R and RStudio

R Statistical Computing & Graphics

- Free open souce software
- Available for Windows, Mac and Linux/Unix operating systems
- Large community of developers
- Many packages/libraries

    - CRAN repository

    - Bioconductor repository

Download and Install

Download the latest stable release of R fromhttps://www.r-project.org, latest version is 4.2.3

RStudio

- Integrated development environment (IDE)

    - R
    - Python

- Console for running code
- Code editor with syntax colouring

The R Project for Statistical Computing

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Download

CRAN

R Project

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Getting Started

R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To **download R**, please choose your preferred CRAN mirror.

If you have questions about R like how to download and install the software, or what the license terms are, please read our answers to frequently asked questions before you send an email.

News

- **R version 4.3.0 (Already Tomorrow) prerelease versions** will appear starting Tuesday 2023-03-21. Final release is scheduled for Friday 2023-04-21.

- **R version 4.2.3 (Shortstop Beagle)** has been released on 2023-03-15.

- **R version 4.1.3 (One Push-Up)** was released on 2022-03-10.

- Thanks to the organisers of useR! 2020 for a successful online conference. Recorded tutorials and talks from the conference are available on the R Consortium YouTube channel.

Index of /src/base/R-4

Name	Last modified	Size	Description
Parent Directory		-	
R-4.0.0.tar.gz	2020-04-24 09:05	32M	
R-4.0.1.tar.gz	2020-06-06 09:05	32M	
R-4.0.2.tar.gz	2020-06-22 09:05	32M	
R-4.0.3.tar.gz	2020-10-10 09:05	32M	
R-4.0.4.tar.gz	2021-02-15 09:05	32M	
R-4.0.5.tar.gz	2021-03-31 09:05	31M	
R-4.1.0.tar.gz	2021-05-18 09:05	32M	
R-4.1.1.tar.gz	2021-08-10 09:05	32M	
R-4.1.2.tar.gz	2021-11-01 09:05	32M	
R-4.1.3.tar.gz	2022-03-10 09:05	33M	
R-4.2.0.tar.gz	2022-04-22 09:05	36M	
R-4.2.1.tar.gz	2022-06-23 09:05	36M	
R-4.2.2.tar.gz	2022-10-31 09:05	32M	
R-4.2.3.tar.gz	2023-03-15 09:06	32M	

Apache Server at cran.r-project.org Port 443

- Workspace/file managment
- Records history of commands

RStudio

Download from https://posit.co/download/rstudio-desktop/

RStudio Desktop

Used by millions of people weekly, the RStudio integrated development environment (IDE) is a set of tools built to help you be more productive with R and Python.

1: Install R

RStudio requires R 3.3.0+. Choose a version of R that matches your computer's operating system.
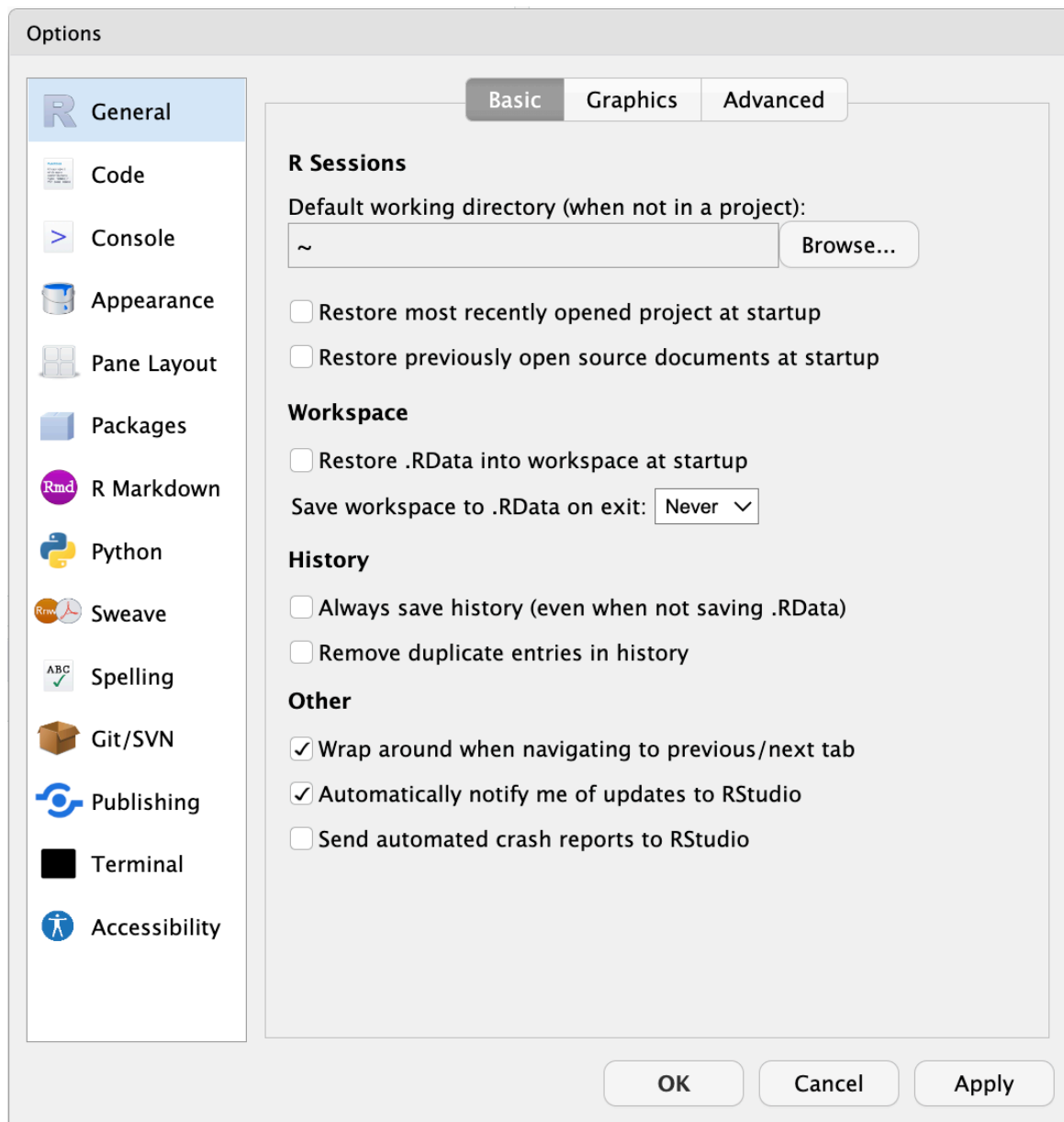
DOWNLOAD AND INSTALL R

2: Install RStudio

DOWNLOAD RSTUDIO DESKTOP FOR MACOS 11+

This version of RStudio is only supported on macOS 11 and higher. For earlier macOS environments, please download a previous version.

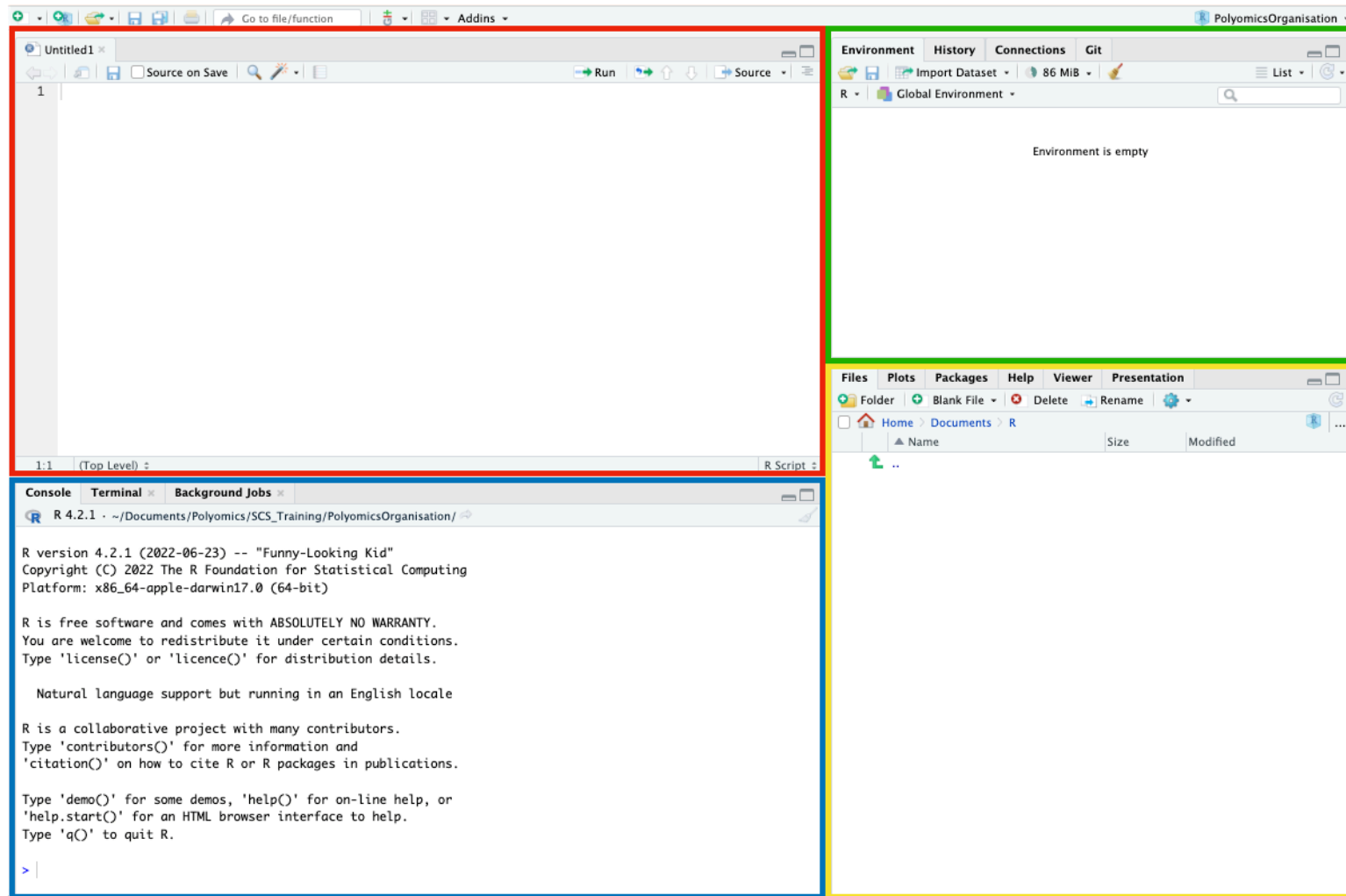- This page should detect your operating system
- Download RStudio
- Click on the install package
- Follow install instructions

RStudio

Set up Rstudio - Set options in **Tools** and **Global Options...**

Options

| Basic | Graphics | Advanced |

R General

Code

> Console

Appearance

Pane Layout

Packages

Rmd R Markdown

Python

Sweave

ABC Spelling

Git/SVN

Publishing

Terminal

Accessibility

R Sessions

Default working directory (when not in a project):

| ~ | | Browse... |

☐ Restore most recently opened project at startup
☐ Restore previously open source documents at startup

Workspace

☐ Restore .RData into workspace at startup

Save workspace to .RData on exit: Never ⌄

History

☐ Always save history (even when not saving .RData)
☐ Remove duplicate entries in history

Other

☑ Wrap around when navigating to previous/next tab
☑ Automatically notify me of updates to RStudio
☐ Send automated crash reports to RStudio

| OK | Cancel | Apply |

- Uncheck the boxes as shown in the example
- Ensure that *Save workspace to .RData on exit* is set to **Never**

YouTube video on installing and setting up RStudio https://www.youtube.com/watch?v=D6CunpqF04E

RStudio

- Source pane
  - Write R commands as R scripts or Notebooks

- Console Pane
  - Where the R commands are executed
- Environment pane
  - Details of the R variables
- Files pane
  - View the directory and file structure

RStudio Libraries

R packages or libraries are extensions to the R language.
R packages contain:

- Code

- Data

- Documentation

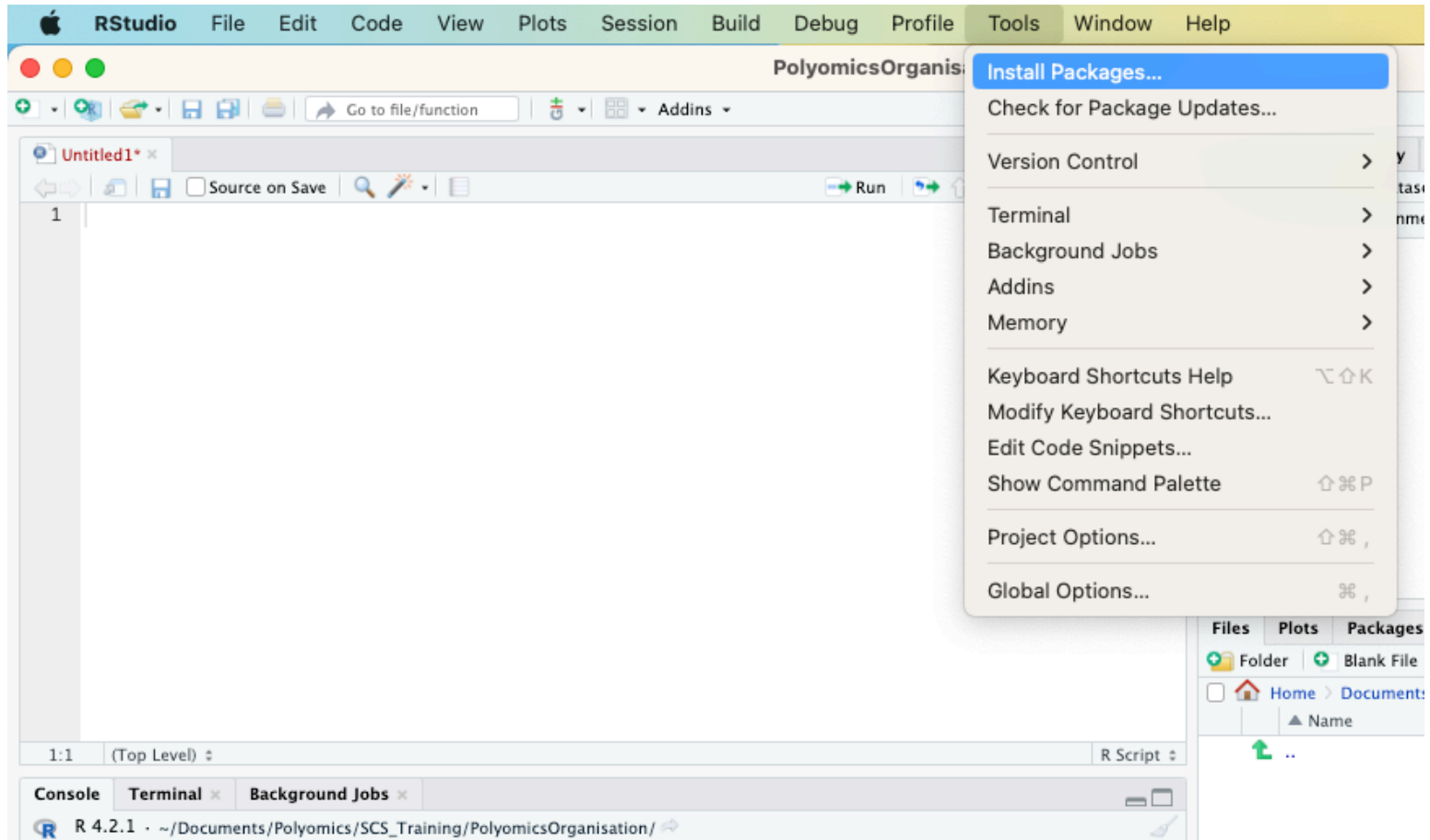The packages are in a standardised format and can be installed from repositories
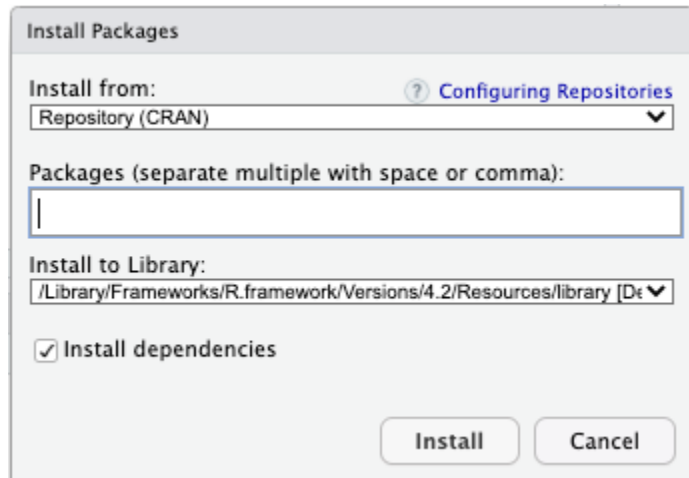
R Repositories

- Comprehensive R Archive Network (CRAN)
  - Main software repositiry, supported by the R Foundation
- Bioconductor
  - R packages for the analysis of biological data
- GitHub
  - Alternative repository for R packages, often in active development

Installing Libraries

RStudio

Installing Packages

Terminal

From CRAN using the R command install.packages

```
install.packages("tidyverse")
```

From Bioconductor First need to install a package manager program

```
if (!require("BiocManager", quietly = TRUE))
    install.packages("BiocManager")
BiocManager::install()
```

Then can install specific packages

```
BiocManager::install(c("GenomicFeatures", "AnnotationDbi"))
```

Installing Packages

Terminal

From GitHub First need to install devtools from CRAN

```
install.packages("devtools")
require("devtools")
```

Then can install GitHub packages. Github packages are usually named after the repository name then the package name e.g. grahamhamilton/Rpackage

```
install_github("GitHubPackage")
```

Installing Packages

Now install these packages

- CRAN

    - tidyverse

    - devtools

Loading Packages

Packages have to be loaded prior to use. There are two ways to load packages in R.

- **library()**

    - library() will output an error and stop the execution of the code