
# Nix for Monorepos

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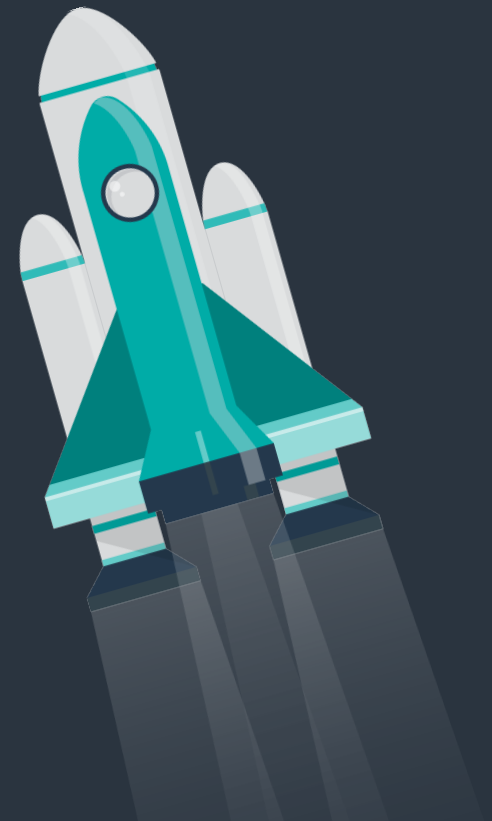
# About Me


- Website: https://korz.dev
- Co-founder and tech lead at alugha
- Nixpkgs maintainer (but not committer :)
- Rustacean
- Runs NixOS for fun on servers, desktops and Raspberry Pis

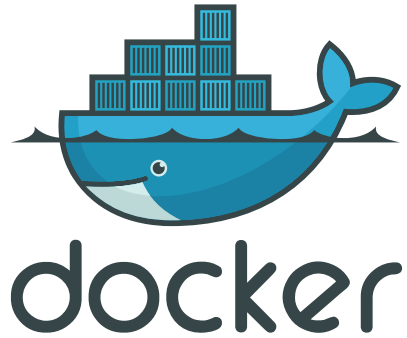
1. **Motivation**
2. Building and Caching
3. Containers and Deployments
4. Further Reading



# Why Monorepos?

- Coordination of multi-service changes
- Shared dependencies without hosting a registry
- Single source for deployments
- All is well, if it works…

# CI at alugha: pre 2023




- ~1000 lines of Gitlab CI YAML
  - Path-based change filters for rebuilding services
  - Dependency caching based on lockfile hashes
- 17 Dockerfiles (217 lines)
  - One docker file per service
  - Some base images for code sharing

# Enter: Nix

https://zero-to-nix.com/

- Declarative package manager
- Functional programming language
- Also a build tool
- Nixpkgs: more than 60'000 up to date packages
  - Debian & Ubuntu: ~20'000
  - Arch User Repository (AUR): ~25'000

# CI at alugha: 2023+

- ~1000 lines of Nix code (excluding auto-generated ones)
- 641 lines of Python scripts
- 86 lines of Gitea Actions YAML
- Fine-grained build cache
- No more hacky change detection

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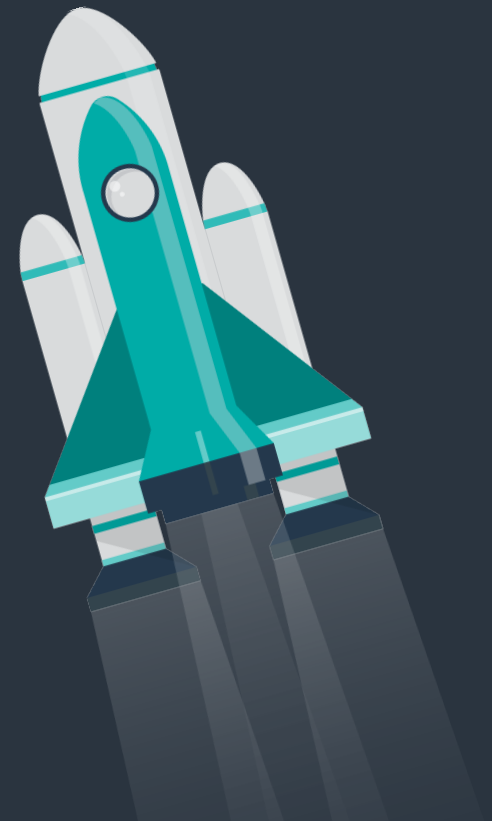

# A basic Nix derivation

```
my-cpp-program = pkgs.stdenv.mkDerivation {
  name = "my-cpp-program";
  src = ./src;
  buildPhase = "c++ -o my-cpp-program main.cpp";
  installPhase = ''
    mkdir -p $out/bin
    cp my-cpp-program $out/bin/
  '';
};
```

# A basic Nix derivation

```
→  nix build .#my-cpp-program
evaluating derivation '.#packages.aarch64-darwin.my-cpp-program'
[1/1 built]

→  file result/bin/my-cpp-program
result/bin/my-cpp-program: Mach-O 64-bit executable arm64
```

# Building Go programs with Nix

```
my-go-program = pkgs.buildGoModule {
  pname = "my-go-program";
  version = "0.5.0";
  src = ./my-go-src;
  buildInputs = with pkgs; [ olm libsignal-ffi ];
  vendorHash = "sha256-sa6M9rMrI7fa8...";
};
```

# Building Rust libraries with Nix

```
libsignal-ffi = pkgs.rustPlatform.buildRustPackage {
  pname = "libsignal-ffi";
  version = "0.39.2";
  src = ./libsignal-ffi-src;
  cargoLock.lockFile = libsignal-ffi-src/Cargo.lock;
  cargoBuildFlags = [ "-p" "libsignal-ffi" ];
};
```

# cargo2nix

```
let rustPkgs = pkgs.rustBuilder.makePackageSet {
    rustVersion = "latest";
    packageFun = import ./Cargo.nix;
}; in {
    manifests = rustPkgs.workspace.manifests { };
    proxypress = rustPkgs.workspace.proxypress { };
    traffic-tracker = rustPkgs.workspace.traffic-tracker { };
}
```

# How Nix improves your build process

- Batteries included for all popular languages
- Bring your own abstractions, or the community's
- Build isolation and hash-addressed caching
- Push to and pull from binary caches
- **It's all a graph**

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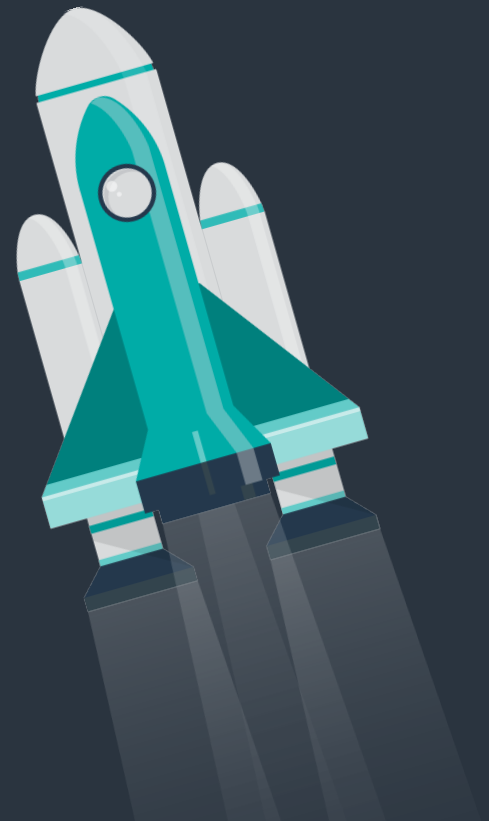

# Our pipeline: a summary

1. Check Nix cache status of current commit's images
2. Rebuild uncached images
3. Push newly built images to container registry
4. Deploy Kubernetes manifests with new image tags

# Dockerfile

```
FROM golang:1.21

COPY my-go-src .

RUN go mod download

# TODO: How do we install libsignal-ffi? 🙀

RUN go build -o /bin/my-go-program .

ENTRYPOINT [ "/bin/my-go-program" ]
```

# Nixpkgs dockerTools

```
pkgs.dockerTools.buildImage {
  name = "my-go-image";
  tag = "latest";
  config.Entrypoint = [
    "${my-go-program}/bin/my-go-program"
  ];
}
```

# nix2container

```
nix2container.buildImage {
  name = "my-go-image";
  config.Entrypoint = ["${my-go-program}/bin/my-go-program"];
  layers = [
    (nix2container.buildLayer { deps = [ glibc ]; })
    (nix2container.buildLayer { deps = [ libsignal-ffi ]; })
  ];
}
```

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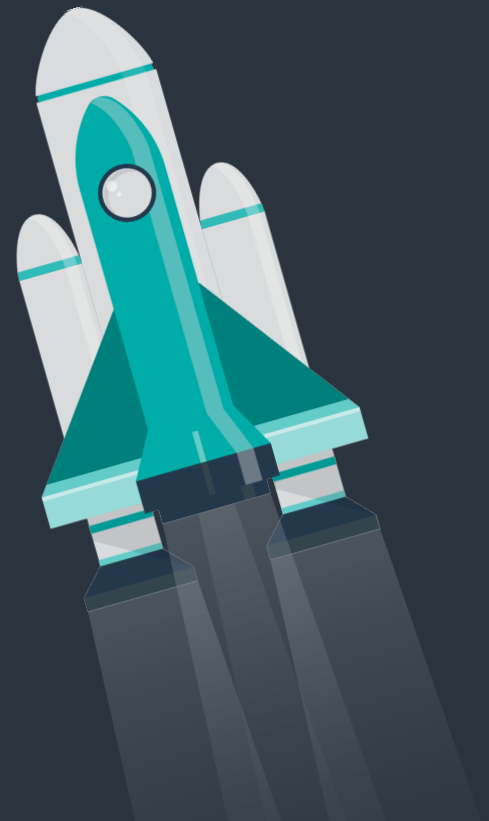

# Further Reading

- Zero to Nix - Your guide to learning Nix and flakes
- Tor Hovland: Building Nix flakes from Rust workspaces
- Adam Hoese: Announcing Gomod2nix
- Luc Perkins: Deploying Nix-built containers to Kubernetes

# Further Reading

- Xe: Nix is a better Docker image builder than Docker's image builder
- Peter Kolloch: Nix & Docker: Layer explicitly without duplicate packages!
- Hopefully soon on my blog (korz.dev): Nix for Monorepos

# Questions?

- Download: https://dl.korz.dev/meetup-nix-monorepos.pdf
- Contact me on…
  - Matrix: @niklaskorz:korz.dev
  - Mastodon: @niklaskorz@rheinneckar.social
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