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SBOM & Attestations

New and Emerging Requirements for Software Vendors

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Introductions

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Software Supply Chain Attacks

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Poll: What do you currently do to secure your software supply chain?

- Check for vulnerabilities (CVEs)
- Consume individually signed software artifacts
- Use 3rd party solutions (SCA, SAST, DAST, etc.)
- Nothing yet, exploring options

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Securing the software supply chain requires more than just managing vulnerabilities (CVEs)

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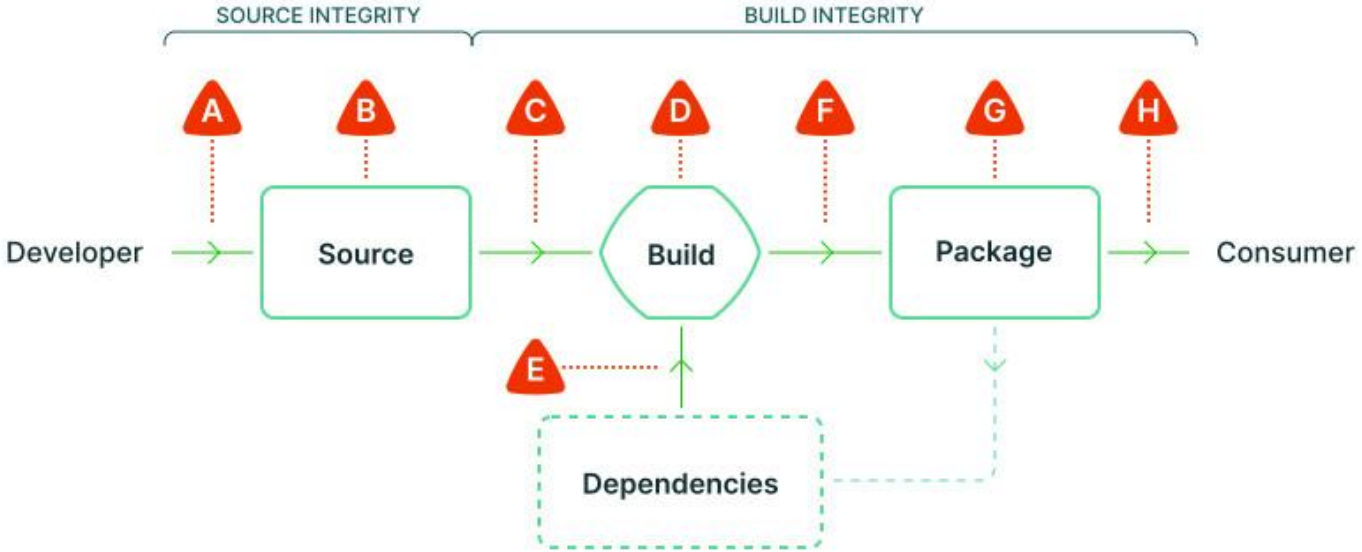
Next Gen Supply Chain Threats



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

Source: SLSA.dev

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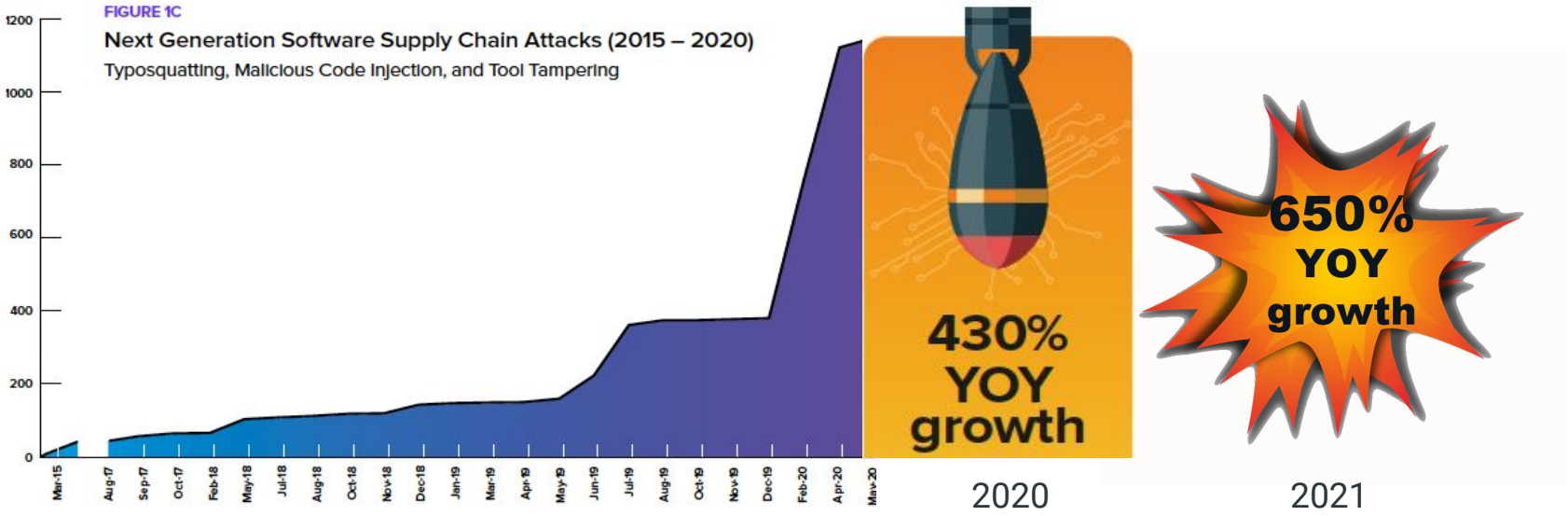
430% YoY growth in **Next Gen** Supply Chain Threats



Source: [Sonatype State of the Software Supply Chain 2021]

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Industry Examples

- Compiler attacks
- Target
- Stuxnet
- ATM malware
- NotPetya / M.E.Doc
- British Airways
- SolarWinds
- Microsoft Exchange Server
- Golden SAML
- Ransomware attacks

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Poll: Results

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The Response

BRIEFING ROOM

Executive Order on Improving the Nation's Cybersecurity

MAY 12, 2021 • PRESIDENTIAL ACTIONS

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. Policy. The United States faces persistent and increasingly sophisticated malicious cyber campaigns that threaten the public sector, the private sector, and ultimately the American people's security and privacy. The Federal Government must improve its efforts to identify, deter, protect against, detect, and respond to these actions and actors. The Federal Government must also carefully examine what occurred during any major cyber incident and apply lessons learned. But cybersecurity requires more than government action. Protecting our Nation from malicious cyber actors requires the Federal Government to partner with the private sector. The private sector must adapt to the continuously changing threat environment, ensure its products are built and operate securely, and partner with the Federal Government to foster a more secure cyberspace. In the end, the trust we place in our digital infrastructure should be proportional to how trustworthy and transparent that infrastructure is, and to the consequences we will incur if that trust is misplaced.

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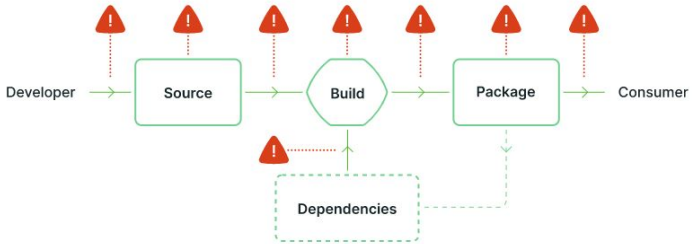
What is SLSA?

Supply chain Levels for Software Artifacts, or SLSA (salsa). It's a security framework, a check-list of standards and controls to prevent tampering, improve integrity, and secure packages and infrastructure in your projects, businesses or enterprises. It's how you get from safe enough to being as resilient as possible, at any link in the chain.

The supply chain problem

Any software can introduce vulnerabilities into a supply chain. As a system gets more complex, it's critical to already have checks and best practices in place to guarantee artifact integrity, that the source code you're relying on is the code you're actually using. Without solid foundations and a plan for the system as it grows, it's difficult to focus your efforts against tomorrow's next hack, breach or compromise.

▶ **More about supply chain attacks**



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The Dependency Problem

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Open Source Dependencies

- Open source components make up >75% of the code in the average app.
- The average app depends on more than 500 components.

VentureBeat Research

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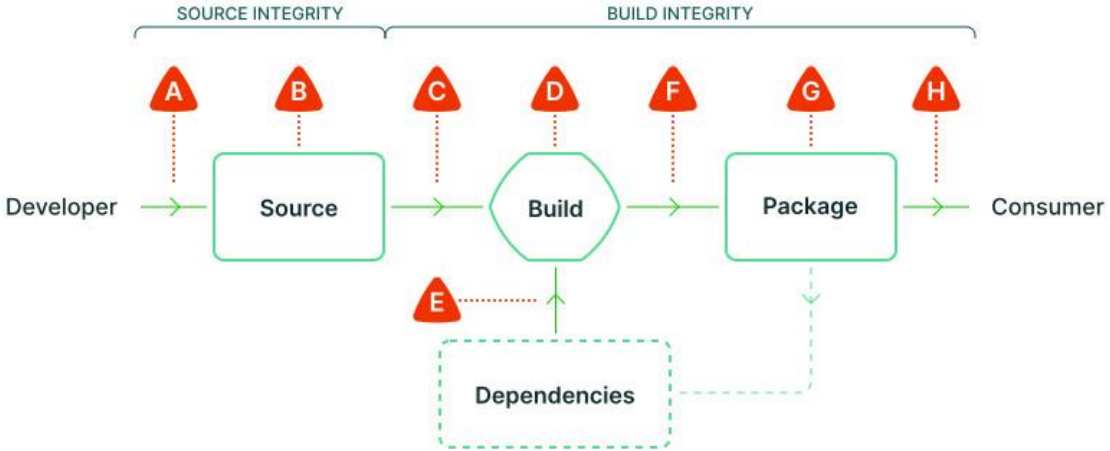
Dependency Threats



Source: SLSA.dev

Open Source Dependency Vendors

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Software Bill of Materials (SBOMs)

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Poll: What is your current experience with SBOMs?

- Checking for vulnerabilities (CVEs)
- Reviewing transitive dependencies
- Supplying to customers for regulatory purposes
- Reviewing open source license utilization
- Reviewing the age of my dependencies
- None of the above

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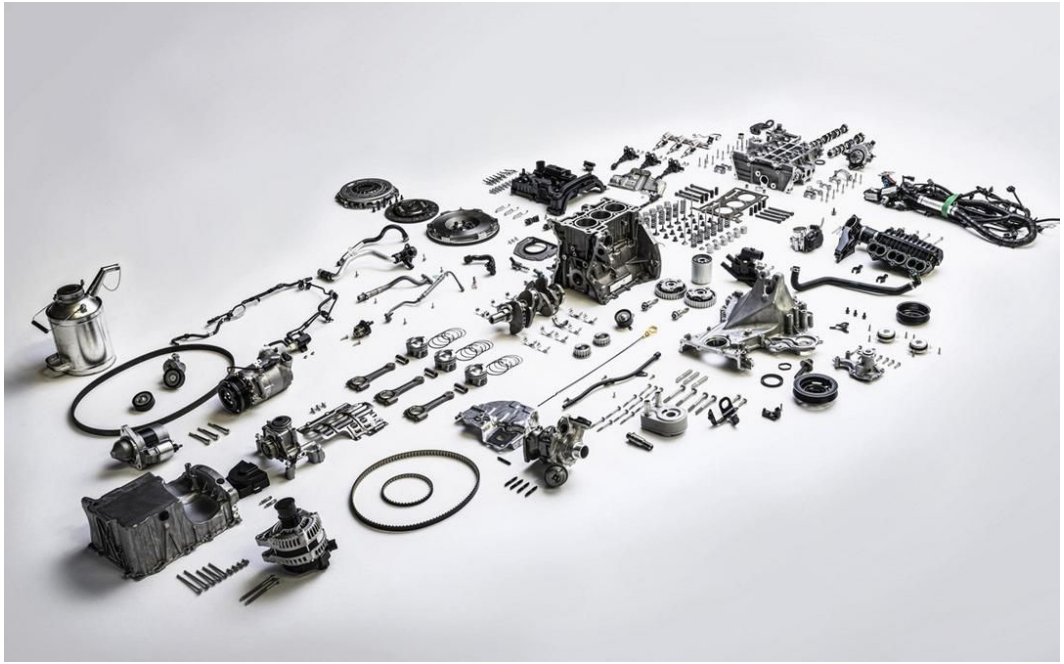
SBOMs - Listing of all the component parts that make up your software



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Elements of an SBOM

The Essentials

- Defines the open source libraries/packages/extensions used
- First party (in house code) used
- Versioning , licensing status

Other Aspects:

- Vulnerability information
- External services
- Component checksums (ex SHA-256 hash)
- The entire thing is signed by the provider

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SBOM Formats

Government Approved Formats (NIST)

- Software Package Data Exchange
- CycloneDX
- SWID

Common in Industry

- CSV
- JSON

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What do you use an SBOM for?

- **Visibility** into all the components that make up a software application.
- **Operational capacity** to resolve vulnerabilities and manage component life cycles (EOL)
- **Automate:** Run the SBOM through a tool (ex. Daggerboard, spdx-to-osv, dependency track) to identify vulnerabilities
- **Provide** as a requirement of regulation to your customers or auditor
- **Request** as a requirement from your software vendors for pre-purchase assurance

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Poll: Results

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Platform Demo - SBOM

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You can do this with a free account today

Documentation: https://docs.activestate.com/platform/projects/sbom/

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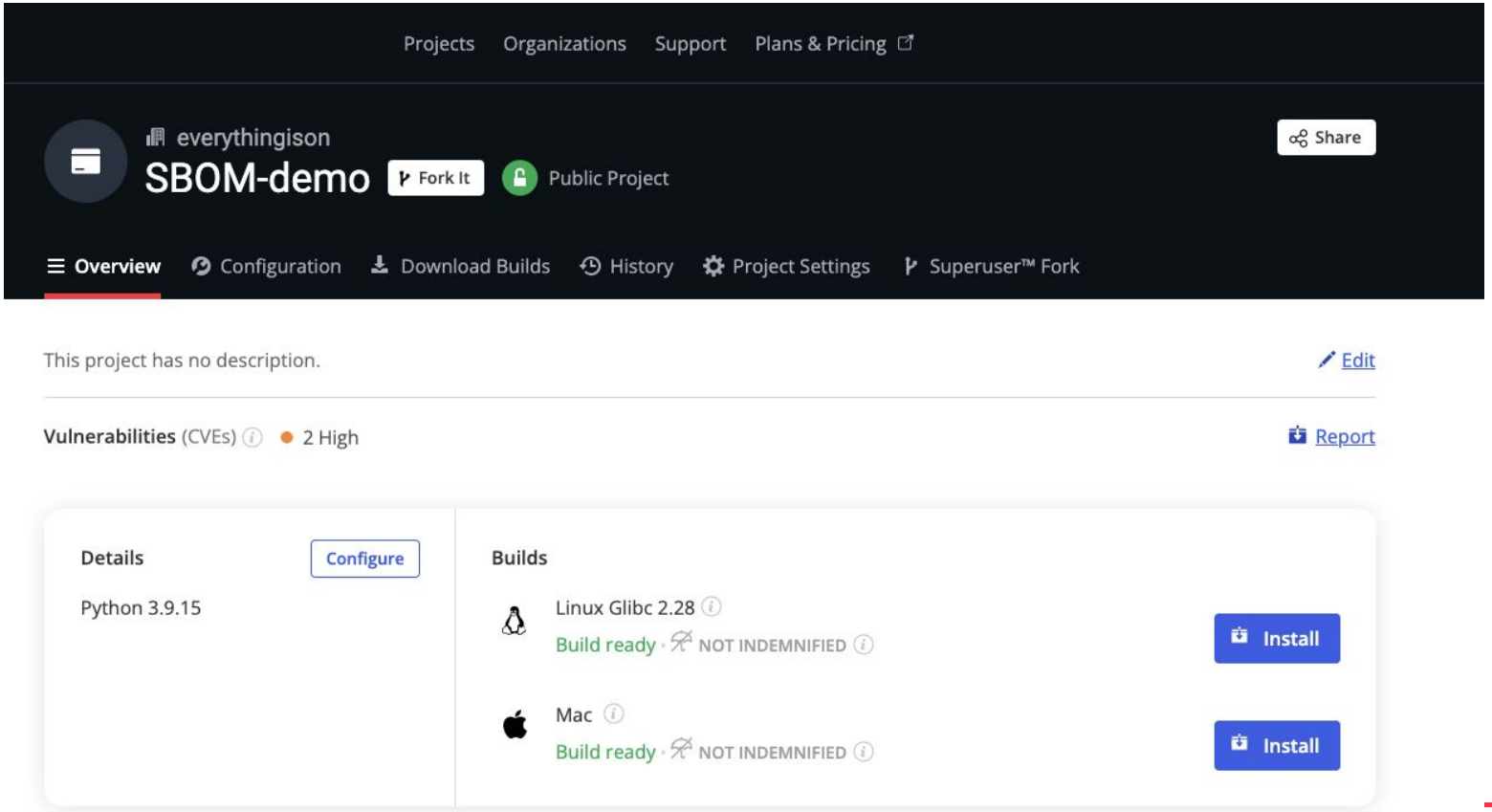
Project



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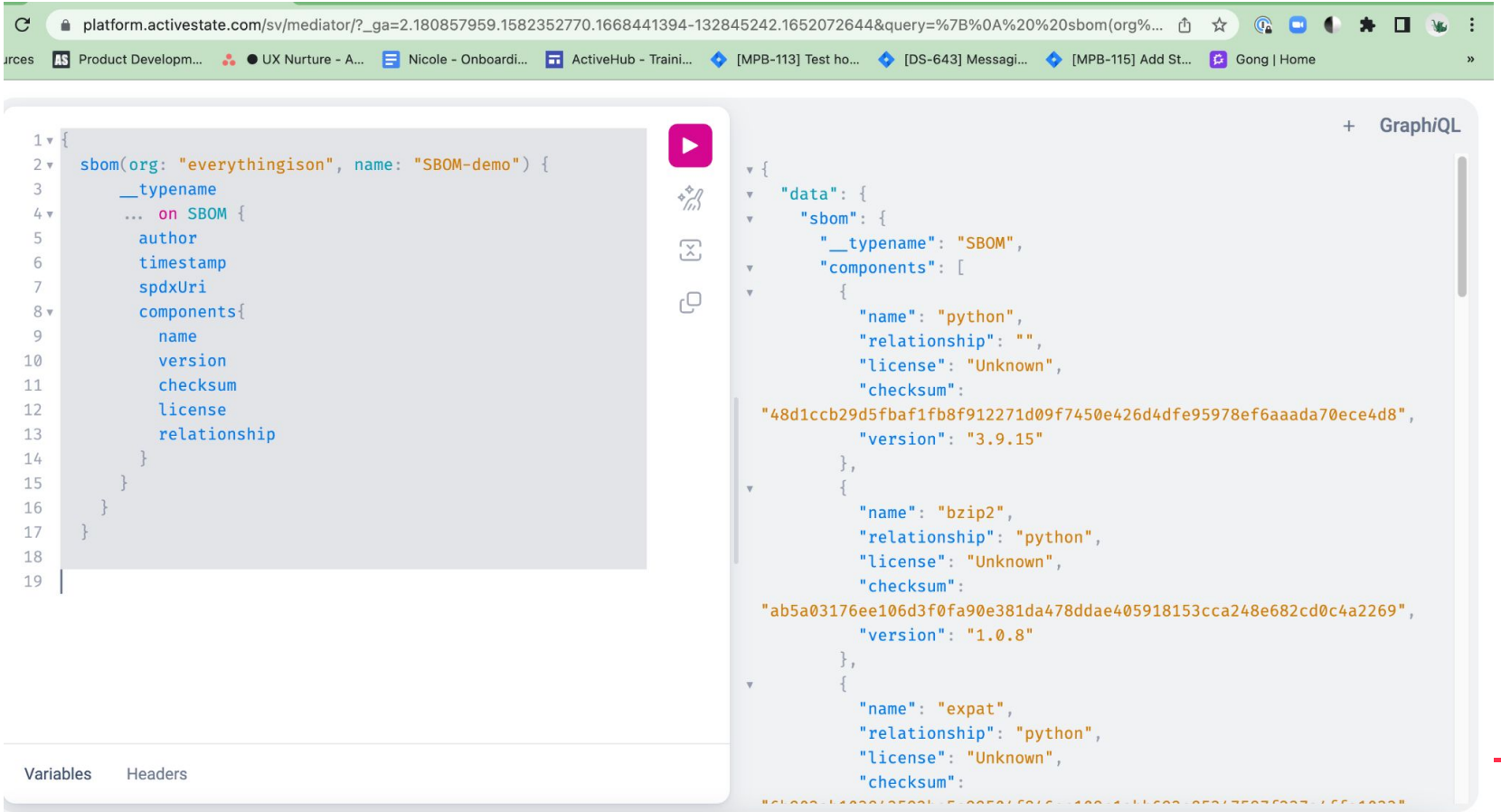
JSON Format



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```

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Attestations (SLSA)

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Poll: What is your current experience with software attestations?

- Heard of them
- Heard of them in relation to US regulatory requirements
- Looking into using or generating them
- Looking into them as part of meeting SLSA framework
- Haven’t heard of them

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Artifacts and Attestations

- **Artifact** - Any digital asset which forms part of a software supply chain.

  Source code, build scripts, installable binaries.
- **Attestation** - A statement about the provenance of an Artifact. Who created it,

  how, when and with what.
- **In-toto ITE-6** - The recommended format for attestations.
- **Non-Falsifiable** - SLSA levels 3 and above

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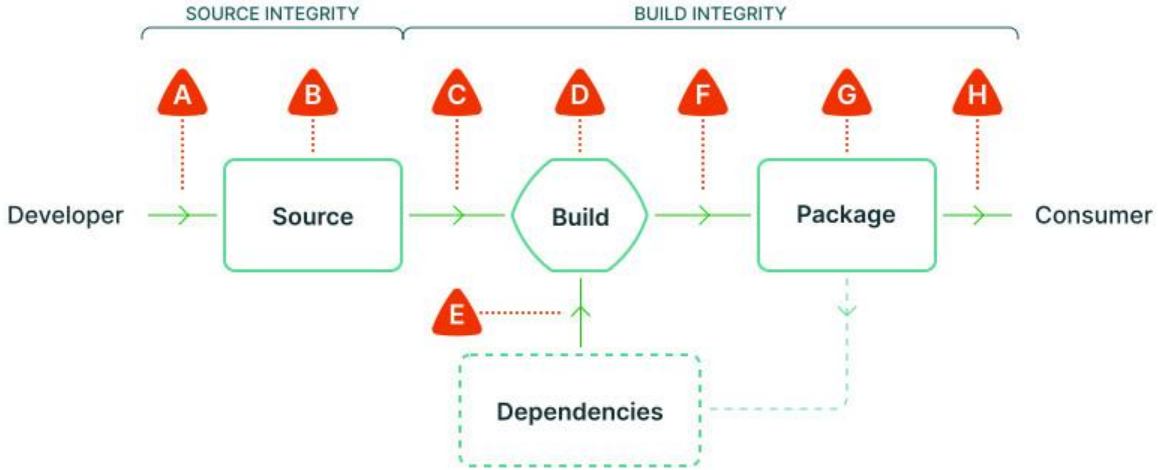
Dependency Threats



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Source: SLSA.dev

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SLSA - Addressing Supply Chain Security

- **SLSA** - Supply Chain Levels for Software Artifacts (https://slsa.dev/).
- **OSSF Initiative** - Operates under OSSF umbrella
- **Industry Backed** - Google, ChainGuard, Linux Foundation
- **Multiple Levels** - Levels providing increasing assurance.
  - 1 - Documentation of the build process
  - 2 - Tamper resistance of the build service
  - 3 - Extra resistance to specific threats
  - 4 - Highest levels of confidence and trust

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Secure Build Service

Requirement	SLSA 1	SLSA 2	SLSA 3	SLSA 4
Build - Scripted build	✓	✓	✓	✓
Build - Build service		✓	✓	✓
Build - Build as code			✓	✓
Build - Ephemeral environment			✓	✓
Build - Isolated			✓	✓
Build - Parameterless				✓
Build - Hermetic				✓
Build - Reproducible				○

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Dependency Vendoring Comparison

	Prebuilt?	Secure?	Up to Date?	Time & Resources
Public Repo (PyPI, npm, etc)	Yes	No	Yes	Low
Build It Yourself	No	Yes	Yes	High
ActiveState Platform	No	Yes	Yes	Low

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Poll: Results

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Platform Demo - Attestations

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Demo: Attestation

intoto — Attestation Document — -zsh — 129×42

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intoto — Attestation Document — -zsh — 129×42

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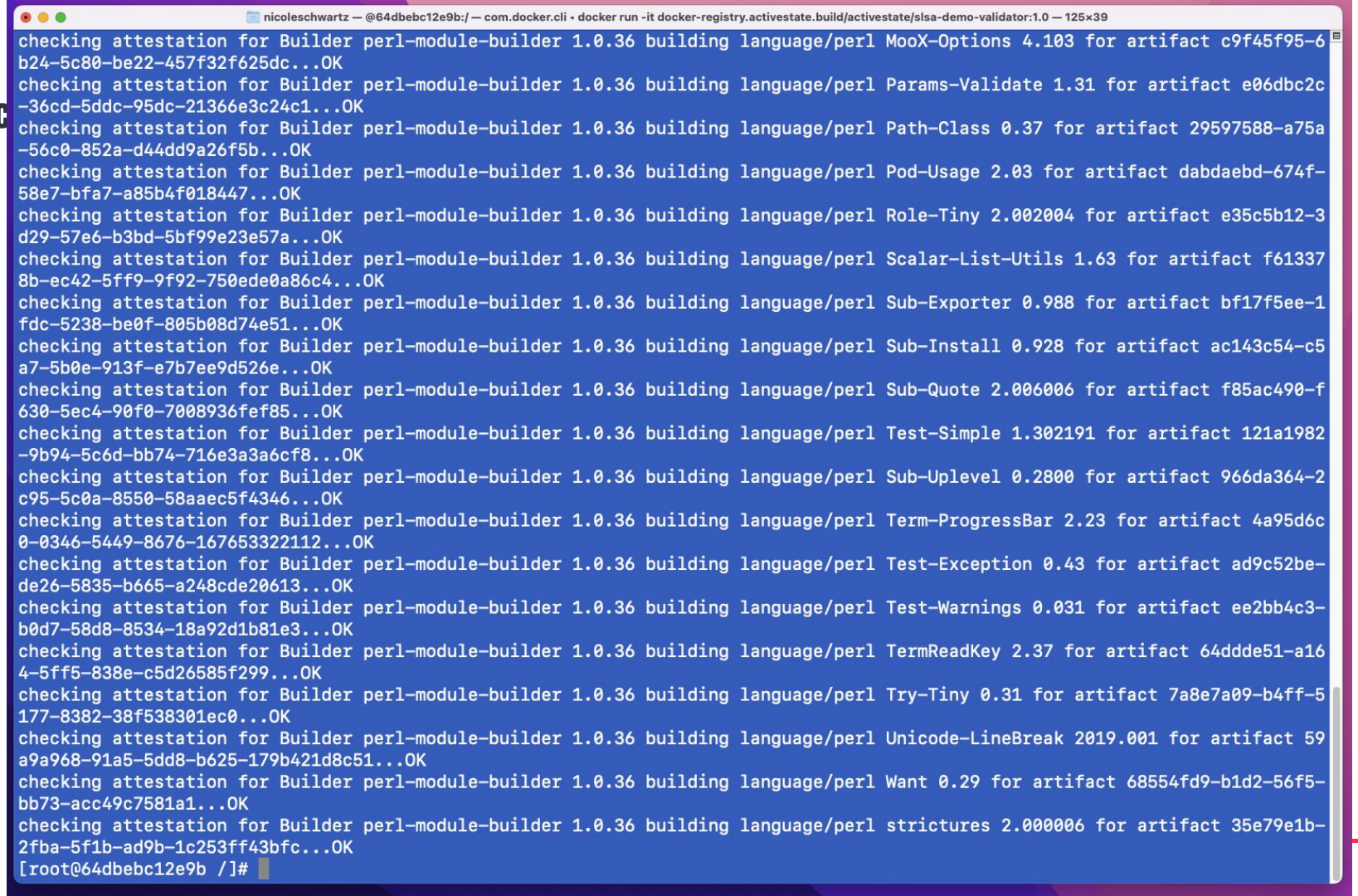

nicoleschwartz — @64dbebc12e9b:/ — com.docker.cli ◂ docker run -it docker-registry.activestate.build/activestate/slsa-demo-validator:1.0 — 125×39
checking attestation for Builder perl-module-builder 1.0.36 building language/perl MooX-Options 4.103 for artifact c9f45f95-6b24-5c80-be22-457f32f625dc...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Params-Validate 1.31 for artifact e06dbc2c-36cd-5ddc-95dc-21366e3c24c1...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Path-Class 0.37 for artifact 29597588-a75a-56c0-852a-d44dd9a26f5b...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Pod-Usage 2.03 for artifact dabdaebd-674f-58e7-bfa7-a85b4f018447...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Role-Tiny 2.002004 for artifact e35c5b12-3d29-57e6-b3bd-5bf99e23e57a...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Scalar-List-Utils 1.63 for artifact f613378b-ec42-5ff9-9f92-750ede0a86c4...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Sub-Exporter 0.988 for artifact bf17f5ee-1fdc-5238-be0f-805b08d74e51...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Sub-Install 0.928 for artifact ac143c54-c5a7-5b0e-913f-e7b7ee9d526e...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Sub-Quote 2.006006 for artifact f85ac490-f630-5ec4-90f0-7008936fef85...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Test-Simple 1.302191 for artifact 121a1982-9b94-5c6d-bb74-716e3a3a6cf8...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Sub-Uplevel 0.2800 for artifact 966da364-2c95-5c0a-8550-58aaec5f4346...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Term-ProgressBar 2.23 for artifact 4a95d6c0-0346-5449-8676-167653322112...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Test-Exception 0.43 for artifact ad9c52be-de26-5835-b665-a248cde20613...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Test-Warnings 0.031 for artifact ee2bb4c3-b0d7-58d8-8534-18a92d1b81e3...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl TermReadKey 2.37 for artifact 64ddde51-a164-5ff5-838e-c5d26585f299...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Try-Tiny 0.31 for artifact 7a8e7a09-b4ff-5177-8382-38f538301ec0...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Unicode-LineBreak 2019.001 for artifact 59a9a968-91a5-5dd8-b625-179b421d8c51...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl Want 0.29 for artifact 68554fd9-b1d2-56f5-bb73-acc49c7581a1...OK
checking attestation for Builder perl-module-builder 1.0.36 building language/perl strictures 2.000006 for artifact 35e79e1b-2fba-5f1b-ad9b-1c253ff43bfc...OK
[root@64dbebc12e9b /]#

ActiveState

Recap

ActiveState

Why are we doing this?

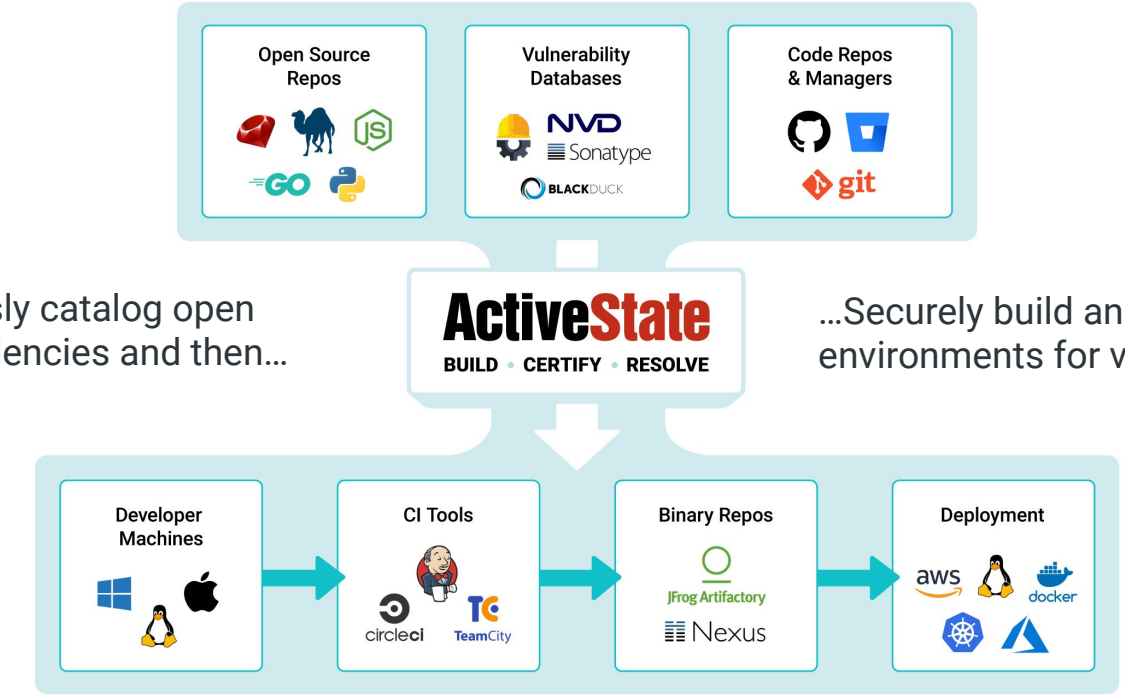
- All critical software that touches government data or systems in any way must be compliant with these new security standards no later than **June 12, 2023, 7 months from now.**
- And all software must adhere to these strict standards no later than September 14, 2023, 10 months from now.

For which you need:

- Software producer self-attestation (can use in-toto)
- SBOM

ActiveState

ActiveState Platform



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Q&A

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Next Steps

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