R Programming

(CSW318B)

#Workshop: 1

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What is Analytics?

- Analytics is the systematic computational analysis of data or statistics.
- It is used for the discovery, interpretation, and communication of meaningful patterns in data.
- It also entails applying data patterns towards effective decision making

Why do we need Analytics?

- Cost Reduction
- Better marketing
- Product Analysis
- Organization Analysis
- Fast
- Better Decision Making

Business Analytics

- Study of business data using statistical techniques and programming for creating decision support and insights for achieving business goals.
- Business Analytics solutions typically use statistical and quantitative analysis and fact-based data to measure past performance to guide organization’s business planning.
- Business analytics is used to evaluate organization-wide operations, and can be implemented in any department from sales to product development to customer service.

Introduction to R

- R is an open source programming language and software environment for statistical computing and graphics.

- The R language is widely used among statisticians and data miners for developing statistical software and data analytics tools

History of R

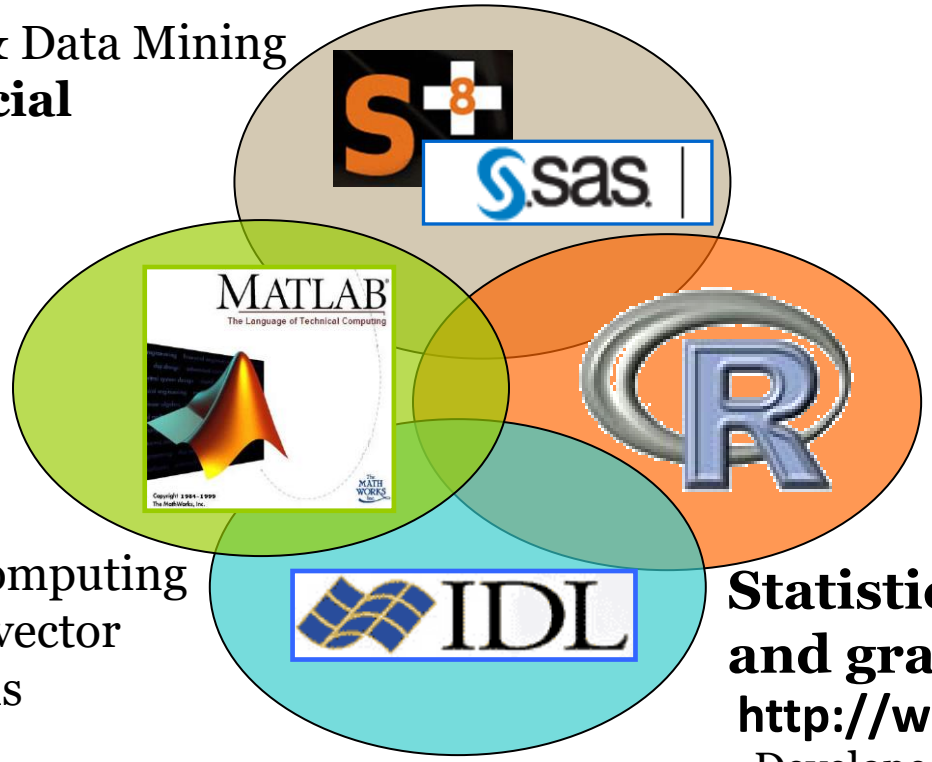
- R was initially written by Ross Ihaka and Robert Gentleman at the Department of Statistics of the University of Auckland in Auckland, New Zealand. R made its first appearance in 1993.
- A large group of individuals has contributed to R by sending code and bug reports.
- Since mid-1997 there has been a core group (the "R Core Team") who can modify the R source code archive.

Why R?

- It's free!
- It runs on a variety of platforms including Windows, Unix and MacOS.
- It provides an unparalleled platform for programming new statistical methods in an easy and straightforward manner.
- It contains advanced statistical routines not yet available in other packages.
- It has state-of-the-art graphics capabilities.

Why R?

- Statistics & Data Mining
- **Commercial**



- Technical computing
- Matrix and vector formulations

- Data Visualization and analysis platform
- Image processing, vector computing

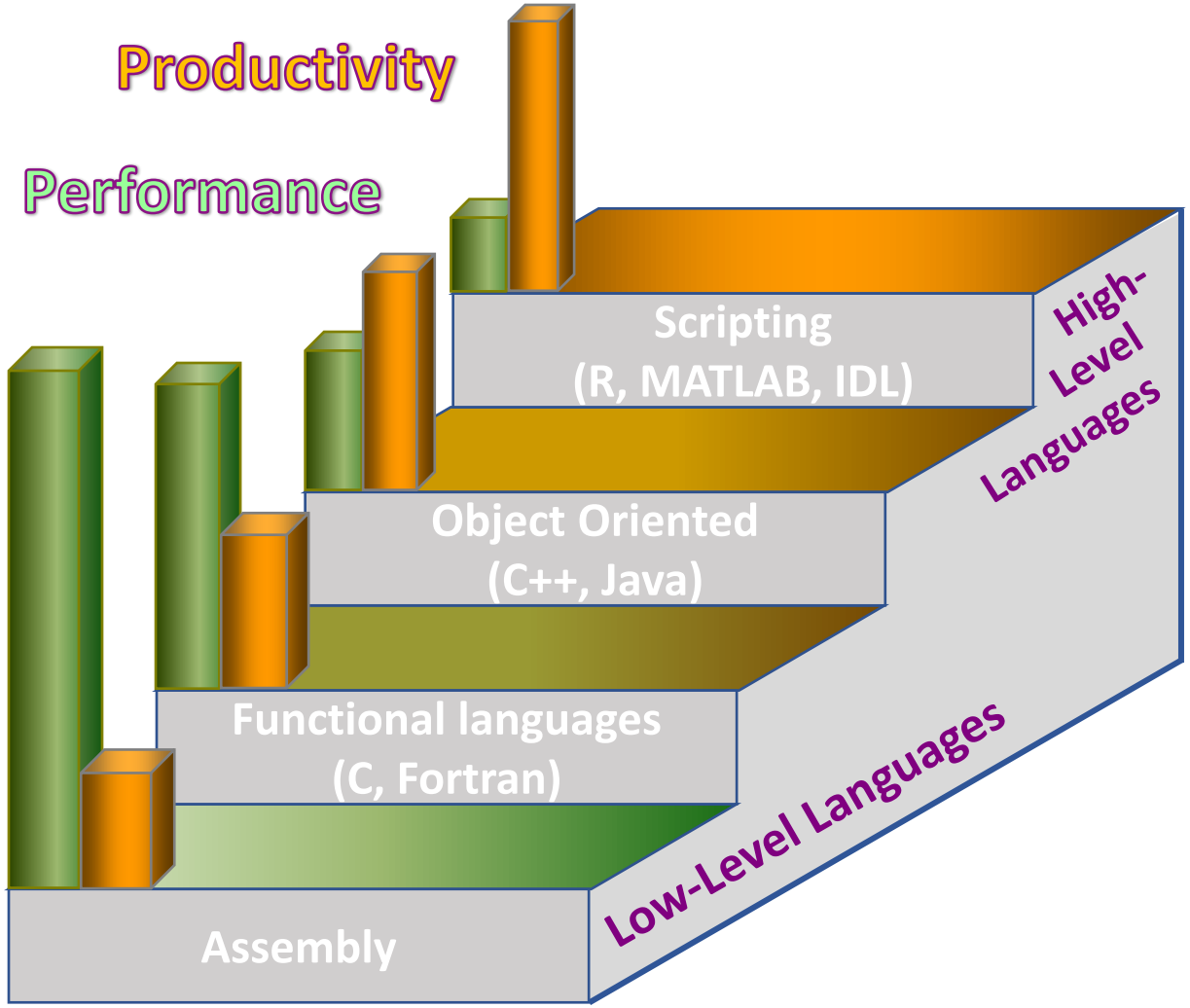
Statistical computing and graphics

http://www.r-project.org

- Developed by **R**. Gentleman & **R**. Ihaka
- Expanded by community as **open source**
- Statistically rich

The Dilemma of Programmer

What programming language to use & why?



Features of R

The following are the important features of R:

- R is a well-developed, simple and effective programming language which includes conditionals, loops, user defined recursive functions and input and output facilities.
- R has an effective data handling and storage facility,
- R provides a suite of operators for calculations on arrays, lists, vectors and matrices.
- R provides a large, coherent and integrated collection of tools for data analysis.
- R provides graphical facilities for data analysis and display either directly at the computer or printing at the papers.

Basic usage: arithmetic in R

- You can use R as a calculator
- Typed expressions will be evaluated and printed out
  - Main operations: +, -, *, /, ^
  - Obeys order of operations
  - Use parentheses to group expressions
- More complex operations appear as *functions*
  - sqrt(2)
  - sin(pi/4), cos(pi/4), tan(pi/4), asin(1), acos(1), atan(1)
  - exp(1), log(2), log10(10)

Resources for R

- http://www.r-project.org/
- http://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf

Download R and RStudio

- Download R :

  http://cran.r-project.org/bin/

- Download RStudio :

  http://www.rstudio.com/ide/download/desktop

Installation

Installing R on windows PC :

- Use internet browser to point to : http://mirror.aarnet.edu.au/pub/CRAN
- Under the heading Precompiled Binary Distributions, choose the link Windows.
- Next heading is R for Windows; choose the link base.
- Click on download option(R 3.4.1 for windows).
- Save this to the folder C:\R on your PC.
- When downloading is complete, close or minimize the Internet browser.
- Double click on R 3.4.1-win32.exe in C:\R to install.

Installing R on Linux:

- sudo apt-get install r-base-core

Installation

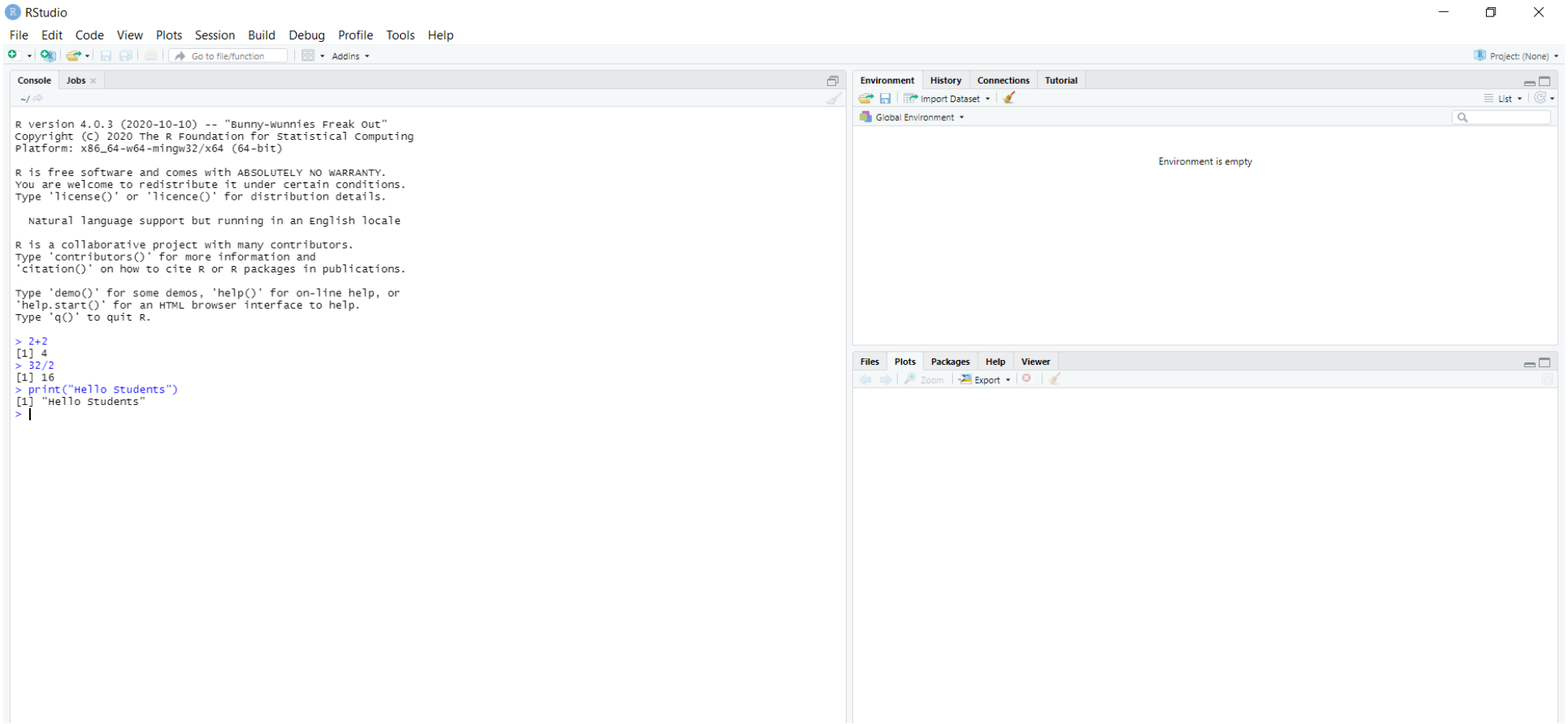
Installing RStudio:

- Go to www.rstudio.com and click on the "Download RStudio" button.
- Click on "Download RStudio Desktop.“
- Click on the version recommended for your system, or the latest Windows version, and save the executable file. Run the .exe file and follow the installation instructions.

For reference:

https://www.youtube.com/watch?v=NZxSA80lF1I

R studio


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function
Addins
Project: (None)
Console
Jobs
~/
R version 4.0.3 (2020-10-10) -- "Bunny-Wunnies Freak Out"
Copyright (C) 2020 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.
> 2+2
[1] 4
> 32/2
[1] 16
> print("Hello Students")
[1] "Hello Students"
>
Environment
History
Connections
Tutorial
Import Dataset
List
Global Environment
Environment is empty
Files
Plots
Packages
Help
Viewer
Zoom
Export

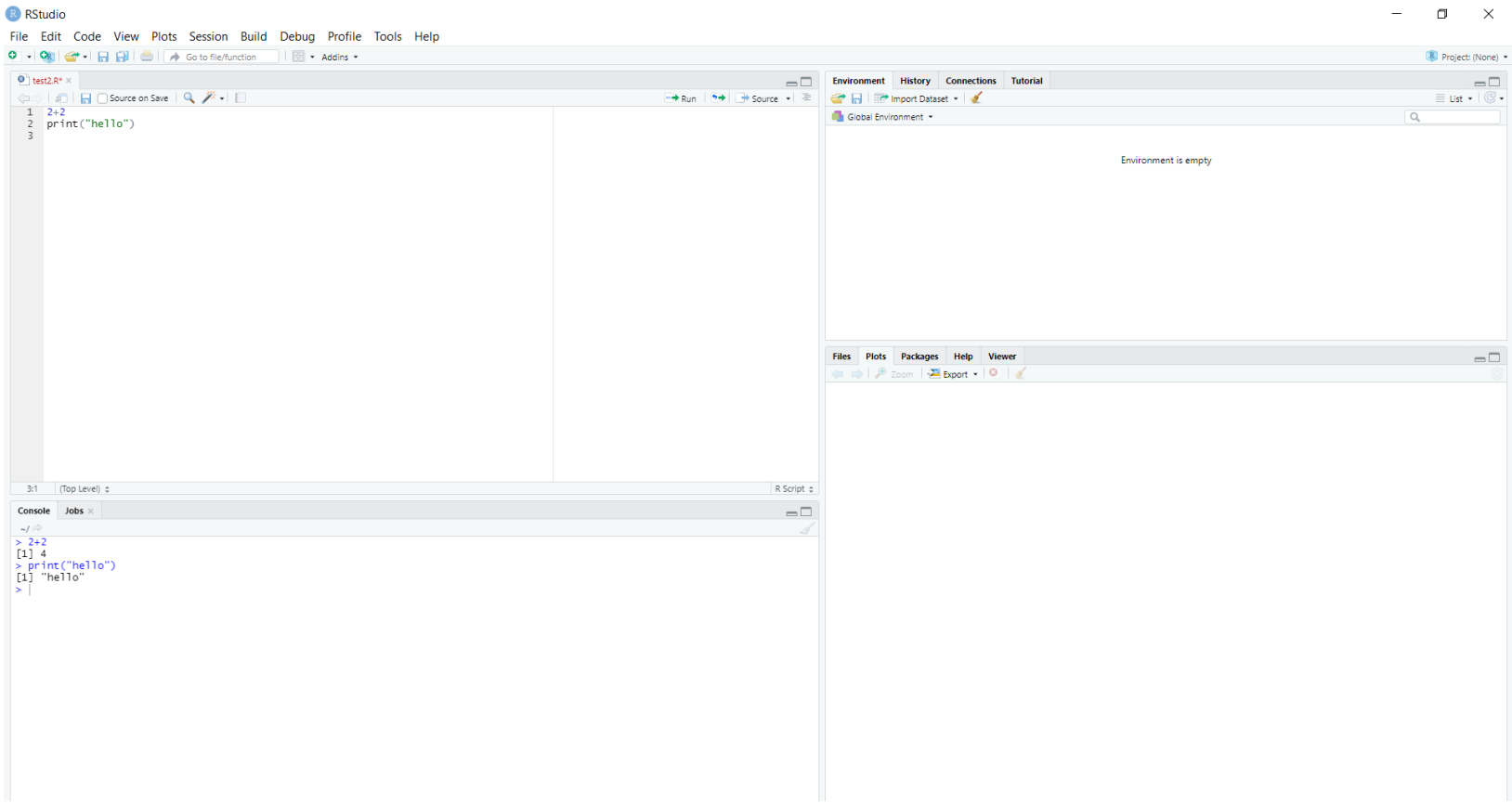
R Script File

- Usually, you will do your programming by writing your programs in script files and then you execute those scripts at your R studio with the help of RUN command. So let's start with writing following code in a text file called test1.R as under:

```
# My first program in R Programming
print ( “Hello Students”)
```

Solution: Hello Students

Save simple program file in R



Useful R links

- R Home: http://www.r-project.org/
- R's CRAN package distribution: http://cran.cnr.berkeley.edu/
- Introduction to R manual: http://cran.cnr.berkeley.edu/doc/manuals/R-intro.pdf
- Writing R extensions: http://cran.cnr.berkeley.edu/doc/manuals/R-exts.pdf
- Other R documentation: http://cran.cnr.berkeley.edu/manuals.html