

Thesis
B.Sc.

IDP,
Guided
Research

Reproducible Re- search Infrastructure with NixOS

Motivation

We have several hardware testbeds which are used by chair staff and students to conduct measurements and experiments with network systems. An important property of scientific research is the ability to easily reproduce its results. This is especially hard to achieve when research results deal with networked systems that involve a complex stack of hardware and software components.

Our approach to reproducible research usually involves our system called Plain Orchestration Service (`pos`). It has functionality to schedule access to the hardware, manage the nodes (booting, OS), configuring test parameters, executing the experiments and storing the resulting artifacts.

Recently new declarative approaches to software configuration and package management appeared, giving a much more tighter control about how a software should be executed than just specifying a Linux distribution and a shell script. The operating system NixOS with its functional package manager Nix provides such functionality.

It would therefore be interesting to integrate support for NixOS into our chair infrastructure. The goal is to be able to boot arbitrary system configurations with our existing CLI-tools.

Your Profile

- You should be familiar with Linux
- Interested to work on reproducible research infrastructure
- **Plus:** Experience with Shell scripting, Python and Nix

Your Tasks

- Learn `nix` and how `pos` works, especially how images are built and booted.
- Build a NixOS image for our testbed.
- Implement the process to apply NixOS configurations with the `pos` tools.
- Conduct a fully reproducible simple network measurement.

Literature

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- [2] E. Dolstra and A. Löhn. Nixos: A purely functional linux distribution. *SIGPLAN Not.*, 43(9):367–378, Sept. 2008.
- [3] S. Gallenmüller, D. Scholz, F. Wohlfart, Q. Scheitle, P. Emmerich, and G. Carle. High-Performance Packet Processing and Measurements (Invited Paper). In *10th International Conference on Communication Systems & Networks (COMSNETS 2018)*, Bangalore, India, Jan. 2018.
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