Making your R-based research project portable

Introduction to the {renv} package

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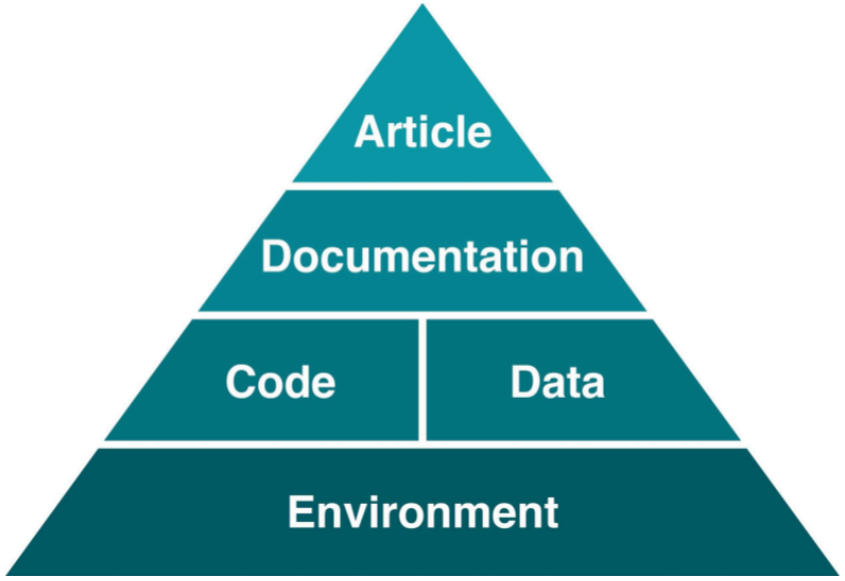
Outline

- All about environments
- System dependencies management
- Project-local R dependencies management

All about environments



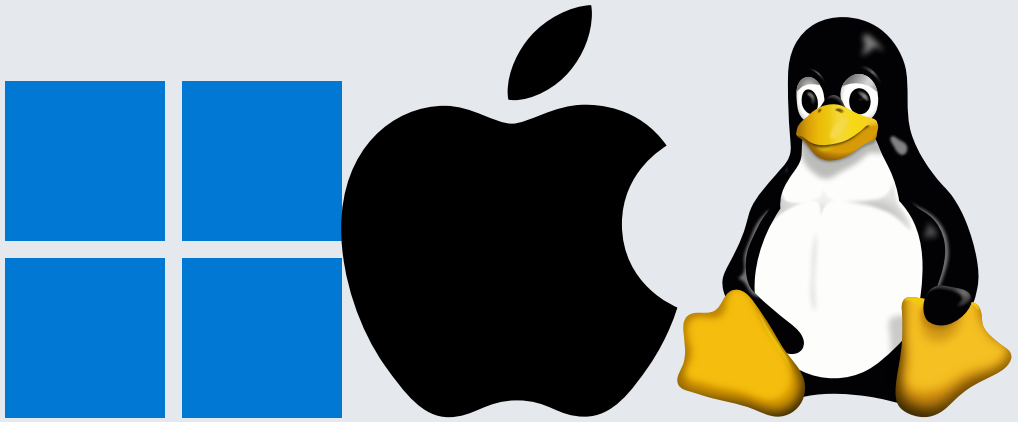
Portability of an R workflow will depend on reproducibility of its related environments

No one cares what operating system you run as long as it stays up.

Bruce Perens

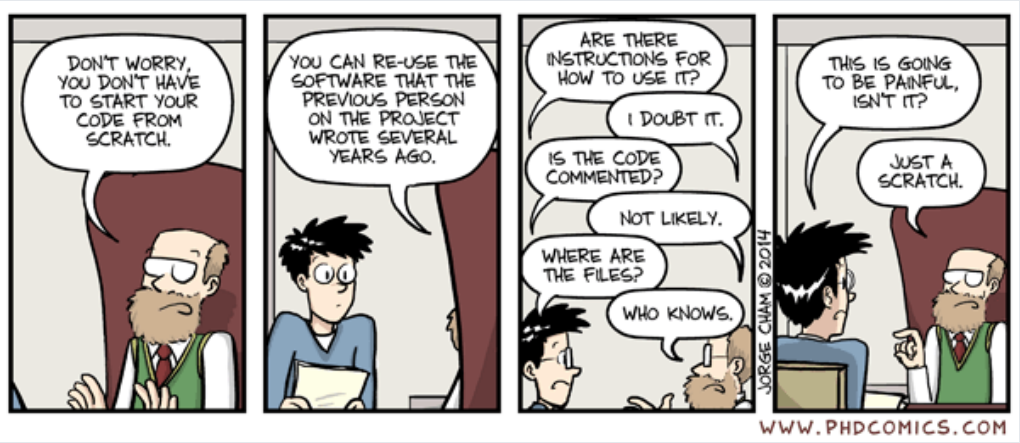
created the defintion of Open Source and wrote the first manifesto of Open Source

Different systems, different requirements



- each operating system (and each of its versions) may/will require specific dependencies in order to install R
- each operating system (and each of its versions) may/will require specific dependencies in order to install some R packages

System dependencies management

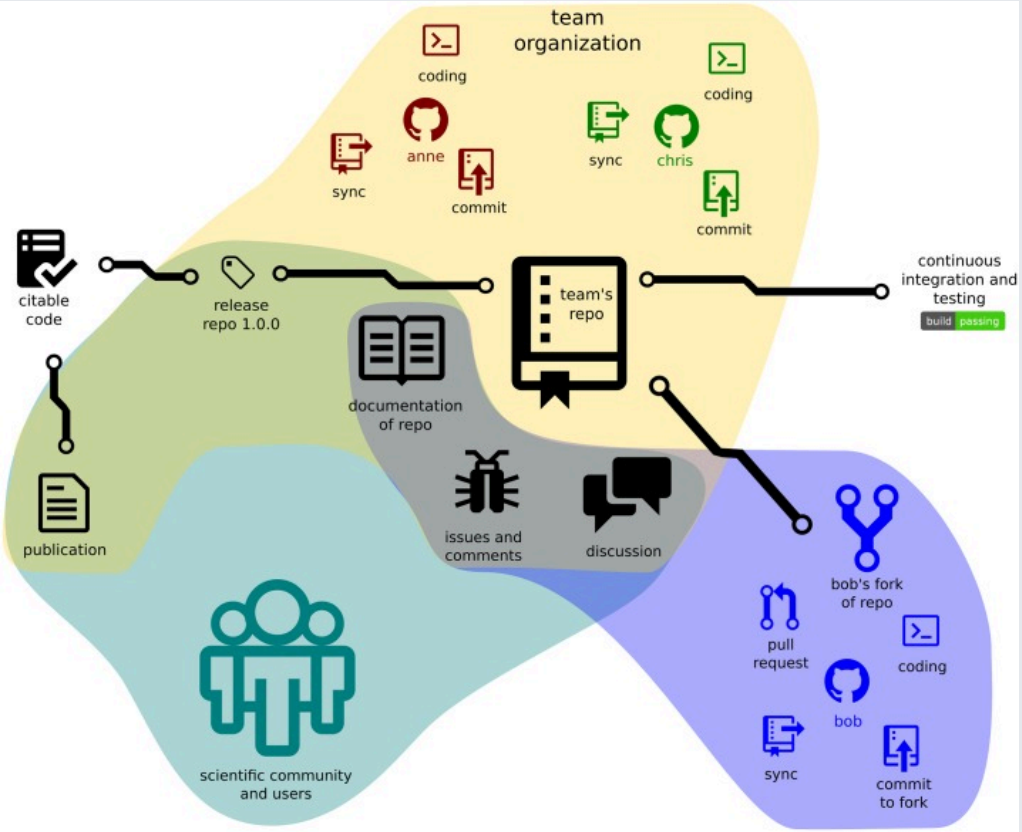


- solutions/approaches will depend on your use case but the most universal step is **documentation**
- **Supervisor-supervisee** or **small research team** settings - establish compatibility guidelines between members and document system requirements for each project;
- **Medium to largish research team** settings
    - use turn-key solutions that standardise R setup using cloud-based or software-as-a-service (SaaS) solutions (e.g., RStudio Cloud); or,
    - setup machines used to be consistent with team's R workflow system requirements through containerisation (e.g., Docker)

Using containers via Docker

- **Containers** are standardised units of packaged software that have everything the software needs to run including libraries, system tools, code, and runtime.
- **Containers** can be deployed either onto remote machines or onto a local machine using Docker
- Rocker is a community-organised and community-maintained hub of Docker containers that are pre-built and specified with different variants and configurations of R for various operating systems and for various types of R workflows e.g., base, RStudio, spatial analysis, machine learning, etc.
- Containers support portability because we are able to "carry" with us almost any operating system + R configuration that we might need in our R workflows

Project-local R dependencies management



- The more people collaborate on code and R workflows, the higher the chances that R package dependencies will increase
- The more complex the type of R analysis workflow that is being implemented, the higher the chances that R package dependencies will increase
- Management of R dependencies will be critical in ensuring portability
- The `{renv}` package facilitates this R dependencies management

The {renv} package

- Initialise a new project-local environment with a private R library;
- Work in the project as normal, installing and removing new R packages as they are needed in the project;
- Save the state of the project library to the lockfile;
- Continue working on your project, installing and updating R packages as needed; and,
- Again save the state of your project library if your attempts to update R packages were successful, or restore to a previous state as encoded in the lockfile if you encounter problems updating a package.

Questions?

Thank you!

Slides can be viewed at https://oxford-ihtm.io/open-reproducible-science/session10.html

PDF version of slides can be downloaded at https://oxford-ihtm.io/open-reproducible-science/pdf/session10-portable-r-projects.pdf

R scripts for slides available here