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Proposal Title

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Signatories

Project team

- Philipp Baumann
- Justin Bedő
- László Kupcsik
- Bruno Rodrigues

Contributors

- Philipp Baumann
- Justin Bedő
- László Kupcsik
- Bruno Rodrigues

Consulted

- Amanda L. Martin
- Josiah Parry

The Problem

An example in-text citation ([Wickham 2016](#)).

The proposal

Overview

We propose to strengthen reproducibility for the R community by ensuring that all CRAN and Bioconductor packages are available as prebuilt binaries through Nix, a package manager with reproducibility as a design goal. While Nix already supports multiple package versions, per-project environments, and cross-platform compatibility, many R packages still require building from source. Our project addresses this gap by funding dedicated hardware that the NixOS Foundation will use to build and distribute R package binaries.

This effort will provide researchers, data scientists, and statisticians with reliable, reproducible environments, simplify collaborative workflows, and enhance continuous integration practices. By making this targeted investment, we deliver a concrete, practical improvement to the R ecosystem's reproducibility and stability, benefiting the community immediately without requiring major infrastructure changes.

Detail

Our proposal aims to extend the power of Nix, a package manager designed for reproducible builds, to fully support CRAN and Bioconductor for R. Nix already enables seamless installation of multiple package versions and per-project development environments across different operating systems and architectures. While CRAN and Bioconductor are partially available through Nix today, many packages still need to be compiled from source. Our goal is to cover the entire repositories—including historical versions—so that the R community can rely on complete reproducibility and long-term stability.

To achieve this, we will invest in dedicated hardware and produce clear documentation, lowering the barriers for R users and making reproducible environments more accessible. This initiative will benefit researchers, data scientists, and statisticians alike, while improving collaborative workflows and continuous integration practices across platforms.

The minimum viable product is straightforward. The NixOS Foundation already operates a build farm that compiles binaries for nearly all of the 120,000 packages available through Nix. Our proposal is to purchase additional hardware and donate it to the NixOS Foundation, which would then integrate it into their existing infrastructure to build R package binaries at scale.

We have already confirmed with the NixOS Foundation that they are open to this arrangement. The main question is whether we should purchase and donate the hardware directly, or transfer the funds to the NixOS Foundation so they can acquire the equipment themselves, which would be a simpler and more effective approach.

In short, this project delivers a practical, community-oriented solution to the persistent challenges of managing R packages across diverse environments. By ensuring consistency, reliability, and reproducibility, it strengthens the foundation for R's long-term growth and collaborative potential.

Project plan

Start-up phase

Technical delivery

Other aspects

Requirements

People

The people involved are the current maintainers of the R programming language for Nix, namely:

- Philipp Baumann
- Justin Bedő
- László Kupcsik
- Bruno Rodrigues

From the NixOS Foundation's side, we have taken up contact with:

- Ron Efroni
- Ryan Trinkle

Processes

The process should:

- establish a formal commitment with the NixOS Foundation to ensure that any purchased hardware will be dedicated to building R package binaries,
- secure funding, and either forward it to the NixOS Foundation for hardware acquisition or purchase the hardware directly and donate it.

Tools & Tech

x86_64 Linux Servers

To build and serve binaries at scale, we will require at least one high-performance x86_64 server. A typical configuration would be:

- CPU: Dual Intel Xeon Gold or AMD EPYC processors, 32–64 cores total
- RAM: 256–512 GB ECC memory
- Storage: 4–8 TB NVMe SSD
- Networking: 10 Gbit Ethernet or better (to sync with the build farm)
- Redundancy: Hot-swappable drives, redundant PSUs for reliability

Such a machine provides the compute and memory required to build thousands of R packages quickly, while integrating smoothly with the existing NixOS build infrastructure.

macOS (aarch64-darwin) Builders

For macOS binary coverage, we will provide two Apple Mac Minis (M4 generation or latest available at purchase). A Mac Mini (as of 2025) typically includes:

- CPU: Apple M4 Pro or M4 Max SoC
- GPU: Integrated 16–40 core GPU
- RAM: 128 GB unified memory
- Storage: 1 TB SSD (or more, but 1 TB is likely enough)
- Networking: Built-in 10 Gbit Ethernet option

Two Mac Minis will be deployed in parallel to provide sufficient capacity and redundancy for macOS builds, ensuring timely binary availability for aarch64-darwin users.

Funding

Estimated cost: ~10'000 EUR: - 2500 EUR for each Mac mini - 5000 EUR for the Linux server

Summary

This project requires modest investment in hardware and formal coordination with the NixOS Foundation. By dedicating a small cluster of Linux servers and Mac Minis to building R package binaries, we can provide full binary coverage for CRAN and Bioconductor within Nix. The total cost of around 10'000 EUR covers both the purchase and donation of this hardware. Once integrated into the existing NixOS build farm, the infrastructure will serve the entire R community by ensuring reproducibility, faster package installation, and reliable support across Linux and macOS platforms.

Success

Definition of done

Measuring success

Future work

Key risks

Wickham, Hadley. 2016. *Ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York.
<https://ggplot2.tidyverse.org>.