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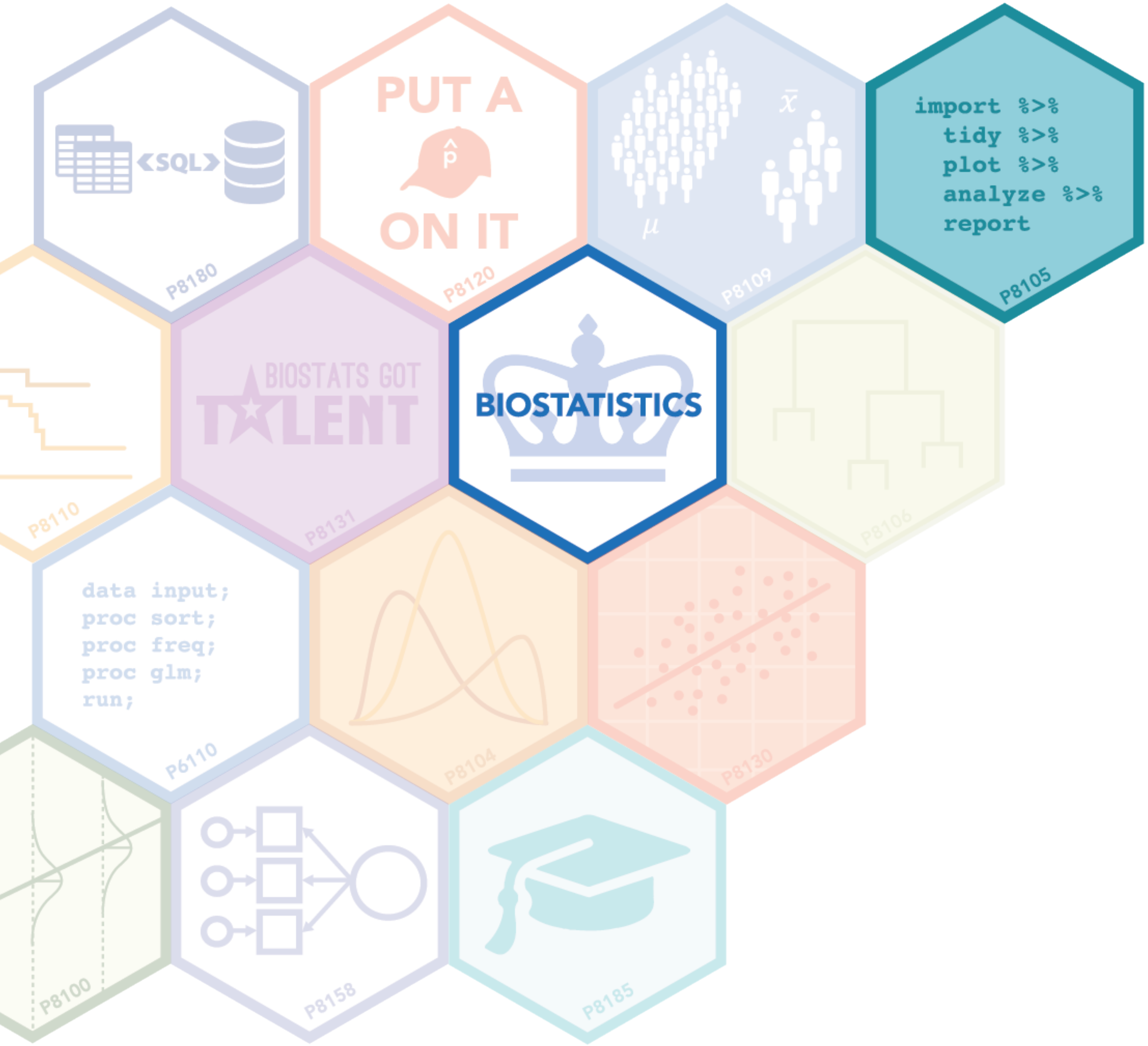

WRITING R PACKAGES

PART II

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What is a package?

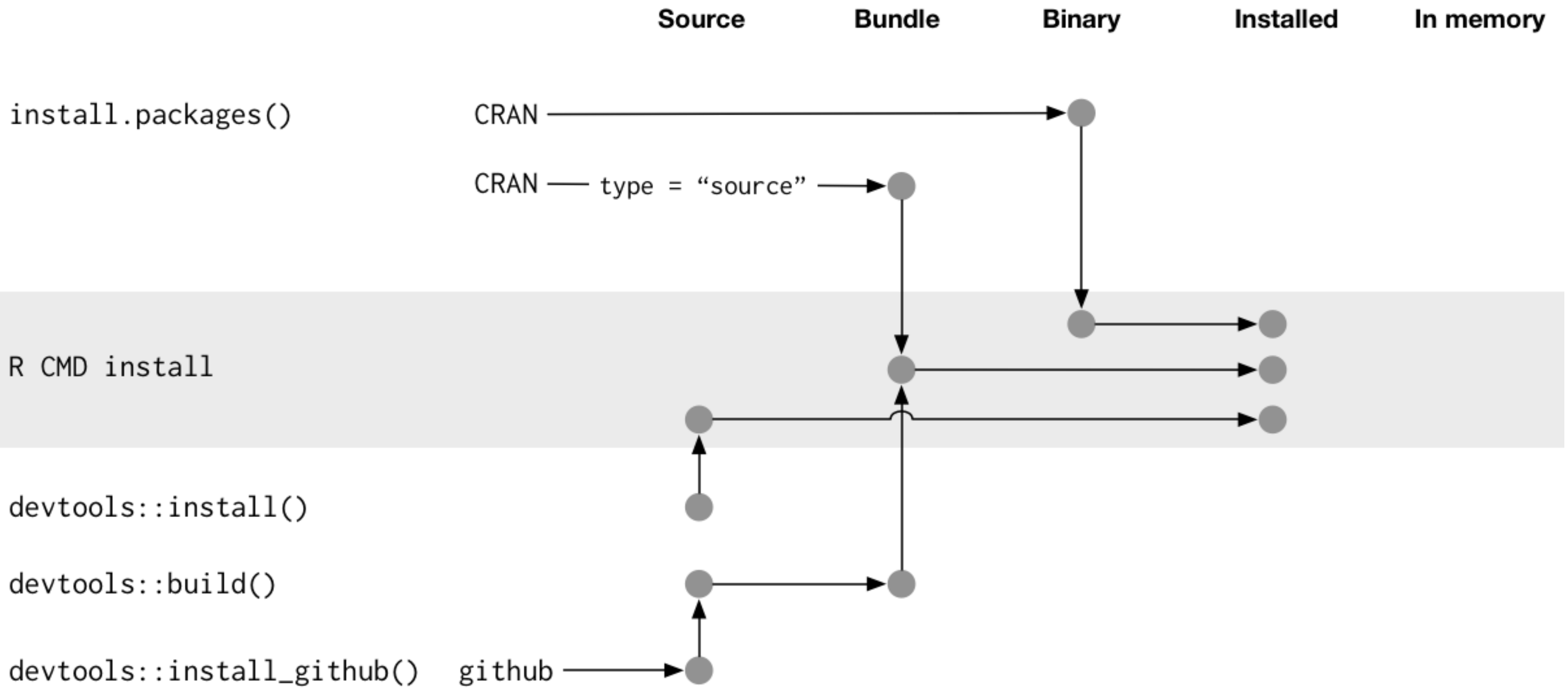
- Collection of related functions, with helpful documentation, written to stand alone
- Can also include data, vignettes, non-R code (e.g. C++), tests, …

What is a package?

- Package can exist as:
  - Source (what we’ve written)
  - Bundle (modified and zipped version of what we’ve written)
  - Binary (system-specific format used by CRAN)

Package types

- Which version you share depends on how it will be installed



Hadley Wickham's R Packages

Install vs attach

- "Installation" takes a source / bundle / binary and embeds in it your package library, making it available to R
  - The path to your package library can be found using `.libPaths()`
  - Various functions can be used for installation

- "Attaching" takes an installed package from your library and places it in R's search path so that you can find the functions it includes
  - The somewhat-unfortunately-named `library()` function attaches packages

- This distinction is why we "Install and Restart" when building packages to include edits changes in the package attached by `library()`

Search path

- When you attach a package using `library()` you add it to the search path
- The search path is where R looks for functions
  - First stop: global environment
  - Next up: attached packages

- If a function doesn't exist in the global environment or attached packages, you can't run it directly

- You can avoid attaching a package by using `package::function()`, because this tells R specifically where to look
  - This is preferred in cases where there might be name conflicts

- Search paths are important for using R in general; they matter even more when you're developing a package

NAMESPACE

- Your package's search path is controlled by the `NAMESPACE` file in your documentation
  - Packages imported by the `NAMESPACE` are in your package's search path
  - Code in your package can access functions in imported packages directly, just as you would in usual code after attaching a package

- This file is edited by roxygen, and reflects the packages you import using `@import`
- This also reflects the functions you export using `@export`; that is, which functions are visible to users when your package is attached

Imports and Exports

- Why not import everything?
  - Packages often have functions with the same name
  - Importing everything increases the chance of a name conflict, which makes function calls ambiguous
  - This is also why you should only attach packages you need, and use `package::function()` in your code and packages

- Why not export everything?
  - To help prevent name conflicts!

Checks

- There’s a lot to keep track of when writing a package
- You will make mistakes
  - In code
  - In documentation
  - In namespace
  - In examples

- check() automatically runs a wide range of checks on your package
- When it finds issues (and it will), fix them!
  - Improves code consistency
  - Updates documentation
  - Keeps package self-contained

Tests

- Checks are the same for every package
  - These focus on common issues

- Tests are package-specific
  - These make sure that the functions produce expected output

- Writing tests formalizes the ad hoc code you try on your package as you develop it
  - The `testthat` package facilitates this process
  - Basically, you write code with expected results and test that the results match your expectations

Vignettes

- Function-level documentation is good for quick references
  - Check argument names and allowed values
  - Understand output
  - Find easy examples
- This is helpful if users already mostly know what's going on

- You need longer documentation to give a package overview
  - What problem you solve
  - How functions work together
  - Non-trivial examples

- Vignettes are this long-form documentation
  - … written in R Markdown!
  - You don't even have to learn anything new …

Other topics

- There’s a lot of stuff we won’t touch on, but matters for development
  - Including data
  - Documenting data
  - Including compiled code (e.g. C / C++)
  - Continuous integration / automated checking
  - Deployment on CRAN
  - Backward compatibility