CT1100: Computer Systems

Topic 1: Introduction to R

Prof. Jim Duggan,

School of Engineering & Informatics

National University of Ireland Galway.

Module Overview

- Exploring the essential building blocks of the information age
  - Semester 1: Data (R) and Computer Hardware
  - *Semester 2 Software & Networks*
- Compulsory for all first year BA students taking IT as a subject
  - Labs from week 4 (1 hour per week, 3 time slots)
  - Worth 5 ECTS in credit
  - Continuous Assessment (MCQ tests, Assignments, Lab Exam)
- See also https://github.com/JimDuggan/CT1100

Topics to be Covered (R)

Topic	Description
1	Introduction to R and R Studio Cloud
2	A program in R
3	The tibble – a way of storing information
4	Data Visualisation I
5	Data Transformation I
6	Running a Script in R
7	Data Visualisation II
8	Data Transformation II
9	Exploring Data
10	Communicating Results

https://r4ds.had.co.nz
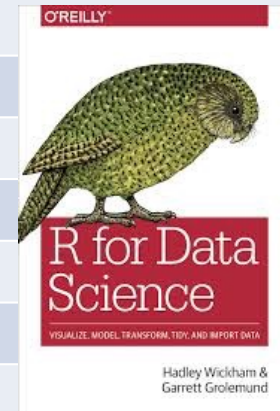
Gather some data today… see Blackboard link.
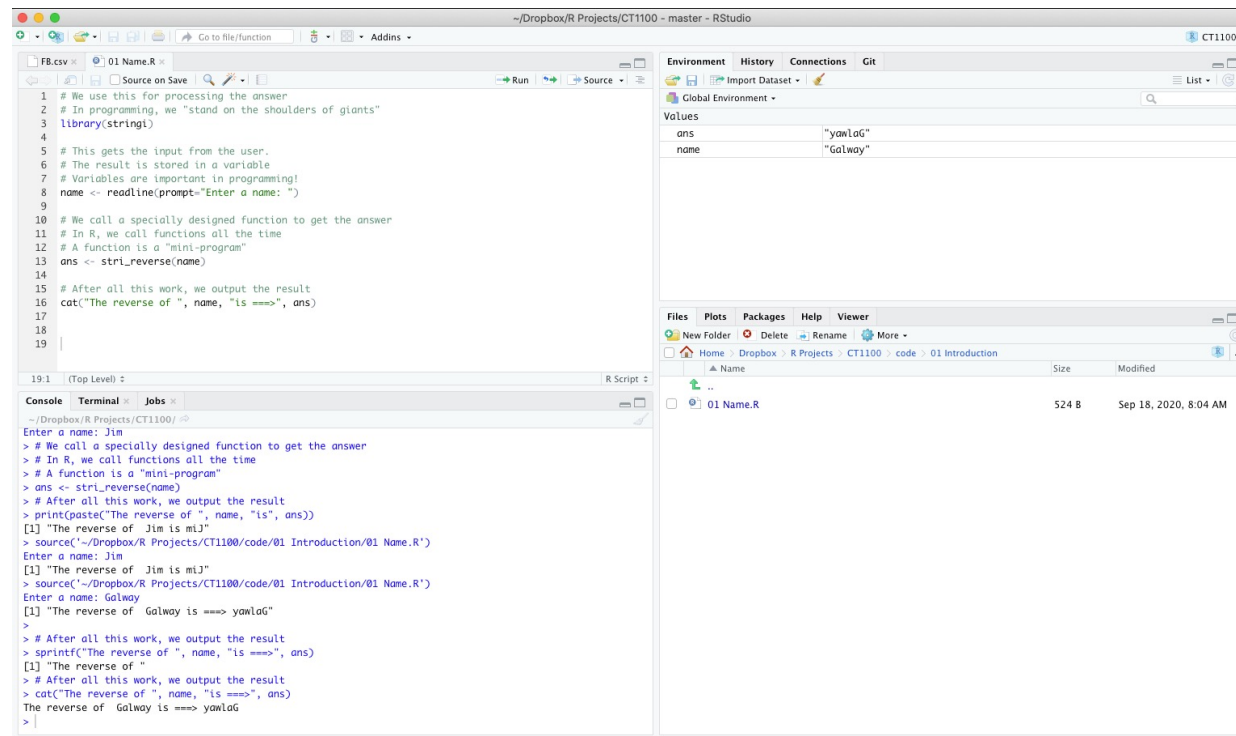
The R Project for Statistical Computing

- R's *mission* is to enable the best and most thorough exploration of data possible (Chambers 2008).

- It is a dialect of the S language, developed at Bell Laboratories

- ACM noted that S *"will forever alter the way people analyze, visualize, and manipulate data"*
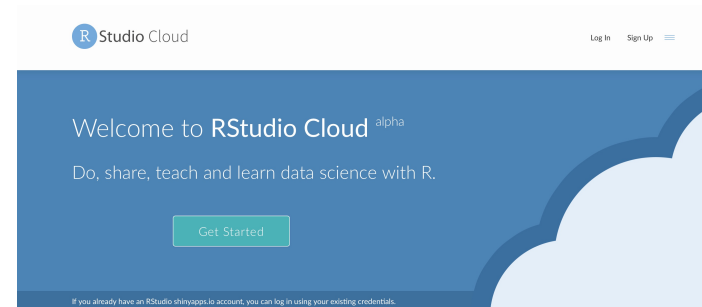

```
1   # We use this for processing the answer
2   # In programming, we "stand on the shoulders of giants"
3   library(stringi)
4
5   # This gets the input from the user.
6   # The result is stored in a variable
7   # Variables are important in programming!
8   name <- readline(prompt="Enter a name: ")
9
10  # We call a specially designed function to get the answer
11  # In R, we call functions all the time
12  # A function is a "mini-program"
13  ans <- stri_reverse(name)
14
15  # After all this work, we output the result
16  cat("The reverse of ", name, "is ===>", ans)
17
```

First Steps: RStudio Cloud!

(1) Create your account on https://rstudio.cloud and login
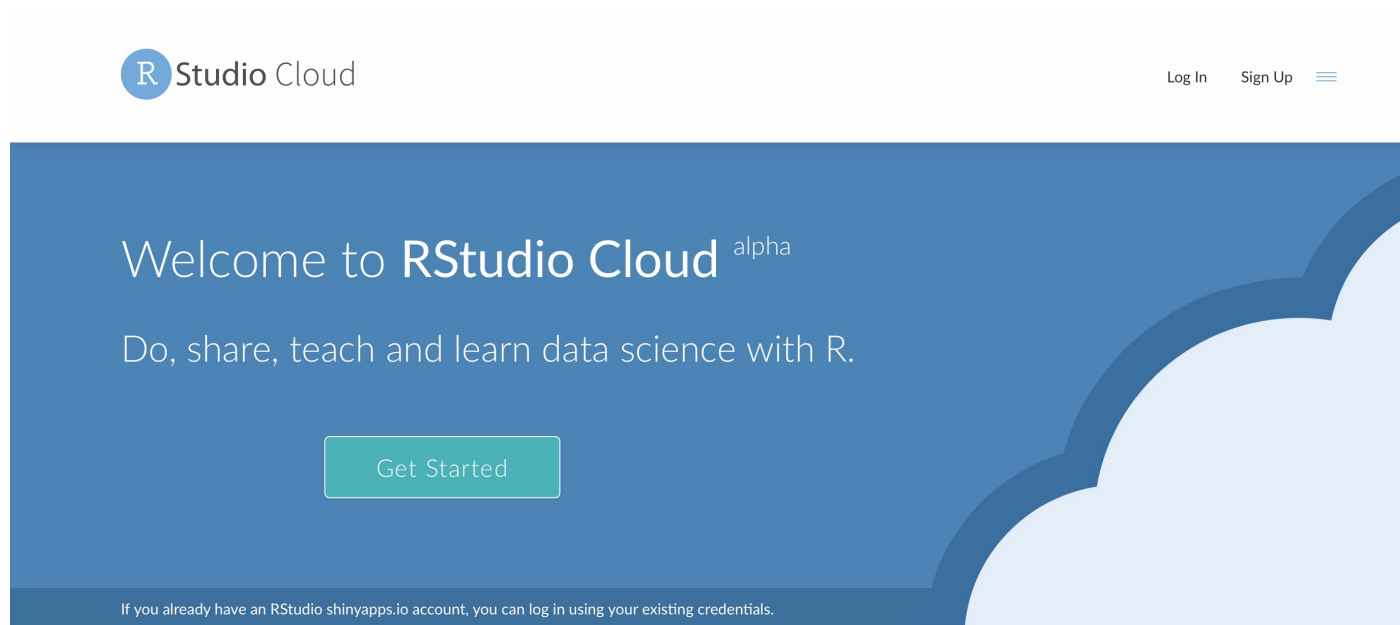
(2) In your workspace, create a project
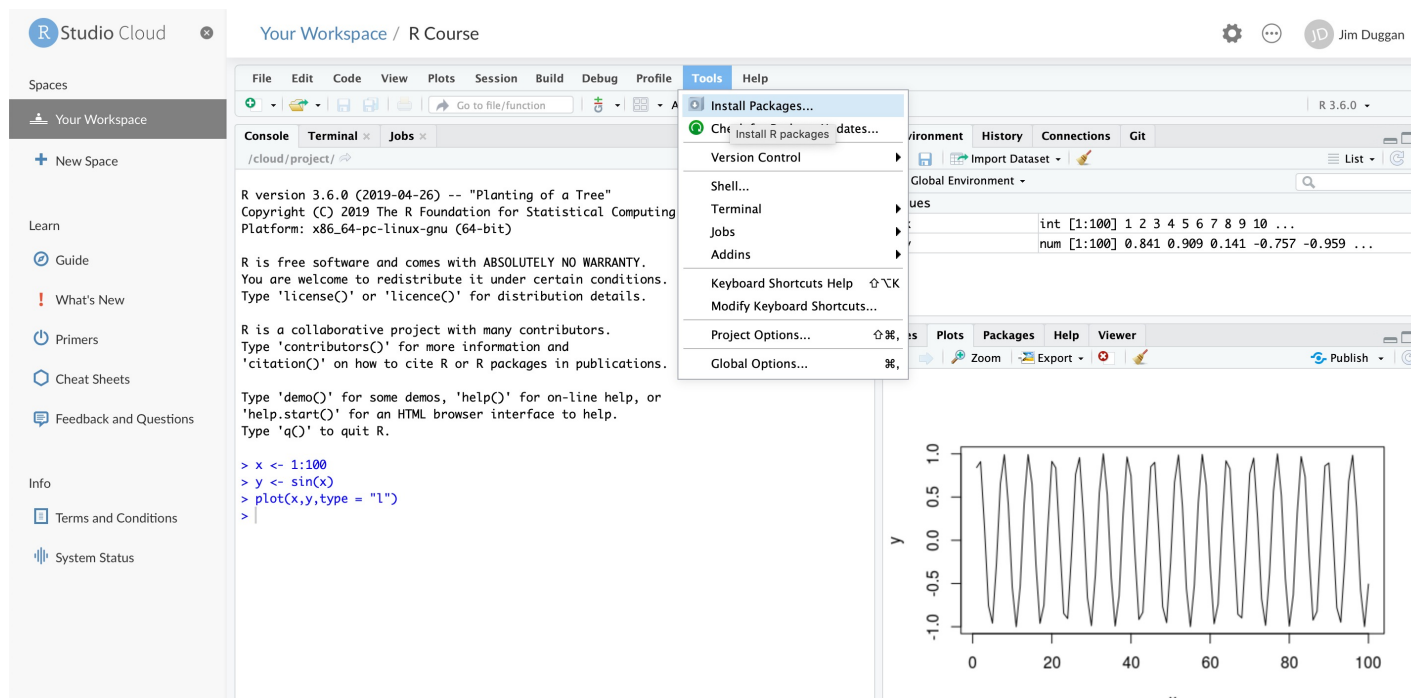
(3) Name the project (e.g. MySmartGrid)
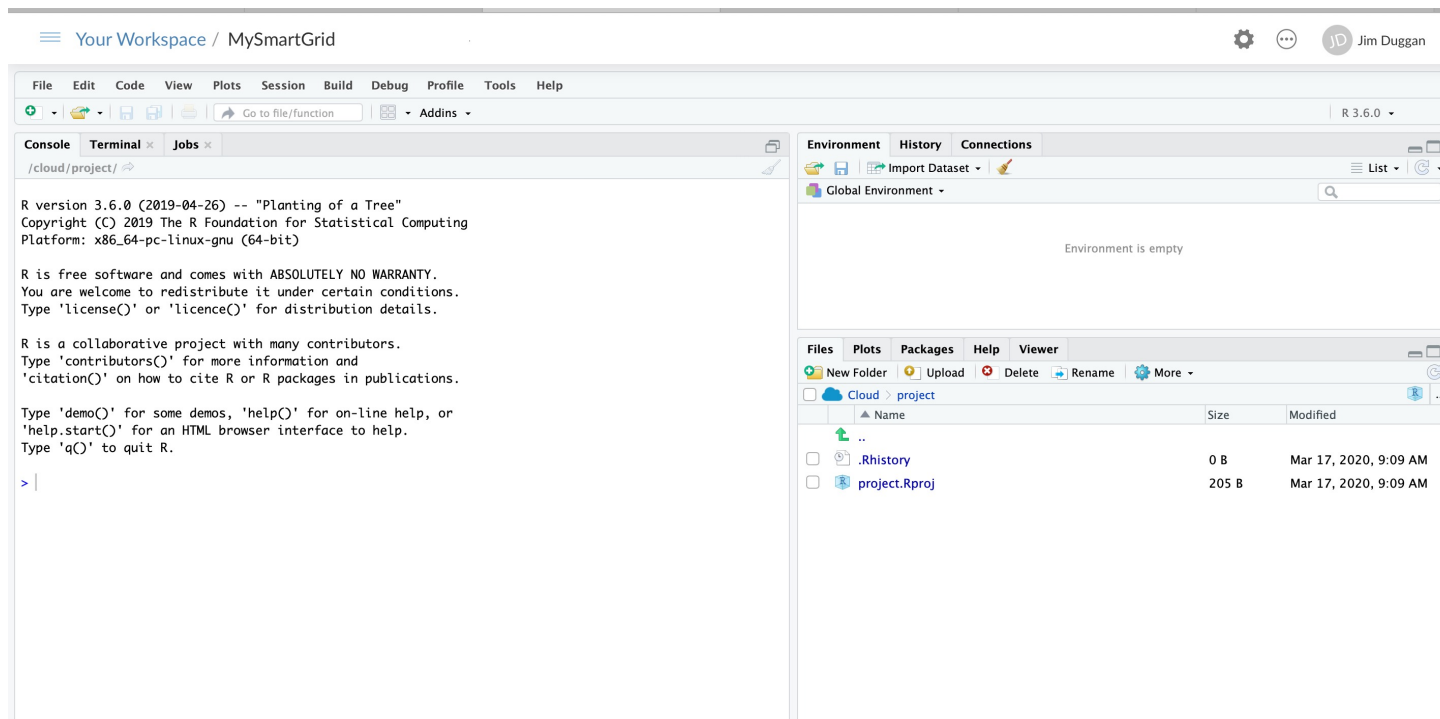
(4) Run some R code in Console
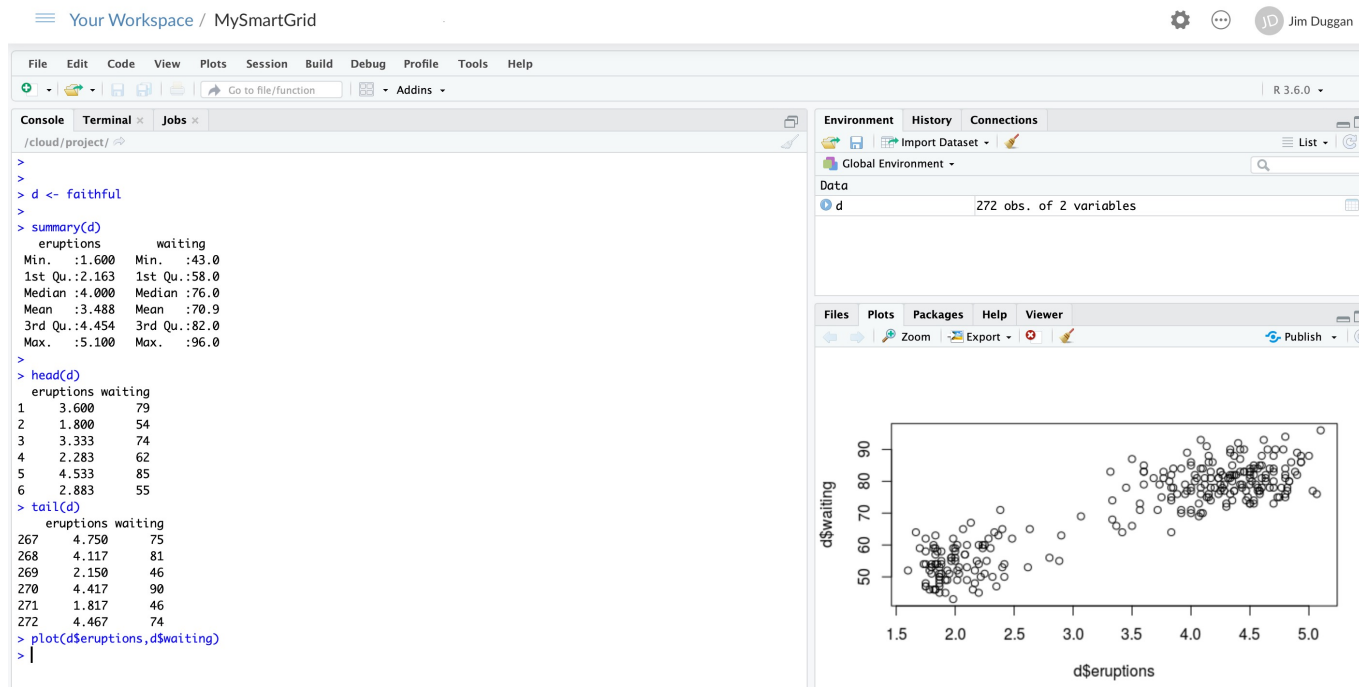
(5) Install required packages

(6) For example, ggplot2

(7) Packages required

Package	Purpose
ggplot2	Produce graphics for data
dplyr	Analysis of data held in tibbles/data frames
aimsir17	2017 Weather data for Ireland
stringi	For manipulating strings

Challenge 1.1

- At the R Console, try it out as a calculator
- Try some classic equations
  - Convert miles to kilometers (use 1.6)
  - Convert Celsius to Fahrenheit (9/5 C + 32)
- Now, using the **<-** assignment operator to store your answer in a variable
- ***Variables*** *are the names you give to computer memory locations which are used to store values in a computer* ***program***