

Install R and R Studio

Getting Started With R

Install R and R Studio

- Installing R on Windows platform
- Installing R on Mac & Linux
- R –studio Installation

Installing R on Mac OS or Linux is similar to Windows.

R CRAN:

The Comprehensive R Archive Network - A network of global web servers storing identical & up-to-date versions of code and documentation for R.

It is the main repository for R packages. Currently, it features 14054 available packages.

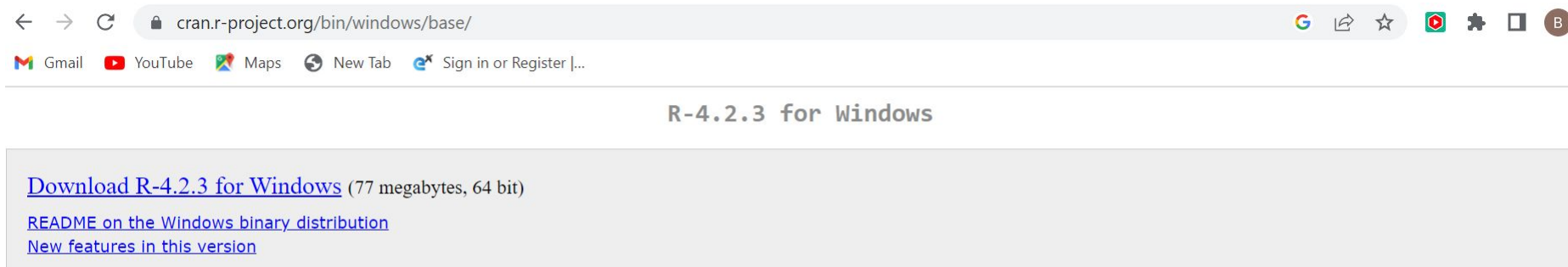
Steps to Download and Install R :

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








Select 'Download R for Windows'.






Installing R on Windows Platform

- Click on 'Download R [latest version]'
- In our case it is R 4.2.3



The screenshot shows a web browser window with the address bar displaying `cran.r-project.org/bin/windows/base/`. Below the address bar, there are navigation links for Gmail, YouTube, Maps, New Tab, and Sign in or Register. The main content area of the page is titled "R-4.2.3 for Windows" and contains three links: "Download R-4.2.3 for Windows (77 megabytes, 64 bit)", "README on the Windows binary distribution", and "New features in this version".

← → ↻ cran.r-project.org/bin/windows/base/       

 Gmail  YouTube  Maps  New Tab  Sign in or Register [...]

R-4.2.3 for Windows

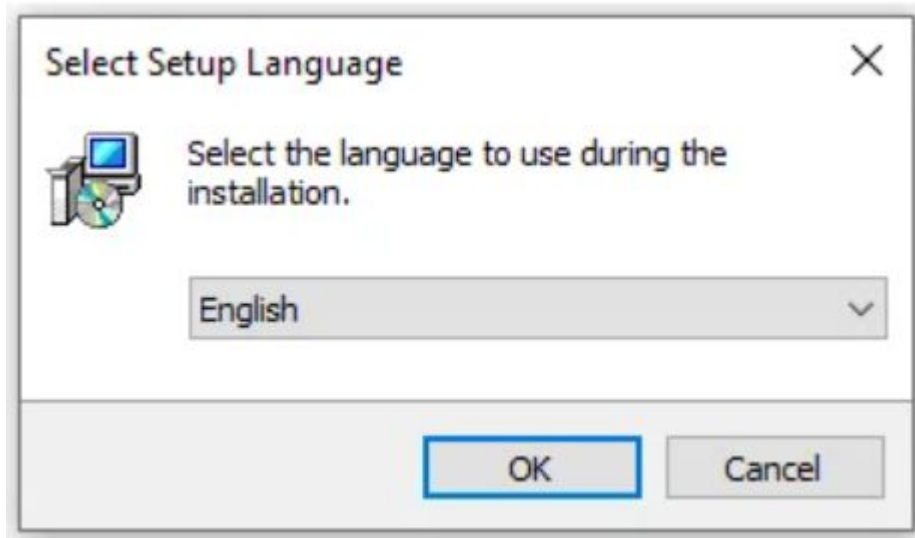
[Download R-4.2.3 for Windows](#) (77 megabytes, 64 bit)
[README on the Windows binary distribution](#)
[New features in this version](#)

This build requires UCRT, which is part of Windows since Windows 10 and Windows Server 2016. On older systems, UCRT has to be installed manually from [here](#).

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.

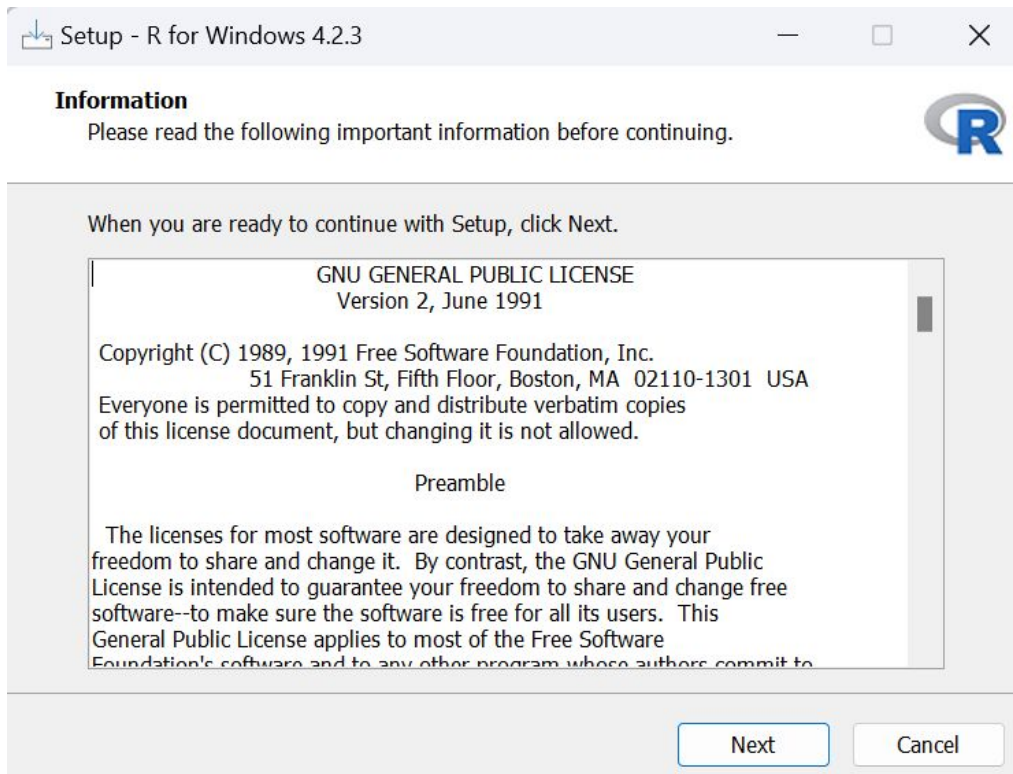
To install R on Windows OS:

1. Go to the [CRAN](#) website.
2. Click on **"Download R for Windows"**.
3. Click on **"install R for the first time"** link to download the R executable (.exe) file.
4. Run the R executable file to start installation, and allow the app to make changes to your device.
5. Select the installation language.



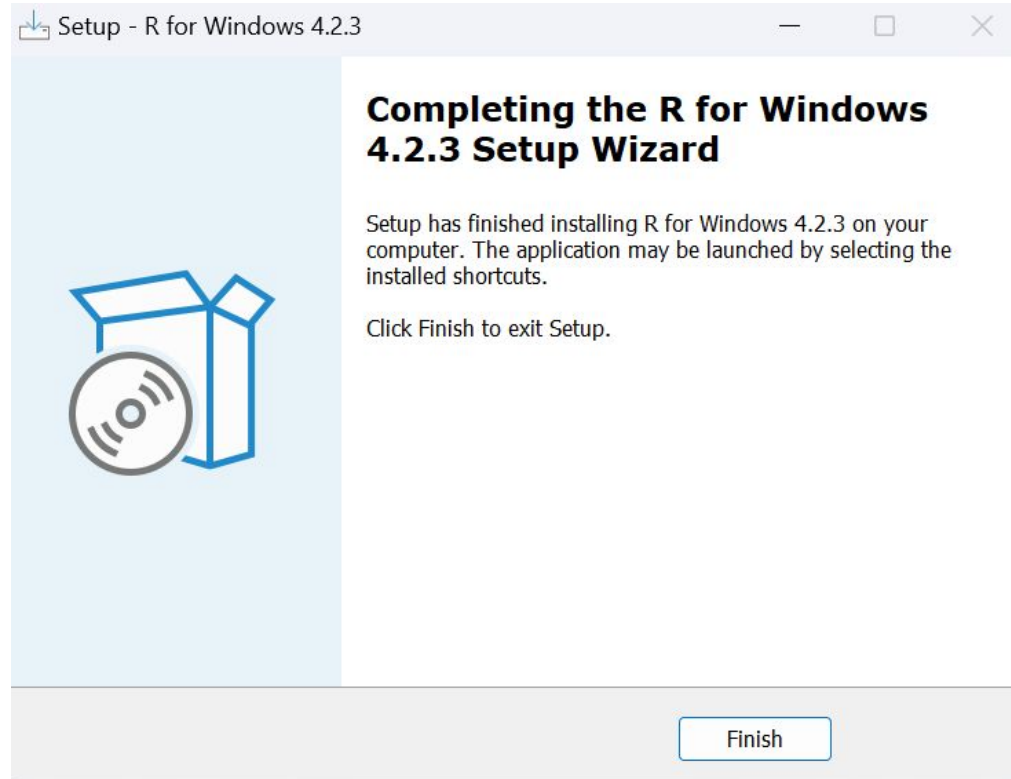
Installing R on Windows Platform

6. Follow the installation instructions



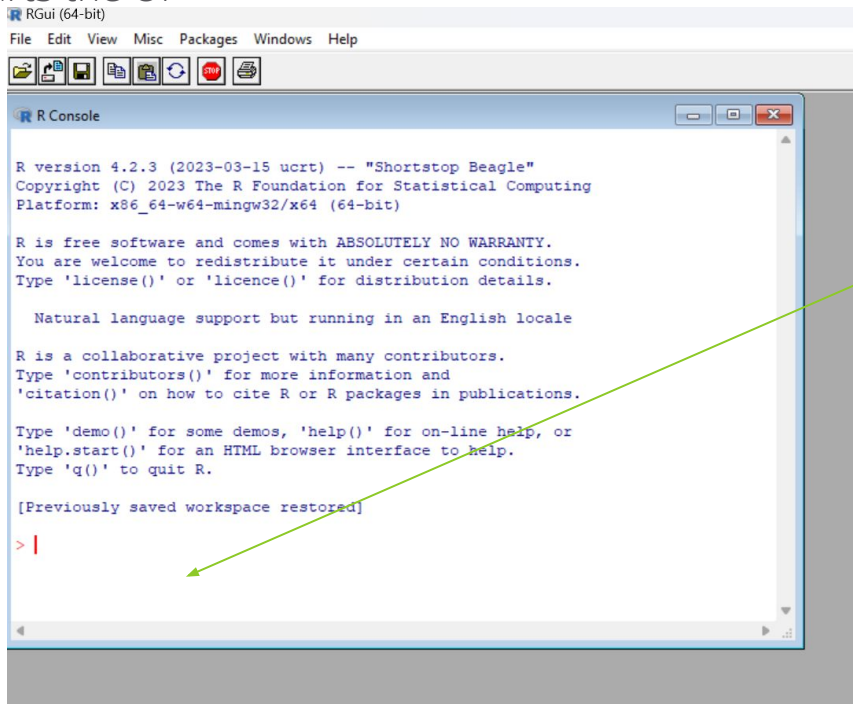
Installing R on Windows Platform

7. Click on **"Finish"** to exit the installation setup



Installing R on Windows Platform

- After it is installed, you should now have a R menu choice. Start the program by choosing either R i386 4.2.3 (32-bit) or R x64 4.2.3 (64-bit)
- This starts the UI



The R console

- Type in the command
- Press Enter
- See the output

Installing R on Mac or Linux Platform

Installing R on Mac OS or Linux is similar to Windows.

Steps to Download and Install R :

- Go to <http://cran.r-project.org/>
- Select 'Download R for Linux' or 'Download R for (Mac) OS X'.
- The next step is to click on the "R-4.2.3 pkg" (or newer version) file to begin the installation. You can leave the default options as is just like for Windows.

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 4.2.3 "Shortstop Beagle" released on 2023/03/15

Please check the integrity of the downloaded package by checking the signature:

```
pkgutil --check-signature R-4.2.3.pkg
```

in the *Terminal* application. If Apple tools are not available you can check the SHA1 checksum of the downloaded image:

```
openssl sha1 R-4.2.3.pkg
```

Latest release:

[R-4.2.3-arm64.pkg](#) (notarized and signed)

SHA1-hash: 99d1ad04b0a67f6d40cd019540ffe722f77b6b81

(ca. 86MB) for M1 and higher Macs only!

R 4.2.3 binary for macOS 11 (**Big Sur**) and higher, **Apple silicon arm64** build, signed and notarized package.

Contains R 4.2.3 framework, R.app GUI 1.79 for Apple silicon Macs (M1 and higher), Tcl/Tk 8.6.12 X11 libraries and Tinfo 6.8.

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

macOS Ventura users: there is a known bug in Ventura, if the installation fails, move the downloaded file away from the *Downloads* folder (e.g., to your home or Desktop)

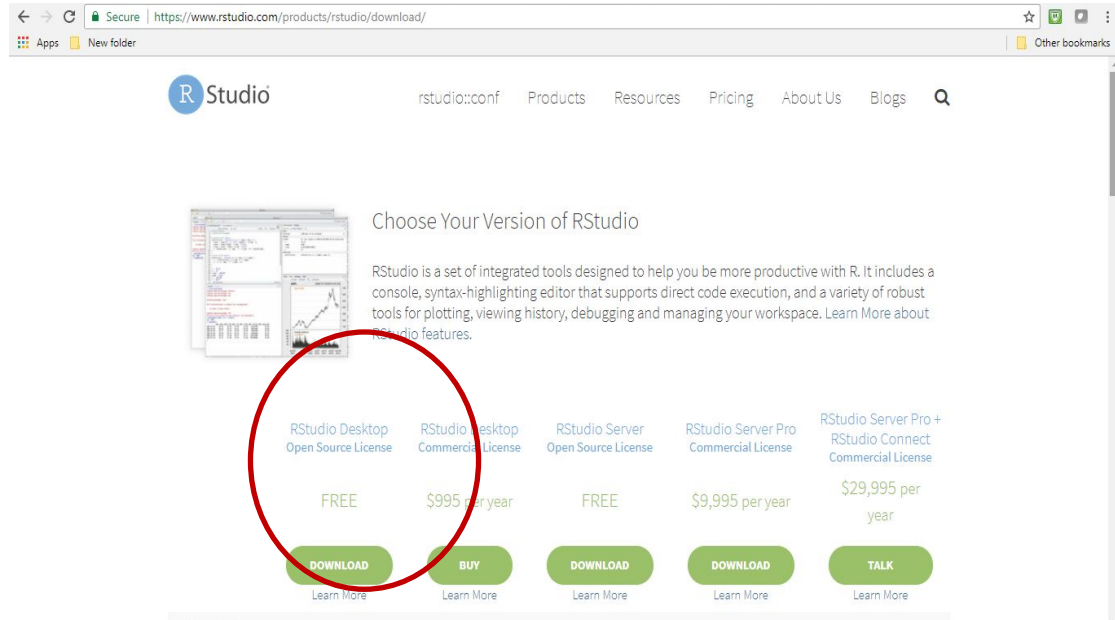
Installing R on Mac or Linux Platform

- RStudio is a free and open source integrated development environment (IDE) for R
- It is more user-friendly than using R directly since it keeps track of your script file, console, plots, and history, all in one place.
- It has an organized layout and several extra options.
- The usual RStudio screen has four windows:
 - Console
 - Workspace and history
 - Files, plots, packages and help
 - The R script(s) and data view.

To download RStudio go to <https://www.rstudio.com/> and follow the steps.

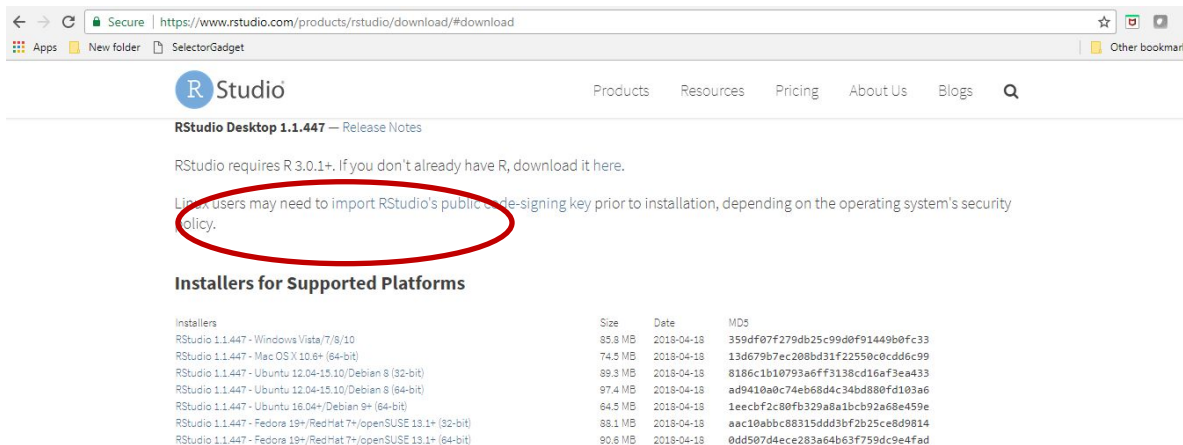
RStudio - Installation

- To download RStudio go to
- <https://www.rstudio.com/products/rstudio/download/>
- Select Download of RStudio Desktop FREE Version



RStudio - Installation

- Choose and download installer as per your machine's platform
- Run the installer and follow instructions
- In our case, RStudio latest version - 1.1.447



The screenshot shows the RStudio website's download page for version 1.1.447. The browser address bar shows the URL <https://www.rstudio.com/products/rstudio/download/#download>. The page header includes the RStudio logo and navigation links: Products, Resources, Pricing, About Us, and Blogs. The main heading is "RStudio Desktop 1.1.447 — Release Notes". Below this, a note states: "RStudio requires R 3.0.1+. If you don't already have R, download it here." A paragraph follows, stating: "Linux users may need to import RStudio's public code-signing key prior to installation, depending on the operating system's security policy." This sentence is circled in red. Below the paragraph is the section "Installers for Supported Platforms", which contains a table of download links, sizes, dates, and MD5 hashes for various operating systems.

Installers	Size	Date	MD5
RStudio 1.1.447 - Windows Vista/7/8/10	85.8 MB	2018-04-18	359df07f279db25c99d0f91449b0fc33
RStudio 1.1.447 - Mac OS X 10.6+ (64-bit)	74.5 MB	2018-04-18	13d679b7ec208bd31f22550c0cdd6c99
RStudio 1.1.447 - Ubuntu 12.04-15.10/Debian 8 (32-bit)	89.3 MB	2018-04-18	8186c1b10793a6ff3138cd16af3ea433
RStudio 1.1.447 - Ubuntu 12.04-15.10/Debian 8 (64-bit)	97.4 MB	2018-04-18	ad9410a0c74eb68d4c34bd880fd103a6
RStudio 1.1.447 - Ubuntu 16.04+/Debian 9+ (64-bit)	64.5 MB	2018-04-18	1eecbf2c80fb329a8a1bcb92a68e459e
RStudio 1.1.447 - Fedora 19+/Red Hat 7+/openSUSE 13.1+ (32-bit)	88.1 MB	2018-04-18	aac10abbcb88315ddd3bf2b25ce8d9814
RStudio 1.1.447 - Fedora 19+/Red Hat 7+/openSUSE 13.1+ (64-bit)	90.6 MB	2018-04-18	0dd507d4ece283a64b63f759dc9e4fad

Getting Started With R

Contents

- What is R?
- Why Learn R?
- History of R
- Users of R
- R Environment
- R community
- IDE (Integrated Development Environment)
- R Studio

Why Learn R ?

Free and
Open
Source

A language where the original source code is freely available and can be modified.

Connects
with other
languages

Languages like C , C++, Java, Python, Fortran can be called from within R

Vast
Engaged
Community

R has a large community of more than 2 million users

Supports
Extensions

Data structures in R consist of vectors, scalars, data frames, lists, etc

Why Learn R ?

Flexible

It is very easy to write code enhancements, develop packages, develop apps , write your own functions and distribute your own software

Extremely Comprehensive

R consists of over 18,000 CRAN, Bioconductor and GitHub packages

Great Data visualization

Varied plots such as boxplots, histograms, barplots, etc are available and are high in quality and self-explanatory.

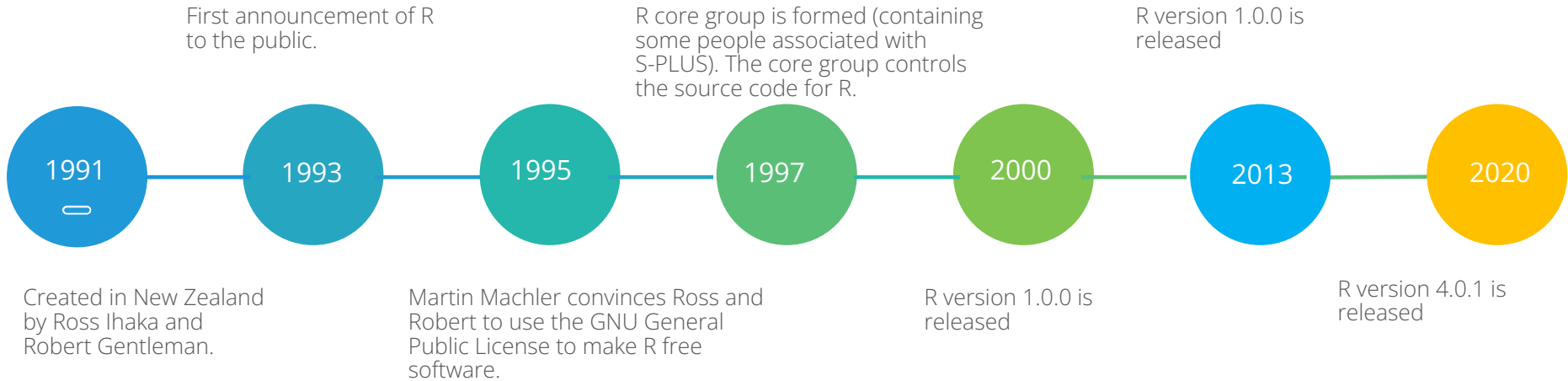
Advanced Statistical Language

Overall structure and syntax of R is exclusively developed for statistical computation

Cross Platform Compatible

You can run R on several O.S like Windows, Macintosh, GNU/Linux, UNIX and varied Software/Hardware

History of R



Users of R

- R has more than 2 million Users and thousands of developers around the world as reported in 2014.
- R is widely used by:
 - Academicians and Researchers.
 - Banks
 - Regulators like FDA (Food and Drug Administration)
 - Social Media giants like Facebook and Twitter, Google, Mozilla, New York Times, Thomas Cook, Uber

R Environment

- R Environment is a collection of objects like functions, variables.
- R can be extended via packages. Currently there are more than 18,000 packages available on CRAN, Bioconductor and GitHub
- All datasets created in the session remain in Memory
- Output can be used as input to other functions
- R commands are Case Sensitive.

R Environment

The screenshot displays the RStudio application window. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. Below the menu is a toolbar with icons for file operations and a 'Go to file/function' search bar. The main editor area shows a script with a single line of code: '1'. The right-hand pane is divided into three tabs: Environment, History, and Connections. The Environment tab is active, showing a list of objects in the Global Environment. The objects are: a (45 obs. of 2 variables), a_all (45 obs. of 8 variables), a1 (45 obs. of 2 variables), a2 (45 obs. of 2 variables), avg_be (45 obs. of 2 variables), avg_be_1516 (31 obs. of 2 variables), avg_be_1517 (40 obs. of 2 variables), b (45 obs. of 2 variables), b_all (45 obs. of 4 variables), b1 (45 obs. of 2 variables), and b2 (45 obs. of 2 variables). The bottom pane is divided into two tabs: Console and Terminal. The Console tab is active, showing the following output:

```
~ /  
Type 'demo()' for some demos, 'help()' for on-line help, or  
'help.start()' for an HTML browser interface to help.  
Type 'q()' to quit R.  
  
[workspace loaded from ~/.RData]  
  
Loading required package: ROCR  
Loading required package: gplots  
  
Attaching package: 'gplots'  
  
The following object is masked from 'package:stats':  
    lowess  
  
> |
```

R Community

- R Community is a group of developers who maintain R and guide its evolution.
- Few of the contributors are: R-bloggers, Revolution Analytics Blog, R-statistics and Data Mining Blog. There are news, blogs, forums, research on new packages or advancements, on their websites. They enable you to connect with other users and you can also contribute to these communities to both help others and learn the material and strengthen your own understanding.
- Useful & most referred Links :
 1. Stack Overflow - <https://stackoverflow.com/>
 2. R Bloggers - <https://www.r-bloggers.com/>
 3. Revolution Analytics Blog - <https://blog.revolutionanalytics.com/>
 4. R Statistics - <https://www.r-statistics.com/>

IDE

- Integrated Development Environment (IDE) is a software which provides programmer with an interface combined with all the required tools at hand.
- There are many IDE's available for R. Few of them are RStudio , eclipse with StatET.
- Most recommended and widely used among these is RStudio. Microsoft R Open, which is the enhanced distribution of R from Microsoft Corporation, can be used with Rstudio and together they make a powerful combination. It is Open source & free to download, use and share.

RStudio

- RStudio is an Integrated development environment (IDE) for R.
- The usual RStudio screen has four windows:
 - Console
 - Workspace and history
 - Files, plots, packages and help
 - The R script(s) and data view.
- RStudio is available in open source and commercial editions and runs on the desktop (Windows, Mac, and Linux) or in a browser connected to RStudio Server or RStudio Server Pro. RStudio supports authoring HTML, PDF, Word Documents, and slide shows.
- RStudio supports interactive graphics. RStudio make it easy to start new or find existing projects.

RStudio

The screenshot shows the RStudio desktop environment. At the top is a menu bar with options: File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. Below the menu bar is a toolbar with icons for file operations and running code. The main workspace is divided into several panes. On the left, there are tabs for R script files (Untitled7, Untitled8, Untitled9, Untitled15, Untitled20, Untitled21). The central pane shows the R script editor with line 1 selected. On the right, there are three panes: Environment, History, and Connections. The Environment pane shows a list of objects in the Global Environment, including 'a', 'a_all', 'a1', 'a2', 'avg_be', 'avg_be_1516', 'avg_be_1517', 'b', 'b_all', 'b1', and 'b2'. Below these are panes for Files, Plots, Packages, Help, and Viewer. The Console pane at the bottom left shows the output of the R session, including the workspace loading process and the loading of the 'gplots' package. Annotations with arrows point to specific parts of the interface: 'R script(s) & Data viewer' points to the script editor tabs; 'Workspace & History' points to the Environment pane; 'Console' points to the Console pane; and 'Files, plots, packages and Help' points to the bottom right pane area.

R script(s) & Data viewer

Workspace & History

Console

Files, plots, packages and Help

```
1:1 (Top Level) | R Script |
Console | Terminal |
~/
Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[workspace loaded from ~/.RData]

Loading required package: ROCR
Loading required package: gplots

Attaching package: 'gplots'

The following object is masked from 'package:stats':

    lowess

> |
```

Quick Recap

- In this session, we had an introduction about R. Here is the quick recap:

R

- It is a programming language and environment for statistical computing and graphics
- It is free and open source software
- Created by Ross Ihaka and Robert Gentleman
- It is built using packages, which contains Basic and advanced functions.
- R Community is a group of developers who maintain R and guide its evolution

RStudio

- RStudio is most widely used user friendly IDE.