CT1100: Computer Systems

Topic 1: Introduction to R

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Module Overview

- Exploring the essential building blocks of the information age
  - Semester 1: Data (R) and 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

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Lecturer –Jim Duggan

- Lectures in
  - Programming (R, MATLAB),
  - Modelling & Simulation
- Research interests:
  - System Dynamics
  - Computational Epidemiology
  - Data Science & Artificial Intelligence

Review | Infodemiology and Infoveillance | Infoveillance, Infodemiology, Digital Disease Surveillance, Infodemic Management

Article | Cited By (6) | Tweetations (29) | Metrics

Review

The Application of Internet-Based Sources for Public Health Surveillance (Infoveillance): Systematic Review

Joana M Barros[1,2], MSc; Jim Duggan[2], PhD; Dietrich Rebholz-Schuhmann[3], PhD

[1]Insight Centre for Data Analytics, National University of Ireland Galway, Galway, Ireland
[2]School of Computer Science, National University of Ireland Galway, Galway, Ireland
[3]ZB MED - Information Centre for Life Sciences, University Cologne, Cologne, Germany

R Studio Education

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Jim Duggan
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Jim is a Lecturer in Computer Science at the National University of Ireland Galway (NUIG), and has been working with R for over 5 years. Before joining NUIG in 1995 he worked as a software engineer for Digital Equipment Corporation. He is author of two CRAN packages (aimsir17 and pysd2r), and has also written a textbook on system dynamics modelling with R. Jim's research interests includes public health and epidemiology, where he combines extensive use of the tidyverse with mathematical modelling approaches, including the R package deSolve.

Teaching language(s): English

https://education.rstudio.com/trainers/people/duggan+jim/

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

O'REILLY
R for Data Science
VISUALIZE, MODEL, TRANSFORM, TIDY, AND IMPORT DATA
Hadley Wickham & Garrett Grolemund

https://r4ds.had.co.nz
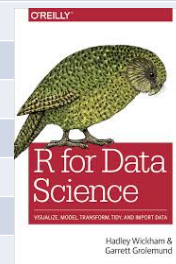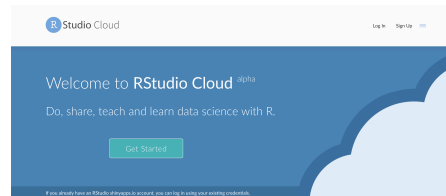
The R Project for Statistical Computing

- 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)
```

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First Steps: RStudio Cloud!
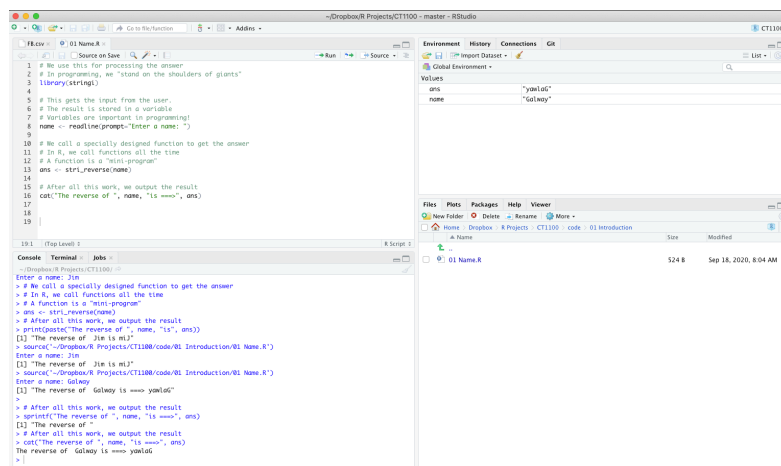
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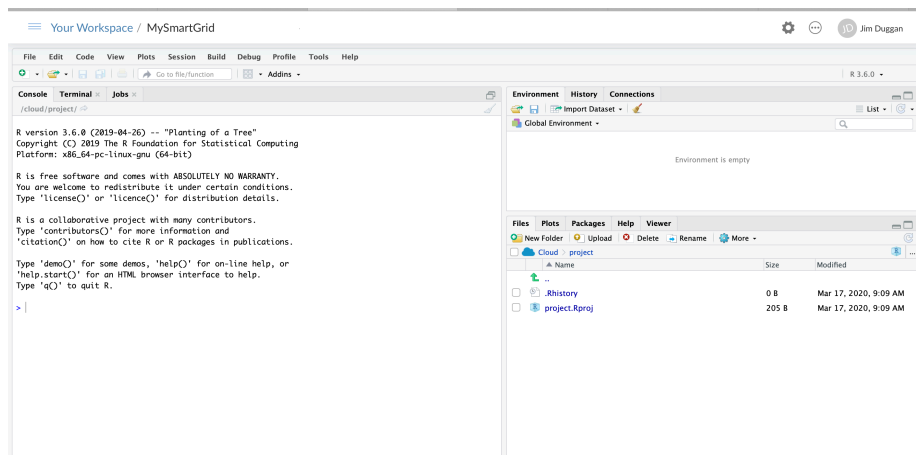## (1) Create your account on https://rstudio.cloud and login
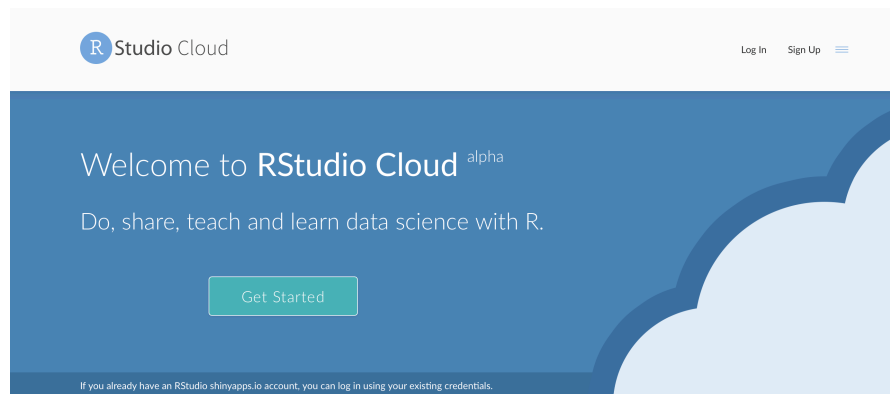
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(2) In your workspace, create a project
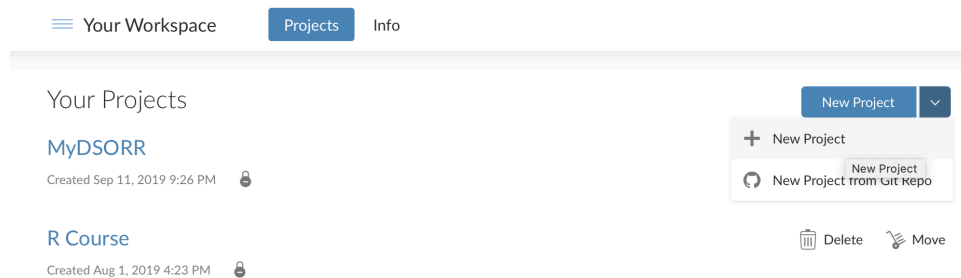
8

(3) Name the project (e.g. MySmartGrid)

(4) Run some R code in Console
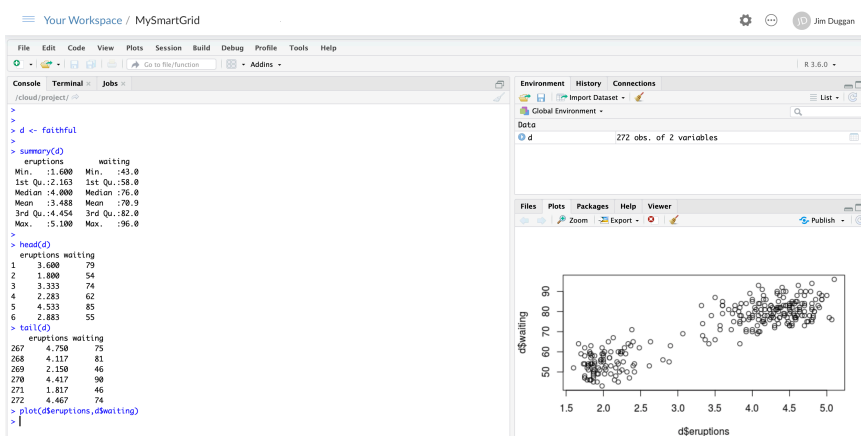
(5) Install required packages

(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***