Using Nix to Create Reproducible Go Development Environments

Introduction

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  - https://haseebmajid.dev
- Loves cats 🐱
- Avid cricketer 🏏 #BazBall

Who is this for?

- Interested in Nix
- Consistent development environments
  - Old project; still works
  - New developers
  - “It works on my machine”

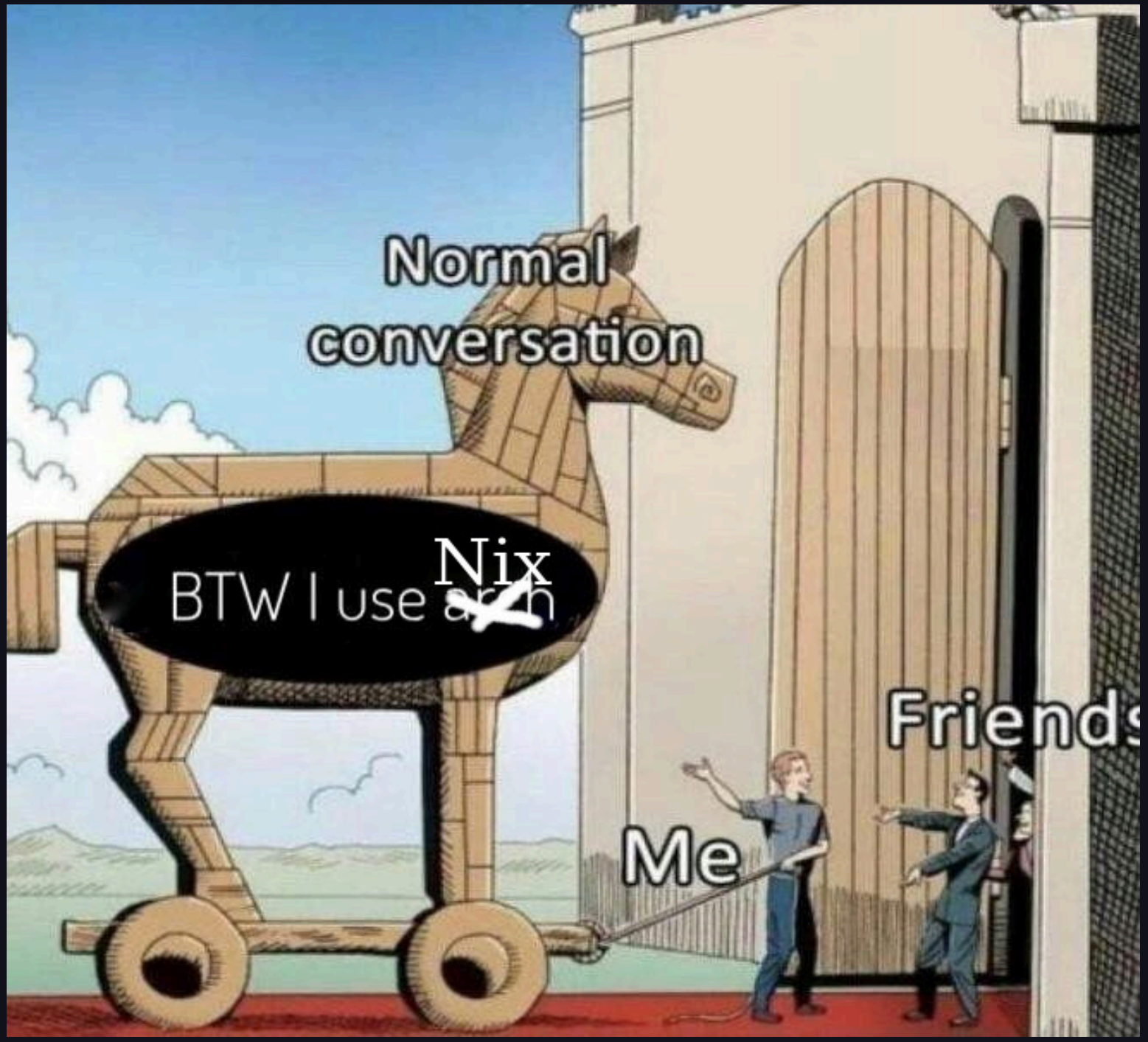
Credit

What is Nix?

- Nix is a declarative package manager
- Nixlang the programming language that powers Nix
- Nixpkgs is the largest repository of Nix packages

Declarative

```
{
  wayland.windowManager.sway.enable = true;
  xsession.windowManager.i3.enable = false;
}
```


Normal conversation
BTW I use arch
Nix
Me
Friends

Summary

- We want reproducible and ephemeral environments
- Nix is an ecosystem of tools

Golang

- Tools to aid development
  - lint
  - testing
  - docker

tools.go

```
1 // +build tools
2
3 package main
4
5 import (
6 _ "github.com/golangci/golangci-lint/cmd/golangci-lint"
7 _ "github.com/goreleaser/goreleaser"
8 )
```

tools.go

```
1 // +build tools
2
3 package main
4
5 import (
6 _ "github.com/golangci/golangci-lint/cmd/golangci-lint"
7 _ "github.com/goreleaser/goreleaser"
8 )
```

```
go run github.com/...../cmd/golangci-lint
```

```
example on  main via 🐹 v1.22.8
❯ ls -al
.rw-r--r-- 101 haseebmajid 28 Mar 15:36 go.mod
.rw-r--r-- 191 haseebmajid 28 Mar 15:37 go.sum
.rw-r--r-- 313 haseebmajid 28 Mar 15:33 main.go
.rw-r--r--   0 haseebmajid 28 Mar 14:55 main_test.go

example on  main via 🐹 v1.22.8
❯ nvim flake.nix
```

```
example on  main via 🐹 v1.22.8
❯ ls -al
.rw-r--r-- 101 haseebmajid 28 Mar 15:36 go.mod
.rw-r--r-- 191 haseebmajid 28 Mar 15:37 go.sum
.rw-r--r-- 313 haseebmajid 28 Mar 15:33 main.go
.rw-r--r--   0 haseebmajid 28 Mar 14:55 main_test.go

example on  main via 🐹 v1.22.8
❯ nvim flake.nix
```

```nix
{
  description = "I use Nix btw!";

  inputs = {
    nixpkgs.url = "github:NixOS/nixpkgs";
    flake-utils.url = "github:numtide/flake-utils";
  };

  outputs = {
    self,
    nixpkgs,
    flake-utils,
    ...
```

```
 5     nixpkgs.url = "github:NixOS/nixpkgs";
 6     flake-utils.url = "github:numtide/flake-utils";
 7   };
 8
 9   outputs = {
10     self,
11     nixpkgs,
12     flake-utils,
13     ...
14   }: (
15     flake-utils.lib.eachDefaultSystem
16     (system: let
17       # system is like "x86_64-linux" or "aarch64-linux"
18       pkgs = nixpkgs.legacyPackages.${system};
```

```
 9    outputs = {
10      self,
11      nixpkgs,
12      flake-utils,
13      ...
14    }: (
15      flake-utils.lib.eachDefaultSystem
16      (system: let
17        # system is like "x86_64-linux" or "aarch64-linu
18        pkgs = nixpkgs.legacyPackages.${system};
19      in {
20        devShells.default = pkgs.mkShell {
21          packages = with pkgs; [
```

```
12      flake-utils,
13      ...
14    }: (
15      flake-utils.lib.eachDefaultSystem
16      (system: let
17        # system is like "x86_64-linux" or "aarch64-linu
18        pkgs = nixpkgs.legacyPackages.${system};
19      in {
20        devShells.default = pkgs.mkShell {
21          packages = with pkgs; [
22            go_1_22
23            golangci-lint
24            gotools
```

```
14    }: (
15      flake-utils.lib.eachDefaultSystem
16      (system: let
17        # system is like "x86_64-linux" or "aarch64-linu
18        pkgs = nixpkgs.legacyPackages.${system};
19      in {
20        devShells.default = pkgs.mkShell {
21          packages = with pkgs; [
22            go_1_22
23            golangci-lint
24            gotools
25            go-junit-report
26            gocover-cobertura
```

```
15      flake-utils.lib.eachDefaultSystem
16      (system: let
17        # system is like "x86_64-linux" or "aarch64-linux"
18        pkgs = nixpkgs.legacyPackages.${system};
19      in {
20        devShells.default = pkgs.mkShell {
21          packages = with pkgs; [
22            go_1_22
23            golangci-lint
24            gotools
25            go-junit-report
26            gocover-cobertura
27            go-task
```

```
19      in {
20        devShells.default = pkgs.mkShell {
21          packages = with pkgs; [
22            go_1_22
23            golangci-lint
24            gotools
25            go-junit-report
26            gocover-cobertura
27            go-task
28            goreleaser
29            sqlc
30          ];
31        };
32      })
```

```
example on  main via 🐹 v1.22.8
❯ which golangci-lint

example on  main via 🐹 v1.22.8
❯ nix develop

example on  main via 🐹 v1.22.8 ❄ impure (nix-shell-env
❯ which golangci-lint
/nix/store/kcd...golangci-lint-1.56.2/bin/golangci-lint
```

```
example on  main via 🐹 v1.22.8
❯ which golangci-lint

example on  main via 🐹 v1.22.8
❯ nix develop

example on  main via 🐹 v1.22.8 ❄ impure (nix-shell-env
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/nix/store/kcd...golangci-lint-1.56.2/bin/golangci-lint
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```
example on  main via 🐹 v1.22.8
❯ which golangci-lint

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example on  main via 🐹 v1.22.8 ❄ impure (nix-shell-env
❯ which golangci-lint
/nix/store/kcd...golangci-lint-1.56.2/bin/golangci-lint
```

```
nix run 'gitlab:hmajid2301/optinix' get --no-tui

# Output

Option: 0
Name: services.prometheus.scrapeConfigs.*.docker_sd_co
Type: null or string
Default: null
Example:
From: NixOS
Sources: [/nix/store/xr9wjzx0cdnwkmhzz74h8lphgn5jmyv3-
```

```
nix run 'gitlab:hmajid2301/optinix' get --no-tui

# Output

Option: 0
Name: services.prometheus.scrapeConfigs.*.docker_sd_co
Type: null or string
Default: null
Example:
From: NixOS
Sources: [/nix/store/xr9wjzx0cdnwkmhzz74h8lphgn5jmyv3-
```

Summary

- Leverage dev shells for installing packages
  - `nix develop`
- Make sure each dev gets the same package
  - `nix flake update`

direnv

```
# .envrc

use flake
```

Direnv Code “use flake”

Usage

```
❯ which golangci-lint

❯ cd banterbus
direnv: error /home/haseeb/banterbus/.envrc
is blocked. Run `direnv allow` to approve
its content

banterbus on  main via 🐹 v1.22.7
❯ direnv allow
direnv: loading ~/banterbus/.envrc
direnv: using flake
direnv: nix-direnv: Renewed cache
...
```

Usage

```
❯ which golangci-lint

❯ cd banterbus
direnv: error /home/haseeb/banterbus/.envrc
is blocked. Run `direnv allow` to approve
its content

banterbus on  main via 🐹 v1.22.7
❯ direnv allow
direnv: loading ~/banterbus/.envrc
direnv: using flake
direnv: nix-direnv: Renewed cache
...
```

Usage

```
❯ which golangci-lint

❯ cd banterbus
direnv: error /home/haseeb/banterbus/.envrc
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banterbus on  main via 🐹 v1.22.7
❯ direnv allow
direnv: loading ~/banterbus/.envrc
direnv: using flake
direnv: nix-direnv: Renewed cache
...
```

Usage

```
❯ cd banterbus
direnv: error /home/haseeb/banterbus/.envrc
is blocked. Run `direnv allow` to approve
its content

banterbus on  main via 🐹 v1.22.7
❯ direnv allow
direnv: loading ~/banterbus/.envrc
direnv: using flake
direnv: nix-direnv: Renewed cache
...

banterbus on  main via 🐹 v1.22.8 via ❄️  impure (nix-s
```

Usage

```
 5 is blocked. Run `direnv allow` to approve
 6 its content
 7
 8 banterbus on  main via 🐹 v1.22.7
 9 ❯ direnv allow
10 direnv: loading ~/banterbus/.envrc
11 direnv: using flake
12 direnv: nix-direnv: Renewed cache
13 ...
14
15 banterbus on  main via 🐹 v1.22.8 via ❄️  impure (nix-s
16 ❯ which golangci-lint
17 /nix/store/kcd...golangci-lint-1.56.2/bin/golangci-lint
18
```

Usage

```
direnv: loading ~/banterbus/.envrc
direnv: using flake
direnv: nix-direnv: Renewed cache
...

banterbus on  main via 🐹 v1.22.8 via ❄  impure (nix-s
❯ which golangci-lint
/nix/store/kcd...golangci-lint-1.56.2/bin/golangci-lint

banterbus on  main via 🐹 v1.22.8 via ❄  impure (nix-s
❯ cd ..
direnv: unloading

❯ which golangci-lint
```

Usage

```
11 direnv: using flake
12 direnv: nix-direnv: Renewed cache
13 ...
14
15 banterbus on  main via 🐹 v1.22.8 via ❄  impure (nix-s
16 ❯ which golangci-lint
17 /nix/store/kcd...golangci-lint-1.56.2/bin/golangci-lint
18
19 banterbus on  main via 🐹 v1.22.8 via ❄  impure (nix-s
20 ❯ cd ..
21 direnv: unloading
22
23 ❯ which golangci-lint
```

Usage

```
11 direnv: using flake
12 direnv: nix-direnv: Renewed cache
13 ...
14
15 banterbus on ᚠ main via 🐻 v1.22.8 via ❄  impure (nix-s
16 ❯ which golangci-lint
17 /nix/store/kcd...golangci-lint-1.56.2/bin/golangci-lint
18
19 banterbus on ᚠ main via 🐻 v1.22.8 via ❄  impure (nix-s
20 ❯ cd ..
21 direnv: unloading
22
23 ❯ which golangci-lint
```

Remote Environments

```
# .envrc

use flake "github:the-nix-way/dev-templates?dir=go"
```

pre-commit

```
 1 {
 2 description = "Development environment for example pro
 3
 4 inputs = {
 5 nixpkgs.url = "github:NixOS/nixpkgs";
 6 flake-utils.url = "github:numtide/flake-utils";
 7 pre-commit.url = "github:cachix/pre-commit-hooks.nix";
 8 };
 9
10 outputs = {
11 self,
12 nixpkgs,
13 flake-utils,
```

pre-commit

```
16 }: (
17 flake-utils.lib.eachDefaultSystem
18 (system: let
19   pkgs = nixpkgs.legacyPackages.${system};
20   pre-commit-check = pre-commit.lib.${system}.run {
21     src = ./.;
22     hooks = {
23       golangci-lint.enable = true;
24       gotest.enable = true;
25     };
26   };
27 in {
28   devShells.default = pkgs.mkShell {
29     shellHook = pre-commit-check.shellHook;
```

pre-commit

```
23          golangci-lint.enable = true;
24          gotest.enable = true;
25        };
26      };
27    in {
28      devShells.default = pkgs.mkShell {
29        shellHook = pre-commit-check.shellHook;
30        packages = with pkgs; [
31          go_1_22
32          golangci-lint
33          gotools
34          go-junit-report
35          gocover-cobertura
```

Summary

- We can use `direnv` to reduce cognitive load
- Use dev shell from remote git repository
- We can manage pre-commit in Nix as well

How does Nix work?

```nix
# shell.nix

{pkgs, ...}:
pkgs.mkShell {
  packages = with pkgs; [
    go_1_22
    golangci-lint
  ];
}
```

mkShell docs

How does Nix work?

```nix
# shell.nix

{pkgs, ...}:
pkgs.mkShell {
  packages = with pkgs; [
    go_1_22
    golangci-lint
  ];
}
```

mkShell docs

How does Nix work?

```nix
# shell.nix

{pkgs, ...}:
pkgs.mkShell {
  packages = with pkgs; [
    go_1_22
    golangci-lint
  ];
}
```

mkShell docs

```nix
# flake.nix

{
  devShells.default = pkgs.callPackage ./shell.nix {
    inherit pkgs;
  };
}
```

Search more than **100 000 packages**

go

Search

Channel: 24.05 unstable

Package sets

- No package set 1132
- haskellPackages 417
- python312Packages 355
- python311Packages 355
- rPackages 258
- emacsPackages 119
- texlivePackages 58
- sbclPackages 44
- gnomeExtensions 28
- vimPlugins 26
- perl536Packages 24
- perl538Packages 23
- home-assistant-component-tests 18
- ocamlPackages 12
- vscode-extensions 9
- libsForQt5 9
- kdePackages 9
- jetbrains 9
- flutterPackages-source 6
- nodePackages 5

Licenses

- MIT License 719

Showing results 1-50 of **2989 packages**.

Sort: Best match

Data from nixpkgs `bc947f54`.

go

Go Programming language

Name: `go` Version: **1.22.7** Homepage Source License: BSD 3-clause "New" or "Revised" License

gox

Dead simple, no frills Go cross compile tool

Name: `gox` Version: **1.0.1** Homepage Source License: Mozilla Public License 2.0

got

Version control system which prioritizes ease of use and simplicity over flexibility

Name: `got` Version: **0.103** Homepage Source License: ISC License

gom

GObject to SQLite object mapper

Name: `gom` Version: **0.4** Outputs: `out` `py` Homepage Source License: GNU Lesser General Public License v2.1 or later

gol

Command-line utility for creating and managing Geographic Object Libraries

Name: `gol` Version: **0.2.0** Homepage Source License: GNU Affero General Public License v3.0 only

goa

Design-based APIs and microservices in Go

Name: `goa` Version: **3.19.1** Homepage Source License: MIT License

search.nixos.org

```
{ lib
, stdenv
, fetchurl
, tzdata
, substituteAll
, iana-etc
, Security
, Foundation
, xcbuild
, mailcap
, buildPackages
, pkgsBuildTarget
, threadsCross
```

Go Nix Expression

```
46    isCross = stdenv.buildPlatform != stdenv.targetPlat
47  in
48  stdenv.mkDerivation (finalAttrs: {
49      pname = "go";
50      version = "1.22.7";
51
52      src = fetchurl {
53          url = "https://go.dev/dl/go....";
54          hash = "sha256-ZkMth9h...";
55      };
56
57    strictDeps = true;
58    buildInputs = [ ]
```

Go Nix Expression

Evaluation

- Evaluation Time: Nix Expression (`.nix`) is parsed and returns a derivation set `.drv`
- Build Time: The derivation is built into a package

Derivations

```
1 /nix/store/<hash>-<name>-<version>.drv
2 /nix/store/zg65r8ys8y5865lcwmmybrq5g...-go-1.21.8.drv
3 /nix/store/z45pk6pw3h4yx0cpi51fc5nwm...-go-1.22.1.drv
```

Derivations

```
1 /nix/store/<hash>-<name>-<version>.drv
2 /nix/store/zg65r8ys8y5865lcwmmybrq5g...-go-1.21.8.drv
3 /nix/store/z45pk6pw3h4yx0cpi51fc5nwm...-go-1.22.1.drv
```

```
nix derivation show nixpkgs#go_1_21
{
"/nix/store/gccilxhvxkbhm79....-go-1.21.8.drv": {
"args": [
  "-e",
  "/nix/store/v6x3cs394jgqfbi0a42pam708flxaphh-defaul
],
"builder": "/nix/store/5lr5n...-bash-5.2p26/bin/bash"
"env": {
  "CGO_ENABLED": "1",
  "GO386": "softfloat",
  "GOARCH": "amd64",
  "GOARM": "",
```

```
{
"/nix/store/gccilxhvxkbhm79....-go-1.21.8.drv": {
"args": [
  "-e",
  "/nix/store/v6x3cs394jgqfbi0a42pam708flxaphh-defaul
],
"builder": "/nix/store/5lr5n...-bash-5.2p26/bin/bash"
"env": {
  "CGO_ENABLED": "1",
  "GO386": "softfloat",
  "GOARCH": "amd64",
  "GOARM": "",
  "GOHOSTARCH": "amd64",
```

```
  3 "/nix/store/gccilxhvxkbhm79....-go-1.21.8.drv": {
  4 "args": [
  5   "-e",
  6   "/nix/store/v6x3cs394jgqfbi0a42pam708flxaphh-defaul
  7 ],
  8 "builder": "/nix/store/5lr5n...-bash-5.2p26/bin/bash"
  9 "env": {
 10   "CGO_ENABLED": "1",
 11   "GO386": "softfloat",
 12   "GOARCH": "amd64",
 13   "GOARM": "",
 14   "GOHOSTARCH": "amd64",
 15   "GOHOSTOS": "linux",
```

```
47    "src": "/nix/store/p81s0316n7snx40fwkhda4p5jczf2pff
48    "stdenv": "/nix/store/c8dj731bkcdzhgrpawhc8qvdgls4x
49    "strictDeps": "1",
50    "system": "x86_64-linux",
51    "version": "1.21.8"
52  },
53  "inputDrvs": {
54    "/nix/store/17gdfyx....-stdenv-linux.drv": {
55      "dynamicOutputs": {},
56      "outputs": [
57        "out"
58      ]
59    },
```

```
53 "inputDrvs": {
54   "/nix/store/17gdfyx....-stdenv-linux.drv": {
55     "dynamicOutputs": {},
56     "outputs": [
57       "out"
58     ]
59   },
60   "/nix/store/9j2pqjj8...-mailcap-1.17.patch.drv": {
61     "dynamicOutputs": {},
62     "outputs": [
63       "out"
64     ]
65   },
```

```
    "/nix/store/m88mg4d43hwkkbip6dha7p858c0vm5c1-go_no_
    "/nix/store/v6x3cs394jgqfbi0a42pam708flxaphh-defaul
    "/nix/store/x48d0s4gns4jrck6qkwrpqn7nh9ygpx6-remove
  ],
  "name": "go-1.21.8",
  "outputs": {
    "out": {
      "path": "/nix/store/afv3zwqxyw062...-go-1.21.8"
    }
  },
  "system": "x86_64-linux"
}
}
```

Advantages

- A derivation is immutable

```
/nix/store/afv3zwqxyw062vg2j220658jq0g1yadv-go-1.21.8
├── bin
│   ├── go -> ../share/go/bin/go
│   └── gofmt -> ../share/go/bin/gofmt
└── share
    └── go
        ├── api
        ├── bin
        ├── doc
        ├── go.env
        ├── lib
        ├── misc
        ├── pkg
```

Advantages

- Binary cache

```
> nix-shell -p go_1_21

this path will be fetched
(39.16 MiB download, 204.47 MiB unpacked):
  /nix/store/k7chjapvryi....-go-1.21.8
copying path '/nix/store/k7chjapvryi....-go-1.21.8'
from 'https://cache.nixos.org'..
```

Advantages

- Binary cache

```
> nix-shell -p go_1_21

this path will be fetched
(39.16 MiB download, 204.47 MiB unpacked):
  /nix/store/k7chjapvryi....-go-1.21.8
copying path '/nix/store/k7chjapvryi....-go-1.21.8'
from 'https://cache.nixos.org'..
```

Advantages

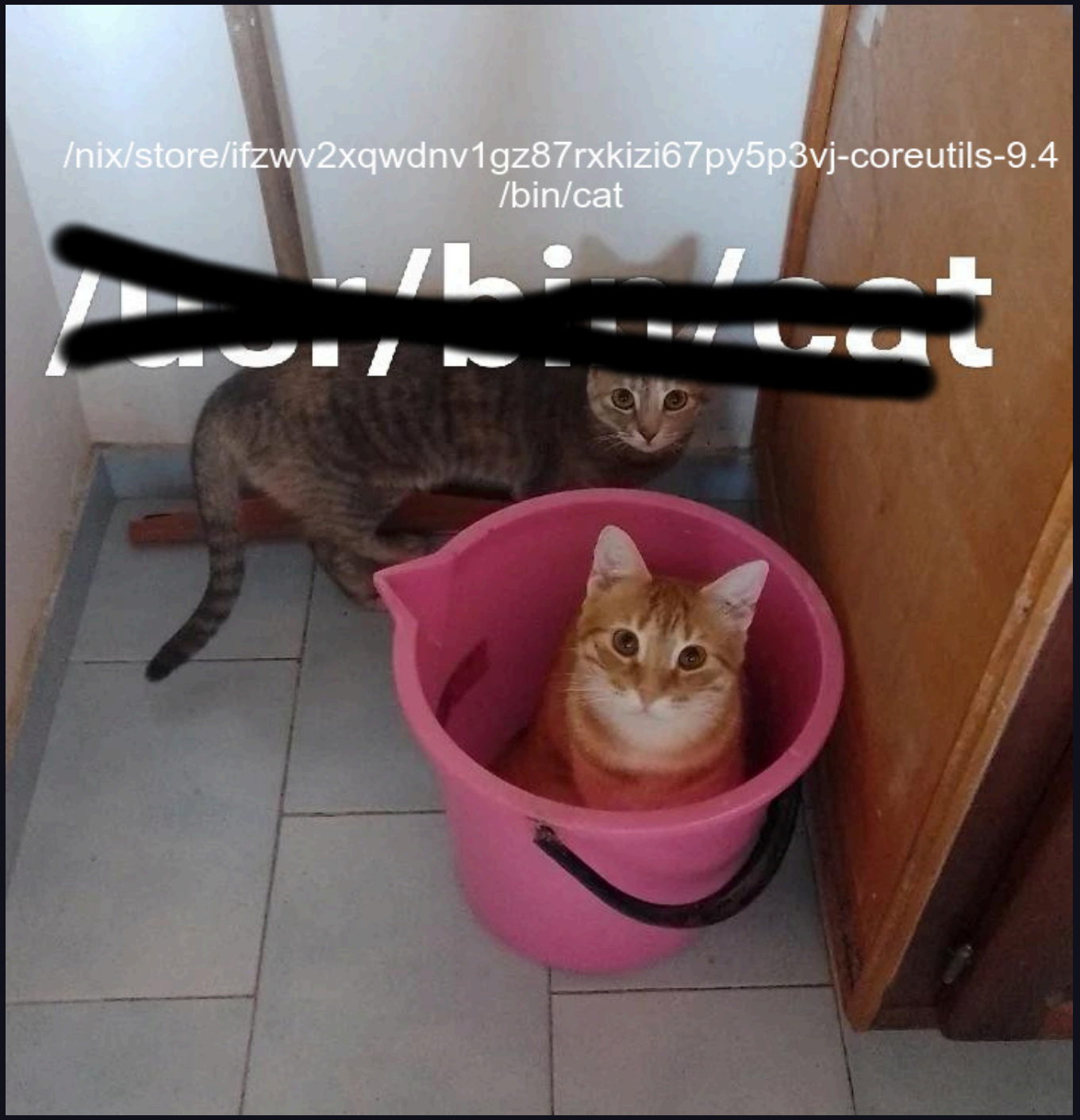
- Forces us to make our dependency tree explicit

```
> nix-store -q --tree /nix/store/k7chj...-go-1.21.8

/nix/store/k7chj...-go-1.21.8
├───/nix/store/7vvggrs9367d3...-mailcap-2.1.53
├───/nix/store/a1s263pmsci9z...-bash-5.2p26
│   ├───/nix/store/ddwyrxif6...-glibc-2.39-5
│   │   ├───/nix/store/rxgan...-xgcc-13.2.0-libgcc
│   │   ├───/nix/store/s32cl...-libidn2-2.3.7
│   │   │   ├───/nix/store/7n...-libunistring-1>
│   │   │   │   └───/nix/store/7n0mbqydcipkpbxm24fab066lxk
│   │   │   └───/nix/store/s32cldbh9pfzd9z82izi12mdlrw0yf8
│   │   └───/nix/store/ddwyrxif62r8n6xclvskjyy6szdhvj60-gl
│   └───/nix/store/a1s263pmsci9zykm5xcdf7x9rv26w6d5-bash-5
```

Advantages

- Atomic updates

```
> ls -al ~/.nix-profile/bin

lrwxrwxrwx - root  1 Jan  1970 , -> /nix/store/09irdfc2nqr
lrwxrwxrwx - root  1 Jan  1970 accessdb -> /nix/store/09ir
lrwxrwxrwx - root  1 Jan  1970 addgnupghome -> /nix/store/
lrwxrwxrwx - root  1 Jan  1970 ag -> /nix/store/09irdfc2nq
lrwxrwxrwx - root  1 Jan  1970 animate -> /nix/store/09irq
lrwxrwxrwx - root  1 Jan  1970 applygnupgdefaults -> /nix/
lrwxrwxrwx - root  1 Jan  1970 apropos -> /nix/store/09irq
lrwxrwxrwx - root  1 Jan  1970 atuin -> /nix/store/09irdfq
```


/nix/store/ifzwv2xqwdnv1gz87rxkizi67py5p3vj-coreutils-9.4
/bin/cat
/usr/bin/cat

Summary

- Derivations are a key building block of Nix
- Nix derivations -> immutable packages

Nix Flakes

- Per project dependencies
  - `flake.lock`
- Improves reproducibility

flake.nix

```
{
  inputs = {
    # Aliased to "nixpkgs";
    nixpkgs.url = "github:NixOS/nixpkgs";
  };
  outputs = {};
}
```

flake.lock

```
{
  "nodes": {
    "nixpkgs": {
      "locked": {
        "lastModified": 1668703332,
        // A SHA of the contents of the flake
        "narHash": "sha256-PW3vz3ODXaInogvp2I...=",
        // The GitHub org
        "owner": "NixOS",
        // The GitHub repo
        "repo": "nixpkgs",
        // The specific revision
        "rev": "de60d387a0e5737375ee61848872b1...",
```

flake.lock

```
{
  "nodes": {
    "nixpkgs": {
      "locked": {
        "lastModified": 1668703332,
        // A SHA of the contents of the flake
        "narHash": "sha256-PW3vz3ODXaInogvp2I...=",
        // The GitHub org
        "owner": "NixOS",
        // The GitHub repo
        "repo": "nixpkgs",
        // The specific revision
        "rev": "de60d387a0e5737375ee61848872b1...",
```

flake.lock

```
 7         "narHash": "sha256-PW3vz3ODXaInogvp2I...=",
 8         // The GitHub org
 9         "owner": "NixOS",
10         // The GitHub repo
11         "repo": "nixpkgs",
12         // The specific revision
13         "rev": "de60d387a0e5737375ee61848872b1...",
14         // The type of input
15         "type": "github"
16       }
17     },
18     // Other inputs
19   }
```

Summary

- Nix Flakes improve reproducibility
  - Lock dependencies
- Provide a more standard way to configure Nix
- Are an EXPERIMENTAL feature still

CI

- Use same versions as local
- Leverage Nix “cachability”

GitLab CI

```yaml
image: nixos/nix

tests:unit:
  only:
    - merge_request
  before_script:
    - echo "experimental-features = nix-command flakes"
  script:
    - nix develop -c task tests:unit
```

GitLab CI

```yaml
image: nixos/nix

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GitLab CI

```yaml
image: nixos/nix

tests:unit:
  only:
    - merge_request
  before_script:
    - echo "experimental-features = nix-command flakes"
  script:
    - nix develop -c task tests:unit
```

```
tasks:
  tests:unit:
    desc: Runs all the unit tests.
    cmds:
      - go test -skip '^TestIntegration' ./internal/...
```

```
copying path '/nix/store/49mrmsvafx8lscgi...-source'
from 'https://cache.nixos.org'...
copying path '/nix/store/v6gqc89sr4gvh3gl75ncg0ajc4rba
copying path '/nix/store/ba7r274fm1v4r9zfgjr4qfsby1hxi
copying path '/nix/store/8rvn0r46zg5zd5chc9wqdpz0cva2p
copying path '/nix/store/dj5kdz9m149apk5hsvancfm5fksx7
copying path '/nix/store/vr6ig5i2y7g8dn50qdj3ym5gkfs7s
copying path '/nix/store/yyhjvp15mhffbfxsnfy3f0br47yfk
copying path '/nix/store/hhxx6ns9cn6ljkphbf1jchcrsa43z
copying path '/nix/store/wak6dggawz5c00cy1iplzkiiwscy4
copying path '/nix/store/g4jq20cqxnmlgz5sidrwiahmwx67r
copying path '/nix/store/fn1y6zydm7mgxrm7b08h1w1c9qkrz
copying path '/nix/store/pd8xxiyn2xi21fgg9qm7r0qghsk87
```

```
29 copying path '/nix/store/ymf1acd7jmq0xbk44ckb78gjxssw
30 copying path '/nix/store/kvi43jy0kzsbkq4kmfgmrk6yw596b
31 copying path '/nix/store/560z0zfybsjb8m76n67x6c1k7gpm0
32 copying path '/nix/store/7k4cvc2cm6am5zq1kf5bzx7hfwm52
33 copying path '/nix/store/awnmm98ja9nrlw5qw6ikq1gp88fph
34 # ...
35 task: [tests:unit] go test ./...
36 go: downloading modernc.org/sqlite v1.31.1
37 go: downloading github.com/remychantenay/slog-otel v1.
38 go: downloading github.com/pressly/goose/v3 v3.21.1
39 go: downloading github.com/sethvargo/go-envconfig v1.1
40 go: downloading github.com/muesli/go-app-paths v0.2.2
41 go: downloading github.com/flexstack/uuid v1.0.0
42 go: downloading github.com/gobwas/ws v1.4.0
```

ci.nix

```nix
{
  pkgs,
  devPackages,
  ...
}:
pkgs.dockerTools.buildImage {
  name = "banterbus-dev";
  tag = "latest";
  copyToRoot = pkgs.buildEnv {
    name = "banterbus-dev";
    pathsToLink = ["/bin"];
    paths = with pkgs;
      [
```

ci.nix

```
11      pathsToLink = ["/bin"];
12      paths = with pkgs;
13        [
14          coreutils
15          gnugrep
16          bash
17          cacert.out
18          curl
19          git
20        ]
21        ++ devPackages;
22    };
23    config = {
```

ci.nix

```
15          gnugrep
16          bash
17          cacert.out
18          curl
19          git
20        ]
21        ++ devPackages;
22    };
23    config = {
24      Env = [
25        "NIX_PAGER=cat"
26        # A user is required by nix
27        # https://github.com/NixOS/nix/blob/9348f9291e5d
```

flake.nix

```nix
# flake.nix
{
  description = "Development environment for BanterBus
  inputs = {
    nixpkgs.url = "github:NixOS/nixpkgs/nixos-unstable
    flake-utils.url = "github:numtide/flake-utils";
    pre-commit-hooks.url = "github:cachix/pre-commit-h
  };
  outputs = {
    self,
    nixpkgs,
```

flake.nix

```
29          go-task
30          goreleaser
31          sqlc
32        ];
33      in {
34        packages.ci = pkgs.callPackage ./ci.nix {
35          inherit pkgs;
36          inherit devPackages;
37        };
38        devShells.default = pkgs.mkShell ./shell.nix {
39          inherit pkgs;
40          inherit devPackages;
41        }
42        };
```

flake.nix

```
33      in {
34        packages.ci = pkgs.callPackage ./ci.nix {
35          inherit pkgs;
36          inherit devPackages;
37        };
38        devShells.default = pkgs.mkShell ./shell.nix {
39          inherit pkgs;
40          inherit devPackages;
41        }
42        };
43      })
44    );
45  }
```

.gitlab-ci.yml

```yaml
publish:docker:ci:
  stage: pre
  variables:
    DOCKER_HOST: tcp://docker:2375
    DOCKER_DRIVER: overlay2
    DOCKER_TLS_CERTDIR: ""
    IMAGE: $CI_REGISTRY_IMAGE/ci
  rules:
    - if: $CI_PIPELINE_SOURCE == "merge_request_event"
      changes:
        - "containers/ci.nix"
  services:
    - docker:25-dind
```

.gitlab-ci.yml

```
10        changes:
11          - "containers/ci.nix"
12    services:
13      - docker:25-dind
14    script:
15      - echo "experimental-features = nix-command flakes
16      - nix-env -iA nixpkgs.docker
17      - nix build .#ci
18      - docker load < ./result
19      - docker login -u $CI_REGISTRY_USER -p $CI_REGISTRY
20      - docker image tag banterbus-dev:latest $IMAGE:late
21      - docker push $CI_REGISTRY_IMAGE/ci:latest
22
```

CI Improved

```
 1
 2 stages:
 3   - deps
 4   - test
 5
 6 .task:
 7   stage: test
 8   image: $CI_REGISTRY_IMAGE/ci:latest
 9   variables:
10     GOPATH: $CI_PROJECT_DIR/.go
11   cache:
12     paths:
13       - ${GOPATH}/pkg/mod
```

CI Improved

```
 2 stages:
 3   - deps
 4   - test
 5
 6 .task:
 7   stage: test
 8   image: $CI_REGISTRY_IMAGE/ci:latest
 9   variables:
10     GOPATH: $CI_PROJECT_DIR/.go
11   cache:
12     paths:
13       - ${GOPATH}/pkg/mod
14     policy: pull
```

CI Improved

```
 5
 6 .task:
 7   stage: test
 8   image: $CI_REGISTRY_IMAGE/ci:latest
 9   variables:
10     GOPATH: $CI_PROJECT_DIR/.go
11   cache:
12     paths:
13       - ${GOPATH}/pkg/mod
14     policy: pull
15   rules:
16     - if: $CI_PIPELINE_SOURCE == "merge_request_event"
17
18 download:dependency:
```

CI Improved

```
17
18 download:dependency:
19   extends: .task
20   stage: deps
21   rules:
22     - if: $CI_PIPELINE_SOURCE == "merge_request_event"
23       changes:
24         - go.mod
25         - go.sum
26   script:
27     - go mod download
28   cache:
29     policy: pull-push
30
```

CI Improved

```
27      - go mod download
28    cache:
29      policy: pull-push
30
31  tests:unit:
32    extends:
33      - .task
34    script:
35      - task tests:unit
36
37  format:
38    extends:
39      - .task
```

Time Improvement

- unit tests job
  - 2 minutes 28 seconds
  - 54 seconds


GET THAT THING OUT OF MY FACE!
NIX
chomp
NIX
chicken thoughts
imgflip.com

Why not Docker?

- Docker is imperative
  - Repeatable but not reproducible
- Hard to personalise
  - bash vs fish vs zsh

Try Nix!

- Install Nix
  - https://determinate.systems/posts/determin nix-installer/
- Use dev template
  - https://flakehub.com/f/the-nix-way/dev-templates
- Install direnv-nix
  - https://github.com/nix-community/nix-diren

```
curl --proto '=https' --tlsv1.2 -sSf -L \
 https://install.determinate.systems/nix | sh -s -- instal

nix flake init --template \
  "https://flakehub.com/f/the-nix-way/dev-templates/*#go"

nix profile install nixpkgs#nix-direnv
```

Further

- gomod2nix: https://www.tweag.io/blog/2021-03-04-gomod2nix/
- Build Docker image: https://jameswillia.ms/posts/go-nix-containers.html
- Arion: Manage docker-compose with nix
- devenv: https://devenv.sh/


NIX All THE THINGS!

My Links

- My Dotfiles Configured Using Nix
- How I setup dev shell for a Go project
  - Project using dev shell

Appendix

- Useful Articles:
  - https://blog.ysndr.de/posts/guides/2021-12-01-nix-shells/
  - https://serokell.io/blog/what-is-nix
  - https://shopify.engineering/what-is-nix
  - nix-shell vs nix shell vs nix develop: https://blog.ysndr.de/posts/guides/2021-12-01-nix-shells/

Useful Tools

```
> namei
```

- Get started with Nix
  - https://zero-to-nix.com/
  - https://nixos.org/guides/nix-pills/why-you-should-give-it-a-try
  - https://nixos-and-flakes.thiscute.world/introduction/

More about flakes:

- https://nixos.wiki/wiki/Flakes
- https://zero-to-nix.com/concepts/flakes

- Useful Channels/Videos
  - https://www.youtube.com/@vimjoyer
  - Docker and Nix (Dockercon 2023): https://www.youtube.com/watch?v=I17oRkhg
  - How to build a new package in Nix: https://www.youtube.com/watch?v=3hMIqxb
  - https://www.youtube.com/watch?app=desktop&v=TsZte_9GfPE&si=osBujLY3py

https://haseebmajid.dev/slides/go-lab-reproducible-envs-with-nix/

References & Thanks

- GIFs made with vhs
- Photos editted with pixlr
- All my friends who took time to give me feedback on this talk
- Some memes from https://github.com/gytis-ivaskevicius/high-quality-nix-content