

Awesome R Package Development Tools

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Table of contents

| | | |
|----|-----------------------------------|---|
| 1 | Generic | 4 |
| 2 | RMarkdown-based | 4 |
| 3 | Shiny | 4 |
| 4 | Meta-packages | 4 |
| 5 | Manual | 5 |
| 6 | Math rendering in HTML/PDF manual | 6 |
| 7 | Vignettes | 6 |
| 8 | Tutorials | 6 |
| 9 | Website | 6 |
| 10 | Translation | 7 |
| 11 | Lifecycle | 7 |
| 12 | Badges and stickers | 7 |
| 13 | Presentation | 7 |
| 14 | Book | 7 |
| 15 | Change log and versioning | 7 |
| 16 | Generic R Packages | 8 |

| | |
|--|-----------|
| 17 Web/database applications | 9 |
| 18 Visual regression testing | 9 |
| 19 Mock testing | 9 |
| 20 Mutation testing | 10 |
| 21 Markdown documents | 10 |
| 22 Shiny applications | 10 |
| 23 Helpers for testing frameworks | 10 |
| 24 General | 11 |
| 25 Code review | 11 |
| 26 Code coverage | 12 |
| 27 Code quality | 12 |
| 28 Code complexity | 12 |
| 29 Code similarity | 12 |
| 30 Compiled code | 13 |
| 31 JavaScript code | 13 |
| 32 Lines of code | 13 |
| 33 Benchmarking | 13 |
| 34 Profiling | 14 |
| 35 Package management | 14 |
| 36 Containerization | 14 |
| 37 Function argument validation | 17 |
| 38 Data validation | 17 |
| 39 C++ | 18 |
| 40 Fortran | 18 |

| | |
|-------------------------------|-----------|
| 41 Python | 18 |
| 42 Rust | 18 |
| 43 .NET Framework | 19 |
| 44 JavaScript/HTML/CSS | 19 |
| 45 Julia | 19 |

A curated list of awesome tools to assist development in R programming language.



What is included?

- Only *tools* helpful for package development are included, and not other resources (e.g. books).
- All relevant tools are included, irrespective of their availability on [CRAN/Bioconductor](#).
- Tools which are part of publicly archived/retired GitHub repositories are *not* included.

If you wish to suggest any additional tools, please make a PR or create an issue [here](#).

Code of Conduct

Please note that the `awesome-r-pkgtools` project is released with a [Contributor Code of Conduct](#). By contributing to this project, you agree to abide by its terms.

Swiss army knives

Tools useful across all stages of package development (some of these are meta-packages and their component packages are also included in respective sections for the sake of completeness), irrespective of whether the package is meant to be submitted to CRAN or Bioconductor.

- `{usethis}`
- `{devtools}`
- `{biocthis}`
- `{packager}`
- `{pacs}`
- `{pkgmaker}`

Package templates

1 Generic

- `{pkgkitten}` (useful for creating new packages for R)
- `{rcompendium}` (to make the creation of R package/research compendium easier)
- `{r.pkg.template}` (an opinionated R package template with CI/CD built-in)
- `{skeletor}` (An R Package Skeleton Generator)

2 RMarkdown-based

- `{fusen}` (to build a package from RMarkdown files)
- `{litr}` (to write a complete R package in a single R markdown document)

3 Shiny

- `{golem}` (framework for building shiny applications)
- `{leprechaun}` (leaner framework for building shiny applications)
- `{rhino}` (a framework to build high quality, enterprise-grade Shiny apps at speed)

4 Meta-packages

- `{pkgverse}` (for package meta-verse)
- `{metamakr}` (for package meta-verse)

Naming things

- `{available}` (to check if a package name is available to use)
- `{collidr}` (to check for namespace collisions)
- `{changer}` (to change the name of an existing R package)

Working with package components

- `{rprojroot}` (accessing files w.r.t. package root directory)
- `{desc}` (manipulating DESCRIPTION files)

- `{withr}` (to manage package side effects by safely and temporarily modifying global states)
- `{pkgload}` (to simulate the process of installing and loading a package)
- `{pkgbuild}` (to find tools needed to build packages)

Package configuration

- `{config}` (to manage environment specific configuration values)
- `{dotenv}` (to load environment variables from `.env` files)
- `{options}` (provides simple mechanisms for defining and interpreting package options)
- `{potions}` (to update and retrieve options, either in the workspace or during package development, without overwriting global options)

Package management tools

- `{pkghash}` (to cache ‘CRAN’-like metadata and packages)

Documentation

5 Manual

- `{roxygen2}` (to generate R package documentation from inline R comments)
- `{Rd2roxygen}` (in case you inherit a project where documentation was not written using `{roxygen2}`)
- `{rdoxygen}` (to create Doxygen documentation for R package C++ code)
- `{roxygenglobals}` (to generate global variables with `{roxygen2}` documentation)
- `{sinew}` (generate `{roxygen2}` skeletons)
- `{autoimport}` (to automatically generate `@importFrom` roxygen tags from R files)
- `{roclang}` (helpers for diffusing content across function documentation)
- `{Rdpack}` (for inserting references, figures, and evaluated examples in Rd docs)
- `{roxygen2md}` (to allow Markdown syntax usage in `{roxygen2}` documentation)
- `{rd2markdown}` (to convert `.Rd` package documentation files into markdown files)
- `{rd2list}` (converts Rd docs to a human-readable list)
- `{pasteAsComment}` (RStudio addin for pasting copied code as roxygen comment)

- `roxygen2Comment` (Rstudio addin for adding and remove `{roxygen2}` comment)

6 Math rendering in HTML/PDF manual

- `{katex}` (to convert latex math expressions to HTML for use in package manual pages)
- `{mathjaxr}` (provides ‘MathJax’ and macros to enable its use within Rd files for rendering equations in the HTML help files)
- `{mathml}` (translates R expressions to ‘MathML’ or ‘MathJax’ so that they can be rendered in HTML manual and Shiny apps)

7 Vignettes

- `{knitr}` (a general-purpose tool for dynamic report generation to be used as a vignette builder for R package vignettes)
- `{rmarkdown}` (to convert R Markdown documents to a variety of formats)
- `{quarto}` (provides R interface to frequently used operations in the Quarto CLI)
- `{R.rsp}` (for incorporating static and dynamic vignettes)
- `{RmdConcord}` (to provide support for concordances in R Markdown files)
- `{prettydoc}` (creates lightweight yet pretty vignettes)
- `{readme2vignette}` (to convert README to vignette during package installation)

8 Tutorials

- `{learnr}` (to turn any R Markdown document into an interactive tutorial)

9 Website

- `{pkgdown}` (static website for package documentation)
- `{gitdown}` (software changes as a gitbook)
- `{altdoc}` (use `docute`, `docsify`, or `MkDocs` to create a static website for package documentation)

10 Translation

- `{potools}` (for translating messages and checking the “health” of the messaging corpus)

11 Lifecycle

- `{lifecycle}` (to manage the life cycle of exported functions)

12 Badges and stickers

- `{badger}` (to query information and generate badges for use in README)
- `{badgen}` (provides bindings to `badgen` to generate beautiful ‘svg’ badges in R without internet access)
- `{hexSticker}` (helper functions for creating reproducible hexagon sticker purely in R)
- `{hexFinder}` (to scavenge the web for possible hex logos for packages)
- `hexwall` (to create a wall of hexstickers)

13 Presentation

- `{xaringan}` (an RMarkdown output format for `remark.js` slides)

14 Book

- `{bookdown}` (authoring framework for books and technical documents with R Markdown)

15 Change log and versioning

- `{fledge}` (to streamline the process of updating change logs and versioning R packages developed in git repositories)
- `{newsmd}` (utilities to add updates to the `NEWS.md` file)
- `{autonewsmd}` (to auto-generate change log using conventional commits)

Documentation quality

- `{docreview}` (to check quality of docs)
- `{spelling}` (to check for spelling mistakes)
- `{gramr}` (for grammar suggestions)

Logging

- `{logger}` (provides a flexible and extensible logging framework for R)
- `{loggit}` (effortless newline-delimited JSON logger, with two primary log-writing interfaces)
- `{log4r}` (logging in R based on the widely-emulated ‘log4j’ system and etymology)
- `{lgr}` (a flexible, feature-rich yet light-weight logging framework based on ‘R6’ classes)
- `{rsyslog}` (write messages to the ‘syslog’ system logger API)
- `{logging}` (pure R implementation of the ubiquitous ‘log4j’ package)
- `{lumberjack}` (to log changes in data)

Unit testing

16 Generic R Packages

- `{testthat}` (a testing framework for R that is easy to learn and use; also provides snapshot testing)
- `{patrick}` (for parameterized unit testing with `{testthat}`)
- `{testdat}` (a family of functions and reporting tools focused on checking of data)
- `{tinytest}` (zero-dependency unit testing framework that installs tests with the package)
- `{tinysnapshot}` (snapshots for unit tests using the `{tinytest}` framework)
- `{tinytest2JUnit}` (to convert `{tinytest}` output to JUnit XML needed by CI/CD)
- `{checkmate.tinytest}` (additional expectations for `{tinytest}` framework)
- `{RUnit}` (a standard unit testing framework, with additional code inspection and report generation tools)
- `{testit}` (a simple package for testing R packages)
- `{realtest}` (a framework unit testing that distinguishes between expected, acceptable, current, fallback, ideal, or regressive behaviours)

- `{roxytest}` (to inline `{testthat}` tests with `{roxygen2}`)
- `{doctest}` (to write `{testthat}` tests by adding `{roxygen2}` tags)
- `{exampletestr}` (tests based on package examples)
- `{roxut}` (to write the unit tests in the same file as the function)
- `{unitizer}` (simplifies regression tests by comparing objects produced by test code with earlier versions of those same objects)
- `{r-hedgehog}` (property based testing)
- `{autotest}` (automatic mutation testing of R packages)
- `{cucumber}` (an implementation of the [Cucumber testing framework](#) in R)
- `{quickcheck}` (provides property-based testing in `{testthat}` framework)

17 Web/database applications

- `{httptest}`/`{httptest2}` (a test environment for HTTP requests in R)
- `{webfakes}` (to fake web apps for HTTP testing)
- `{vcr}` (to record HTTP requests and responses on disk and replay them for the unit tests)
- `{dittodb}` (makes testing against databases easy)

18 Visual regression testing

- `{vdiff}` (for visual regression testing with `{testthat}`)
- `{gdiff}` (for performing graphical difference different package or R versions)

19 Mock testing

- `{mockthat}` (provides a way to mock package function for unit testing, while coping with S3 dispatch)
- `{mockr}` (provides a way to mock package function for unit testing)
- `{mockery}` (provides a way to mock package function for unit testing and can be used with any testing framework)

20 Mutation testing

- `{mutant}` (mutation testing for R)

21 Markdown documents

- `{pandoc}` (to check Markdown documents across various version of [Pandoc](#))

22 Shiny applications

- `{shinytest}` (testing Shiny apps)
- `{shinytest2}` (testing Shiny apps using a headless Chromium web browser)
- `{shinyloadtest}` (to load test deployed Shiny apps)

23 Helpers for testing frameworks

- `{testthis}` (RStudio addins for working with files that contain tests)
- `{xpectr}` (builds unit tests with the `{testthat}` package by providing tools for generating expectations)
- `{testdown}` (turn `{testthat}` results into a `{bookdown}` project)
- `{ttdo}` (provides ‘diff’-style comparison of R objects for `{tinymtest}` framework)

Code/Document Formatting

- `{styler}` (to format code according to a style guide)
- `{stylermd}` (to format text in Markdown documents)
- `{formatR}` (to format R source code)
- `{RFormatter}` (extension of `{formatR}` with slightly improved heuristics)
- `{grkstyle}` (extension package for `{styler}` that supports author’s personal code style preferences)
- `{codegrip}` (addin for RStudio IDE to reshape R code and navigate across syntactic constructs)

- `{BiocStyle}` (provides standard formatting styles for Bioconductor PDF and HTML documents)
- `AlignAssign` (RStudio addin that aligns the assignment operators within a highlighted area)
- `{snakecase}` (helpful for having consistent case while naming objects in the package)
- `{dotInternals}` (to distinguish non-exported package functions by prepending their names with a dot)

Code analysis

24 General

- `{codetools}` (code analysis tools for R)
- `{goodpractice}` (Swiss army knife for good practices)
- `{inteRgrate}` (provides an opinionated set of rules for R package development)
- `{checklist}` (to provide an elaborate and strict set of checks for R packages and R code)
- `{pkgcheck}` (checks if package follows good practices recommended for packages in the `rOpenSci` ecosystem)
- `{pkgstats}` (a static code analysis tool)
- `{rchk}` (provides several bug-finding tools that look for memory protection errors in C source code using R API)
- `{sourcetools}` (tools for reading, tokenizing, and parsing R code)
- `{precommit}` (git hooks for common tasks like formatting files, spell checking, etc.)

25 Code review

- `{PaRe}` (reviews other packages during code review by looking at their dependencies, code style, code complexity, and how internally defined functions interact with one another)

26 Code coverage

- `{covr}` (to compute code coverage)
- `{covrpage}` (to include summary README of code coverage and more detailed information about tests)
- `{covtracer}` (provides tools for contextualizing tests)

27 Code quality

- `{lintr}` (static code analysis)
- `{flint}` (to fix lints found by `{lintr}`)
- `{roxygenlint}` (to lint `{roxygen2}`-generated documentation)
- `{checkglobals}` (to check R-packages for globals and imports)
- `{CodeDepends}` (analysis of R code for reproducible research and code view)
- `{adaptalint}` (infer code style from one package and use it to check another)
- `{box.linters}` (linters for `{box}` modules)
- `{roger}` (provides tools for grading the coding style and documentation of R scripts)
- `{cleanr}` (tests code for some of the most common code layout flaws)

28 Code complexity

- `{cyclocomp}` (to index the complexity of a function)
- `{pkgGraphR}` (to visualize the relationship between functions in an R package)

29 Code similarity

- `{dupree}` (identifies code blocks that have a high level of similarity within a set of R files)
- `{rscc}` (provides source code similarity evaluation by variable/function names)
- `{SimilaR}` (quantifies the similarity of the code-base of R functions by means of program dependence graphs)

30 Compiled code

- `{memtools}` (to solve memory leaks)
- `{sanitizers}` (to test for memory violations and other undefined behaviour)
- `{cppcheckR}` (to check C and C++ code using `Cppcheck`)

31 JavaScript code

- `{jshintR}` (to run `JSHint` for static code analysis for JavaScript code included in the package)

32 Lines of code

- `{cloc}` (counts blank lines, comment lines, and physical lines of source code in source files)

Refactoring

- `{refactor}` (to check speed and performance of both the original and refactored version of code)

Code performance

33 Benchmarking

- `{bench}` (provides high precision benchmarks for R expressions)
- `{microbenchmark}` (infrastructure to accurately measure and compare the execution time of R expressions)
- `{tictoc}` (functions for timing R scripts)
- `{touchstone}` (to benchmark pull requests)
- `{benchmarkme}` (to crowd-source system benchmarking)
- `{comparer}` (to compare the results of different code chunks)

34 Profiling

- `{profvis}` (to profile and visualize profiling data)
- `{proffer}` (to create friendlier, faster visualizations for profiling data)
- `{jointprof}` (to profile packages with native code in C, C++, Fortran, etc.)
- `{xrprof}` (an external sampling profiler)

Reproducible Environments

35 Package management

- `{renv}` (to create project-local environments)
- `{rix}` (to create reproducible data science environments using the Nix package manager)
- `{bspm}` (to enable binary package installations via Linux distribution's package manager)
- `{rspm}` (to access [Posit Public Package Manager](#) for binary package installations on Linux)
- `{groundhogr}` (to load packages and their dependencies as available on chosen date on CRAN)

36 Containerization

- `{containerit}` (to package R script/session/workspace and all dependencies as a **Docker** container by generating a suitable **Dockerfile**)
- `{dockerfiler}` (to generate **Dockerfile** for R projects)
- `{pracpac}` (a `{usethis}`-like interface to create Docker images from R packages under development)
- `{usethat}` (to automate analytic project setup tasks)

Dependency Management

- `{pkgdepends}` (to find recursive dependencies of from various sources)
- `{deepdep}` (to visualize and explore package dependencies)
- `{itdepends}` (to assess usage, measure weights, visualize proportions, and assist removal of dependencies)

- `{DependenciesGraphs}` (to visualize package dependencies)
- `{DependencyReviewer}` (to investigate packages during code review by looking at their dependencies)
- `{pkgdepR}` (to visualize dependencies between functions for a group of R packages)
- `{deps}` (to manage source code dependencies by decorating R code with roxygen-style comments)
- `{pkgnet}` (to build a graph representation of a package and its dependencies)
- `{functiondepends}` (to find functions in an unstructured directory and explore their dependencies)
- `{pkgndep}` (checks the heaviness of the packages used)
- `{attachment}` (to deal with package dependencies during package development)

CRAN/Bioconductor checks

- `{rcmdcheck}` (to run R CMD check from R programmatically)
- `{BiocCheck}` (to run Bioconductor-specific package checks)
- `{rhub}` (to run R CMD check on CRAN architectures)
- `{checked}` (systematically run R CMD check against multiple packages)
- `{checkhelper}` (to help avoid problems with CRAN submissions)
- `{extrachecks}` (to run some additional CRAN checks)
- `{foghorn}` (to check for results and submission portal status)
- `{urlchecker}` (to checks for URL rot)

Usage

- `{cranlogs}` (for computing CRAN download counts)
- `{packageRank}` (for visualizing CRAN download counts)
- `{Visualize.CRAN.Downloads}` (to visualize CRAN downloads)
- `{dlstats}` (provides download statistics for packages)

CI/CD

CI/CD: continuous integration and either continuous delivery or continuous deployment

- `actions` (provides [GitHub Actions](#) relevant for R)
- `{gha}` (Useful functions for GitHub Actions)

- [actions-sync](#) (to manage GitHub Actions workflows across repositories)
- [{rworkflows}](#) (GitHub Actions to automates testing, documentation website building, and containerized deployment)
- [AzureR](#) (a family of packages for working with [Azure](#) from R)
- [r-appveyor](#) (for [AppVeyor](#))
- [{tic}](#) (for [Circle CI](#) and [GitHub Actions](#))
- [{circle}](#) (for [Circle CI](#))
- [{jenkins}](#) (for [Jenkins CI](#))
- [{cronR}](#) (to schedule R scripts/processes with the cron scheduler)

Security/Privacy

- [{gpg}](#) (GNU privacy guard for R)
- [{oystere}](#) (to secure package against insecure dependencies)

Build systems

- [{fakemake}](#) (to mock Unix Make build system in case it is unavailable)

Debugging

- [{debugme}](#) (provides helpers to specify debug messages as special string constants, and control debugging of packages via environment variables)
- [{debugr}](#) (tools to print out the value of R objects/expressions while running an R script)
- [{winch}](#) (provides stack traces for call chains that cross between R and C/C++ function calls)
- [{flow}](#) (to visualize as flow diagrams the logic of functions, expressions, or scripts, which can ease debugging)
- [{boomer}](#) (provides debugging tools to inspect the intermediate steps of a call)

Input validation

37 Function argument validation

- `{chk}` (to check user-supplied function arguments)
- `{checkmate}` (fast and versatile argument checks)
- `{assertthat}` (to declare the pre and post conditions that your code should satisfy and to produce friendly error messages)
- `{assertive}` (provides readable check functions to ensure code integrity)
- `{valaddin}` (functional input validation)
- `{dreamerr}` (to check the arguments passed to a function and to offer informative error messages)
- `{erify}` (to check arguments and generate readable error messages)

38 Data validation

- `{assertr}` (to verify assumptions about data early)
- `{ensurer}` (to ensure values are as expected at runtime)
- `{validate}` (to check whether data lives up to expectations based on the domain-specific knowledge)

Package metadata

- `{codemetar}` (provides utilities to generate, parse, and modify `codemeta.jsonld` files automatically for R packages), or `{codemeta}` (a leaner version of `{codemetar}`)
- `{cffr}` (provides utilities to generate, parse, modify and validate `CITATION.cff` files automatically for R packages)
- `{citation}` (creates `CITATION.cff` from R package metadata)
- `{pkgapi}` (to create the map of function calls in a package)
- `{riskmetric}` (provides a collection of risk metrics to evaluate the quality of R packages)
- `{packagemetrics}` (for comparing among packages)
- `{devtoolbox}` (to create a summary report for R package and to extract dependency statistics in a tidy data frame)
- `{pkgattr}` (useful for getting information on the contents of any R package)
- `{foreman}` (for unpacking, interrogating and subsetting R packages)

- `{sessioninfo}` (to include R session information)

Reverse dependency checks

- `{revdepcheck}` (for automated, isolated, reverse dependency checking)
- `{xfun}` (specifically, `xfun::rev_check()`)

Gratitude

To thank the contributors or maintainers of packages you rely on.

- `{thankr}` (to find out who maintains the packages you are using)
- `{allcontributors}` (to help acknowledge all contributions)

Integration with other languages

39 C++

- `{Rcpp}`
- `{cpp11}`

40 Fortran

- `{RFI}`

41 Python

- `{reticulate}`

42 Rust

- `{rextendr}`
- `{cargo}`
- `{hellorust}`

43 .NET Framework

- `{rClr}`

44 JavaScript/HTML/CSS

- `{htmltools}`
- `{packer}`

45 Julia

- `{JuliaCall}`

Upkeep

- `{TODOr}` (RStudio addin to list things that you need to do or change)

Sundry

- `{lazyData}` (supplies a lazy data loading for packages with datasets that do not provide `LazyData: true`)
- `{pkglite}` (tools to represent and exchange R package source code as text files)
- `{gpttools}` (RStudio addin that allows using `chatGPT` to automate writing documentation, tests, etc.)
- `{rfold}` (to work with many R folders within an R package)
- `{many}` (to create R packages from many directories)
- `{prefixer}` (prefix function with their namespace)
- `{onetime}` (for package authors to run code only once for a given user on a given computer)
- `{rstudioapi}` (to conditionally access the RStudio API from CRAN packages)
- `{rcheology}` (to access data on base packages for previous versions of R)
- `{gitignore}` (to fetch gitignore templates)
- `{DIZutils}` (helpers for packages dealing with database connections)
- `{dang}` (Miscellaneous utilities for CRAN packages)

Session information

Session details

```
- Session info -----
setting  value
version  R version 4.4.2 (2024-10-31)
os       Ubuntu 24.04.1 LTS
system   x86_64, linux-gnu
hostname  fv-az790-55
ui       X11
language (EN)
collate   C.UTF-8
ctype     C.UTF-8
tz        UTC
date      2025-01-12
pandoc    3.6.1 @ /opt/hostedtoolcache/pandoc/3.6.1/x64/ (via rmarkdown)
quarto    1.7.9 @ /usr/local/bin/quarto

- Packages -----
package    * version      date (UTC) lib source
base       * 4.4.2        2024-11-07 [3] local
cli        3.6.3        2024-06-21 [1] RSPM
clipr      0.8.0        2022-02-22 [1] RSPM
compiler   4.4.2        2024-11-07 [3] local
datasets   * 4.4.2        2024-11-07 [3] local
desc       1.4.3        2023-12-10 [1] RSPM
details    * 0.3.0        2022-03-27 [1] RSPM
digest     0.6.37       2024-08-19 [1] RSPM
evaluate   1.0.3        2025-01-10 [1] RSPM
fastmap    1.2.0        2024-05-15 [1] RSPM
graphics   * 4.4.2        2024-11-07 [3] local
grDevices  * 4.4.2        2024-11-07 [3] local
grid       4.4.2        2024-11-07 [3] local
htmltools  0.5.8.1      2024-04-04 [1] RSPM
httr       1.4.7        2023-08-15 [1] RSPM
jsonlite   1.8.9        2024-09-20 [1] RSPM
knitr      1.49         2024-11-08 [1] RSPM
magrittr   2.0.3        2022-03-30 [1] RSPM
methods    * 4.4.2        2024-11-07 [3] local
png        0.1-8        2022-11-29 [1] RSPM
R6         2.5.1        2021-08-19 [1] RSPM
```

| | | | | |
|-------------|------------|------------|-----|--|
| rlang | 1.1.4 | 2024-06-04 | [1] | RSPM |
| rmarkdown | 2.29 | 2024-11-04 | [1] | RSPM |
| sessioninfo | 1.2.2.9000 | 2025-01-12 | [1] | Github (r-lib/sessioninfo@37c81af) |
| stats | * 4.4.2 | 2024-11-07 | [3] | local |
| tools | 4.4.2 | 2024-11-07 | [3] | local |
| utils | * 4.4.2 | 2024-11-07 | [3] | local |
| withr | 3.0.2 | 2024-10-28 | [1] | RSPM |
| xfun | 0.50 | 2025-01-07 | [1] | RSPM |
| xml2 | 1.3.6 | 2023-12-04 | [1] | RSPM |
| yaml | 2.3.10 | 2024-07-26 | [1] | RSPM |

[1] /home/runner/work/_temp/Library

[2] /opt/R/4.4.2/lib/R/site-library

[3] /opt/R/4.4.2/lib/R/library

* -- Packages attached to the search path.
