

# Introduction to R, RStudio and Quarto

*Kursus R: Pengenalan dan Praktikal*

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R

# Introduction to R

- R programming language is a lot like magic...
- Except instead of spells, we have a function.
- R users are like magician.
  - We can rely on functions that have been developed for them.
  - We can also create our own.
  - We do not have to pay for the use of them.
  - And once experienced enough, we are almost unlimited in our ability to change our environment.

# Open Source?

- **Free!** We don't have to pay to use R.
- We can use it on **any computer**.
- We have full access to algorithm and our implementation.
- We can modify the code to suit our needs.
- Promote **REPRODUCIBLE RESEARCH** by providing open and accessible tools.
- It is **CUTTING EDGE**

# What is R?

- R is a programming language.
- R is a high-level language.
  - Code that is easy to read and write, close to human language
- R is an interpreted computer language.
  - Execute line-by-line
  - No need to compile
  - The software that interprets R language and executes codes
- Provide an extensive, coherent and integrated collection of tools for data analysis.

# Is it relevance to me?

- IKU is one of **RESEARCH INSTITUTE** in Malaysia
  - That mean our main job is doing research (and related activities)
- We depend on data to make decisions
  - 80% of our time is spent on data **preparation and cleaning**
- We also require effective data visualization to communicate our findings

# Pros and Cons

## Pros

- Fast and Free
- State of the art
- Active user community
- **It forces We to *think* about our analysis.**
- **New techniques available without delayed**

## Cons

- Steep learning curve
- Some commercial support
- In the beginning, data prep & cleaning can be messier and more mistake-prone
- It is easy to make mistakes and not know.
- *Limited in handling huge dataset*
- *It can be not easy to choose the best package for We need*

# SPSS and R

- Learning (and using) R requires a new paradigm of thinking.
  - R is a programming language, and We will be writing code 99% of the time.
- This is not an exam. We don't have to remember everything.
- Google (and *AI chatbox*) is our friend



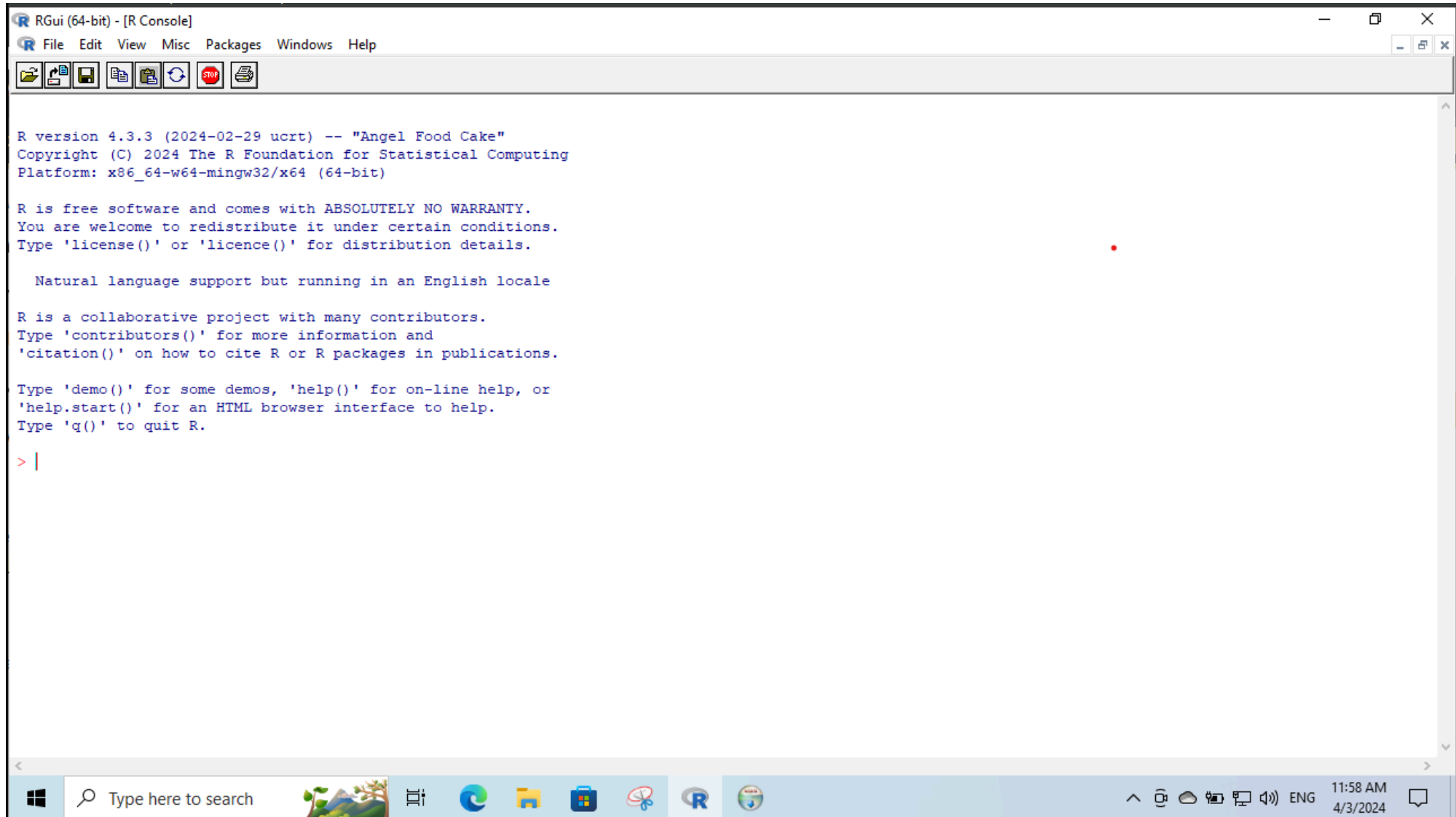
# SPSS and R

- Learning (and using) R requires a new paradigm of thinking.
- Almost everything in R is an objects
  - We can create, modify, and delete
  - Import external files
  - Many different options are available at the same time.
  - The dataset can be any dimension.
- SPSS only available one dataset at a time
  - SPSS datasets are rectangular

# Learning R

- CRAN website, manuals
- Because R is interactive, errors are our friends!
- `?lm` gives We help on the lm function.
- Reading help files can be very helpful.
- **MOST IMPORTANT** - the more time We spend using R, the more comfortable We become with it

# R consoles



```
RGui (64-bit) - [R Console]
File Edit View Misc Packages Windows Help

R version 4.3.3 (2024-02-29 ucrt) -- "Angel Food Cake"
Copyright (C) 2024 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (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.

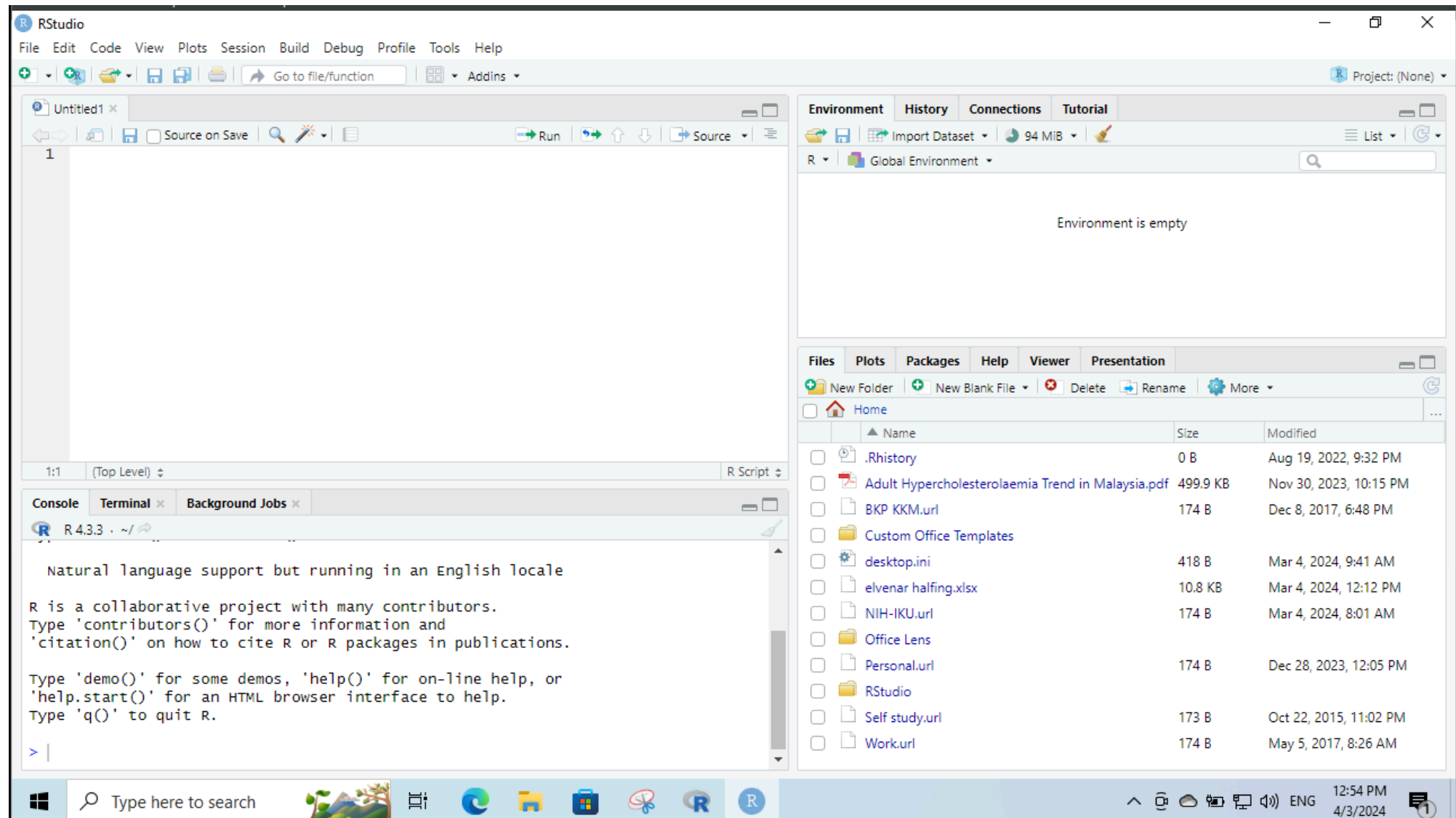
> |
```

# RStudio

# RStudio for Statistical Analysis Workflow

- RStudio is an integrated development environment (IDE) for R.
- It includes a console and syntax highlighting editor
- Supports direct code execution and tools for
  - Plotting
  - History
  - Debugging
  - Workspace management
- Support version control (git)

# RStudio GUI



# Quarto





# Quarto as Notebook

- In my sessions, Quarto will be use as notebook
- Code output will be display in the same document
- Quarto is pre-installed in RStudio

# Quarto as Notebook

The screenshot displays the RStudio environment with a Quarto document open. The source editor shows the following code:

```
1 ---
2 title: "Quarto Test"
3 format: html
4 editor: visual
5 ---
6
7 ## Quarto
8
9 quarto enables you to weave together content and executable
10 code into a finished document. To learn more about Quarto see
11 <https://quarto.org>.
12
13 ## Running Code
14
15 when you click the Render button a document will be
16 generated that includes both content and the output of
```

The console output shows the R startup message:

```
R 4.3.3 . ~/
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.
> |
```

The right-hand pane shows the Environment tab, which is empty, and the Files tab, which displays a list of files in the home directory:

Name	Size	Modified
.Rhistory	0 B	Aug 19, 2022, 9:32 PM
Adult Hypercholesterolaemia Trend in Malaysia.pdf	499.9 KB	Nov 30, 2023, 10:15 PM
BKP KKM.url	174 B	Dec 8, 2017, 6:48 PM
Custom Office Templates		
desktop.ini	418 B	Mar 4, 2024, 9:41 AM
elvenar halving.xlsx	10.8 KB	Mar 4, 2024, 12:12 PM
NIH-IKU.url	174 B	Mar 4, 2024, 8:01 AM
Office Lens		
Personal.url	174 B	Dec 28, 2023, 12:05 PM
RStudio		
Self study.url	173 B	Oct 22, 2015, 11:02 PM
Work.url	174 B	May 5, 2017, 8:26 AM

The system tray at the bottom indicates the date and time: Tuesday, 5 March, 2024, 11:43 AM 5/3/2024.

# Further Reading

- [R for Data Science](#)
- [RStudio Cheat Sheets](#)
- [Quarto Documentation](#)
- [Graphic with ggplot2](#)
- [Tidyverse](#)
- [Advanced R](#)