

NIXOS

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NIXOS

*“Reproducible builds and
deployments.”*



By Tim Cuthbertson CC BY 4.0, <https://nixos.org>

FEATURES

Nix Package Manager

- >60k packages
- many ecosystems
Java, JS, Rust, Haskell...
- reproducible
- idempotent

```
$ nix-shell --packages jdk
```

Nix Language

- Declarative
- Functional
- No mutation
- No side-effects

```
mkDerivation {  
  name = "myProject-1.0.0";  
  src = ./src;  
  buildInputs = [ maven jdk ];  
}
```

NIX LANGUAGE

HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)



By <https://xkcd.com/927/> CC BY-NC 2.5

NIX LANGUAGE

Pure, Functional, Lazy

- Strings "hello"
- Numbers 42
- List [1 2 3]
- Expressions 1+2+3
- Attribute Sets { }
- Functions f x

ATTRIBUTE SET

```
{  
  name = "myProject-1.0.0";  
  src = ./src;  
  buildInputs = [ maven jdk ];  
  ...  
}
```

Assignment:

```
three = 3;  
myDerivation = { name = "myProject-1.0.0"; src = ... }  
myName = myDerivation.name;
```

FUNCTIONS

Math

```
f :  $\mathbb{R} \rightarrow \mathbb{R}$   
f(x) = 2x
```

Typescript

```
const f = x => 2x  
f(3)
```

```
const g = (x, y) => x+y  
g(3, 4)
```

Nix

```
f = x: 2*x  
f 3
```

```
g = x: y: x+y  
g 3 4
```


FUNCTIONS

```
mkDerivation {  
  name = "myProject-1.0.0";  
  src = ./src;  
  ..  
}
```

Resulting Derivation

```
{  
  "/nix/store/dvmig8jgrdapvbyxb1rprckdmdqx08kv-myProject-  
    1.0.0.drv": {  
    "outputs": {  
      "out": {  
        "path": "/nix/store/w9yy7v61ipb5rx6i35zqlmvc2iqfmps1-  
          myProject-1.0.0"  
      }  
    },  
    "inputSrcs": [  
      "/nix/store/9krlzvny65gdc8s7kpb6lkx8cd02c25b-default-  
        builder.sh"  
    ],  
    "inputDrvs": {
```


DERIVATIONS

```
# shell.nix
let
  pkgs = import <nixpkgs> {};
in
pkgs.stdenv.mkDerivation {
  name = "myProject-1.0.0";
  src = ./src;
  buildInputs = [ pkgs.maven pkgs.jdk ];
  buildPhase = "maven clean build";
}
```

```
$ nix-build shell.nix
$ nix-shell shell.nix
```

NIXPKGS

`(import <nixpkgs> {})` evaluates to:

```
{
  stdenv = { .. }
  ...
  maven = stdenv.mkDerivation {... jdk ...}
  jdk = ..
  jdk11 = ..
  ...
  git = ....
  ...
  firefox = ...
  ...
}
```

<https://github.com/NixOS/nixpkgs>

DEMO

NIX PACKAGE MANAGER

Store

```
/nix/store/9234jfkdfj23j45r2102jfd-maven-2.0.0  
/nix/store/34234sdfjskdfj32j4kjdsf-maven-3.0.0  
/nix/store/sdf34dfkjlkj09u123123ss-maven-3.0.0  
..  
/nix/store/fsdkf234jdfdsfjkj0111df-jdk-1.8.0  
..
```

NIXOS

```
{  
  ..  
  boot.loader.grub.device = "/dev/sda";  
  boot.kernelPackages = pkgs.linuxPackages_latest;  
  ..  
  
  users.users.mneuss = {  
    isNormalUser = true;  
    home = "/home/mneuss";  
    extraGroups = [  
      "wheel" # Enable 'sudo' for the user.  
      "docker"  
      "network-manager" ];  
  }
```

```
nixos-rebuild switch
```

FURTHER STUDY



- **Main Page**

<https://nixos.org/>

- **Cloud Deployment**

[https://github.com
/NixOS/nixops](https://github.com/NixOS/nixops)

- **My Blog**

<https://lambdablob.com/>

- **Switch Dev**

Environments

<https://direnv.net/>

// reveal.js plugins