R Software

Use of a software is desirable and moreover an essential part of any analysis.

Some popular statistical software are SPSS, SAS, Minitab, Stata, Matlab etc.

Another software is R.

R is a free software.

Developers of R Software

Currently developed by the R Development Core Team.

Available at www.r-project.org

It supports many free packages which helps the data scientist and analyst.

What is R?

R is an environment for data manipulation, statistical computing, graphics display and data analysis.

Effective data handling and storage of outputs is possible.

Simple as well as complicated calculations are possible.

Simulations are possible.

What is R?

Graphical display on-screen and hardcopy are possible.

Programming language is effective which includes all possibilities just like any other good programming language.

R has a statistical computing environment.

R is free (open source) software and therefore is not a black box.

Switching to R

R is available for Windows, Unix, Linux and Macintosh platforms.

Built in and contributed packages are available, and users are provided tools to make packages.

It is possible to contribute own packages.

The commands can be saved, run and stored in script files.

Graphics can be directly saved in a Postscript or PDF format.

Installing R

You may install R in a windows or Mac platform by downloading from the Comprehensive R Archive Network (CRAN) website: www.r-project.org or directly from http://cran.r-project.org/

Installing R

 Icon will appear.

Double click on this icon will start the software.

Installing Packages and Libraries

The base R package contains programs for basic operations.

It does not contain some of the libraries necessary for advanced statistical work.

Specific requirements are met by special packages.

They are downloaded and their downloading is very simple.

Installing Packages and Libraries

The base R package contains some necessary libraries only.

Other libraries are required for advanced statistical work which are downloaded and installed as and when required.

Run the R program, then use the `install.packages` command to download the libraries.

Examples :

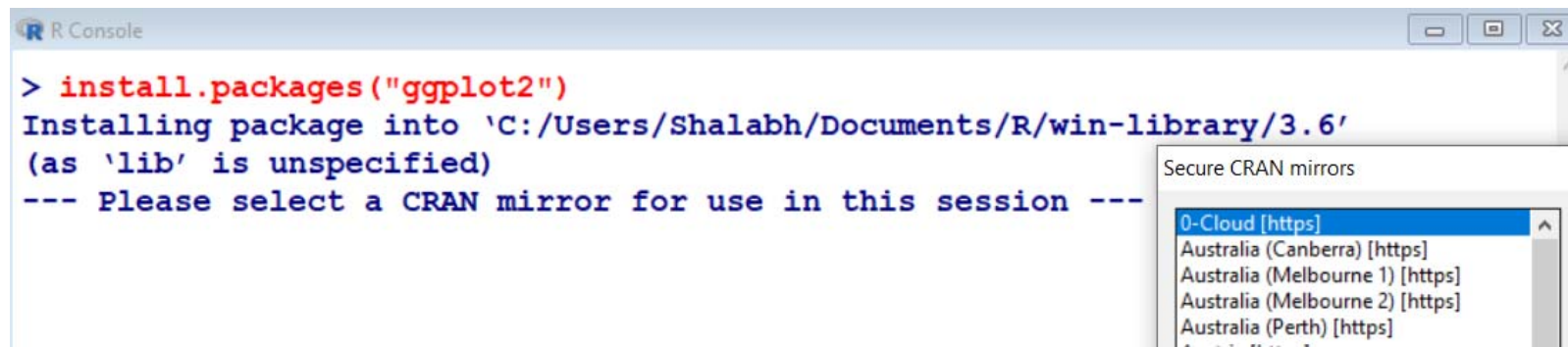`install.packages("ggplot2")` : installs package `ggplot2`

`install.packages("agricolae")` : installs package `agricolae`

`install.packages("DoE.base")` : installs package `DoE.base`
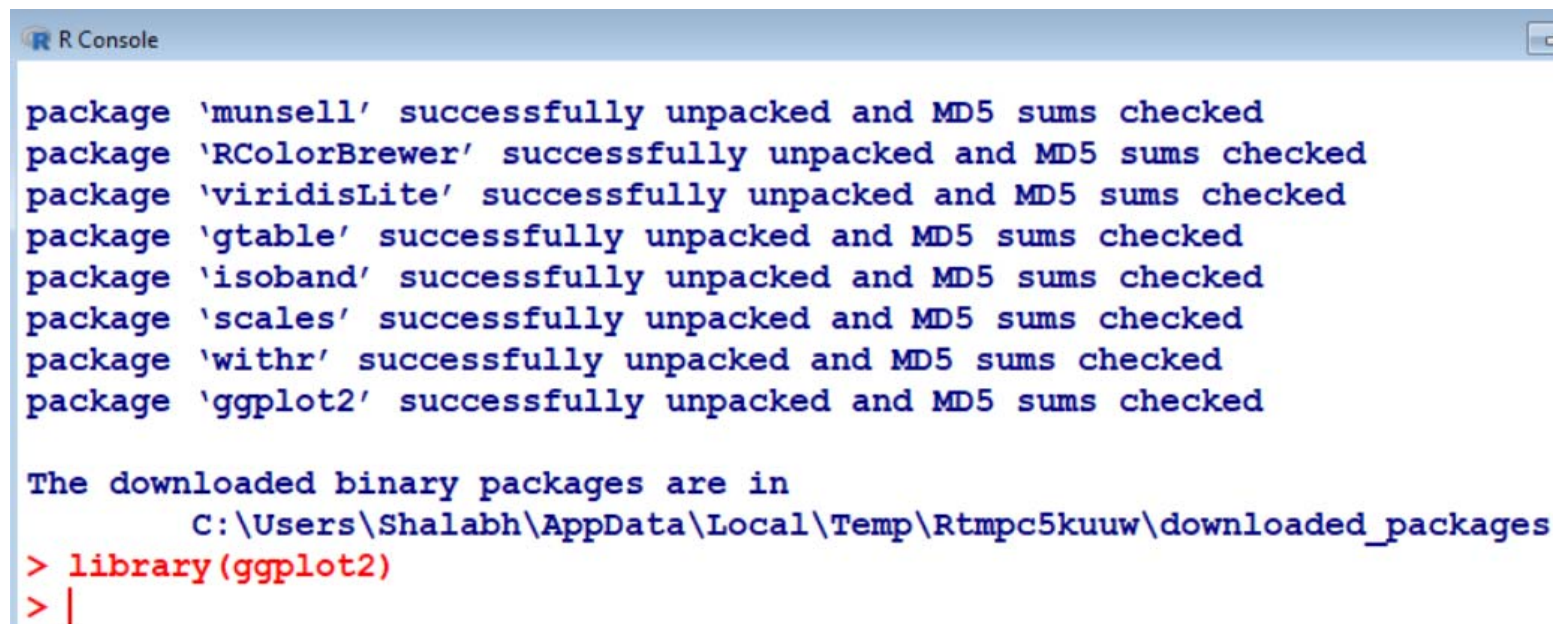
Installing Packages and Libraries

Example

```
install.packages("ggplot2")
```

Libraries in R

To use a library, type the `library` function with the name of

the library in brackets.

Thus to load the `ggplot2` library type:

`library(ggplot2)`

Similarly,

`library(agricolae)` : loads package `agricolae`

`library(DoE.base)`: loads package `DoE.base`

Libraries in R

Examples of libraries that come as a part of base package in R.

`MASS` : package associated with Venables and Ripley's book entitled *Modern Applied Statistics using S-Plus.*

`library(MASS)` loads package `MASS`

Contents of Libraries

Use `help` function to get the detailed contents of library packages.

We find out about the contents of the `agricolae` library using
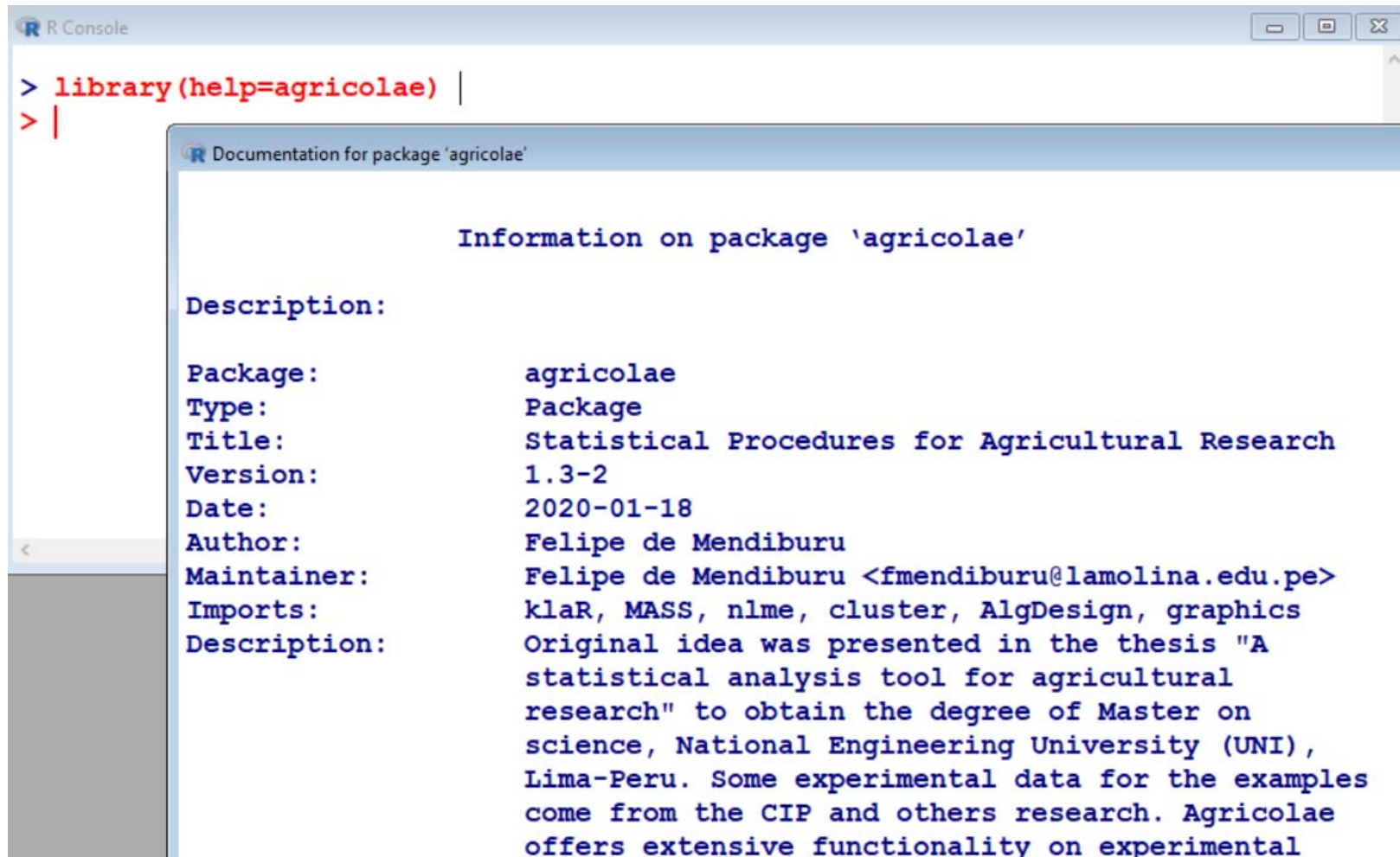
`library(help=agricolae)` command

```
                    Information on package 'agricolae'
Description:

Package:            agricolae
Type:               Package
Title:              Statistical Procedures for Agricultural Research
Version:            1.3-2
Date:               2020-01-18
Author:             Felipe de Mendiburu
Maintainer:         Felipe de Mendiburu <fmendiburu@lamolina.edu.pe>
Imports:            klaR, MASS, nlme, cluster, AlgDesign, graphics
Description:        Original idea was presented in the thesis "A
                    statistical analysis tool for agricultural … …
… … …
```

followed by a list of all the functions and data sets.

Contents of Libraries

Cleaning up the Windows

We assign names to variables when analyzing any data.

It is good practice to remove the variable names given to any data frame at the end each session in R.

`rm()` command removes variable names

For example,

`rm(x,y,z)` removes the variables `x`, `y` and `z`.

How to clear the screen in R
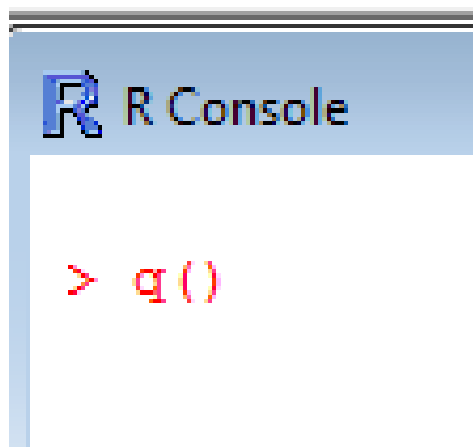
Press $ctrl + L$ to clear the screen of R console.

 and

How to quit in R

Type q( ) to quit R.

Working with R

Use command line to type and execute the commands.

Some free software like R Studio, Tinn R etc. are also available to work with R software.

They are the interface between R and us and help in running the R software. Such software make coding and execution of programmes easier.
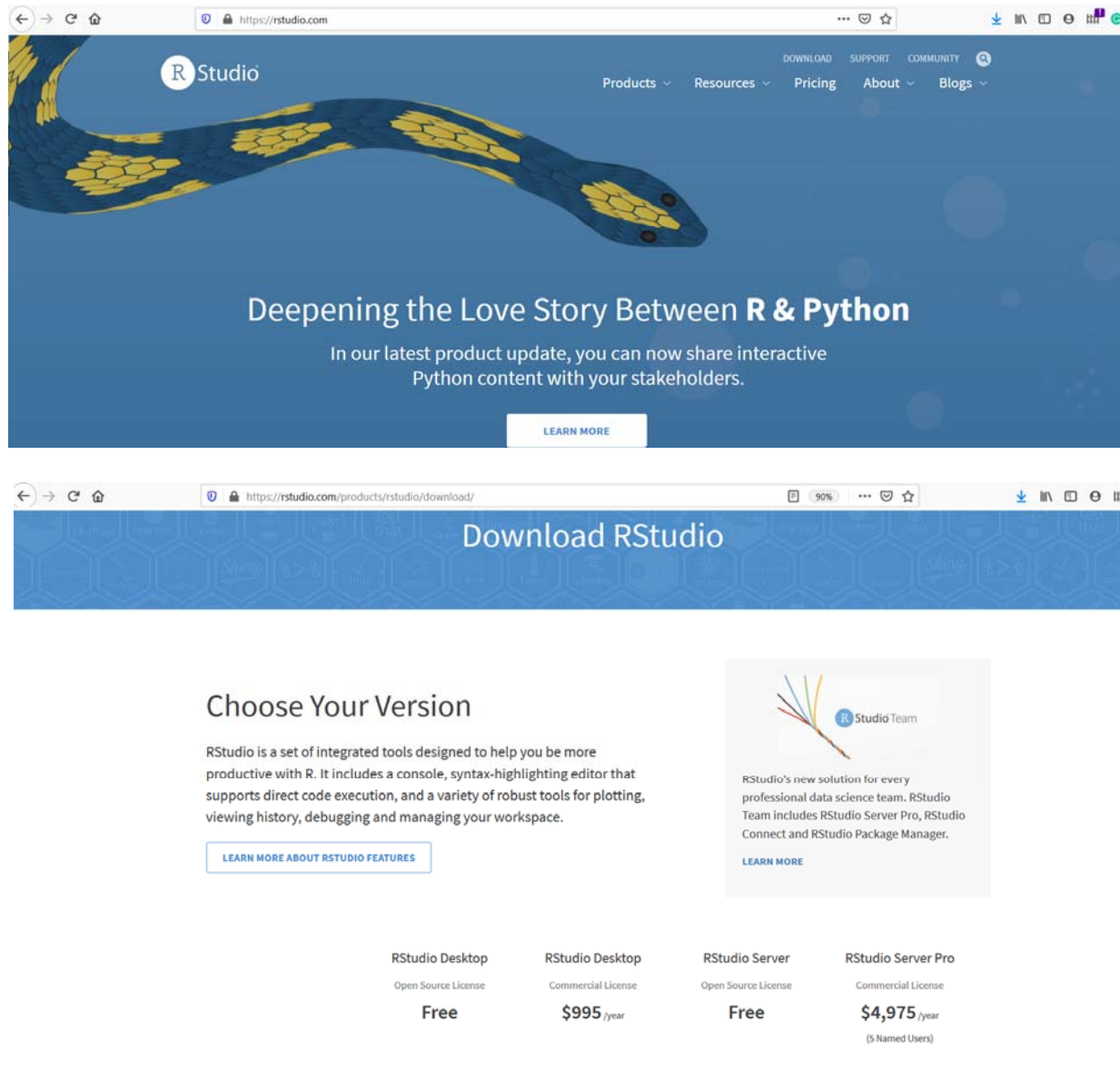
R Studio is available at **https://www.rstudio.com/**
Rstudio is written in C++ programming language.

Rstudio is a free and open-source integrated development environment (IDE) for R.

Tinn R is available at **https://sourceforge.net/projects/tinn-r/**

Installing R Studio

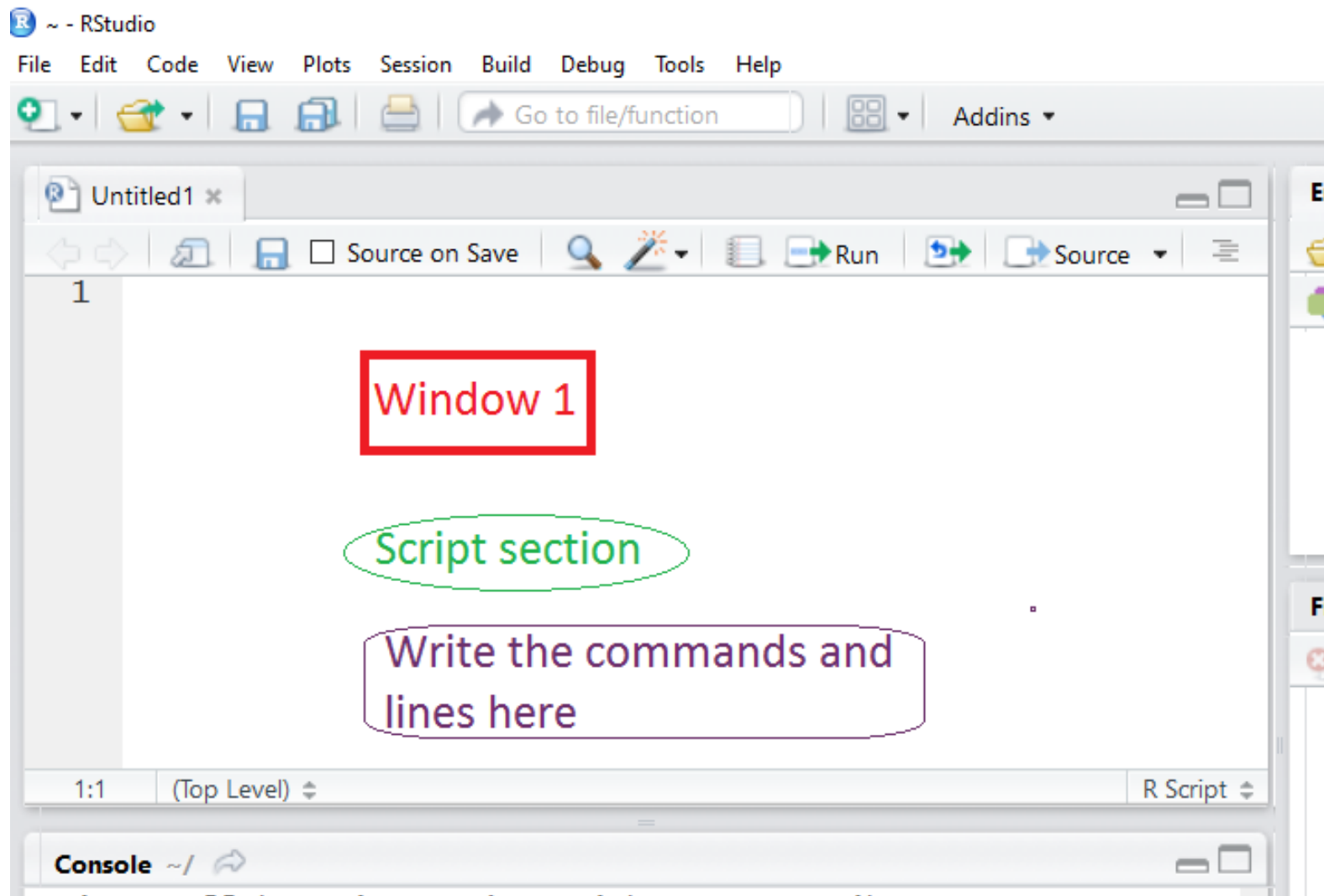**Download and double click on the downloaded file.**

Introduction to R Studio

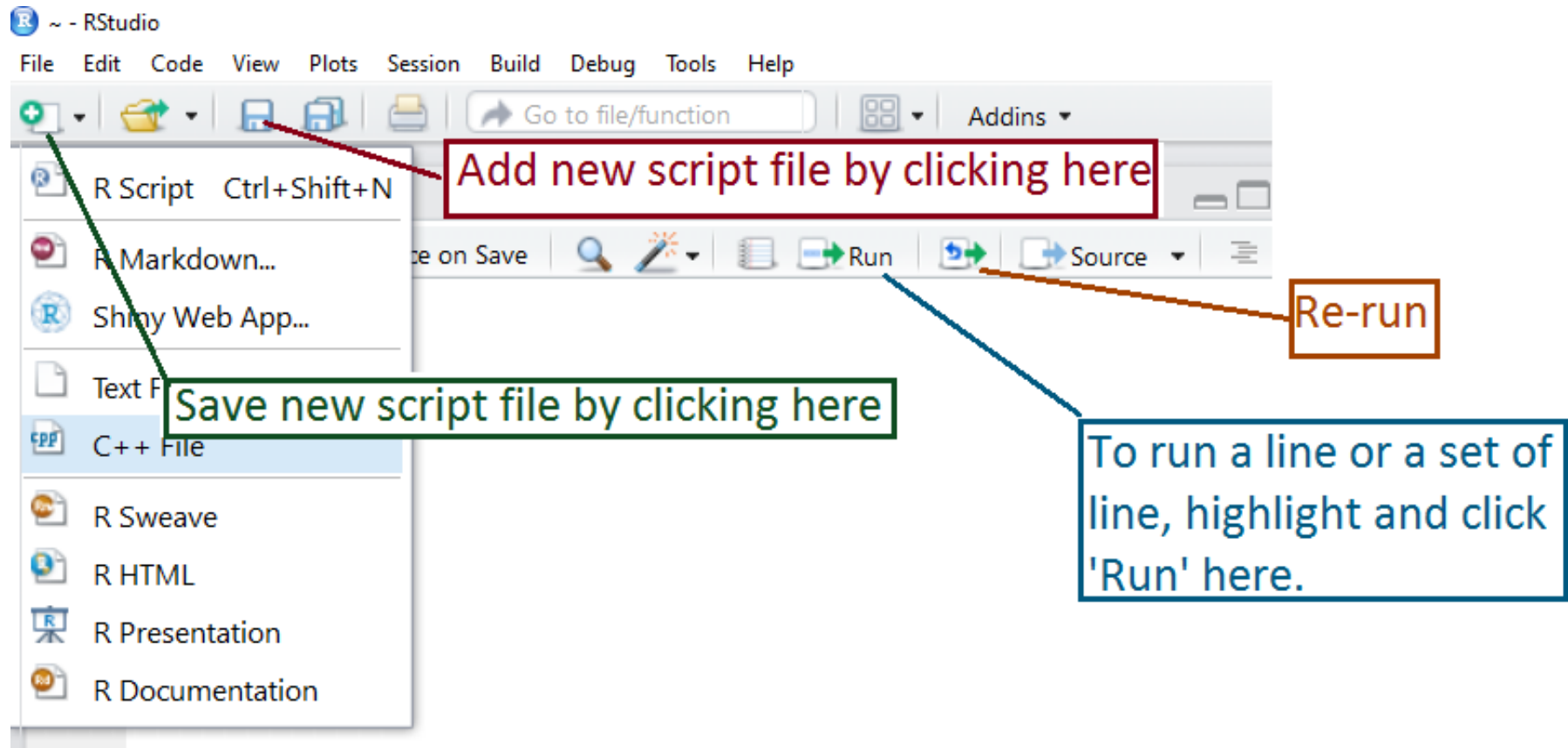**First opening window of Rstudio is as follows having four windows.**
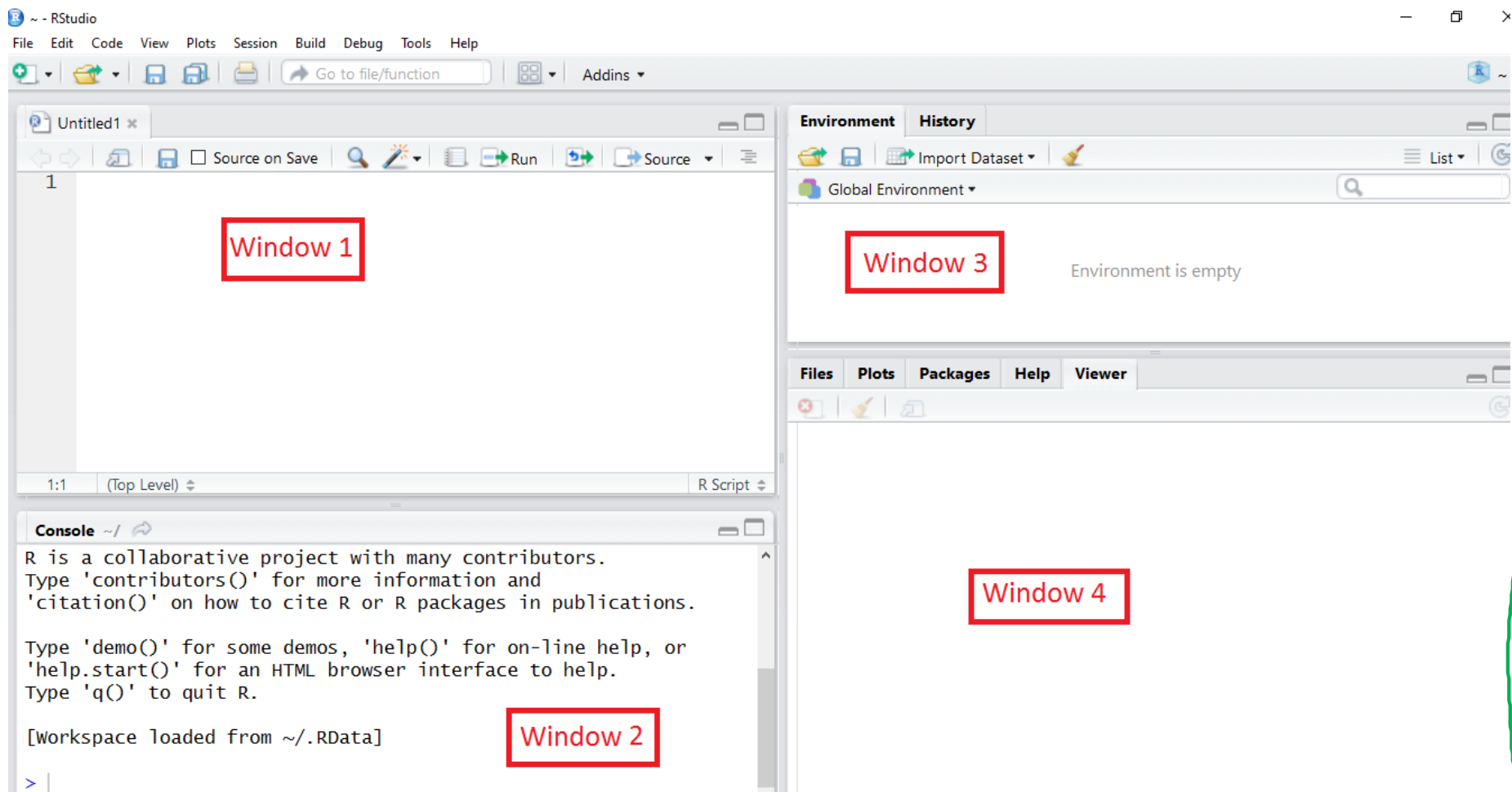
Introduction to R Studio

Description of Window 1

Introduction to R Studio
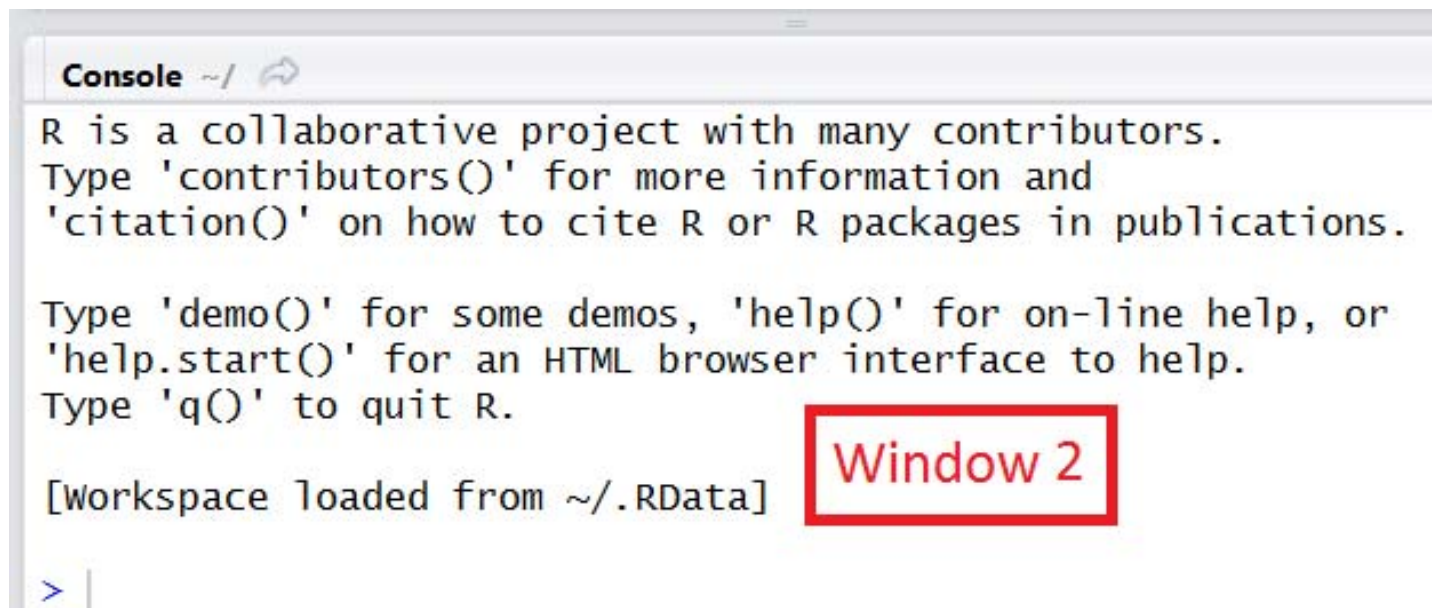
Description of Window 1

Introduction to R Studio

Description of Window 2 : Console

R program window appears here.

Calculations take place inconsole window.

One can write programmes in console also but it is hard to make corrections and experiments with the coding.
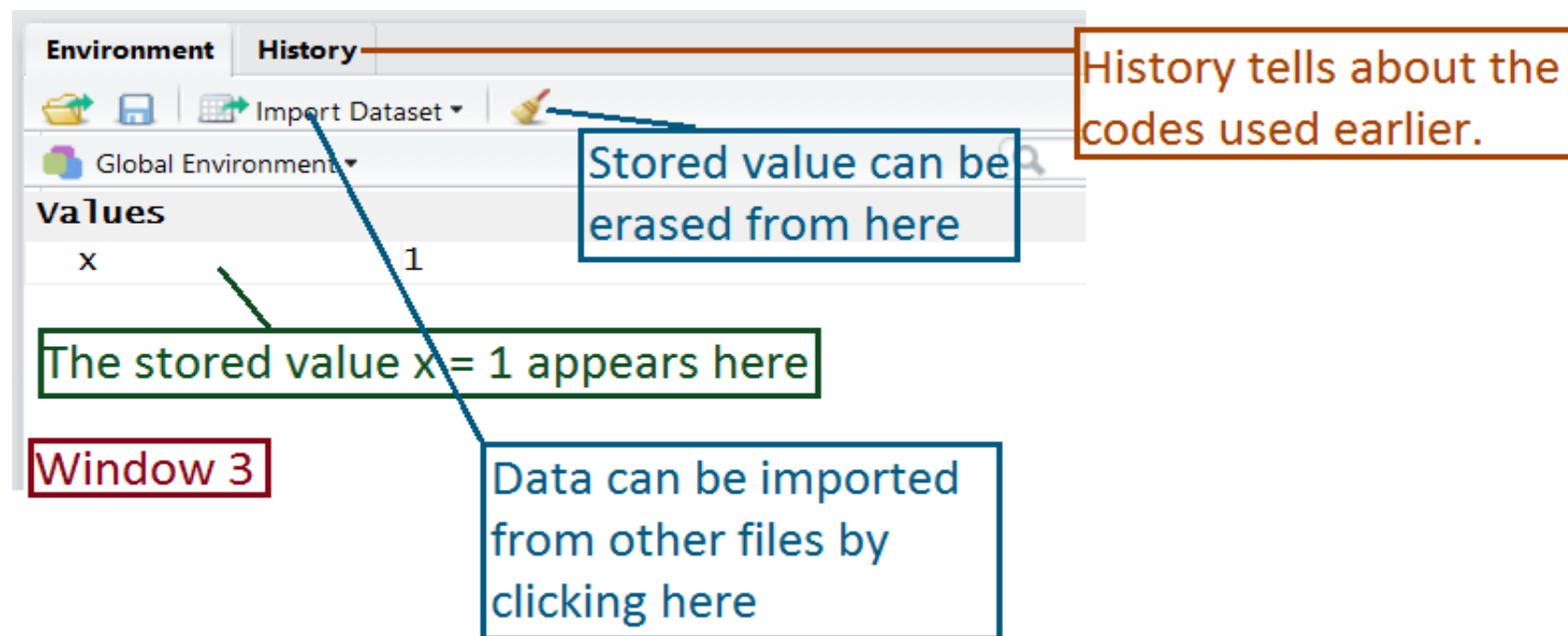


```
Console ~/
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

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.
                                        Window 2
[Workspace loaded from ~/.RData]

>
```

Introduction to R Studio

Description of Window 3 : Environment window

All the variables and objects used in the programme appear here.

The nature and values of variables and objects also appear here.

Introduction to R Studio

Description of Window 4 : Output window

The output of programmes appears in this window.

Shows the created plots

Shows the packages being used

Help in finding functions etc.

Files   Plots   Packages   Help   Viewer

Window 4

Output of programmes appears here
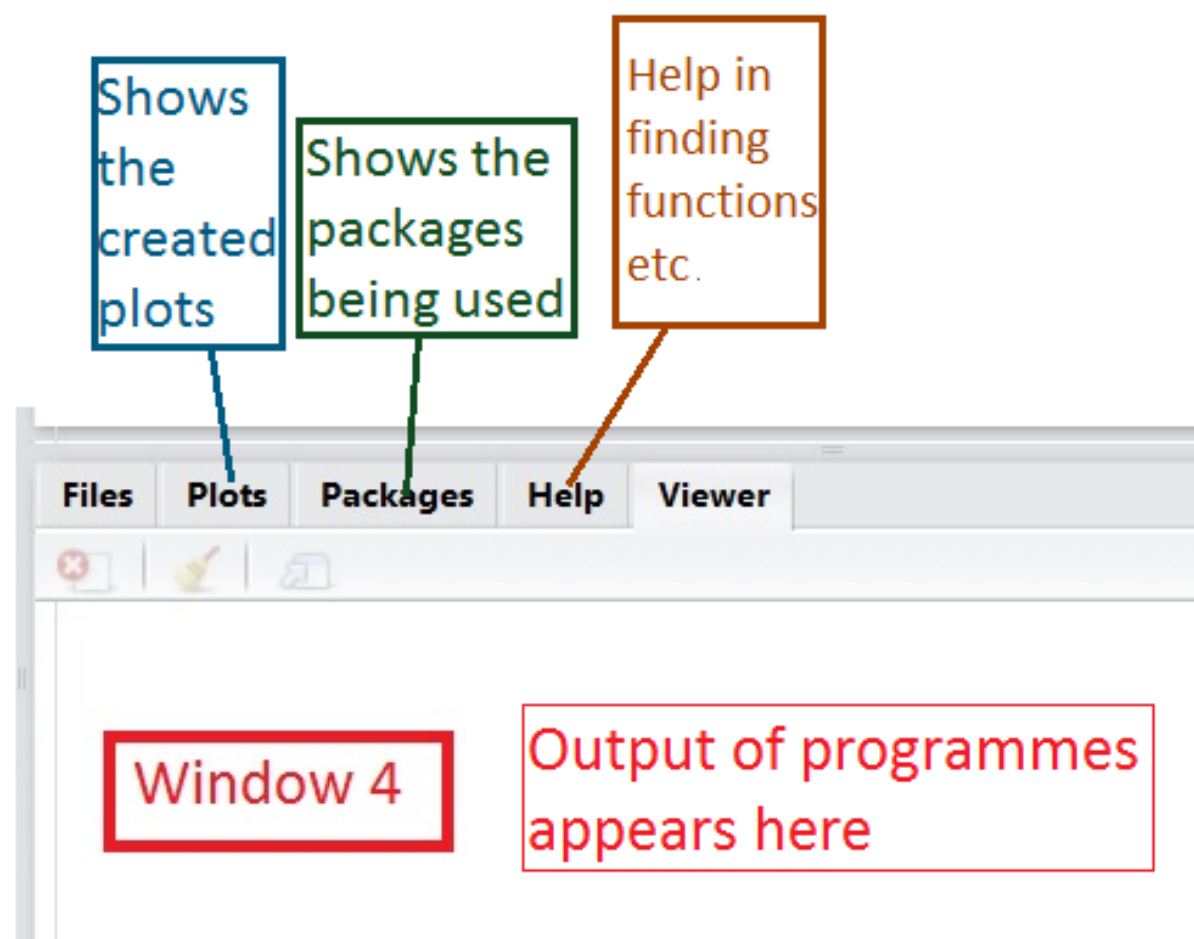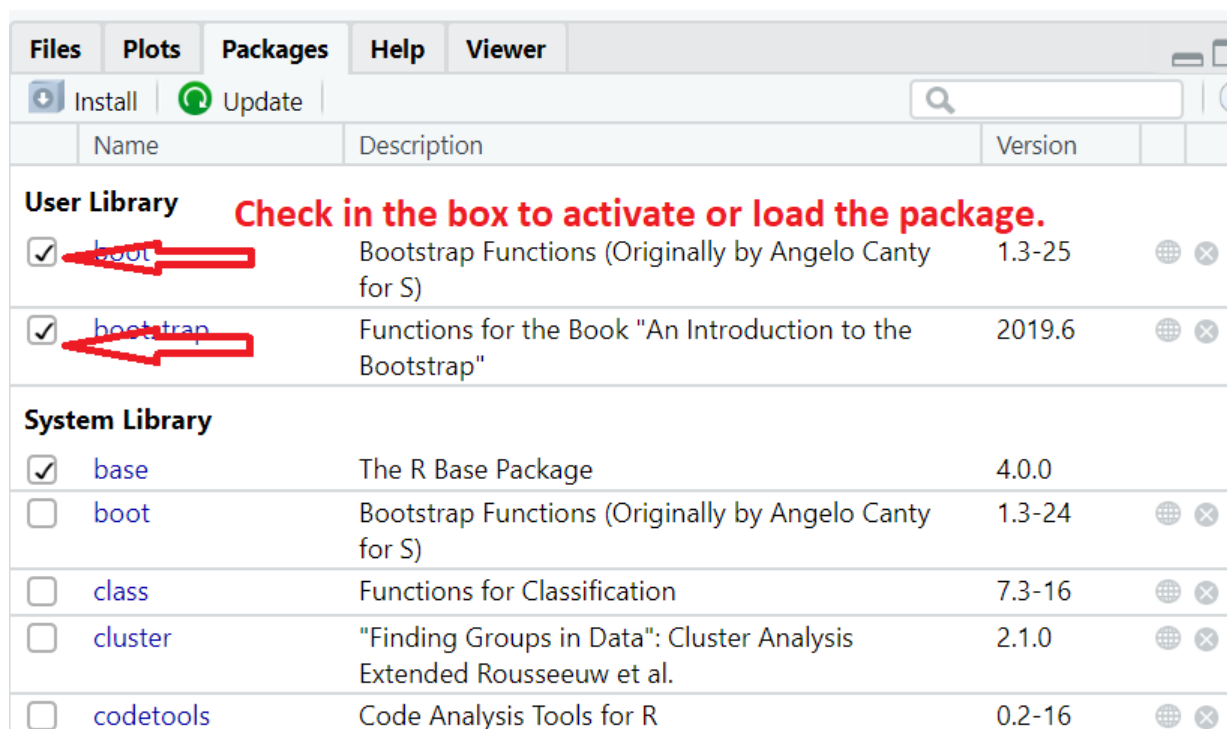
Introduction to R Studio

Description of Window 4 : Output window

Packages:

All the packages being installed appear here.

Packages are not active.

Check mark in the boxes to activate them.

Introduction to R Studio

Window 4 : Output window

Help:

Various types of help can be asked.

E.g., to know about histogram,
type **hist**.

Information appears.