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Learning Lab:
Using Chainguard's Static Images with Compiled Languages

Meet Your Trainer

- DevRel Engineer at Chainguard
- Wrote "Using Docker" for O'Reilly

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Adrian Mouat

Agenda

- Intro to CVEs
- Intro to Chainguard Images
- Show our example image
- Migrate to Chainguard equivalent
- Using Multistage Builds
- Wrap-up

Prerequisites

- Docker installed
  - Podman should also work
- Basic container knowledge
  - `docker run`
- Git installed

artbleed Bug

d Bug is a serious vulnerability in the popular OpenSSL
software library. This weakness allows stealing the
otected, under normal conditions, by the SSL/TLS
d to secure the Internet. SSL/TLS provides communication
ivacy over the Internet for applications such as web, email,
ing (IM) and some virtual private networks (VPNs).

d bug allows anyone on the Internet to read the memory of
otected by the vulnerable versions of the OpenSSL
compromises the secret keys used to identify the service
o encrypt the traffic, the names and passwords of the
ctual content. This allows attackers to eavesdrop
s, steal data directly from the services and users and to
rvices and users.

HEARTBLEED PROJECT

SCAN

Vulnerability	Severity	Package
CVE-2018-5709	Negligible	krb5
CVE-2018-7738	Negligible	util-linux
CVE-2016-10228	Negligible	glibc
CVE-2019-7309	Negligible	glibc
E-2017-7245	Negligible	pcre3
7-7246	Negligible	pcre3
0654	Negligible	libtasn1-6
	Medium	krb5
	Medium	glibc
CV	Medium	libonig
CVE-2019-1	Medium	gnupg2

Customers trust us as the safe source for open source.

Our customers build software efficiently and securely from the start.

We can do this because of our team. It's the same team that created widely adopted open source projects like Kubernetes, Sigstore, SLSA, and Google Distroless.

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Chainguard Works with Customers Across Critical Industries:

Software

Canva, CLOUDERA, GitLab, Figma, CONFLUENT, appian, ROBLOX, DELL Technologies, elastic, Hewlett Packard Enterprise, GONG, Seismic, Ironclad

Health & Bio

AETION, dexcom, GoHealth, Humana, lifebit, Optum

Security

okta, WIZ, zscaler, cyera, Abnormal, jamf, onetrust, Checkmarx, GitGuardian, bugcrowd, RELIAQUEST, 1KOSMOS

FinServ

Capital One, ADP, FIDELITY NATIONAL FINANCIAL, ANZ, BNP PARIBAS, ABSA, intuit, VPBank, Thomson Reuters

Public Sector

NASA, CDC, CMS, Department for Work & Pensions, CDAO

Defense & Safety

ANDURIL, ASI AIR SPACE INTELLIGENCE, Booz | Allen | Hamilton, Defense Unicorns, 2F, AXON, SHIFT5

Data & AI

Palantir, C3.ai, snowflake, LexisNexis, scale, precisely, DataRobot, fiddler, securiti, HIDDENLAYER, yurts

F500

American Airlines, Ford, mastercard, CISCO, TESLA, Prudential, The Home Depot, Hapag-Lloyd, CENTENE Corporation, CBRE, coupang

Chainguard Images

- Dedicated OS-Level STIG
- Kernel Independent FIPS
- HTML OSCAP Scan Reports
- SLAs for CVE Remediation
- Zero CVEs
- Minimal Attack Surface
- All Maintained Versions
- SBOMs and Attestation

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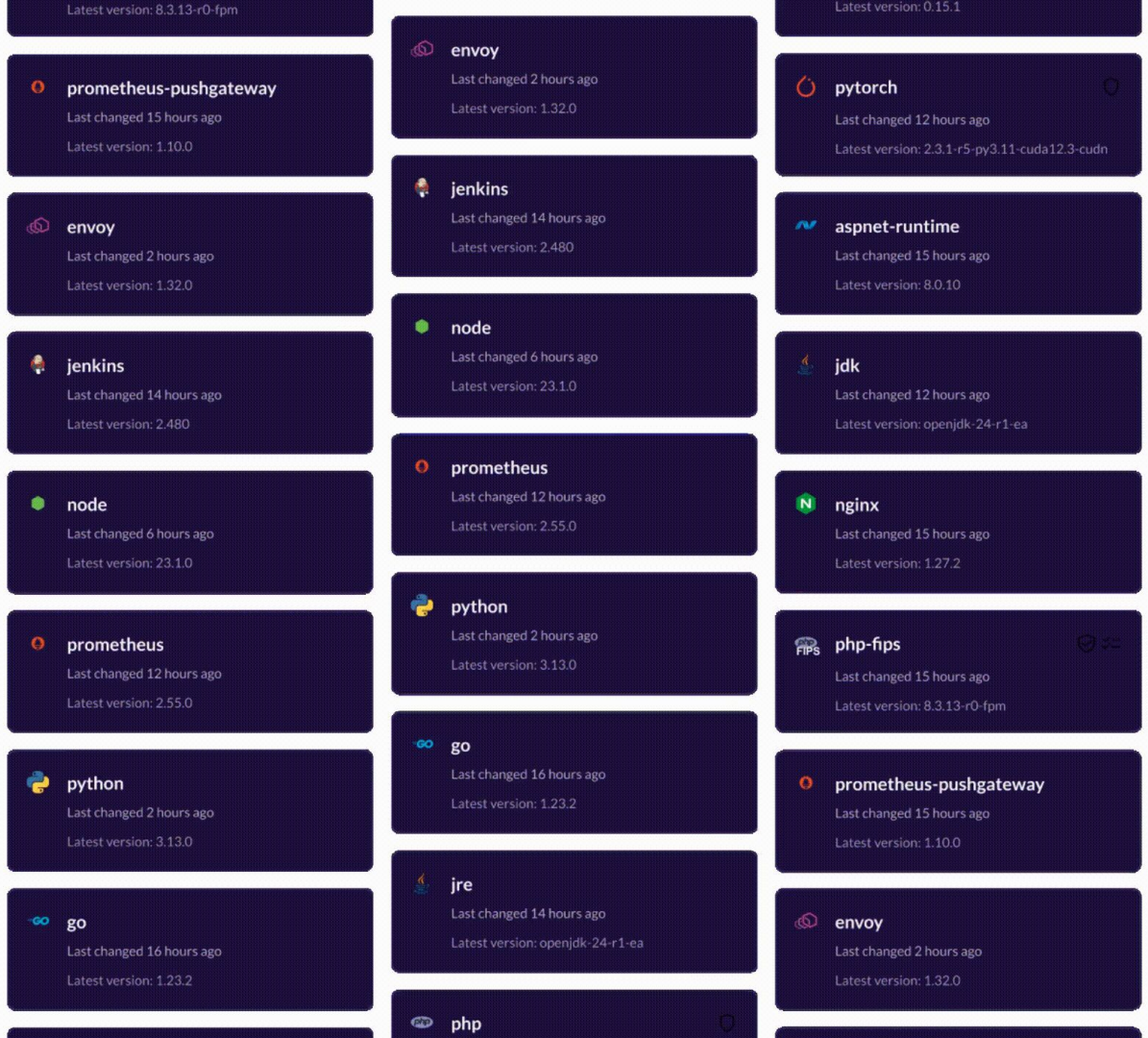


Chainguard

`cgr.dev/chainguard-private/python:latest`

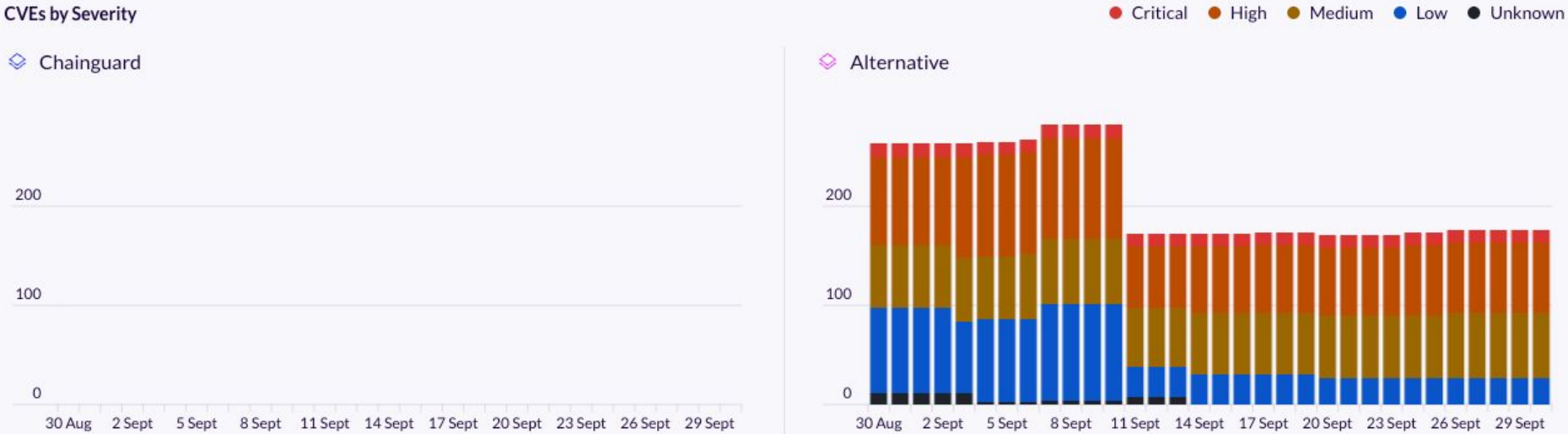
Latest CVE count	Daily average	Compressed size
0	0	22.39 MB

Alternative

`python:latest`

Latest CVE count	Daily average	Compressed size
176	210	392.85 MB

CVEs by Severity



~~Shift Left.~~ Start Left.

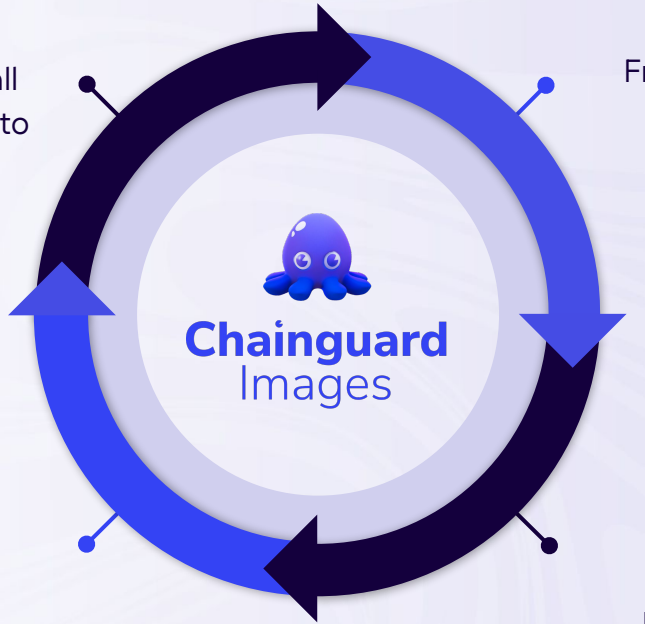
Delivered & Verified

Images with SBOMs attestations all signed with Sigstore and delivered to your registry of choice.

Rebuilt Daily

From upstream open source projects and minimized.

Wolfi



Scan & Patch CVEs

To fix any known or new vulnerabilities.

Check Behavior

Changes in behavior between package versions are checked.

Practical

- Switching to a Chainguard Image
- Grab the code from:
  - https://github.com/chainguard-dev/learning-labs-static/

Results

Build Based On	Size (MB)	CVEs (Grype)	CVEs (Scout)
golang	1330	329	72
cgr.dev/chainguard/go	1220	0	0
cgr.dev/chainguard/static	18	0	0

So what is this "static" thing?

- Dynamic binaries
  - Link against other libraries
  - Often system libraries
- Static binaries are fully self contained
- Rust and Go code itself is statically linked
  - **Except** against system libraries

glibc and musl

- `glibc` is the "standard" Linux C library
  - But isn't good for static linking
  - Variant images available
- `musl` is an alternative C library
  - Can be statically linked
  - Sometimes compatibility concerns

Static Variants

- Sometimes need a few common libraries
- Almost static?!
- cgr.dev/chainguard/cc-dynamic
  - `glibc, libgcc`
- cgr.dev/chainguard/glibc-dynamic
  - `glibc, libgcc, libstdc++`

A word on FIPS

- FIPS is not covered by this lab
- You are responsible for creating binaries and images which solely use FIPS cryptography
- go-fips image
  - Overview and advice
- glibc-openssl-fips image
  - Possibly useful as a base in multistage

Static Binaries and Rust

- `cgr.dev/chainguard/glibc-dynamic` image should work
- Otherwise use musl target
  - E.g. `cargo build \`

    `--target=x86_64-unknown-linux-musl`

What's "distroless"?

- Chainguard Images are often described as distroless
  - Contain minimum number of dependencies
  - No shell or package manager by default
  - But `latest-dev` variants available

Practical 2

- Debugging Distroless Containers

Debugging Distroless

- Note `latest-dev` variants
- Docker Debug
- Ephemeral containers
- cdebug

How we keep out CVEs

- Cut down dependencies
- Keep things up-to-date
- Apply patches when necessary
- Issue Security Advisories

Wrap Up

- Simple to change to Chainguard Images
- Major advantages in size and security
- Large number of images available
  - Include `-dev` variants

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Learning Lab:
Chainguard Libraries for JavaScript

Oct 30 1PM ET

Further Resources

- Chainguard Images Directory
- Chainguard Academy
- Docker Debug
- cdebug
- Statically Linking Go