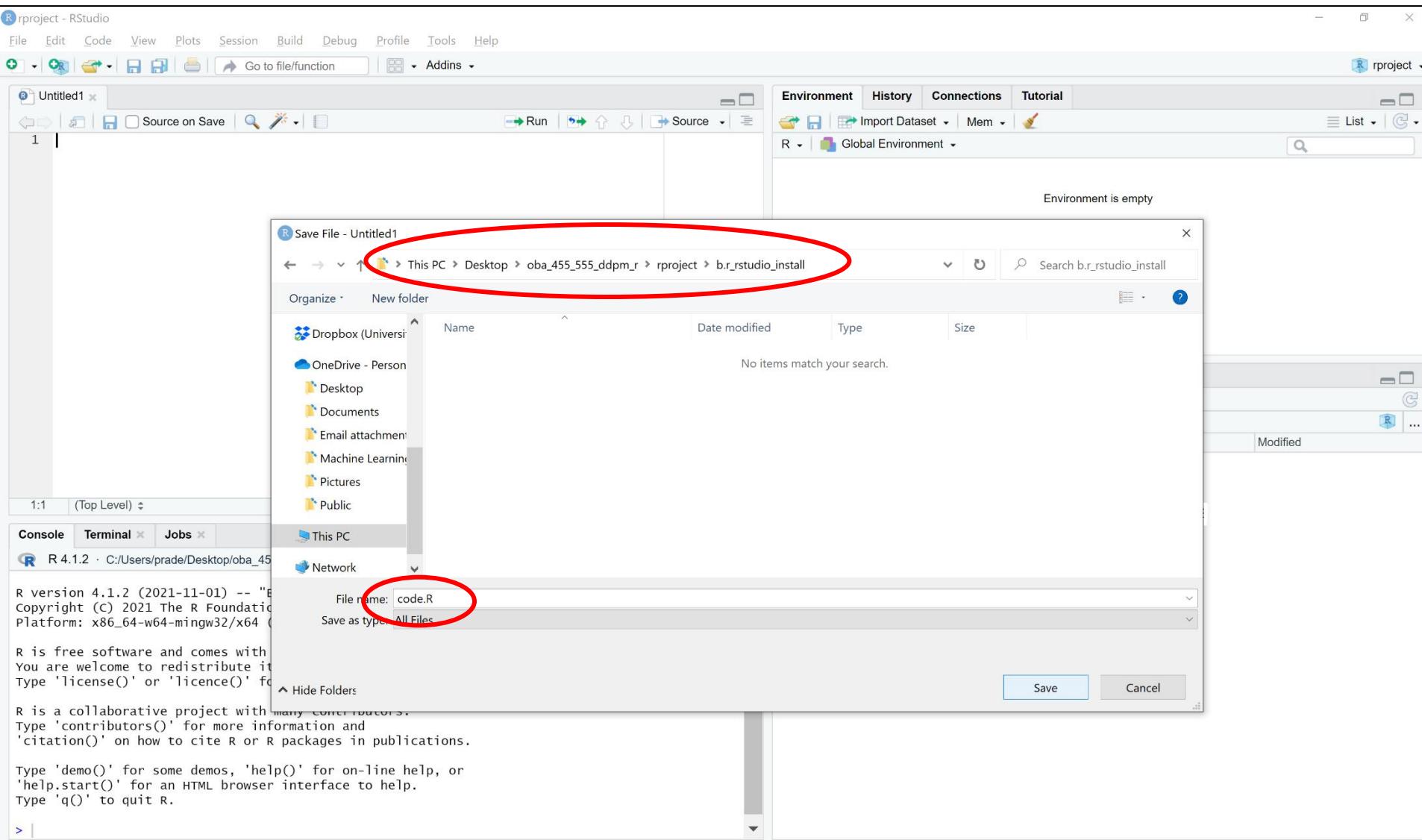
Saving the new R script

- Click the single floppy disk icon

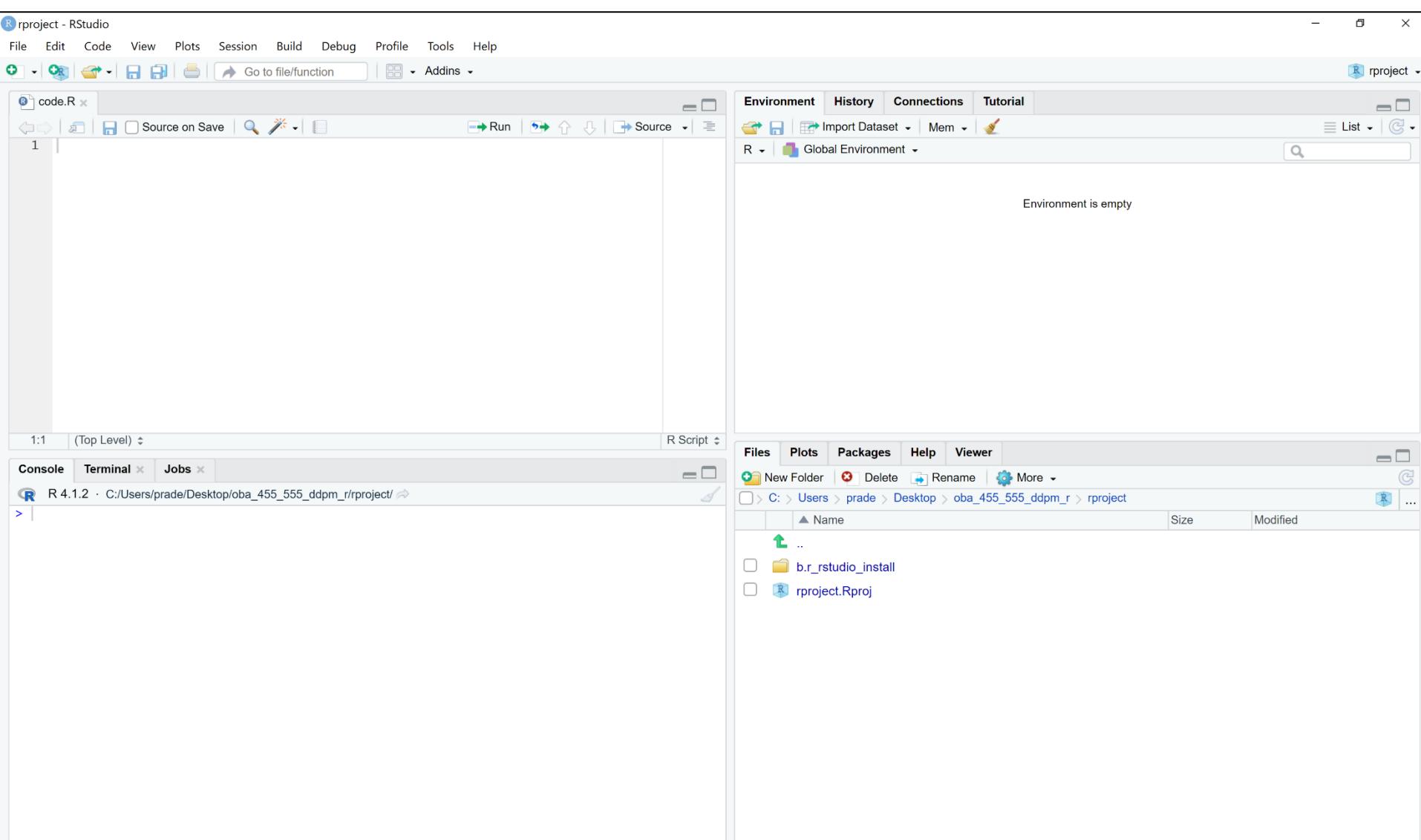


Saving R script

- Choose “code.R” as file name & save within “b.r_rstudio_install” folder



Complete RStudio Project Window



Script Editor

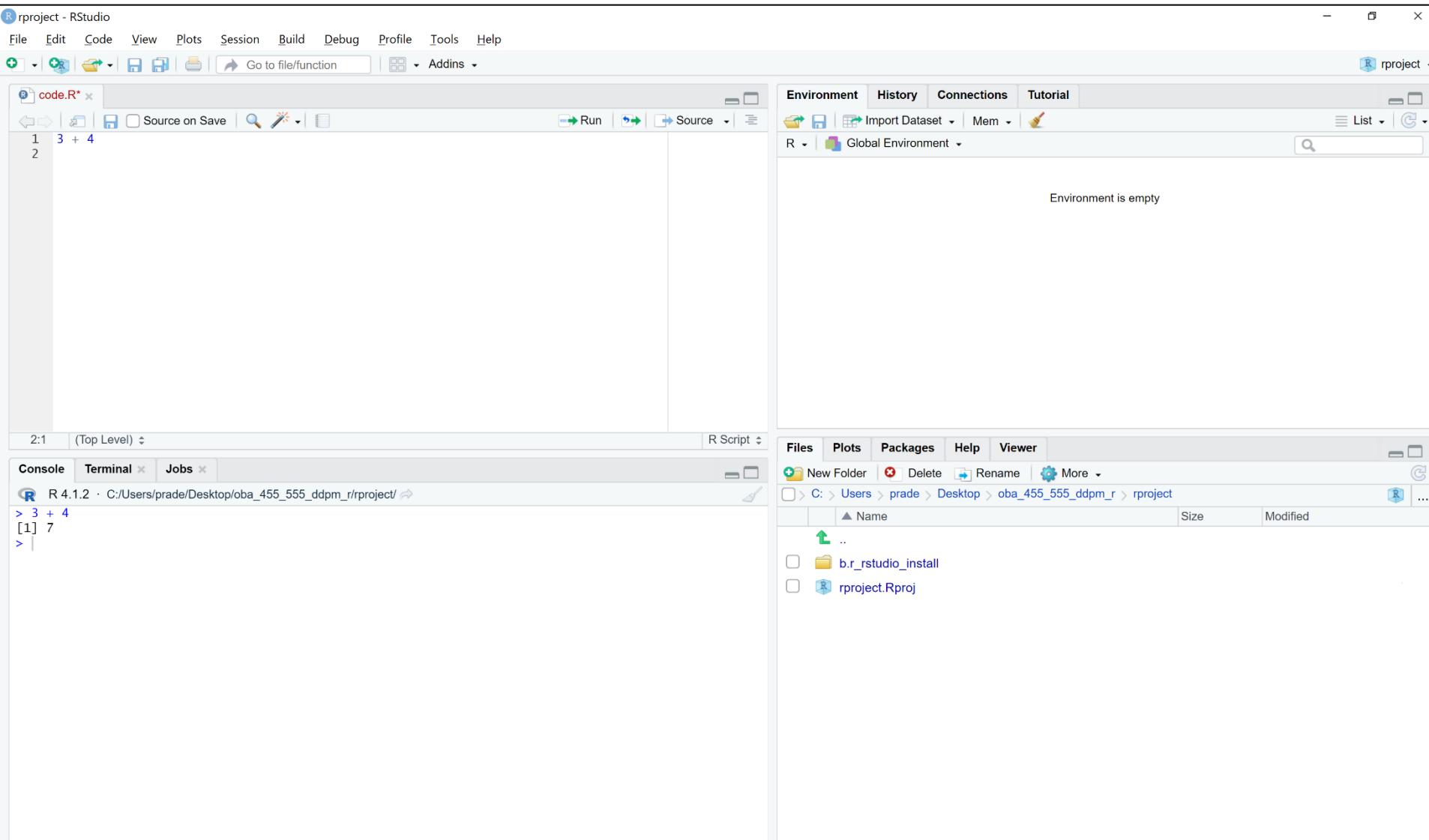
The screenshot displays the RStudio interface with several open panes:

- Code Editor (Top Left):** Shows a file named "code.R" with the content "1".
- Environment (Top Right):** Shows the Global Environment pane with the message "Environment is empty".
- Files (Bottom Right):** Shows the project structure:
 - Root folder: C:\Users\prade\Desktop\oba_455_555_ddpm_r\rproject
 - Subfolders: .., b.r rstudio_install
 - File: rproject.Rproj
- Console (Bottom Left):** Shows the R console output for R 4.1.2 running in the directory C:/Users/prade/Desktop/oba_455_555_ddpm_r/rproject.

R Script (Coding window)

- Window to code and comment
- Saves the code in the “code.R” file
- Can open multiple scripts at a time

Script Editor



- Ctrl + Enter (Windows) ; Cmd + Enter (Mac)
- A good [introduction](#) to script editor

Workspace environment window

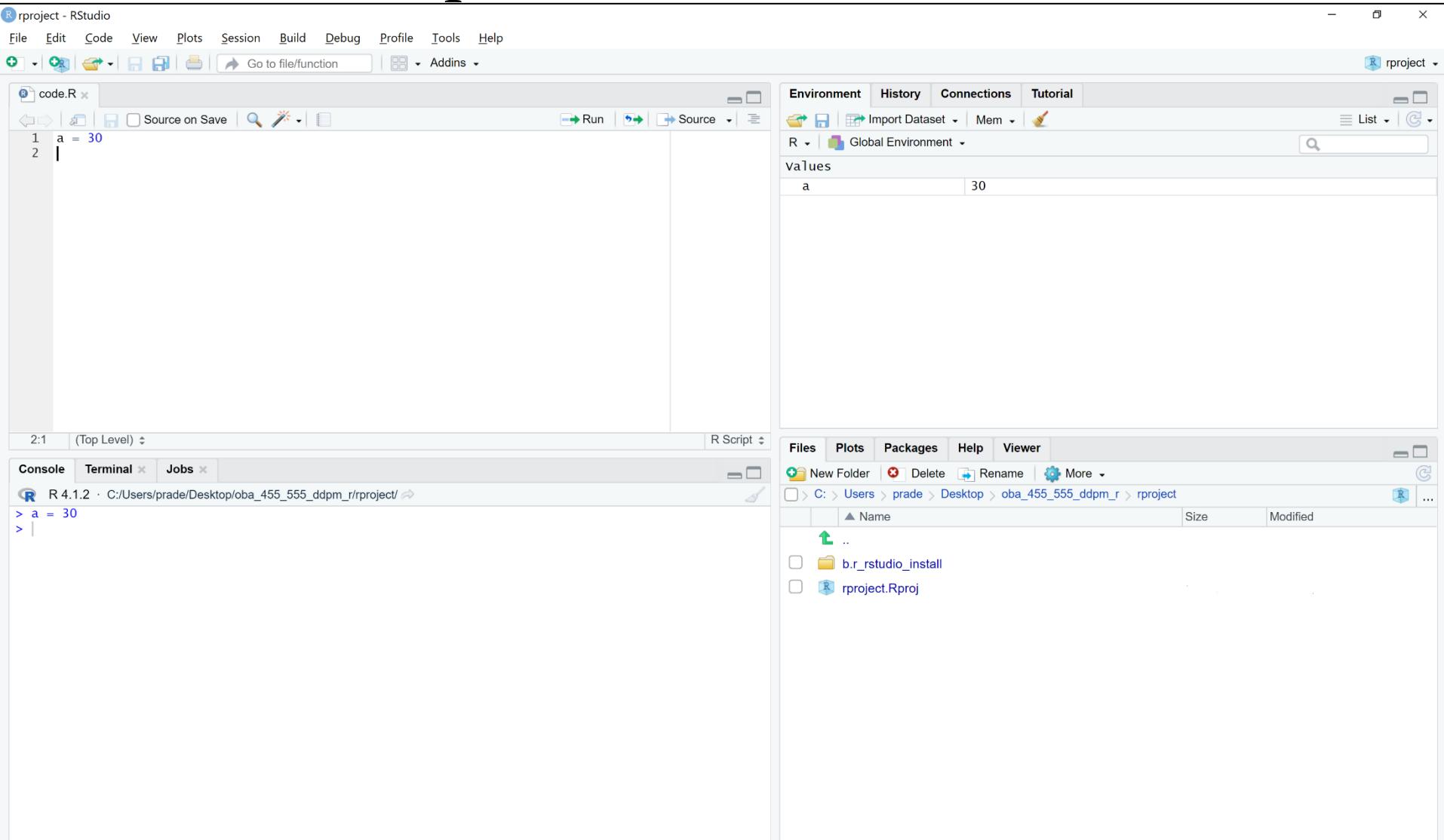
The screenshot shows the RStudio interface with the following components:

- Top Bar:** File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help.
- Project Explorer:** Shows a project named "rproject".
- Code Editor:** A file named "code.R" is open, showing a single line of code: "1".
- Environment Tab:** Shows the Global Environment. A message says "Environment is empty".
- Console Tab:** Shows the R console output: "R 4.1.2 · C:/Users/prade/Desktop/oba_455_555_ddpm_r/rproject/".
- File Explorer:** Shows the directory structure: "C: > Users > prade > Desktop > oba_455_555_ddpm_r > rproject".

Workspace environment

- Holds your data/objects
- Can review history

Workspace environment window



- All assigned variables (or more generally “objects”) are visible in Environment Window

Console window

The screenshot shows the RStudio interface with the following components:

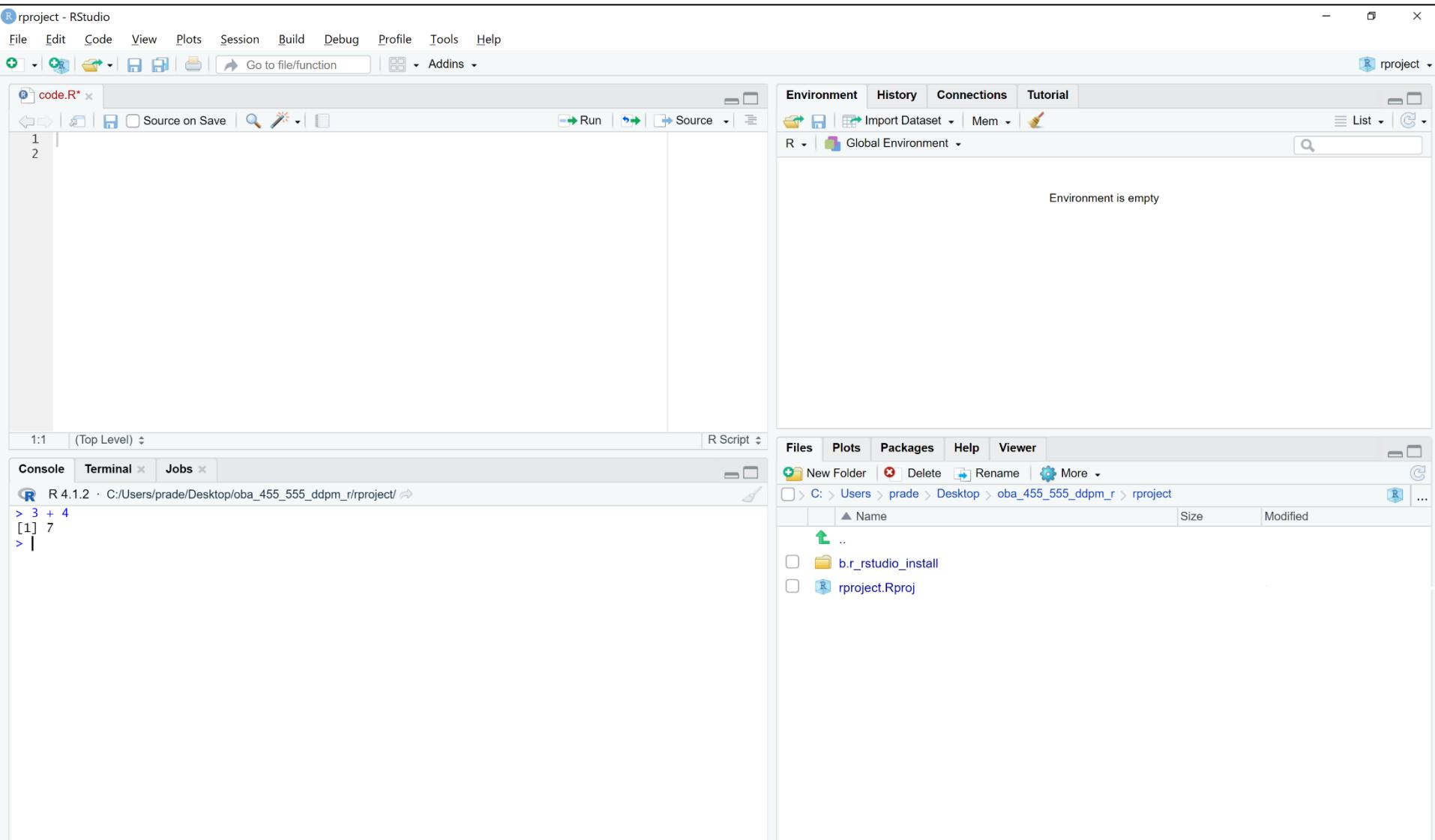
- Top Bar:** File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help.
- Left Sidebar:** Addins dropdown.
- Code Editor:** A script named "code.R" is open, showing a single line "1".
- Environment Tab:** Shows the Global Environment with the message "Environment is empty".
- Files Tab:** Displays the file structure: C:\Users\prade\Desktop\oba_455_555_ddpm_r\rproject. The contents of the folder are listed below:

Name	Size	Modified
..		
b.r_rstudio_install		
rproject.Rproj		
- Console Tab:** Shows the R version (R 4.1.2) and the current working directory (C:/Users/prade/Desktop/oba_455_555_ddpm_r/rproject).
- Output Area:** Contains the heading "Console window" and a bulleted list describing the console's features.

Console window

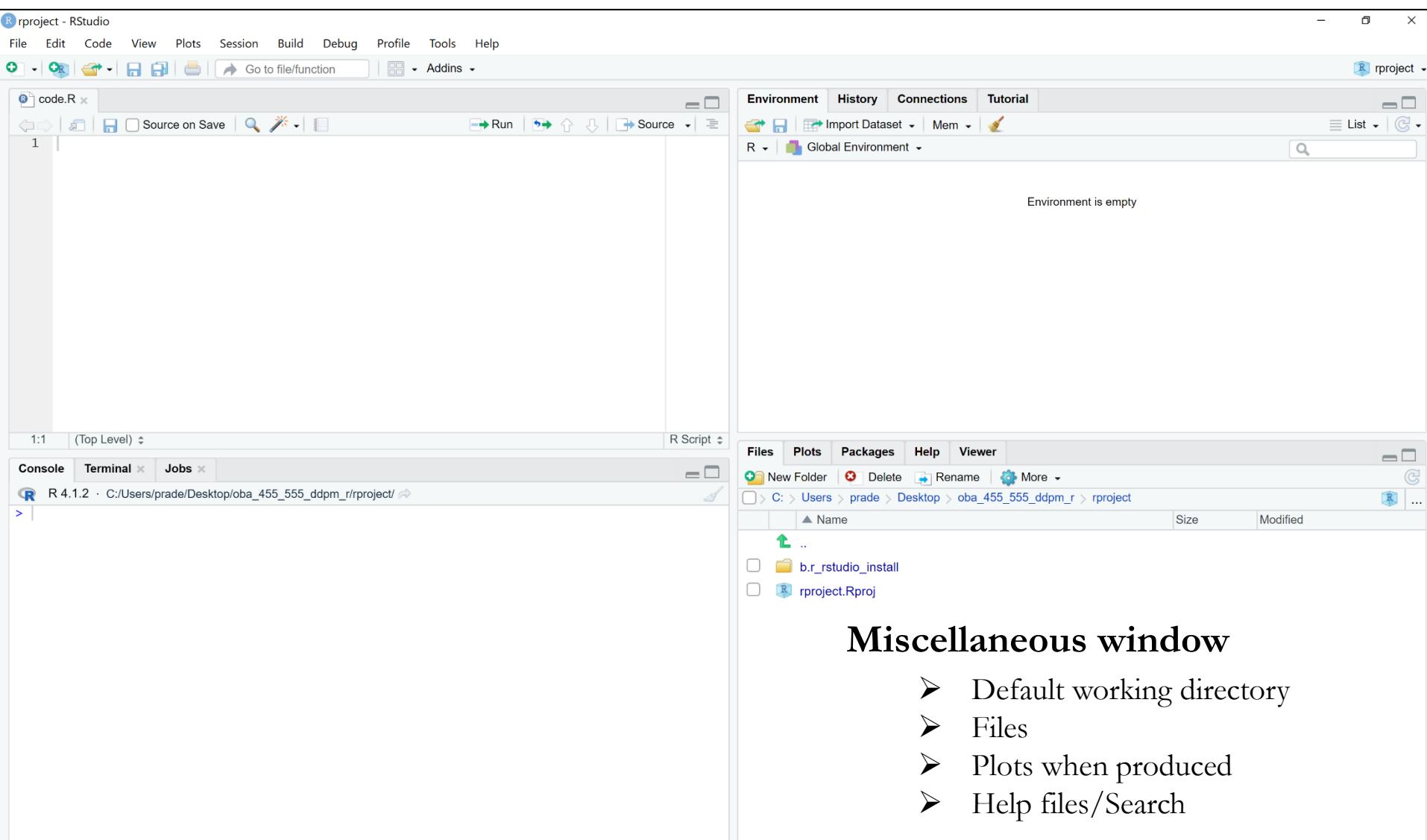
- Use as a calculator
- Does not save code
- Display of output

Console window



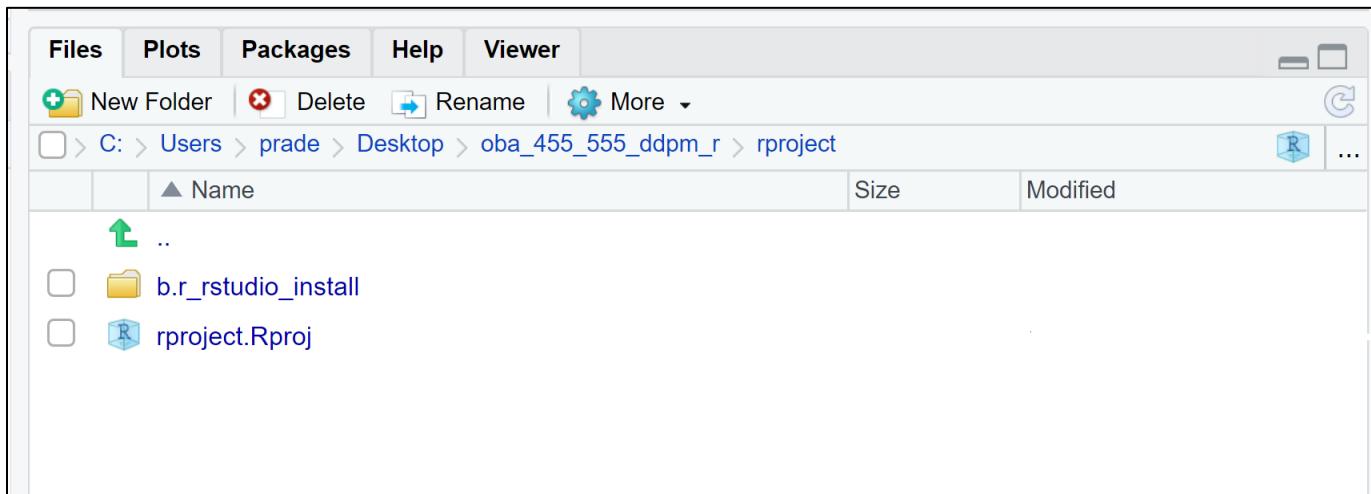
- Code scripted on console window is not saved

Miscellaneous window



Help → Cheatsheets → RStudio IDE Cheat Sheet

Miscellaneous Window



- Files: Lists all files in your working directory
- Plots: Display any plots/graphics that are produced by your code
- Packages: Lists packages installed to your machine and that are loaded
- Help: Search for topics you need help on

Online help

- Help documentation and support in R is comprehensive and easily accessible
- [Stack Overflow](#): a searchable Q&A site oriented toward programming issues
- [Cross Validated](#): a searchable Q&A site oriented toward statistical analysis
- [R-bloggers](#): a central hub of content collected from over 500 bloggers who provide news and tutorials about R
- Best Approach : Google the problem

Basic Programming

- Close the “**code.R**” code file within RStudio
- Download “**basic_ops_code.R**” file from canvas
- Place file in “**oba_455_555_ddpm_r/rproject/b.r rstudio_install**”
- Open “**basic_ops_code.R**” file within RStudio

Today's tasks

- Get familiarity with RStudio
- Practice coding on basic operations
- Students form groups of three on canvas (if you have not yet done)
- **Due date (& time)** for group formation in syllabus file
- Register on <https://www.kaggle.com/> (if you have not yet done)

Next Class

- Exposure to different Data Science packages in R/RStudio
- Basic Data Management
 - Reading data
 - Exploring data
 - Summarizing data
 - Other operations

Thank You