

NIXOS

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NIXOS

*“Reproducible builds and
deployments.”*



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

CONTENT



Nix

- Package Manager
- Language
- OS

NIX PACKAGE MANAGER

- Adhoc environments

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

- Reproducible environments

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

DEMO

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

Derivation

```
{
  "/nix/store/dvmidxj5...-myProject-1.0.0.drv": {
    "outputs": {
      "out": {
        "path": "/nix/store/w9yy7v...-myProject-1.0.0"
      }
    },
    "inputSrcs": [
      "/nix/store/9krlzvn...-default-builder.sh"
    ],
    "inputDrvs": {
      "/nix/store/lpsqjc0l1...-bash-4.4-p23.drv": [
        "out"
      ],
    },
```


NIX LANGUAGE

≈Json + Functions

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

Benefits

- Declarative
- Functional
- Pure

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:

```
myNumber    = 3;  
myAttrSet   = { name = "myProject-1.0.0"; src = ... }  
myString    = myAttrSet.name;  
myFunction  = x: 2*x;
```

FUNCTIONS

Typescript

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

Nix

```
f = x: 2*x      # definition  
f 3             # usage
```

FUNCTIONS

Typescript

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

Nix

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

FUNCTIONS

Currying

$g: (\mathbb{R}, \mathbb{R}) \rightarrow \mathbb{R}$
 $g: (x, y) \mapsto x+y$

$g: \mathbb{R} \rightarrow (\mathbb{R} \rightarrow \mathbb{R})$
 $g: x \mapsto (y \mapsto x+y)$

Usage

$g(3, 4)$

$g\ 3\ 4$

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": {
```


DERIVATION

```
# 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";
}
```


NIXPKGS

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

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

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

SEARCH PACKAGES

 [Back to nixos.org](#) **Packages** [Options](#)

Q Search more than **80 000 packages**

Channel:

Package sets

No package set 28

Licenses

GNU General Public License v2.0 only (with Classpath exception) 12

GNU General Public License v2.0 only 10

Unfree 4

No license 1

GNU General Public License v2.0 or later (with Classpath exception) 1

Maintainers

Takuo Yonezawa 12

Edward Tjörnhammar 8

Tim Steinbach 5

No maintainers 5

Showing results 1-28 of **28 packages.**

[jdk](#)

The open-source Java Development Kit

Name: openjdk Version: 8u272-b10 Licenses: GNU General Public License v2.0 only [Homepage](#) [Source](#)

[jdk14](#)

The open-source Java Development Kit

Name: openjdk Version: 14.0.2-ga Licenses: GNU General Public License v2.0 only [Homepage](#) [Source](#)

[jdk11](#)

The open-source Java Development Kit

Name: openjdk Version: 11.0.9+11 Licenses: GNU General Public License v2.0 only [Homepage](#) [Source](#)

[jdk8_headless](#)

The open-source Java Development Kit

Name: openjdk-headless Version: 8u272-b10 Licenses: GNU General Public License v2.0 only [Homepage](#) [Source](#)

<https://search.nixos.org>

REPRODUCIBLE BUILDS

```
$ nix-build shell.nix    # build artifact, put into store
```

Store

```
/nix/store/9234jfkdfj23j45r2102jfd-myProject-1.0.0  
/nix/store/34234sdfjskdfj32j4kjdsf-maven-3.0.0  
/nix/store/sdf34dfkjlkj09u123123ss-maven-3.0.0  
..  
/nix/store/fsdkf234jdfdsfjkj0111df-jdk-1.8.0  
..
```

```
$ nix-shell shell.nix    # load environment with buildInputs
```


DEMO

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