
# Enterprise R Package Development

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# Outline

A tutorial on how to build packages in R that can be deployed to the Enterprise or to the Comprehensive R Archive Network (CRAN) including continuous integration, testing, and code coverage analysis.

- Quick Introduction to R
- Introduction to R packages
- Open Source Licenses in the Corporate Ecosystem
- Package Development Tech Stack
- Demo
  - https://github.com/bertcarnell/dogfoodcon2019
  - https://github.com/bertcarnell/dogfoodconpackage

# What does the R in Rob stand for?

# A Little About Me

- Diverse Education
  - BS Physics
  - MS Statistics
  - MEM in Engineering Management
  - Nuclear Engineering in US Navy
- Data Science Experience
  - Research - Probabilisitic Risk Assessment, National Security, Bioinformatics, Forensics, Transportation
  - Marketing
  - Banking
- Languages Spoken
  - R, c/C++, python, SAS, Java, C#, javascript, VBA, ASP.NET

# Quick Introduction to R

-  -"R is a free software environment for statistical computing and graphics."
  - **Free** like "free beer", and **Free** like "freedom to modify, extend, and distribute" the source
  - Technically, a functional scripting language with object oriented programming options. C and Fortran under the hood.
- 
  - An Integrated Development Environment (IDE) for programming in R

# Introduction to R Packages

Packages in R "provide a mechanism for loading optional code, data and documentation as needed. The R distribution itself includes about 30 packages."

CRAN Packages:

- **CRAN** (The Comprehensive R Archive Network): A world-wide mirrored repository of curated extensions (packages) for the R environment.
- **Testing**: CRAN packages are tested on entry and periodically thereafter and are scanned by the CRAN team for use with designated R versions and designated dependent packages.
- **Security**: Code is open source and is usually inspected. Closed source 3rd party binary libraries are discouraged or not allowed. Packages are manually reviewed for a user's first package or if something unusual is requested.

# Introduction to R Pacakges (cont)

Github Packages + other:

- More of the wild west
- Corporate users need to do due dilligence before using a package from github if access is even allowed in the Enterprise
- Most often used as a "faster" way to distribute package bug fixes than the CRAN process
- Also allows package users to see the level of rigor around the package development: continuous integration, testing, code documentation, etc.

# Use Case for Enterprise Package Development

- Great way to standardize, document, and distribute a package
- Can use internal git repository as the package repository
- Much easier for users to re-use validated code
- Automated unit testing and validation against new versions of R and dependent packages
- Fits better within a corporate governance structure as a self-contained tool, rather than a collection of scripts

# Open Source Licenses in the Corporate Ecosystem

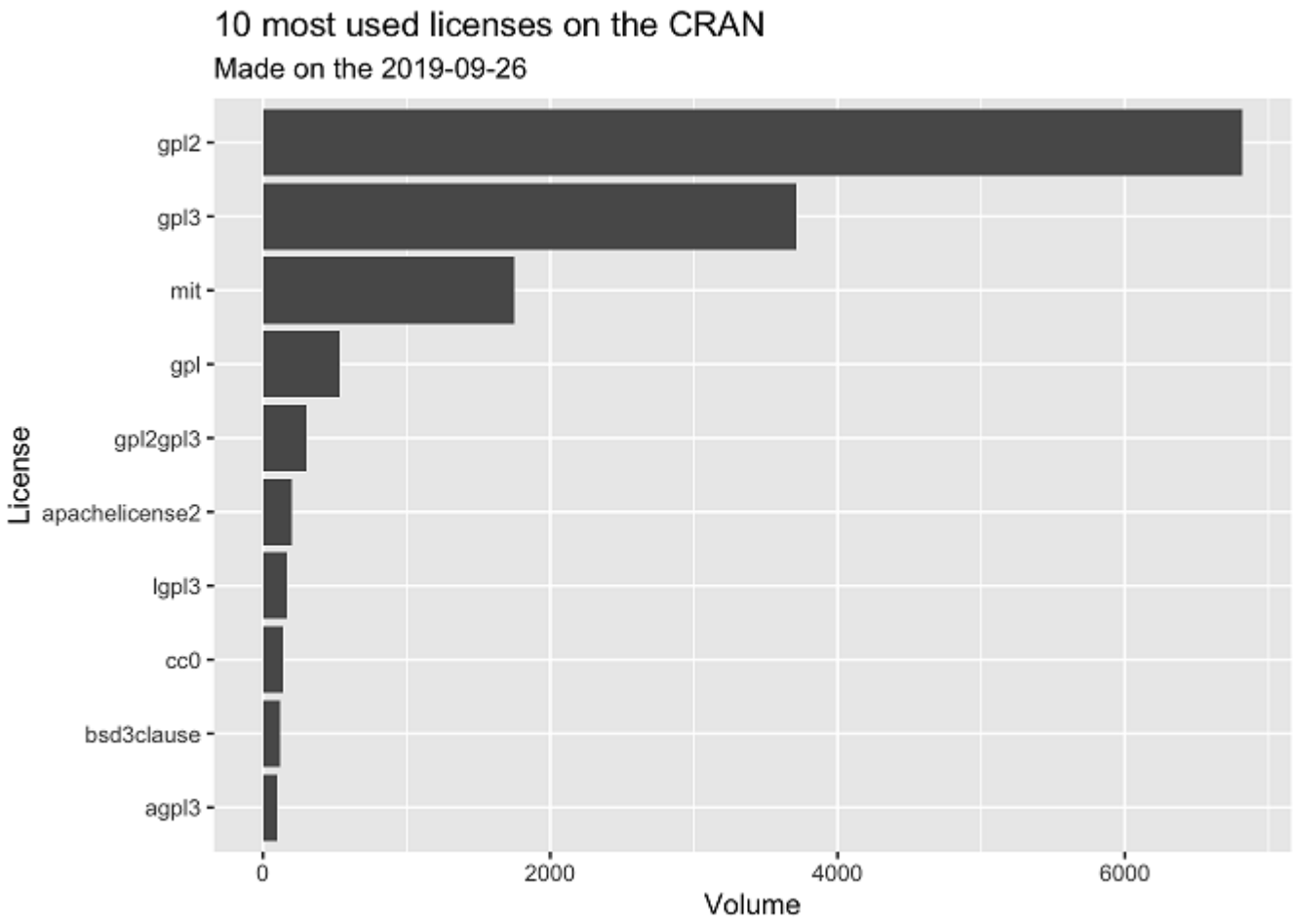
Open Source Licenses

- R: GNU General Public License (GPL) version 2 or 3
- Most R packages are governed under:
  - MIT
  - GPL, LGPL, AGPL
  - BSD
  - CCBY-4
  - Apache 2.0

Please discuss with your company's legal department about specific policies on these licenses.

Read more at the Free Software Foundation

# Most Popular CRAN Licenses




From Here

# Package Development Tech Stack

Open Source Tech Stack:

- R
- Integrated Development Environment: RStudio
- Continuous Integration: Travis CI
- Test Coverage: CodeCov
- Source Control: git
- Documentation, Project Management, Collaboration: github

Analogs for each element can be implemented internally in the corporate environment or enterprise licenses can be bought

# Demonstration of Package Environment

# Learn More + R References

The gold standard reference from the R Project:

- Writing R Extenstions - R

R packages:

- roxygen2 - Inline R Documentation
- covr - Test Coverage for Packages
- devtools - Package development tools

# Learn More + Getting Started References

Others:

- STAT 545 - University of British Columbia, Jenny Bryan
- The Political Methodologist
- devtools cheatsheet - RStudio
- Developing R Packages - jtleek
- R Package primer
- R Packages - Hadley Wickham

# Thank You