Nix: A new way to manage packages

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What is Nix?
Nix is an ecosystem

- Nix (the daemon)
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- Nixos
But why?
What makes Nix* cool

- Atomic upgrades and installs
- Partial upgrades through isolated packages
- Easy rollbacks
- Rootless package operations
- Source based with a binary cache
- Cross platform (theoretically)
- Version pinning of specific packages
- Reproducible, sandboxed build environments
- Can output docker files, VM’s, file systems, etc.
- Supports cross compilation
What makes Nix* less cool

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- The language has a learning curve
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Hopefully this talk will help you understand Nix
Let’s make a package!
Nix (the daemon)

- Accepts derivations and builds them
- Gives every package (derivation) a hash based on the hashes of inputs
- Stores built packages in
  
  /nix/store/hash-packageName/{bin/share/lib/include/*}
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**What about the Linux Filesystem Hierarchy?**

Nix uses a combination of symlinks, environment variables, and patched low level tools to make software run in this environment. If those fail for a package, Nix can create a fake hierarchy which only that package sees.
What is a derivation?

A derivation is a key value pair with the following keys:

- system = “x86_64-linux” (or darwin or …)
- name = “Package name”
- builder = “command to build package”
- args = [“Args” “To pass” “to the builder”]
- A few really uncommon ones...

Any other keys become environment variables in the sandbox.
What makes derivations cool?

- Builders can’t depend on any files or variables not mentioned in the derivation
- Any files mentioned in the derivation become packages
- Any packages needed by the derivation get built first
- Derivations are reproducible, complete build instructions
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- Derivations are reproducible, complete build instructions
- Derivations can be copied between machines
with (import <nixpkgs> {{}});

derivation {
  name = "hello";
  builder = "${bash}/bin/bash";
  args = [ ./hello_builder.sh ];
  inherit gnumake gcc coreutils gawk gnused gnugrep;
  binutils = binutils-unwrapped;
  src = fetchTarball {
    sha256 = "...Not Important...";
  };
  system = builtins.currentSystem;
}
export PATH="$gcc/bin:$gnumake/bin:$coreutils/bin:...
$src/configure --prefix=$out
make
make install
with (import <nixpkgs> {});
stdenv.mkDerivation {
    pname = "hello";
    version = "2.10";
    src = fetchTarball {
        sha256 = "...Not Important...";
    };
Install it

- Run `nix build -f default.nix`
- Take a look in `result` to make sure it built correctly
- Run `nix-env -f default.nix -i hello`
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What just happened?
Symlinks!
Removing a package!
Easy right?

nix-env --uninstall hello
Garbage Collection

nix-collect-garbage
nix-collect-garbage

nix-collect-garbage -d Once you’re certain your new profile works
But why?
Nixpkgs
What is it?

- A (git) repository of packages used by Nix/Nixos by default

- Has versioned releases and an unstable rolling branch

- Contains packages you would expect from a package manager

- A collection of modules for Nixos

- Also a TON of library functions for packaging and modules
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Nixos
Nix has a pretty cool way of packaging...
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What if your entire OS were a package!

Nixos is some bootstrapping scripts + nixos-rebuild + Nixpkgs
Low level primitives

A few low level nix functions + scripts dynamically create the right directory structure

- system.build.toplevel = The contents of the system profile
- system.build.installBootLoader = A script run on sudo nixos-rebuild boot|switch
- environment.etc = dictionary of files to symlink in /etc
- environment.pathsToLink = directories to symlink in $systemProfile/sw
What might a config look like?
Nix-shell
Since nix runs on Linux/OSX, you can easily share development/build environments.

Given a shell.nix file, you can be sure a user will have all dependencies and/or dev dependencies.