y|sndr

Introduction to Nix

Functionally pure package management for deterministic artifacts and more

DevOps @ KTH

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What is this Nix?

It's difficult...

1. A programming language
2. A package manager
3. An operating system
4. A full ecosystem of tools

What the Nix?

Nix, the package manager

- packages/artifacts in nix: *Derivations*
- Defined as pure functions

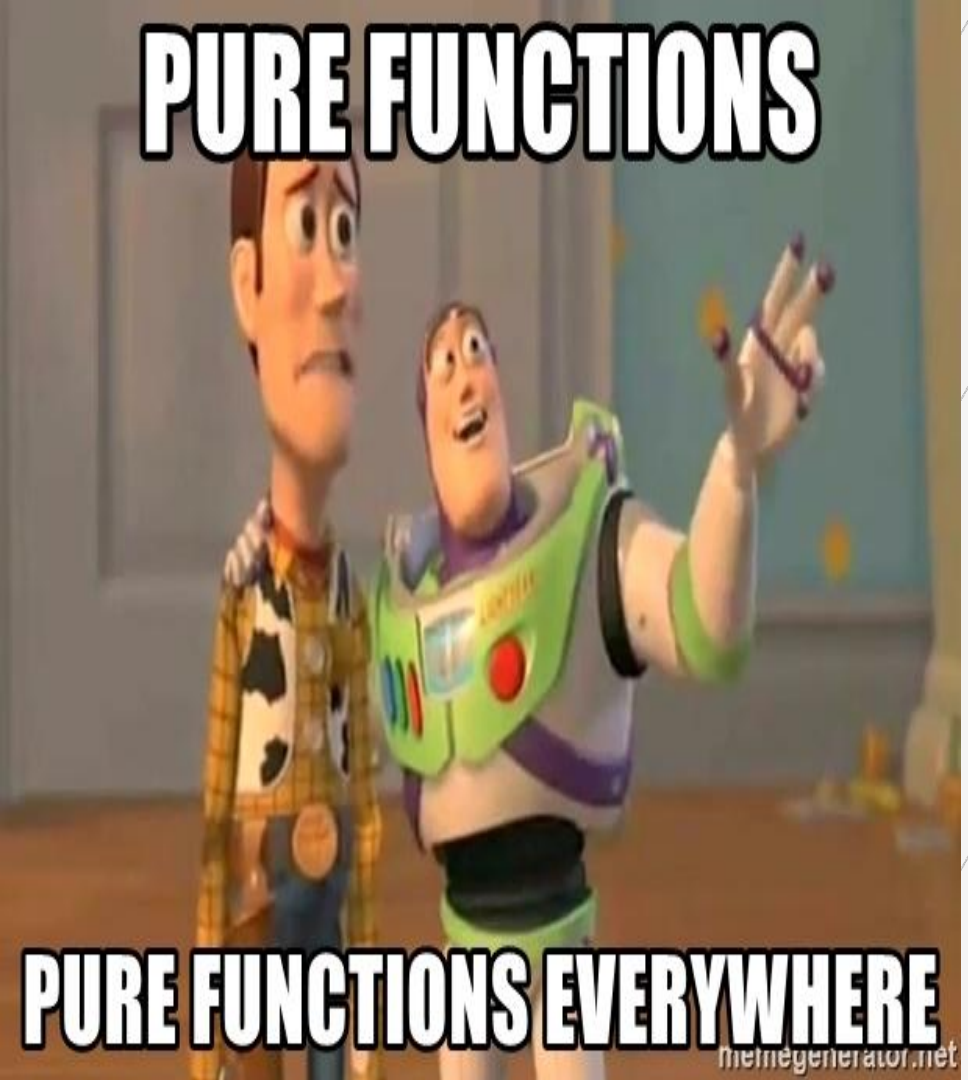
Arguments: Dependencies
Function definition: Build steps
Return value: Build result

```
{ lib, fetchFromGitHub, stdenv, autoreconfHook
, ncurses, IOKit
}:

stdenv.mkDerivation rec {
  pname = "htop";
  version = "3.0.5";

  src = fetchFromGitHub {
    owner = "htop-dev";
    repo = pname;
    rev = version;
    sha256 = "sha256-9zecDd3oZ24RyOLnKdJmR29Chx6S24Kvuf/F7RYzl4I=";
  };

  nativeBuildInputs = [ autoreconfHook ];

  buildInputs = [ ncurses
  ] ++ lib.optionals stdenv.isDarwin [ IOKit ];

  meta = with lib; {
    description = "An interactive process viewer for Linux";
    homepage = "https://htop.dev";
    license = licenses.gpl2Only;
    platforms = with platforms; linux ++ freebsd ++ openbsd ++ darwin;
    maintainers = with maintainers; [ rob relrod ];
  };
}
```

arguments

Function definition

Did you say Pure functions?!



Yes :)

- Immutable inputs
- Immutable outputs
- Derivation instructions, dependencies and sources are hashed to into a single identifier
- *Turing Complete*

How does that work

`/nix/store/47kr83pgj3k2zgy7p46354mr42gdb0sl-tree-1.8.0`

The `ro` nix store, contains **all** *built* derivations
It is also the single thing heavier than `node_modules`

The aforementioned hash value of **one specific** instantiation of the `tree` program

Information for *human*

Contents of a built result

Resembles `/usr` folder in Linux Filesystem Hierarchy Standard (FHS)

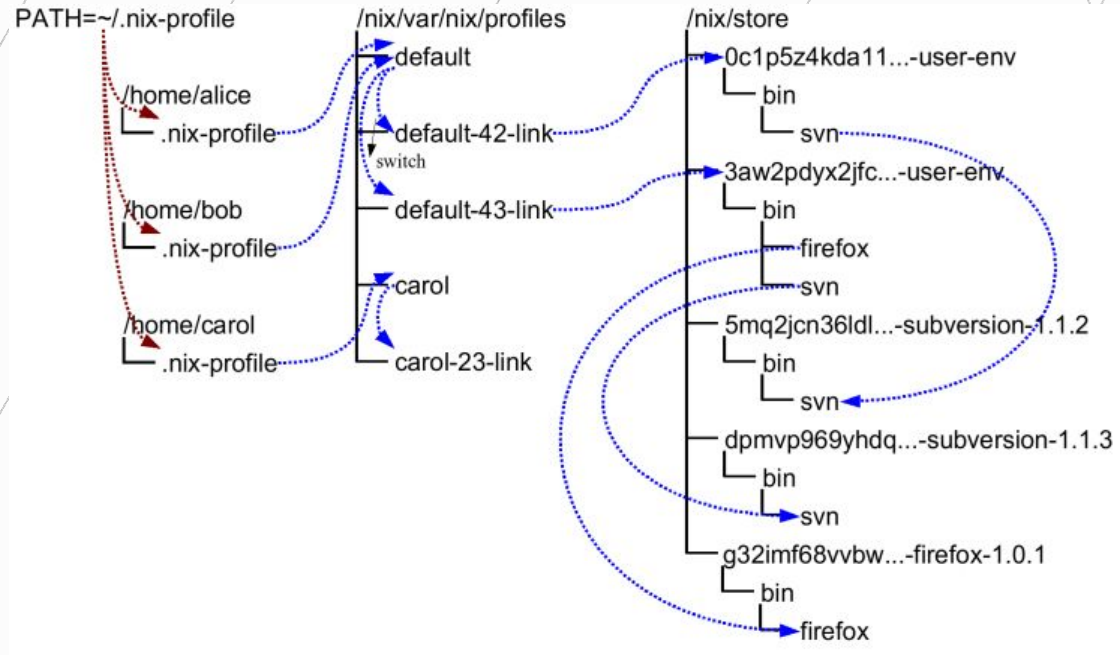
```
/nix/store/25hn ... ppn5-neuropil
├── include
│   ├── neuropil.h
│   ├── neuropil_attributes.h
│   └── neuropil_data.h
└── lib
    ├── libneuropil.a
    └── libneuropil.dylib
```

ceci n'est pas un package manager

Package *Management*

Installing derivations creates a sophisticated graph of links

Binaries **linked** to into a folder on the user's $PATH



What Else?

Nixpkgs

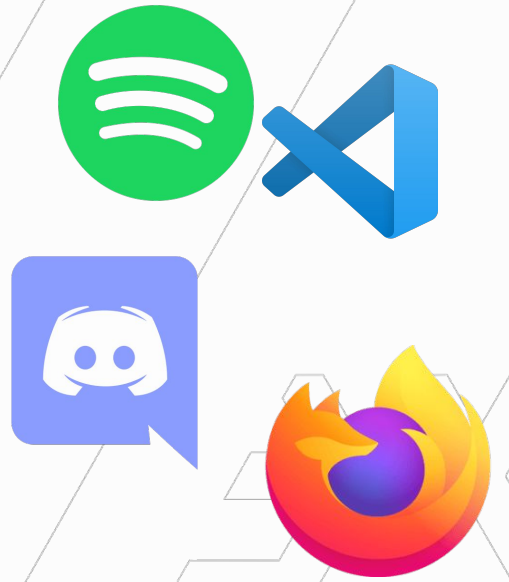
- The nixpkgs repo contains all available packages
- 80.000 and counting
- Automatized updates

Development Shells

- **Virtual Environments**
- Define Programs, libraries, environment variables
- Can be loaded automatically (direnv)

Declaratively installed Software

- Define what **should** be installed
- Nix takes care of installing providing programs
- NixOS and home-manager



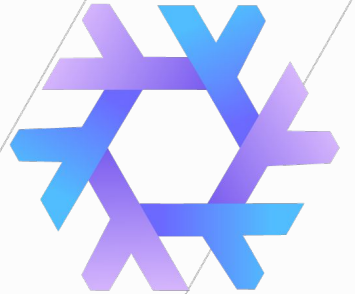
Declaratively configured Services

- Configure Servers and Daemons in one single place
- Nix Implementation writes config files
- NixOS and home-manager

elasticsearch

Let's Encrypt

NixOS



NixOS

- A complete operating system built entirely on Nix
- Configure almost anything declaratively
- Users, Services, Hardware, Network, etc
- Reversible configurations

DevOps?

Nix as a DevOps tool

- Pure builds, push proven packages to servers
- Minimally disruptive updates
- Integration with Testing pipeline hydra or Hercules CI
- NixOps to deploy and provision many servers at once

Nix combines: **Building,** *Testing*, ***Deploying*** *Packages*, and deployment of full reversible systems


SHUT UP AND
TAKE MY MONEY!

Thank you!