Part 1. R 프로그래밍 (데이터 분석 전문가 양성과정)

01

R과 RStudio

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R과 RStudio 설치

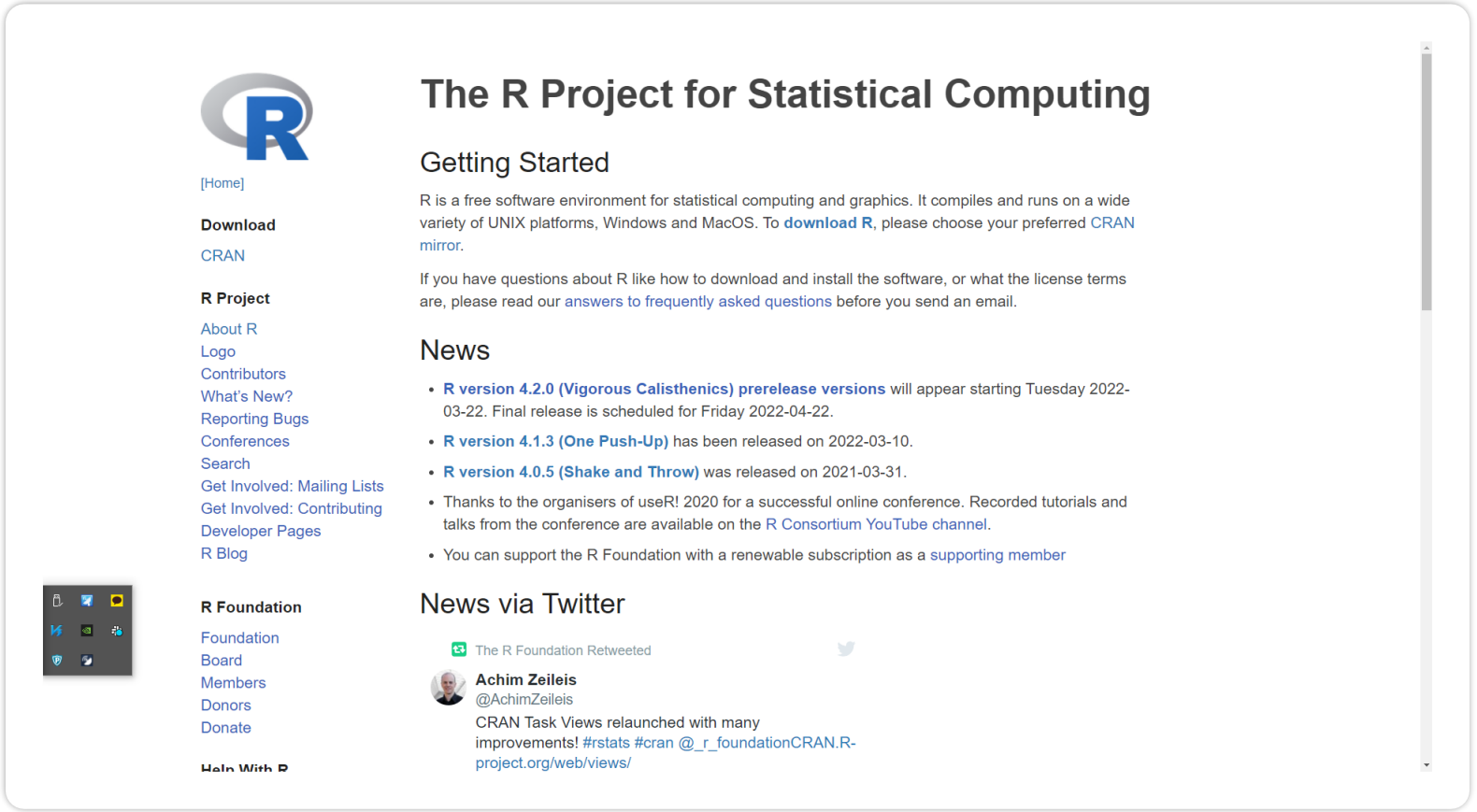
- ✓ tools.zip: R과 RStudio 설치 파일
  - R-4.2.0-win.exe: R 설치 파일
  - RStudio-2022.02.2-485.exe: RStudio 설치 파일
- ✓ MacOS/Linux 사용자:
  - 다운로드 사이트에서 해당 플랫폼 버전을 받아서 설치

R 언어

- 데이터의 통계 분석과 시각화를 위해 탄생한 프로그래밍 언어
- 뉴질랜드 오클랜드 대학의 통계학자인 로스 이하카와 로버트 젠틀맨이 개발
- 1993년에 처음 공개된 이후로 오픈소스 소프트웨어로 관리되고 있음
  - 누구나 무료로 사용 가능함
  - 활발한 사용자 커뮤니티가 최신 분석 기능을 신속하게 제공함
- 데이터 분석과 시각화에 최적화된 매우 강력한 특징들을 가지고 있음

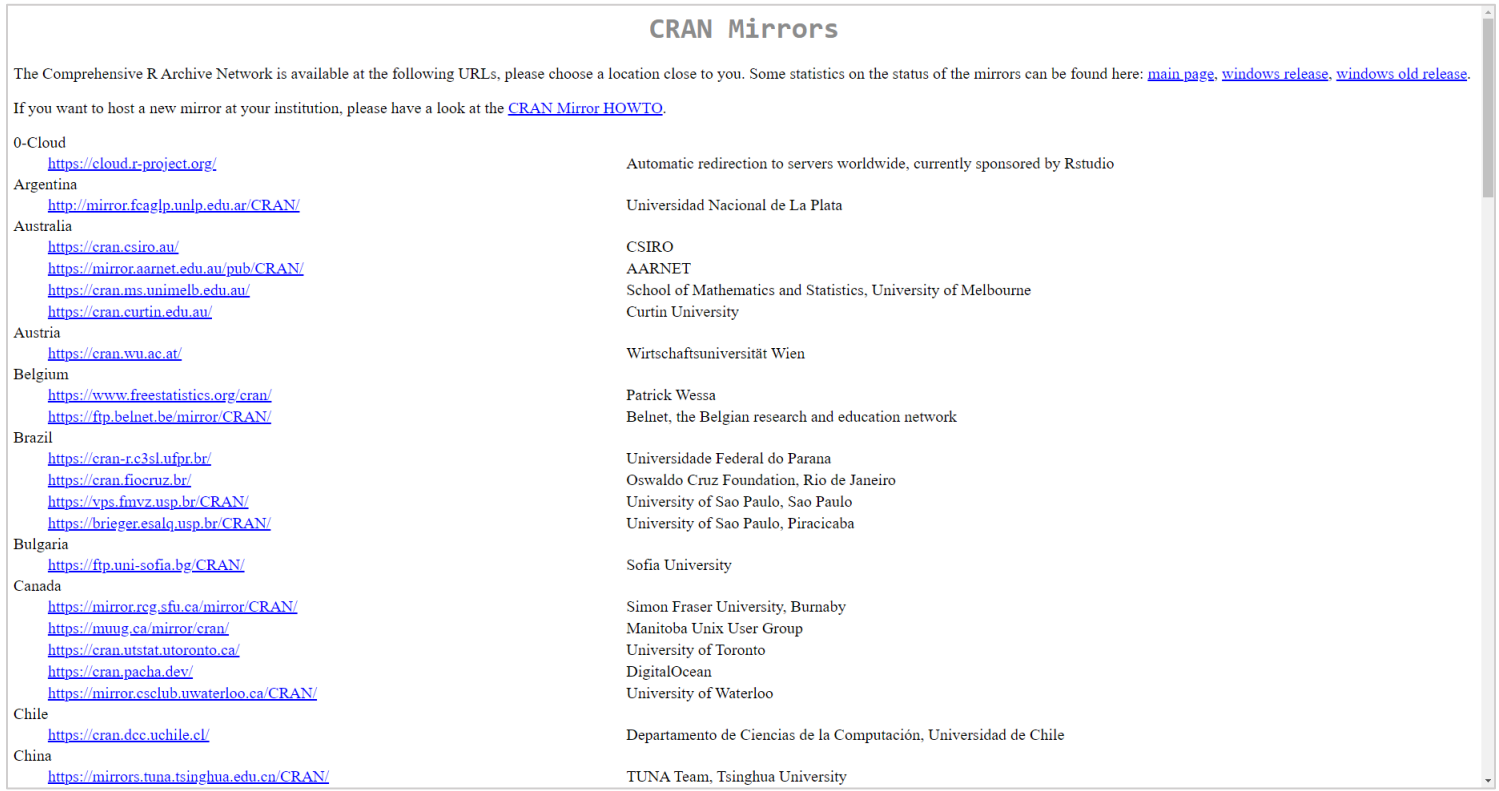
01. R과 RStudio

- R 다운로드 및 설치
  - R 프로젝트: https://www.r-project.org



01. R과 RStudio

- Download R > Korea > https://cran.yu.ac.kr



CRAN Mirrors

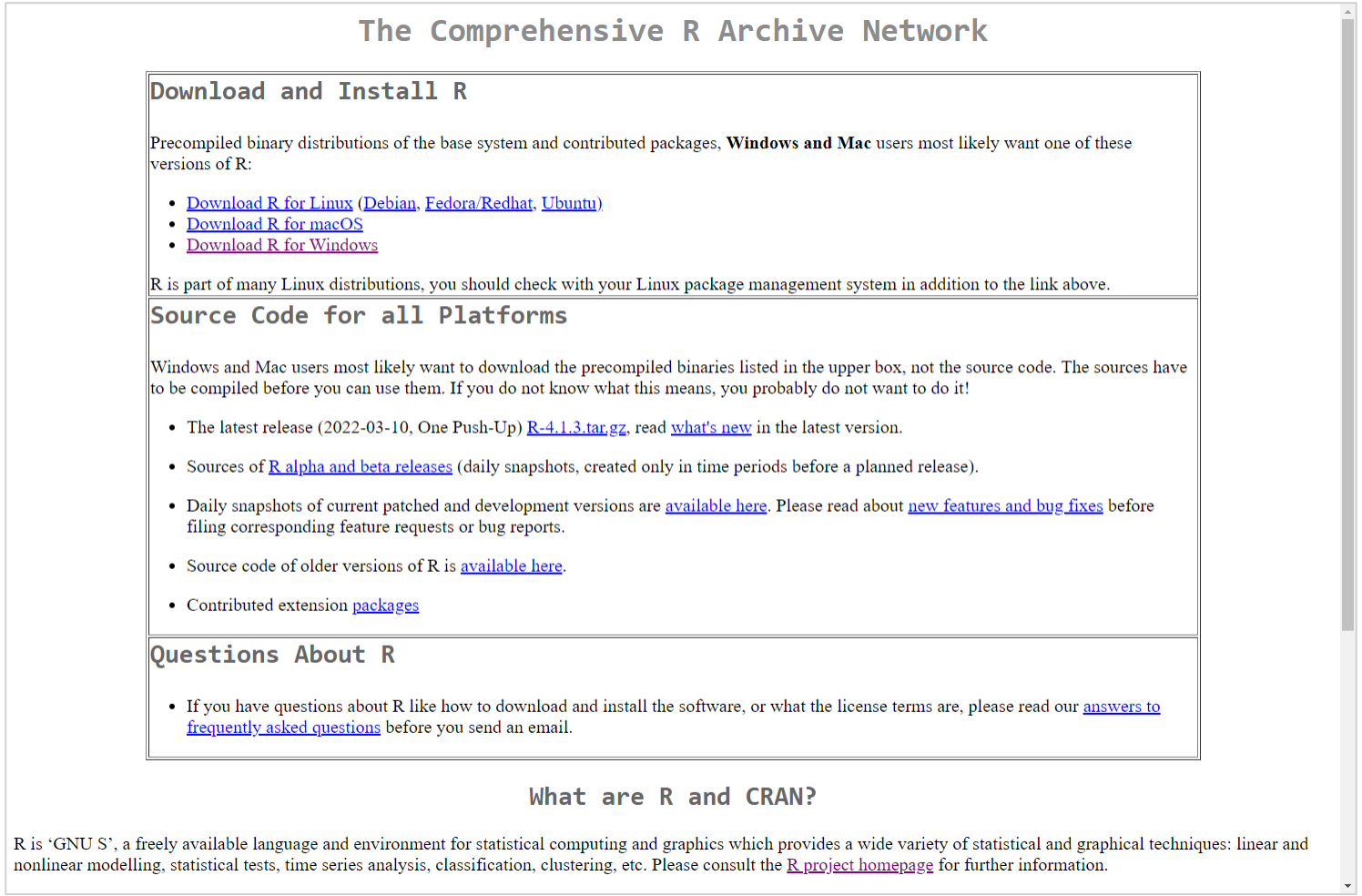
The Comprehensive R Archive Network is available at the following URLs, please choose a location close to you. Some statistics on the status of the mirrors can be found here: main page, windows release, windows old release.

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 Rstudio
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
https://cran.curtin.edu.au/	Curtin University
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://cran.utstat.utoronto.ca/	University of Toronto
https://cran.pacha.dev/	DigitalOcean
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

01. R과 RStudio

- Download R for Windows (macOS, Linux)



The Comprehensive R Archive Network

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 (2022-03-10, One Push-Up) R-4.1.3.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

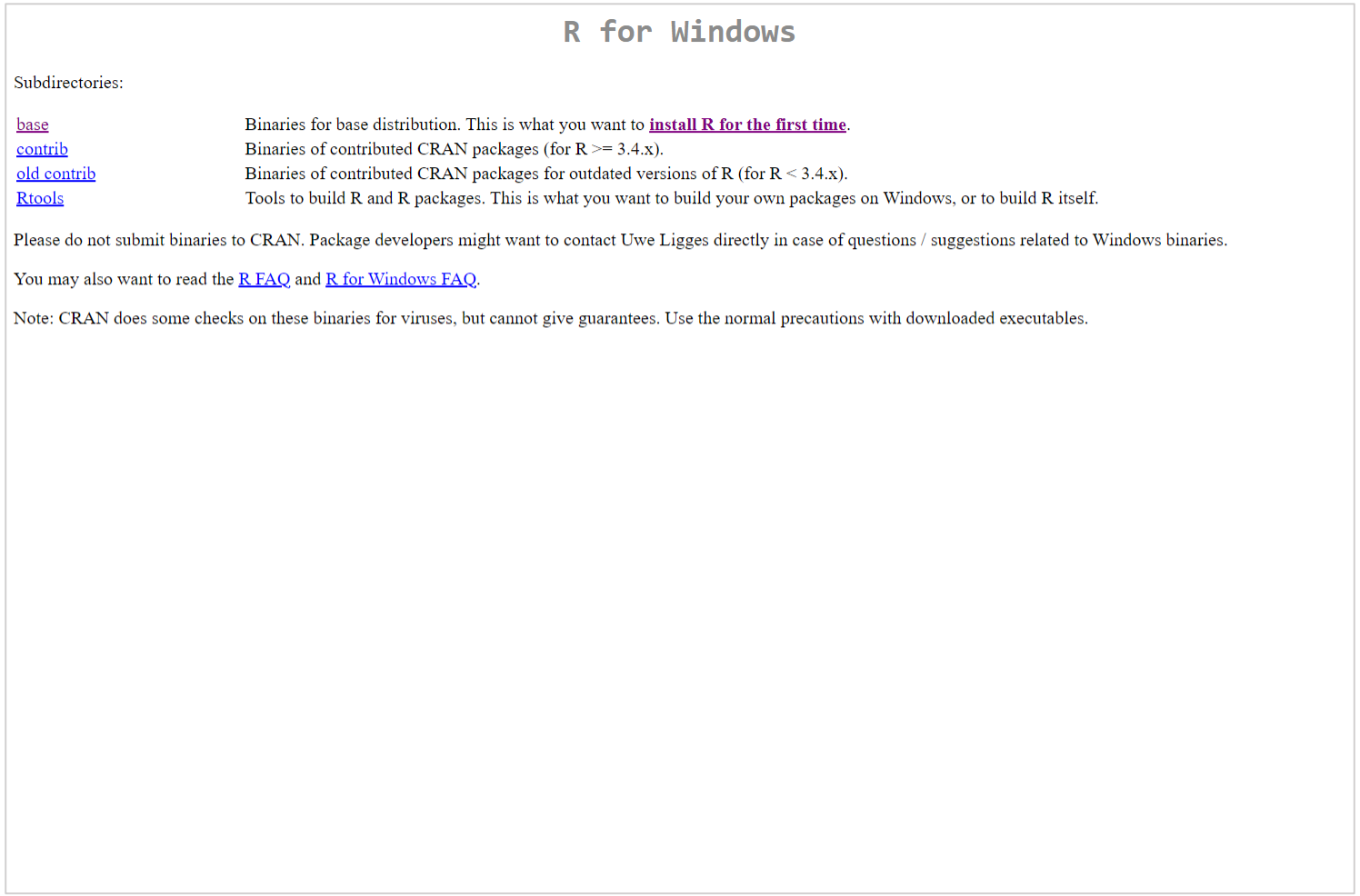
Questions About R

- 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.

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.

- Install R for the first time



R for Windows

Subdirectories:

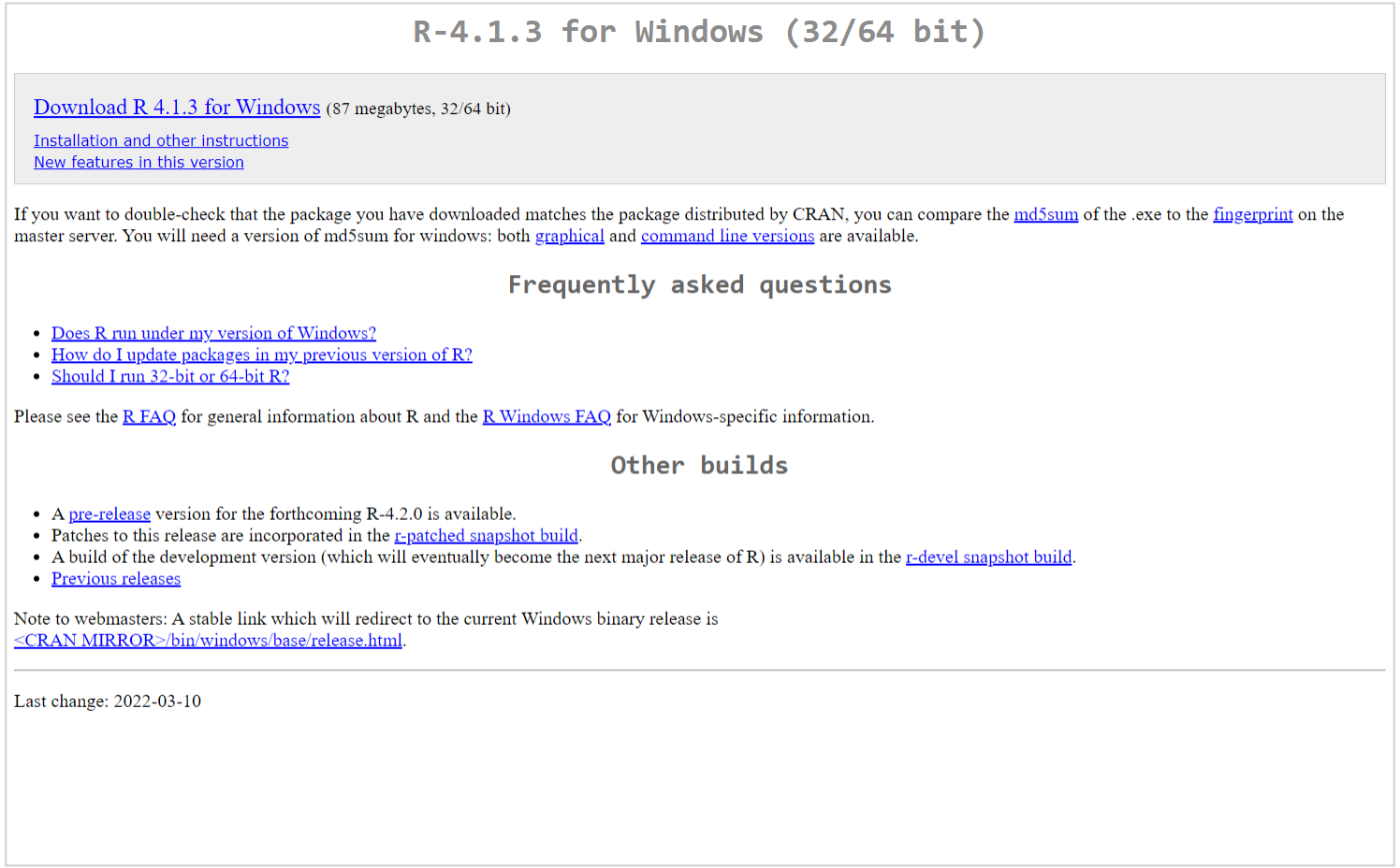
base	Binaries for base distribution. This is what you want to **install R for the first time**.
contrib	Binaries of contributed CRAN packages (for R >= 3.4.x).
old contrib	Binaries of contributed CRAN packages for outdated versions of R (for R < 3.4.x).
Rtools	Tools to build R and R packages. This is what you want to build your own packages on Windows, or to build R itself.

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.

You may also want to read the R FAQ and R for Windows FAQ.

Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables.

- Download R 4.x.x for Windows



R-4.1.3 for Windows (32/64 bit)

Download R 4.1.3 for Windows (87 megabytes, 32/64 bit)

Installation and other instructions
New features in this version

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.

Frequently asked questions

- Does R run under my version of Windows?
- How do I update packages in my previous version of R?
- Should I run 32-bit or 64-bit R?

Please see the R FAQ for general information about R and the R Windows FAQ for Windows-specific information.

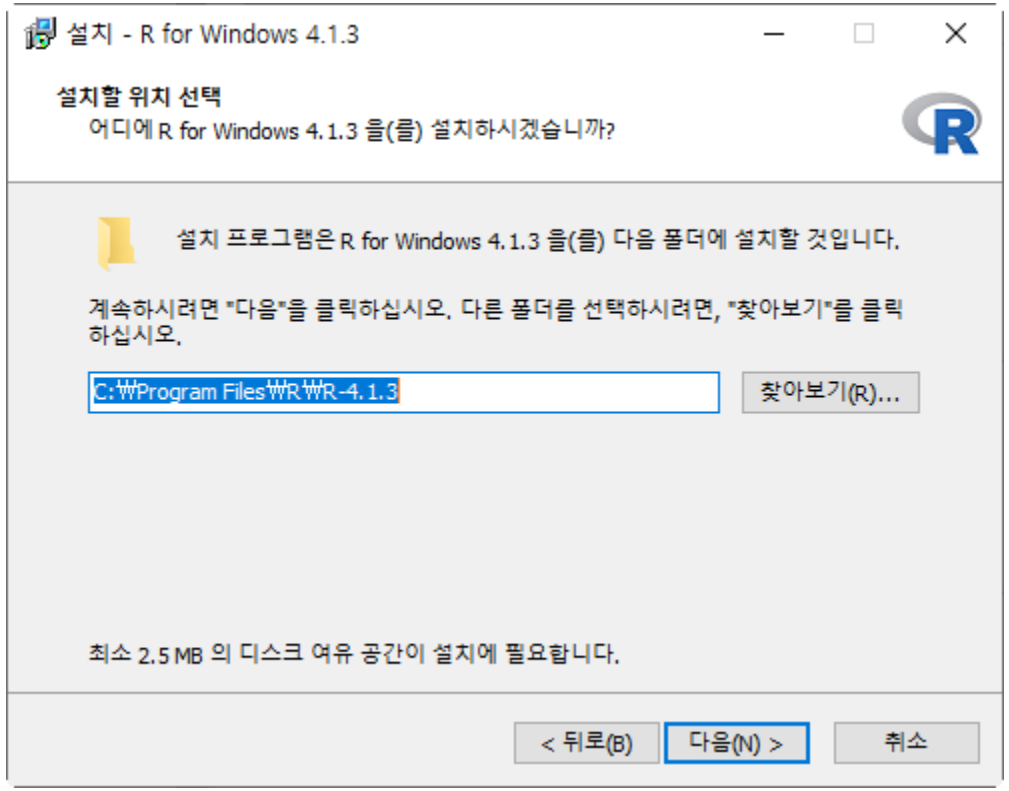
Other builds

- A pre-release version for the forthcoming R-4.2.0 is available.
- 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.
- Previous releases

Note to webmasters: A stable link which will redirect to the current Windows binary release is <CRAN MIRROR>/bin/windows/base/release.html.

Last change: 2022-03-10

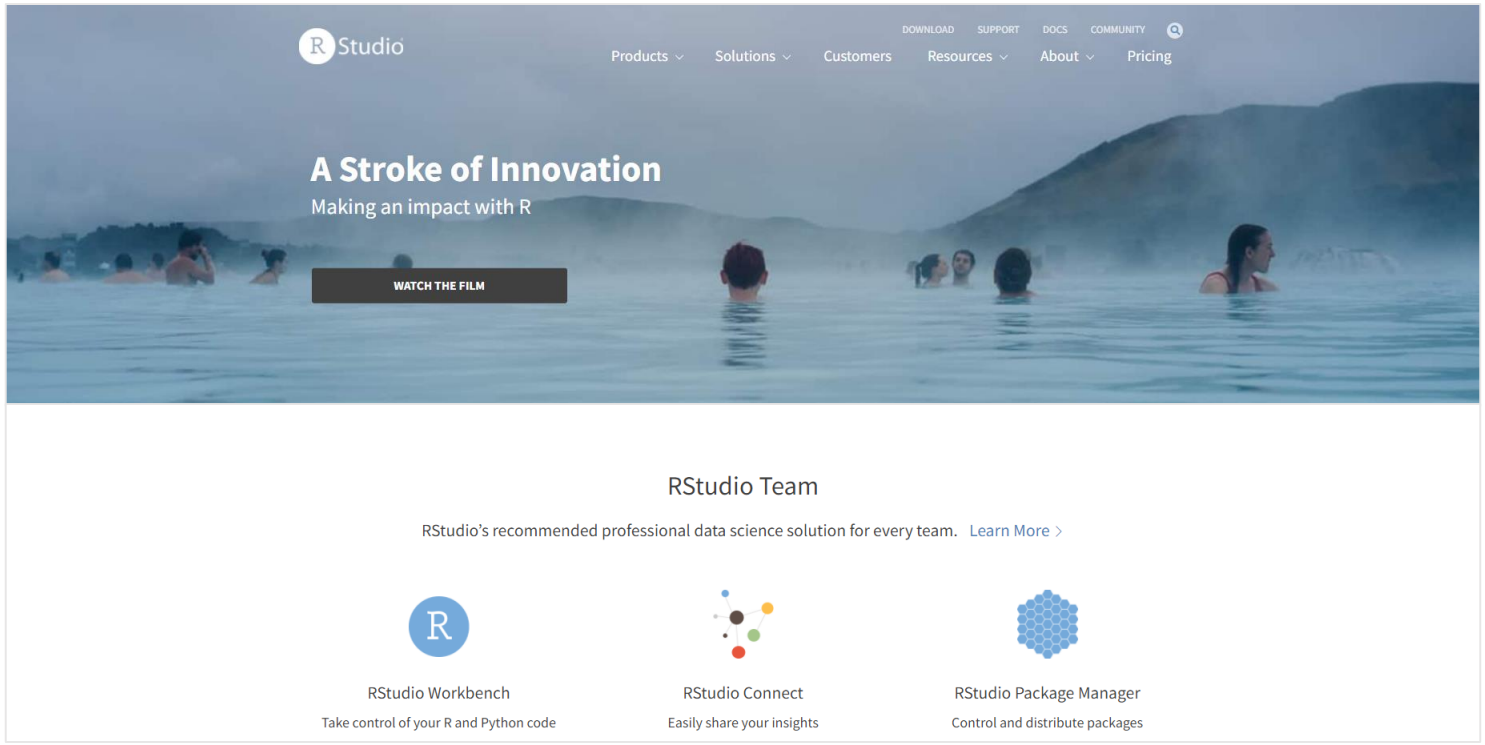
- R 소프트웨어: 디폴트로 설치



RStudio

- R 언어를 사용하여 데이터 분석과 시각화를 할 수 있는 통합개발환경
- R과 마찬가지로 오픈소스 소프트웨어로 관리되어 있음
- 데이터 분석과 시각화를 편리하게 할 수 있는 강력한 기능을 탑재하고 있음

- RStudio 다운로드 및 설치
  - RStudio 홈페이지: https://www.rstudio.com



01. R과 RStudio

- Download > RStudio Desktop > Download

RStudio Desktop 2022.02.1+461 - Release Notes

1. Install R. RStudio requires R 3.3.0+.

2. Download RStudio Desktop. Recommended for your system:

DOWNLOAD RSTUDIO FOR WINDOWS
2022.02.1+461 | 177.27MB

Requires Windows 10/11 (64-bit)

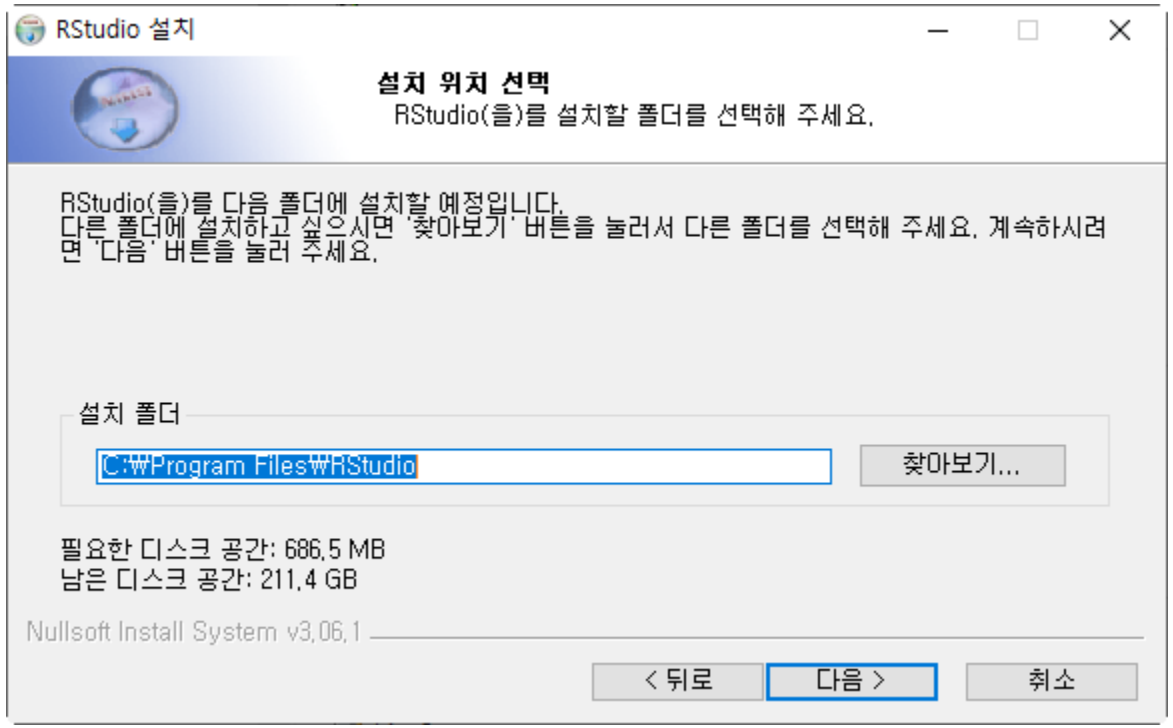
All Installers

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.

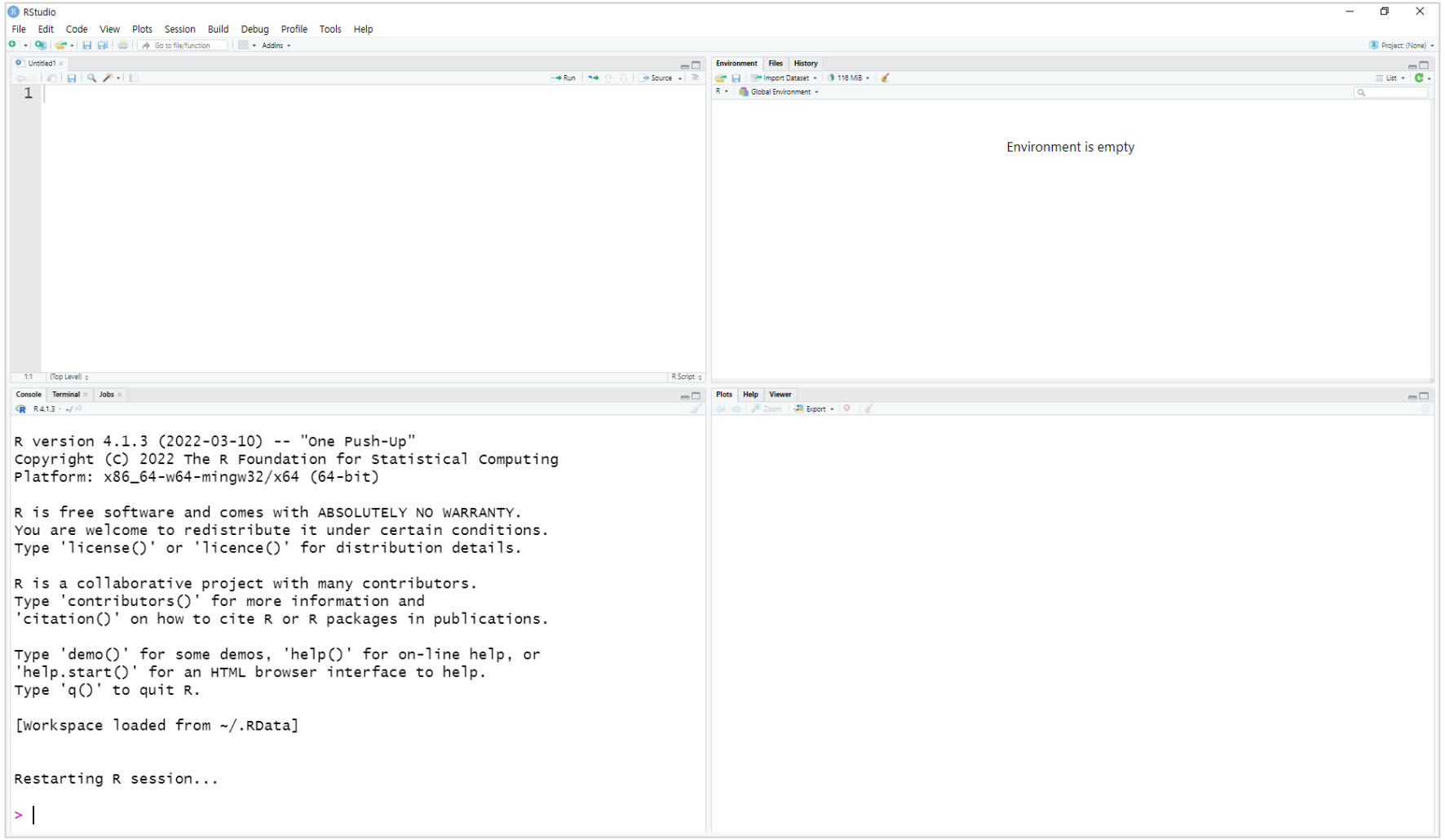
OS	Download	Size	SHA-256
Windows 10/11	RStudio-2022.02.1-461.exe	177.27 MB	b14149b1
macOS 10.15+	RStudio-2022.02.1-461.dmg	217.25 MB	5b268cfa
Ubuntu 18+/Debian 10+	rstudio-2022.02.1-461-amd64.deb	128.58 MB	d5aaa02f
Fedora 19/Red Hat 7	rstudio-2022.02.1-461-x86_64.rpm	144.66 MB	48ea1732
Fedora 34/Red Hat 8	rstudio-2022.02.1-461-x86_64.rpm	144.70 MB	8d17f829

- RStudio: **디폴트로 설치**



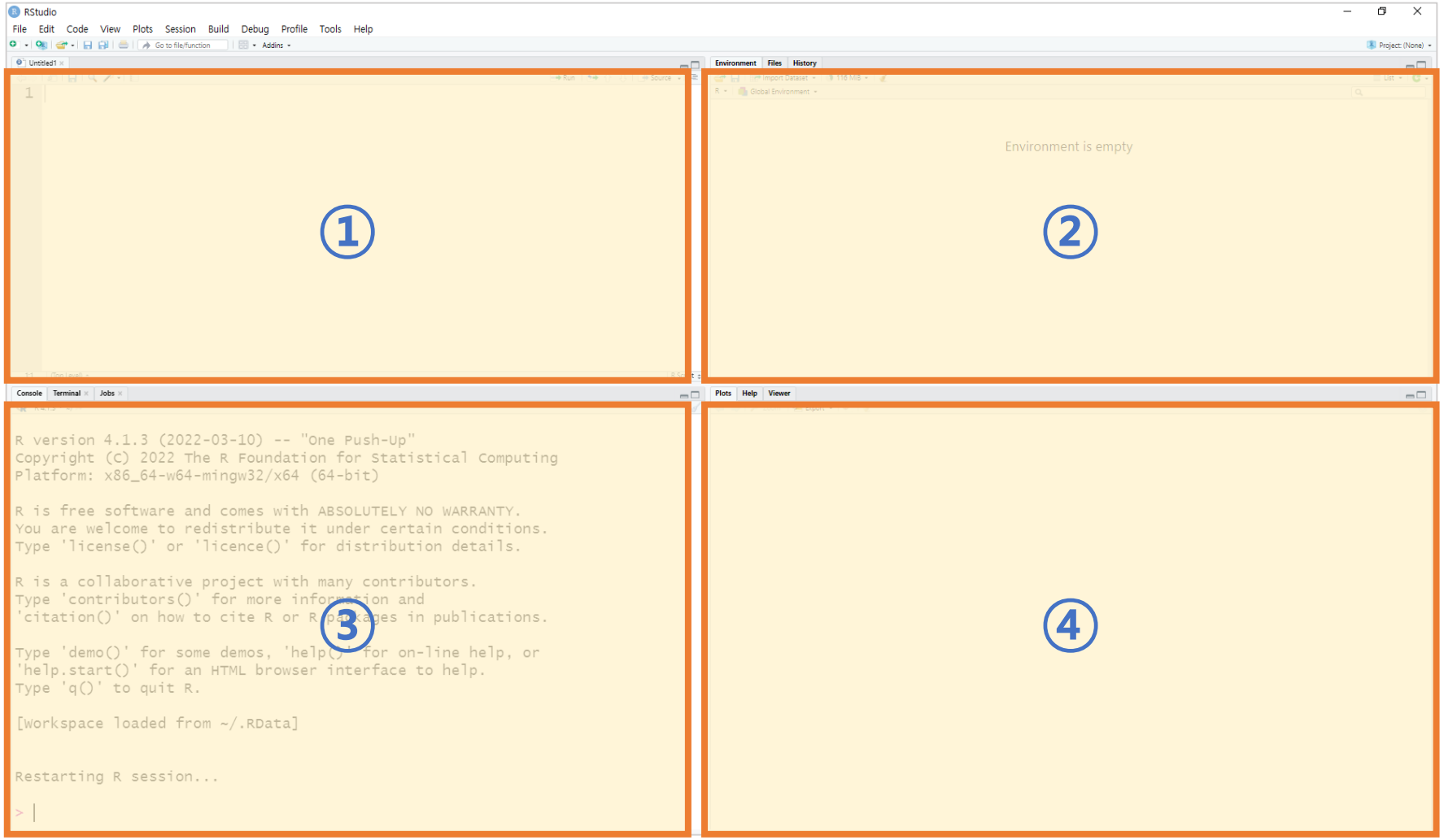
01. R과 RStudio

- RStudio **실행**



01. R과 RStudio

- RStudio는 4개의 창(Pane)으로 구분되어 있음



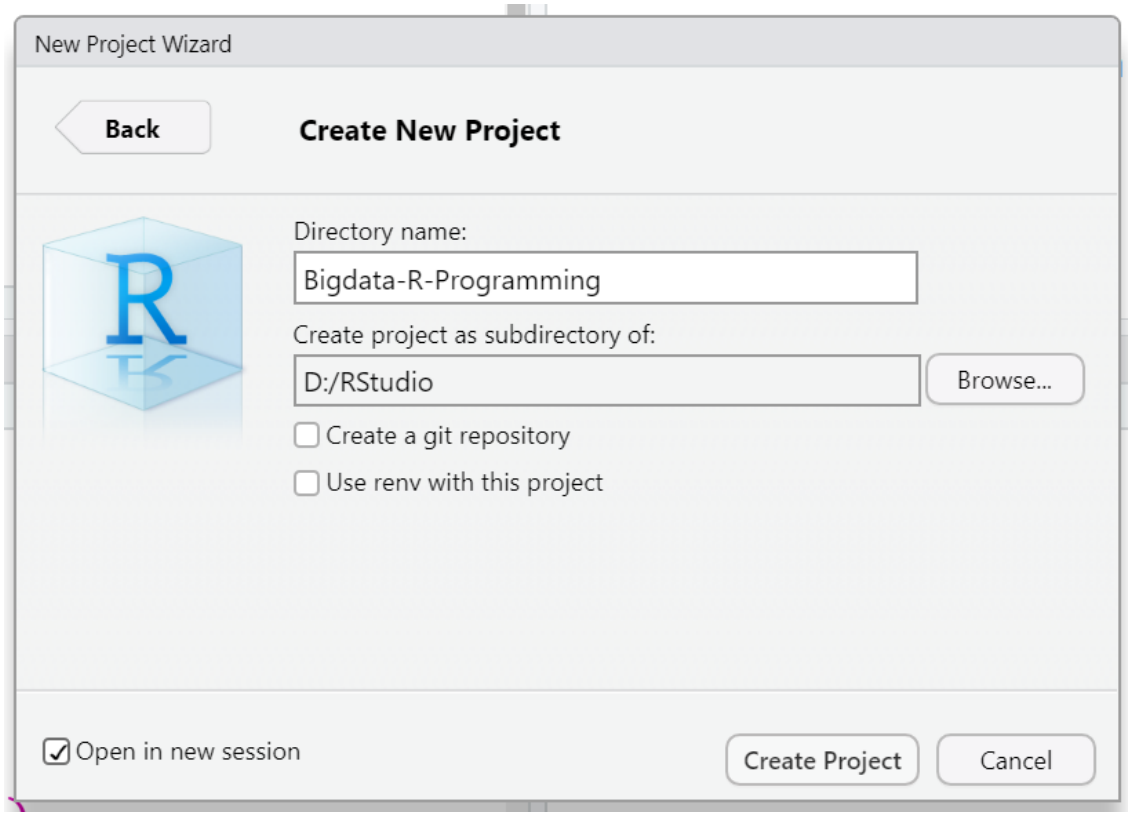
- RStudio에서 소스 코드의 작성과 실행
  - Alt+Enter: 커서가 위치한 곳에 있는 한 문장을 실행
  - Ctrl+Enter: 한 문장 실행 후 커서를 다음 문장으로 이동
  - 블록 지정 후 Ctrl+Enter: 선택된 블록을 한꺼번에 실행

  - ALT+ −: <- 입력

```
> print('Hello, R!')
[1] "Hello, R!"
> x <- 10
> x
[1] 10
> y <- 20
> y
[1] 20
> z <- x + y
> z
[1] 30
```

RStudio 프로젝트 만들기

- File > New Project > New Directory > New Project

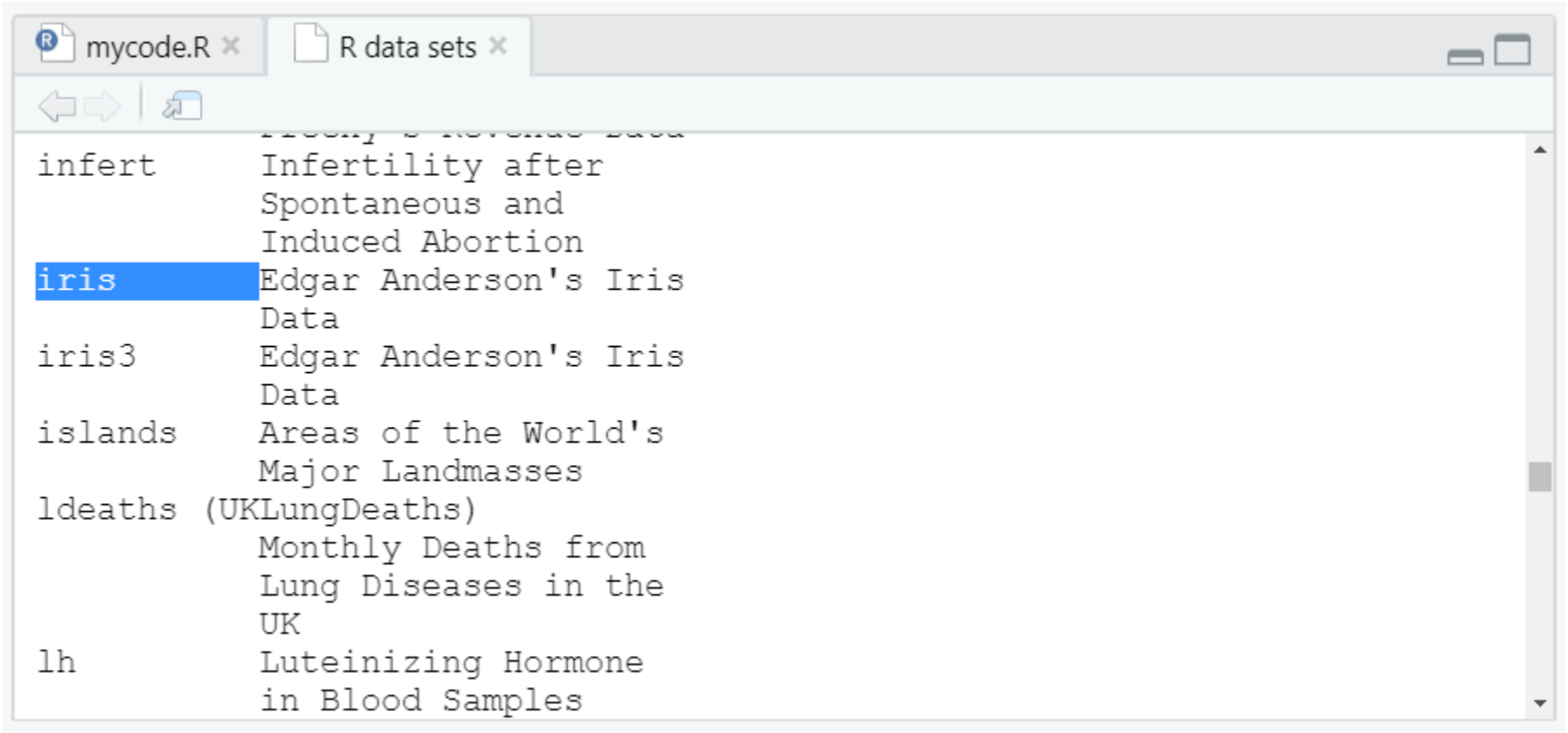


- **새 스크립트 파일 만들기**: File > New File > R Script
- **스크립트 파일 저장하기**: File > Save (Ctrl+S)

```
> getwd()
[1] "D:/RStudio/Bigdata-R-Programming"
```

- RStudio의 여러 가지 화면 구성
  - Source Pane: 편집 창
  - Console Pane: 콘솔 창
  - Plot Pane: 플롯 창
  - Help Pane: 도움말 창
  - Files Pane: 파일(폴더) 창
  - Environment Pane: 환경 창
  - Viewer Pane: 뷰어 창
  - History Pane: 히스토리 창

```
> data()
```


mycode.R
R data sets
infert Infertility after
Spontaneous and
Induced Abortion
iris Edgar Anderson's Iris
Data
iris3 Edgar Anderson's Iris
Data
islands Areas of the World's
Major Landmasses
ldeaths (UKLungDeaths)
Monthly Deaths from
Lung Diseases in the
UK
lh Luteinizing Hormone
in Blood Samples

```
> View(iris)
```

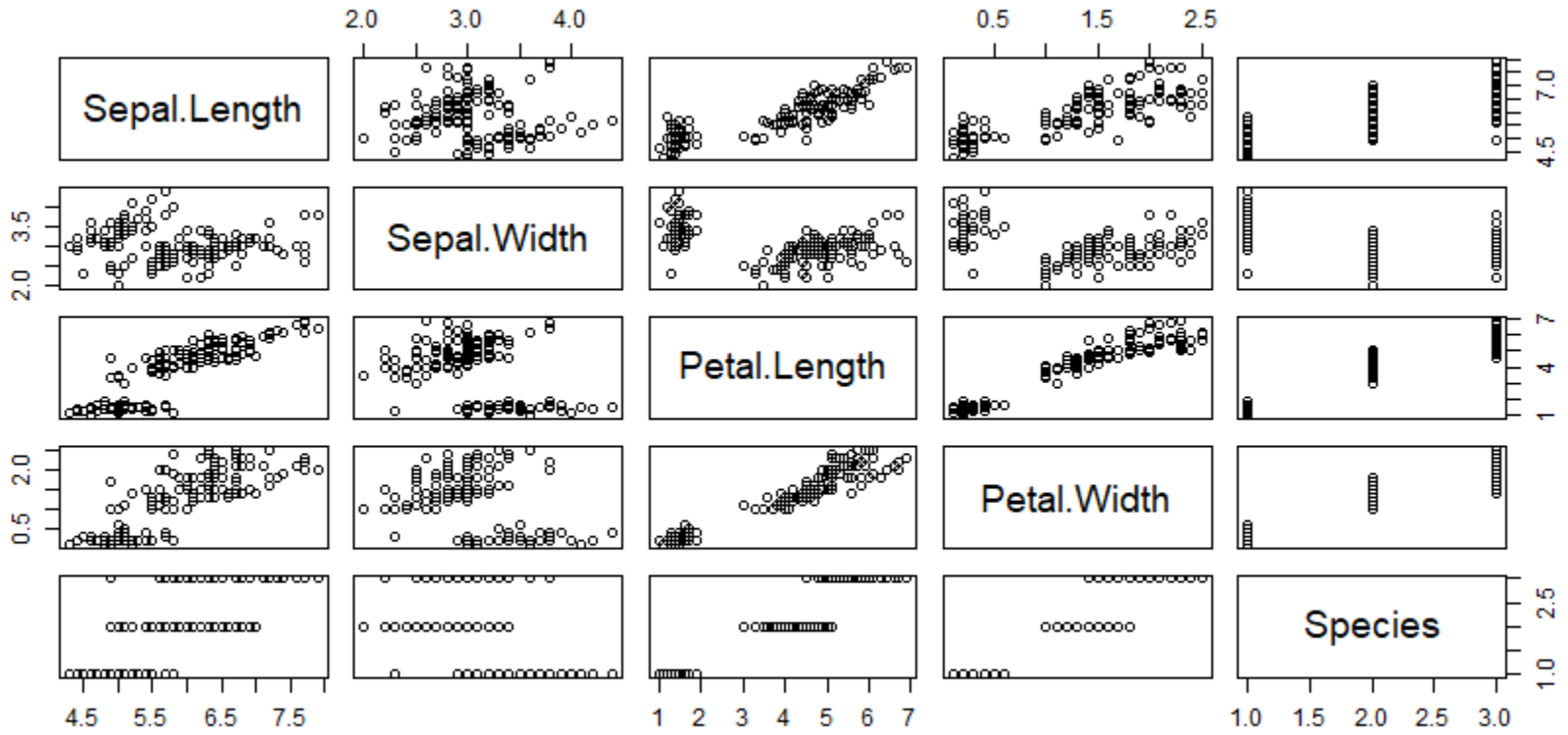
mycode.R | iris | R data sets

Filter

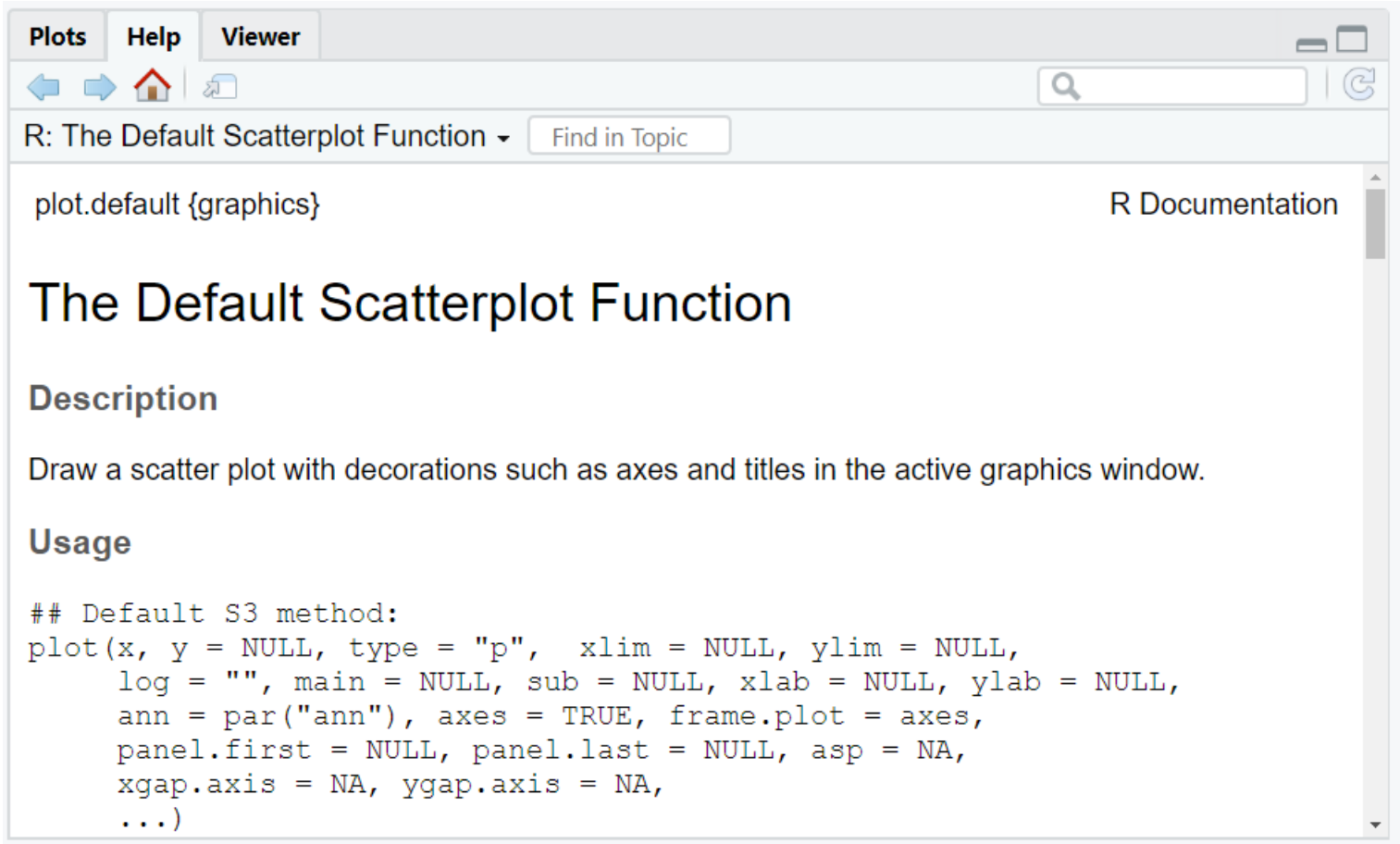
	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
1	5.1	3.5	1.4	0.2	setosa
2	4.9	3.0	1.4	0.2	setosa
3	4.7	3.2	1.3	0.2	setosa
4	4.6	3.1	1.5	0.2	setosa
5	5.0	3.6	1.4	0.2	setosa
6	5.4	3.9	1.7	0.4	setosa
7	4.6	3.4	1.4	0.3	setosa
8	5.0	3.4	1.5	0.2	setosa
9	4.4	2.9	1.4	0.2	setosa
10	4.9	3.1	1.5	0.1	setosa
11	5.4	3.7	1.5	0.2	setosa

Showing 1 to 11 of 150 entries, 5 total columns

```
> plot(iris)
```


Sepal.Length
Sepal.Width
Petal.Length
Petal.Width
Species
2.0 3.0 4.0
0.5 1.5 2.5
4.5 7.0
2.0 3.5
1 4 7
0.5 2.0
1.0 2.5
4.5 5.5 6.5 7.5
1 2 3 4 5 6 7
1.0 1.5 2.0 2.5 3.0

```
> ?plot
```


Plots
Help
Viewer
R: The Default Scatterplot Function
Find in Topic
plot.default {graphics}
R Documentation
The Default Scatterplot Function
Description
Draw a scatter plot with decorations such as axes and titles in the active graphics window.
Usage
Default S3 method:
plot(x, y = NULL, type = "p", xlim = NULL, ylim = NULL,
log = "", main = NULL, sub = NULL, xlab = NULL, ylab = NULL,
ann = par("ann"), axes = TRUE, frame.plot = axes,
panel.first = NULL, panel.last = NULL, asp = NA,
xgap.axis = NA, ygap.axis = NA,
...)

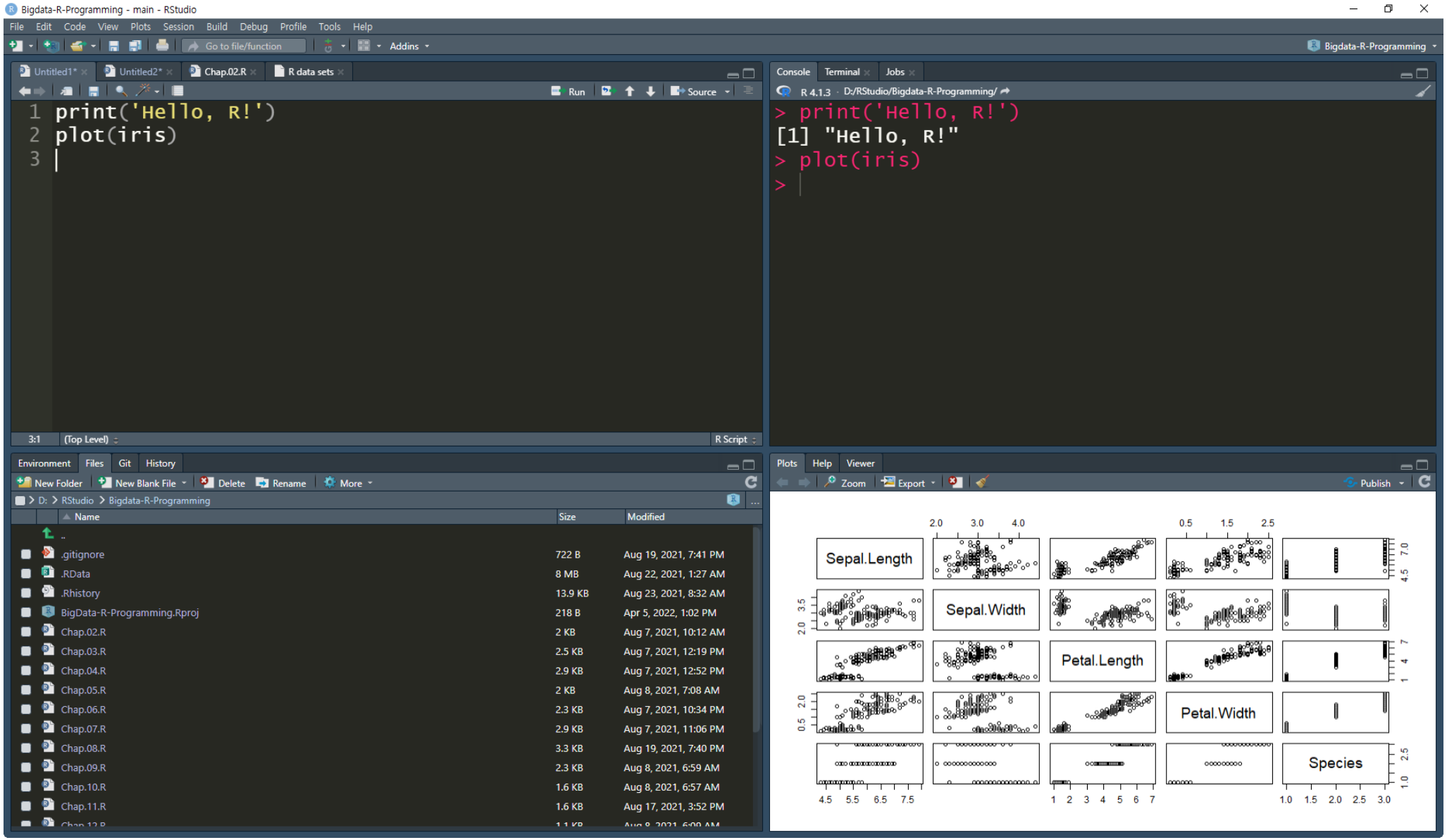
```
> install.packages("cowsay")
> library(cowsay)
> say('Hello, World!')
> say('Hello, Chicken', by = 'chicken')

 -----
Hello, Chicken, R!
 ------
    \
     \
         _
       _/ }
      `>' \
      `|   \
       |   /'-.     .-.
        \'      ';`--' .'
         \'.     `'-./
          '.`-..-;`
            `;-..'
            _| _|
            /` /` [nosig]
```

RStudio의 환경 설정

- **테마 적용하기**: Tools > Global Options > Appearance > RStudio theme
  - Modern + *Consolas* + *Cobalt*
  - **폰트 기본 크기 조정**: 16 or 18
  - **편집 모드에서** Ctrl++, Ctrl+– **키로 임의 확대/축소 가능**
- Console on Left (or Right)
  - **편집/콘솔 창을 상하 또는 좌우로 변경하기:**
- Pane Layout:
  - **플롯 창, 도움말 창, 파일 창을 상하 또는 좌우로 변경하기:**

01. R과 RStudio



Any Questions?