Supply Chain Security

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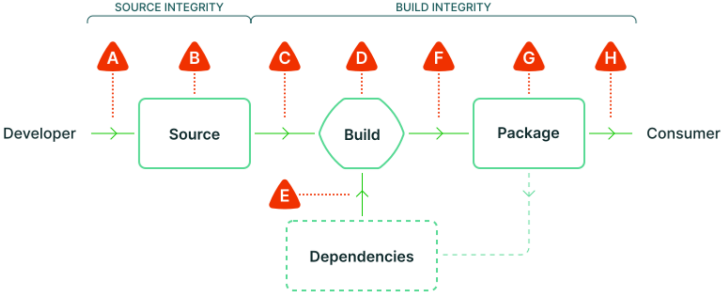
Outline

Problem statement



A Submit unauthorized change

B Compromise source repo

C Build from modified source

D Compromise build process

E Use compromised dependency

F Upload modified package

G Compromise package repo

H Use compromised package

image src: `https://slsa.dev/spec/v0.1/#supply-chain-threats`

Breach cases

TODO: This one is just an example. Work needed.

1959 CIA intercepted a USSR lunar probe

`https://www.cia.gov/readingroom/collection/lunik-loan-space-age-spy-story`

2014 3rd party vendor credential leak on Home Depot's credit card terminals

`https://www.computerweekly.com/news/2240234281/Home-Depot-traces-credit-card-data-hack-to-supplier-comprom`

2021 backdoor in the open source PHP Git server

`https://news-web.php.net/php.internals/113838`

SLSA Framework

Source Integrity

Ensuring every change reflects the intent of producer.

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Availability

Ensuring that all code and change history are available for potential incident investigation.

Levels of Assurance

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Level 1

Easy to adopt, offering supply chain visibility and generating provenance

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Level 2

Minimal build integrity, minimal SW tampering protection

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Hardened infrastructure, trust integration

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Hardened infrastructure, trust integration

Level 4

The highest assurance of build integrity and dependency management

NixOS / Spectrum Build Environment

TODO: Build environment picture
Hydra -> BinCache -> Jenkins -> Release

- — TII GitHub
- — OpenSrc locations

NixOS SLSA Solution

Hydra package signing

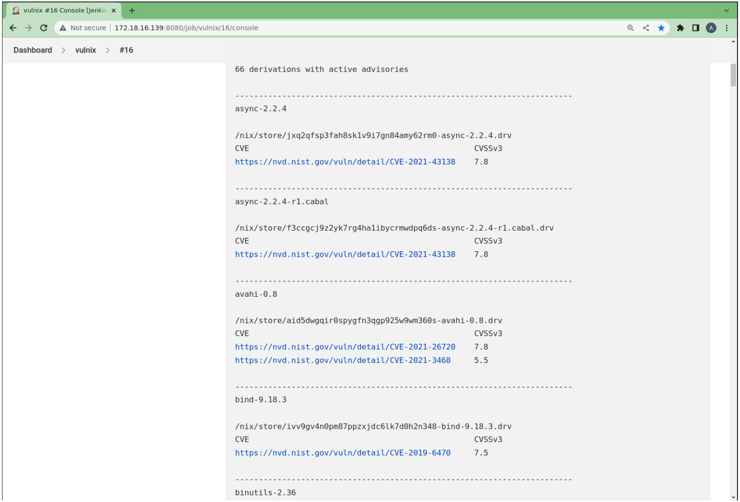
Binary cache package signing

Jenkins package signature verification

SCA (Software Composition Analysis)

- Automated process that defines the open source software in the codebase.
- Companies need to be aware of potential obligations, limitations and security vulnerabilities that open source brings into play.
- As the codebase grows, tracking all of those becomes rather tricky.
- SCA takes use of automatic scanners to enable productivity without compromise on security.

Look & Feel


vulnix #16 Console [Jenkin
Not secure
172.18.16.139:8080/job/vulnix/16/console
Dashboard
vulnix
#16

```
66 derivations with active advisories

------------------------------------------------------------------------
async-2.2.4

/nix/store/jxq2qfsp3fah8sk1v9i7gn84amy62rm0-async-2.2.4.drv
CVE                                                CVSSv3
https://nvd.nist.gov/vuln/detail/CVE-2021-43138    7.8

------------------------------------------------------------------------
async-2.2.4-r1.cabal

/nix/store/f3ccgcj9z2yk7rg4ha1ibycrmwdpq6ds-async-2.2.4-r1.cabal.drv
CVE                                                CVSSv3
https://nvd.nist.gov/vuln/detail/CVE-2021-43138    7.8

------------------------------------------------------------------------
avahi-0.8

/nix/store/aid5dwgqir0spygfn3qgp925w9wm360s-avahi-0.8.drv
CVE                                                CVSSv3
https://nvd.nist.gov/vuln/detail/CVE-2021-26720    7.8
https://nvd.nist.gov/vuln/detail/CVE-2021-3468     5.5

------------------------------------------------------------------------
bind-9.18.3

/nix/store/ivv9gv4n0pm87ppzxjdc6lk7d0h2n348-bind-9.18.3.drv
CVE                                                CVSSv3
https://nvd.nist.gov/vuln/detail/CVE-2019-6470     7.5

------------------------------------------------------------------------
binutils-2.36
```

[Vulnix] Theory of operation

- Pulls all known CVEs from NVD
- Matches a list of derivations against CVE entries
- Whitelisting is used to suppress unwanted results

[Vulnix] Pros & Cons

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Pros

- Fast
- Easy integration
- Written in Python - easy to maintain

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Cons

- Simplistic mapping can lead to false positives / negatives
- Inactive development