

# Introduction to R and RStudio IDE

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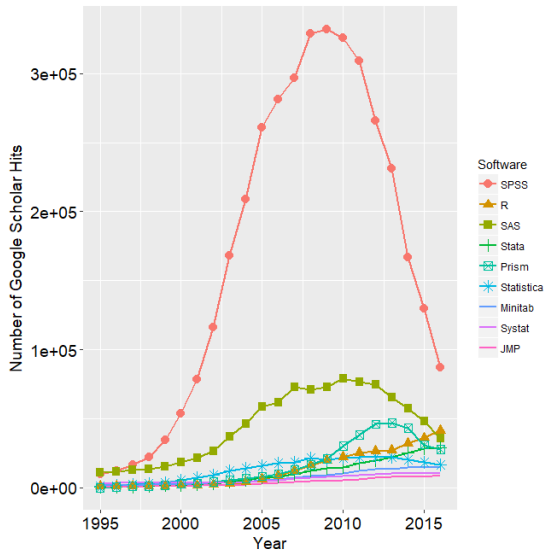
# Why use R?

*R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS.*

Source: <https://www.r-project.org/>

# R outpaces other statistics software

Source: <http://r4stats.com/articles/popularity/>

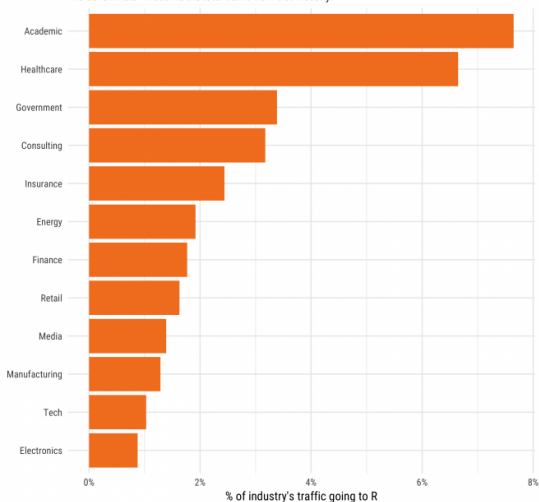


# R is getting more popular among academician

Source: <https://stackoverflow.blog/2017/10/10/impressive-growth-r/>

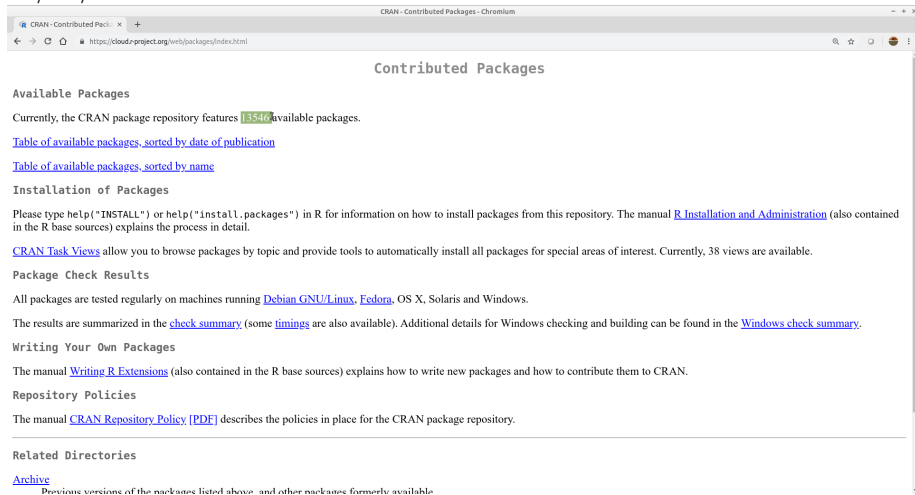
## Visits to R by industry

Based on visits to Stack Overflow questions from the US/UK in January-August 2017.  
The denominator in each is the total traffic from that industry.



# Availability of R packages

Source: <https://cloud.r-project.org/web/packages/index.html>, as of 18/12/2018.



The screenshot shows a web browser window with the title "CRAN - Contributed Packages - Chromium". The address bar shows the URL "https://cloud.r-project.org/web/packages/index.html". The main content area is titled "Contributed Packages" and contains several sections:

- Available Packages**

Currently, the CRAN package repository features **13546** available packages.

[Table of available packages, sorted by date of publication](#)

[Table of available packages, sorted by name](#)
- Installation of Packages**

Please type `help("INSTALL")` or `help("install.packages")` in R for information on how to install packages from this repository. The manual [R Installation and Administration](#) (also contained in the R base sources) explains the process in detail.

[CRAN Task Views](#) allow you to browse packages by topic and provide tools to automatically install all packages for special areas of interest. Currently, 38 views are available.
- Package Check Results**

All packages are tested regularly on machines running [Debian GNU/Linux](#), [Fedora](#), OS X, Solaris and Windows.

The results are summarized in the [check summary](#) (some [timings](#) are also available). Additional details for Windows checking and building can be found in the [Windows check summary](#).
- Writing Your Own Packages**

The manual [Writing R Extensions](#) (also contained in the R base sources) explains how to write new packages and how to contribute them to CRAN.
- Repository Policies**

The manual [CRAN Repository Policy \[PDF\]](#) describes the policies in place for the CRAN package repository.
- Related Directories**

[Archive](#)  
Previous versions of the packages listed above and other packages formerly available

# R and RStudio



R @ <https://cran.r-project.org/>

The screenshot shows the R Project for Statistical Computing website. The browser title is "R: The R Project for Statistical Computing - Chromium" and the address bar shows "https://www.r-project.org".

**The R Project for Statistical Computing**

**Getting Started**

R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To [download R](#), please choose your preferred CRAN mirror.

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.

**News**

- R version 3.5.2 (Eggshell Igloo) prerelease versions will appear starting Monday 2018-12-10. Final release is scheduled for Thursday 2018-12-20.
- The R Foundation Conference Committee has released a [call for proposals](#) to host useR! 2020 in North America.
- You can now support the R Foundation with a renewable subscription as a [supporting member](#)
- R version 3.5.1 (Feather Spray) has been released on 2018-07-02.
- The R Foundation has been awarded the Personality/Organization of the year 2018 award by the professional association of German market and social researchers.

**News via Twitter**

**The R Foundation** @\_R\_Foundation  
We welcome @gdequeroz, @edzerpebesma and @henrikbergsson, elected as ordinary members of the R Foundation in recognition of their services to the R community.  
Oct 27, 2018

**The R Foundation Released**  
useR! 2019 @UserR2019\_Conf  
17-12-18 ;  
01-19 ;  
15-02-19 ;  
All the important dates are on our website! [user2019.r-project.org/dates/](https://user2019.r-project.org/dates/)

**Navigation Links (Left Sidebar):**

- Home
- Download
- CRAN
- R Project
  - About R
  - Logo
  - Contributors
  - What's New?
  - Reporting Bugs
  - Conferences
  - Search
  - Get Involved: Mailing Lists
  - Developer Pages
  - R Blog
- R Foundation
  - Foundation
  - Board
  - Members
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  - Donate
- Help With R
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  - Manuals
  - FAQs
  - The R Journal
  - Books
  - Certification
  - Other
- Links
  - Bioconductor
  - Related Projects
  - GSOC

# RStudio Installation

RStudio @ <http://www.rstudio.com/>

Download RStudio - RStudio - Chromium

https://www.rstudio.com/products/rstudio/download/#download

RStudio

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**RStudio Desktop 1.1.463** — Release Notes

RStudio requires R 3.0.1+. If you don't already have R, download it [here](#).

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

**Installers for Supported Platforms**

| Installers   | Size    | Date       | MD5                               |
|--|---------|------------|-----------------------------------|
| RStudio 1.1.463 - Windows Vista/7/8/10                         | 85.8 MB | 2018-10-29 | 58b3d796d8c9f96fb8580c62f46ab64d4 |
| RStudio 1.1.463 - Mac OS X 10.6+ (64-bit)                      | 74.5 MB | 2018-10-29 | a79832ba4d7daaa86a8d0e1948278d94  |
| RStudio 1.1.463 - Ubuntu 12.04-15.10/Debian 8 (32-bit)         | 89.3 MB | 2018-10-29 | 8a67557a9fae2bafce289df3358aa6f63 |
| RStudio 1.1.463 - Ubuntu 12.04-15.10/Debian 8 (64-bit)         | 97.4 MB | 2018-10-29 | bc58d65bd34926c1cc3ae4a209067d649 |
| RStudio 1.1.463 - Ubuntu 16.04+/Debian 9+ (64-bit)             | 65 MB   | 2018-10-29 | cf6d59db18619cc78d1592fefaac7353  |
| RStudio 1.1.463 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (32-bit) | 88.1 MB | 2018-10-29 | 742f8bad60df6aa3281576e14ad6699e  |
| RStudio 1.1.463 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (64-bit) | 90.6 MB | 2018-10-29 | c73830670ca99ddea7e427b856952d1   |

**Zip/Tarballs**

| Zip/tar archives   | Size     | Date       | MD5                               |
|--|----------|------------|-----------------------------------|
| RStudio 1.1.463 - Windows Vista/7/8/10                         | 122.9 MB | 2018-10-29 | 1eb1d7758bd4bf44bb68d4a7c3fe8d894 |
| RStudio 1.1.463 - Ubuntu 12.04-15.10/Debian 8 (32-bit)         | 90 MB    | 2018-10-29 | e19242b621d36c304e986b888840b41   |
| RStudio 1.1.463 - Ubuntu 12.04-15.10/Debian 8 (64-bit)         | 98.3 MB  | 2018-10-29 | 5944b3dd118cfa46f2a6c484d768324   |
| RStudio 1.1.463 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (32-bit) | 88.8 MB  | 2018-10-29 | 6bee446eeb4cc8e32967845e1f7ffe2b  |
| RStudio 1.1.463 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (64-bit) | 91.4 MB  | 2018-10-29 | 3163725769b79b76fedb75462a19180   |

**Source Code**

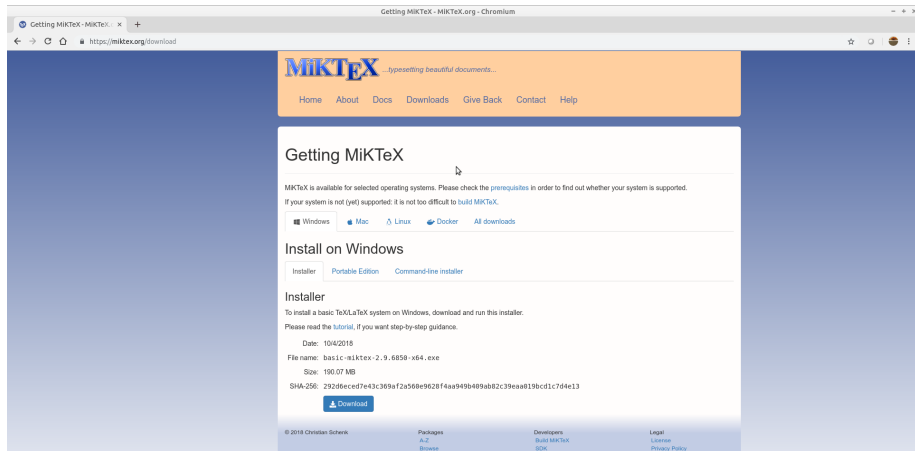
A tarball containing source code for RStudio v1.1.463 can be downloaded from [here](#)

Try RStudio Server Pro for free!

# R to PDF Installation

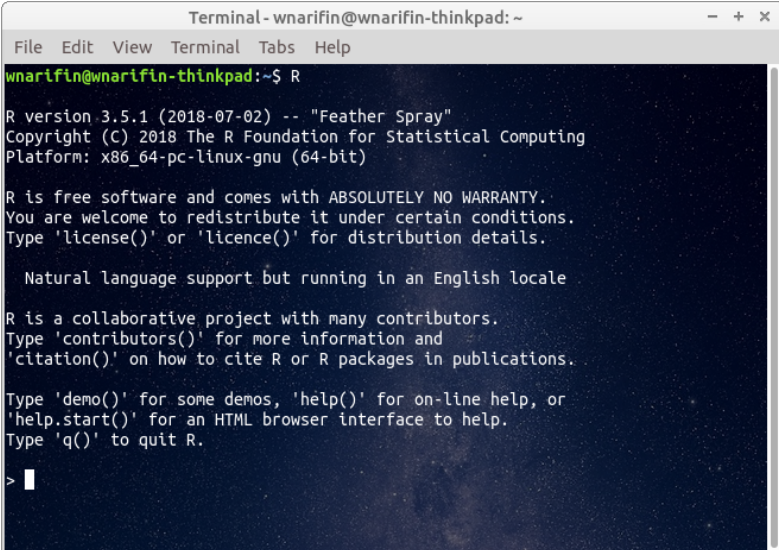
- Windows & MacOS – MikTeX @ <https://miktex.org/download>
- Linux – texlive.

Important for R-markdown session later.



The screenshot shows a web browser window with the URL <https://miktex.org/download>. The page features the MikTeX logo and navigation links: Home, About, Docs, Downloads, Give Back, Contact, and Help. The main heading is "Getting MikTeX". Below this, a message states: "MikTeX is available for selected operating systems. Please check the prerequisites in order to find out whether your system is supported. If your system is not (yet) supported, it is not too difficult to build MikTeX." There are tabs for Windows, Mac, Linux, Docker, and All downloads. The "Windows" tab is selected, and the sub-section "Install on Windows" is active. Under "Install on Windows", there are options for "Installer", "Portable Edition", and "Command-line installer". The "Installer" section is expanded, showing the following details: "Date: 10/4/2018", "File name: basic-miktex-2.9.6859-x64.exe", "Size: 190.07 MB", and "SHA-256: 292d6ced7e43c369af2a568e9620f4aa949b409ab02c39eaa019bcd1c7d4e13". A "Download" button is visible. At the bottom of the page, there are links for "Packages A-Z Browse", "Developers Build MikTeX SDK", and "Legal License Privacy Policy".

# R Interface

A terminal window titled "Terminal - wnarifin@wnarifin-thinkpad: ~" with standard window controls. The terminal shows the command "R" being executed, followed by the R startup banner. The banner includes the version number (3.5.1), copyright information (© 2018 The R Foundation), platform details (x86\_64-pc-linux-gnu), and a disclaimer about warranties. It also lists various help options like "license()", "contributors()", "citation()", "demo()", and "help.start()", and instructions on how to quit with "q()". The prompt ">" is visible at the bottom.

```
Terminal - wnarifin@wnarifin-thinkpad: ~
File Edit View Terminal Tabs Help
wnarifin@wnarifin-thinkpad:~$ R
R version 3.5.1 (2018-07-02) -- "Feather Spray"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platform: x86_64-pc-linux-gnu (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.

  Natural language support but running in an English locale

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

> █
```

Figure 2: Plain R

# RStudio Interface

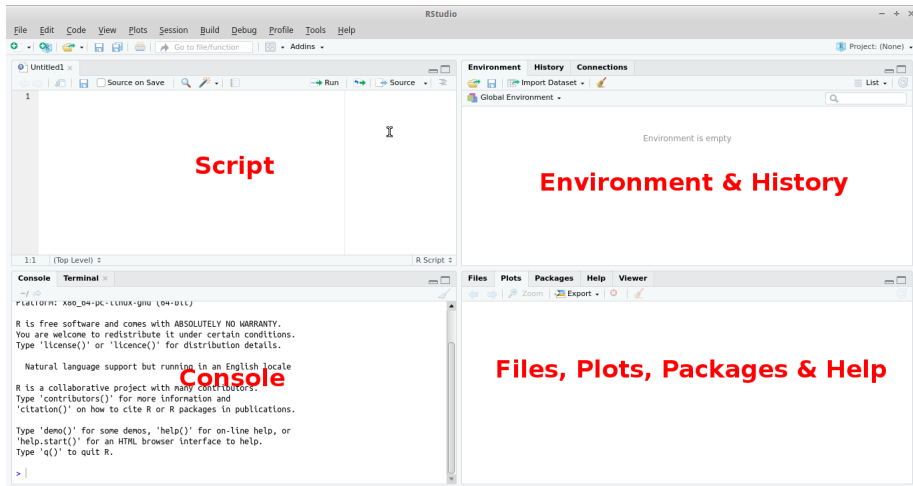


Figure 3: RStudio

# R script

## File > New file > R script

- type all commands/functions here
- comments, start with “#”
- run all commands by Ctrl+Enter

# Function and Object



- R function(), think of MS Excel function
- structure

```
function(argument1 = value, argument2 = value)
```

# Object

- name assigned on left side of “<-” / “=”
- variable, data (data frame, matrix, list)

```
x <- 1  
y = 2  
z = x + y  
z # type object name, you'll get the value
```

# R packages

# Install packages a.k.a libraries

- Graphically

## Packages > Install

- Command

e.g. psych, car

```
install.packages("psych")  
install.packages("car")
```

# Load libraries

e.g. load psych and car,

```
library(psych)  
library(car)
```

# Working directory

# Set working directory

- 1 Browse to target directory: **Files Tab** > ... > **Go To Folder**
- 2 **Files Tab** > **More** > **Set As Working Directory**

Help



If you know the name of packages/functions,

```
?psych  
?library
```

Search by keywords,

```
??mean  
??survey
```

Thank you

# References

Fox, J., Weisberg, S., & Price, B. (2018). *Car: Companion to applied regression*. Retrieved from <https://CRAN.R-project.org/package=car>

R Core Team. (2018). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from <https://www.R-project.org/>

Revelle, W. (2018). *Psych: Procedures for psychological, psychometric, and personality research*. Retrieved from <https://CRAN.R-project.org/package=psych>