2023-ITP-W2

ITP-WS2: Installation Guide for R and RStudio

2023 VLR-UOS International Training Program Workshop 2

1. Installation of R, Rtools, and RStudio
    i. Downloading necessary executable files.
    ii. Installing R.
    iii. Installing RTools (for Windows).
    iv. Installing RStudio.
2. Getting Started with RStudio IDE
    i. Dark theme setup (optional)
    ii. Pane Layouts
    iii. Navigation via Keyboard Shortcuts
3. Installing, Loading and Updating Packages
    i. Installing Packages
    ii. Loading Packages
    iii. Updating Packages

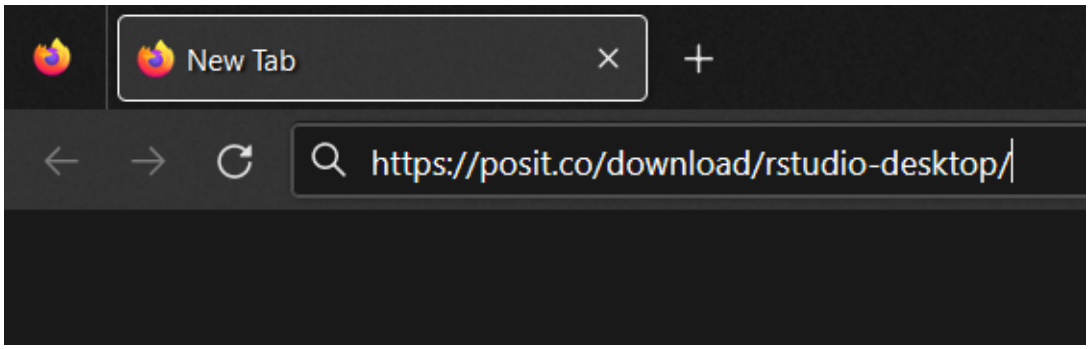
Installation of R, Rtools, and RStudio

2023 ITP-WS2

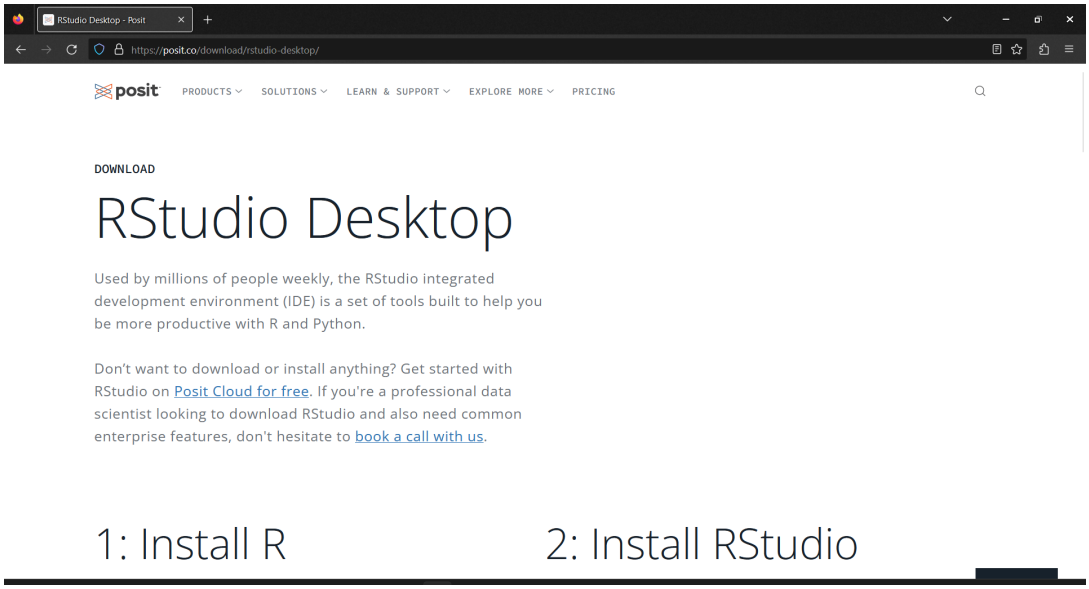
AUTHOR
Prof. Rey R. Cuenca
Math-Stat Dept., MSU-IIT

Downloading the Necessary Executable Files

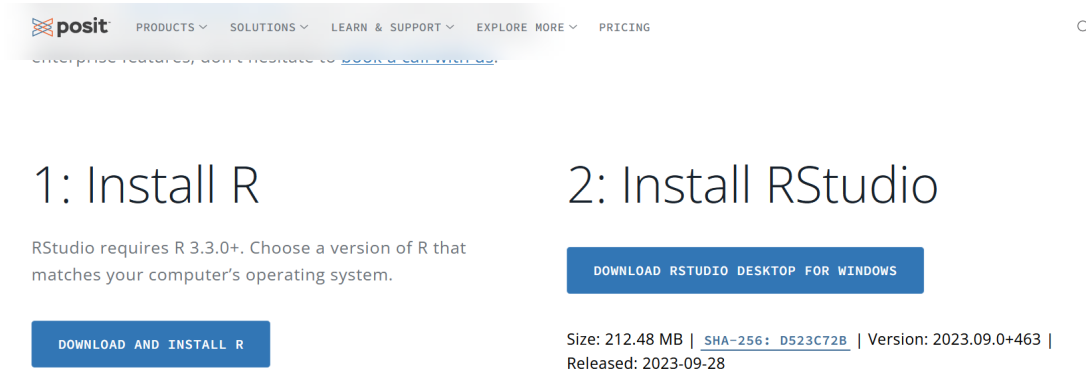
1. Open a browser and go to https://posit.co/download/rstudio-desktop.



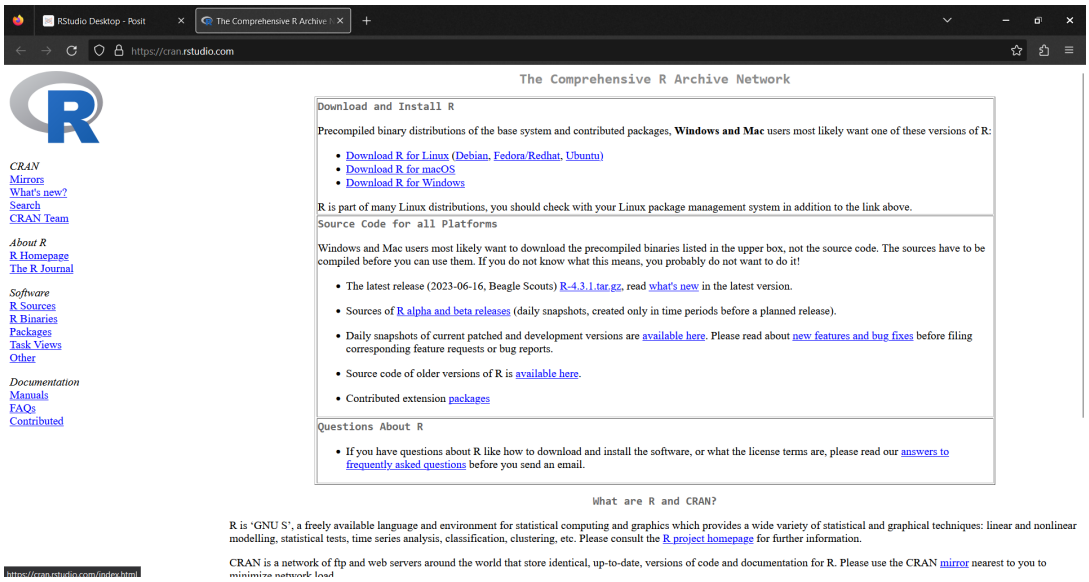
2. You will be navigated to the page where the instruction and links for installing R, Rtools, and RStudio are located.



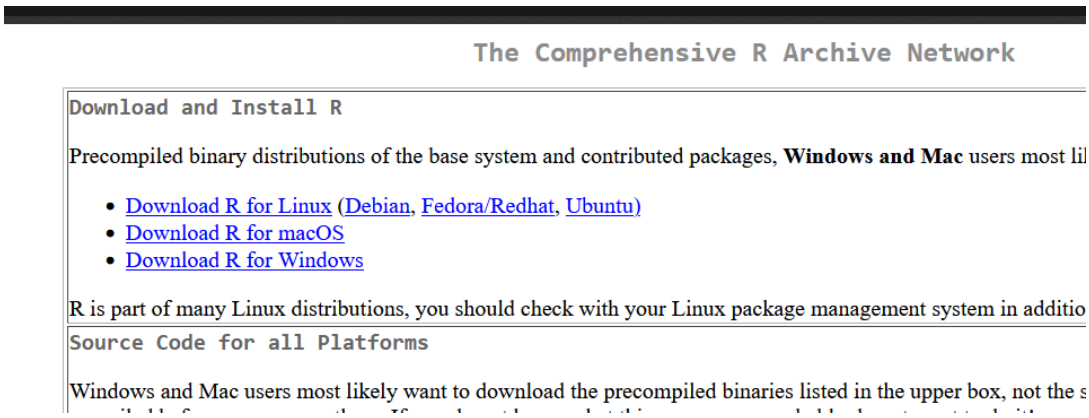
3. Scroll down and click the `DOWNLOAD AND INSTALL R` button.



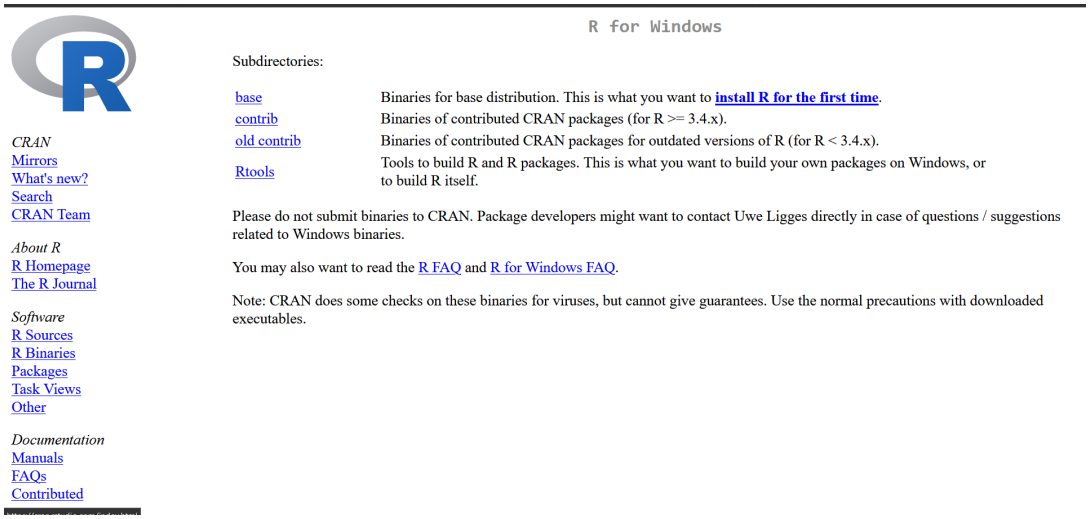
4. You will be navigated to the [RStudio CRAN server](https://cran.rstudio.com).



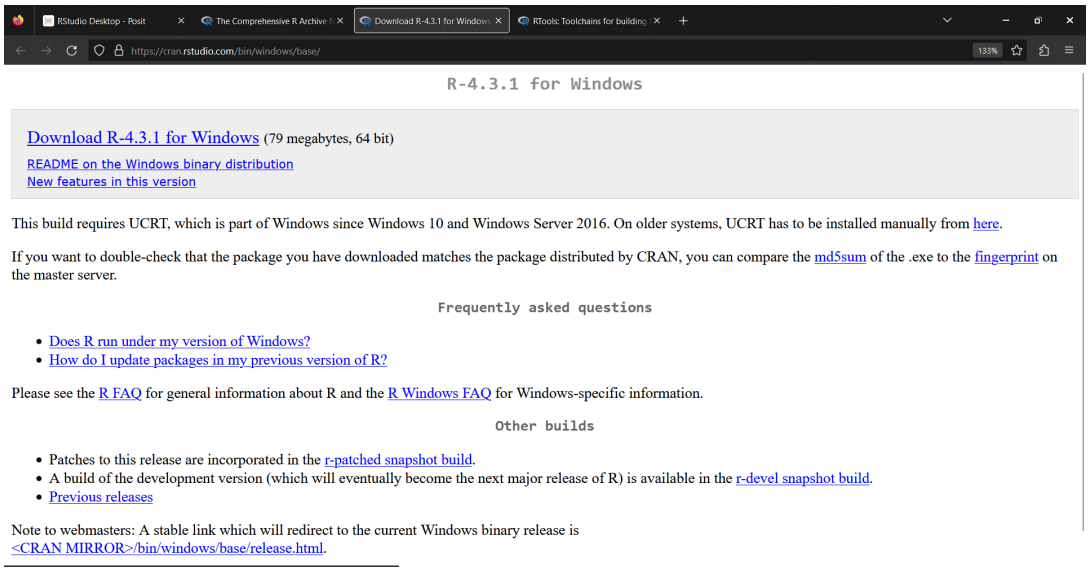
5. On the "Download and Install R" pane, click the appropriate system you need. In this demo we choose the Windows option and click "Download R for Windows" linked text.



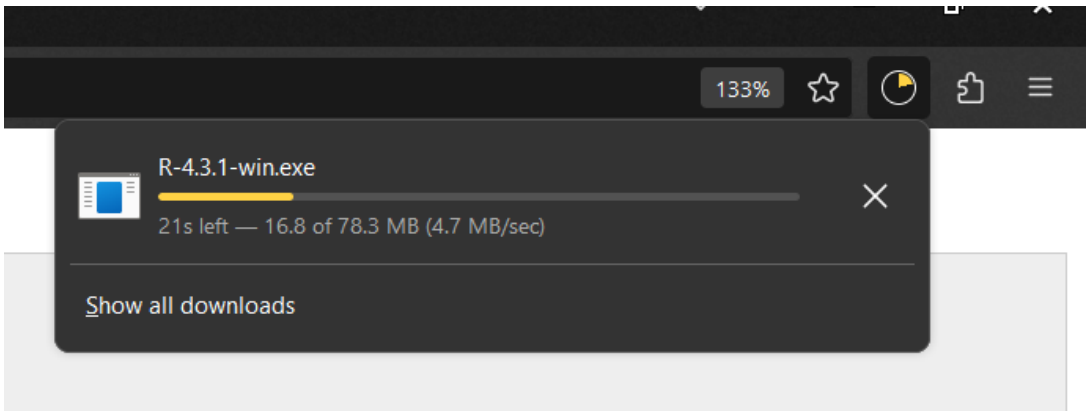
6. On the page you are navigated, hold `Cntrl` on your keyboard and click "base" and "Rtools" links to open on new tabs the pages for the download links necessary in the installation of R and Rtools respectively.



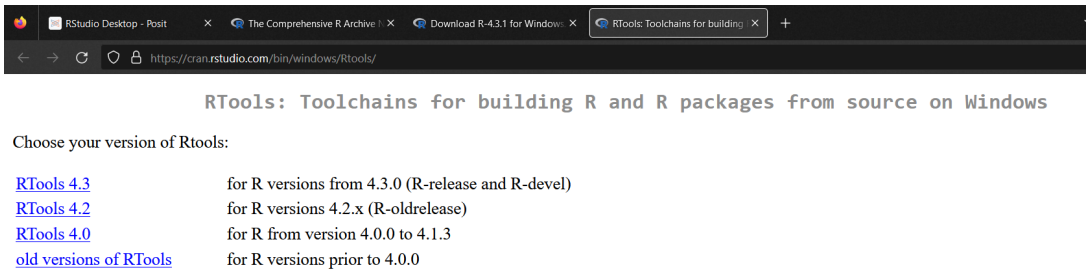
7. On the “base” page, click the linked text “Download R-4.3.1 for Windows” (the latest version of R at the time of writing this demo).



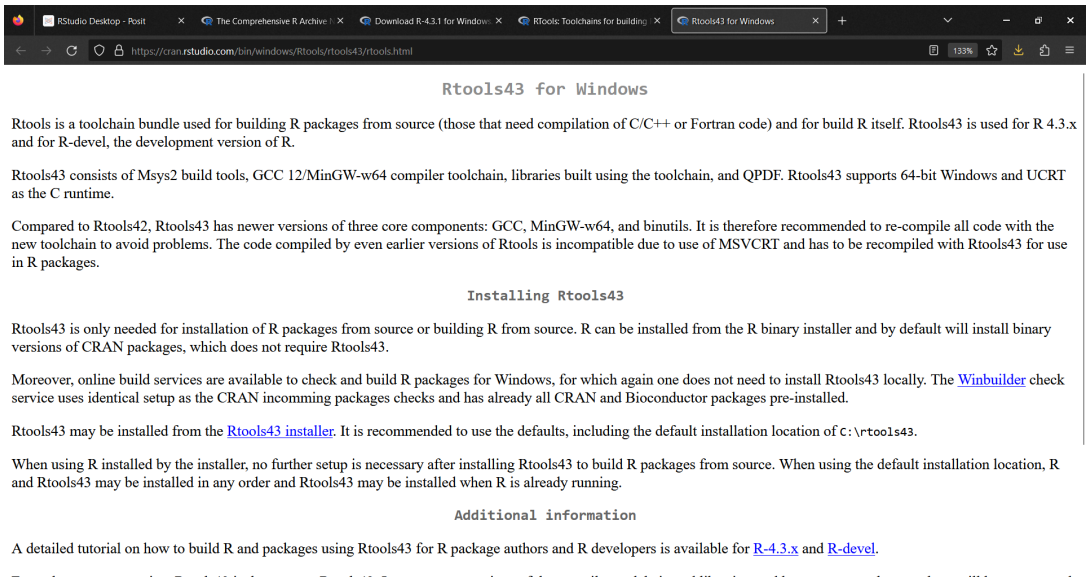
8. This will download the executable file for R.



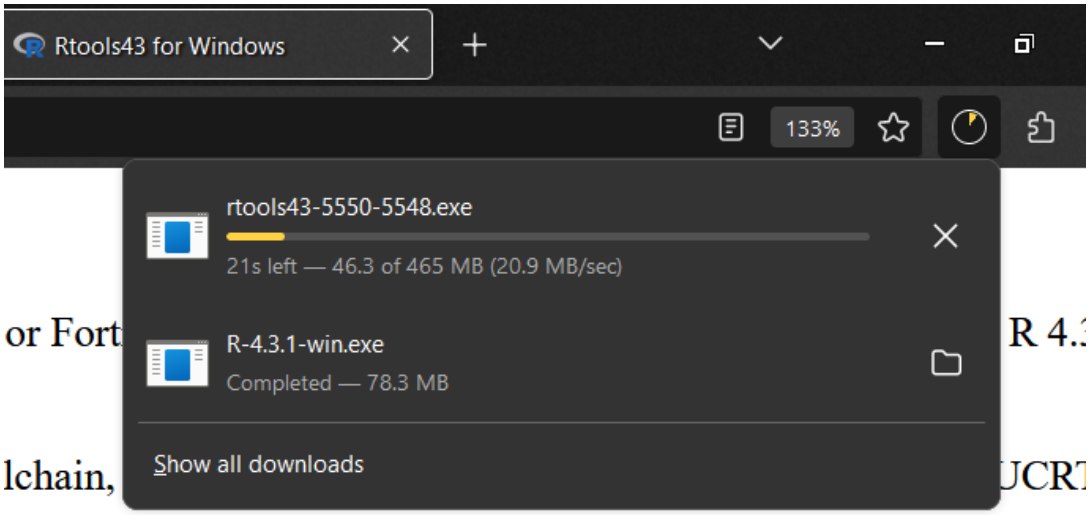
9. Now, on the “Rtools” page, click on the appropriate Rtools version. Since this demo uses an R version R.4.3.1, we choose “RTools 4.3”.



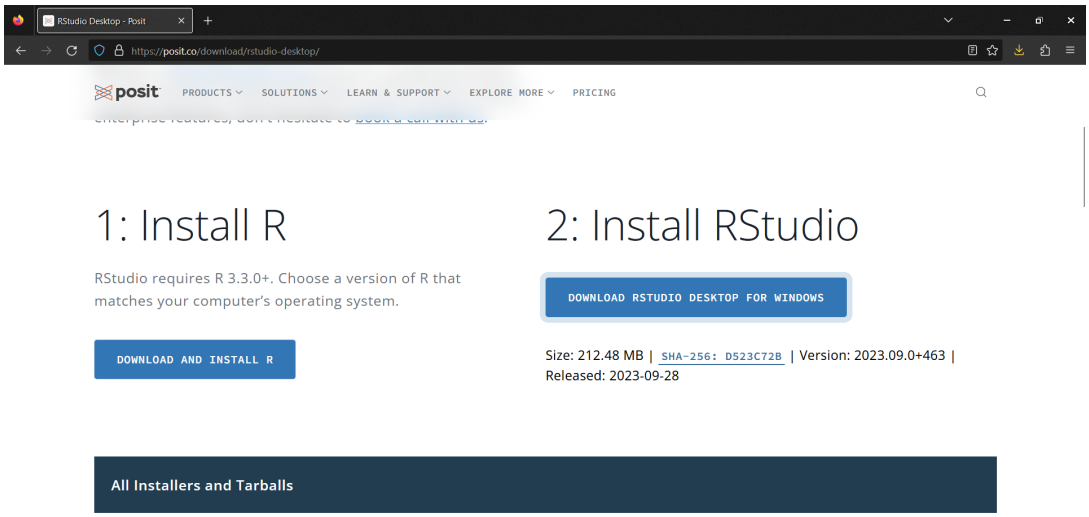
10. Clicking on the “RTools 4.3” linked text navigates you to the page where the link to the executable file for Rtools is located. Click the linked text “Rtools43 installer”.



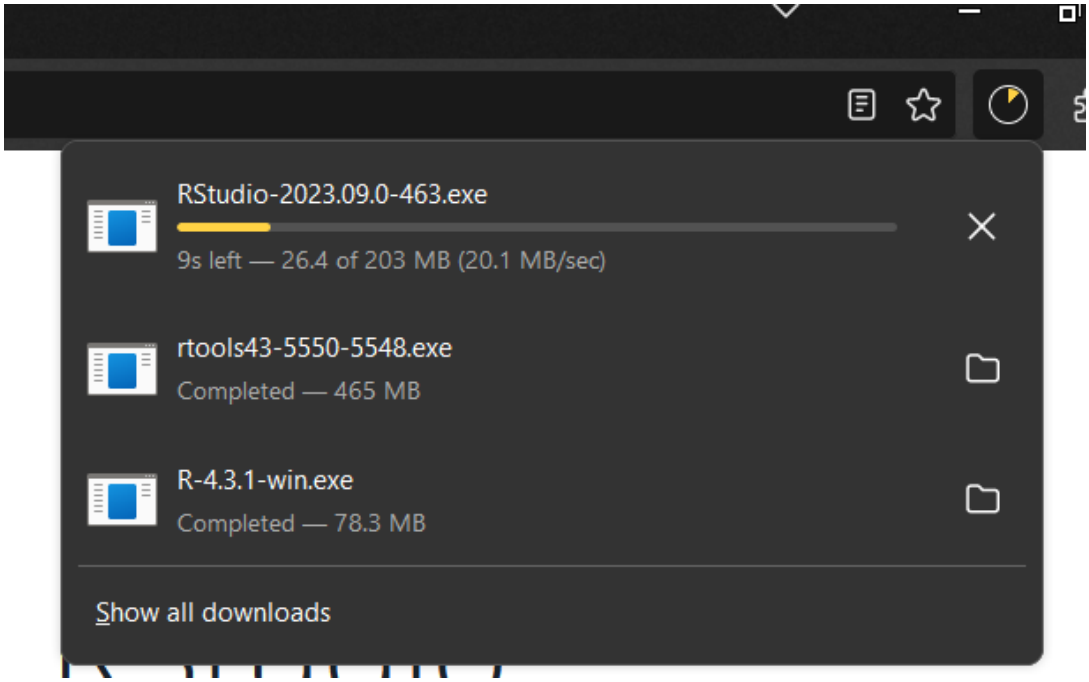
11. Clicking the linked text “Rtools43 installer” downloads the installer for our necessary Rtools.



12. Now go back to the page https://posit.co/download/rstudio-desktop and click the `DOWNLOAD RSTUDIO DESKTOP FOR WINDOWS` button.

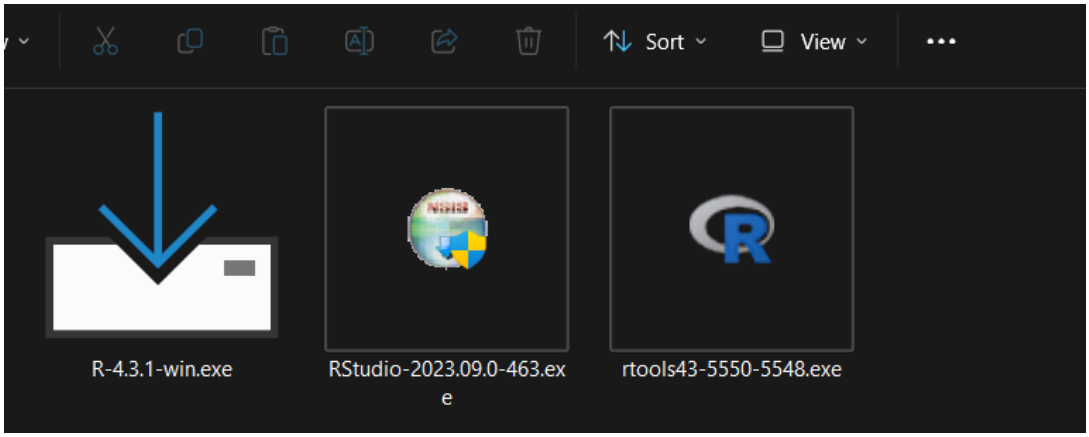


13. Doing Step 12 downloads the executable file for the latest RStudio installer to your local drive.

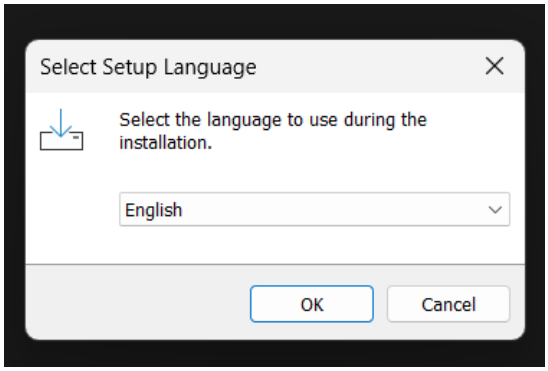


Installing R

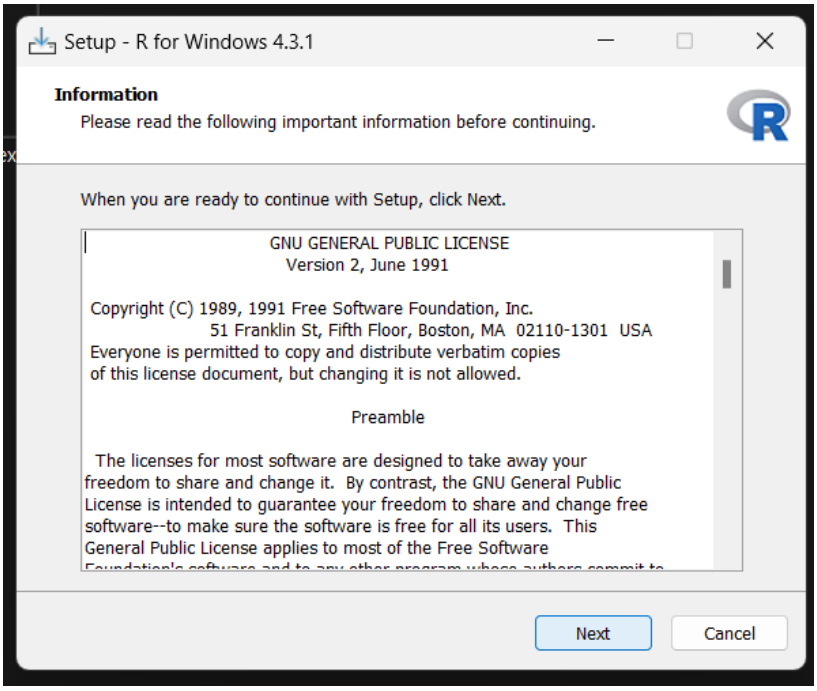
1. Once we are done downloading the necessary executable files, we first install R by clicking it's corresponding executable file which in the current demo is `R-4.3.1-win.exe` .



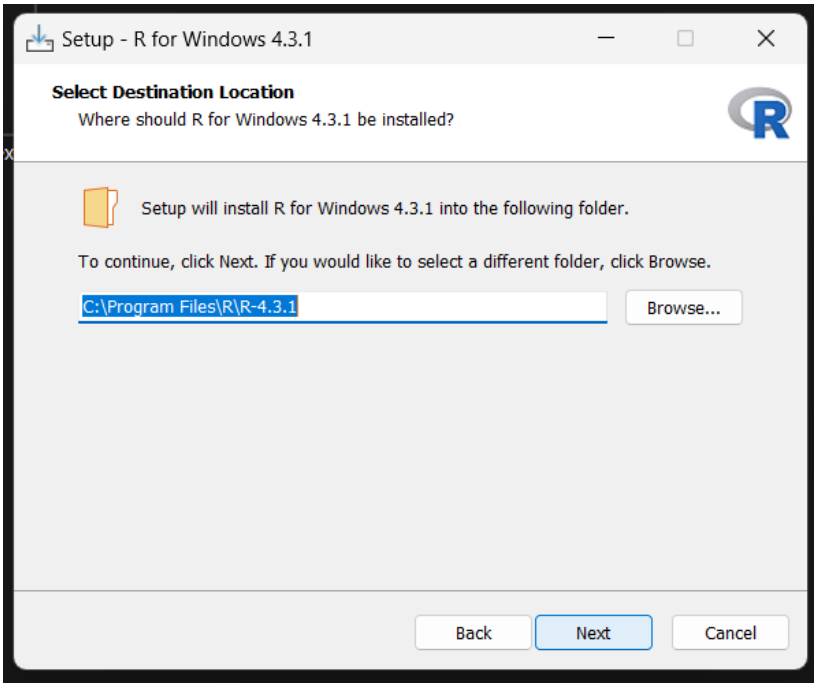
2. Clicking the R executable file opens a prompt window asking you to choose what language. In our demo, we choose the default “English” option.



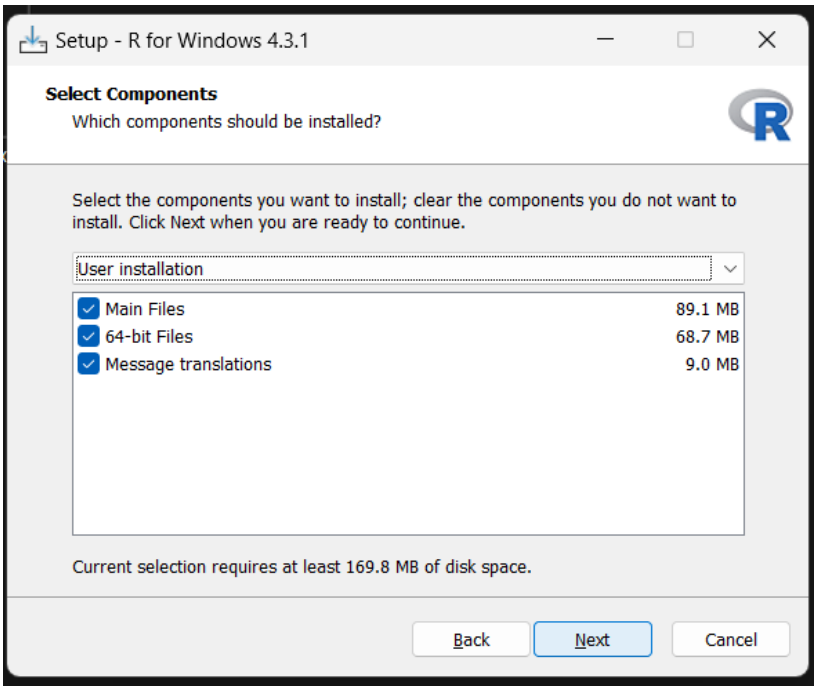
3. From this point on until Step 6, just accept the defaults by clicking the “Next” button.



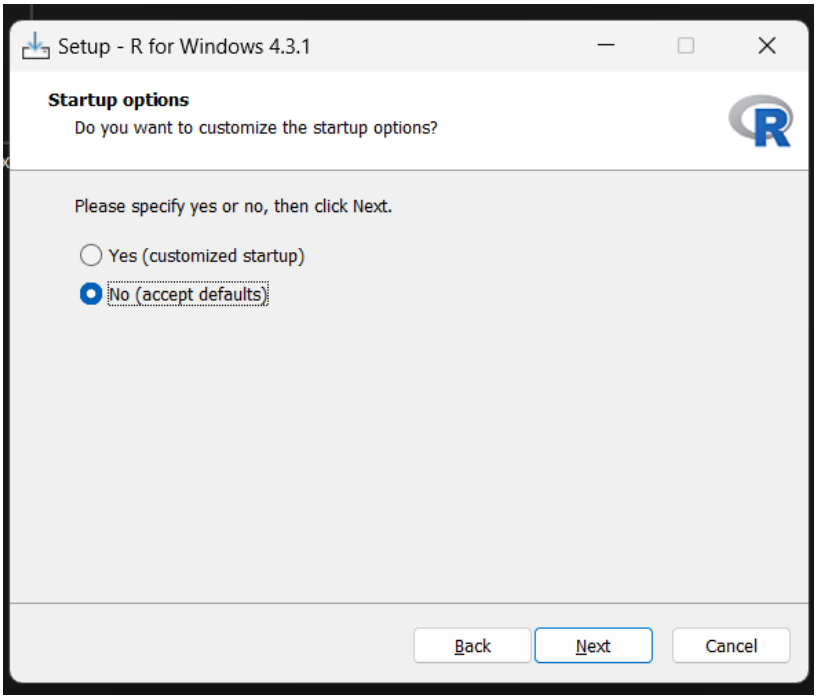
4. Click Next.



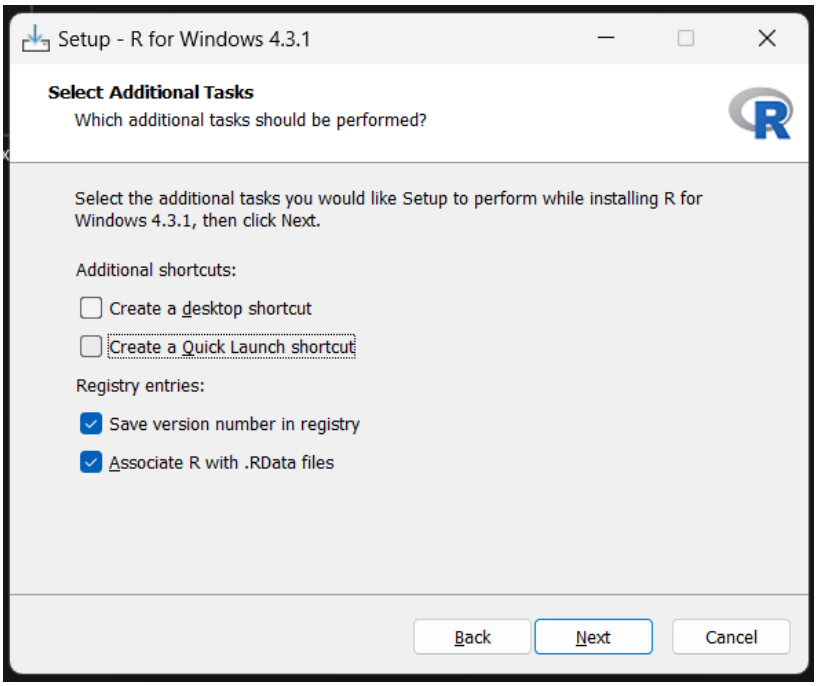
5. Click Next.



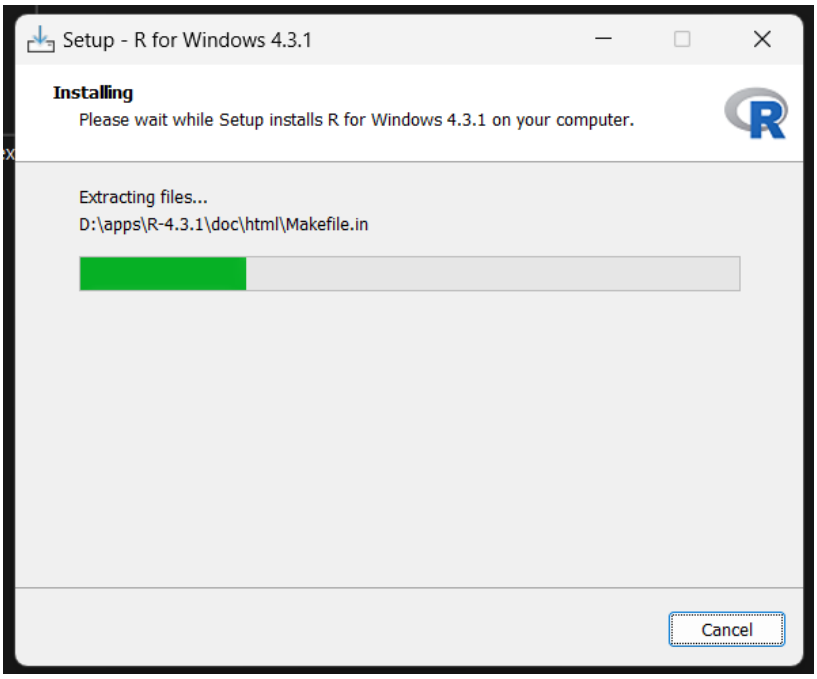
6. Click Next.



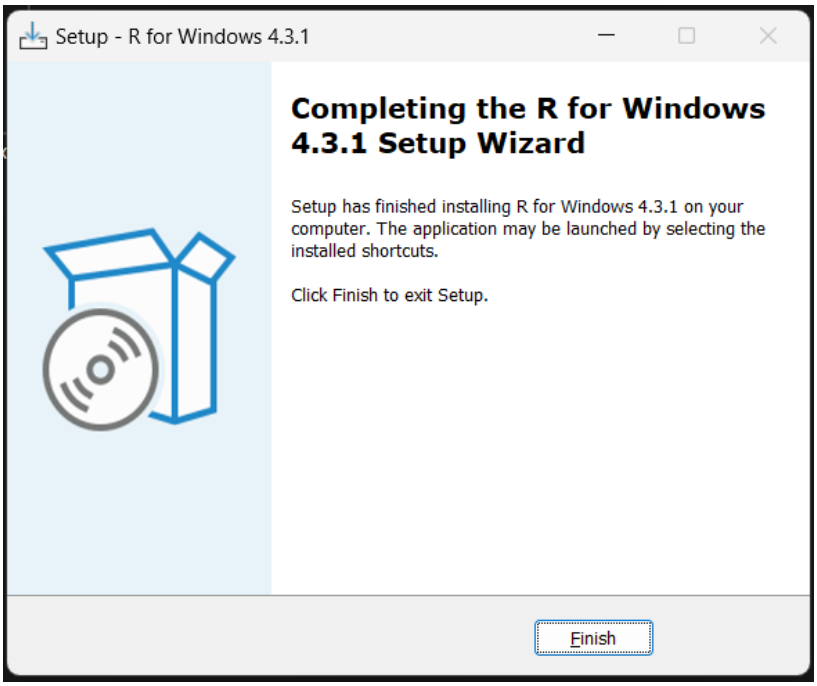
7. For this step where we are instructed to “Select Additional Tasks”, you may opt to accept the default or uncheck some of the checkboxes. In this demo, we will uncheck the two checkboxes under “Additional shortcuts” section and click the Next button.



8. Now we wait until the Setup Wizard is done installing.



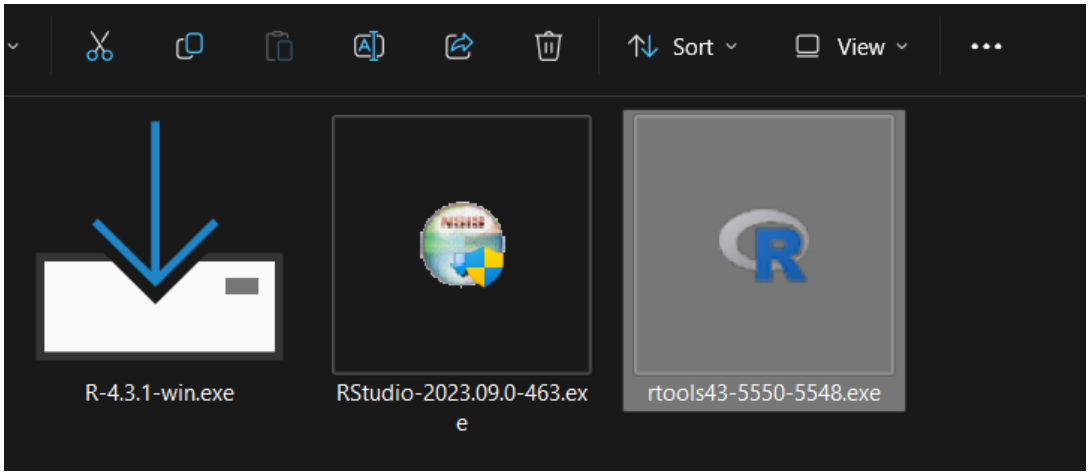
9. Once the Setup Wizard is done installing, just click the “Finish” button.



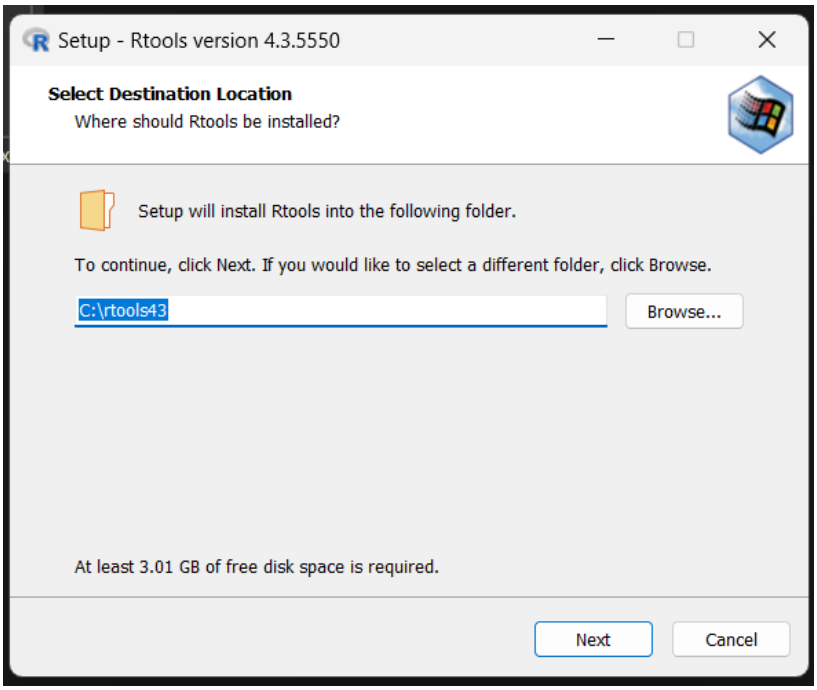
Installing Rtools

Important Note: Rtools are only used for those who are using Windows system.

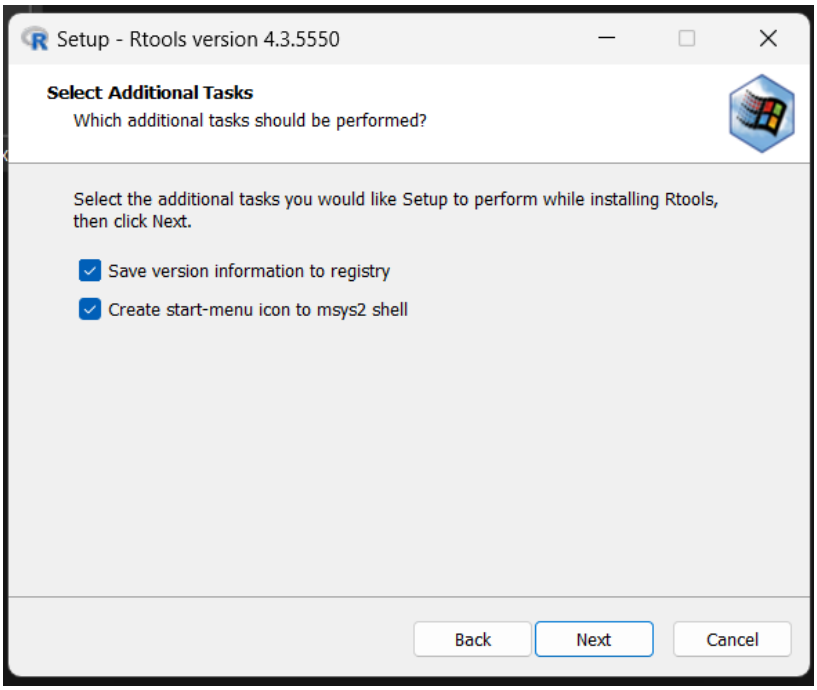
1. To install Rtools, click the corresponding executable file we have downloaded. In this demo, it is `rtools43-5550-5548.exe` .



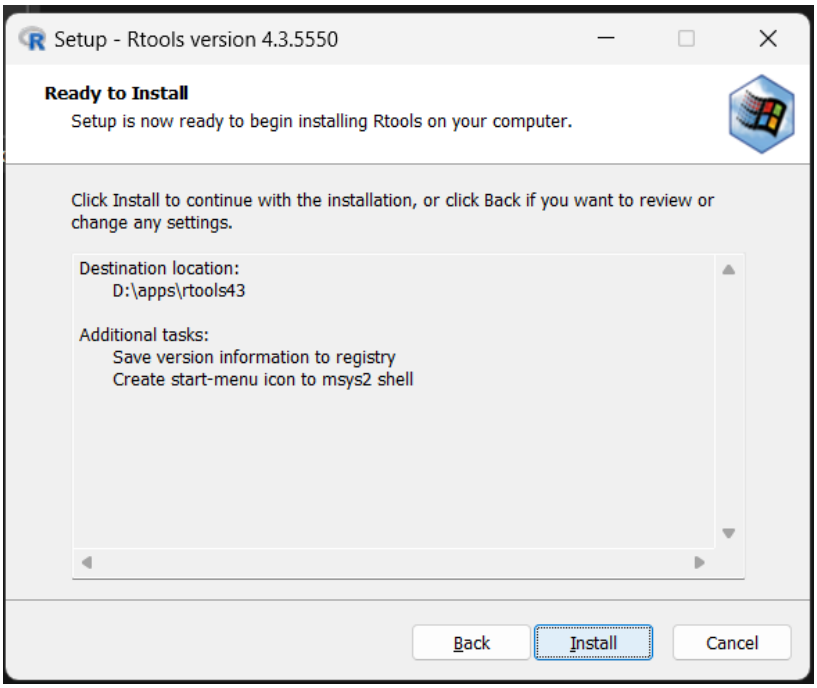
2. By default, the Setup Wizard will install Rtools in your local drive `C:` which in this demo have the path `C:\rtools43`. Just accept this default unless you have a valid reason not to do so (e.g. low drive storage capacity). Now just click the “Next” button.



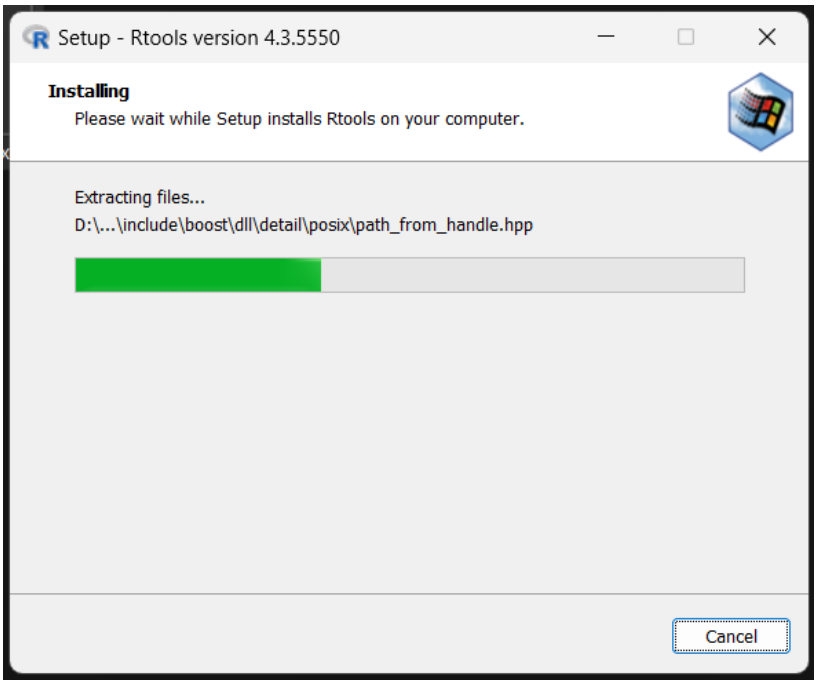
3. Accept defaults and click “Next”.



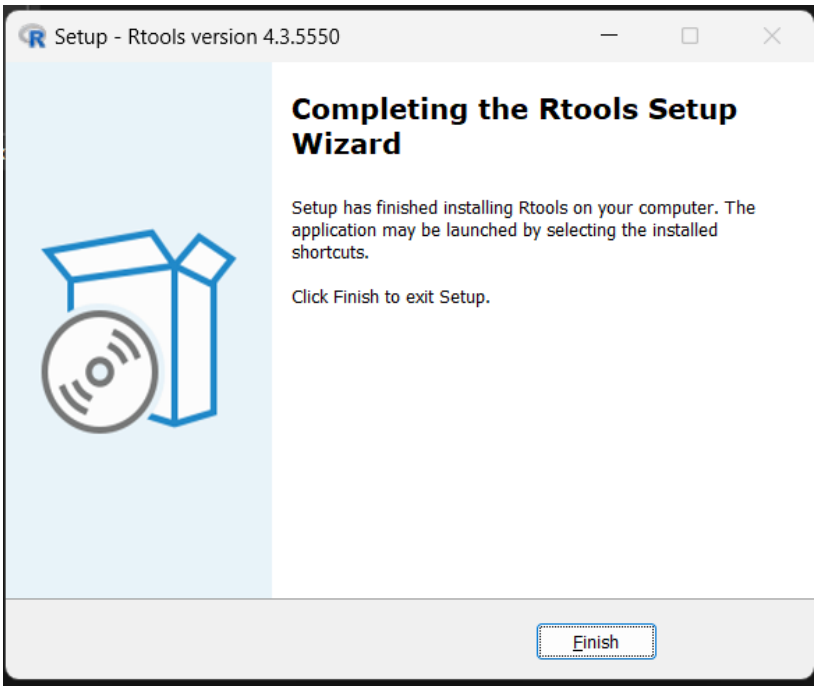
4. Click “Install”.



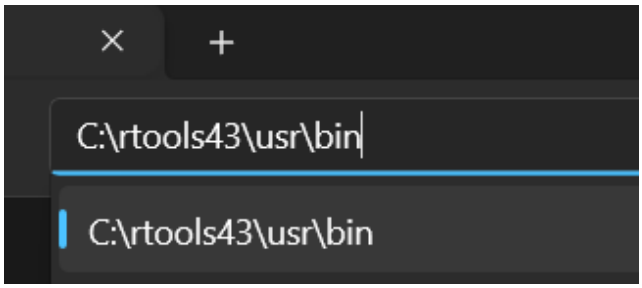
5. Wait until the Setup Wizard finishes the installation.



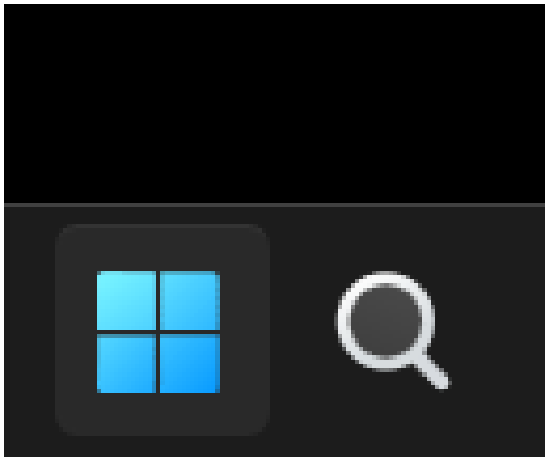
6. Click the “Finish” button.



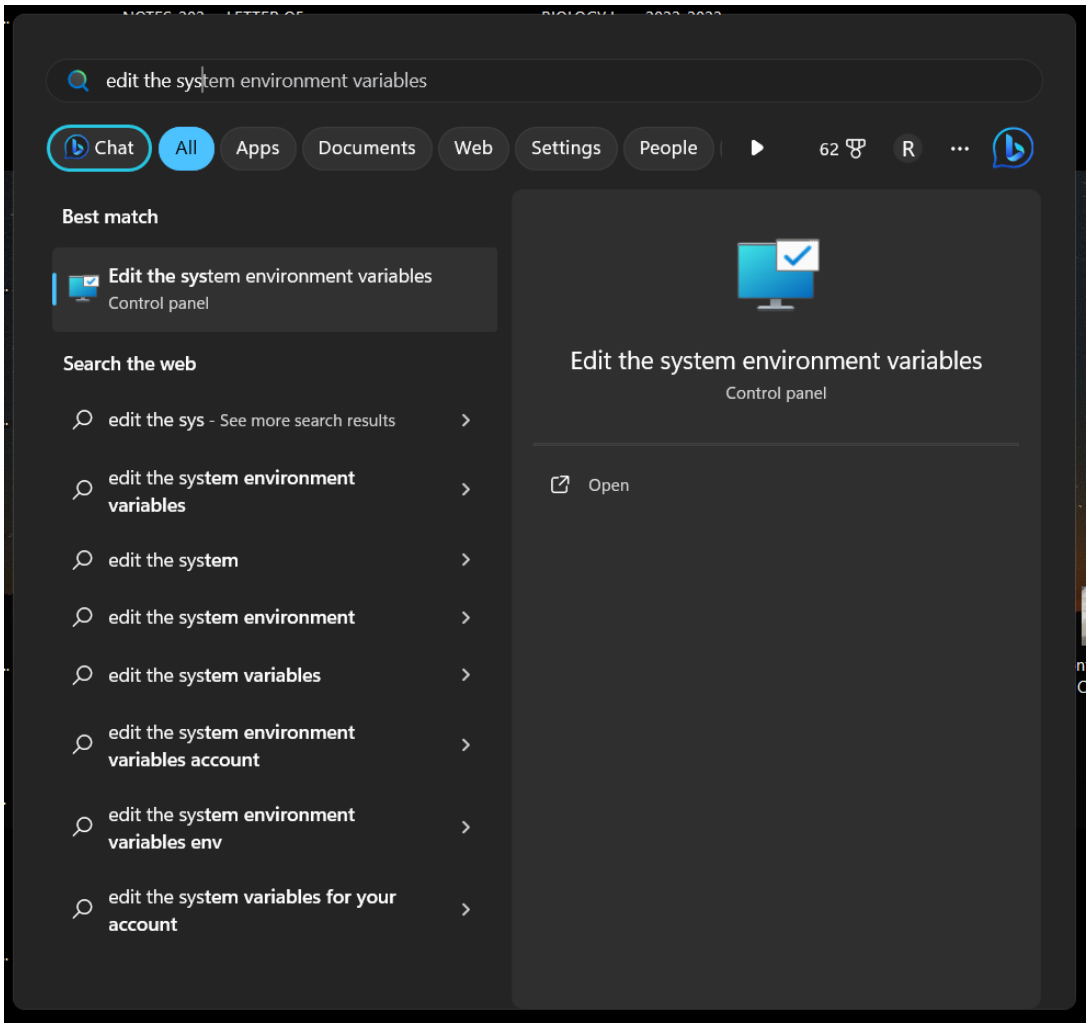
7. Now navigate to the path where your rtools is installed and copy the path to where the `usr/bin` folder is located. In this demo, the path is `C:\rtools43\usr\bin` as shown below. Copy this path. (**Note:** This path may differ depending on the previous installation you have chosen.)



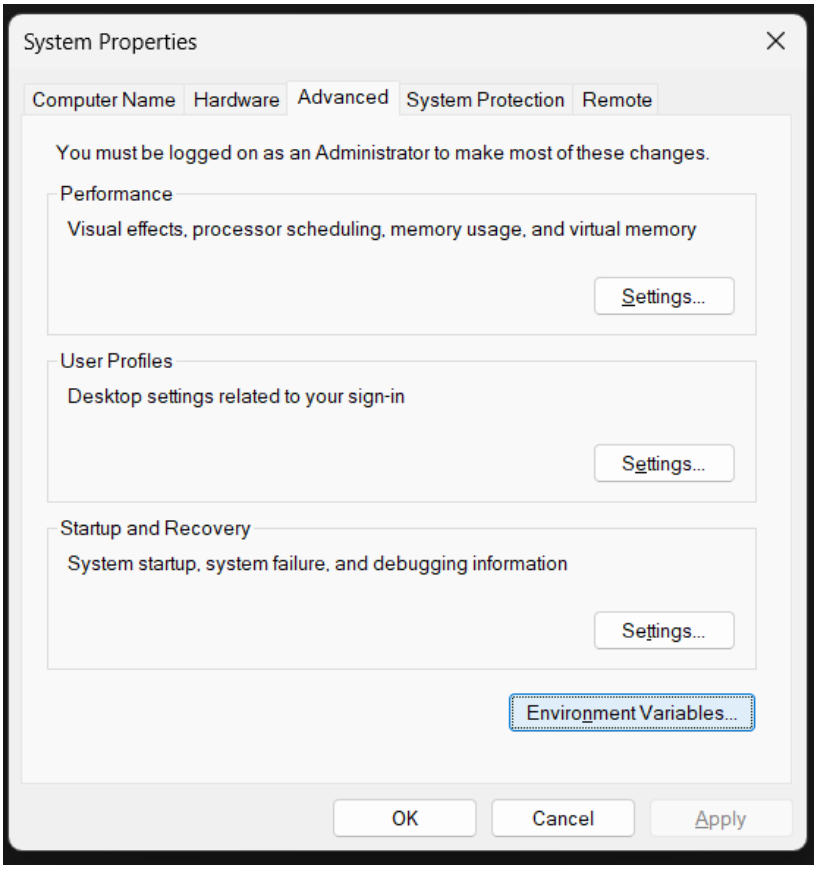
8. Now go to your Windows Search Bar. In Windows 11, this is the magnifying glass icon on your Taskbar.



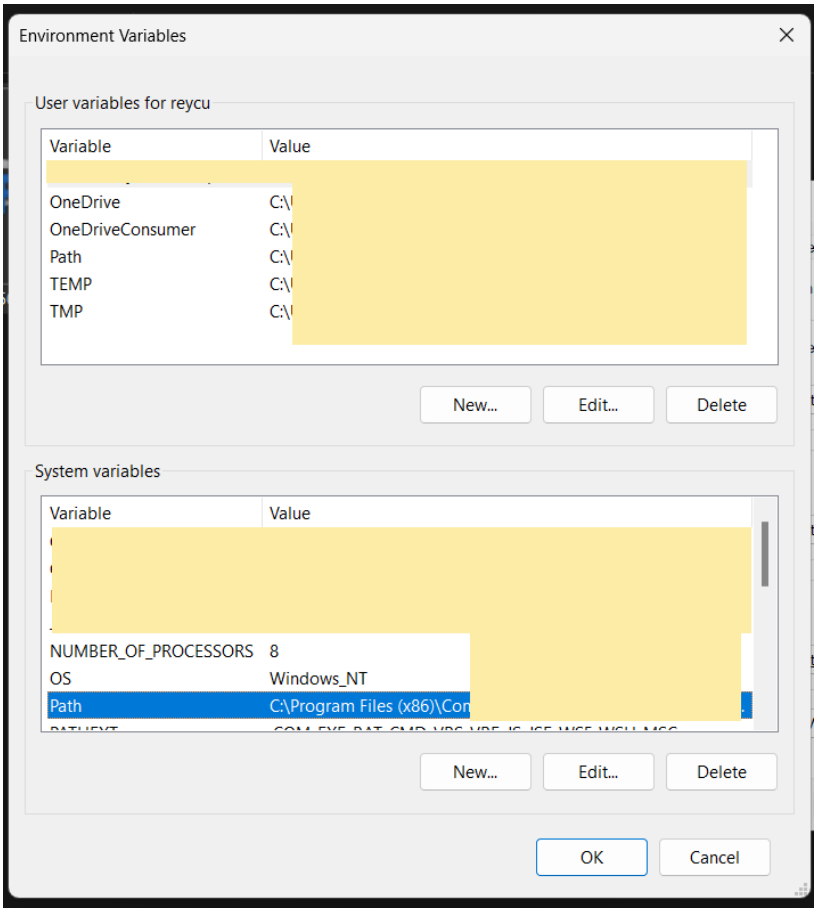
9. Clicking the magnifying glass icon opens the Windows Search Bar. Now type “edit the system environment variables” and click on the Best match result.



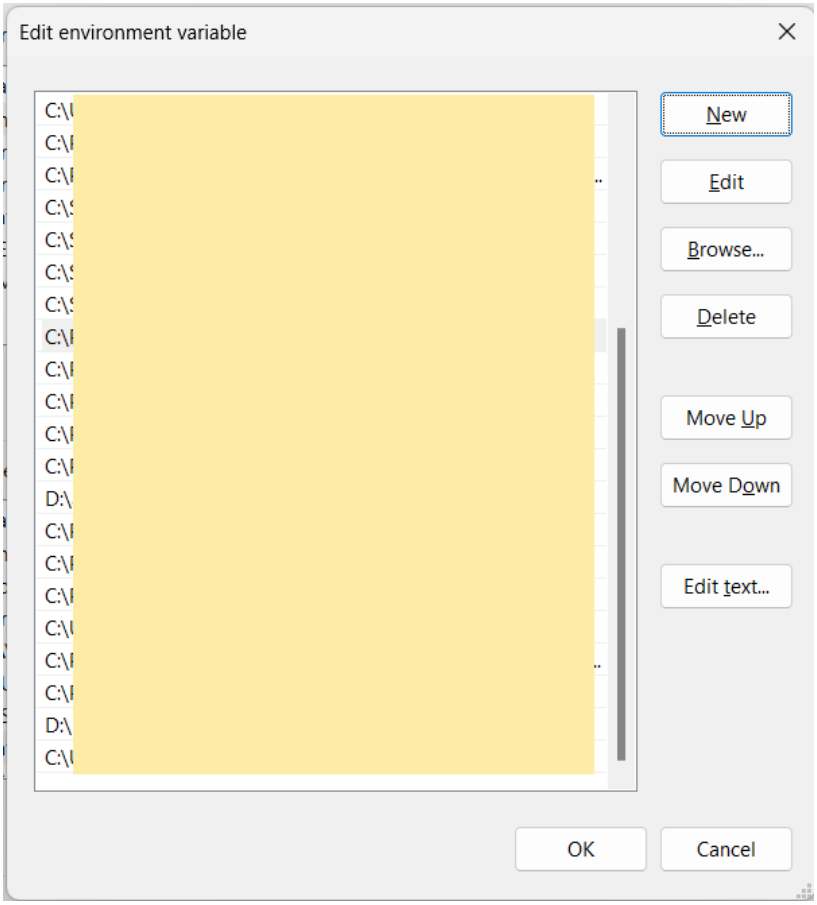
10. On the pop-up window, click “Environment Variables” somewhere near the lower right.



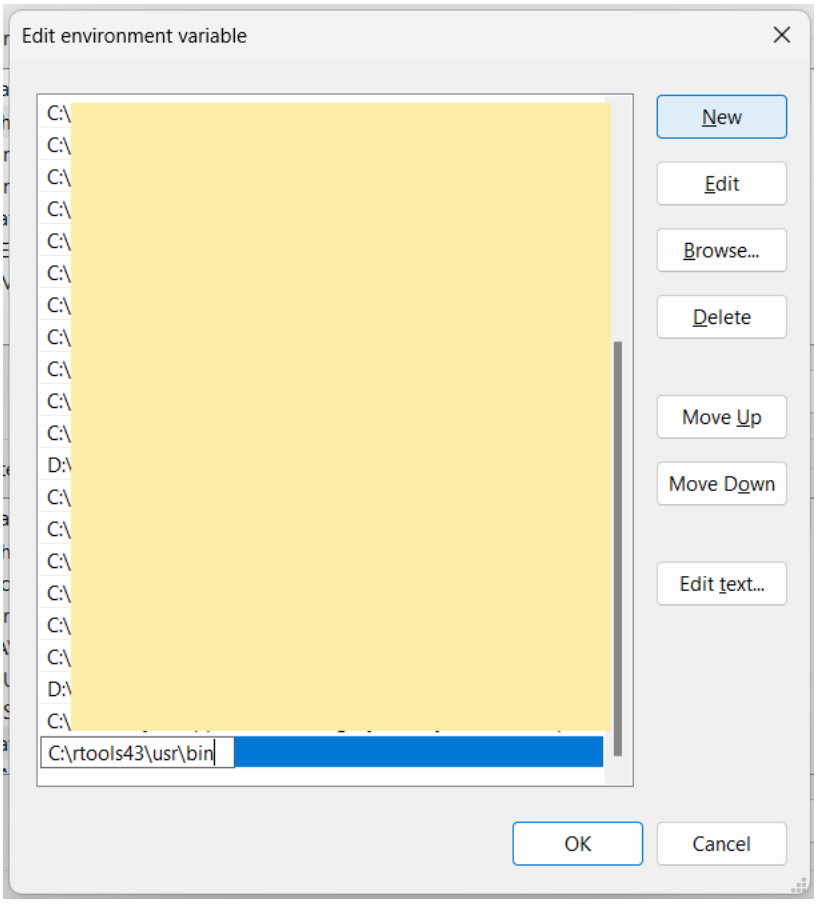
11. Clicking on the “Environment Variables” button opens another pop-up window that lists both User and System variables. Under the “System variables” section, click on the variable “Path” (this is indicated as the blue-highlighted portion in the image below). Now click the “Edit” button right below it.



12. Doing Step 11 opens another pop-up window listing all the Systems Paths you have in your machine. (**Warning**: Be sure not to delete any this paths unless you know what you are doing.) Now click the button on the upper right portion that says “New”.



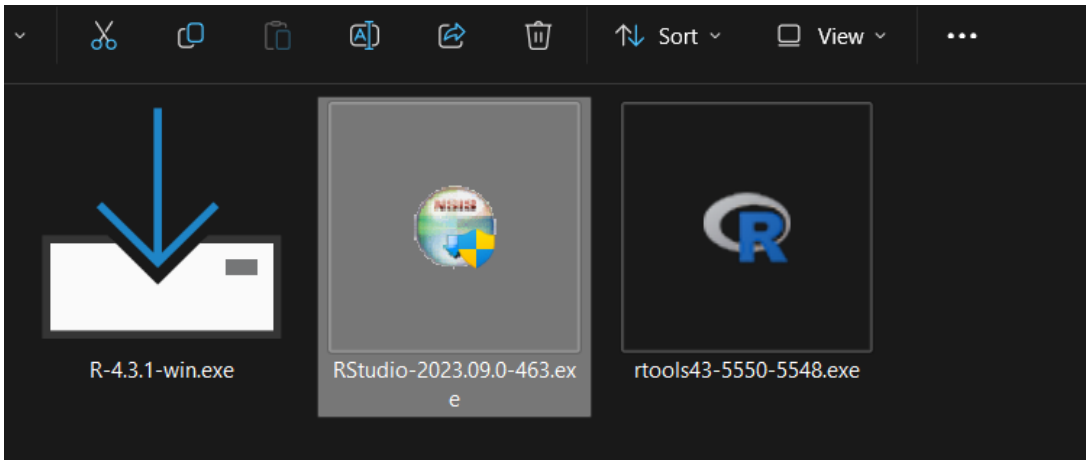
13. This will create a new empty entry at the very bottom of the list of paths. Paste here the path you have copied in Step 7. Once you are done, click the all the OK buttons on all the pop-up windows.



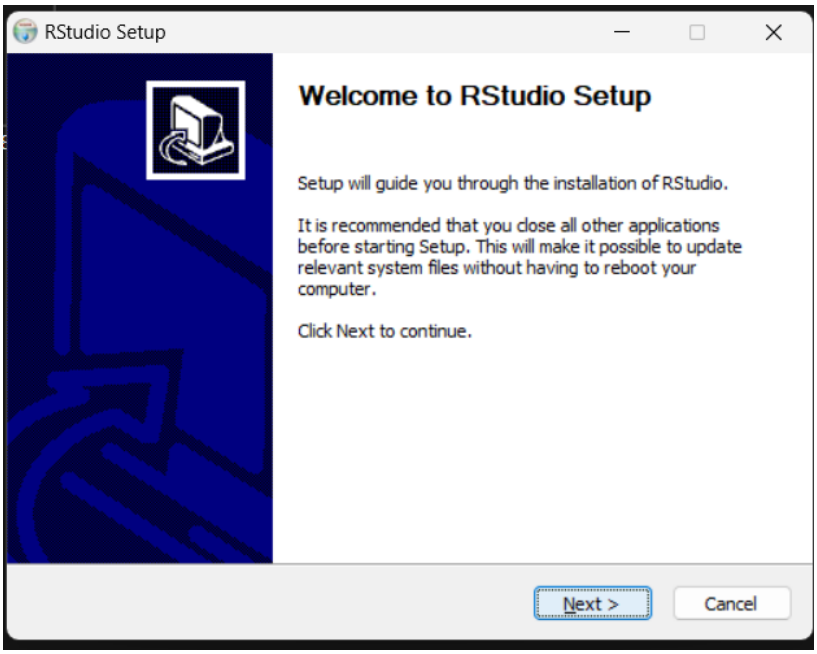
Installing RStudio

IMPORTANT: *It is assumed that you have successfully installed R and Rtools at this point. Otherwise, it would be deemed useless proceeding further in installing RStudio.*

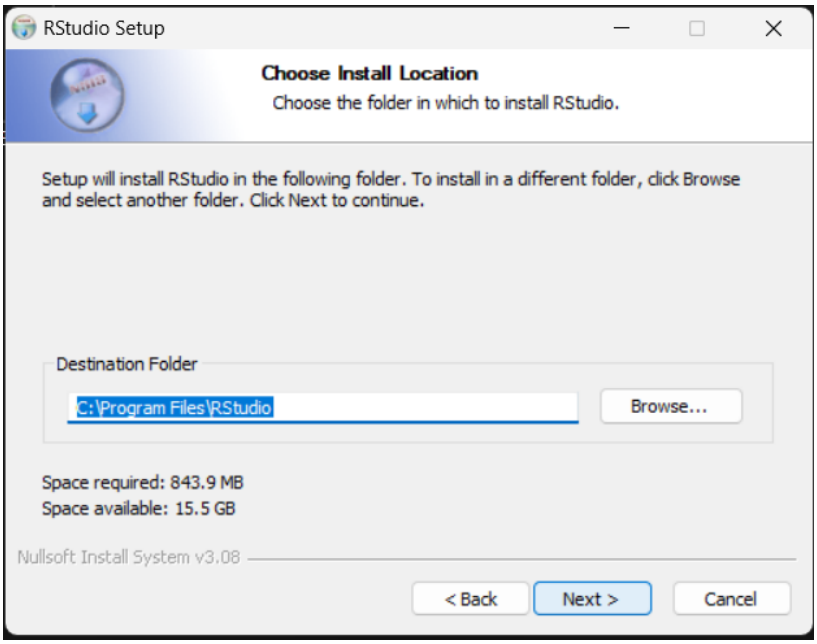
1. To install RStudio, click the corresponding executable file. In this demo, it is `RStudio-2023.09.0-463.exe`.



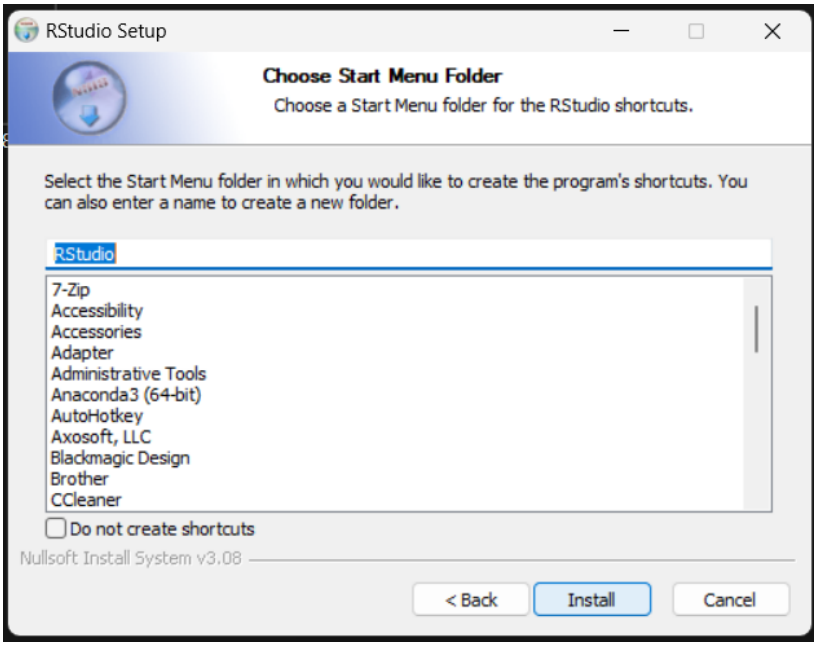
2. Starting at this point until the last step, just accept all the defaults. Now, click “Next”.



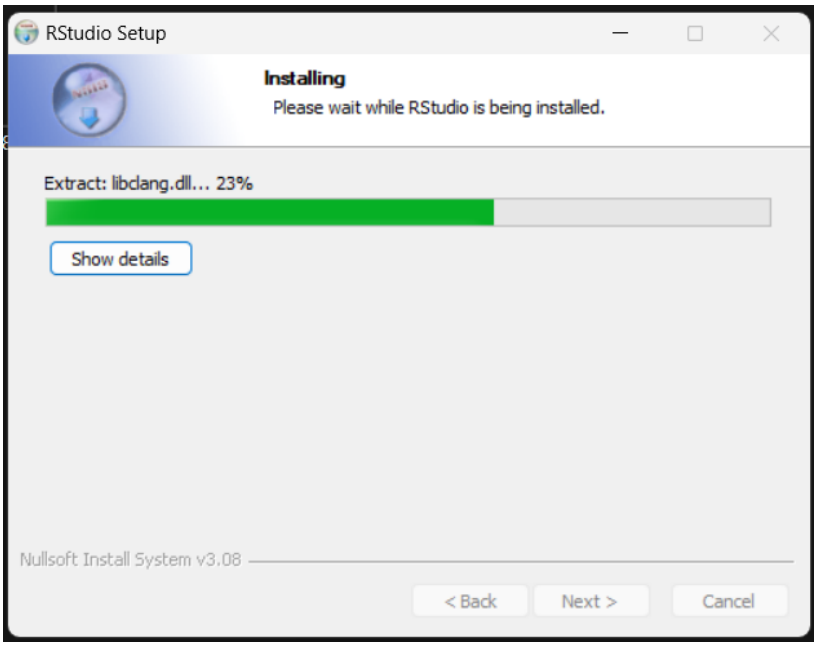
3. Click “Next”.



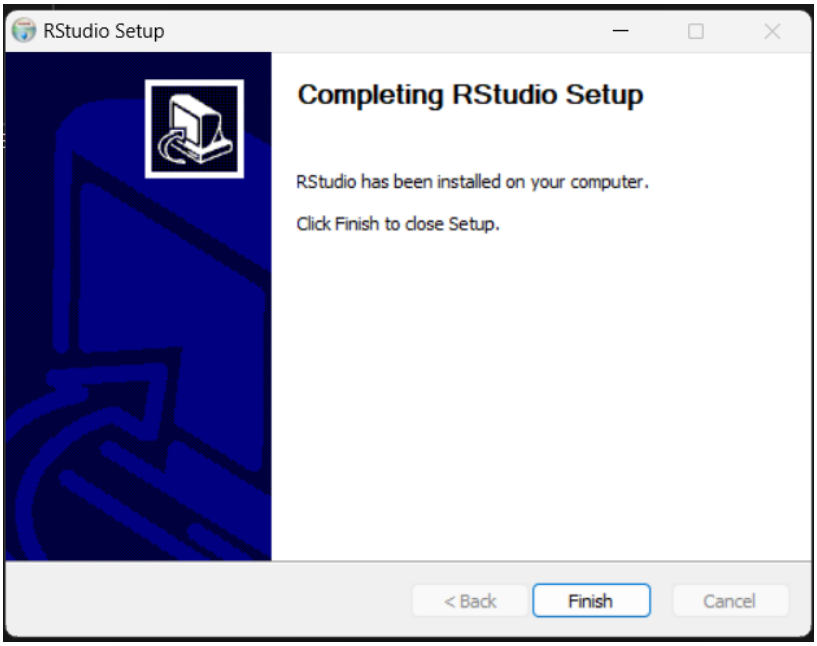
4. Click “Install”.



5. Wait until the Setup Wizard is done installing.



6. Hit the “Finish” button. Now, you are ready to use R via RStudio IDE.



Getting Started with RStudio IDE

2023 ITP-WS2

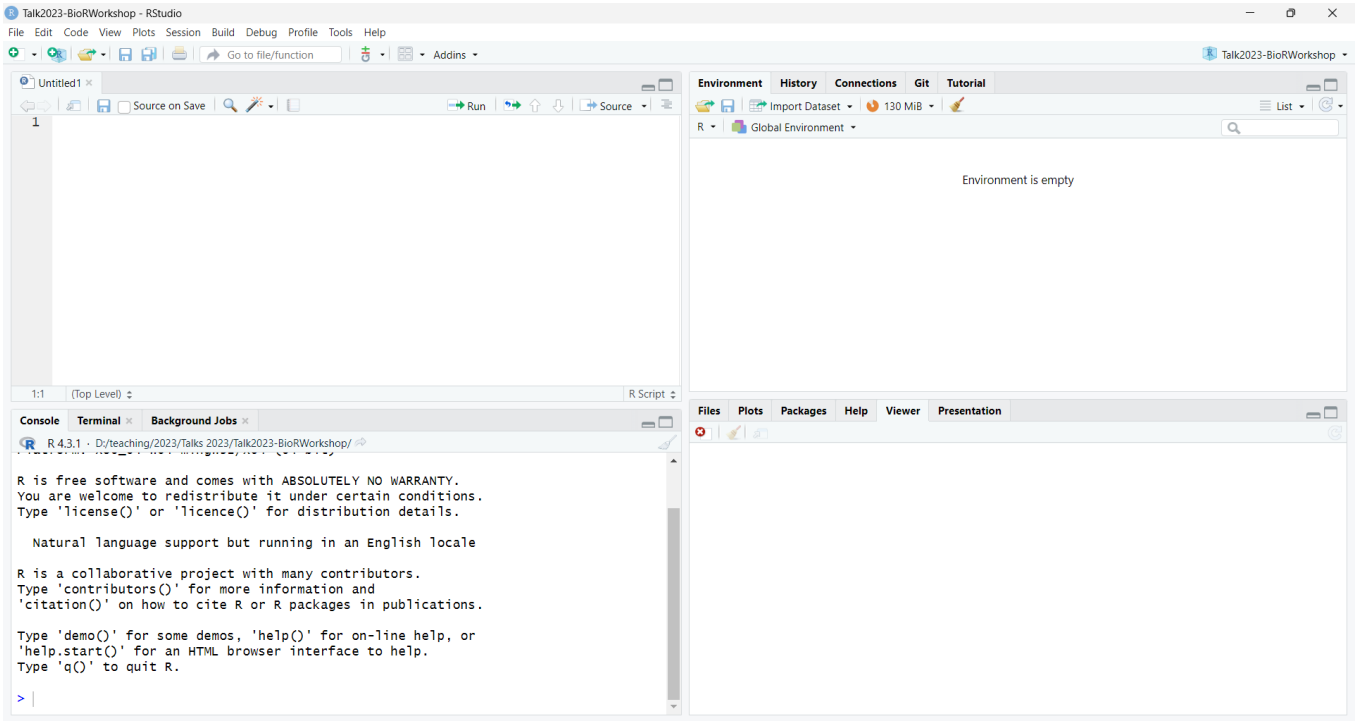
AUTHOR

Prof. Rey R. Cuenca

Math-Stat Dept., MSU-IIT

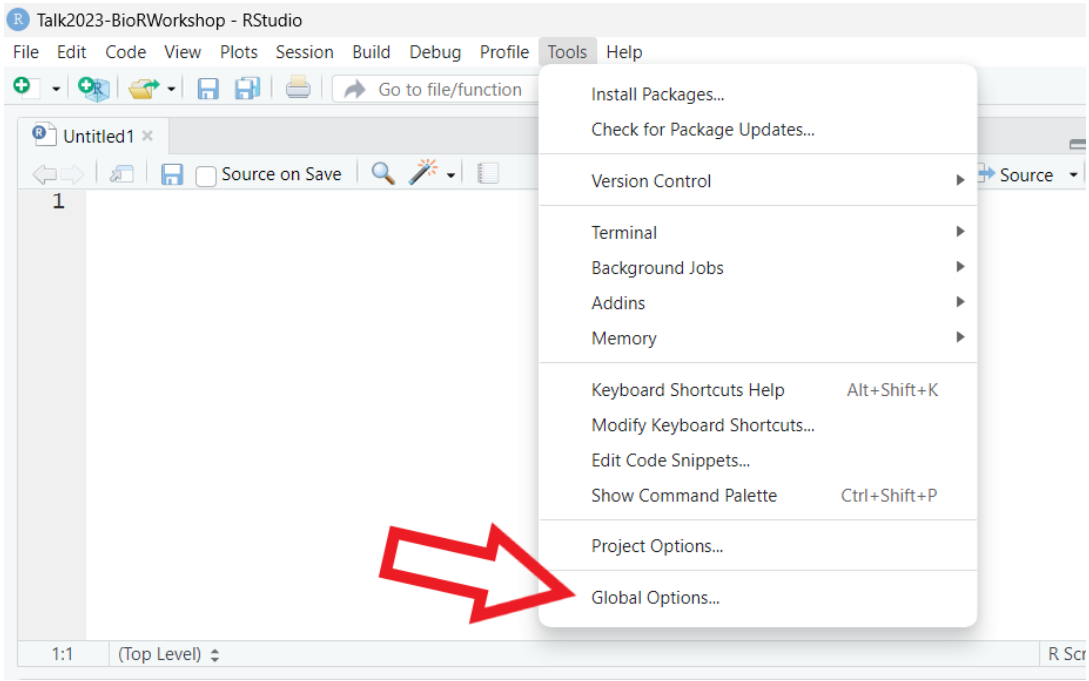
Dark Theme Setup (Optional)

By default, RStudio IDE has the following default theme as shown in the following screenshot.

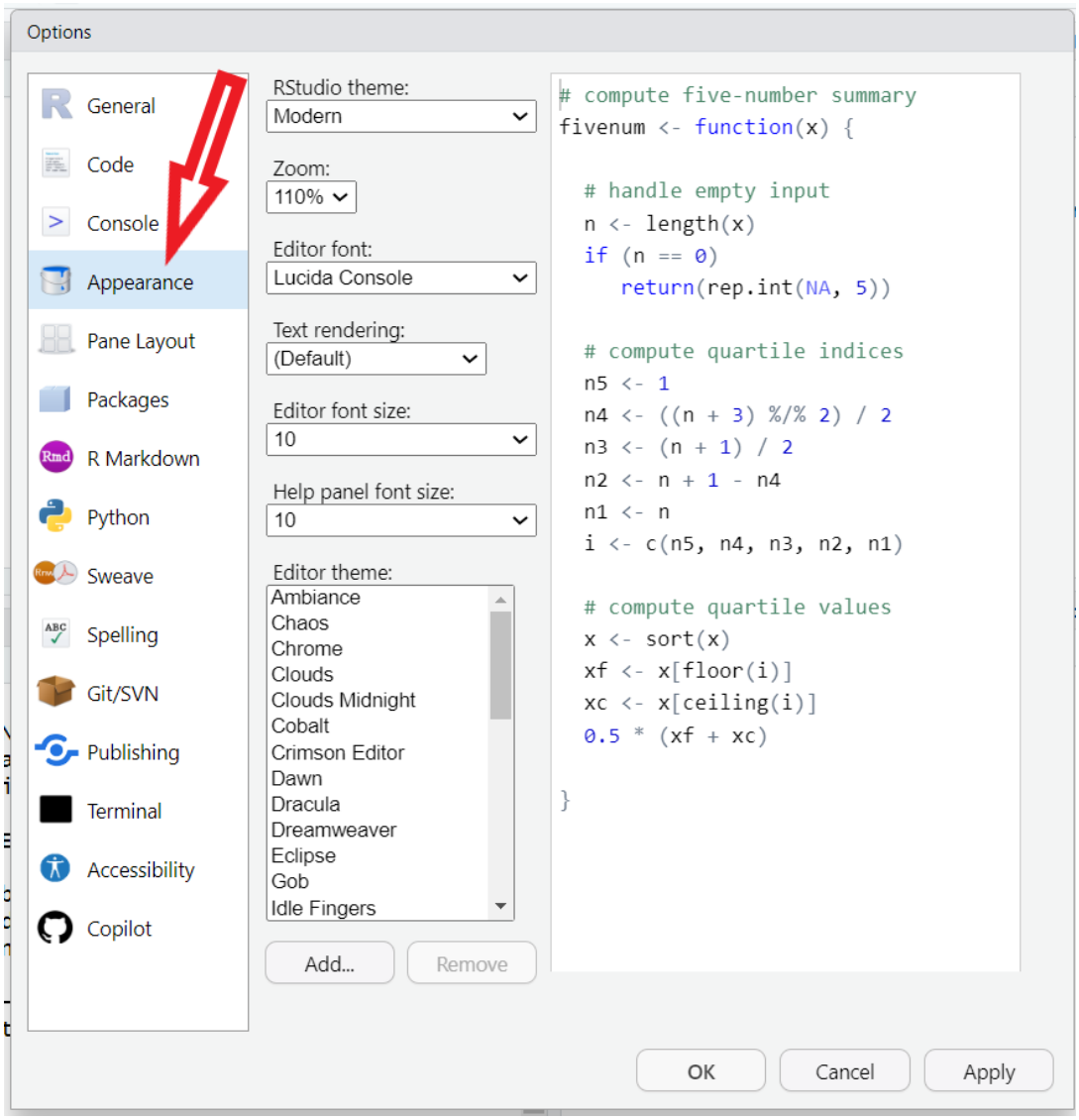


We can, however, change the theme of the IDE, say into Dark Theme. The steps of doing this are as follows:

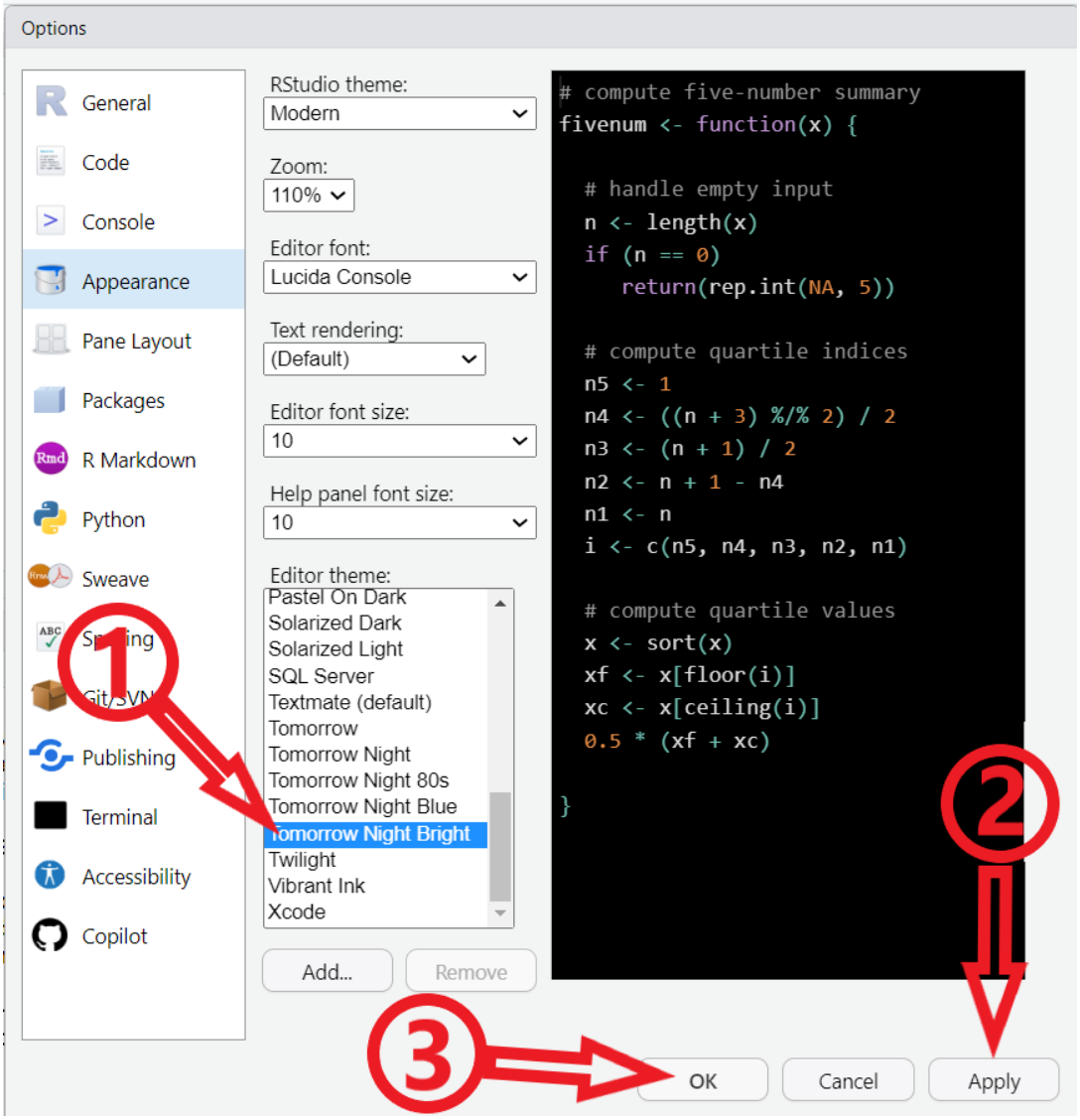
1. Go to `Tools > Global Options.`



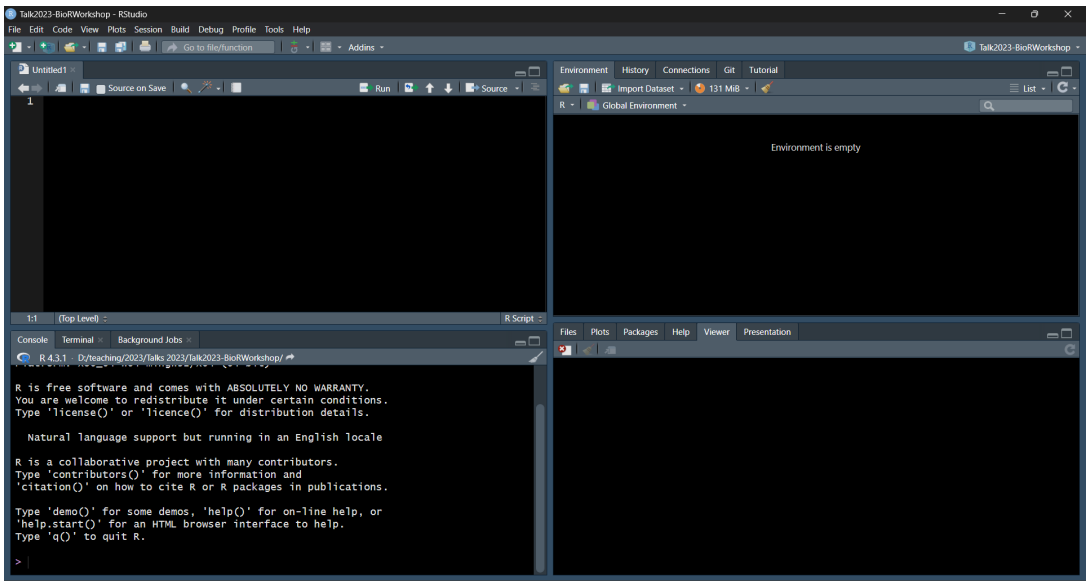
2. Navigate to the `Appearance` section.



3. In this demo, we choose `Tomorrow Night Bright` theme under the `Editor theme` section. Click `Apply` and then `OK`.



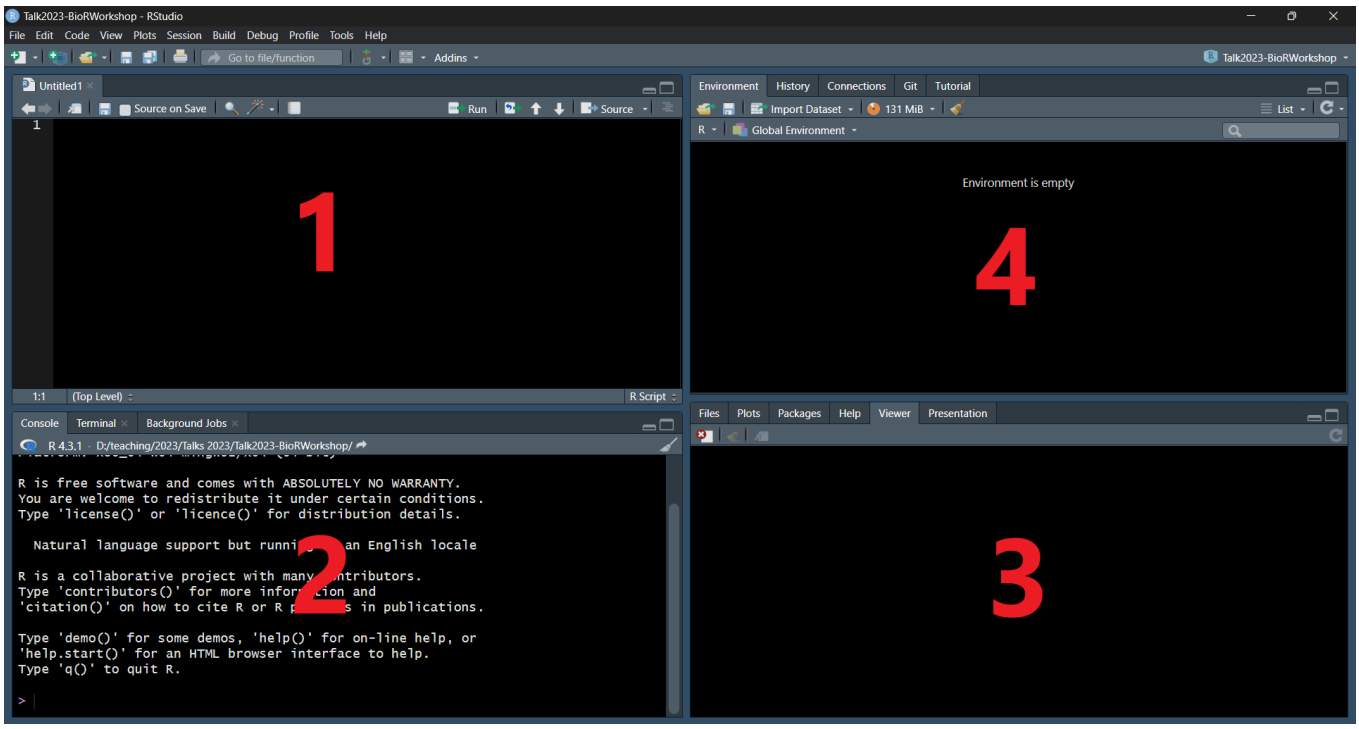
4. Doing Step 3 changes the theme as shown in the image below.



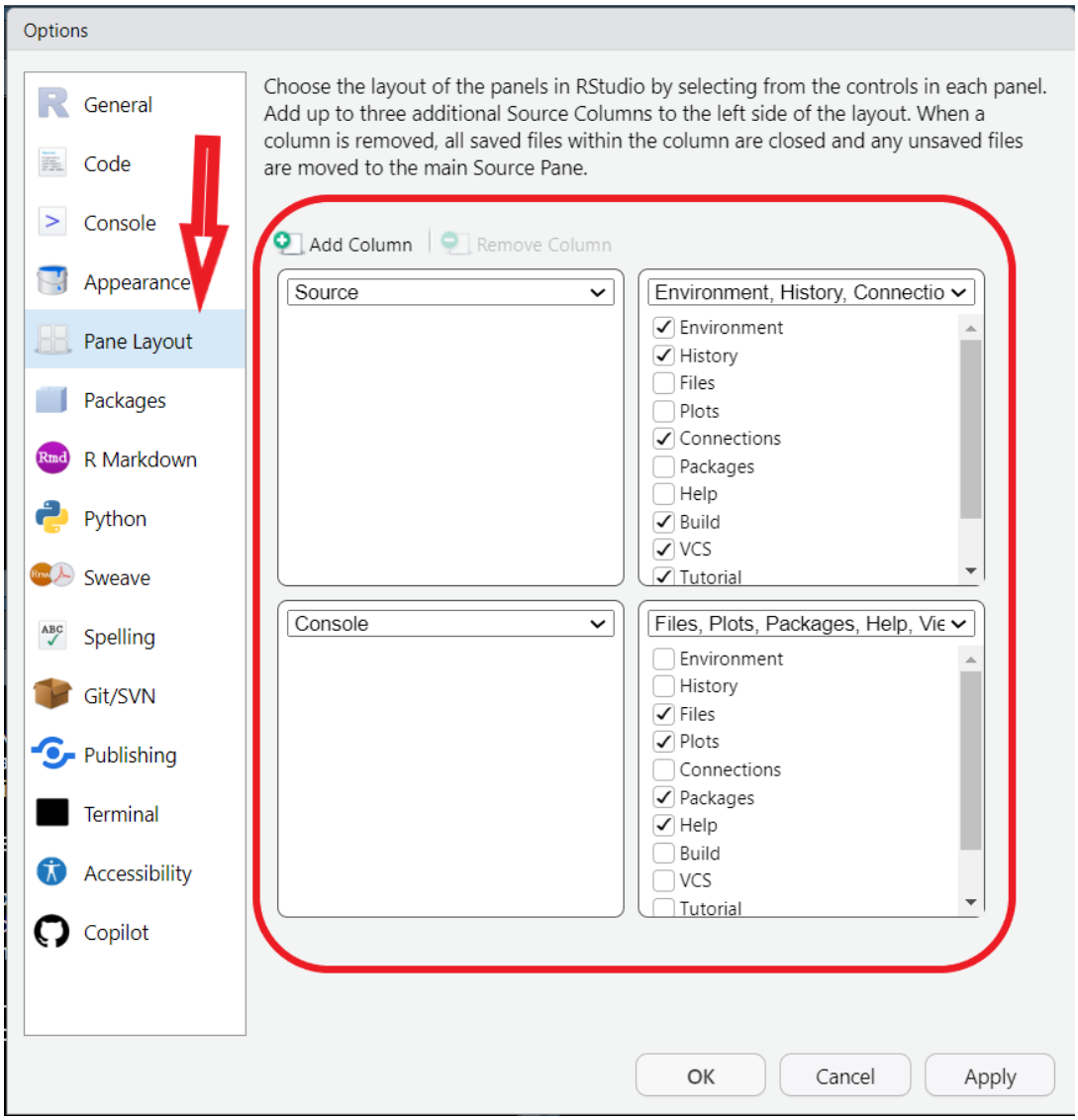
Pane Layouts

Majority of the area covered by the IDE consists of four primary panes.

1. **Source pane**
2. **Console pane**
3. **Output pane**, containing the **Files**, **Plots**, **Packages**, **Help**, **Viewer**, and **Presentation** tabs
4. **Environment pane**, containing the **Environment**, **History**, **Connections**, **Build**, **VCS** , and **Tutorial** tabs

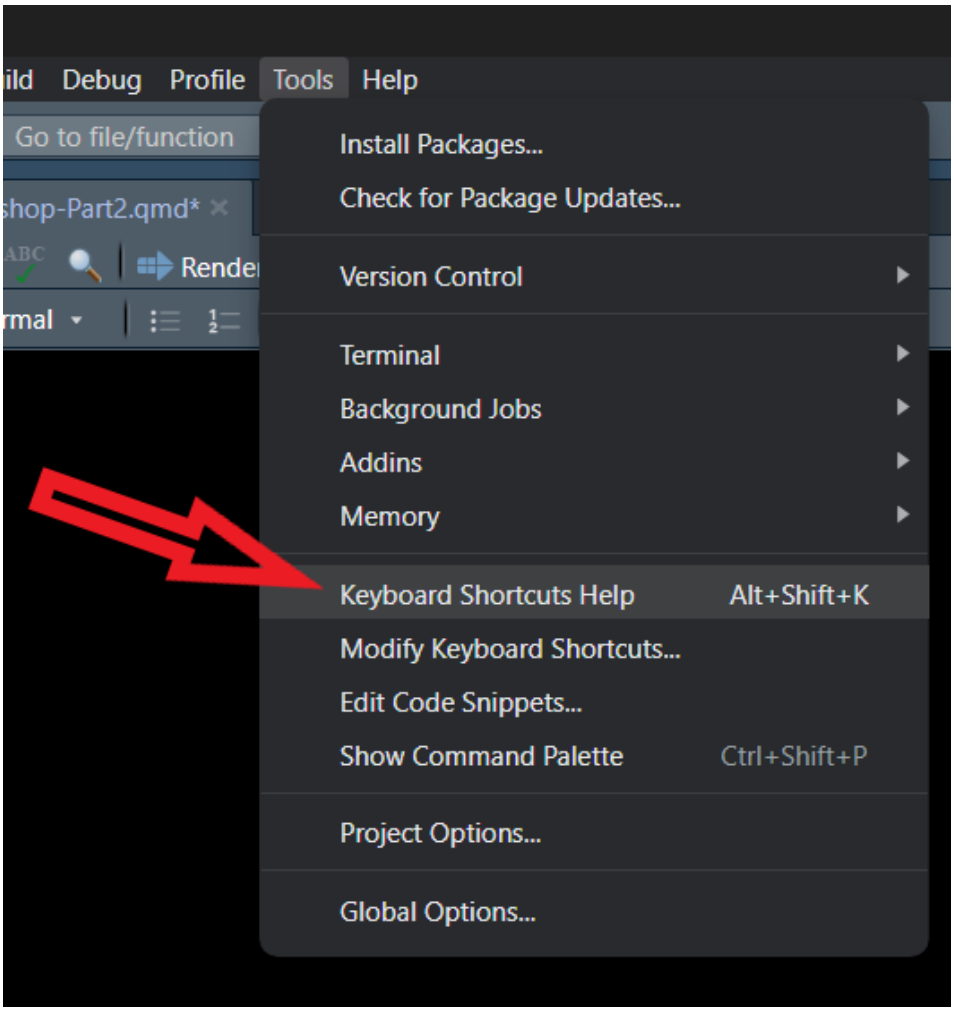


The arrangements and components of each pane can be modified by opening `Tools > Global Options > Pane Layout`：



Navigation via Keyboard Shortcuts

To get the best experience in using RStudio IDE by way of *keyboard shortcuts*. A list of default keyboard shortcuts in RStudio IDE can be accessed by navigating to `Tools > Keyboard Shortcuts Help` or by pressing `Alt + Shift + K` (for Windows) or `Ctrl + Shift + K` (for Mac):



A list of these keyboard shorts are provided as a tabset below:

Accessibility | Console | Source | Editing (Console and Source) | Completions (Console and Source) | Views | Help | Build | Debug | Plots | Git/SVN | Sessions | Terminal | Main Menu (Server)

Description	Windows & Linux	Mac
Toggle Screen Reader Support	Alt+Shift+/	Ctrl+Shift+U
Speak Text Editor Location	Alt+Shift+1	Ctrl+Option+1
Focus Console Output	Ctrl+` or Alt+Shift+2	Ctrl+` or Ctrl+Option+2
Toggle Tab Key Always Moves Focus	Alt+Shift+[	Ctrl+Option+[
Focus Next Pane	F6	F6
Focus Previous Pane	Shift+F6	Shift+F6
Focus Main Toolbar	Alt+Shift+Y	Ctrl+Option+Y

Frequently Used Key Shortcuts

1. Insert a new code chunk: `Ctrl + Alt + I` or `Option + Command + I`
2. Insert assignment operator `<-` : `Alt + (minus)` or `Command + (minus)`
3. Comment out the current line where the cursor is located or the entire highlighted lines: `Cntrl + Shift + C` or `Shift + Command + C`
4. Run all codes in the current chunk: `Ctrl + Shift + Enter` or `Shift + Command + Return`
5. Run the code in the current line where the cursor is located: `Ctrl + Enter` or `Shit + Return`
6. When a cursor is located to an R object,
    i. pressing `F1` navigates to the help page of this object and
    ii. pressing `F2` opens the definition of this object.
7. Insert pipe (`%>%`) operator: `Ctrl + Shift + M` or `Shift + Command + M`
8. Auto-completion (on snippets and function arguments) using the `Tab` button.
9. Clear the Console: `Ctrl + L` or `Shift + L`

Installing, Loading and Updating Packages

2023 ITP-WS2

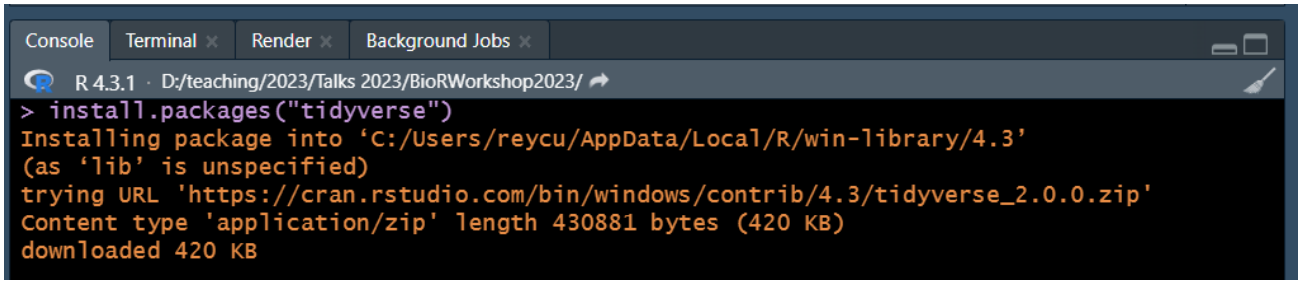
AUTHOR
Prof. Rey R. Cuenca
Math-Stat Dept., MSU-IIT

Installing Packages

We now demonstrate how to install a package with `tidyverse` package as an example.

1. Go to the console pane, type the following code and hit Enter.

```
install.packages("tidyverse")
```



2. Alternatively, one go to `Tools > Install Packages` and type on `Packages` blank entry the name of the package you want to install, e.g. `tidyverse`. Once done click "Install".

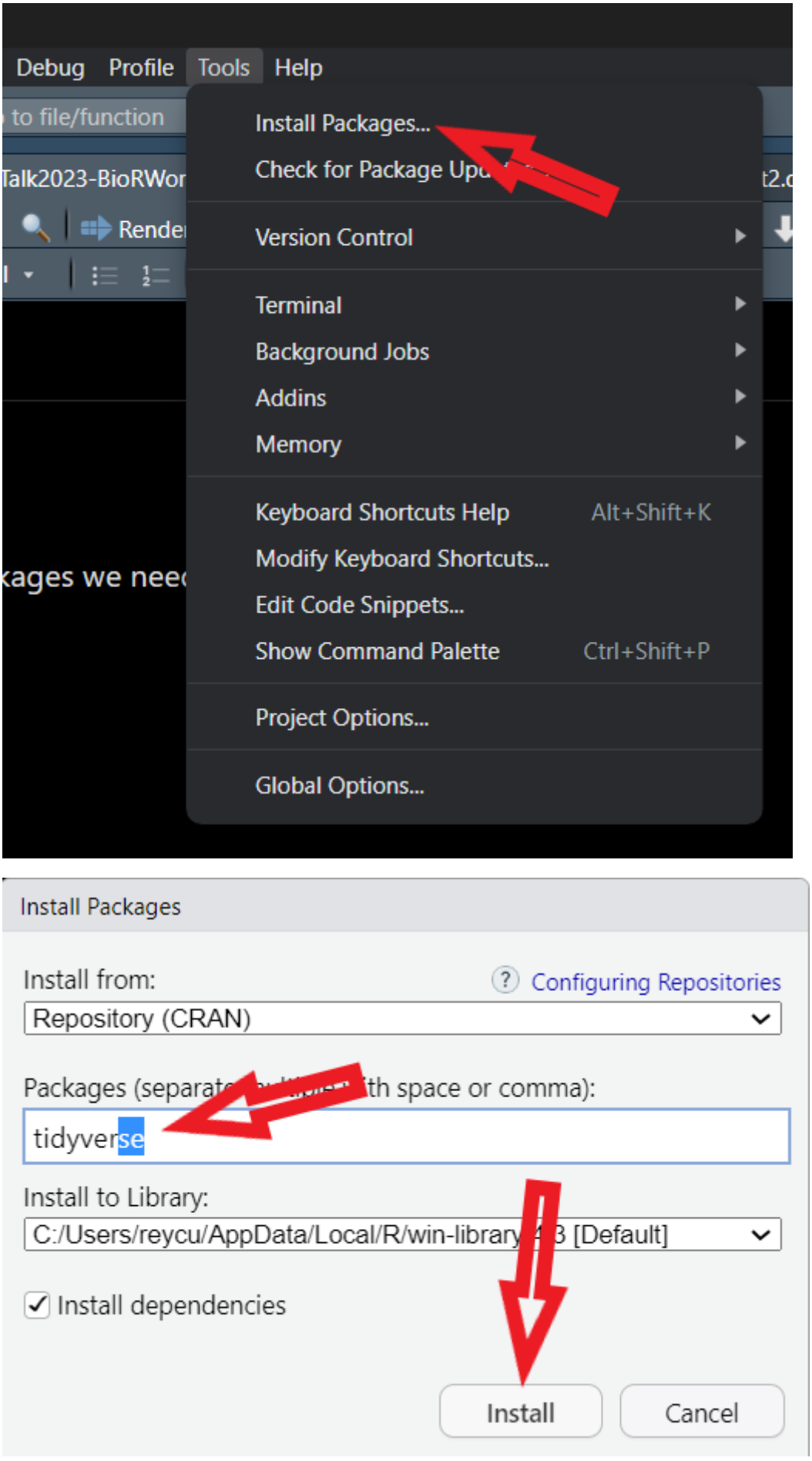


Figure 1: Installing packages using RStudio's Tools menu.

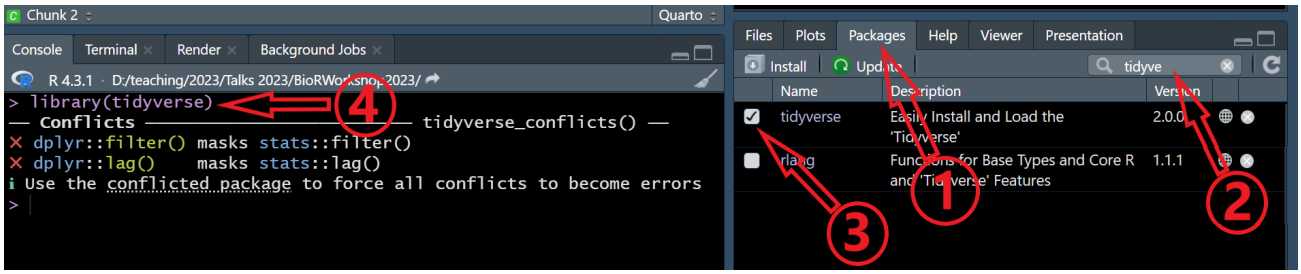
Loading Packages

There are two ways to load a package in a current session of R.

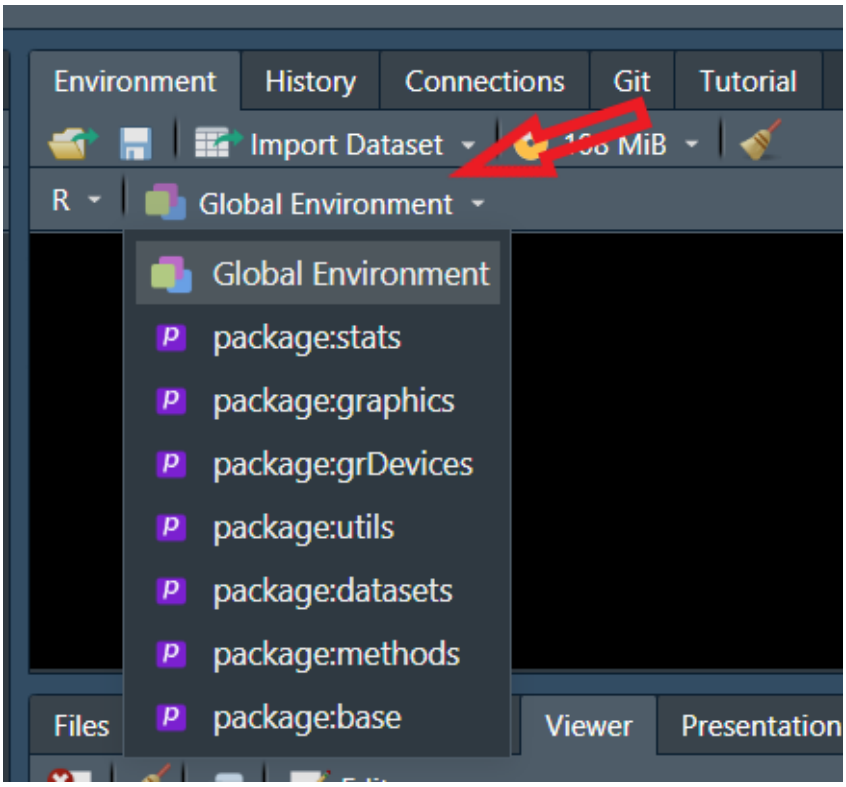
1. Using the Console, type the following command line and hit Enter.

```
library(tidyverse)
```

2. Using `Packages` tab in the `Output Pane`, first search the name of the package (assuming it is already installed) in the mini-search bar. Check the corresponding check box that matches to the package you want to load in the current session of R.



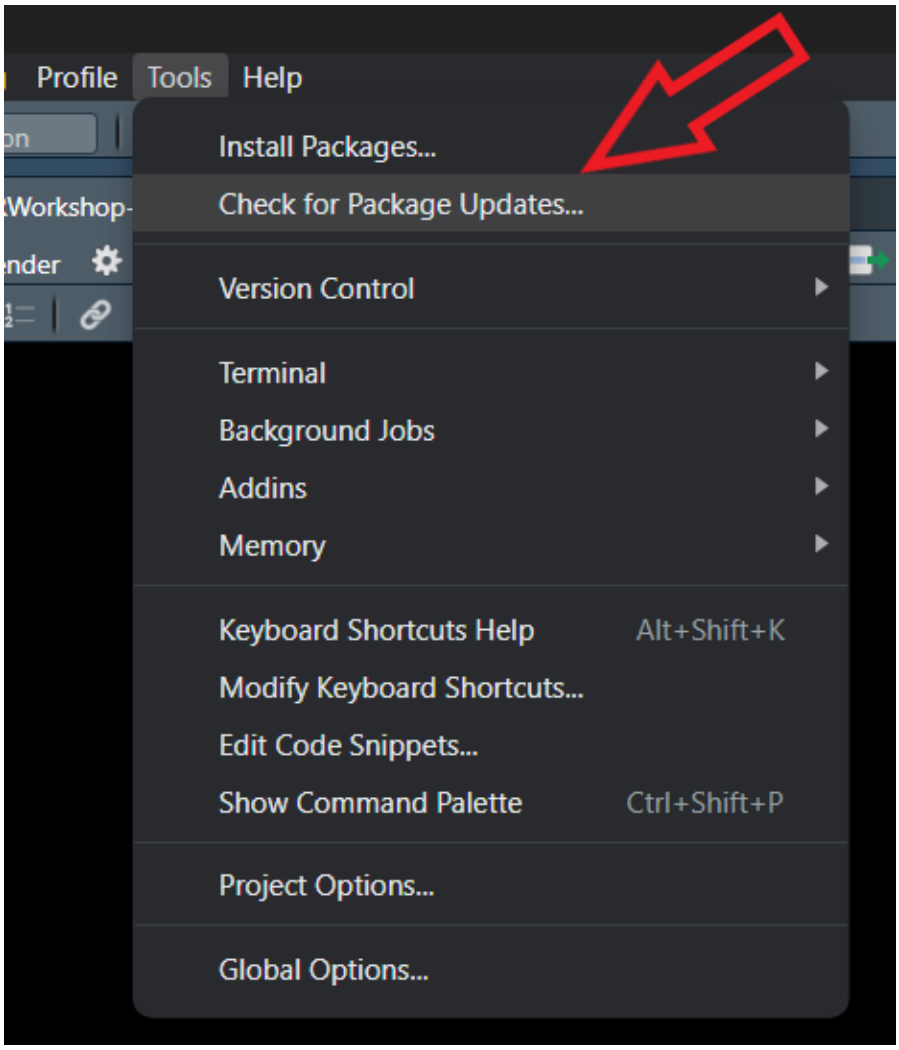
When you installed R for the first time in you system, some packages are already pre-installed along with it. Some of these packages are even pre-loaded when you open RStudio:



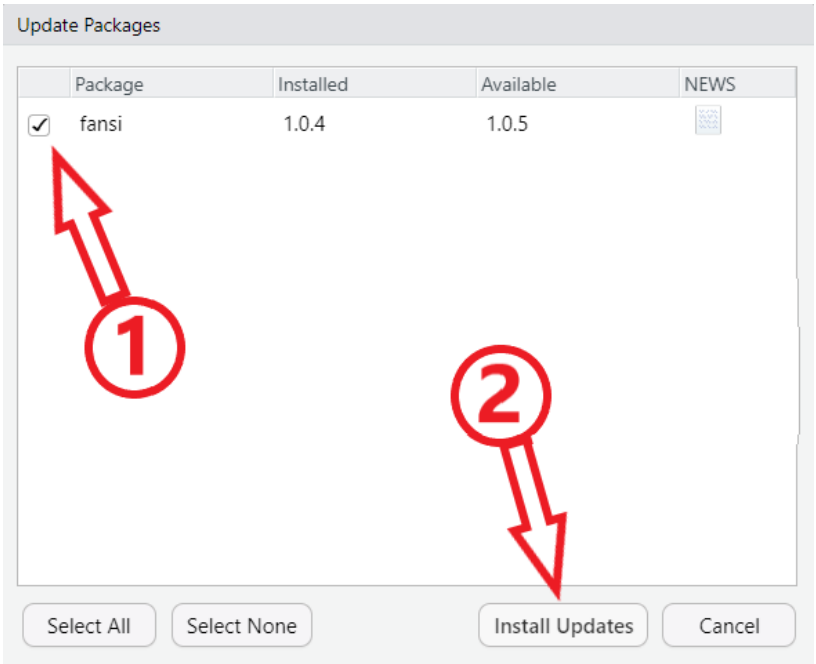
Updating Packages

To check for updates on all currently installed packages,

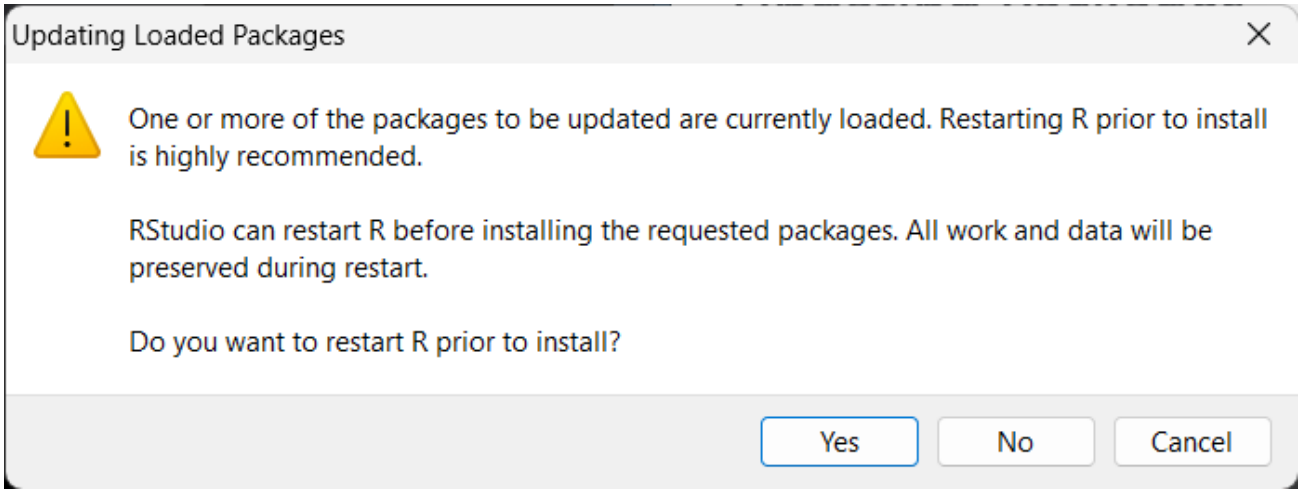
1. Go to `Tools > Check for Package Updates`:



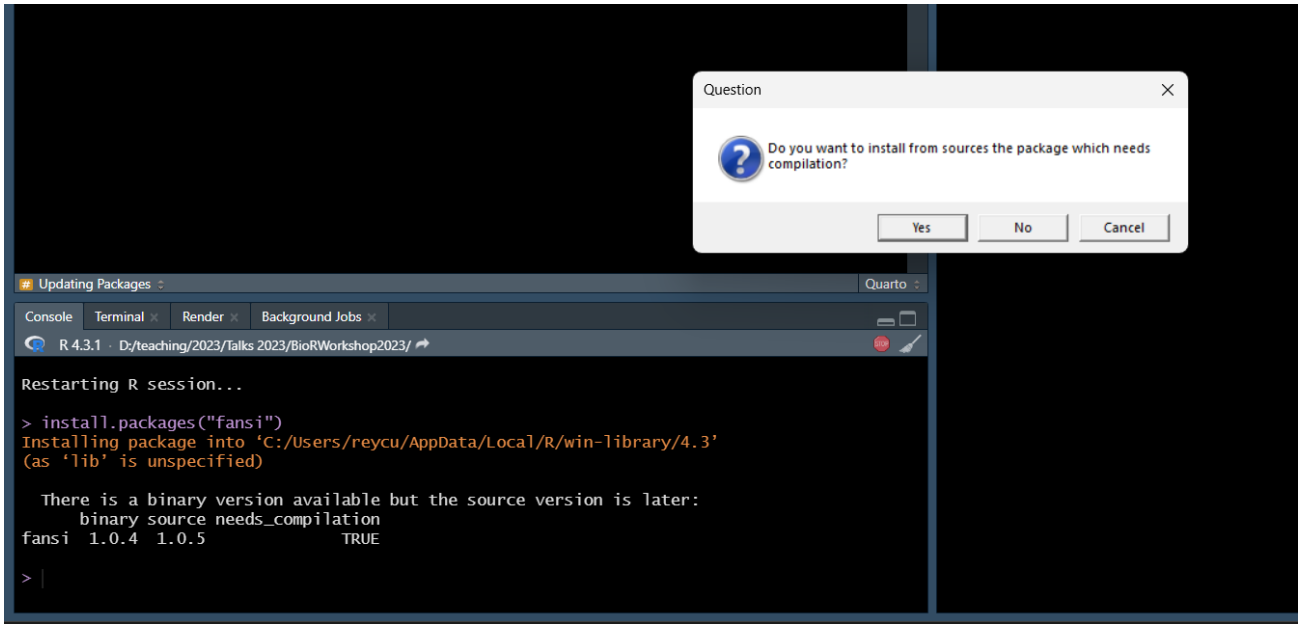
2. Check the boxes of all packages you want to update and click “Install”.



3. Sometimes you are prompted to restart you current session if some packages are pre-loaded that needs to updated simultaneously with the package we want to update. Just click “Yes”. (**Note:** If this problem still persists, just close the current project and do steps 1 and 2 again.) Moreover, there is also the case when updating a package gives you an option on whether to compile from source or not. Usually, we just click “Yes” on this.



(a) Prompt to Restart



(b) Compile from Source

Figure 2: Other possible scenarios during updating of packages.

4. The last step is to wait for the installation to finish and then you are done.