Introduction to R

Lecture 2

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Overview

Talk Overview

Useful information

- R was created by Ihaka (left) and Gentleman (right).
- R software is more appropriate for statistical analysis.
- R is open-source and free of charge under the GNU General Public Licence.

https://www.r-project.org/

A huge number of plot functions that helps into visialization and understand the data structure.

Variables, functions, results, etc. stored in the RAM of a computer, i.e. objects, with a specif name.

Every object starts with a capital or lowercase letter following by numbers and dots.

Why R?

Extremely powerful programming language.

Easy to use, easy to learn, and excellent flexibility.

Many publications from the Statistical Science field, provide their analysis with R.

Secure! R is open-source → anyone who using R can have an access to the code, before doing an analysis.

Amazing graphical environment.

Absolutely free in comparison with other alternatives statistical packages, like Minitab, SPSS, etc.

Packages

R comes with some packages that are appropriate for the basic functionalities.

All functions are stored into a library and this library contains function packages.

Package name "*base*" is the heart of the R and includes all the basic functions which are necessary to work with data.

Apart from the previous the R community has been contribute with more than 19000 packages so far.

Some packages must be load to R before we use them.

Infinitely many applications like

- Economic Analysis
- Medicine
- Social Sciences
- Natural Sciences
- etc.

Packages of R

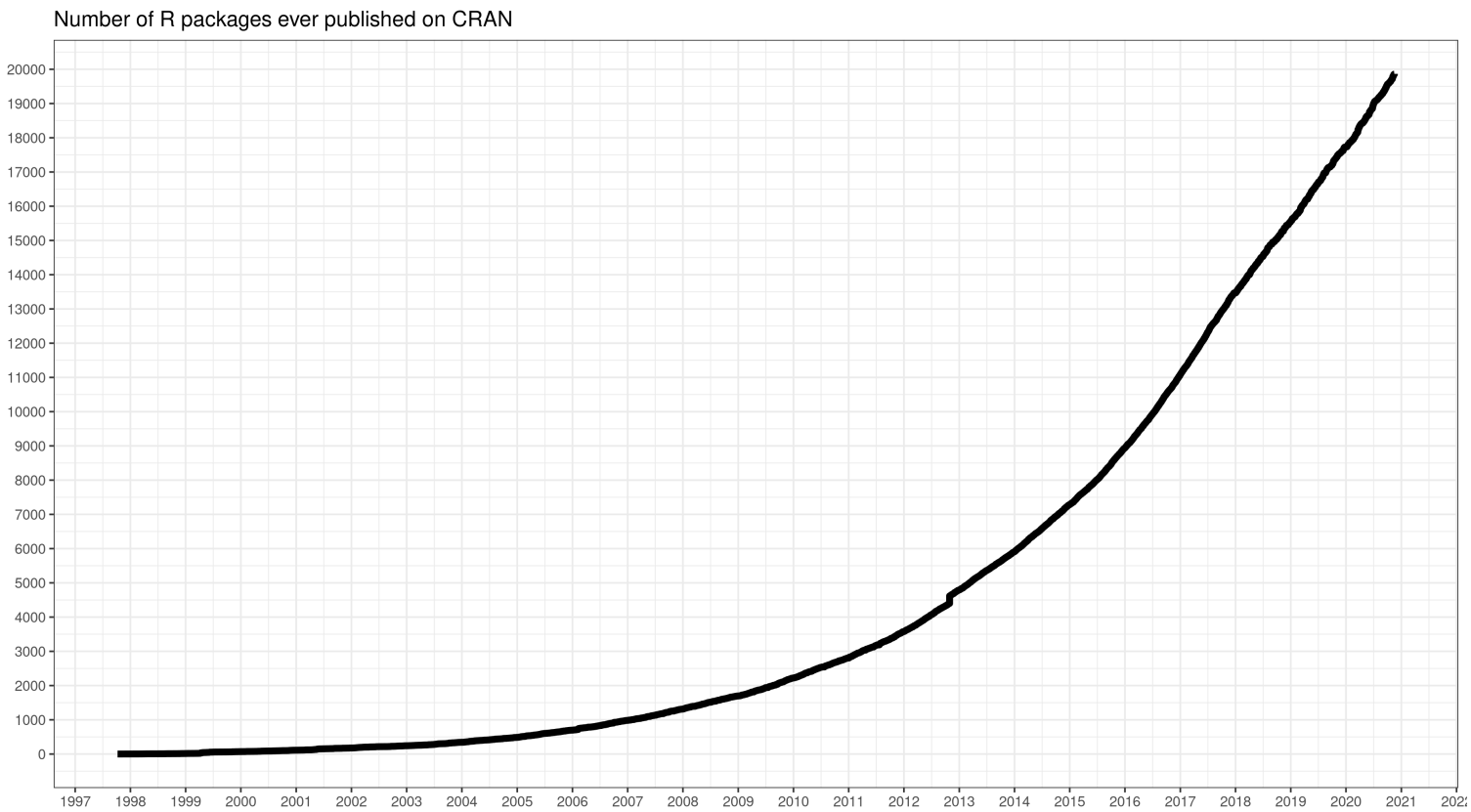


Figure: *The growth of submitted packages on CRAN. [Dar24]*

Popularity of R

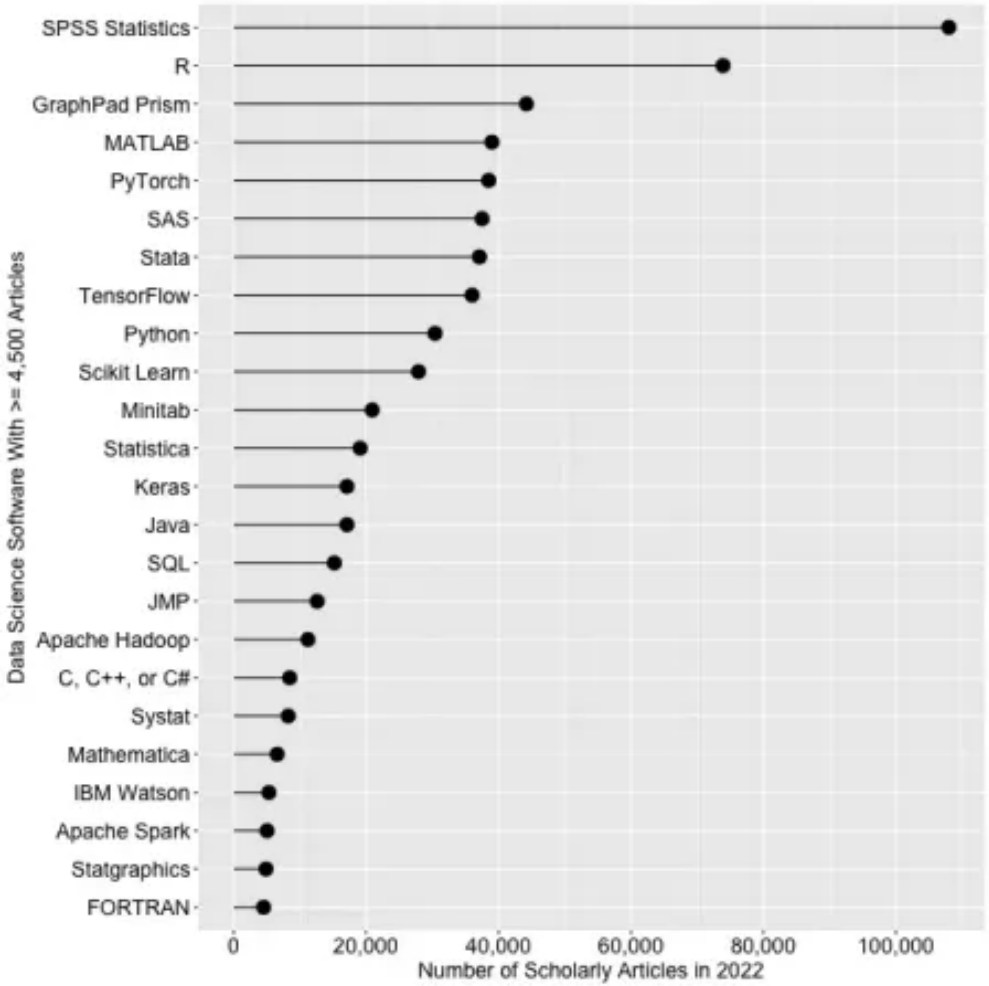


Figure: *Popularity of R vs other software packages. [RAD22]*

Environment of R

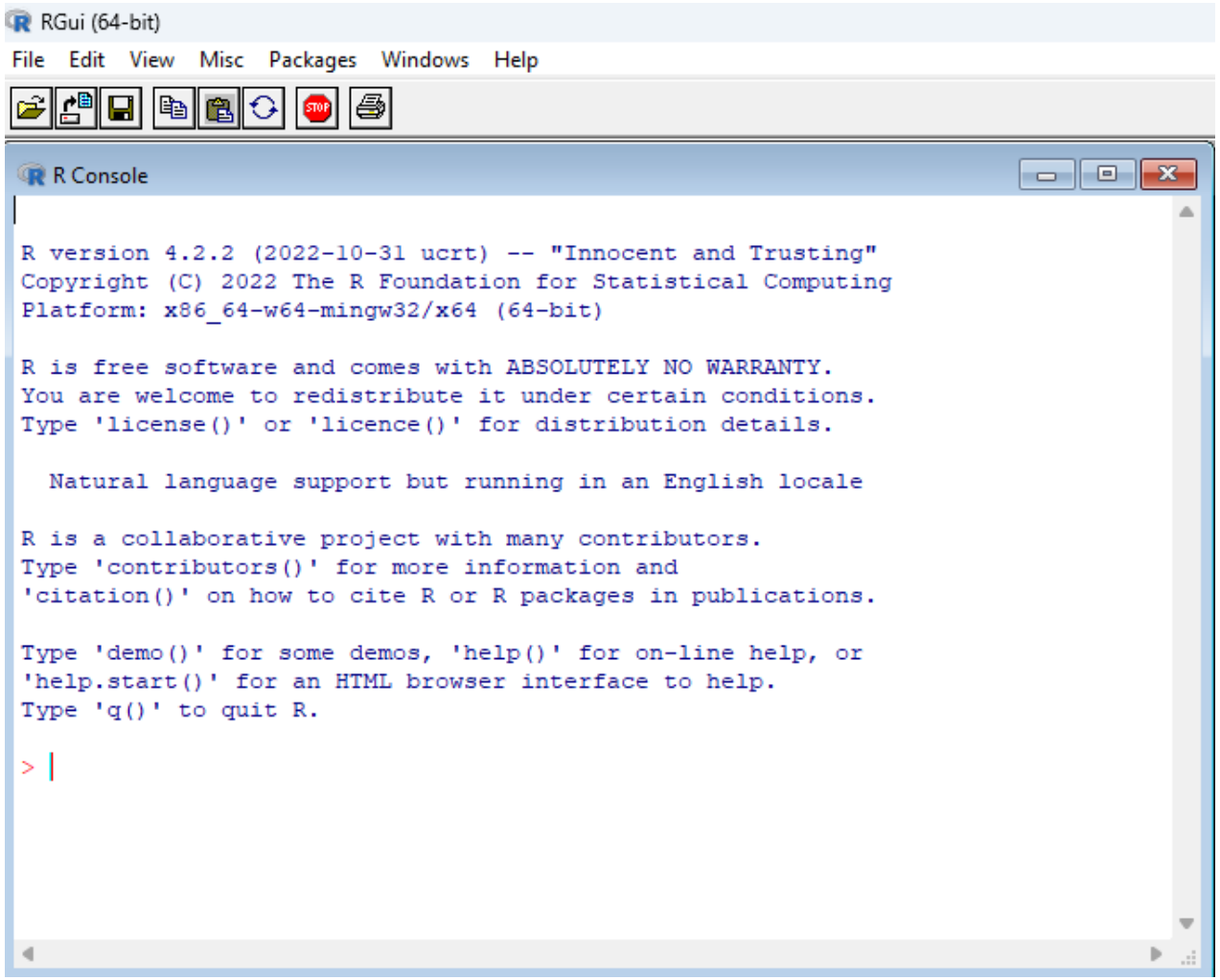


Figure: *The R environment.*

File

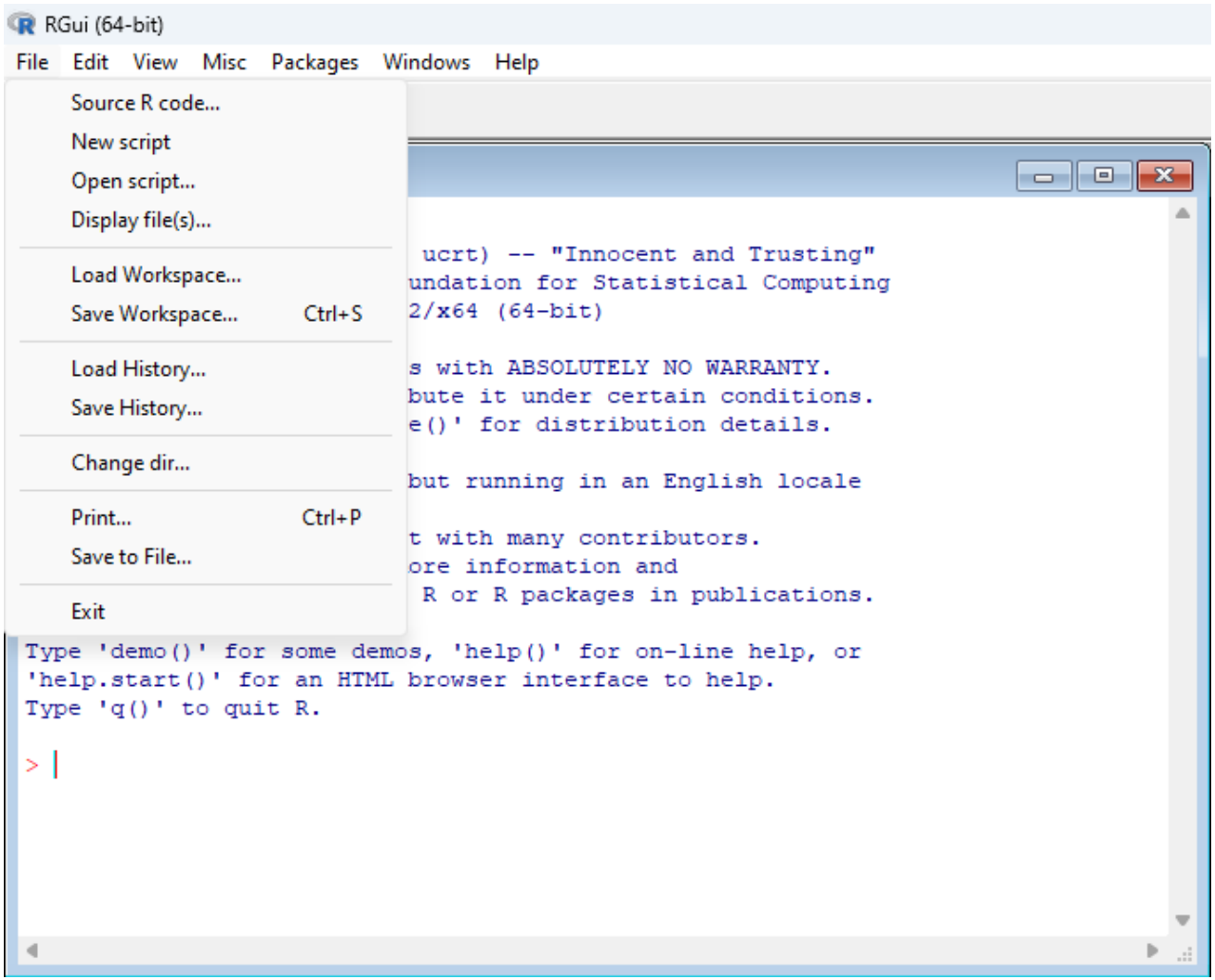


Figure: *File option of* R.

File options

Source R code

Import and execution previous commands.

New Script

Open a new script and print out what we want to do. Select all the typed expression → right click → **Run line or selection** or ***Ctrl* + *R***.

Open script

To open a file that we have created, for further editing.

Display file(s)

Shows the available files in our working directory.

Load / Save Workspace

To **Load** or **Save** (***Ctrl* + *S***) previous Workspace results where we have been created.

Load / Save History

Import or save commands where we have been created.

Change dir

To change the current working directory.

Edit

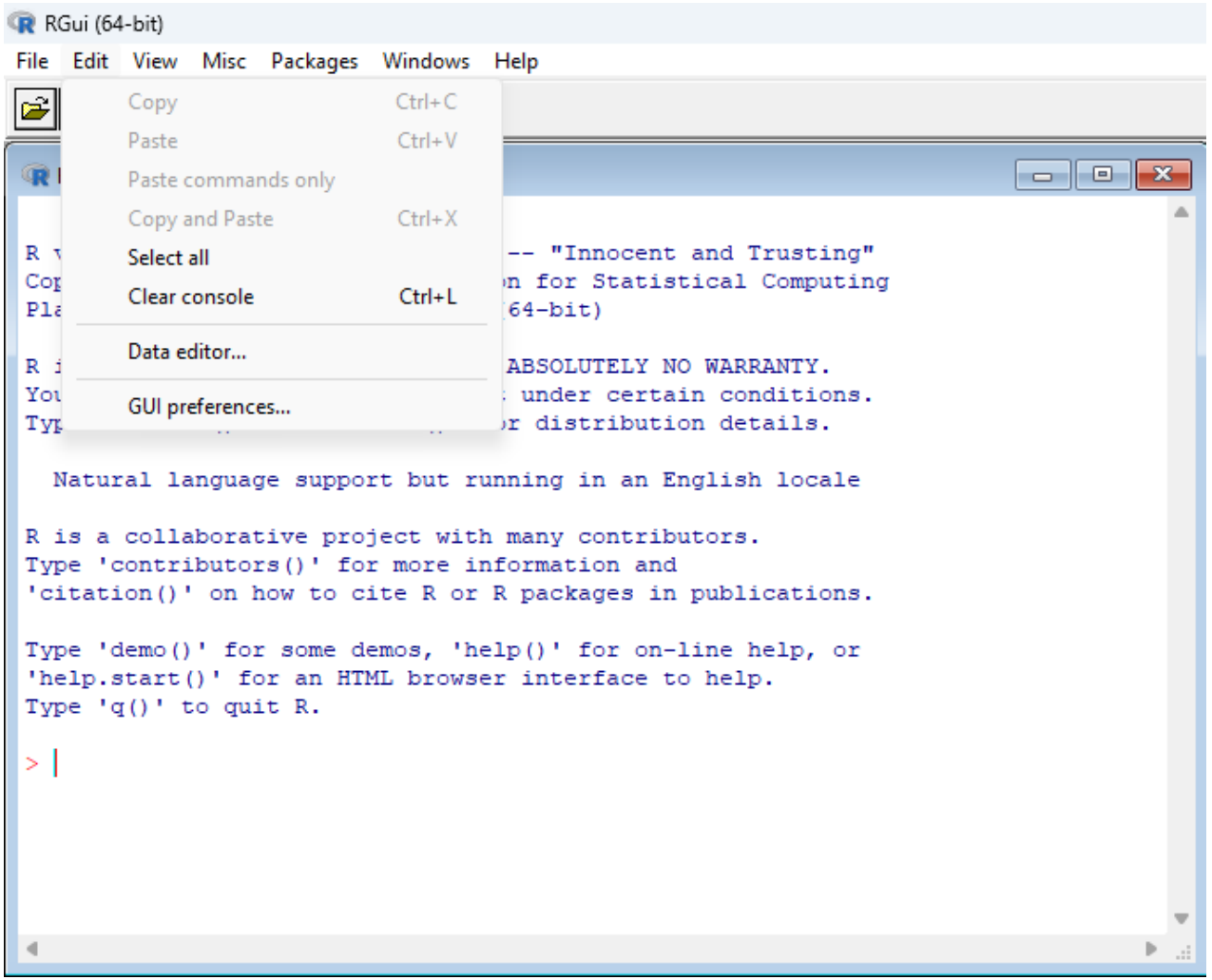


Figure: *Edit option of* R.

Edit options

Copy, **Paste**, **Select all**,. . . → no comments :)

Data editor

Open data frames and edit them

GUI Preferences

Change the working environment (fonts, etc.).

View

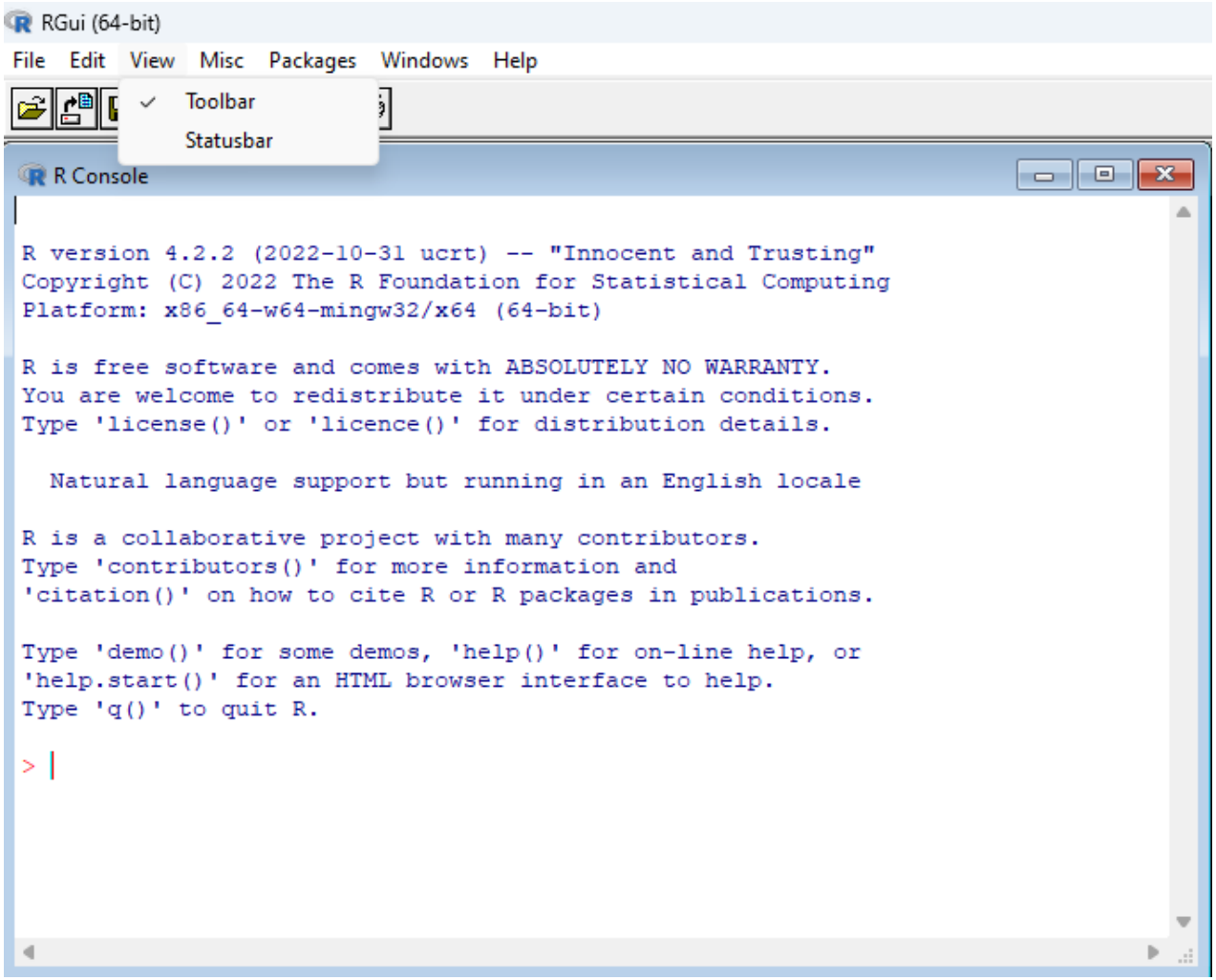


Figure: *View option of* R.

View Options

Toolbar

To cover or uncover the toolbar.

Statusbar

To cover or uncover the statusbar (information regarding the current version of R).

Misc

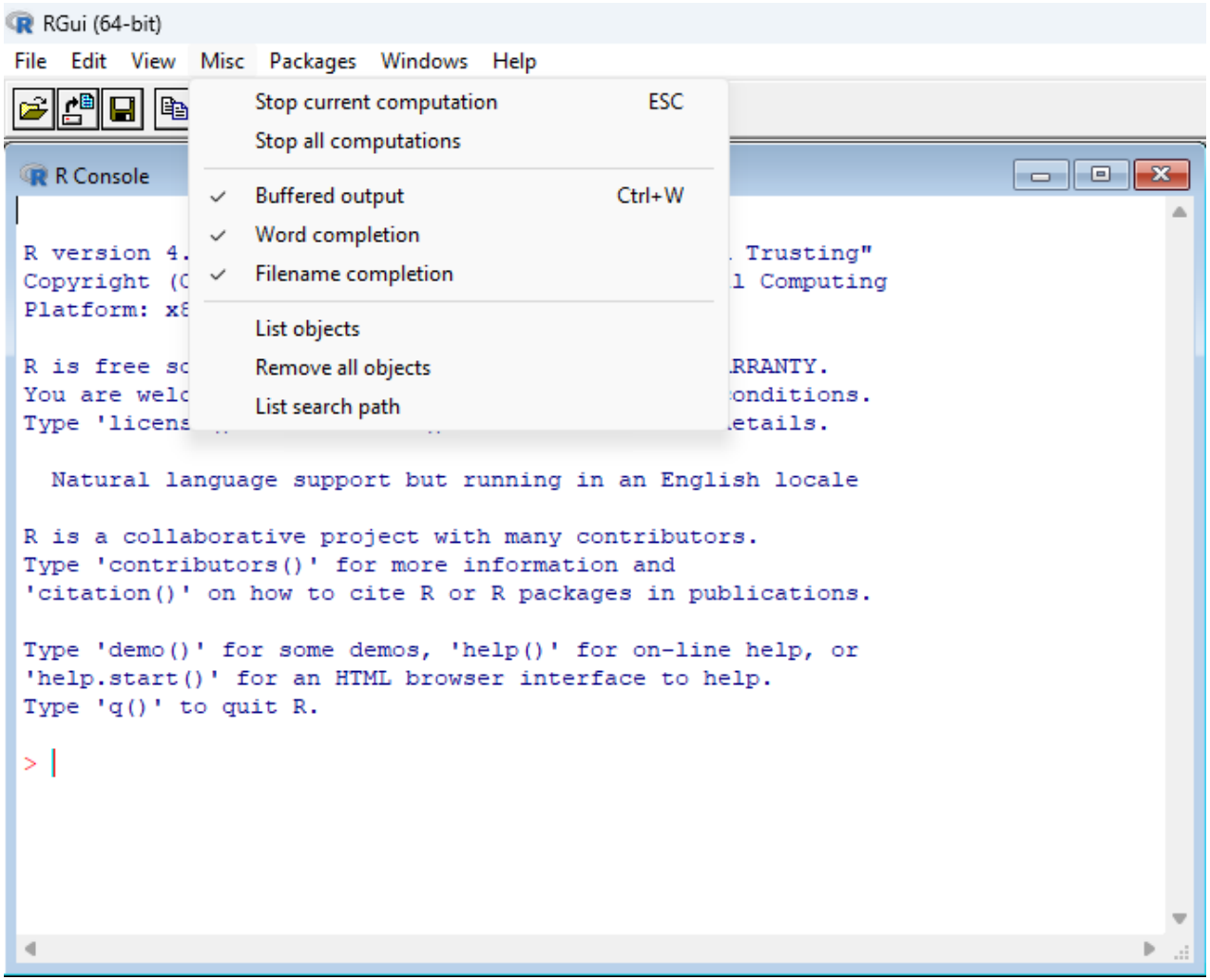


Figure: *Misc option of* R.

Misc options

User can stop current or all computations.

User can stop print results (buffered output or Ctrl+W).

User can access all the objects have been created (List objects).

User can remove all these objects have been created (Remove all objects).

User can view which libraries and data frames have been used in the current working environment (List search path).

Packages

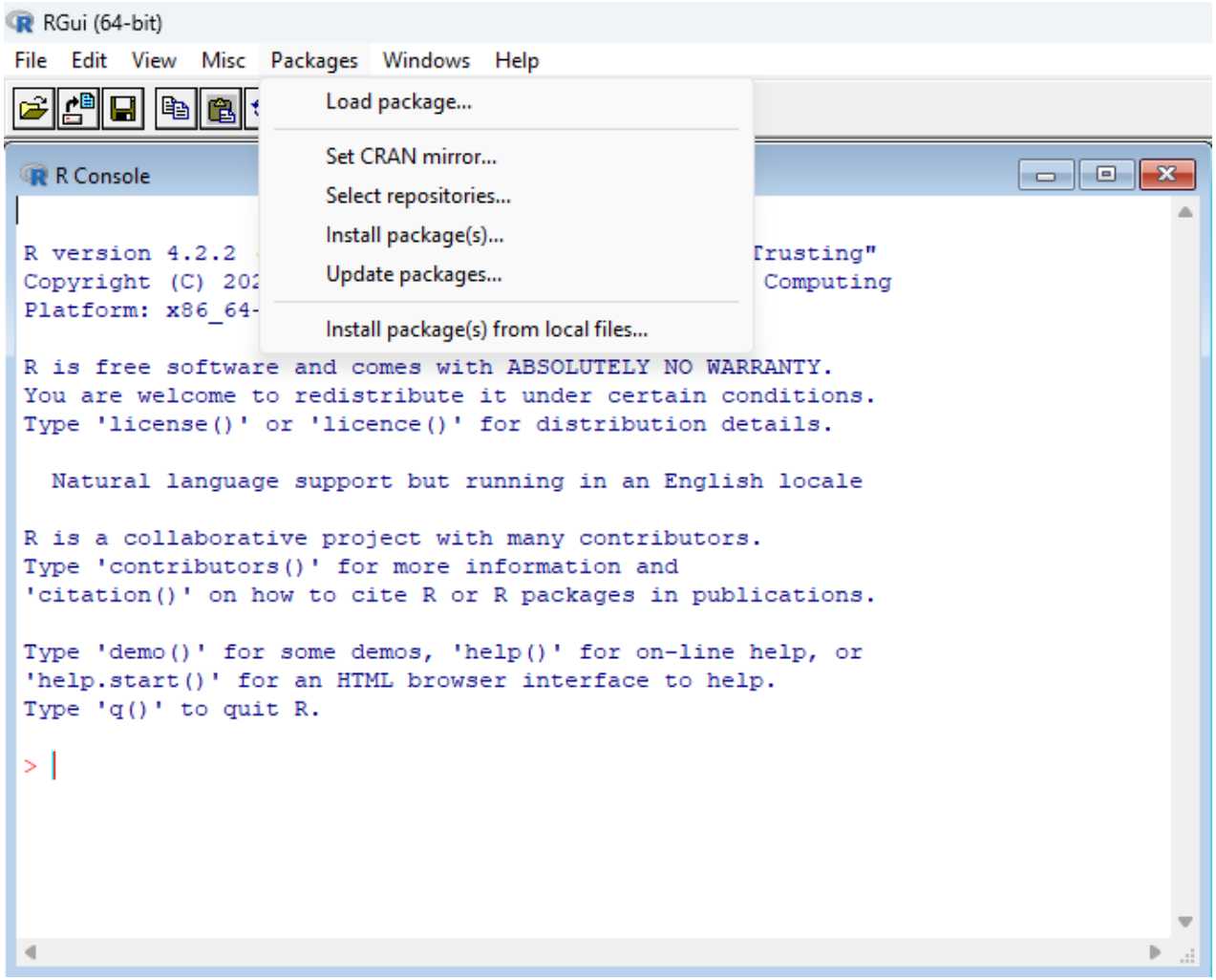


Figure: *Packages option of R.*

Packages options

A user can load packages that have been already download (Load Package).

A user can choose from which place of the world wants his packages been download (Set CRAN mirror).

Interact with the user to choose the package repositories to be used (Select repositories).

A user can download packages from the CRAN (Install package(s)).

A user can update one or all packages that have been downloaded (Update package(s)).

A user can install packages that have been downloaded priviously and saved localy in the HDD (Install package(s) from local files).

You can install a package with the following command in the R console:

```
install.packages("name of a package")
```

`search()`: Gives a list of attached packages.

`installed.packages()`: Returns details of all packages installed.

Windows

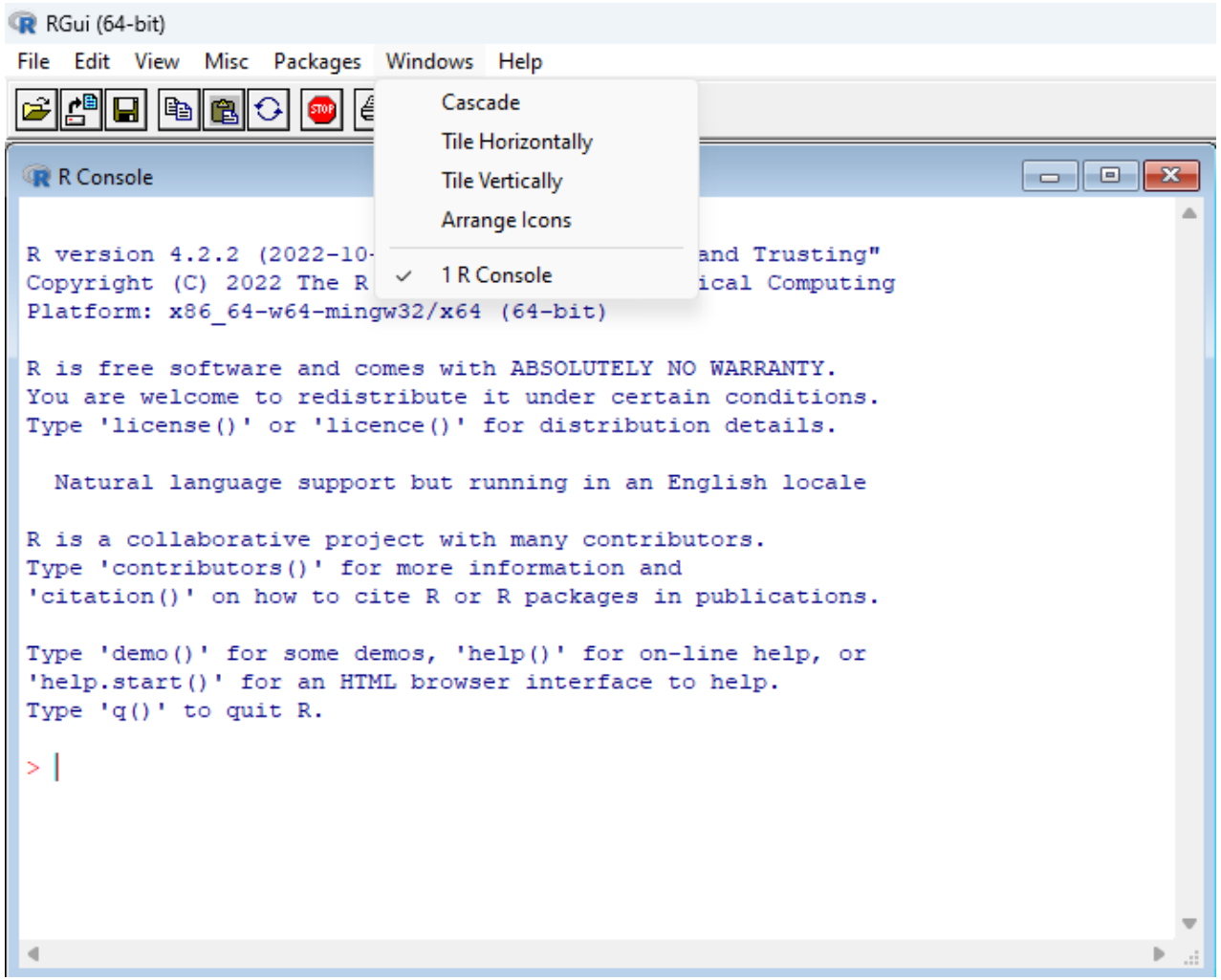


Figure: *Windows option of R.*

Windows options

A user can arrange all opened windows have been produces by R and arrange them in four different ways:

- Cascade.
- Tile Horizontally.
- Tile Vertically.
- Arange Icons.

Help

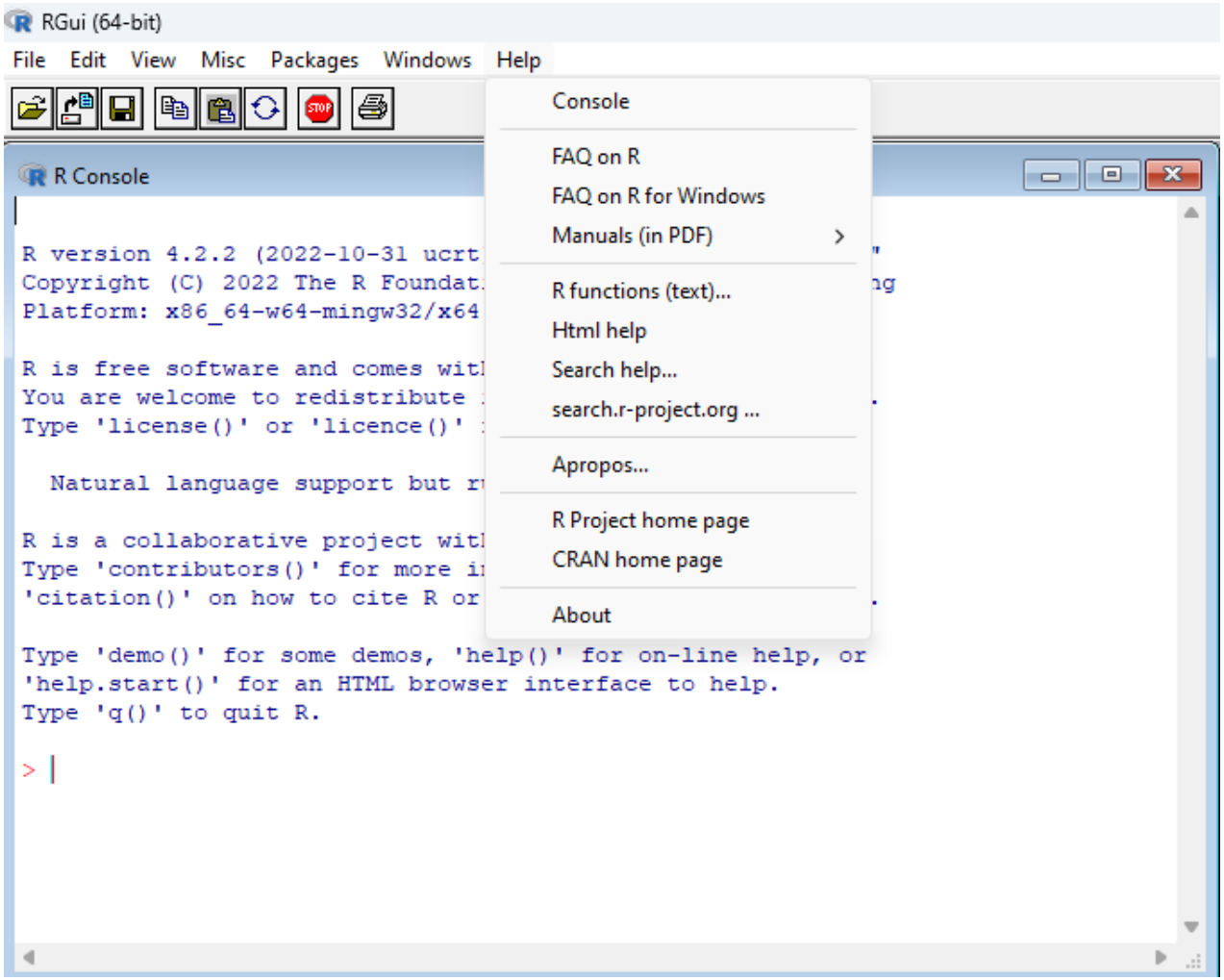


Figure: *Help option of* R.

Talk Overview

Numerical operators

Symbol	Operation
$+$	Addition
$-$	Substraction
$\times$	Multiplication
$\div$	Divisor
$\wedge$	Power
$x\%/\%y$	Integer division
$x\%\%y$	Modulus (remainder)

Table: *Numerical Operations of* R.

Installation of R

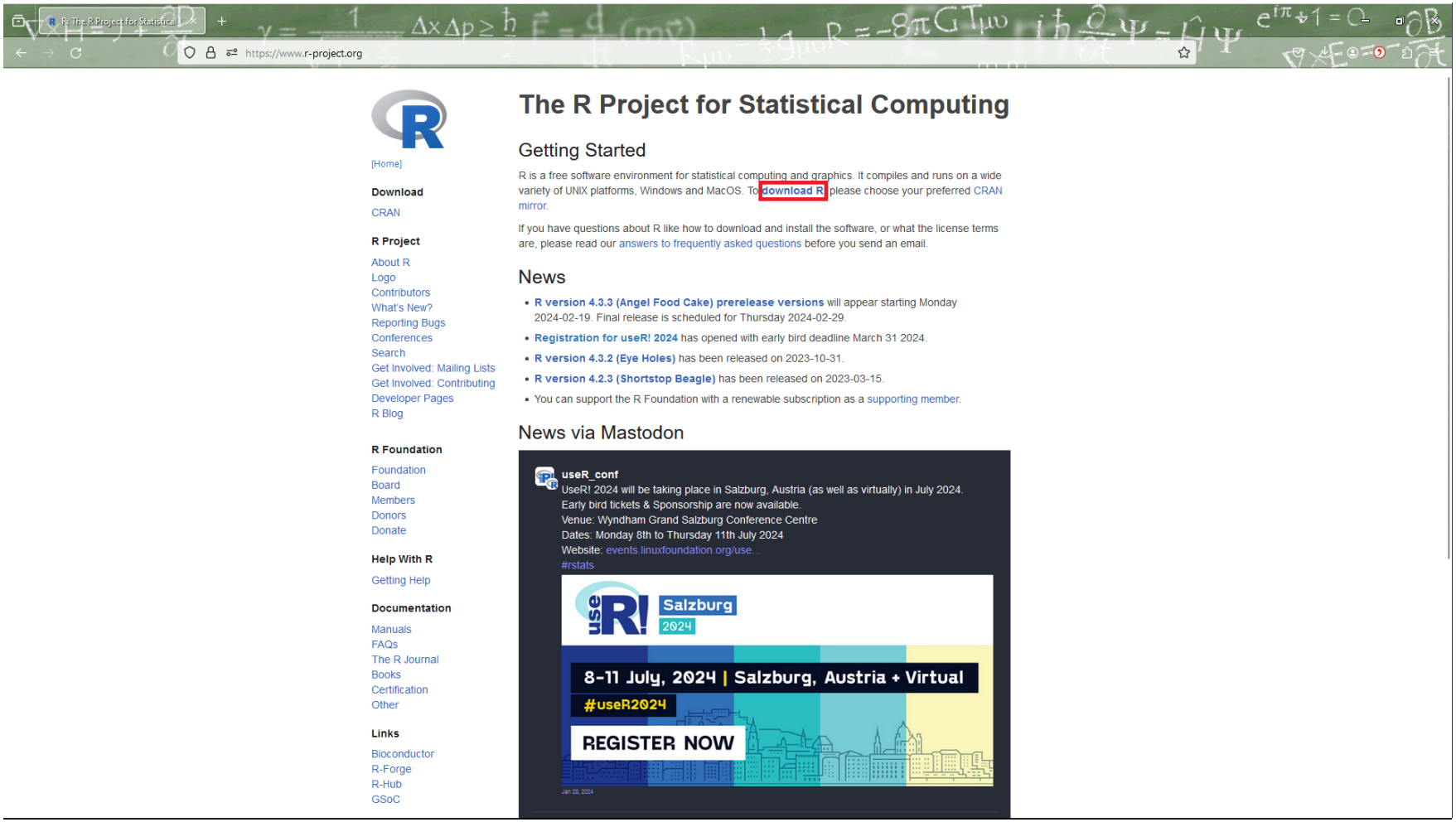
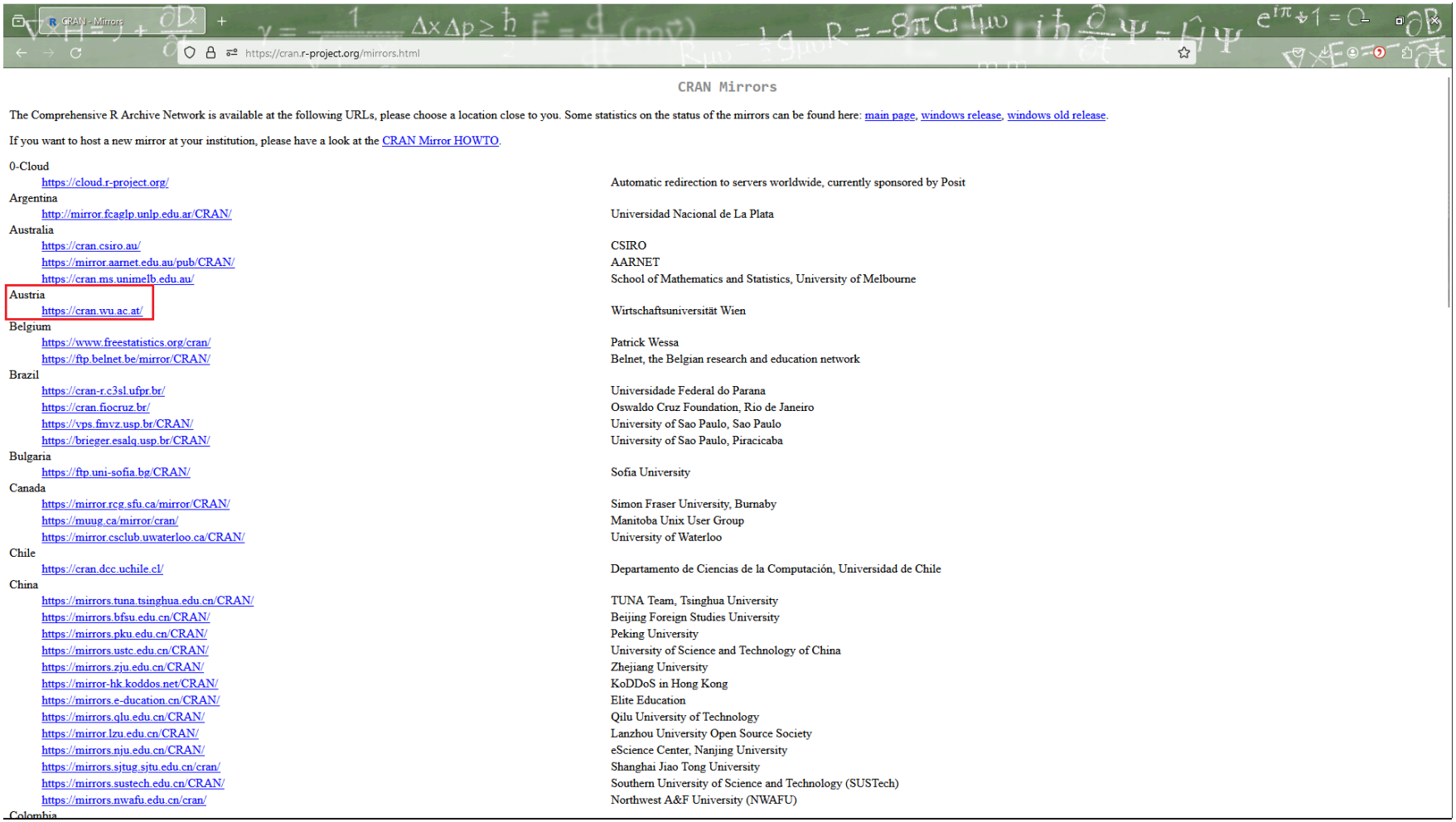


Figure: *The R project.* https://www.r-project.org/

Installation of



CRAN Mirrors

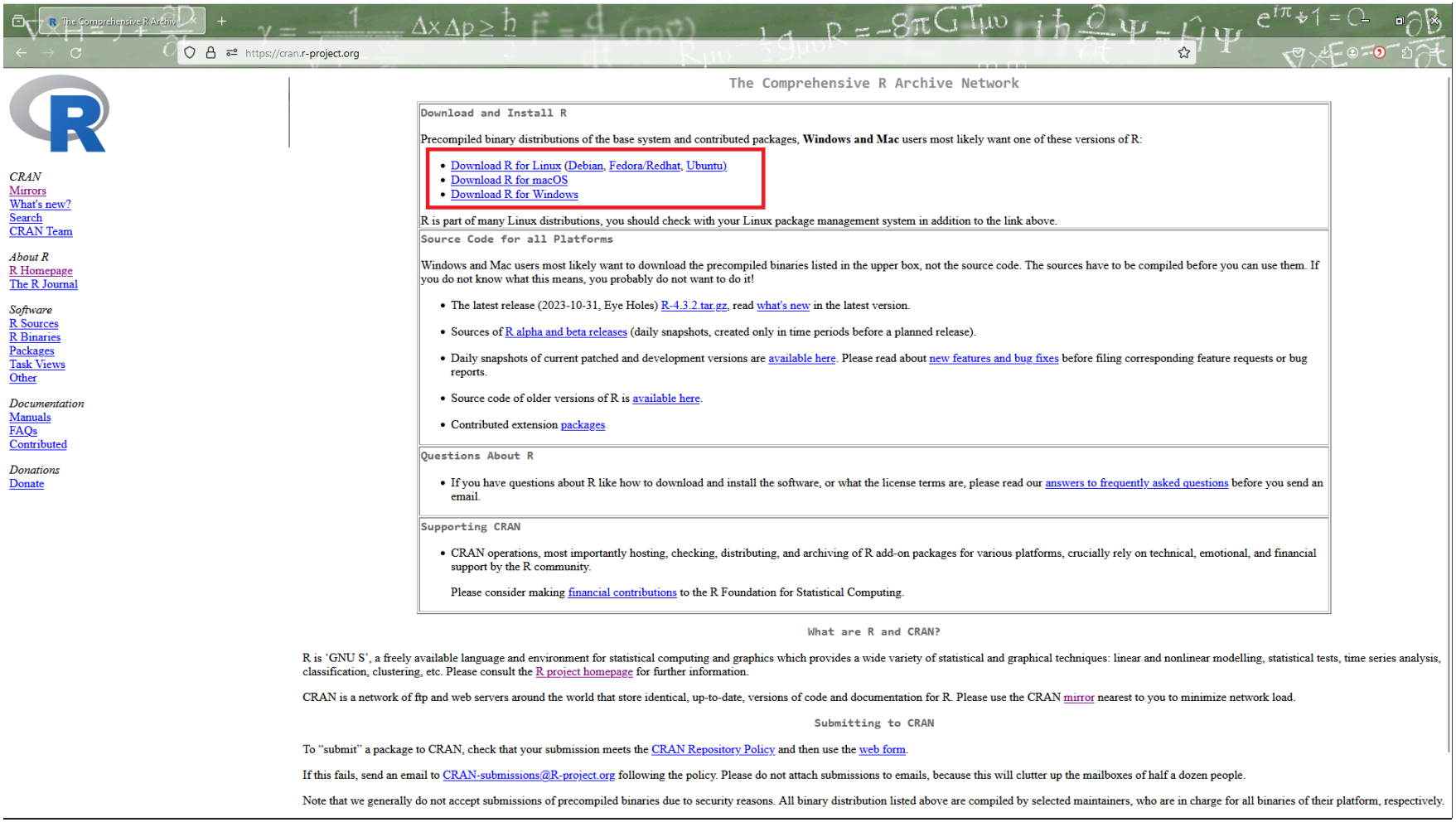
The Comprehensive R Archive Network is available at the following URLs, please choose a location close to you. Some statistics on the status of the mirrors can be found here: main page, windows release, windows old release.

If you want to host a new mirror at your institution, please have a look at the CRAN Mirror HOWTO.

0-Cloud	
https://cloud.r-project.org/	Automatic redirection to servers worldwide, currently sponsored by Posit
Argentina	
http://mirror.fcaglp.unlp.edu.ar/CRAN/	Universidad Nacional de La Plata
Australia	
https://cran.csiro.au/	CSIRO
https://mirror.aarnet.edu.au/pub/CRAN/	AARNET
https://cran.ms.unimelb.edu.au/	School of Mathematics and Statistics, University of Melbourne
Austria	
https://cran.wu.ac.at/	Wirtschaftsuniversität Wien
Belgium	
https://www.freestatistics.org/cran/	Patrick Wessa
https://ftp.belnet.be/mirror/CRAN/	Belnet, the Belgian research and education network
Brazil	
https://cran-r.c3sl.ufpr.br/	Universidade Federal do Parana
https://cran.fiocruz.br/	Oswaldo Cruz Foundation, Rio de Janeiro
https://vps.fmvz.usp.br/CRAN/	University of Sao Paulo, Sao Paulo
https://brieger.esalq.usp.br/CRAN/	University of Sao Paulo, Piracicaba
Bulgaria	
https://ftp.uni-sofia.bg/CRAN/	Sofia University
Canada	
https://mirror.rcg.sfu.ca/mirror/CRAN/	Simon Fraser University, Burnaby
https://muug.ca/mirror/cran/	Manitoba Unix User Group
https://mirror.csclub.uwaterloo.ca/CRAN/	University of Waterloo
Chile	
https://cran.dcc.uchile.cl/	Departamento de Ciencias de la Computación, Universidad de Chile
China	
https://mirrors.tuna.tsinghua.edu.cn/CRAN/	TUNA Team, Tsinghua University
https://mirrors.bfsu.edu.cn/CRAN/	Beijing Foreign Studies University
https://mirrors.pku.edu.cn/CRAN/	Peking University
https://mirrors.ustc.edu.cn/CRAN/	University of Science and Technology of China
https://mirrors.zju.edu.cn/CRAN/	Zhejiang University
https://mirror-hk.koddos.net/CRAN/	KoDDoS in Hong Kong
https://mirrors.e-ducation.cn/CRAN/	Elite Education
https://mirrors.qlu.edu.cn/CRAN/	Qilu University of Technology
https://mirror.lzu.edu.cn/CRAN/	Lanzhou University Open Source Society
https://mirrors.nju.edu.cn/CRAN/	eScience Center, Nanjing University
https://mirrors.sjtug.sjtu.edu.cn/cran/	Shanghai Jiao Tong University
https://mirrors.sustech.edu.cn/CRAN/	Southern University of Science and Technology (SUSTech)
https://mirrors.nwafu.edu.cn/cran/	Northwest A&F University (NWAFU)
Colombia	

Figure: *The project.*

Installation of



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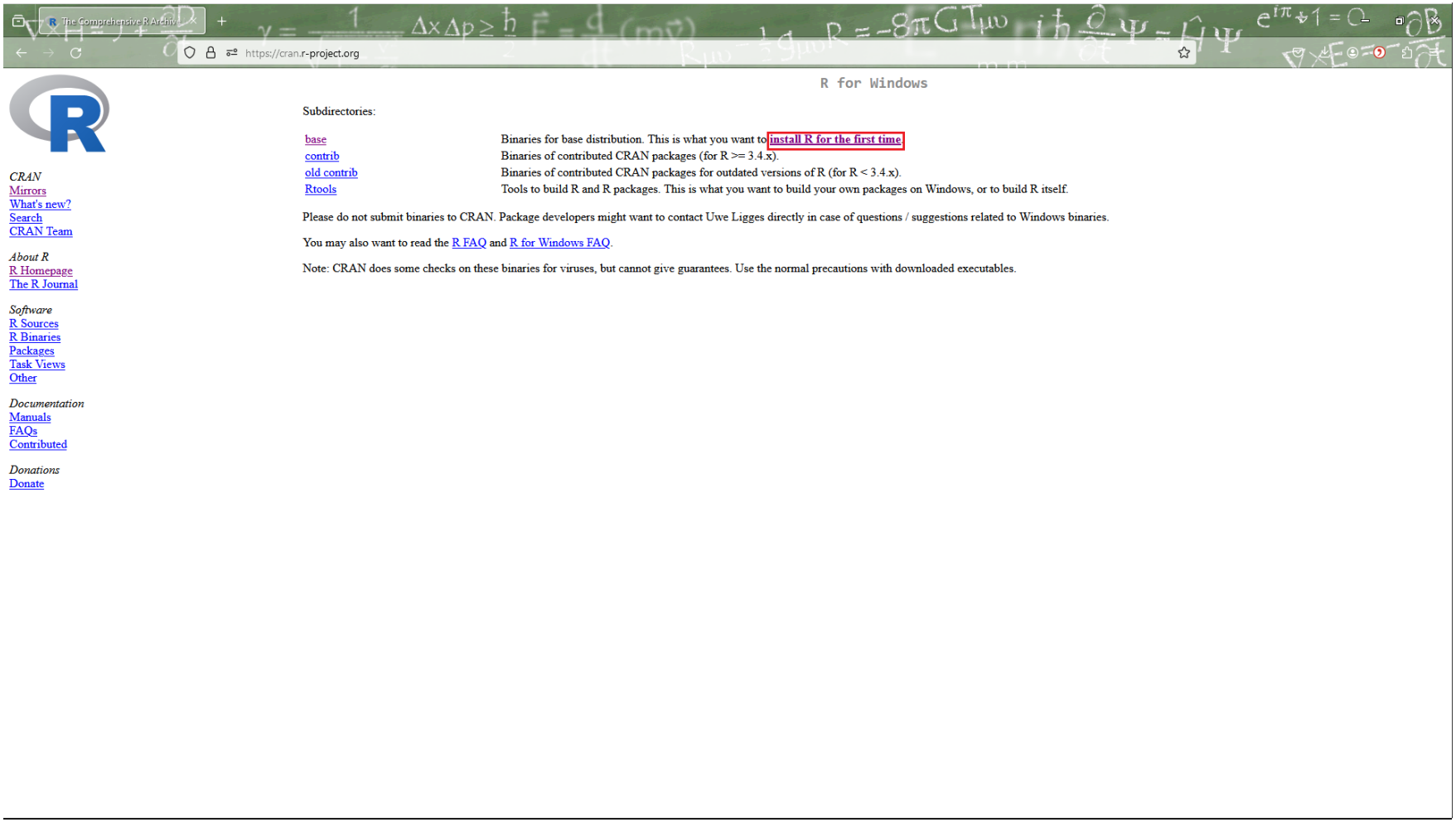

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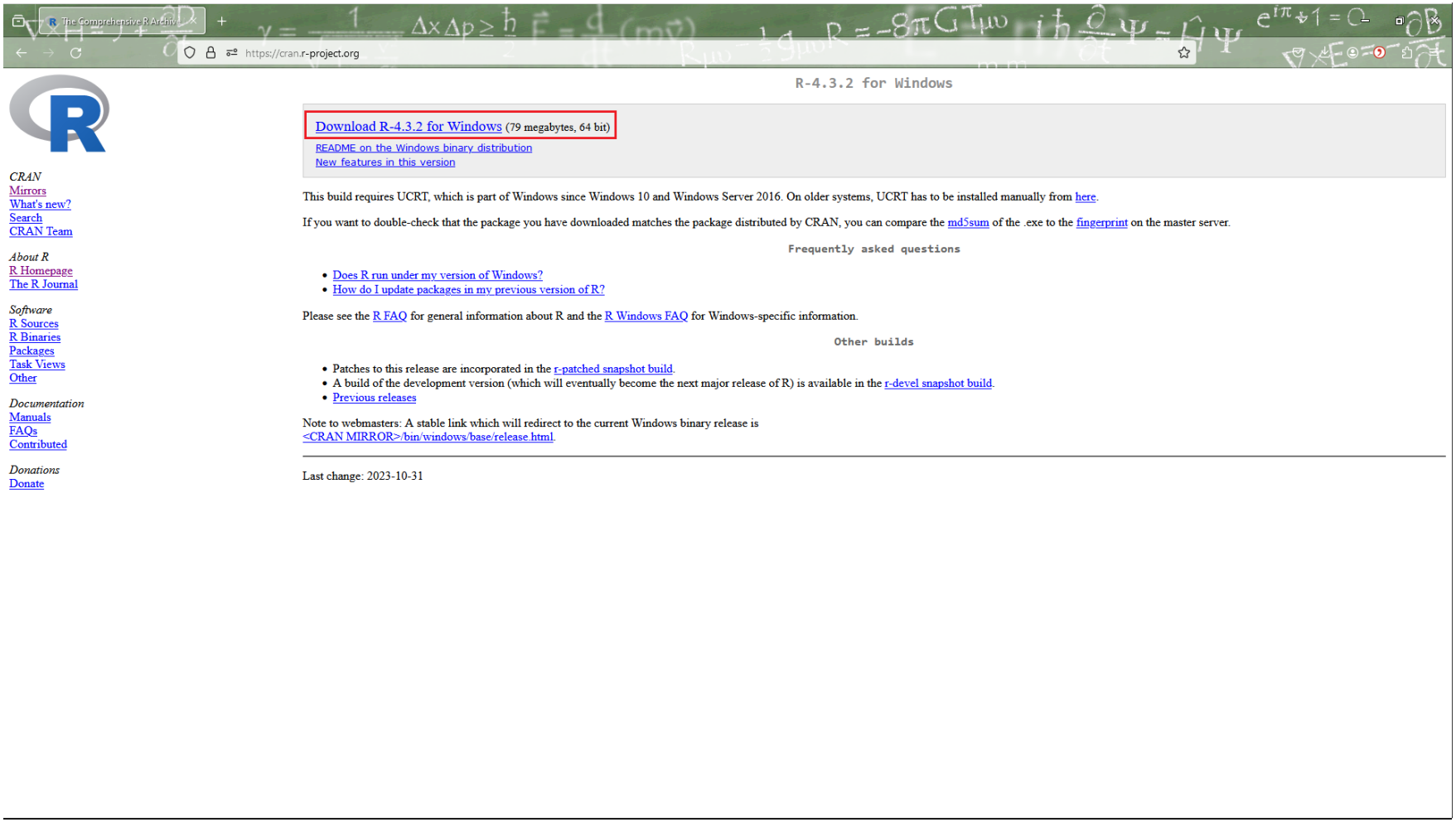

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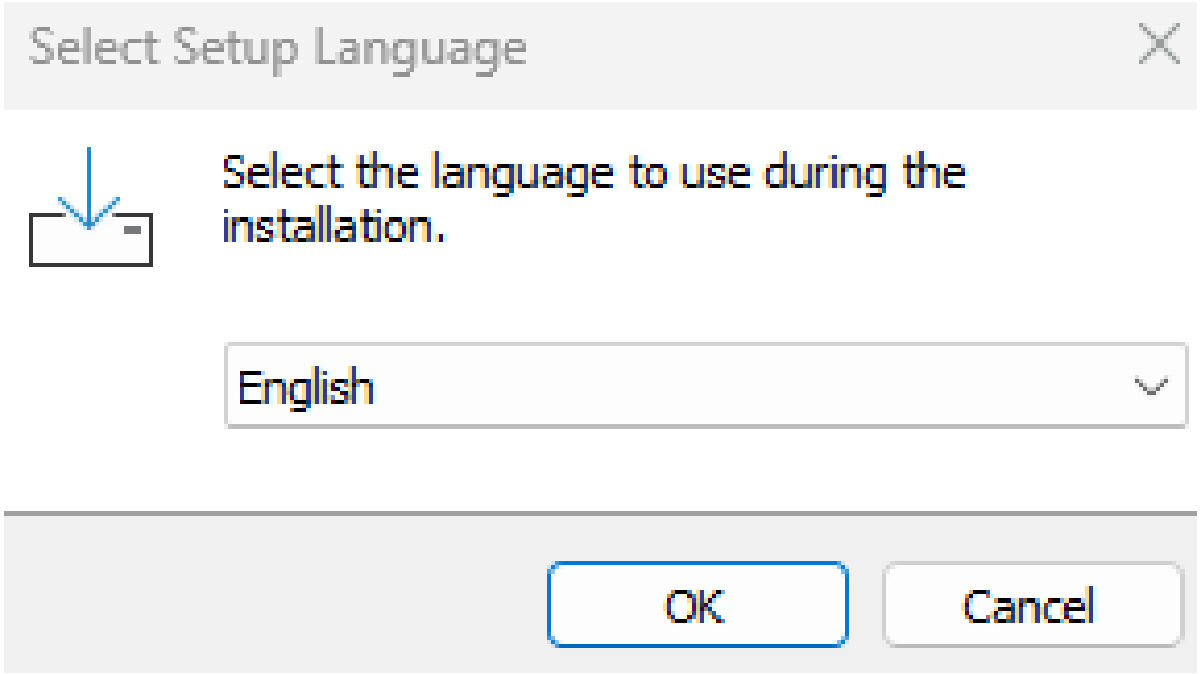

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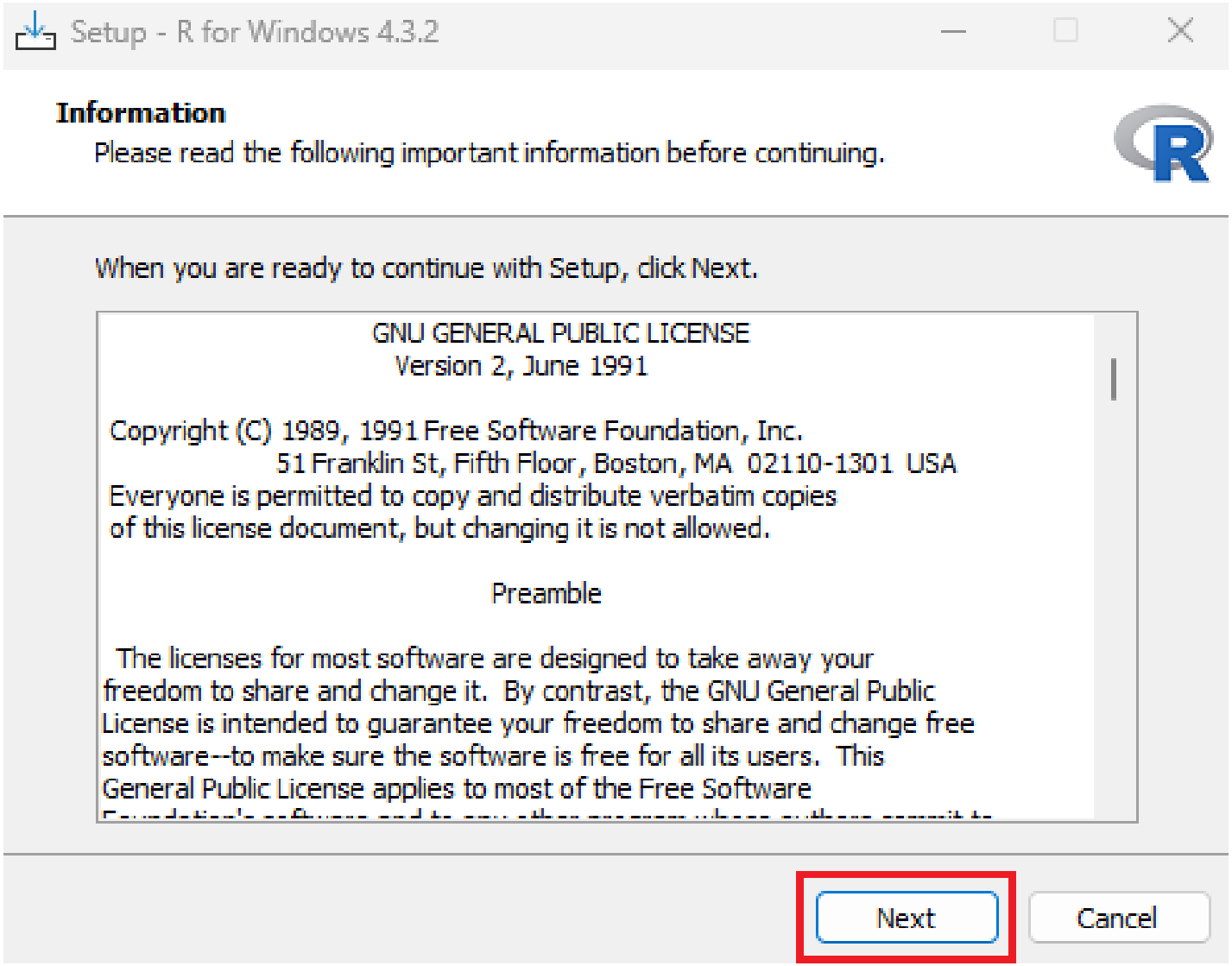

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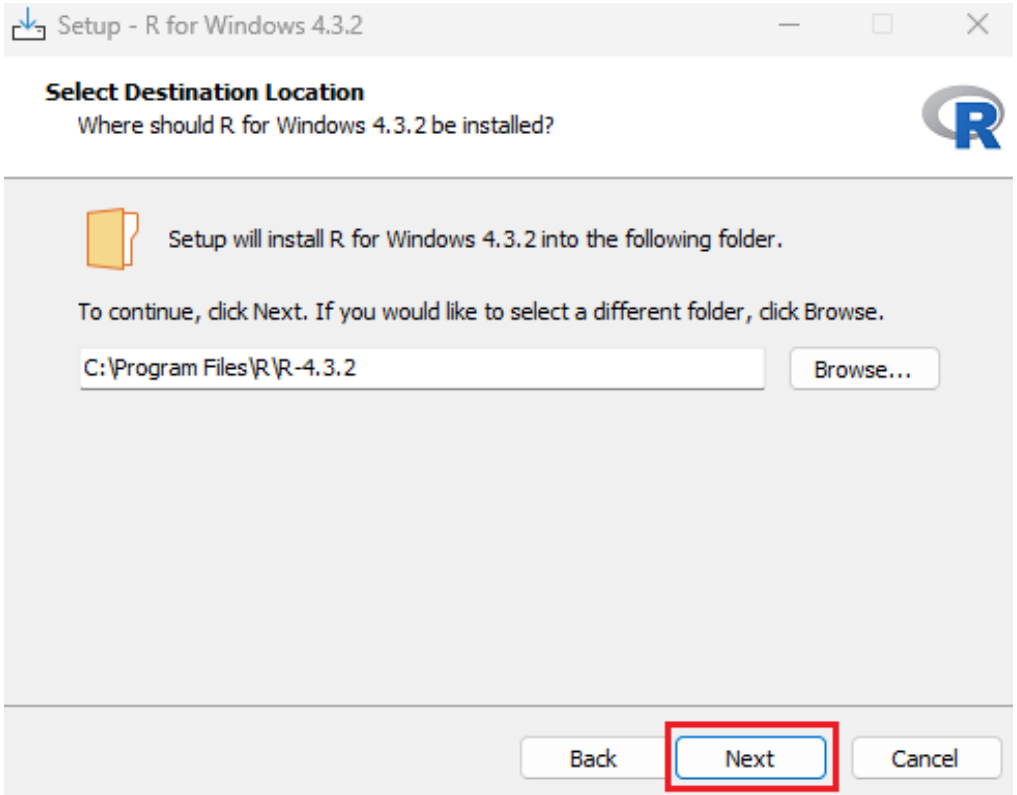

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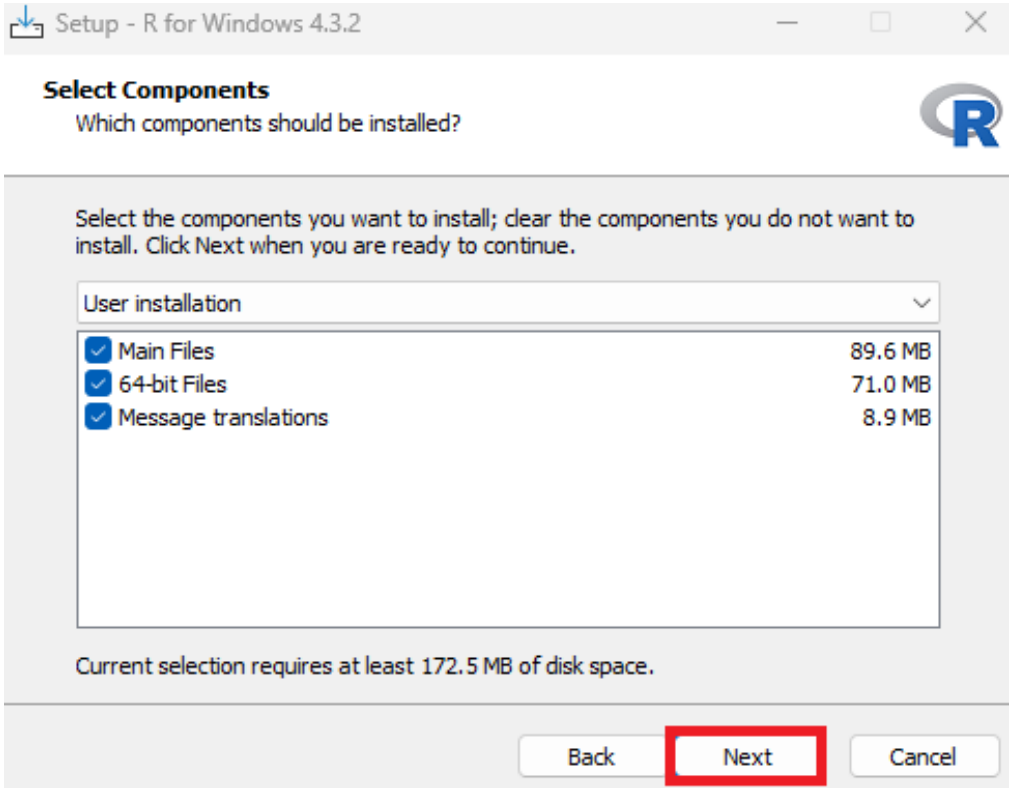

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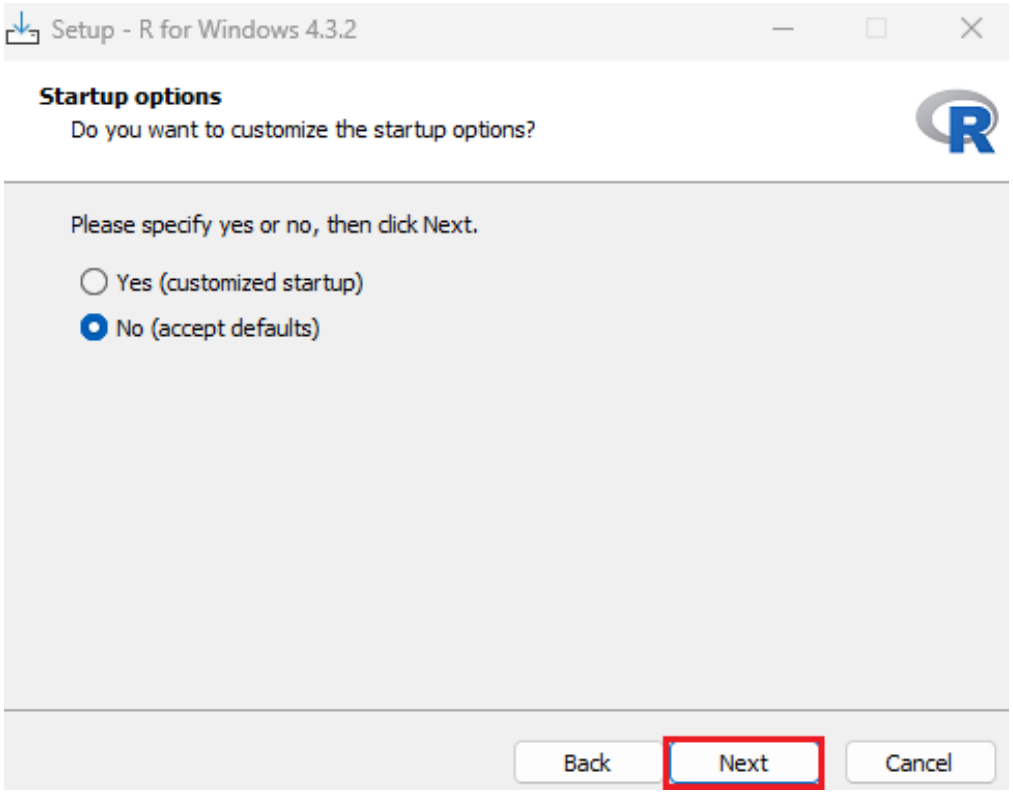

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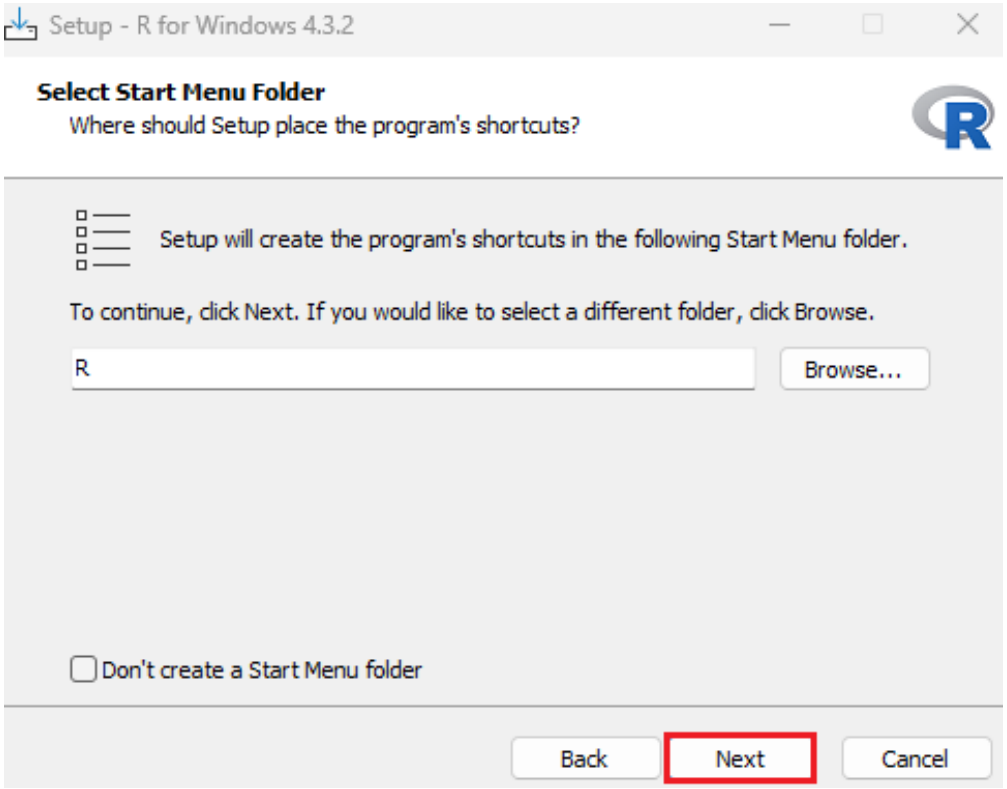

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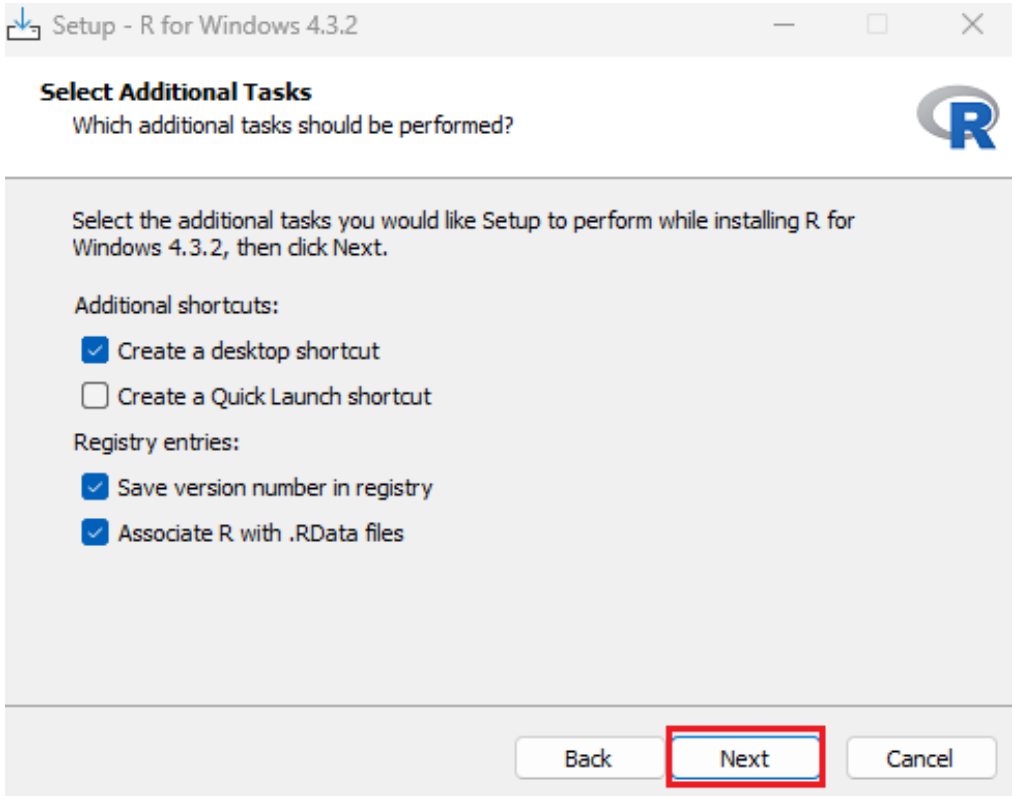

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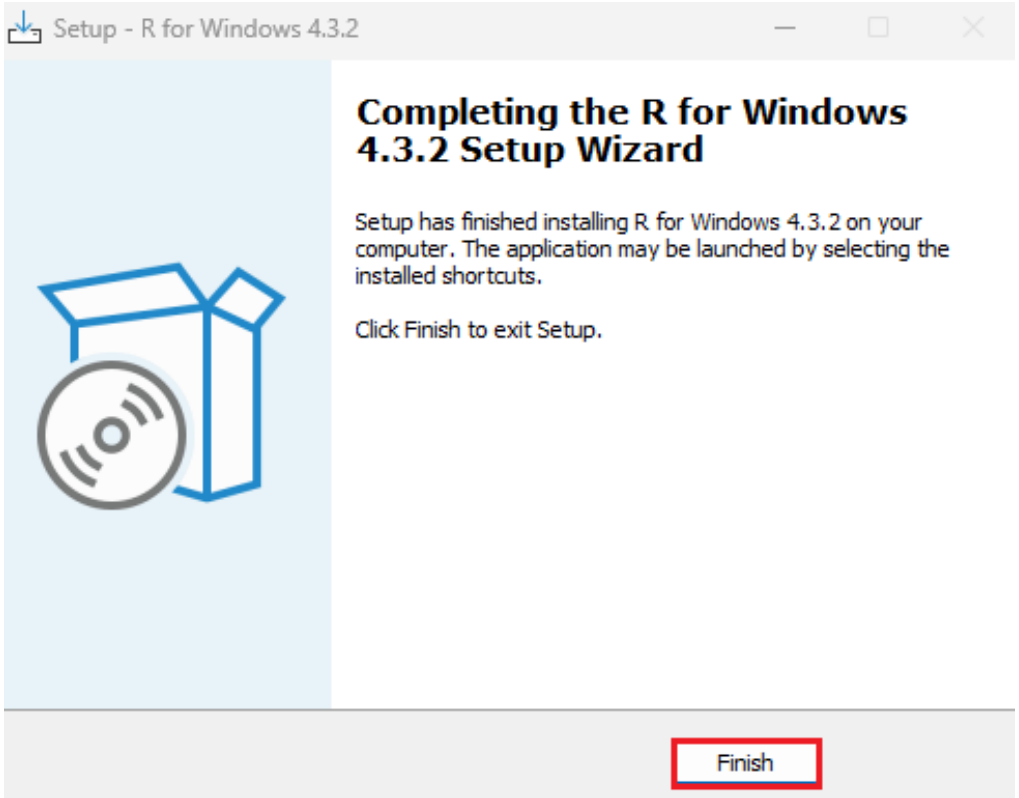

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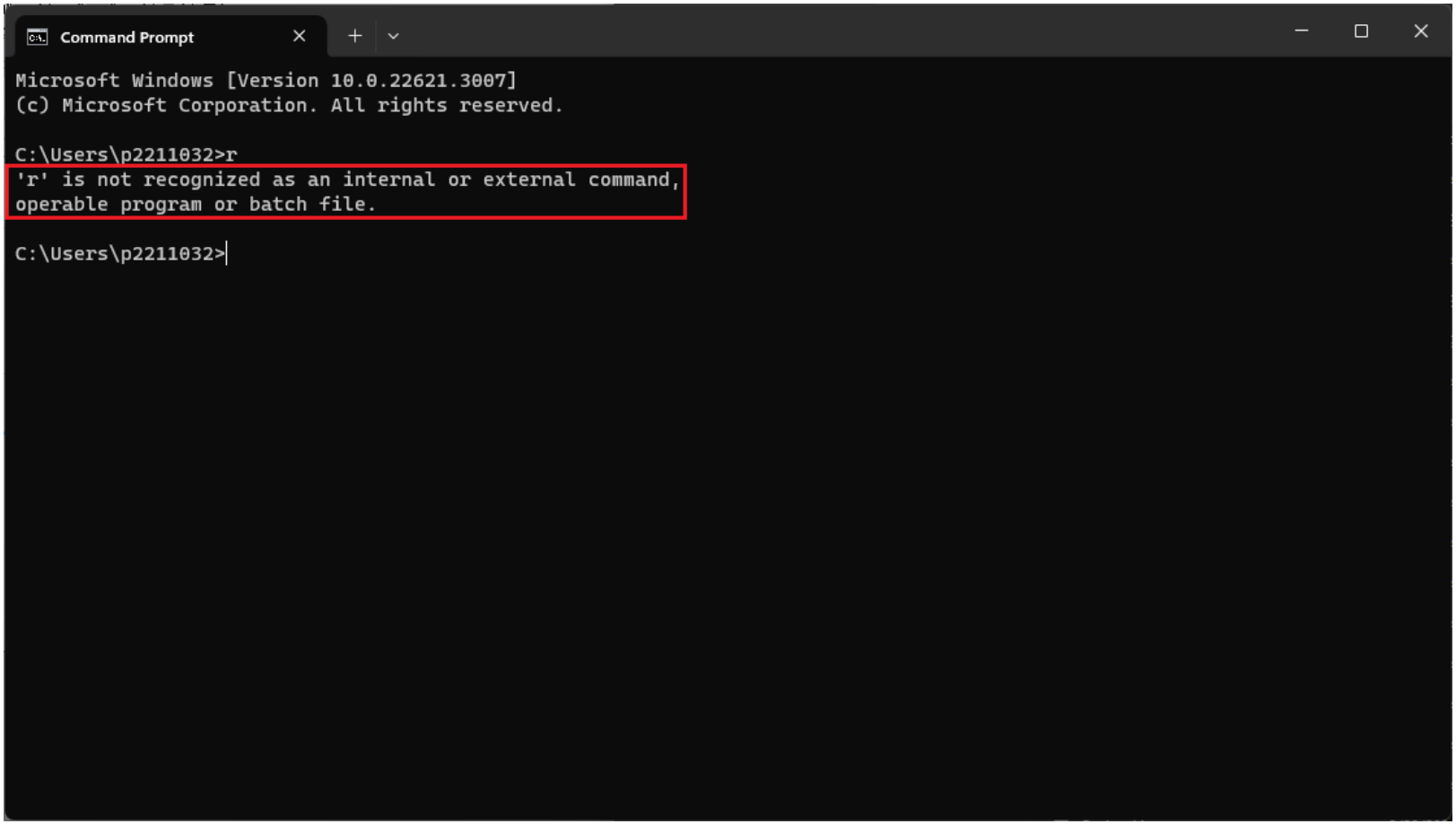

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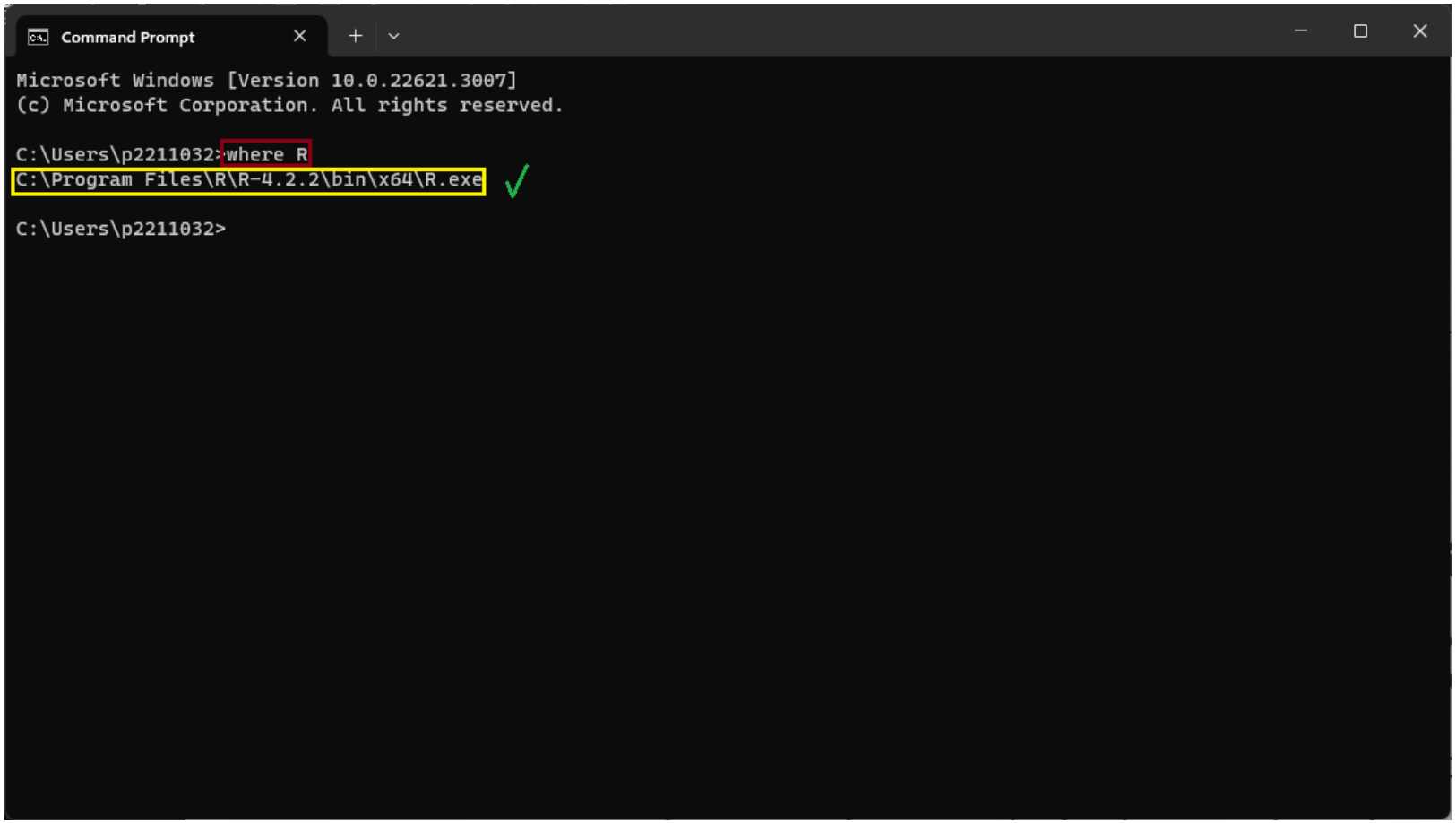
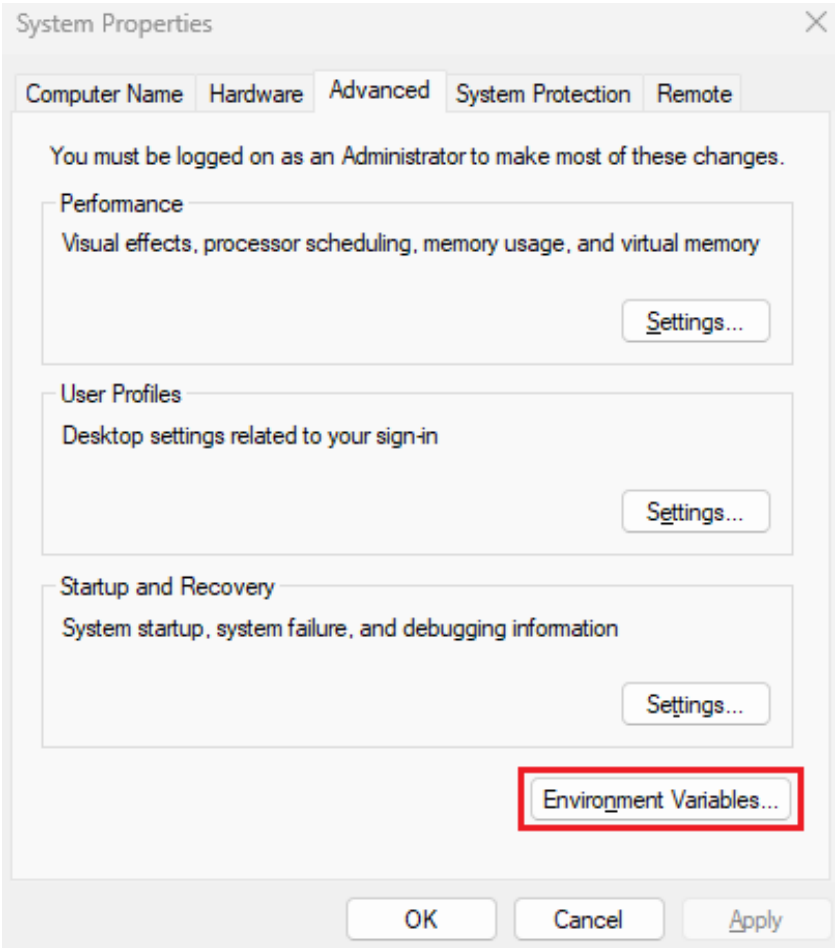


Figure: *The project.*

Installation of

Add path to `Environment Variables`



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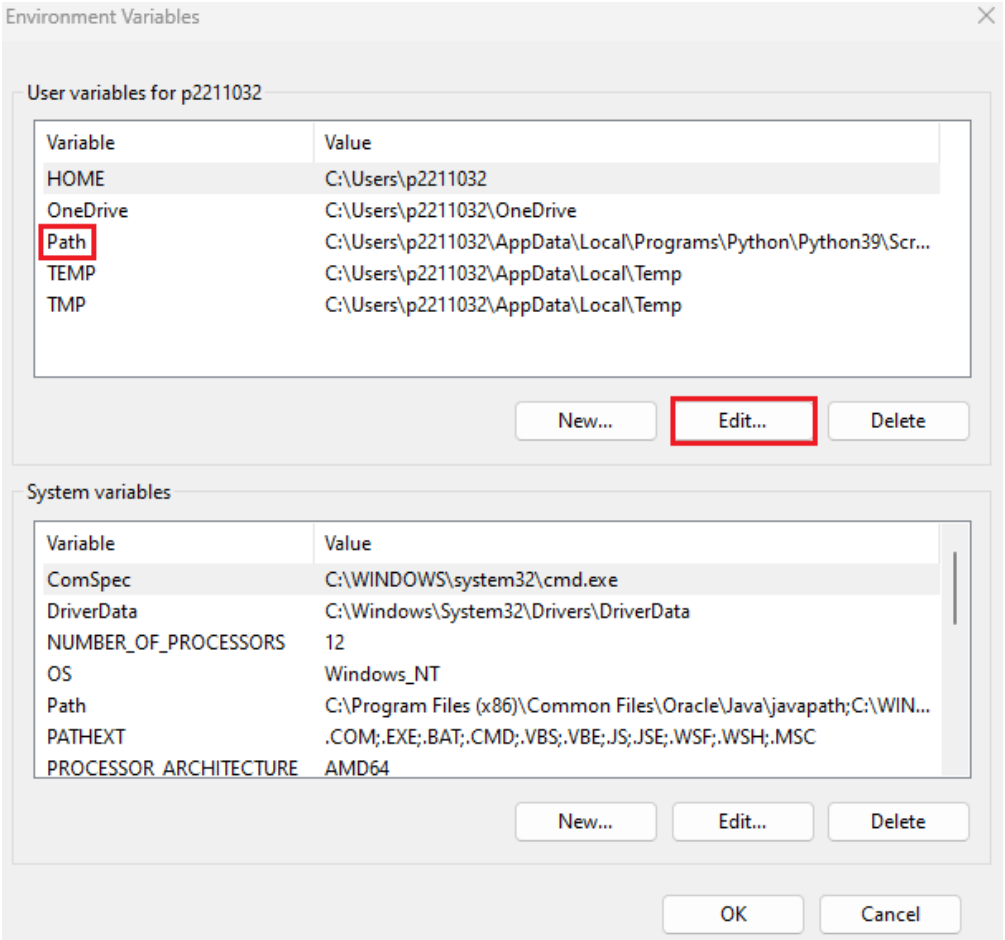
Installation of R



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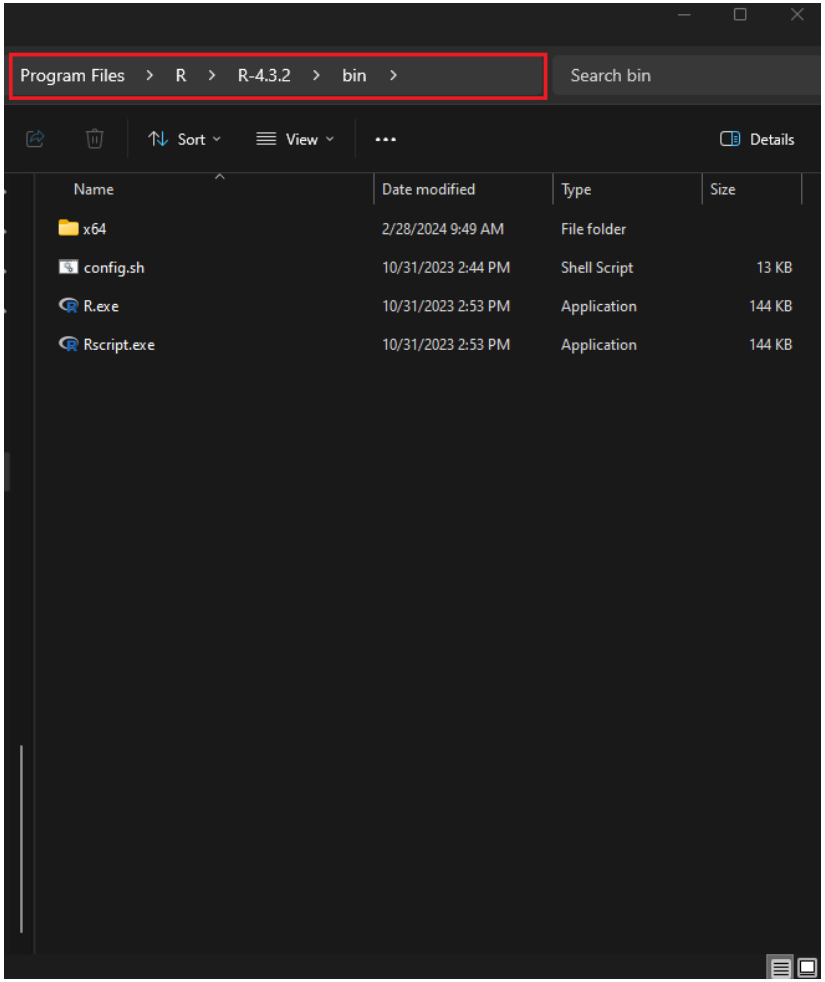
Installation of



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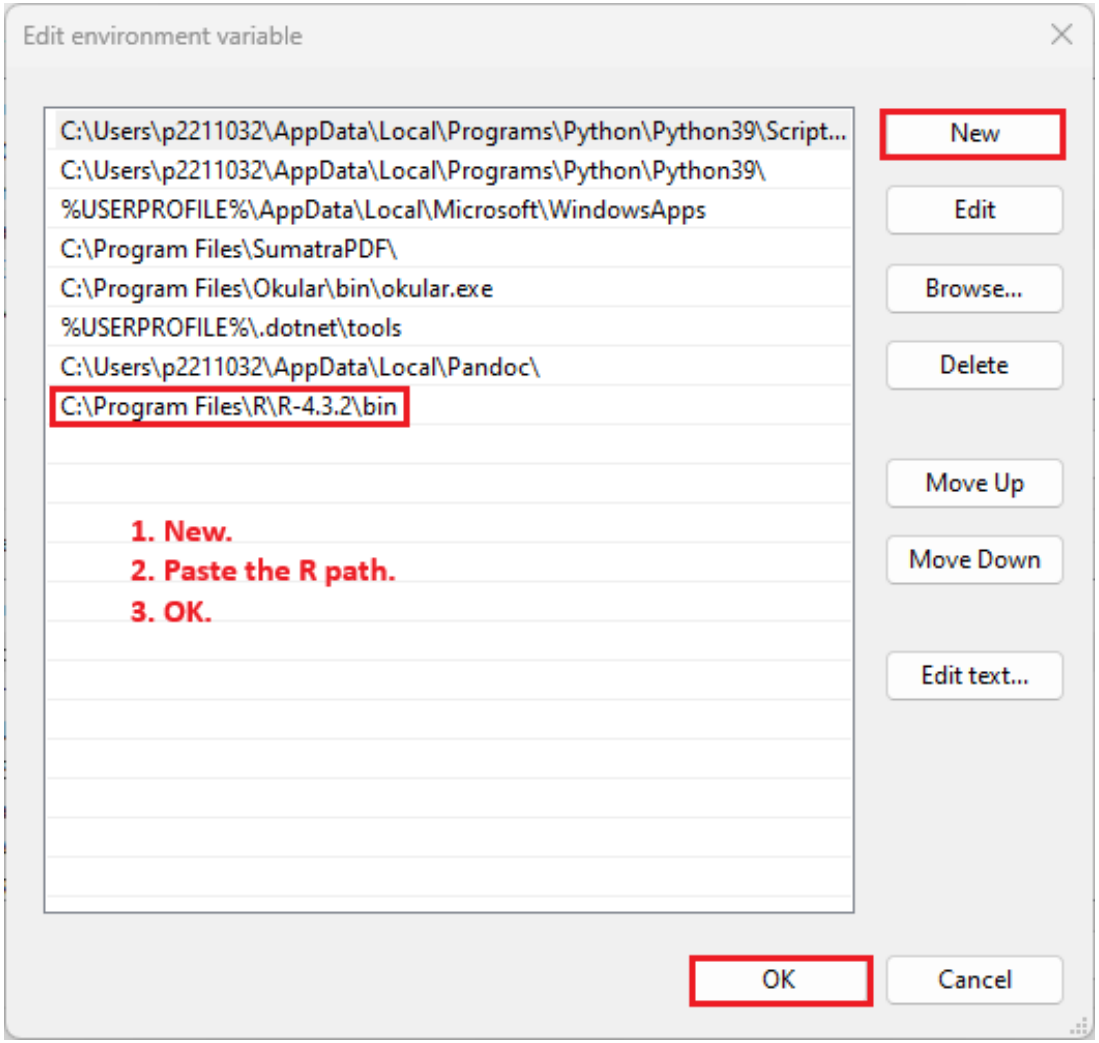

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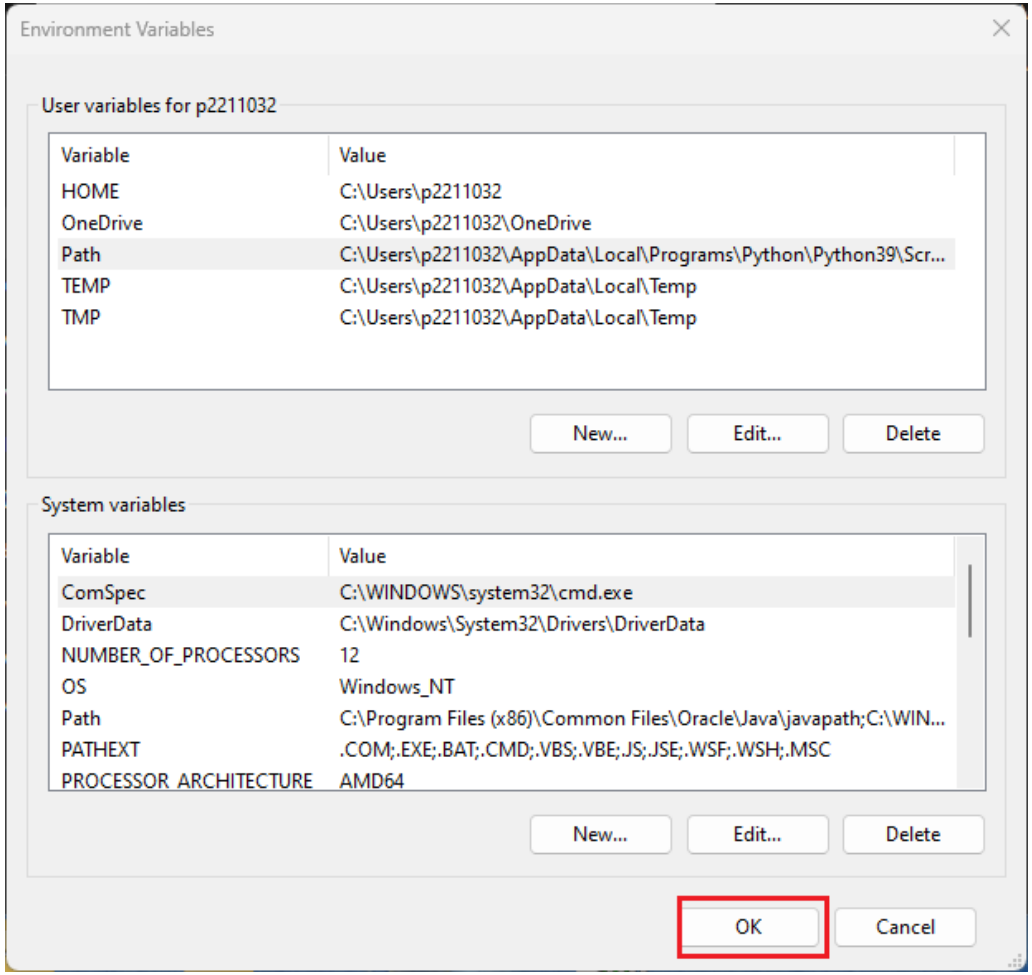

Figure: *The project.*

Installation of

Done!!We are ready to go!

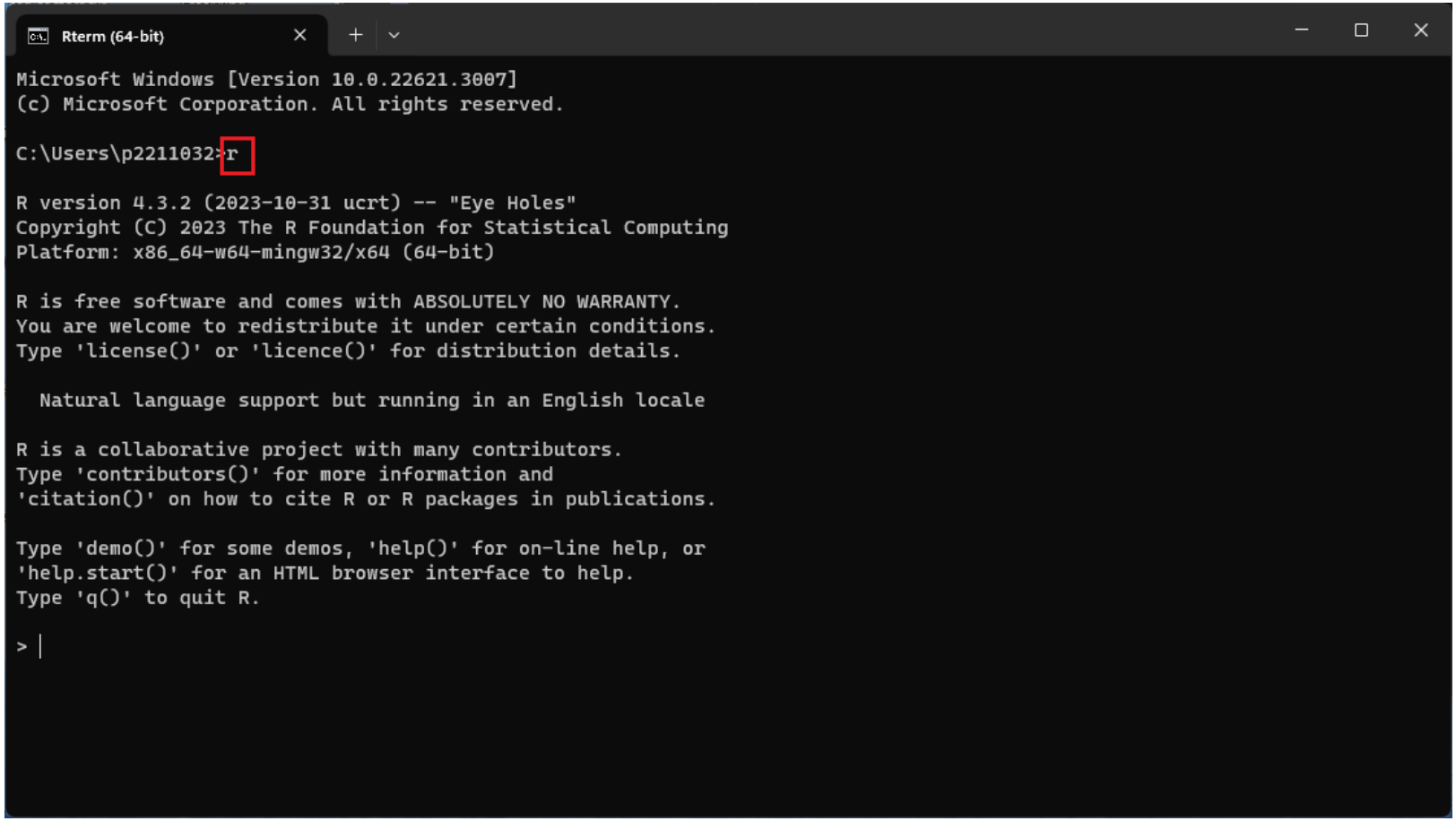

Figure: *The project.*

Talk Overview

Introduction to Jupyter lab

Install Jupyter on Windows

The pip package: https://pypi.org/project/pip/

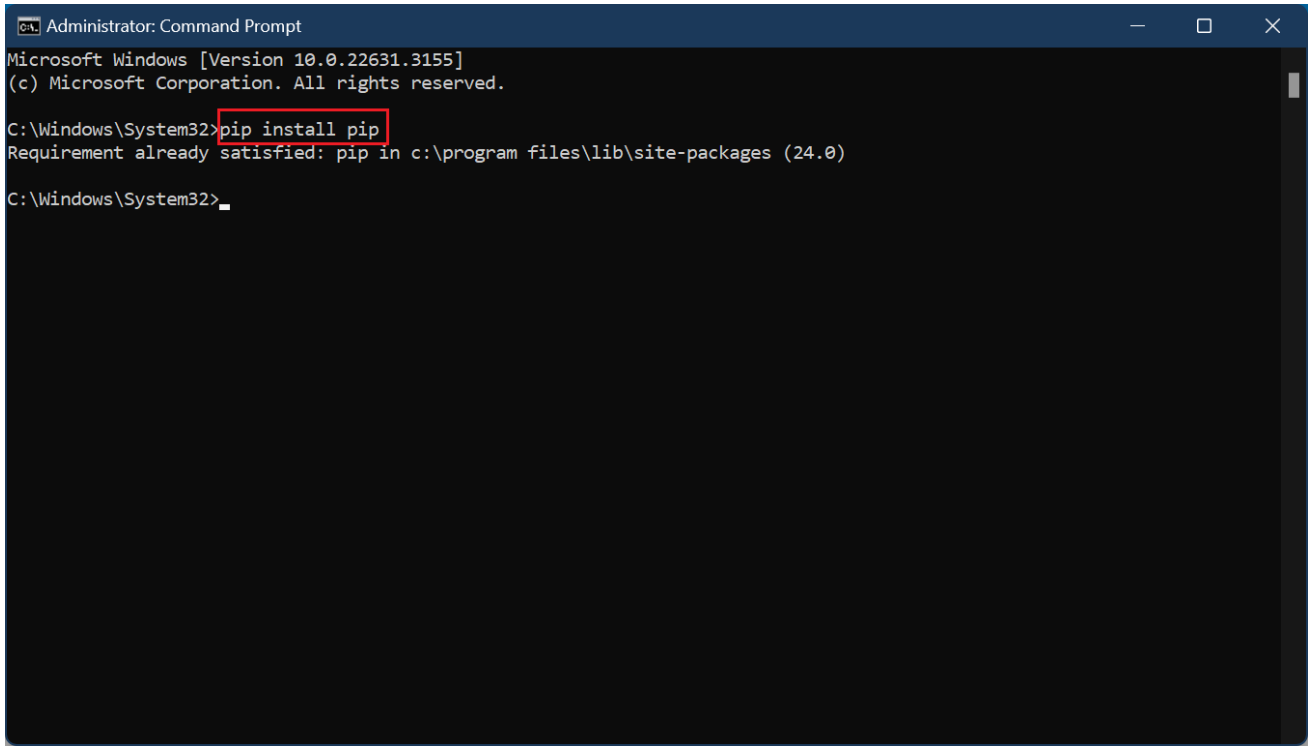

Figure: *The* *project.*

Introduction to Jupyter lab

The Jupyter environment: https://jupyter.org/

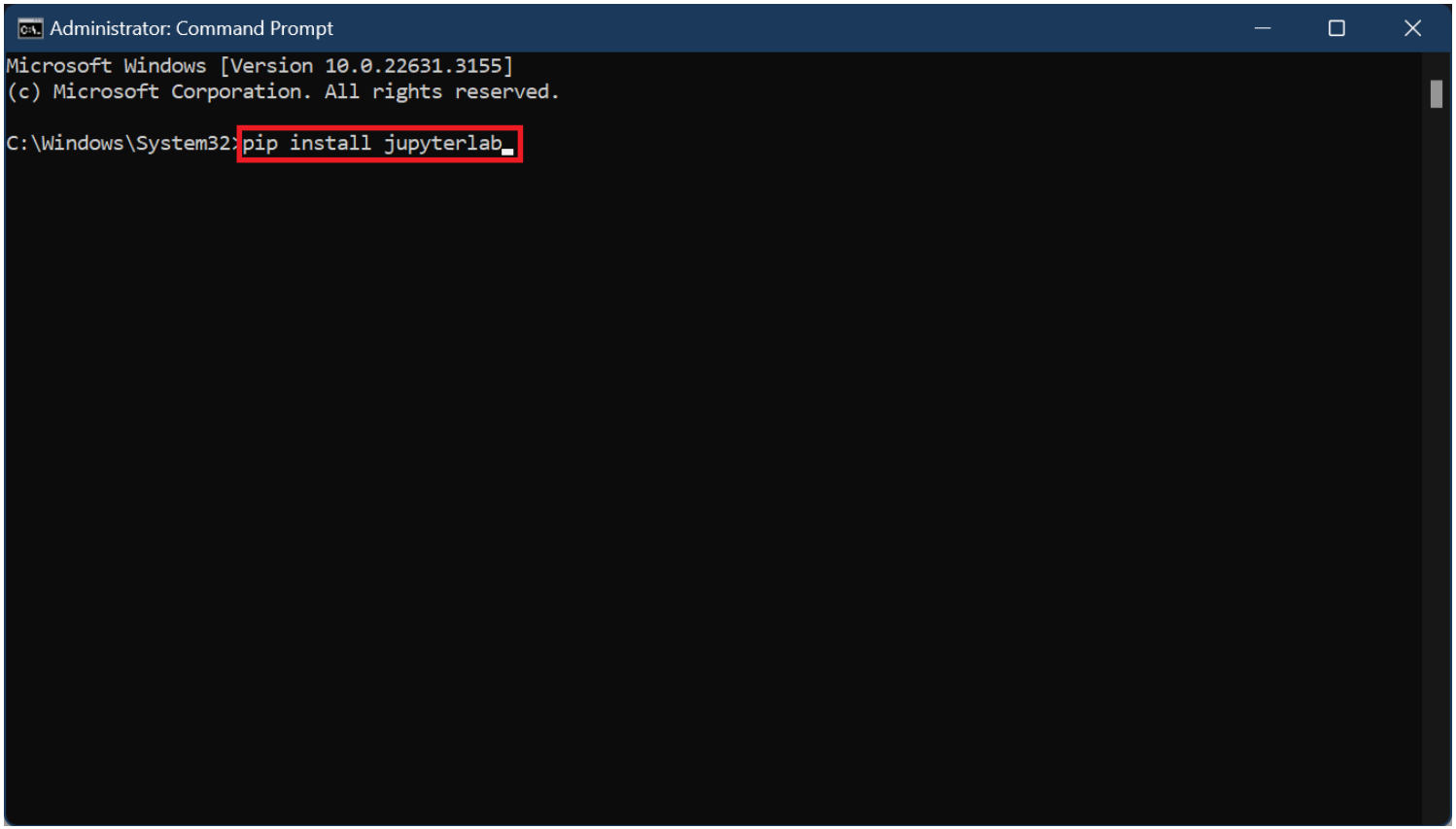

Figure: *The project.*

Introduction to Jupyter lab

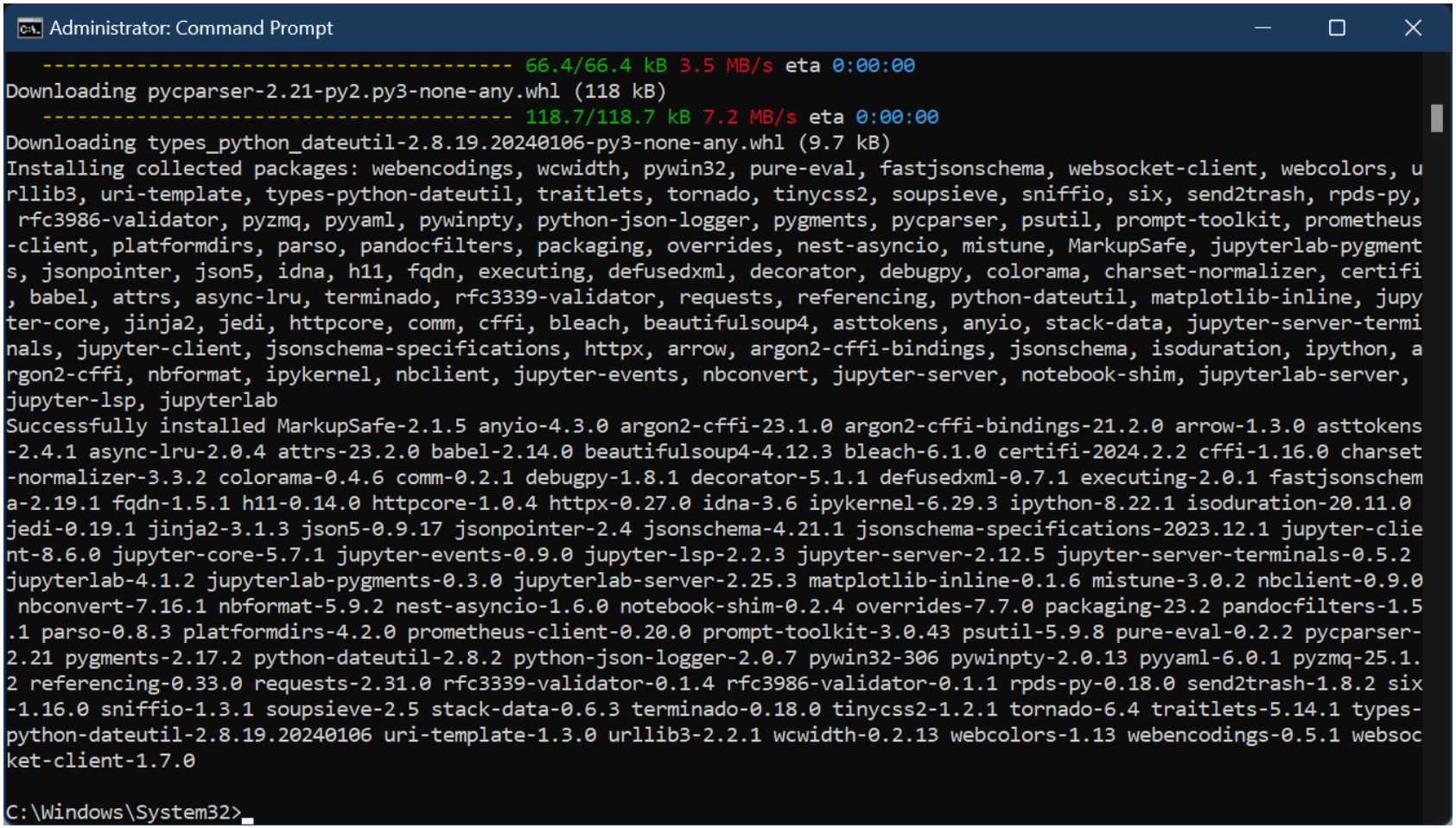

Figure: *The* jupyter *project.*

Introduction to Jupyter lab

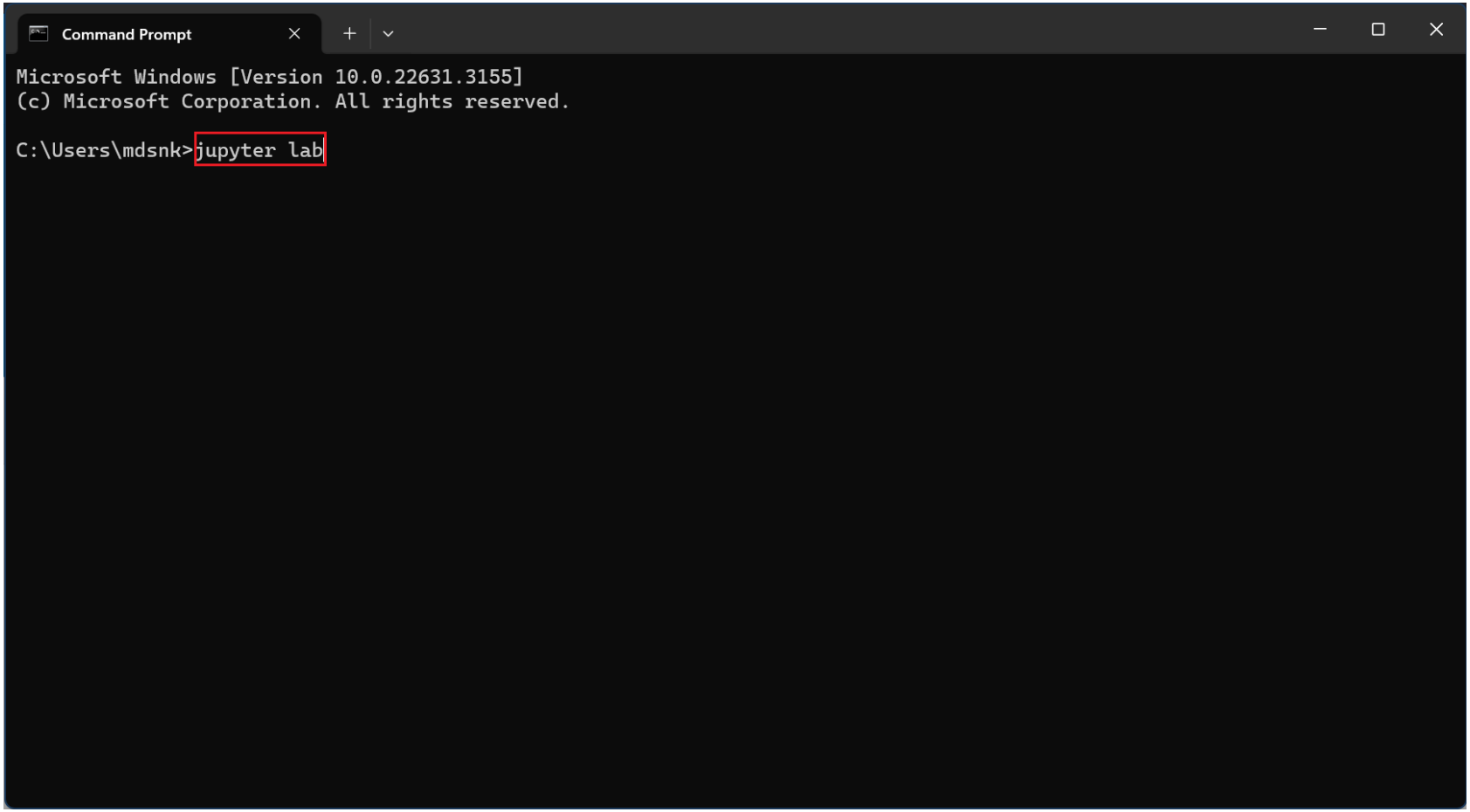

Figure: *The project.*

Introduction to Jupyter lab

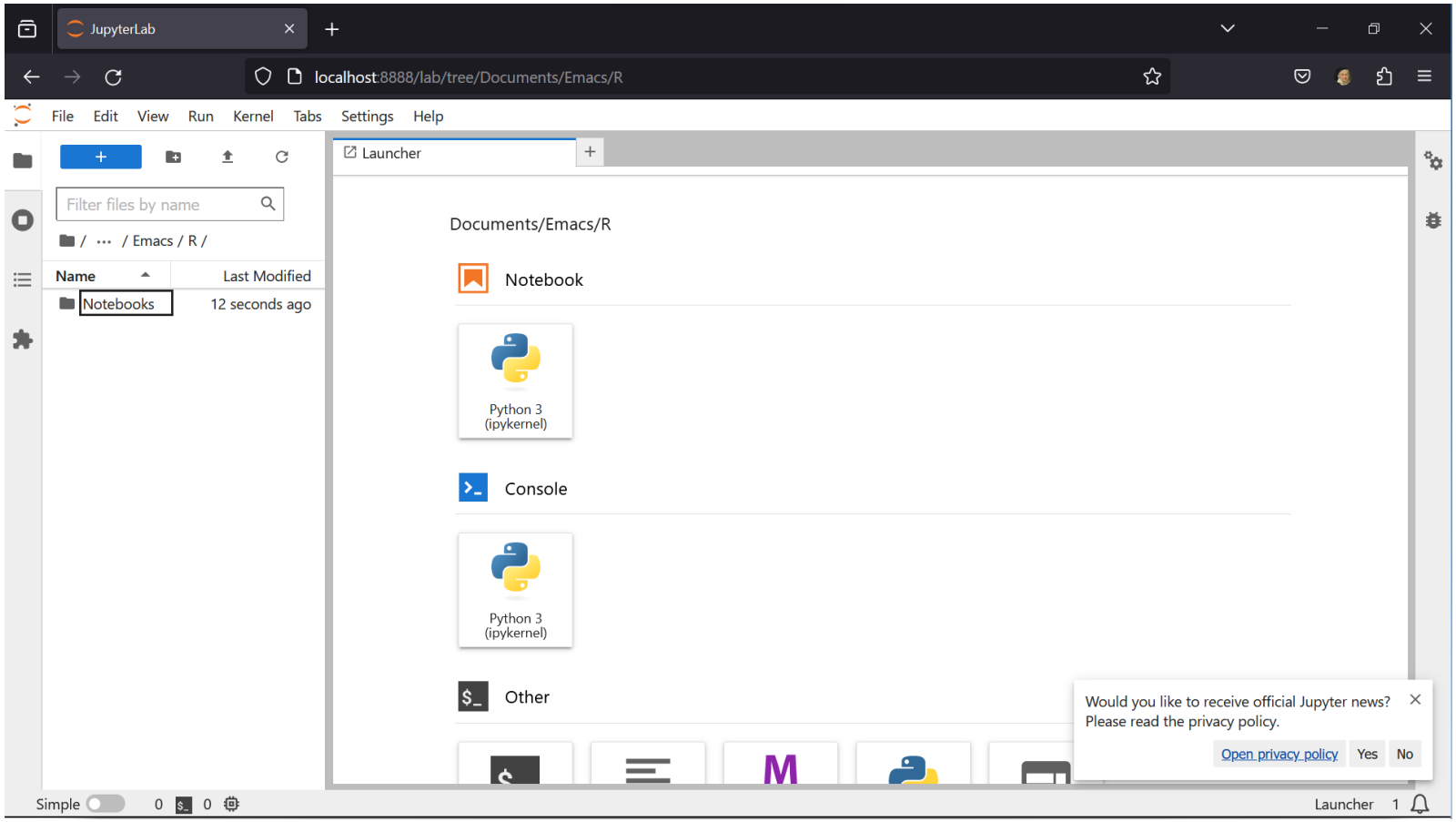

Figure: *The jupyter project.*

Introduction to Jupyter lab

`install.packages('IRkernel')` Keep in mind step 2!

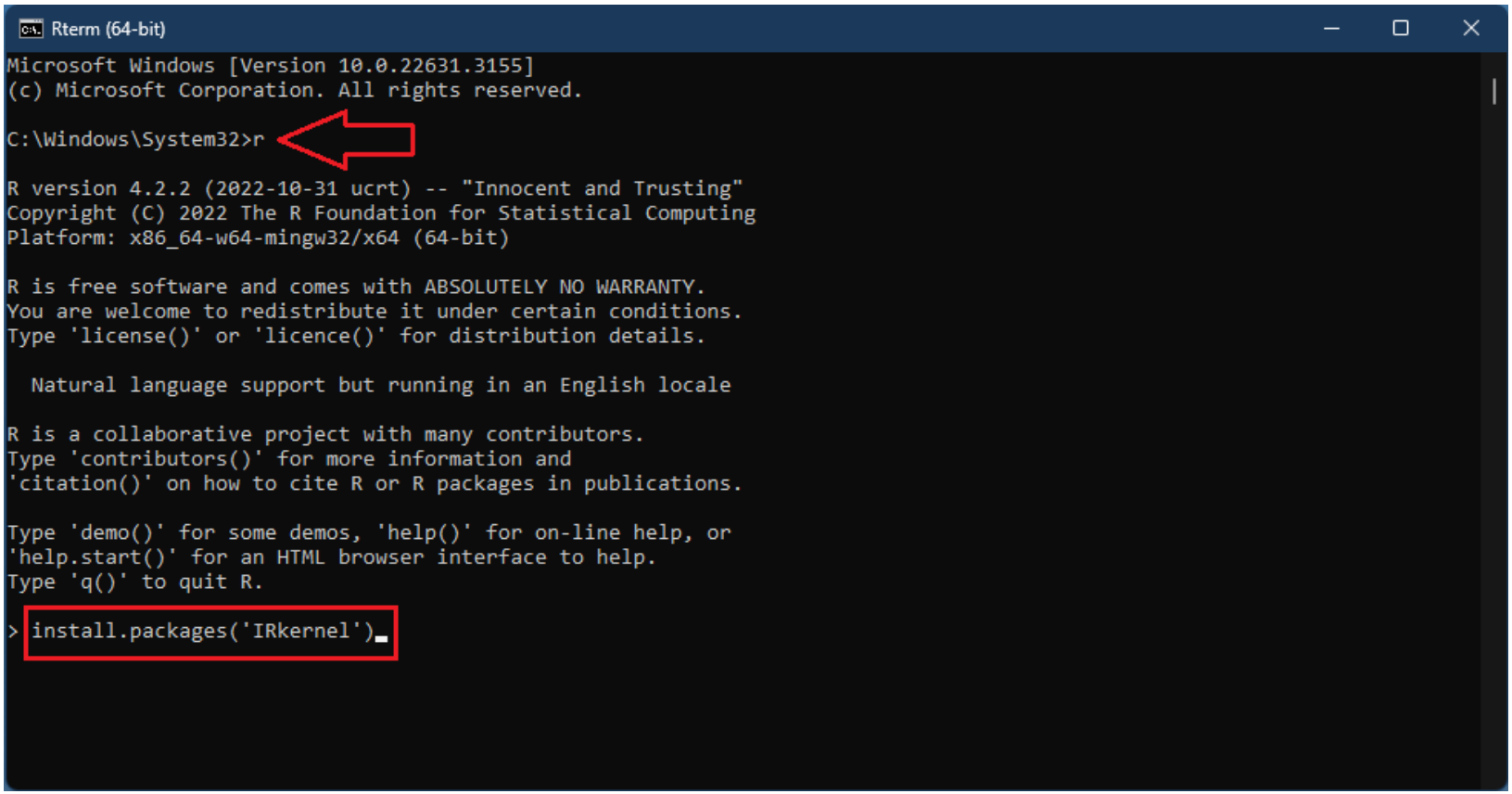

Figure: *The* jupyter *project.* *https://irkernel.github.io/installation/*

Introduction to Jupyter lab

Type: `IRkernel::installspec()`

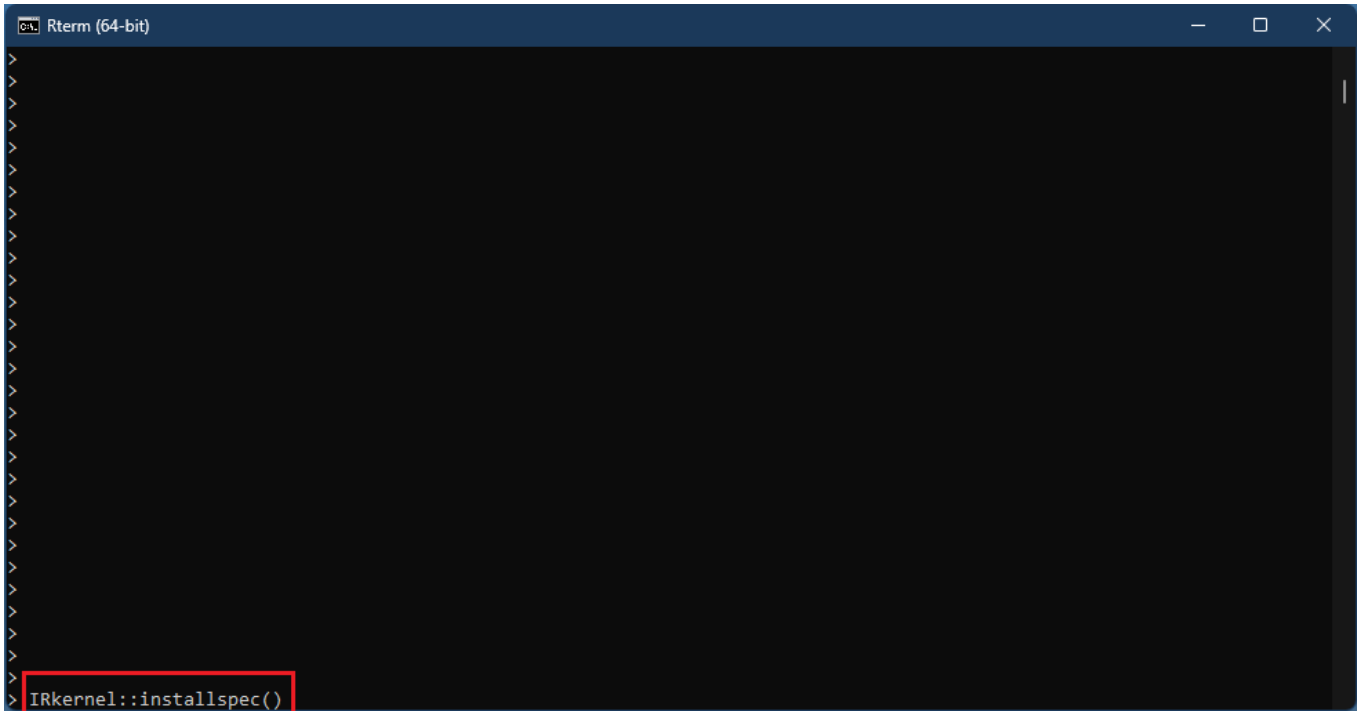

Figure: *The jupyter project.*

Introduction to Jupyter lab

Type: `jupyter lab`

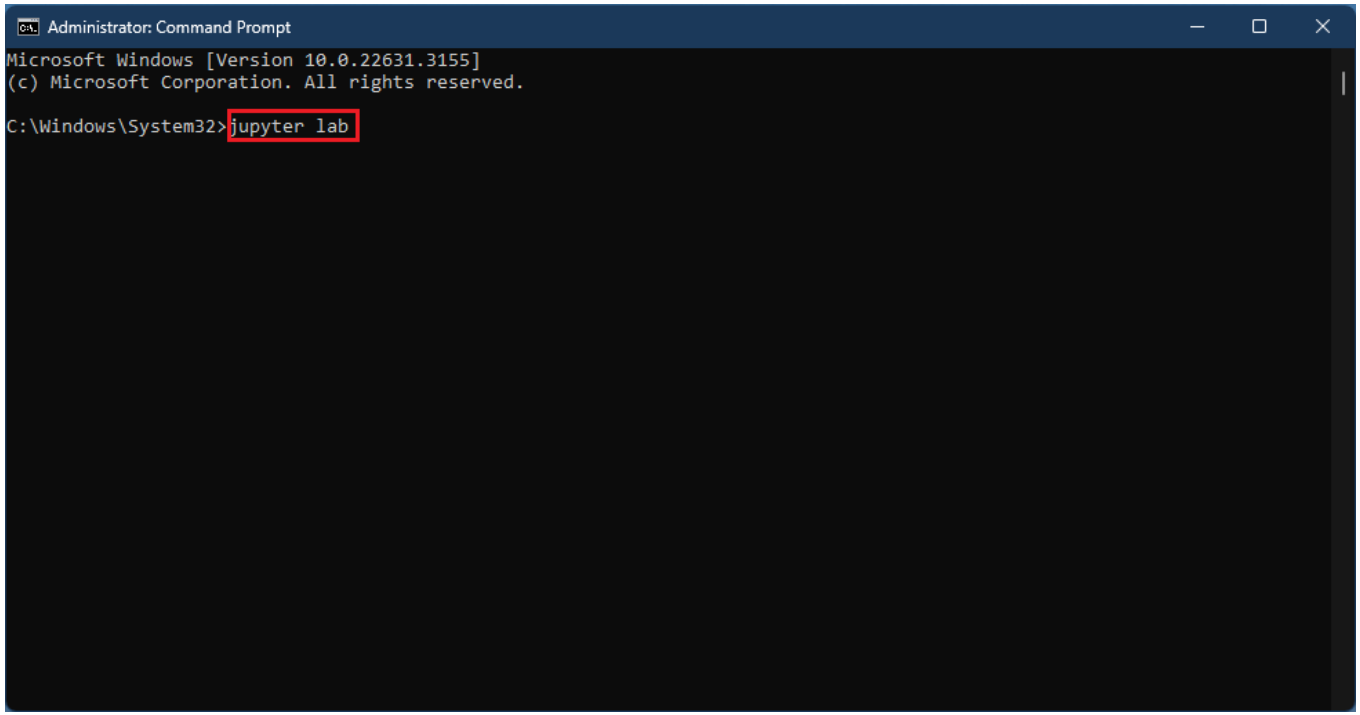

Figure: *The jupyter project.*

Introduction to Jupyter lab

The environment

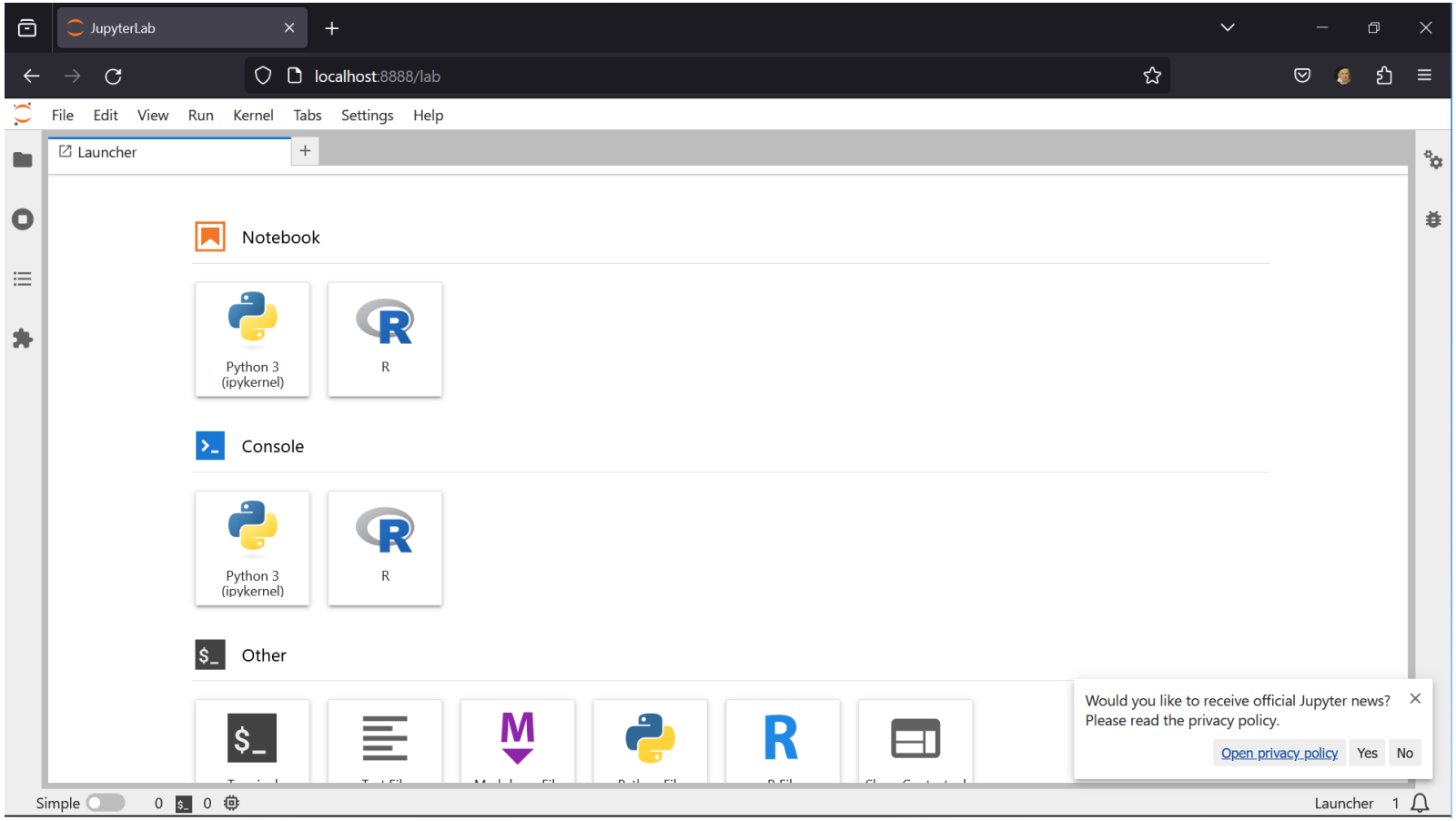

Figure: *The project.*

Introduction to Jupyter lab

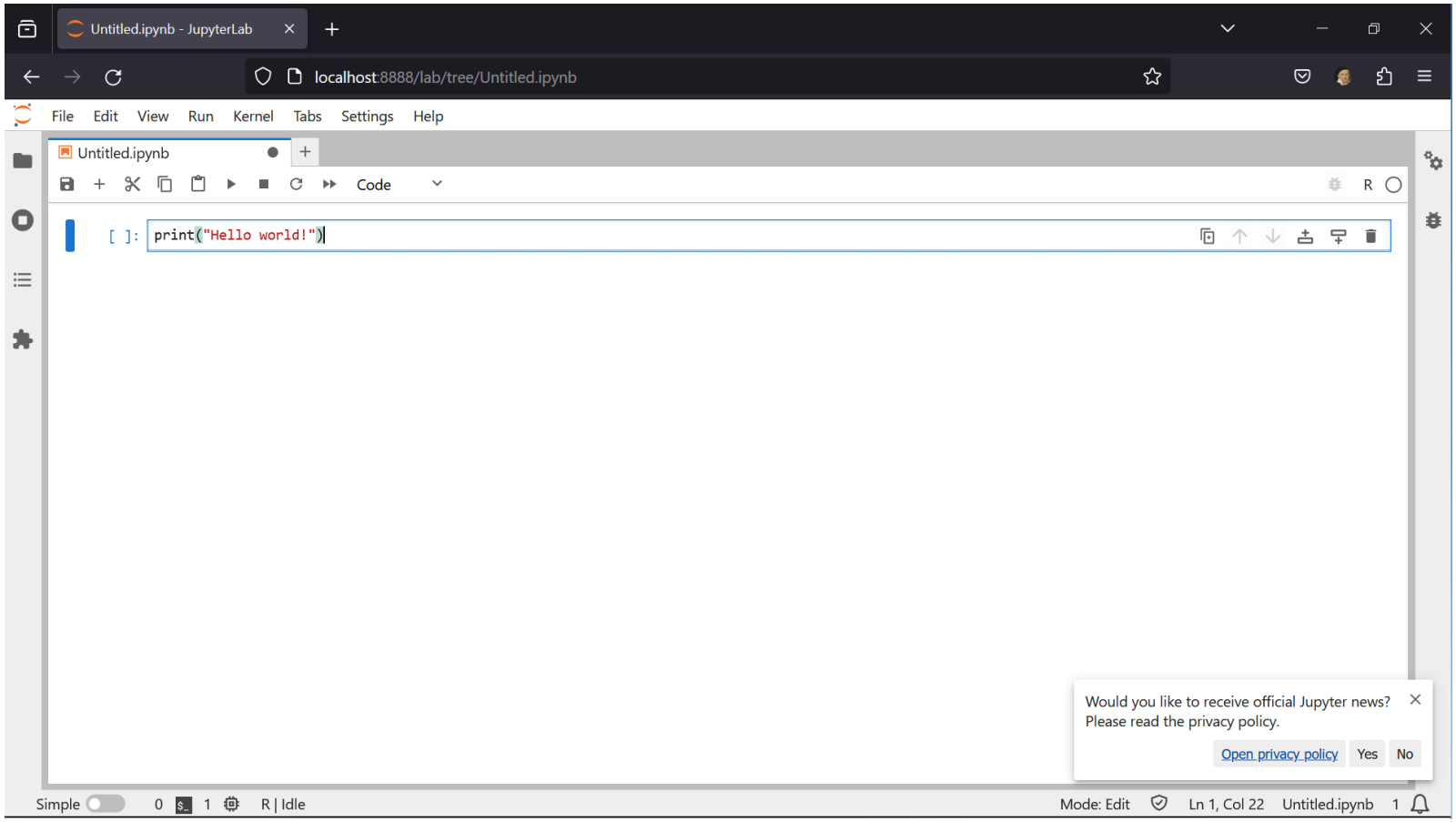

Figure: *The jupyter project.*

Introduction to Jupyter lab

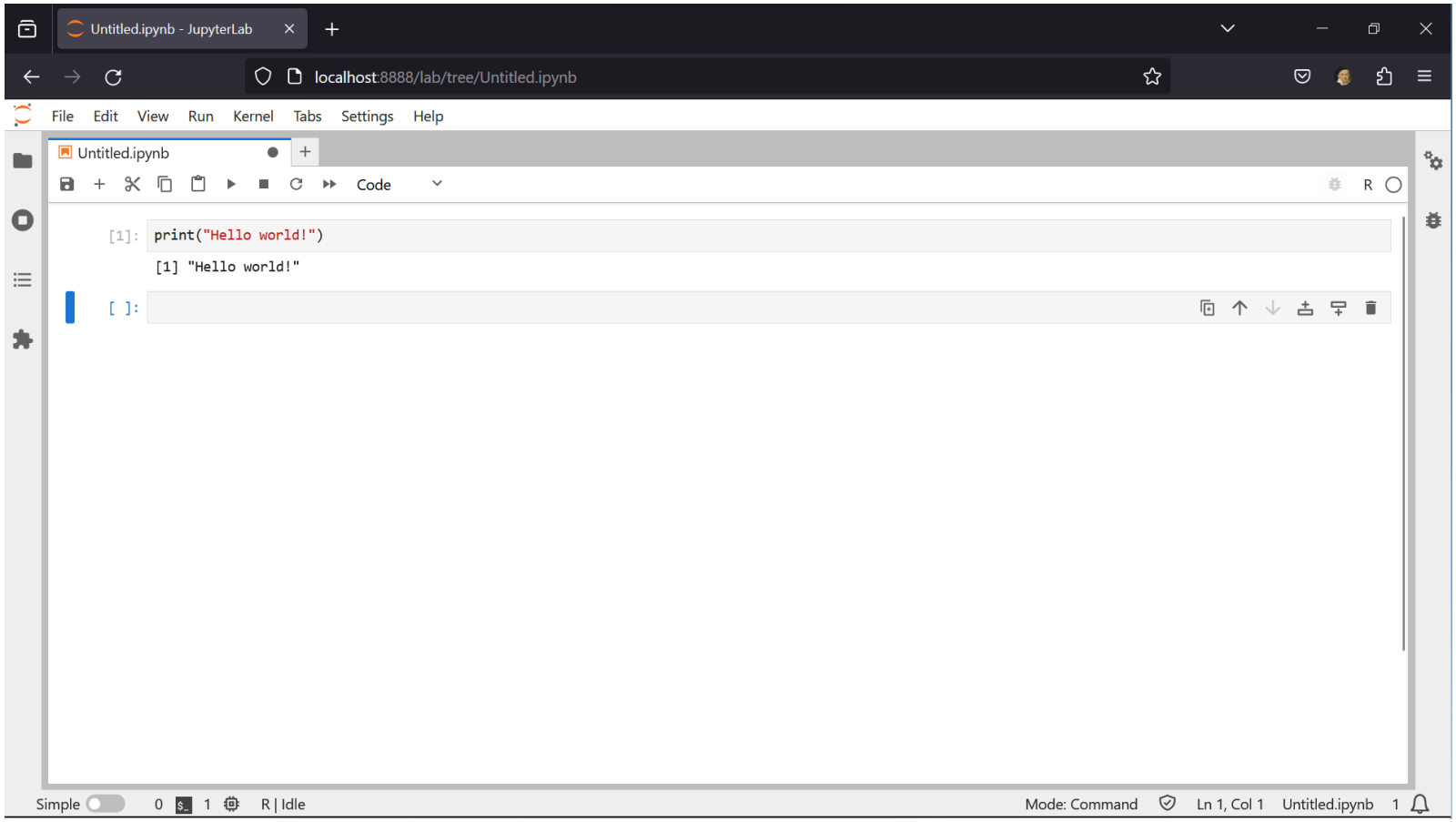

Figure: *The jupyter project.*

Talk Overview

Introduction to RStudio

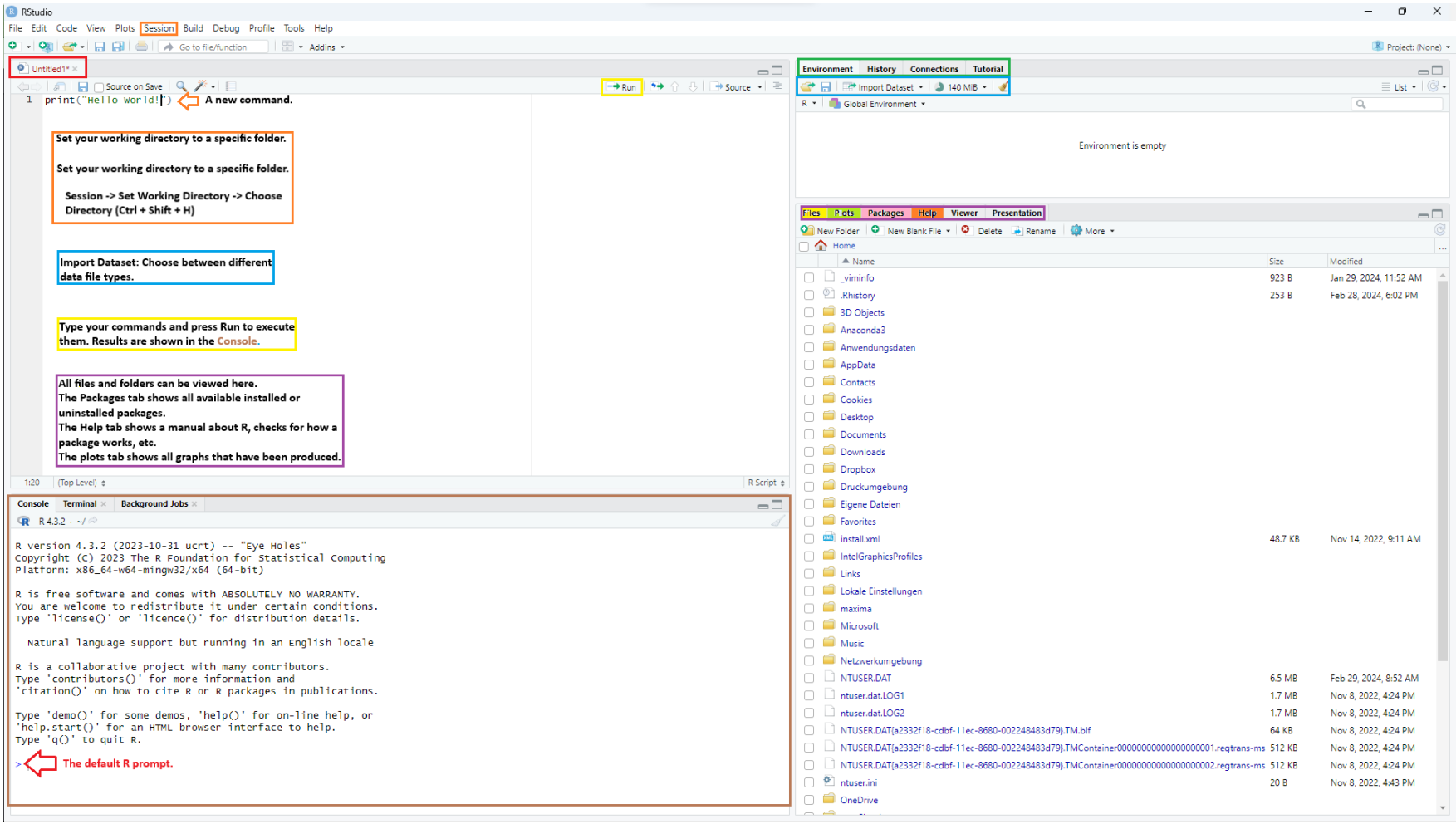

Figure: *RStudio.* https://posit.co/download/rstudio-desktop/

Talk Overview

References


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End of lecture 2

Thank you!