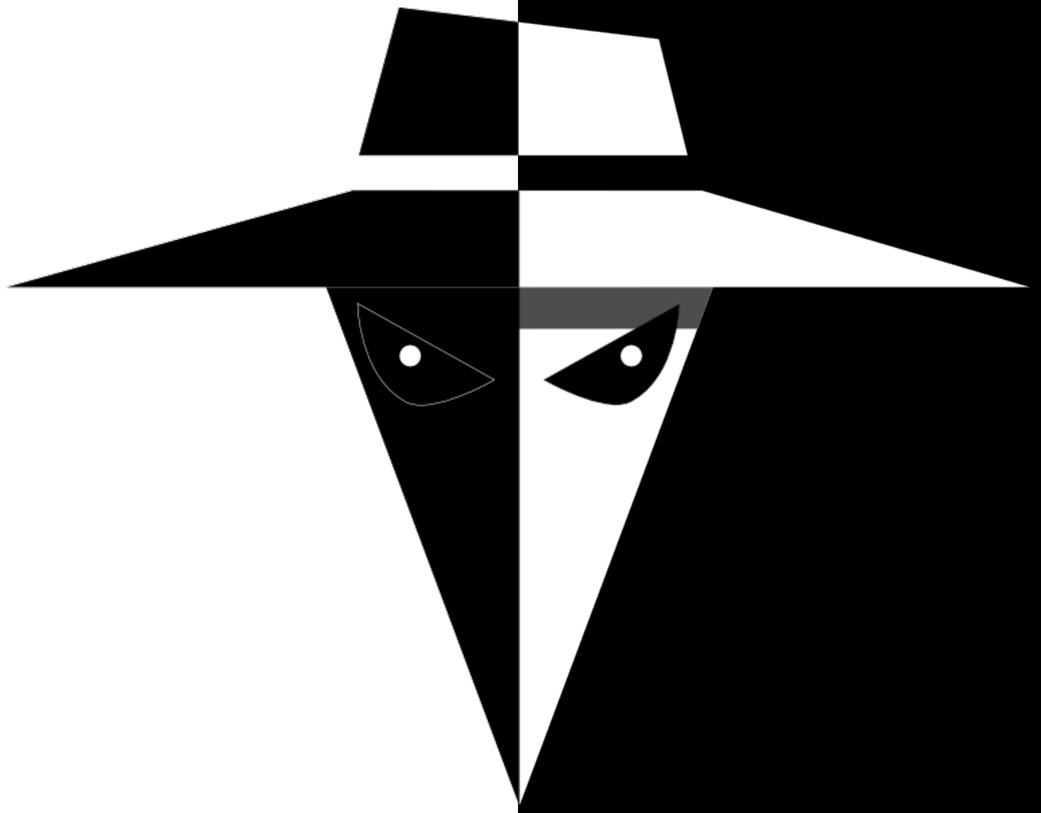
WARGAMES



JAVA VULNERABILITIES AND WHY YOU SHOULD CARE

ABOUT ME.

Gerrit Grunwald | Developer Advocate | Azul | @hansolo_

I AM A DEVELOPER

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NOT A SECURITY EXPERT

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24TH NOVEMBER 2021

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LOG4SHELL

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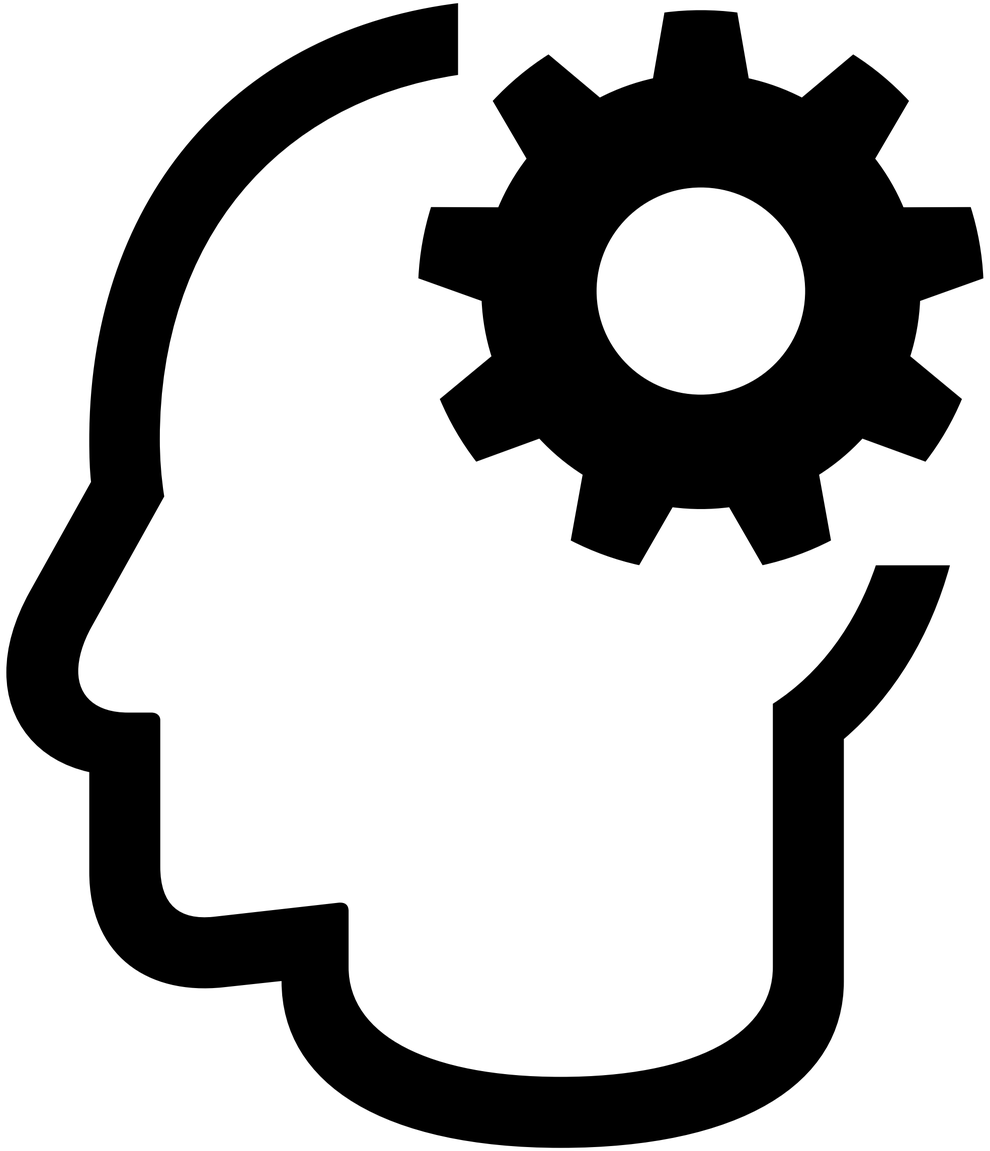

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20TH CENTURY

Software landscape

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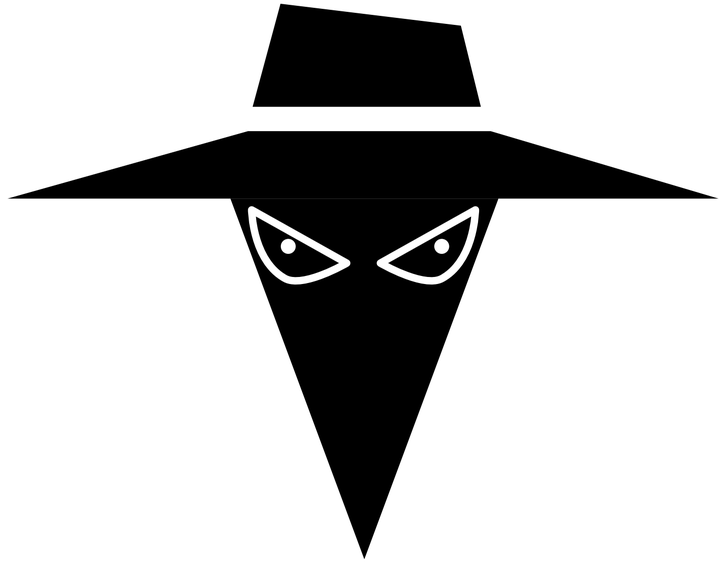
20TH CENTURY

Software landscape

- Code was self written and closed source
- Source code was managed in a repository on a local server
- Manually build
- Delivered on hardware (CD, DVD, USB-Sticks)
- Ran on closed networks or local servers
- Large monolithic systems
- Connected systems only in government / banking / energy providers
- Full control over the source code



20TH CENTURY VULNERABILITIES

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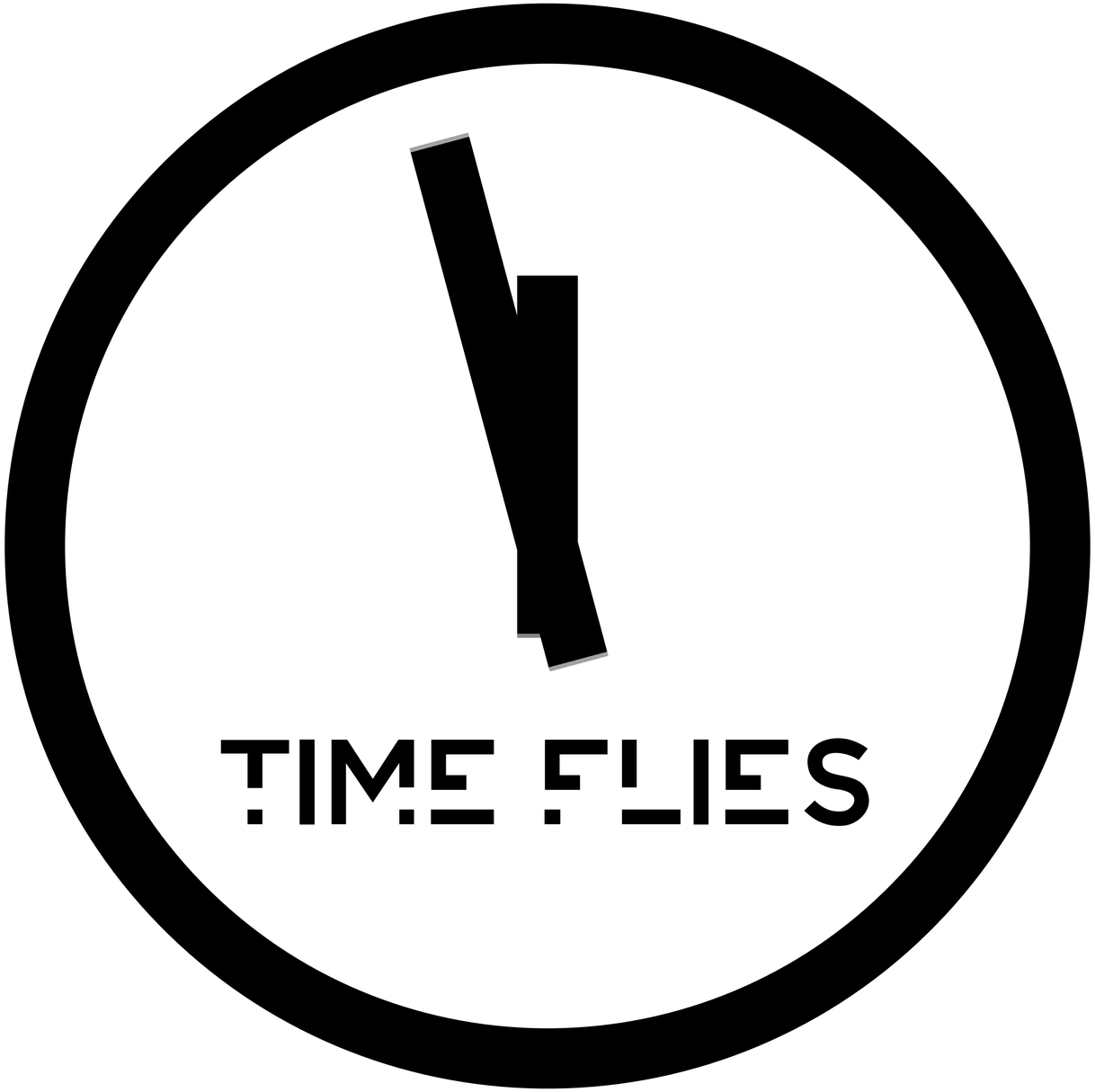
20TH CENTURY VULNERABILITIES

Vulnerabilities

- Password hacking / cracking
- Computer viruses (spread via floppy discs/usb sticks)
- Early days of hacking via internet



21ST CENTURY

Software landscape

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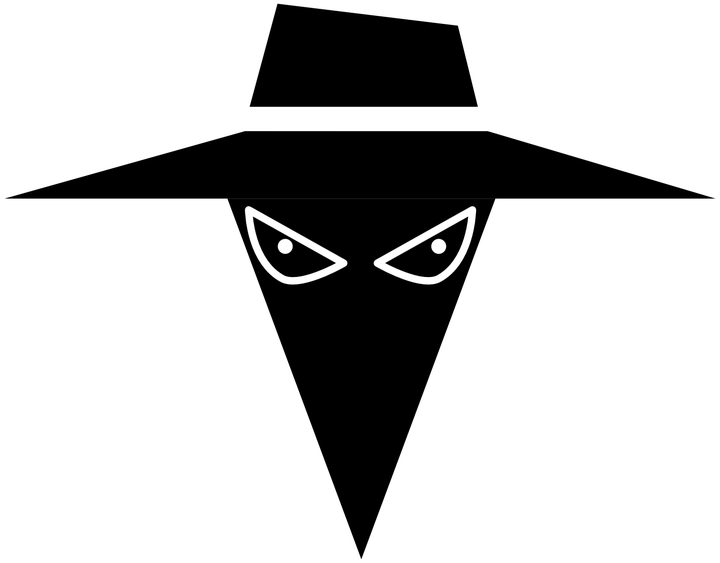
21ST CENTURY

Software landscape

- A lot of open source software used
- Distributed source code management systems
- Automated builds by CI / CD systems
- Hosted in artifact repositories
- Running on public networks
- Accessible via browsers or api's
- "Everything" is connected
- No full control over the source code
- Today we have a whole software supply chain



21ST CENTURY VULNERABILITIES

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21ST CENTURY VULNERABILITIES

Vulnerabilities

- Danger through Social Engineering (SIM swapping etc.)
- Malware / Ransomware (spread via mail / websites)
- Everything that is connected, will be hacked
- Spreading malicious code is way easier
- The whole software supply chain is target of attacks

SOME DEFINITIONS

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CWE

Common Weakness Enumeration

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CWE

Common Weakness Enumeration

https://cwe.mitre.org/

Community developed list of software and hardware weakness types.

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NVD

National Vulnerability Database

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NVD

National Vulnerability Database

https://nvd.nist.gov/

U.S. government repository of standards based vulnerability management data, represented using the Security Content Automation Protocol (SCAP)

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CVE

Common Vulnerability + Exposure

CVE

Common Vulnerability + Exposure

https://cve.org/

CVE Program Mission

"Identify, define, and catalog publicly disclosed cybersecurity vulnerabilities"

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LOG4SHELL

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CVE-2021-44228

CVE-2021-44228

Log4Shell

https://nvd.nist.gov/vuln/detail/CVE-2021-44228

Apache Log4j2 2.0-beta9 through 2.15.0 (excluding security releases 2.12.2, 2.12.3, and 2.3.1) JNDI features used in configuration, log messages, and parameters do not protect against attacker controlled LDAP and other JNDI related endpoints. An attacker who can control log messages or log message parameters can execute arbitrary code loaded from LDAP servers when message lookup substitution is enabled. From log4j 2.15.0, this behavior has been disabled by default. From version 2.16.0 (along with 2.12.2, 2.12.3, and 2.3.1), this functionality has been completely removed. Note that this vulnerability is specific to log4j-core and does not affect log4net, log4cxx, or other Apache Logging Services projects.

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CVE-2021-44228

Log4Shell

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Versions affected

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CVE-2021-44228

Log4Shell

https://nvd.nist.gov/vuln/detail/CVE-2021-44228

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The vulnerability

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CVE-2021-44228

Log4Shell

https://nvd.nist.gov/vuln/detail/CVE-2021-44228

Apache Log4j2 2.0-beta9 through 2.15.0 (excluding security releases 2.12.2, 2.12.3, and 2.3.1) JNDI features used in configuration, log messages, and parameters do not protect against attacker controlled LDAP and other JNDI related endpoints. An attacker who can control log messages or log message parameters can execute arbitrary code loaded from LDAP servers when message lookup substitution is enabled.

Description

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CVSS

Common Vulnerability Severity Score

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CVSS

Common Vulnerability Severity Score

https://nvd.nist.gov/vuln-metrics/cvss

Vulnerability Severity Ratings (CVSS v2.0)

Severity	Score
Low	0.0 - 3.9
Medium	4.0 - 6.9
High	7.0 - 10.0

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CVSS

Common Vulnerability Severity Score

https://nvd.nist.gov/vuln-metrics/cvss

Vulnerability Severity Ratings (CVSS v3.1)

CVSS v4.0
1st Nov 2023

Severity	Score
None	0.0
Low	0.1 - 3.9
Medium	4.0 - 6.9
High	7.0 - 8.9
Critical	9.0 - 10.0

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CVSS

CVE-2021-44228 (Log4Shell)

https://nvd.nist.gov/vuln/detail/CVE-2021-44228

CVSS v2.0

Severity	Score
High	9.3

CVSS v3.1

Severity	Score
Critical	10.0

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IS JAVA SECURE ?

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OPENJDK VULNERABILITY GROUP

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OPENJDK VULNERABILITY GROUP

What is it...?

- Private forum (trusted members of the OpenJDK community)
- Receives/reviews reports of vulnerabilities in the OpenJDK code base
- Collaborates on fixing the issues
- Coordinates the release of such fixes
- Maintains list of CVE's patched for each release
- Tracks CVE's by component (not all Java users leverage every component)
- Discusses OpenJDK security related issues
- Does not actively test the OpenJDK source code

OPENJDK VULNERABILITY ADVISORIES

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VULNERABILITY

ADVISORIES

https://openjdk.org/groups/vulnerability/advisories/

OpenJDK Vulnerability Adivsories

Published 4x a year

Describing
- Severity
- Area
- Affected versions

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OPENJDK VULNERABILITY ADVISORIES

Example 17th of October 2023

OpenJDK Risk matrix

CVE ID	Component	CVSSv3.1 Vector	Affects ... 8	11	17	21
CVE-2023-22067	other-libs/ corba	5.3 NLNNUNLN	•			
CVE-2023-22081	security-libs/ javax.net.ssl	5.3 NLNNUNNL	•	•	•	•
CVE-2023-22025	hotspot/ compiler	3.7 NHNNUNLN			•	•

OpenJFX Risk matrix

CVE ID	Component	CVSSv3.1 Vector	Affects ... 11	17	21
None					

Acknowledgements

We acknowledge the following parties for their reports and contributions: Carter Kozak, and Dinglijie.

We also thank the Leads of the JDK 8 Updates, JDK 11 Updates, JDK 17 Updates, and OpenJFX Projects for providing the risk-matrix information for their releases.

How to report a vulnerability

Please see the reporting instructions for information about how to report a vulnerability.

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JAVA RELEASE CYCLE

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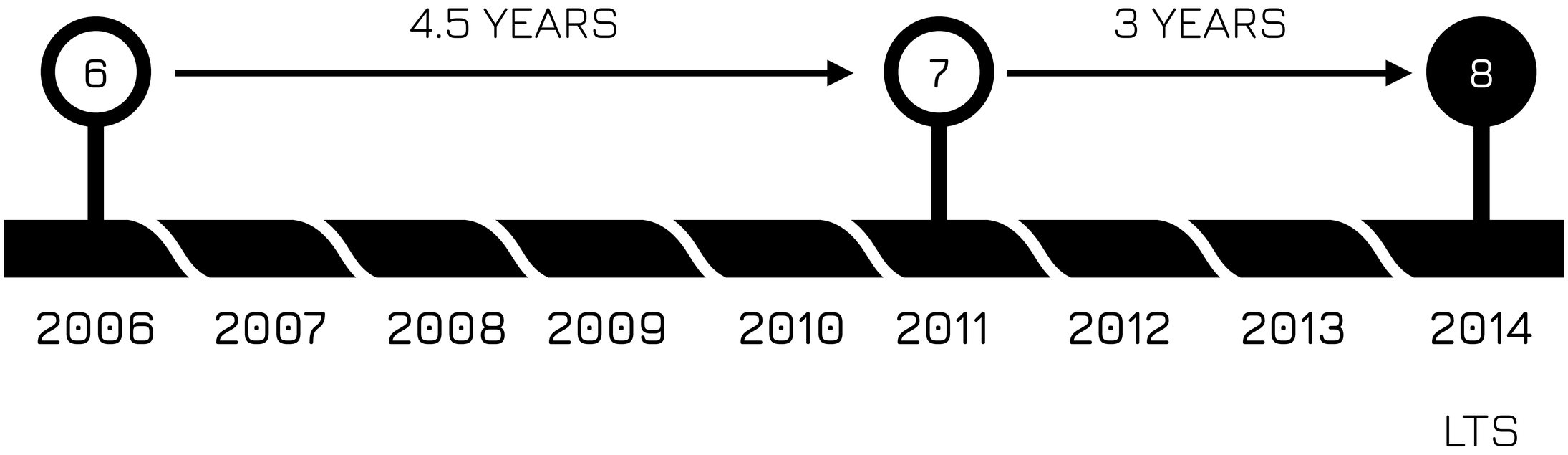
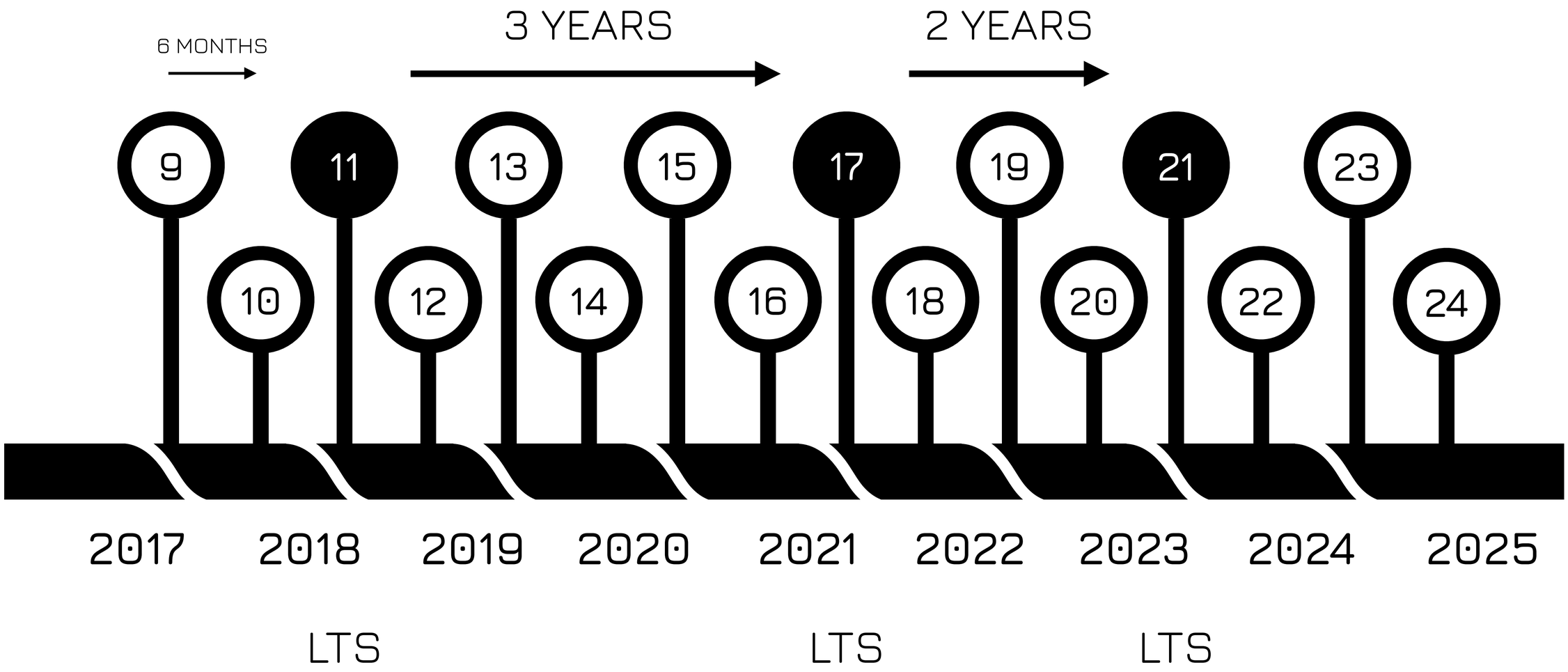
JAVA RELEASE CYCLE

Old Cadence



JAVA RELEASE CYCLE

New Cadence



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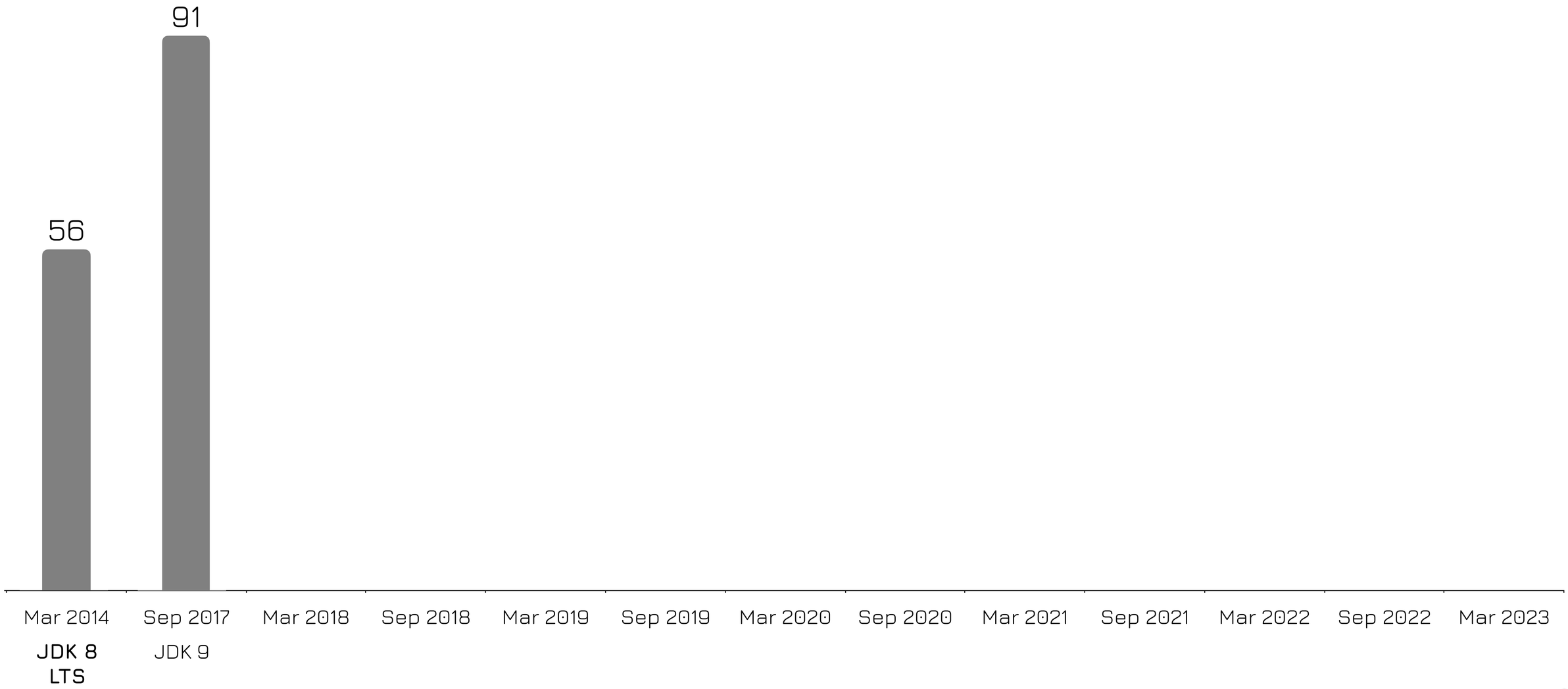
BUT HOW DOES THAT HELP ?

JAVA RELEASE CYCLE

Features per release



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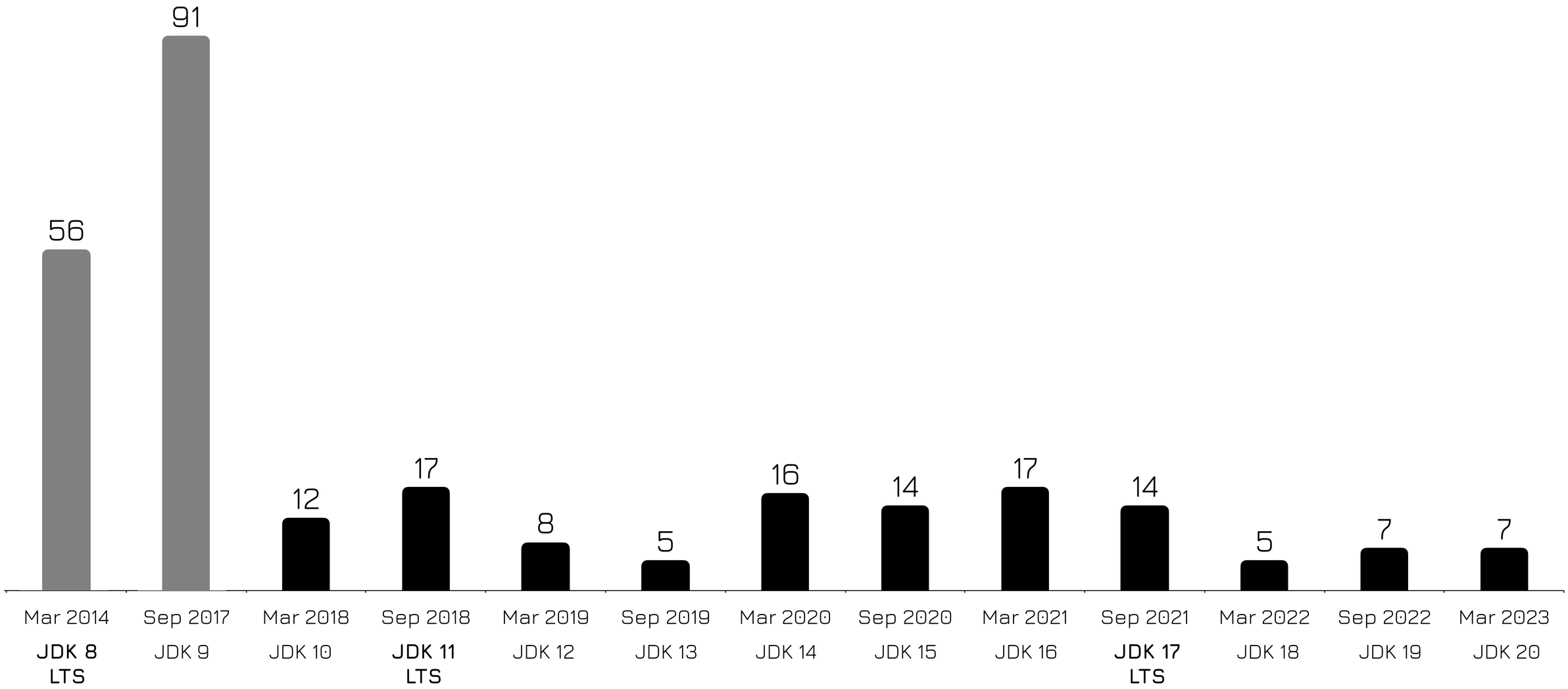
JAVA RELEASE CYCLE

Features per release



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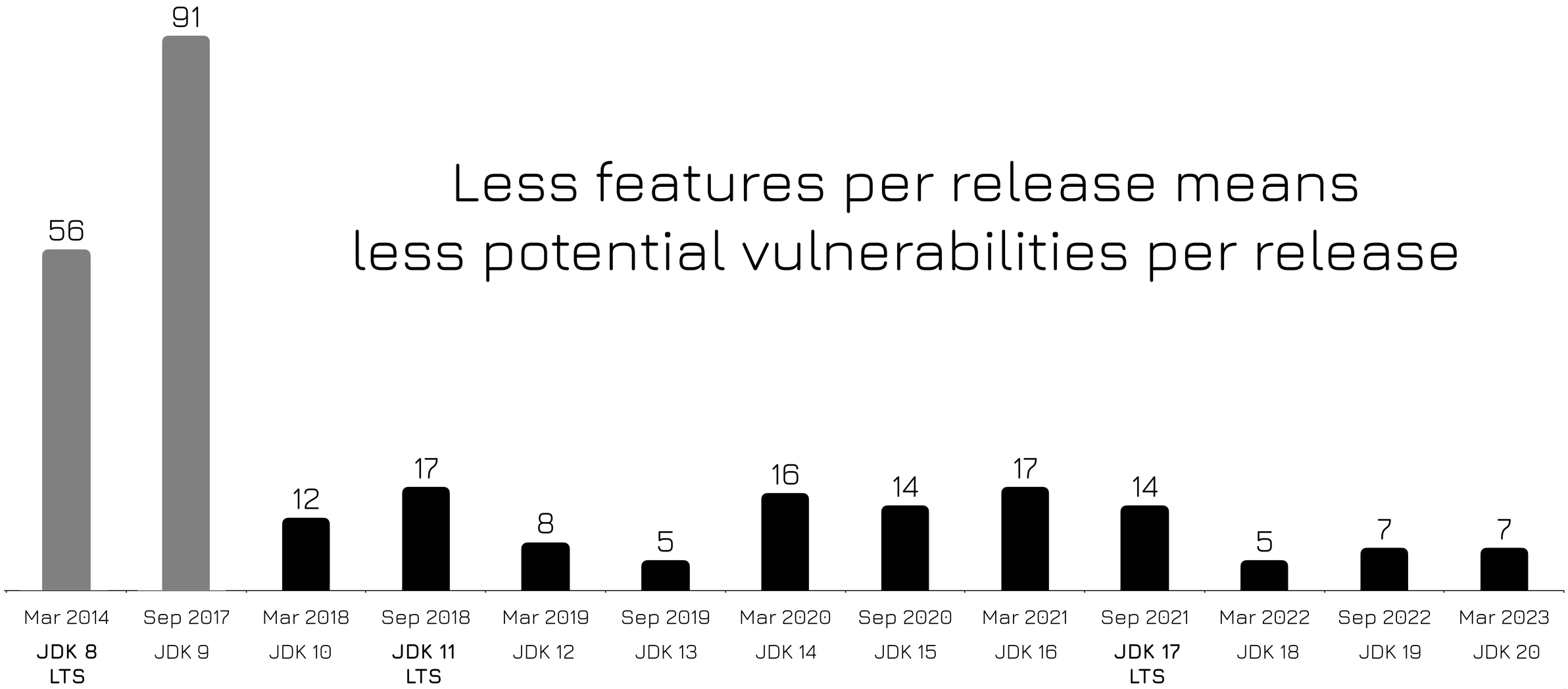
JAVA RELEASE CYCLE

Features per release



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JAVA UPDATES

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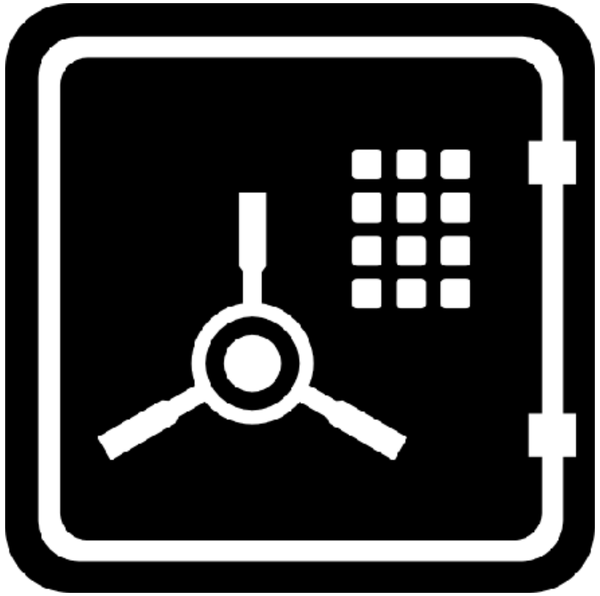
CPU

Critical Patch Update

CPU

Critical Patch Update



Safe to use in production

Contains

- Fixes vulnerabilities
- Fixes critical issues

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PSU

Patch Set Update

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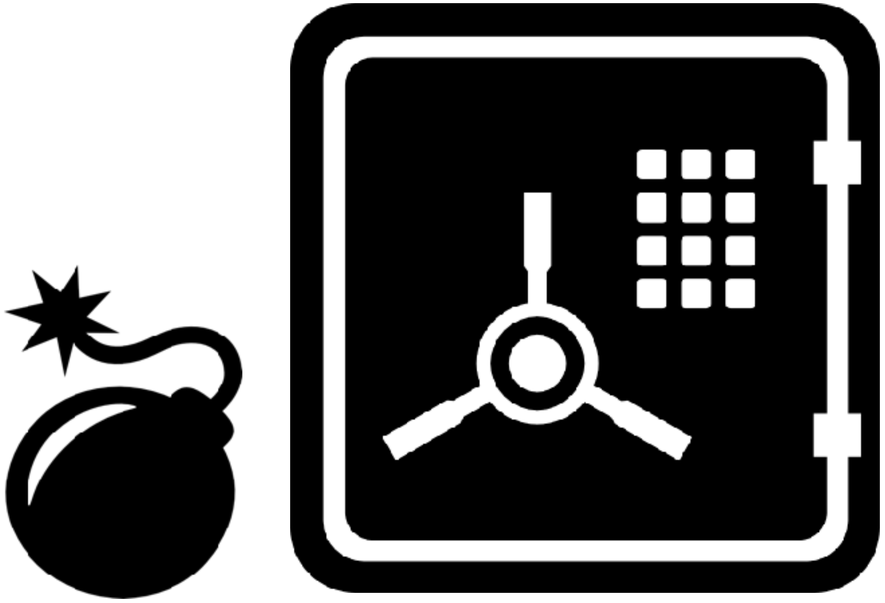
PSU

Patch Set Update



Could possibly introduce new vulnerabilities !!!

Superset of CPU

Contains

- Fixes vulnerabilities
- Fixes critical issues
- Fixes non critical issues
- New features

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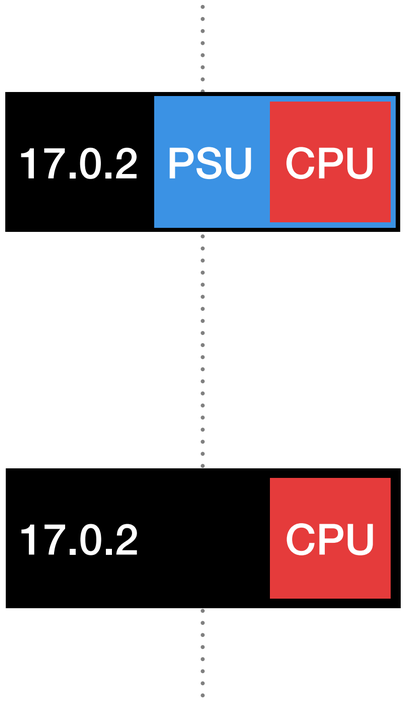
UPDATES

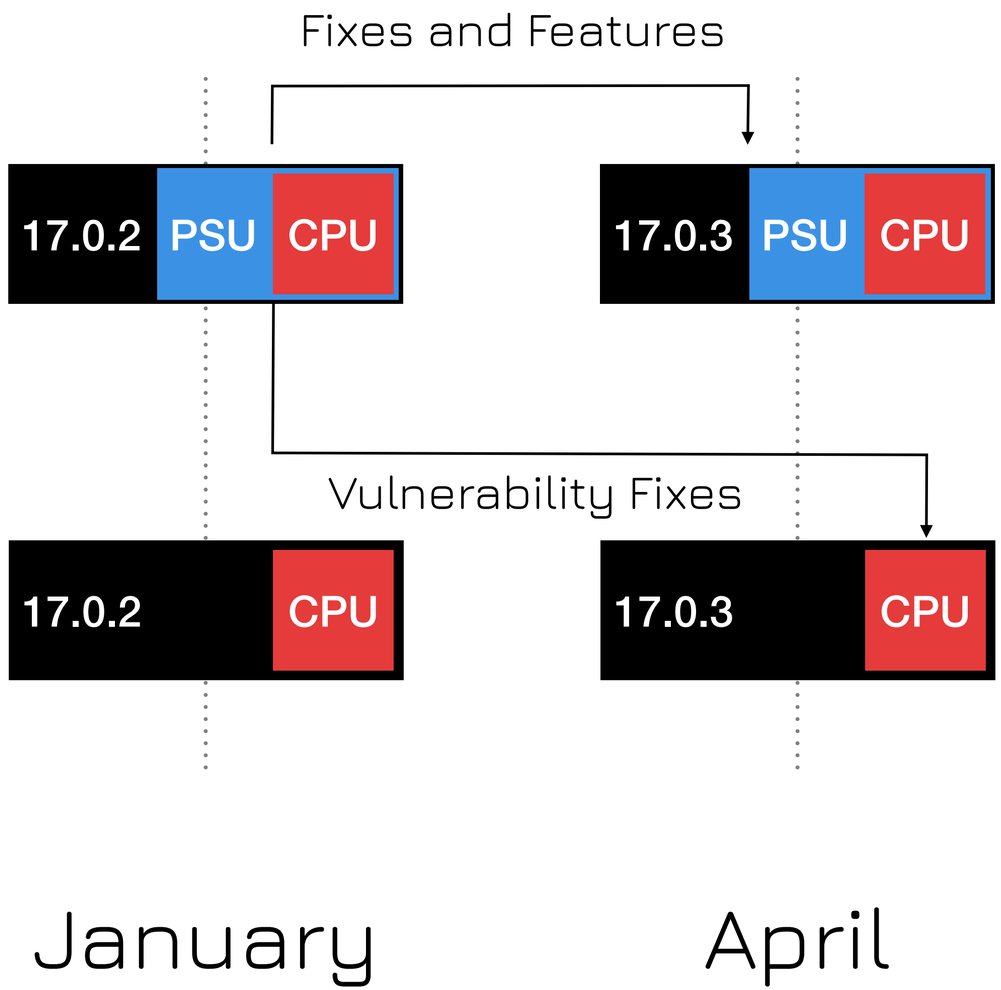
Four times a year



January

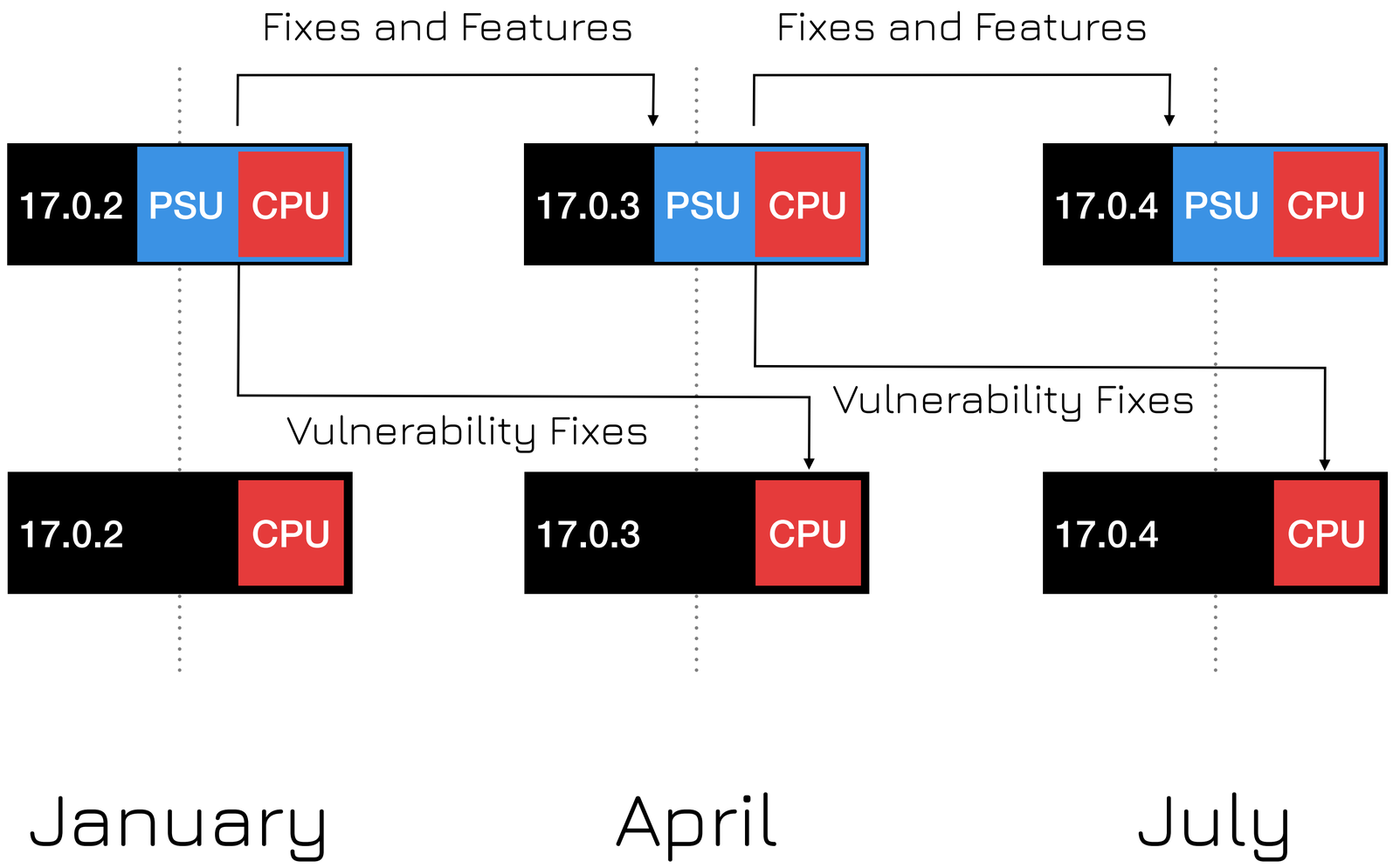
UPDATES

Four times a year



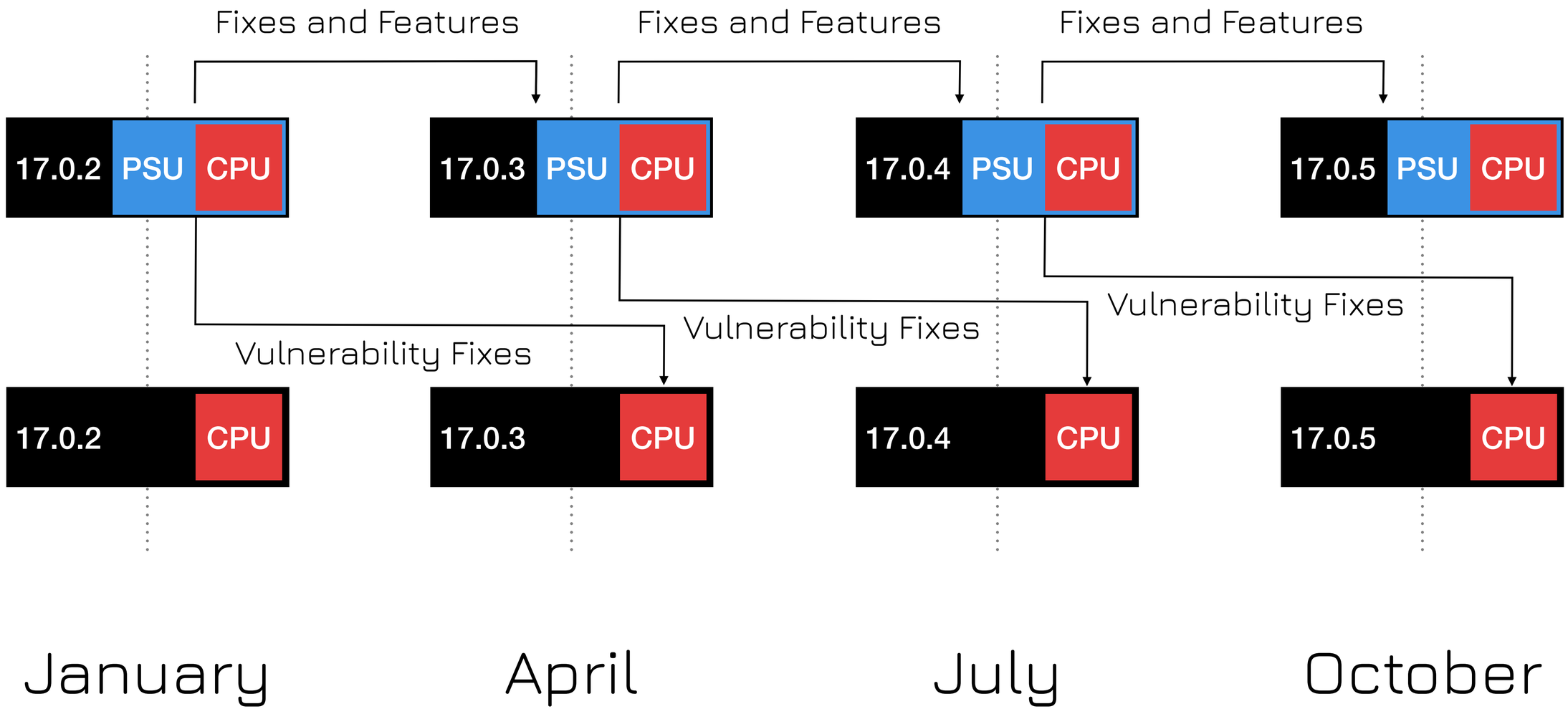
UPDATES

Four times a year



UPDATES

Four times a year



UPDATES

Keep in mind

- Updates are available 4 times a year (every 3 months starting from January)
- Patch Set Updates (PSU) contains the CPU plus non-critical fixes and small features
- Critical Patch Updates (CPU) contain only critical vulnerability fixes and are feature-wise always one step behind the PSU

UPDATES

Why CPUs matter

- **PSU 8u252** introduced a change that prevented Hadoop cluster and Solr from running
- **CPU 8u251** only contained security fixes from **PSU 8u242** and did not introduce this change

IMPACT WITHOUT UPDATES

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JDK 17

14.09.2021	19.10.2021	
17.0.0	17.0.1	
	CVE-2021-35567	6.8
	CVE-2021-35586	5.9
	CVE-2021-35564	5.3
	CVE-2021-35561	5.3
	CVE-2021-35559	5.3
	CVE-2021-35578	5.3
	CVE-2021-35556	5.3
	CVE-2021-35603	3.7

8 CVE's

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18.01.2022

17.0.2

CVE-2022-21341	5.3
CVE-2022-21365	5.3
CVE-2022-21282	5.3
CVE-2022-21291	5.3
CVE-2022-21277	5.3
CVE-2022-21305	5.3
CVE-2022-21299	5.3
CVE-2022-21296	5.3
CVE-2022-21283	5.3
CVE-2022-21340	5.3
CVE-2022-21293	5.3
CVE-2022-21294	5.3
CVE-2022-21360	5.3
CVE-2022-21366	5.3
CVE-2022-21248	3.7

15 CVE's

19.04.2022

17.0.3

CVE-2022-21449	7.5
CVE-2022-21496	5.3
CVE-2022-21434	5.3
CVE-2022-21426	5.3
CVE-2022-21443	3.7

5 CVE's

19.07.2022

17.0.4

CVE-2022-34169	7.5
CVE-2022-21541	5.9
CVE-2022-21540	5.3

3 CVE's

18.10.2022

17.0.5

CVE-2022-21618	5.3
CVE-2022-21628	5.3
CVE-2022-39399	3.7
CVE-2022-21619	3.7
CVE-2022-21624	3.7

5 CVE's

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17.01.2023

17.0.6

CVE-2023-21835	5.3
CVE-2023-21843	3.7

2 CVE's

18.04.2023

17.0.7

CVE-2023-21930	7.4
CVE-2023-21954	5.9
CVE-2023-21967	5.9
CVE-2023-21939	5.3
CVE-2023-21938	3.7
CVE-2023-21937	3.7
CVE-2023-21968	3.7

7 CVE's

18.07.2023

17.0.8

CVE-2023-22041	5.1
CVE-2023-25193	3.7
CVE-2023-22044	3.7
CVE-2023-22045	3.7
CVE-2023-22049	3.7
CVE-2023-22036	3.7
CVE-2023-22006	3.1

7 CVE's

17.10.2023

17.0.9

CVE-2023-22081	5.3
CVE-2023-22025	3.7

2 CVE's

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IMPACT WITHOUT UPDATES

JDK 17

If you stick to 17.0.0 you are vulnerable to 54 CVE's !!!

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IF IT AIN'T BROKE DON'T FIX IT ?

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IF IT AIN'T BROKE AT LEAST KEEP IT UP TO DATE!

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MODULAR RUNTIME IMAGES

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MODULAR RUNTIME IMAGES

Java Platform Module System

- Reducing risk by removing modules
- JLink makes this possible (since JDK9 introduced the Java Platform Module System JPMS)
- Removing unused modules means reducing risk for vulnerabilities
- Hackers cannot attack what isn't there
- Your application doesn't need to be modular

MODULAR RUNTIME IMAGES

JDK 21.0.1

Java Platform Module System

java.base	java.scripting	jdk.charsets	jdk.internal.opt	jdk.jlink	jdk.nio.mapmode
java.compiler	java.se	jdk.compiler	jdk.internal.vm.ci	jdk.jpackage	jdk.random
java.datatransfer	java.security.jgss	jdk.crypto.cryptoki	jdk.internal.vm.compiler	jdk.jshell	jdk.sctp
java.desktop	[illegible]	[illegible]	[illegible]	[illegible]	jdk.security.auth
java.instrument	[illegible]	jdk.dynalink	[illegible]	[illegible]	jdk.security.jgss
java.logging	java.sql	jdk.editpad	jdk.javadoc	jdk.localedata	jdk.unsupported
java.management	java.sql.rowset	[illegible]	jdk.jcmd	jdk.management	jdk.unsupported.desktop
java.management.rmi	java.transaction.xa	[illegible]	[illegible]	jdk.management.agent	jdk.xml.dom
java.naming	java.xml	jdk.incubator.vector	jdk.jdeps	jdk.management.jfr	jdk.zipfs
java.net.http	java.xml.crypto	jdk.internal.ed	jdk.jdwp.agent	jdk.naming.dns	
java.prefs	jdk.accessibility	jdk.internal.jvmstat	jdk.jdi	jdk.naming.rmi	
java.rmi	jdk.attach	jdk.internal.le	jdk.jfr	jdk.net	

69 Modules

339 MB

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MODULAR RUNTIME IMAGES

JRE 21.0.1

Java Platform Module System (JRE 21)

java.base
java.compiler
java.datatransfer
java.desktop
java.instrument
java.logging
java.management
java.management.rmi
java.naming
java.net.http
java.prefs
java.rmi
java.scripting
java.se
java.security.jgss
java.sql
java.sql.rowset
java.transaction.xa
java.xml
java.xml.crypto
jdk.accessibility
jdk.charsets
jdk.crypto.cryptoki
jdk.internal.vm.ci
jdk.internal.vm.compiler
jdk.jdwp.agent
jdk.jfr
jdk.localedata
jdk.management
jdk.management.agent
jdk.management.jfr
jdk.naming.dns
jdk.naming.rmi
jdk.net
jdk.nio.mapmode
jdk.random
jdk.sctp
jdk.security.auth
jdk.security.jgss
jdk.unsupported
jdk.xml.dom
jdk.zipfs

50 Modules

150 MB

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MODULAR RUNTIME IMAGES

JLINK JRE

Java Platform Module System (JLINK JRE 21)

java.base

java.security.jgss

jdk.sctp

java.desktop

11 Modules

48 MB

java.sql

jdk.localedata

jdk.unsupported

java.management

java.naming

java.net.http

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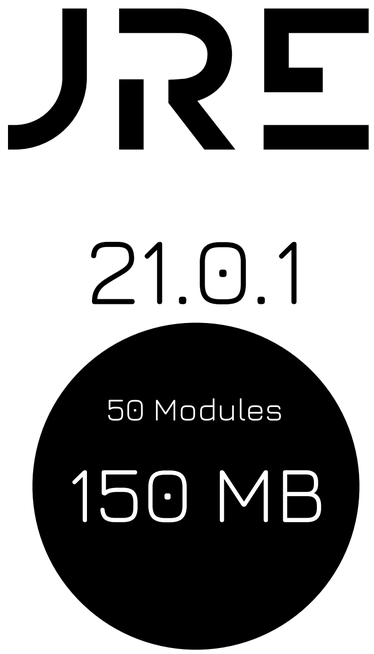
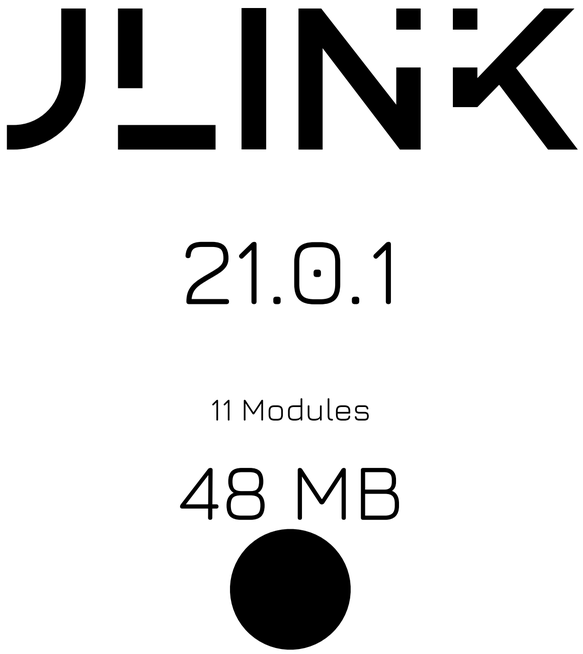
MODULAR RUNTIME IMAGES

Java Platform Module System





SOFTWARE SUPPLY CHAIN

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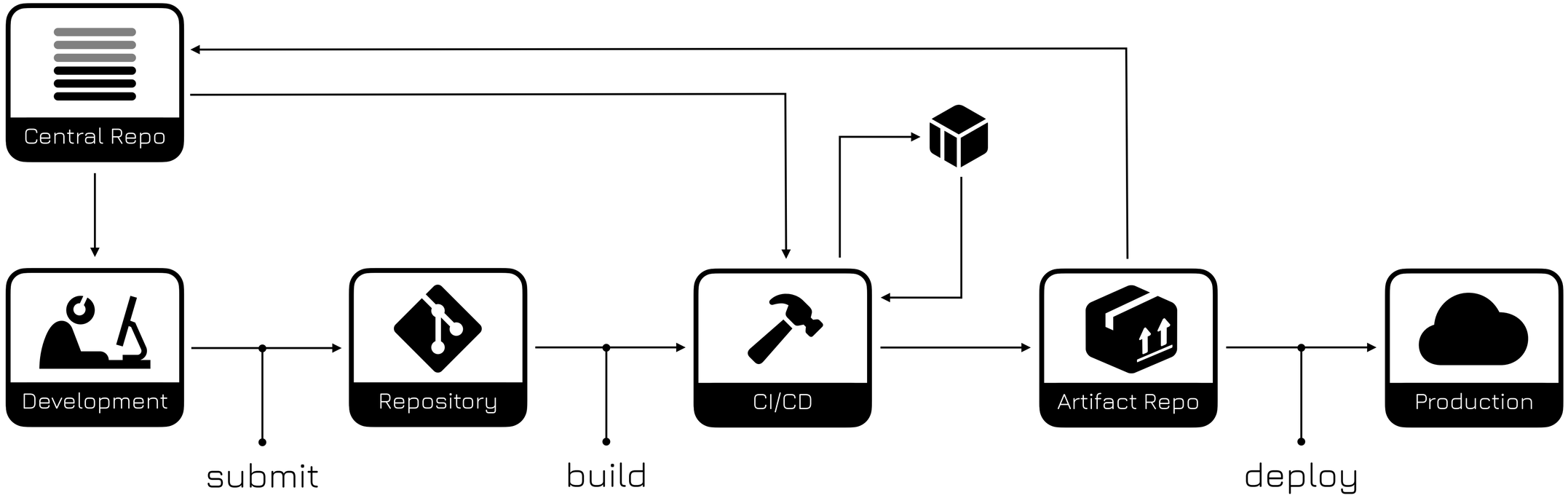
SOFTWARE SUPPLY CHAIN



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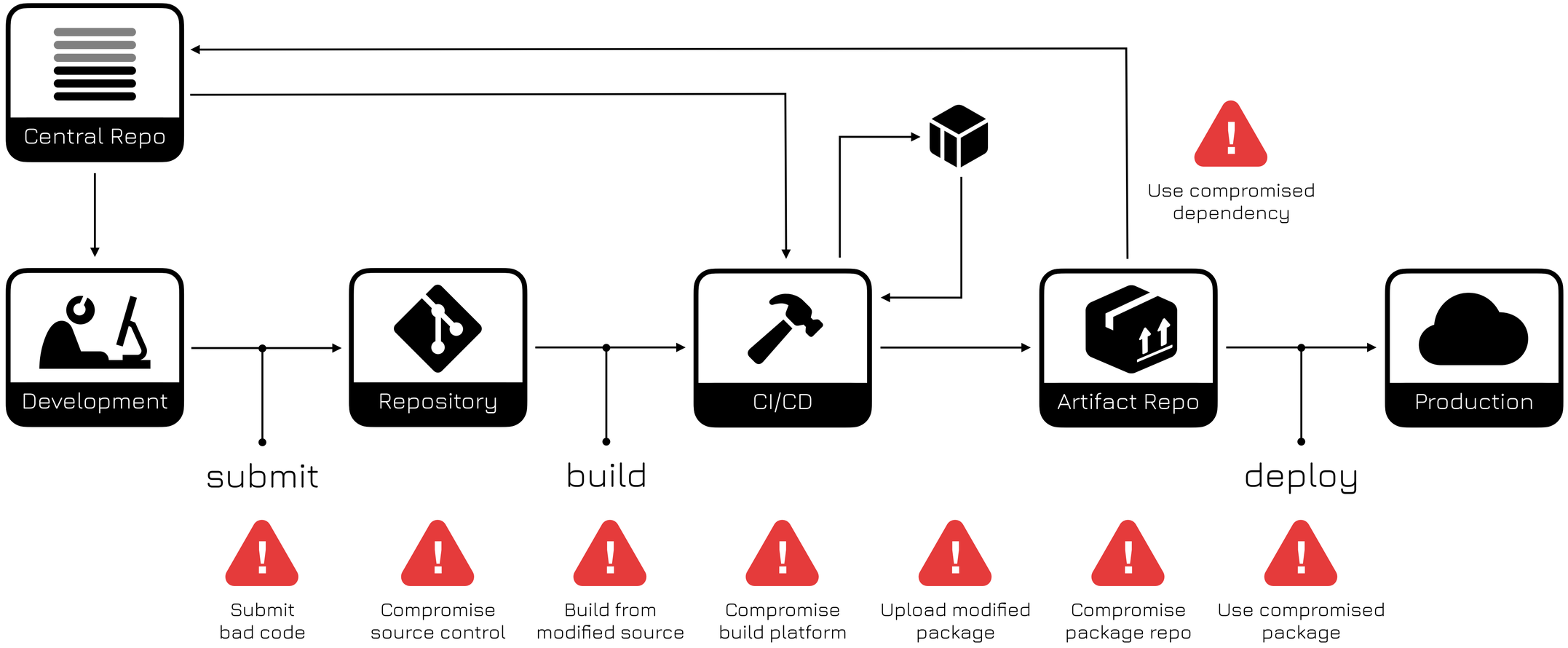
SOFTWARE SUPPLY CHAIN

And it's vulnerabilities



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SOME FACTS

ATTACKS

Software Supply Chain attacks

742%

(Sonatype State of the Software Chain report)

Increase over the past

3

years

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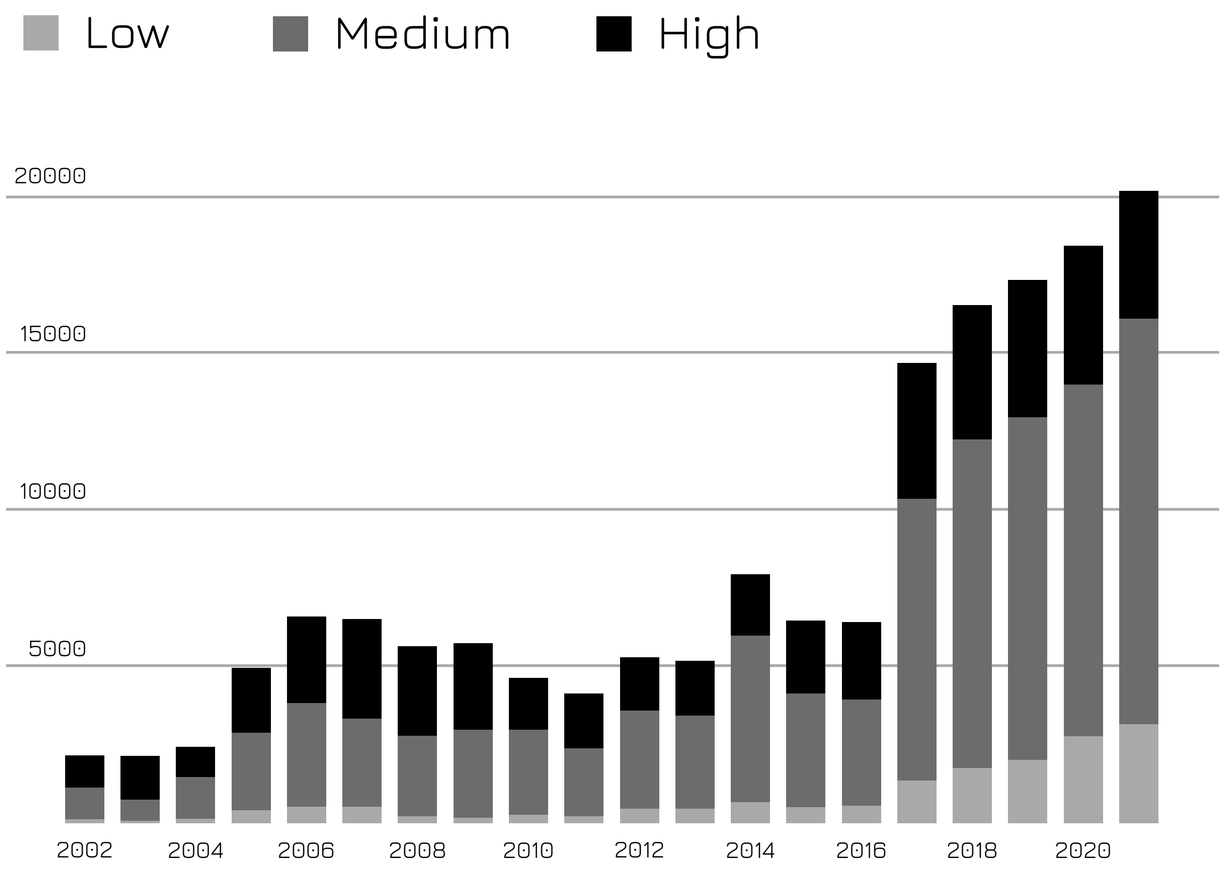
VULNERABILITIES

Distribution by severity over time



(NIST National Vulnerability Database)

The year 2021 saw

20 142

unique bugs and security vulnerabilities recorded

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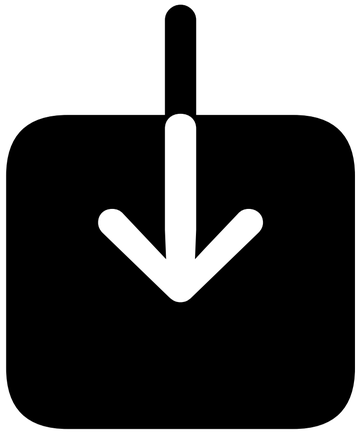
USER LAZINESS

Downloaded versions of Log4j



20%

(Christian Grobmeier, Log4j maintainer)

Of all Log4j downloads

20%

are still vulnerable to CVE 2021-44228, even

21 months

after Log4j has been patched !

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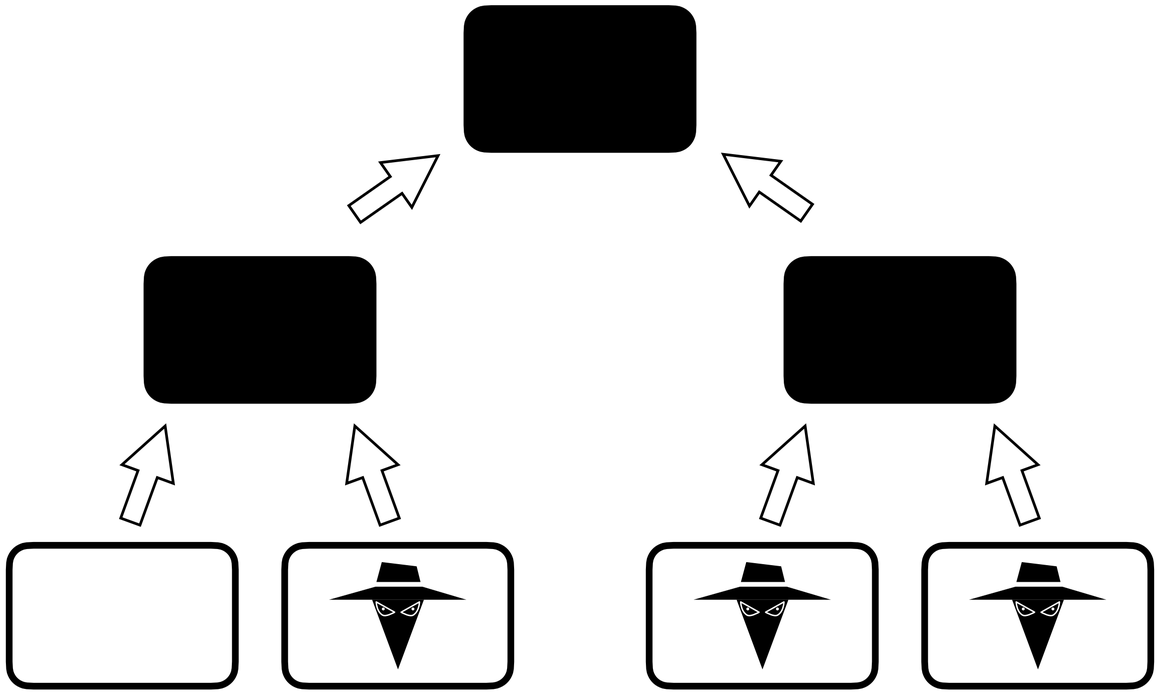
VULNERABILITIES

Transitive dependencies



(Sonatype State of the Software Chain report)

About

6 out of 7

project vulnerabilities come from transitive dependencies

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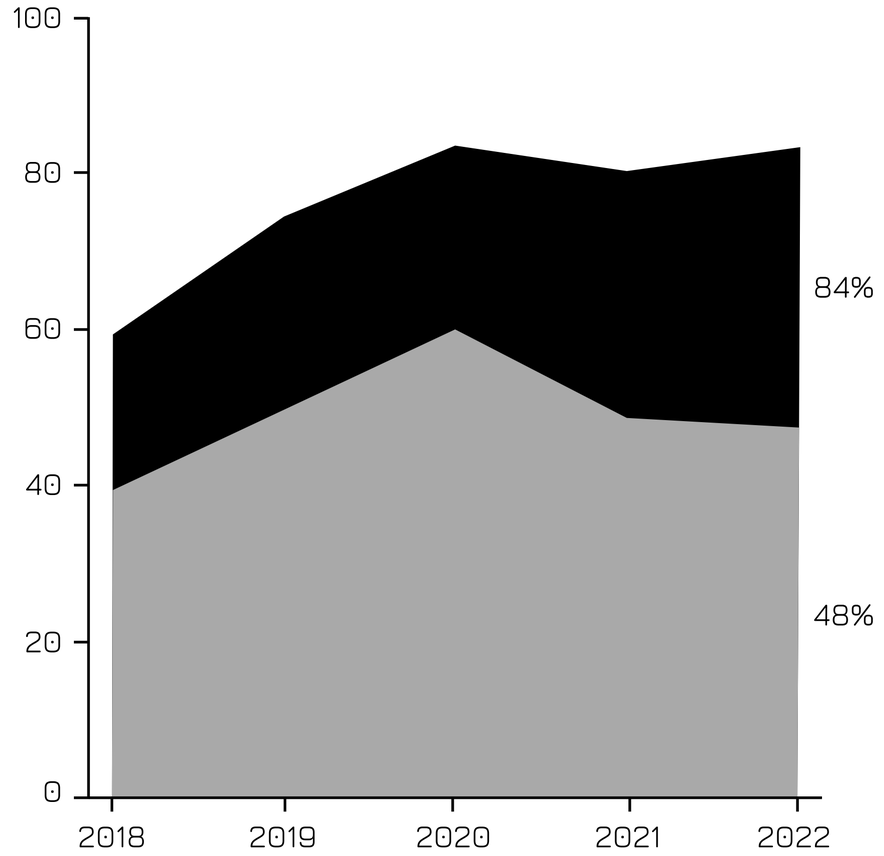
SECURITY RISK

Is prevalent



(Synopsys OSS security and risk analysis report)

At least one vulnerability in

84%

of all scanned codebases and

48%

contained high-risk vulnerabilities

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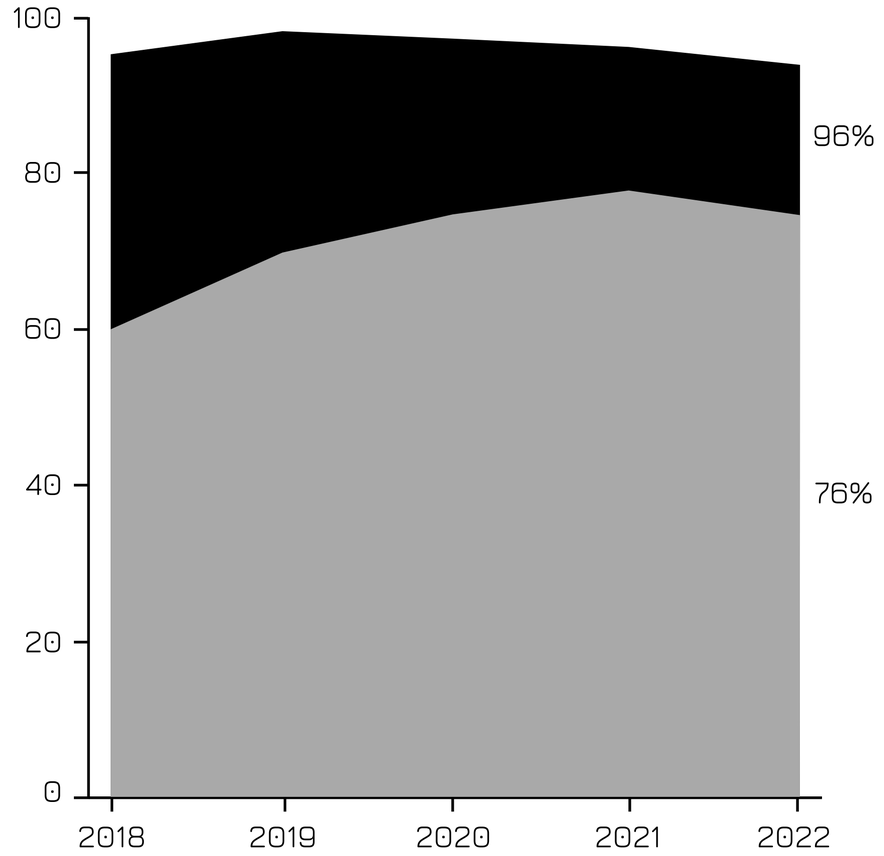
OPEN SOURCE

Is everywhere



(Synopsys OSS security and risk analysis report)

Open Source used in

96%

of all scanned codebases and

76%

of code in codebases was Open Source

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OPEN SOURCE

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MEANS...

I OWE YOU NOTHING!

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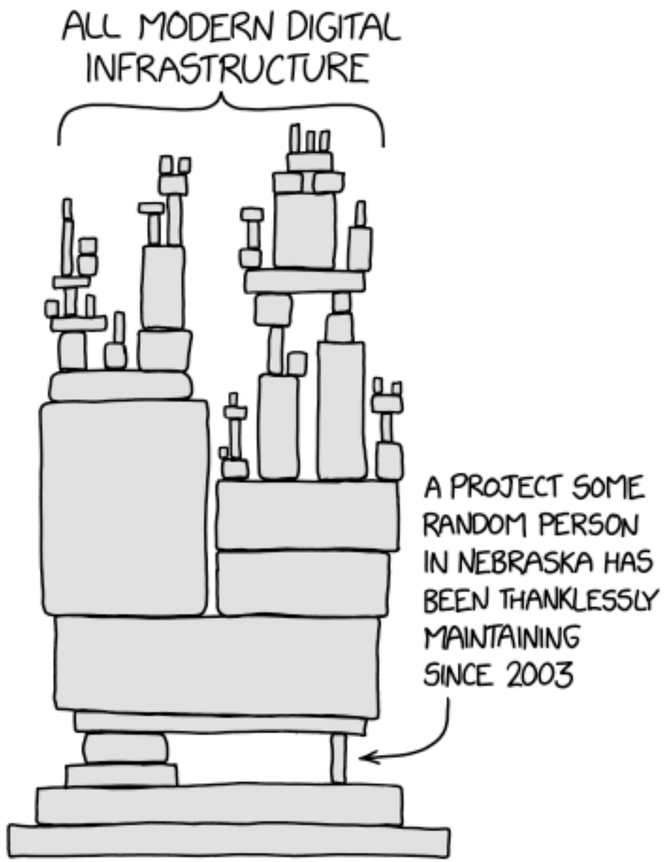
OPEN SOURCE

Providers...not suppliers



https://xkcd.com/2347/

Keep in mind that:

OpenSource maintainer are not suppliers !

You don't have a business relationship with them !

If you use their code, it's up to you to make sure it's up to date and secure !

WHAT CAN WE DO?

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SHIFT LEFT

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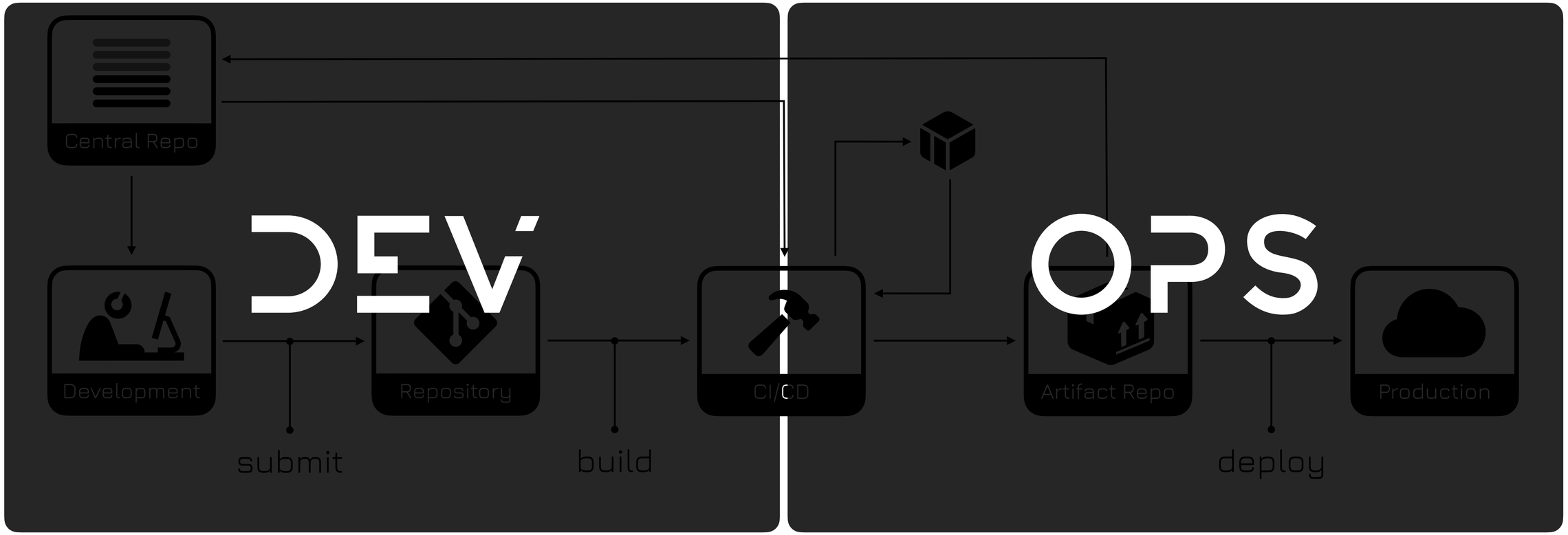
SHIFT LEFT

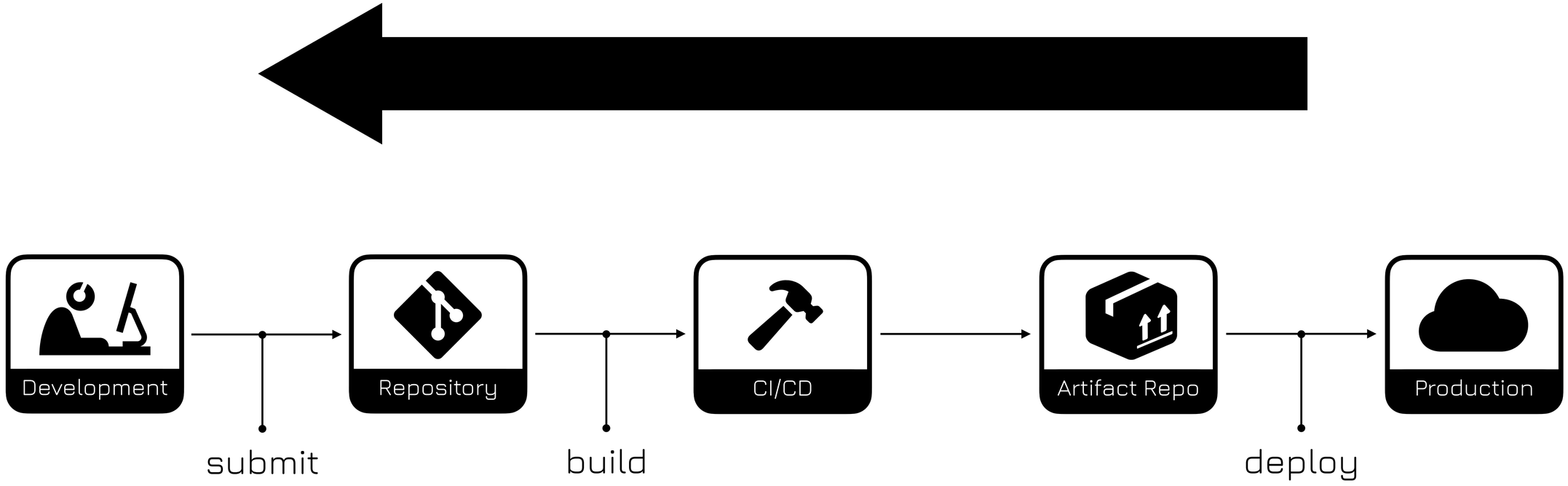


Software Supply Chain

azul

SHIFT LEFT

Security should start more on the left side of the diagram



Software Supply Chain

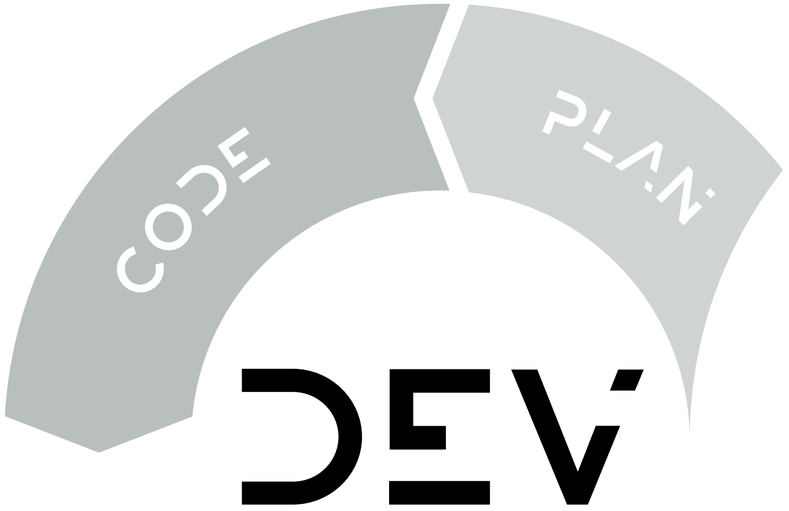
DEVOPS

DEV OPS LOOP

Plan

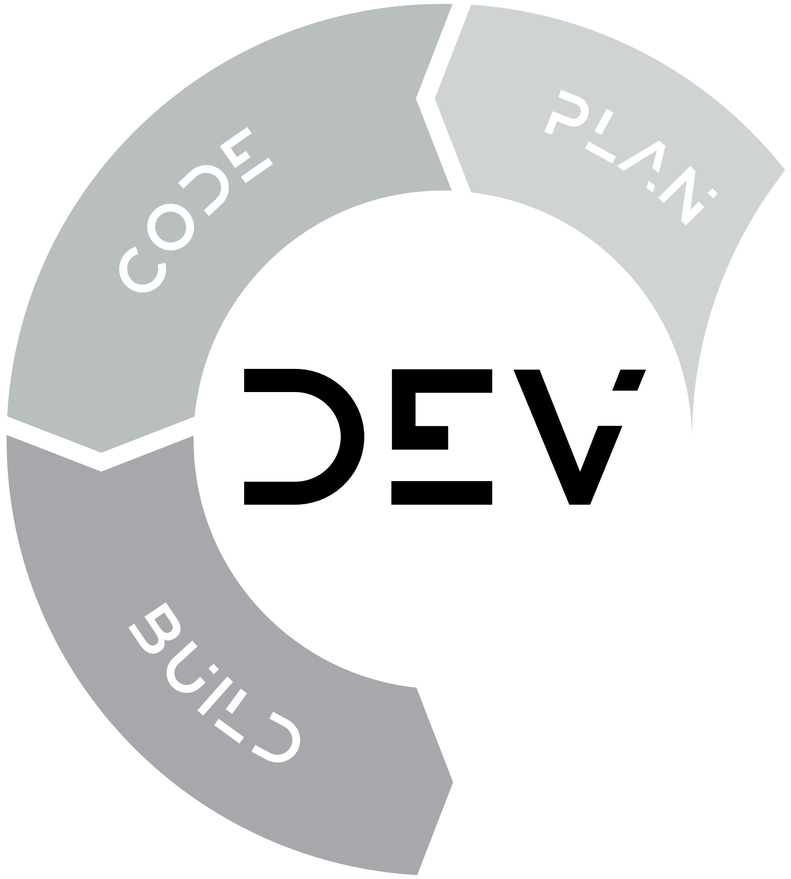
DEV OPS LOOP

Code



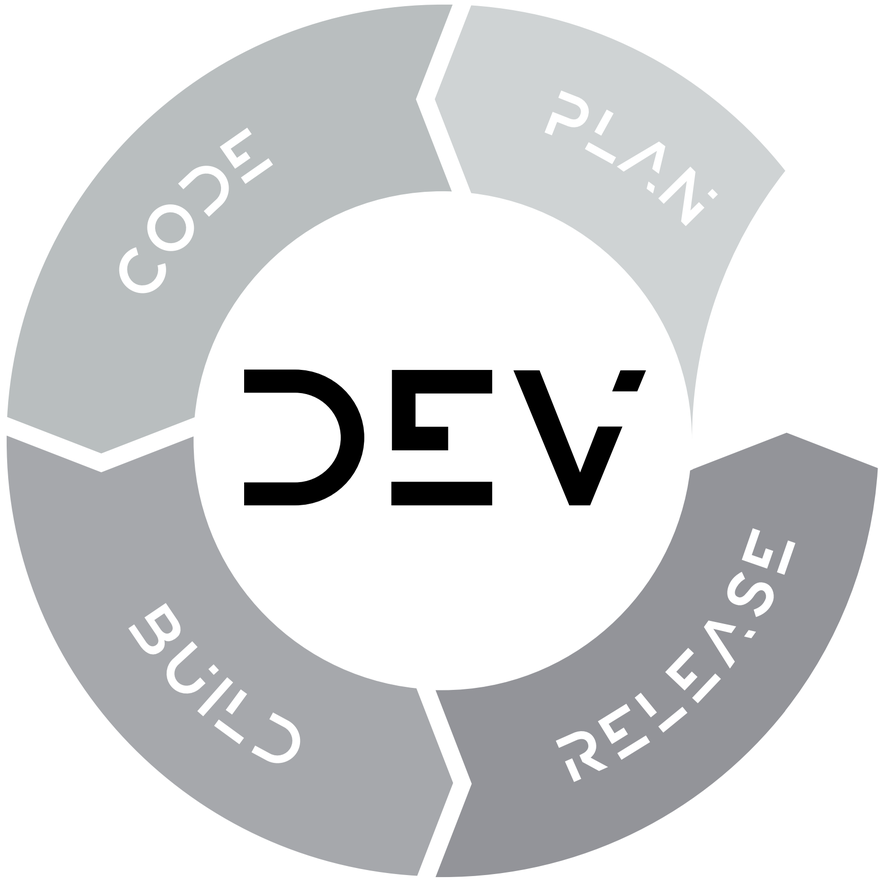
DEV OPS LOOP

Build



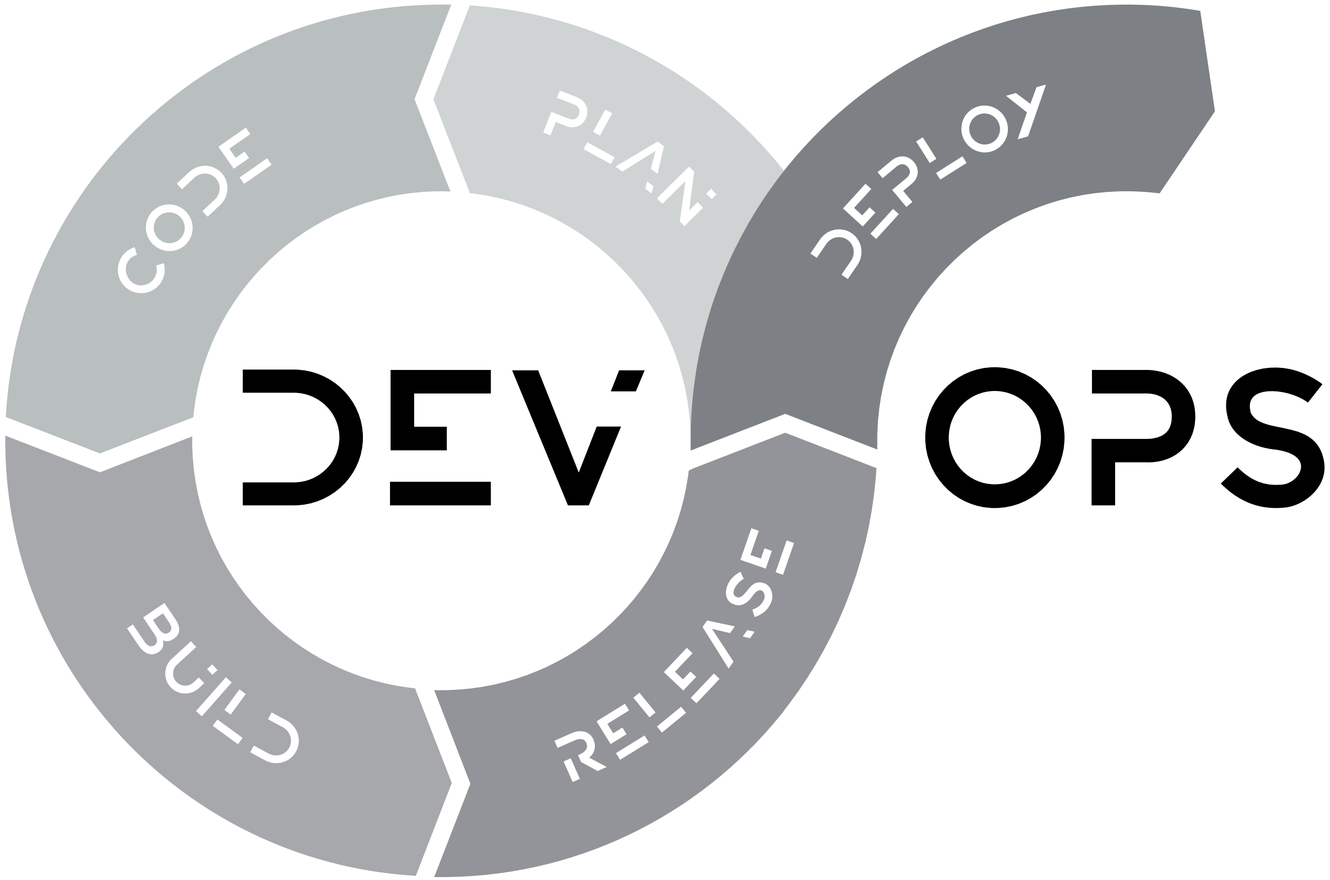
DEV OPS LOOP

Release



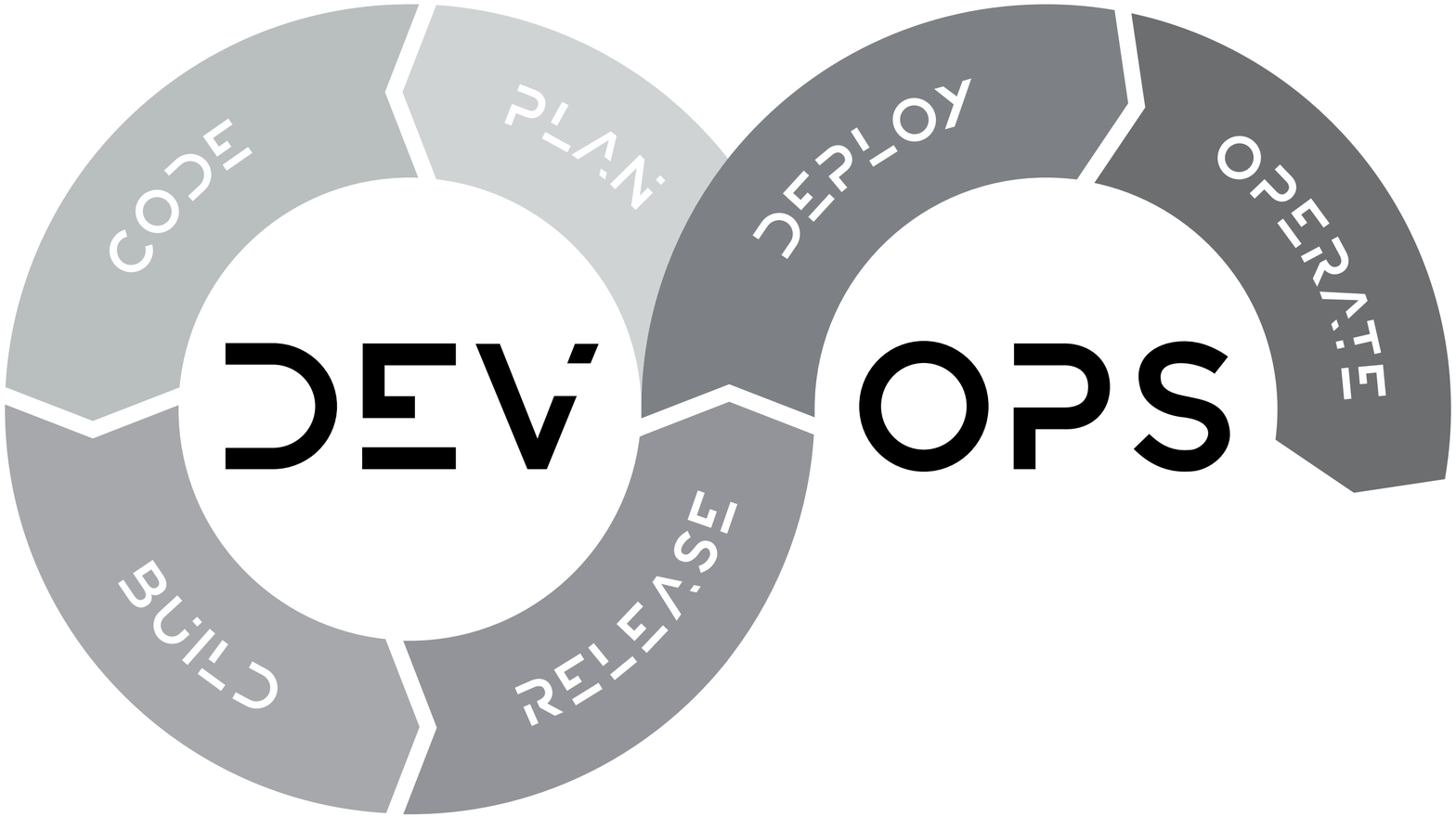
DEV OPS LOOP

Deploy



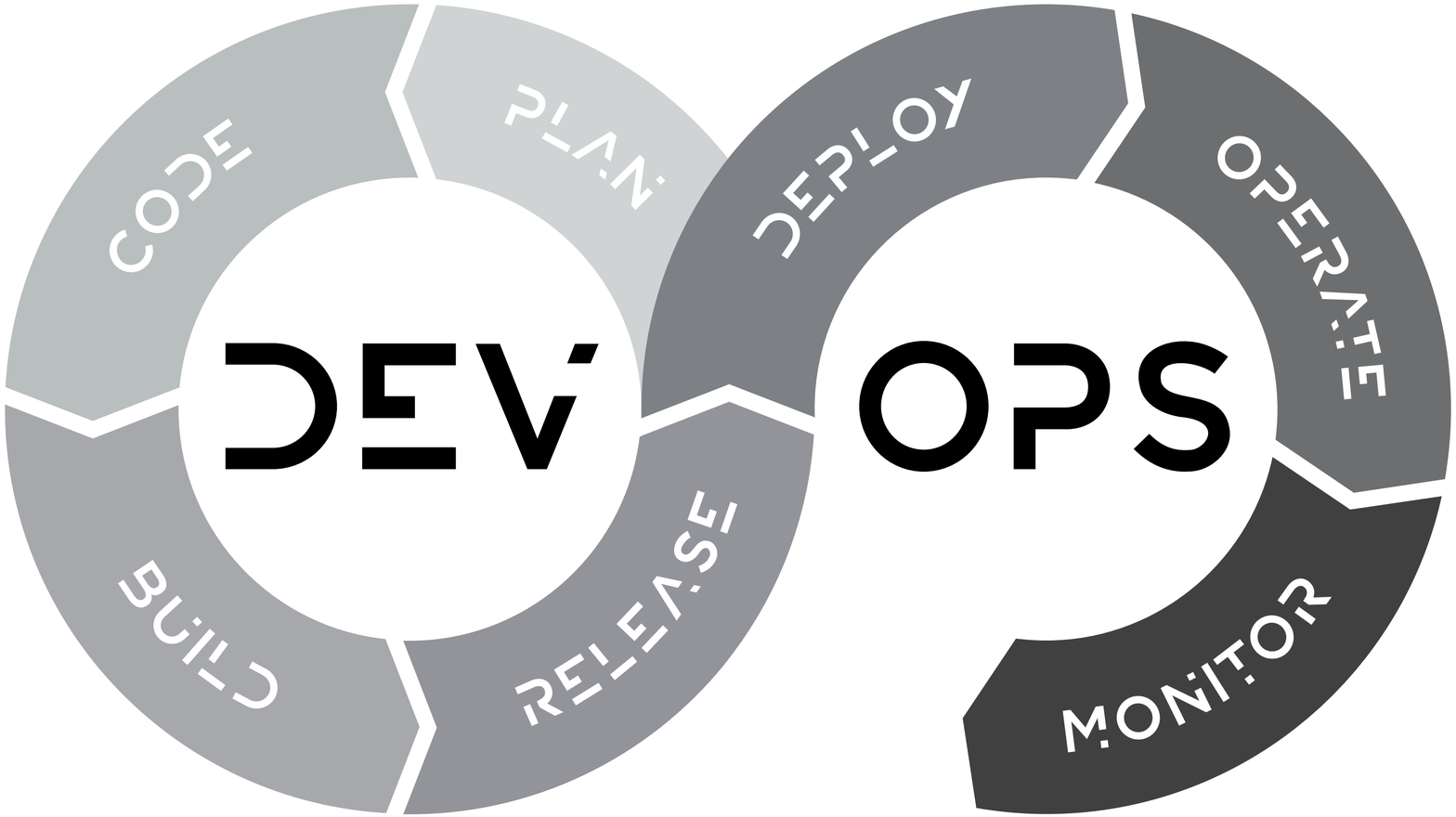
DEV OPS LOOP

Operate



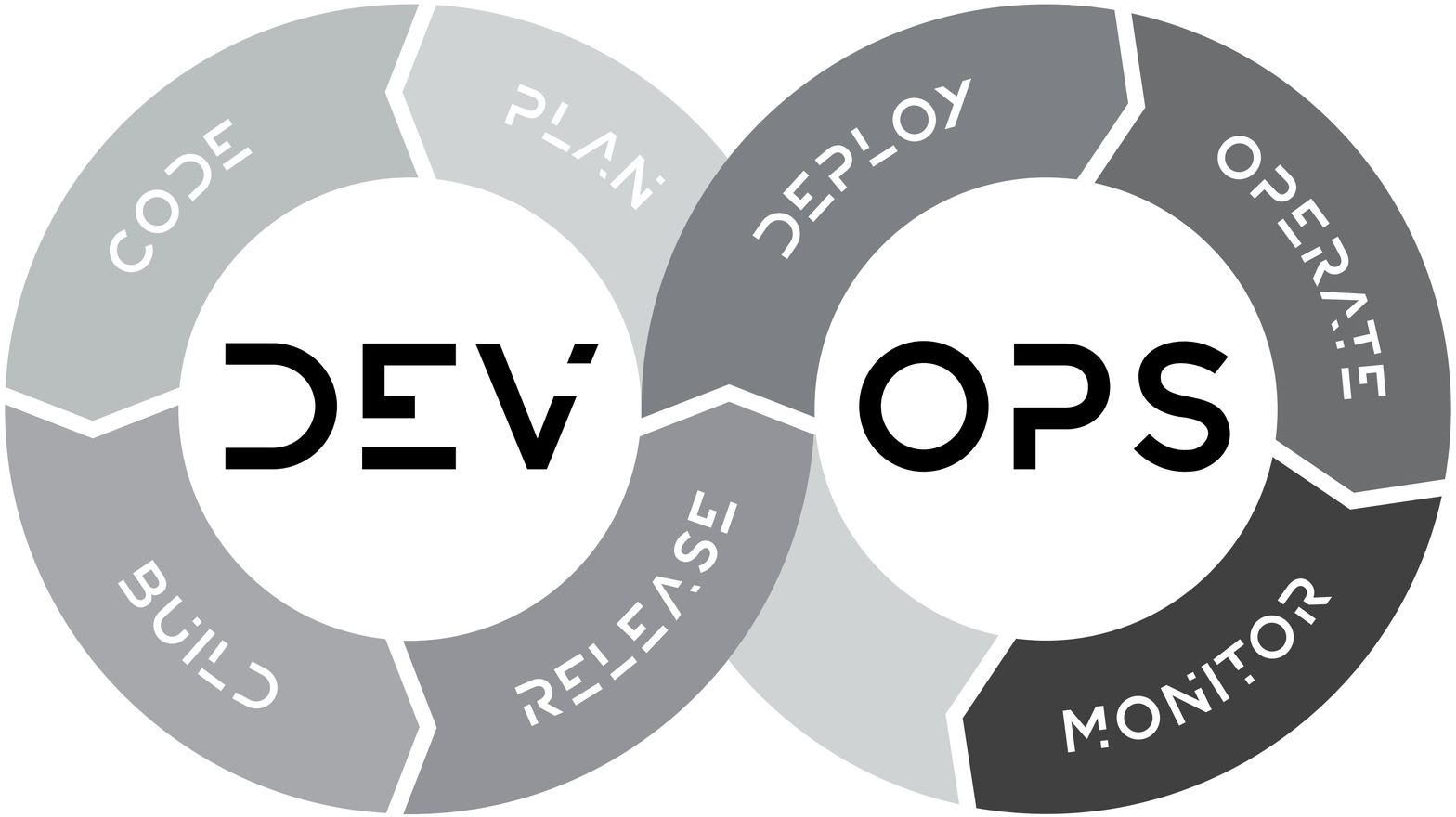
DEV OPS LOOP

Monitor



DEV OPS LOOP

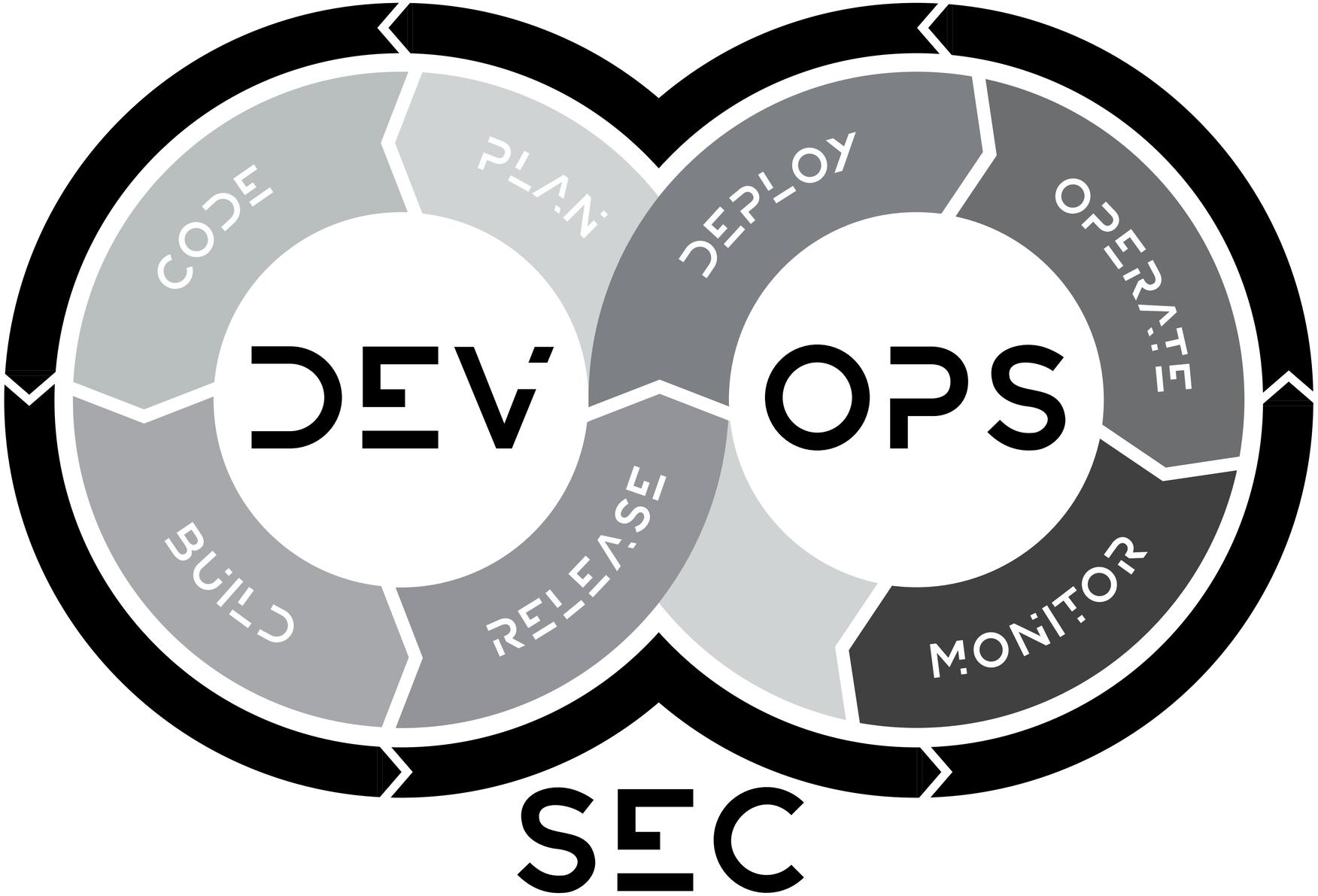
Plan



DEV OPS LOOP

What about security?

DEV SEC OPS



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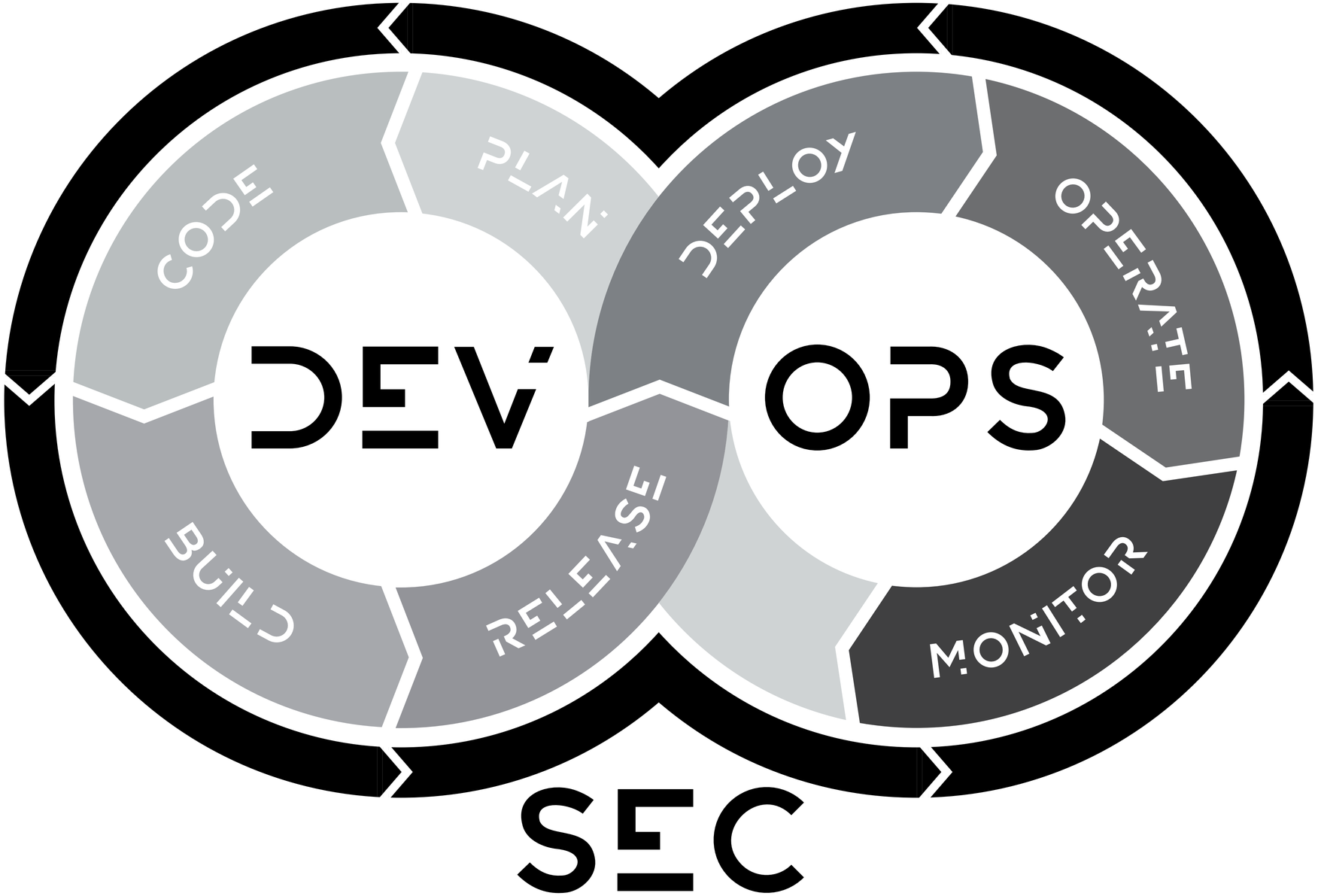
SECURITY APPLIES TO ALL AREAS



SHIFT LEFT?

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YES...BUT

ALSO

VALIDATE RIGHT

UPDATE YOUR JDK

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SDKMAN

Command line application

https://sdkman.io/

Facts

- Supports many JDK distributions
- Commandline only
- Linux, MacOS
- Downloads and installs JDK's

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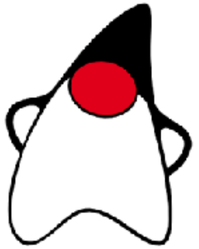
JDKMON

Desktop application



https://github.com/HanSolo/JDKMon/releases

Facts

- Info about JDK updates
- Supports "all" JDK distributions
- Downloads JDK's
- Taskbar application
- Windows, Linux, MacOS
- Shows CVE's in OpenJDK

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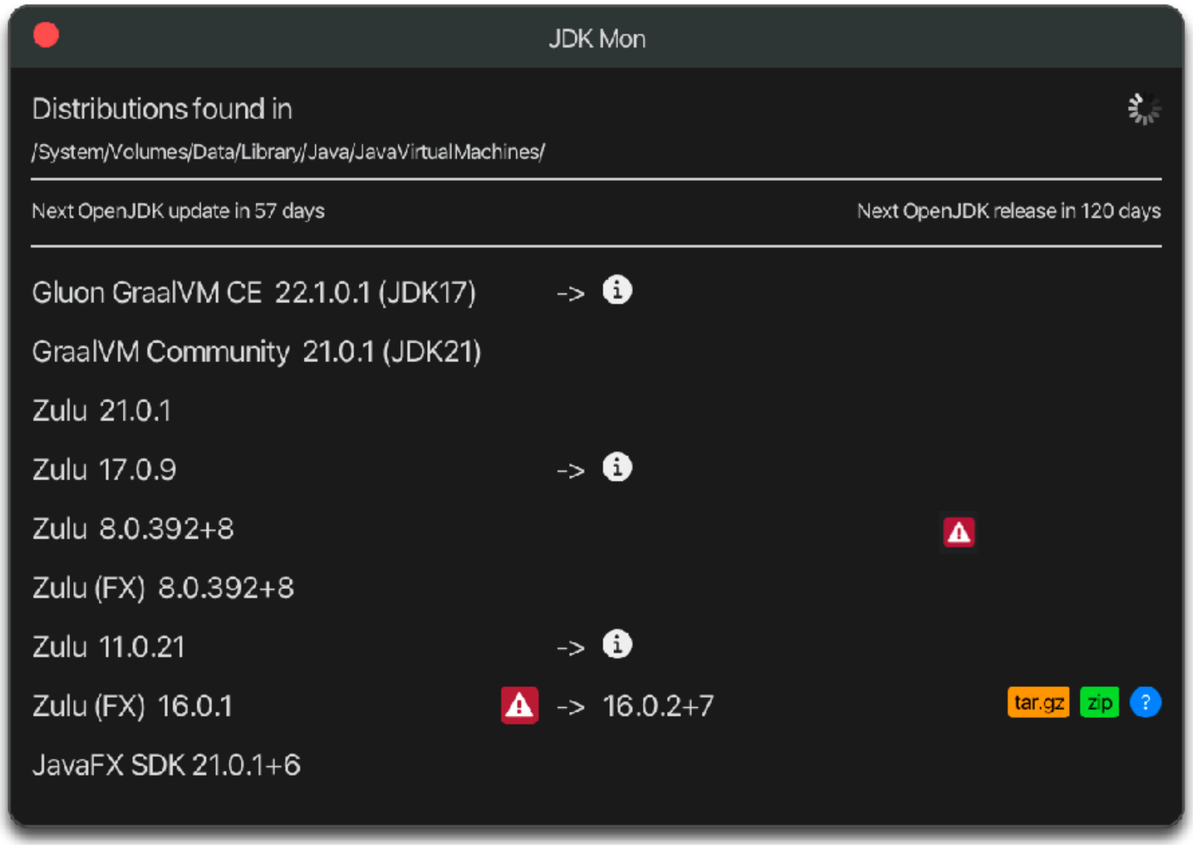
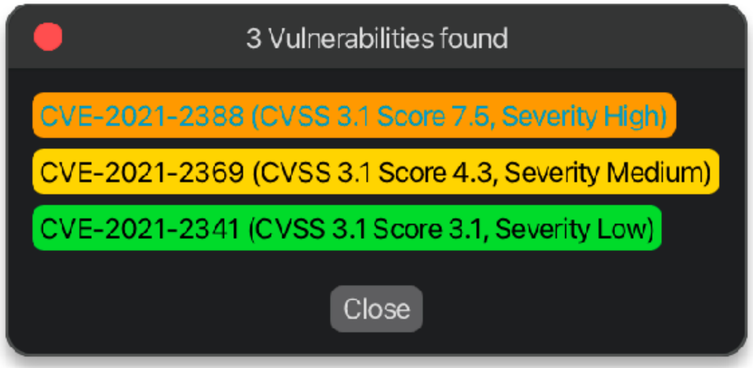
JDKMON

Desktop application



Installed JDK distributions



Vulnerabilities found for JDK

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STATIC CODE ANALYSIS

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STATIC CODE ANALYSIS

What is it ?

- Usually part of a code review (white-box testing)
- Identifies vulnerabilities in source code
- At the implementation phase
- Inexpensive because adjustments can be done easily
- Standalone tools / IDE plugins

STATIC CODE ANALYSIS

Source Code Security Analyzers

- AppSonar/CodeSonar by CyberTest $
- Codiga by Codiga ~~$~~ $
- DerScanner by DerSecur Ltd. $
- FindSecurityBugs free ~~$~~
- Snyk Code by Snyk Limited ~~$~~ $
- SonarQube by SonarSource ~~$~~ $
- Static Reviewer by Security Reviewer $

taken from https://www.nist.gov/itl/ssd/software-quality-group/source-code-security-analyzers

FIND SECURITY BUGS

FIND SECURITY BUGS

SpotBugs plugin

https://find-sec-bugs.github.io/

Facts

- Free of charge
- Extends SpotBugs
- 400+ bug patterns
- Plugin

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FIND SECURITY BUGS

Eclipse Plugin

Java - vulnerable-webapp/src/main/java/testcode/xmldecoder/XmlDecodeUtil.java - Eclipse

File Edit Source Refactor Navigate Search Project Run Window Help

Quick Access | Java

Package Explorer | Bug Explorer

- Potential SQL/JPQL Injection (JPA) (5)
  - The query is potentially vulnerable SQL,
  - The query is potentially vulnerable SQL,
  - The query is potentially vulnerable SQL,
  - The query is potentially vulnerable SQL,
  - The query is potentially vulnerable SQL,
- Static IV (5)
- Found Struts 1 Action (1)
- Found Struts 2 Endpoint (1)
- Struts Form Without Input Validation (3)
- Found Tapestry Page (2)
- Unencrypted Socket (4)
- Unvalidated Redirect (2)
- FilenameUtils Not Filtering Null Bytes (9)
- MessageDigest Is Weak (13)
- TrustManager Implementation Empty (4)
  - The implementation of TrustManager is
  - The implementation of TrustManager is
  - The implementation of TrustManager is
  - The implementation of TrustManager is
- Found Wicket Page (1)
- XMLDecoder usage (1)
  - Its not safe to use an XMLDecoder to pa
- Potential XPath Injection (5)
- Servlet reflected cross site scripting vulner
- XSSRequestWrapper is Weak XSS Protecti
- Potential XSS in Servlet (1)
- XML Parsing Vulnerable to XXE (Documen
- XML Parsing Vulnerable to XXE (SAXParse
- XML Parsing Vulnerable to XXE (XMLRead

XmlDecodeUtil.java

```
1  package testcode.xmldecoder;
2
3  import java.beans.XMLDecoder;
5
6  public class XmlDecodeUtil {
7
8      public static Object handleXml(InputStream in) {
9          XMLDecoder d = new XMLDecoder(in);
10         try {
11             Object result = d.readObject();
12             return result;
13         }
14         finally {
15             d.close();
16         }
17     }
18
```

Problems | Javadoc | Declaration | Bug Info

XmlDecodeUtil.java: 9

Navigation

Vulnerable Code:

```
XMLDecoder d = new XMLDecoder(in);
try {
    Object result = d.readObject();
}
[...]
```

Solution:
The solution is to avoid using XMLDecoder to parse content from an untrusted source.

Its not safe to use an XMLDecoder to parse user supplied data [Scary(5), High confidence]

VULNERABILITY SCANNERS

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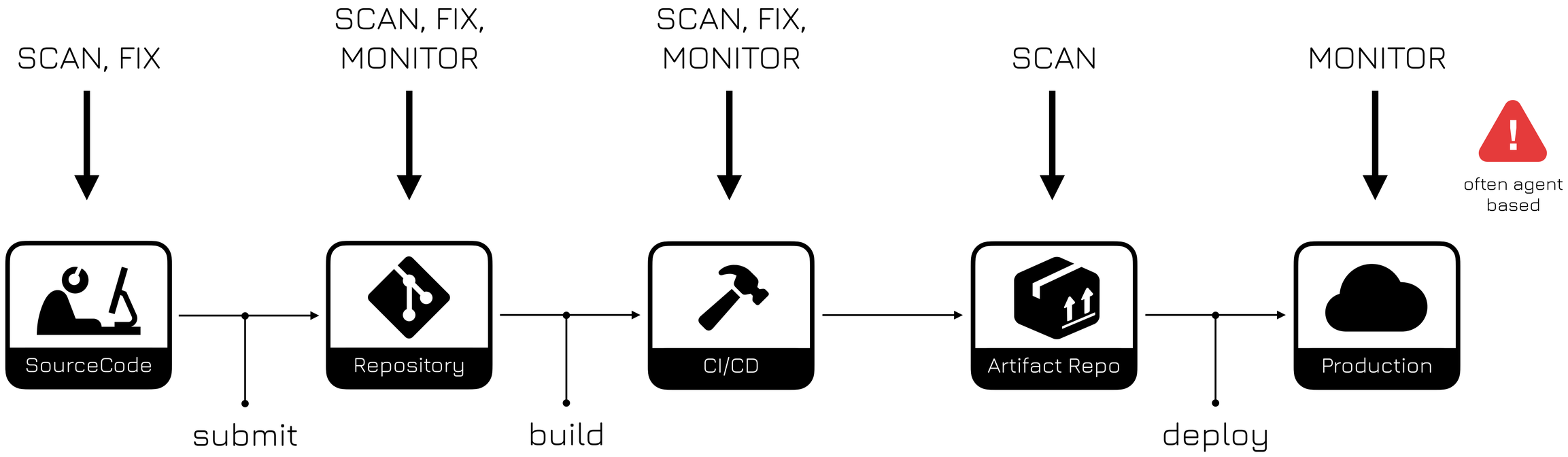
VULNERABILITY SCANNERS

What is it?

- Detect vulnerabilities (using a database / probing for common flaws)
- Monitor misconfigurations and coding flaws
- Help using only artifacts from reliable sources
- Help using only latest secure version (without known vulnerabilities)
- Monitor appearance of new packages with fixed vulnerabilities
- Update dependencies (as soon as new versions are available)

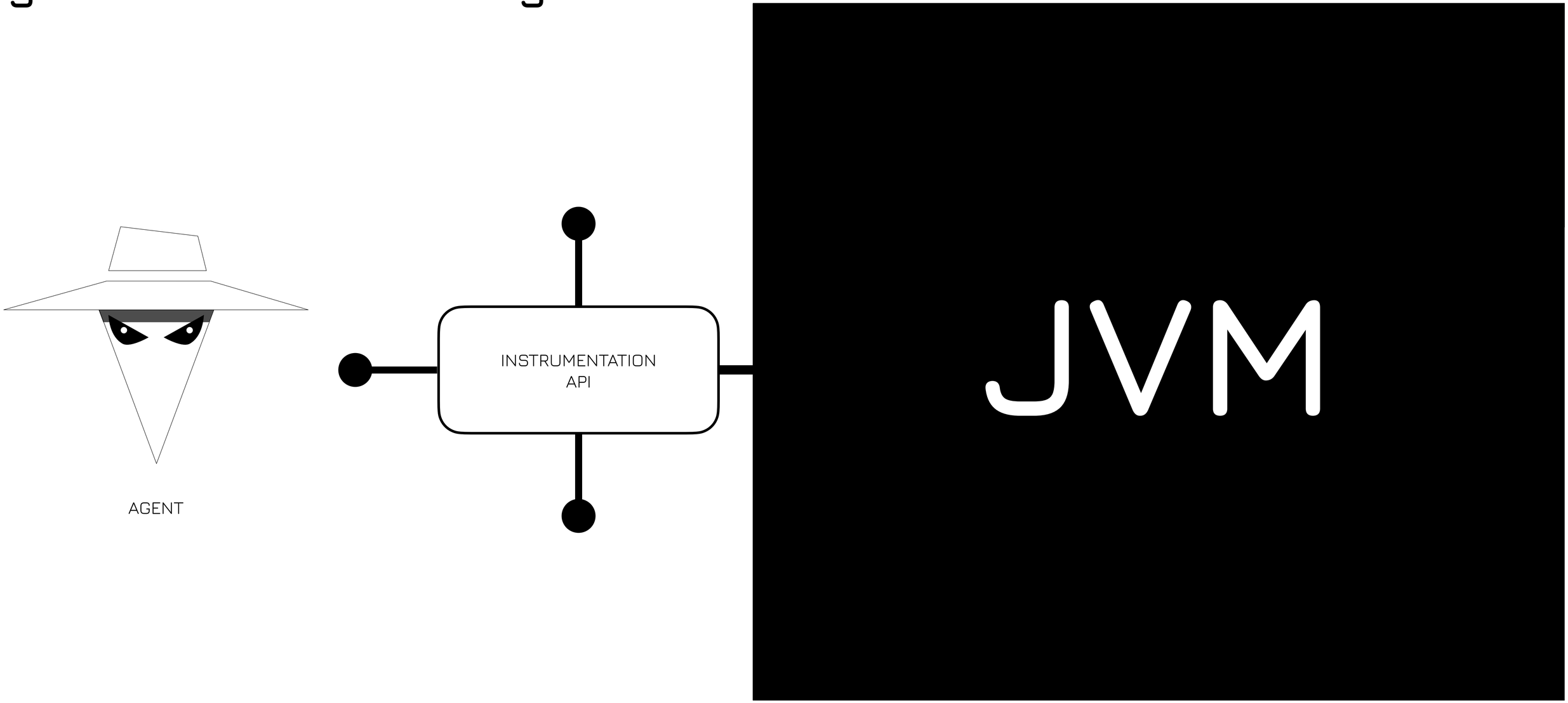
VULNERABILITY SCANNERS

How they work



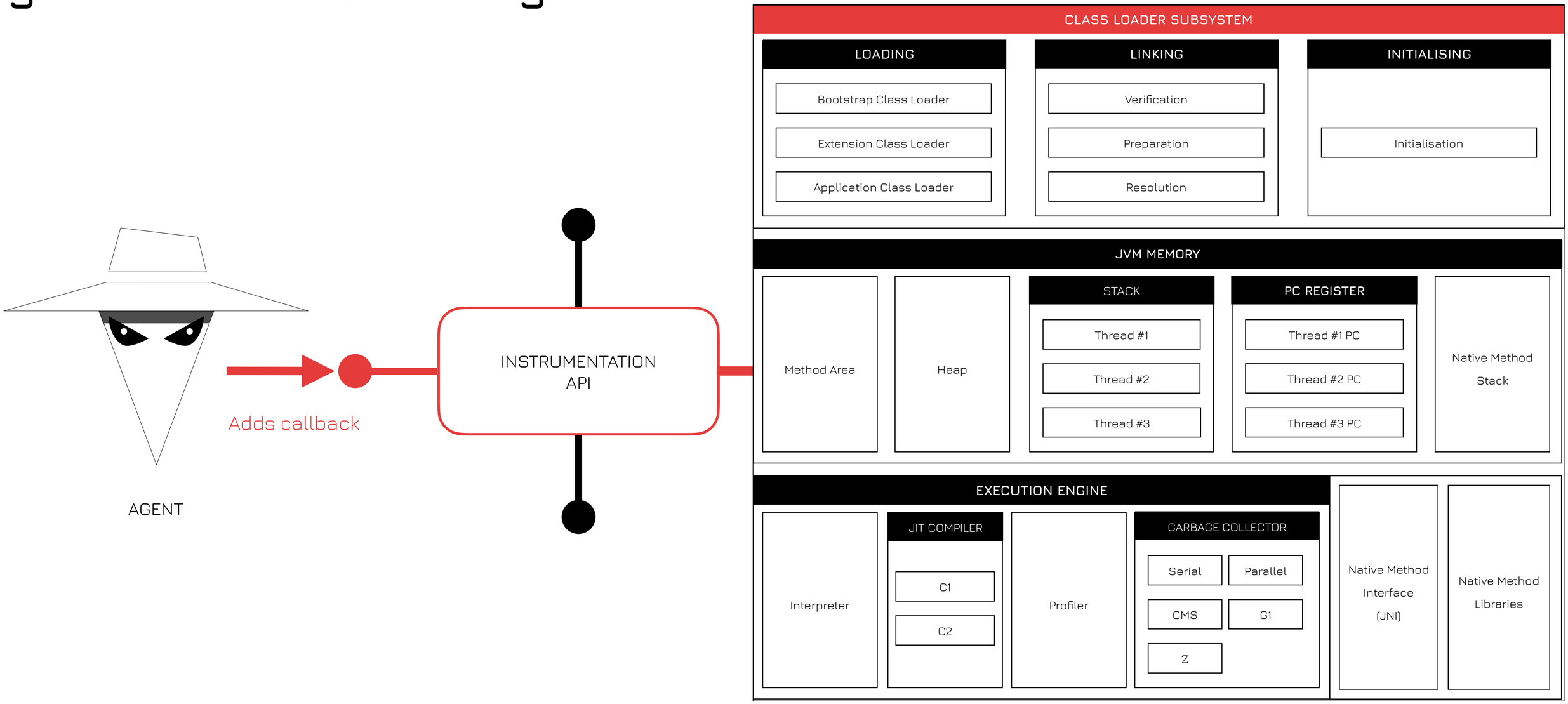
VULNERABILITY SCANNERS

Agent based monitoring



VULNERABILITY SCANNERS

Agent based monitoring



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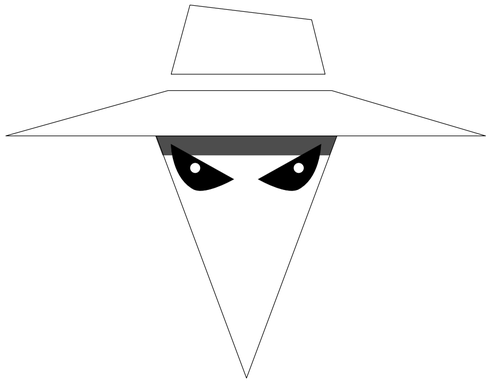
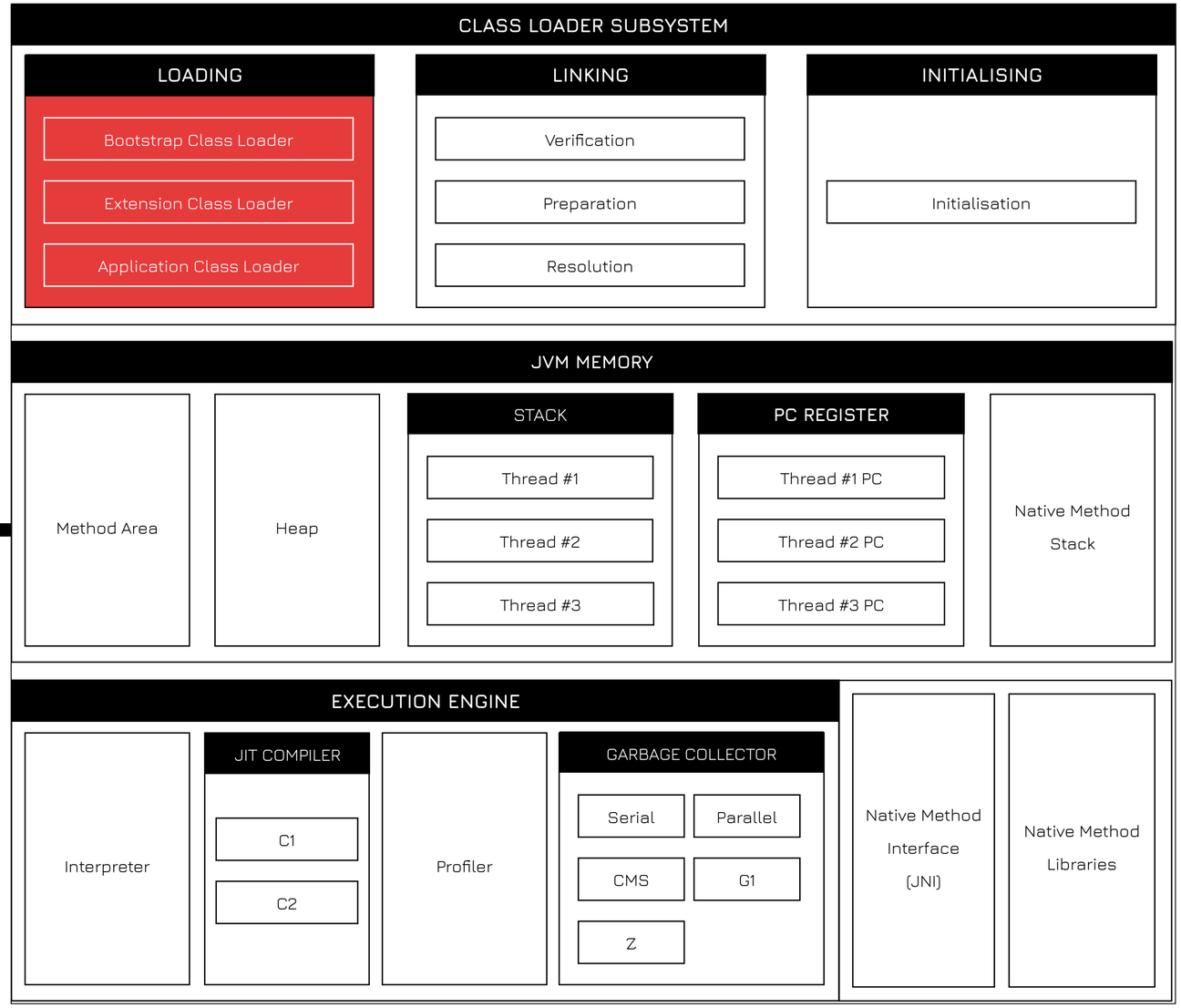
VULNERABILITY SCANNERS

Agent based monitoring



AGENT

INSTRUMENTATION API



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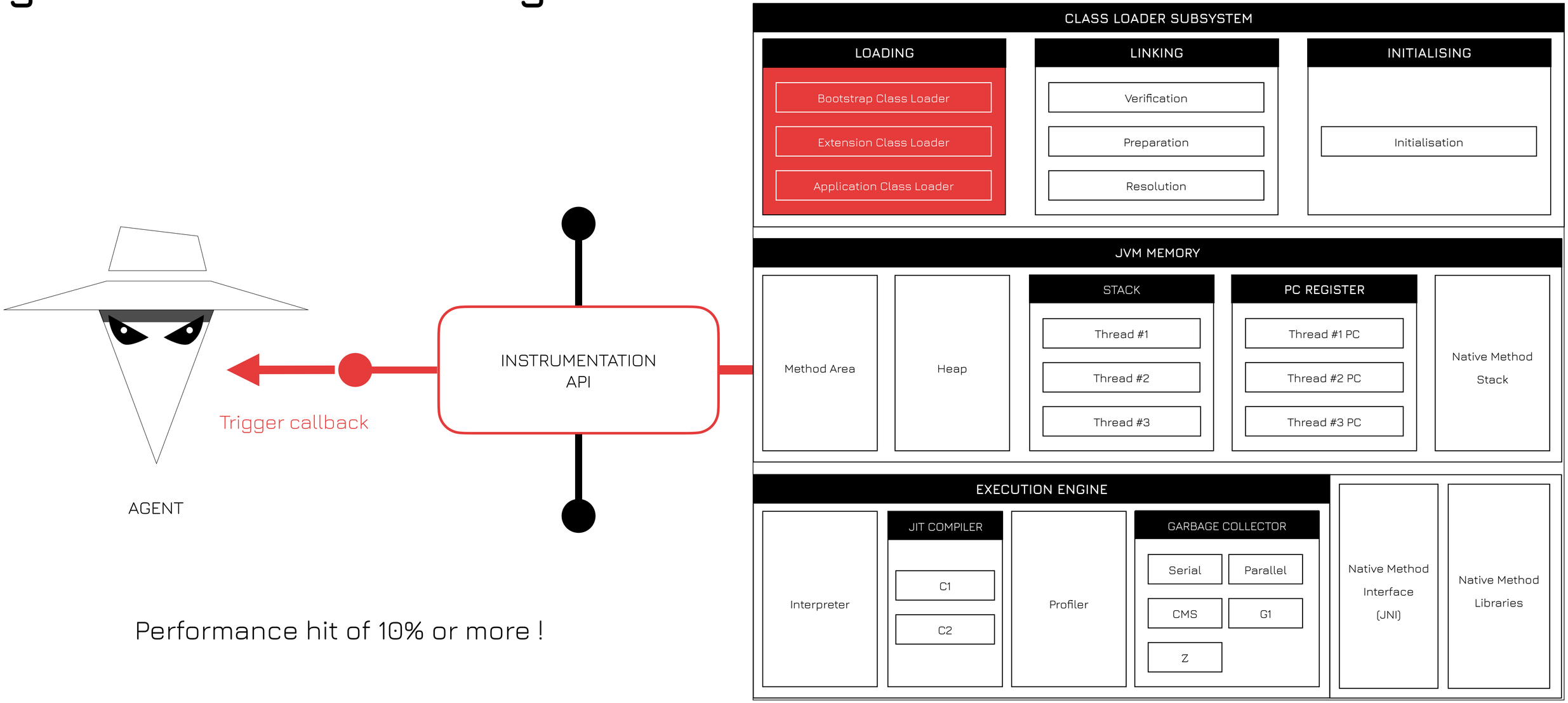
VULNERABILITY SCANNERS

Agent based monitoring



Performance hit of 10% or more !

VULNERABILITY SCANNERS

For Java development

Azul Vulnerability Detection	by Azul		$
Black Duck	by Synopsis		$
Xray	by JFrog	$	$
Snyk	by Snyk Limited	$	$
SonarQube	by SonarSource	$	$
Trivy	by Aqua	$	

SNYK CODE

SNYK CODE

Static application Security Testing

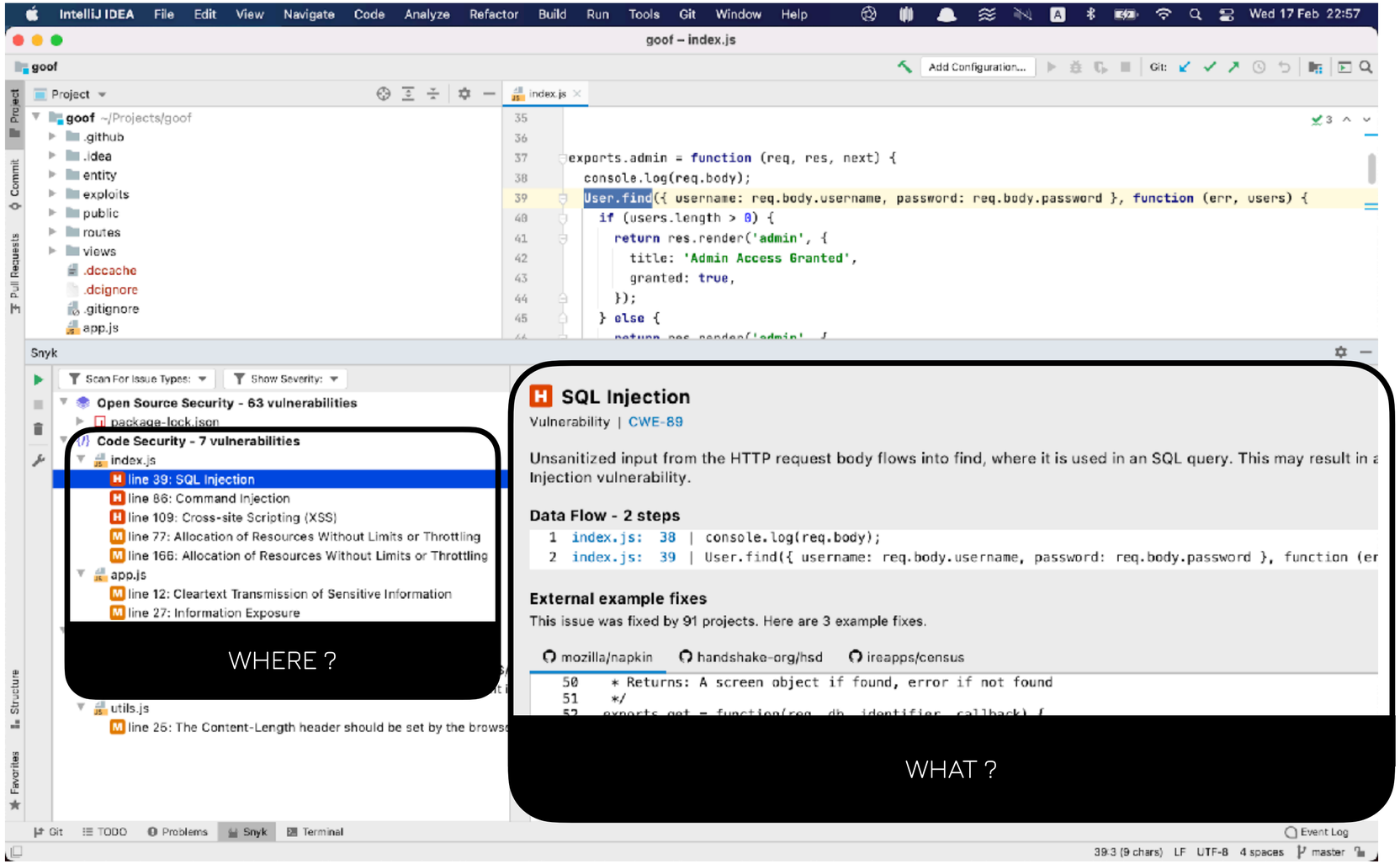
https://snyk.io/product/snyk-code/

Facts

- Free and paid version
- 9+ languages supported
- Developer first
- Standalone
- IDE Plugin available
- CI/CD integration

SNYK CODE

Intellij Plugin



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SONARQUBE

SONARQUBE

Automatic code review tool

https://www.sonarsource.com/products/sonarqube/

Facts

- Free and paid version
- 30+ languages
- 4800+ analysis rules
- Standalone
- Plugin available
- CI/CD integration

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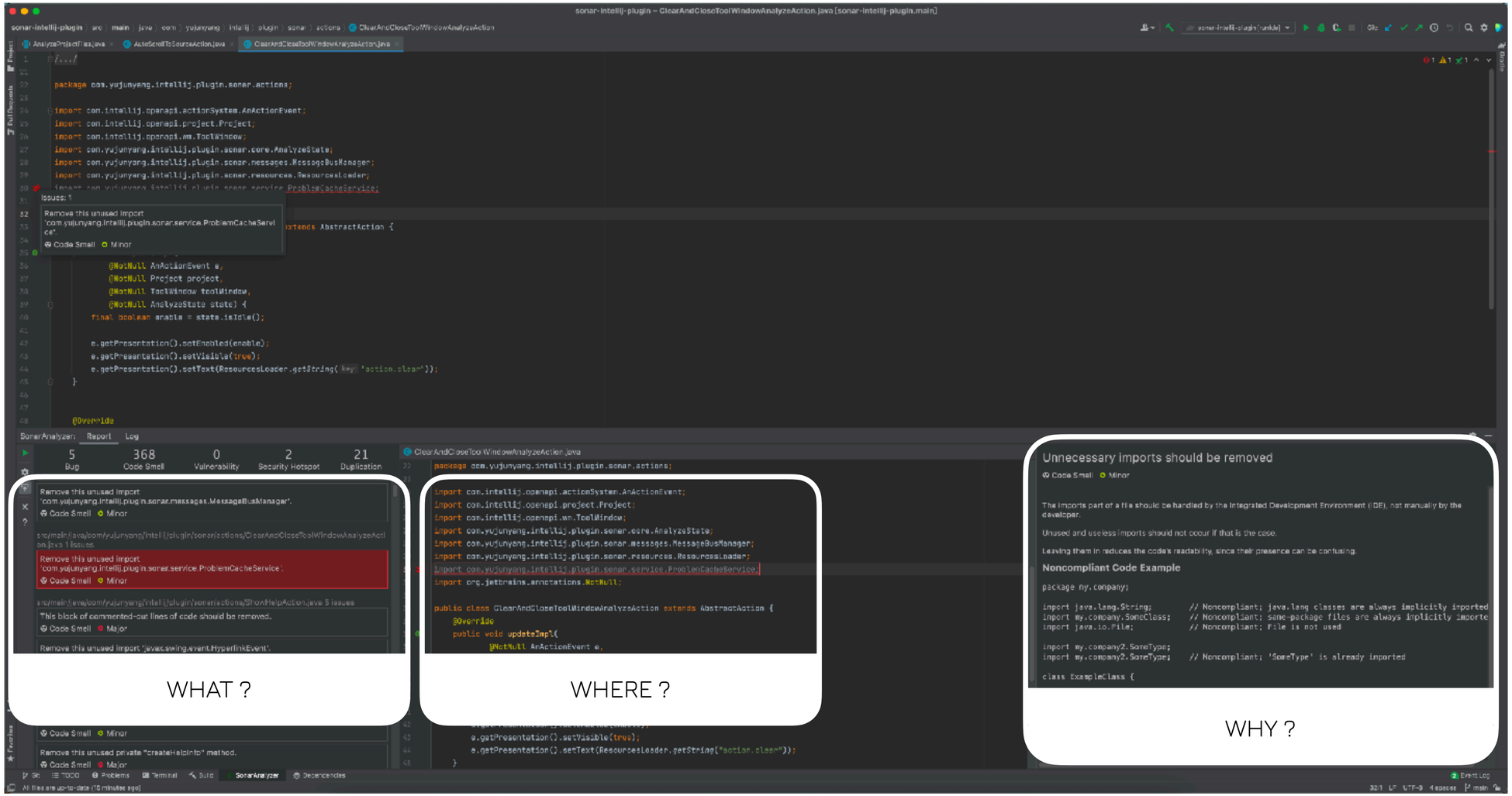
SONARQUBE

Intellij Plugin



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AZUL VULNERABILITY DETECTION

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AVD

Azul Vulnerability Detection

https://www.azul.com/products/vulnerability-detection/

Facts

- Runs in production
- JVM only
- Fewer false positives
- Does code inventory
- No Java agent -> no performance overhead

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AZUL VULNERABILITY DETECTION

Web UI

azul Vulnerability Detection

1m → now

CVE Analysis

Show Unaffected

Component	Version	CVE	CVE Score	CVE Status	Timestamp	Hostname	Instance ID
netty	3.6.0.Final	CVE-2021-37137	7.5	PRESENT	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
netty-codec-haproxy	4.0.29.Final	CVE-2021-37137	7.5	PRESENT	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
jackson-databind	2.6.5	CVE-2019-14892	9.8	PRESENT	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
cp-chill_2.11-0.8.0.jar1125461229560569 4756.jar	UNKNOWN	None CVE impact	N/a	-	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
	UNKNOWN				6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
	2.2.0				6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
cp-jackson-databind-2.6.5.jar6660364613748728752...	UNKNOWN	CVE-2019-14540	9.8	USED	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
javax.inject	2.1.95	None CVE impact	N/a	-	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
eclipse-collections-9.2.0.jar	UNKNOWN	None CVE impact	N/a	-	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
jackson-core-asl	1.9.13	None CVE impact	N/a	-	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
jackson-databind	2.6.5	CVE-2018-7489	9.8	PRESENT	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
neo4j-common	3.5.12	None CVE impact	N/a	-	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
netty-transport	4.0.29.Final	CVE-2021-37137	7.5	PRESENT	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
javassist	3.18.1-GA	None CVE impact	N/a	-	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
jackson-databind	2.6.5	CVE-2020-36182	8.1	PRESENT	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
netty	3.6.0.Final	CVE-2021-43797	6.5	PRESENT	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
neo4j	3.5.12	None CVE impact	N/a	-	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
javax.inject	2.1.86	None CVE impact	N/a	-	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed
hadoop-annotations	2.2.0	CVE-2016-6811	8.8	PRESENT	6/24/2022, 9:32:50 AM	skylakeC2.azulsystems.com	5ed19c86e1ed

WHERE ?

VULNERABLE ?

USED ?

A SECURE SOFTWARE SUPPLY CHAIN

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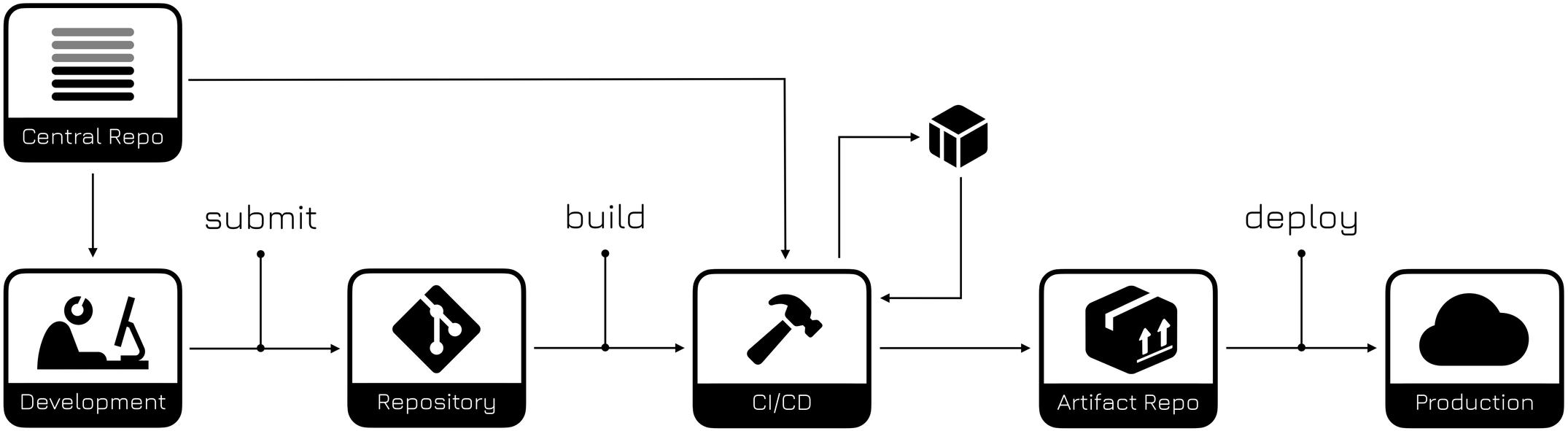
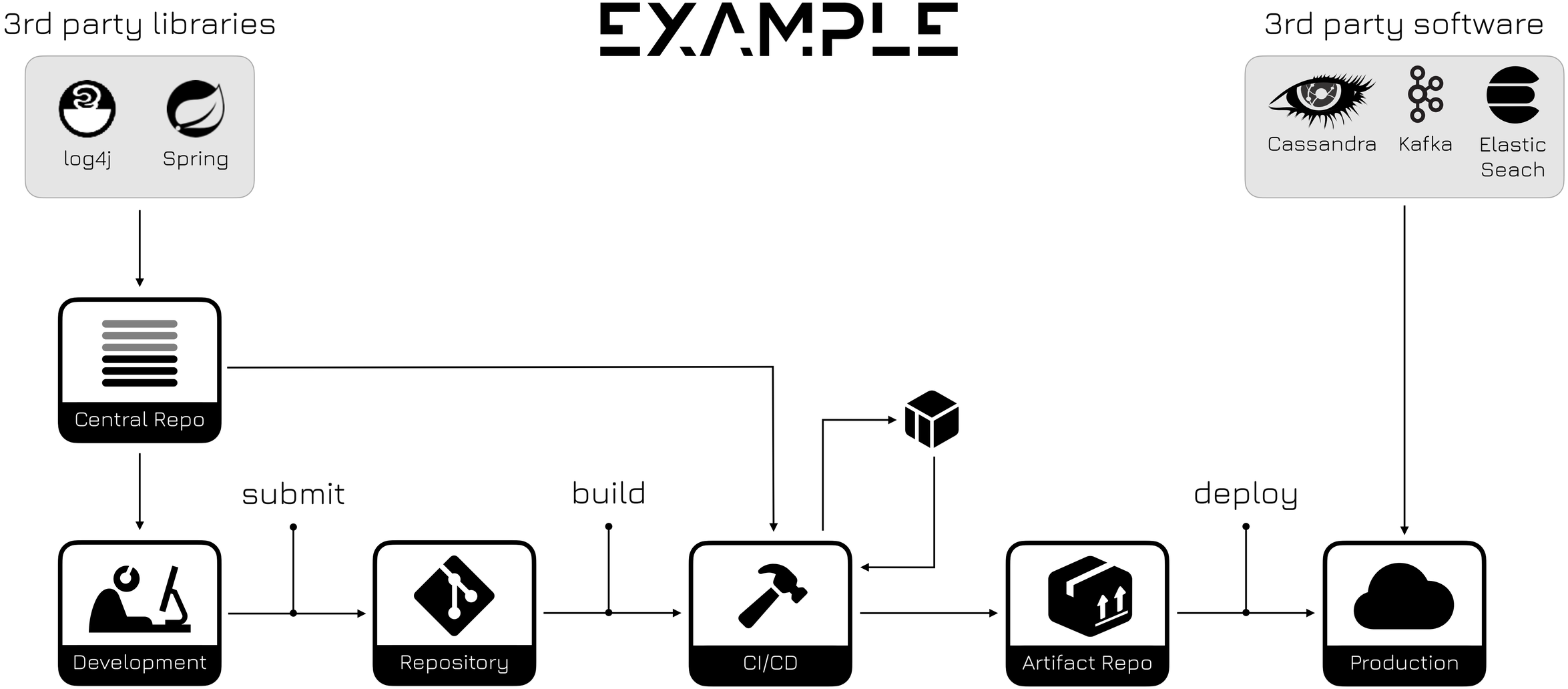
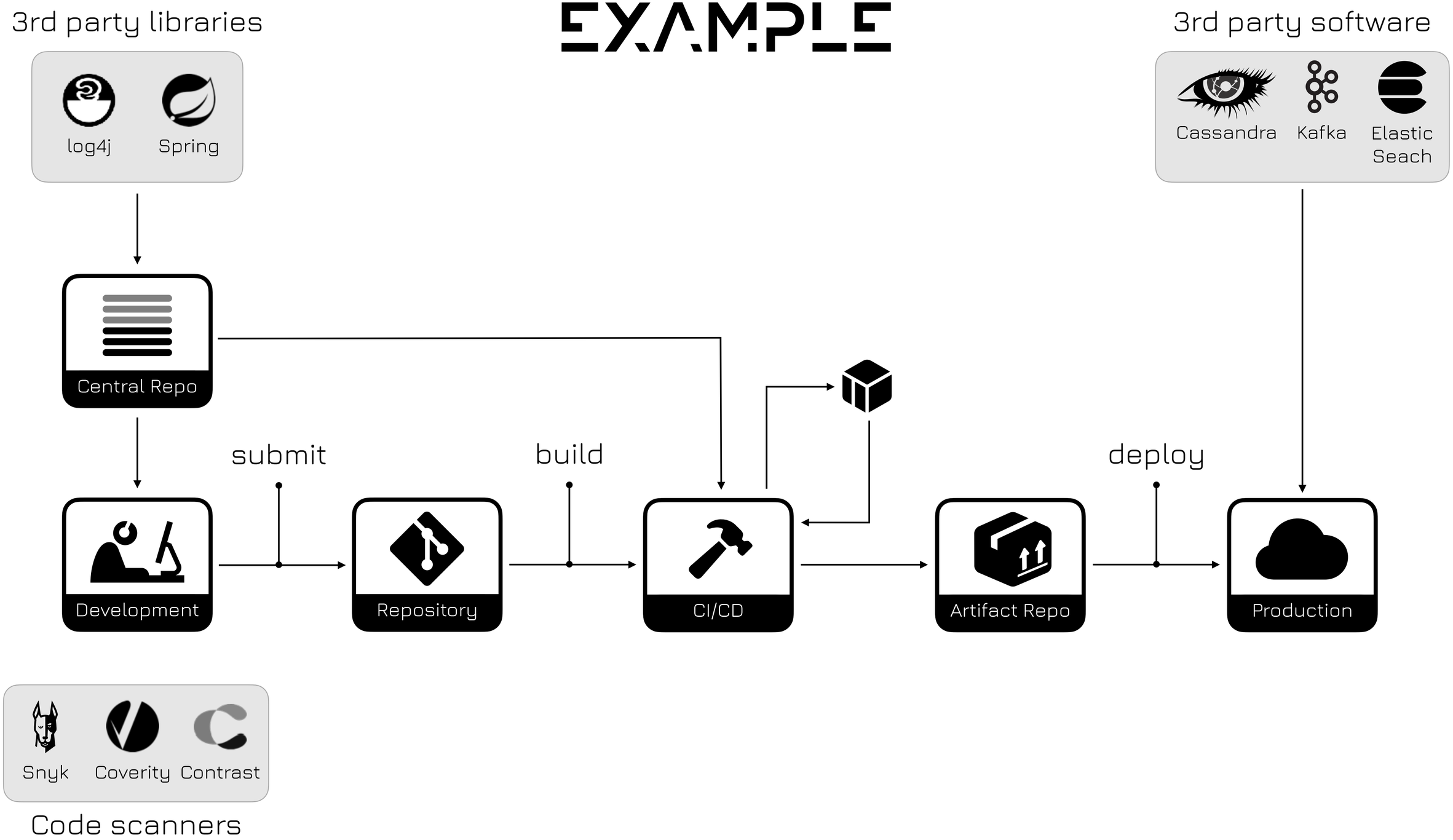
EXAMPLE


Central Repo
submit
build
deploy
Development
Repository
CI/CD
Artifact Repo
Production

EXAMPLE


3rd party libraries
log4j
Spring
3rd party software
Cassandra
Kafka
Elastic Seach
Central Repo
submit
build
deploy
Development
Repository
CI/CD
Artifact Repo
Production

EXAMPLE



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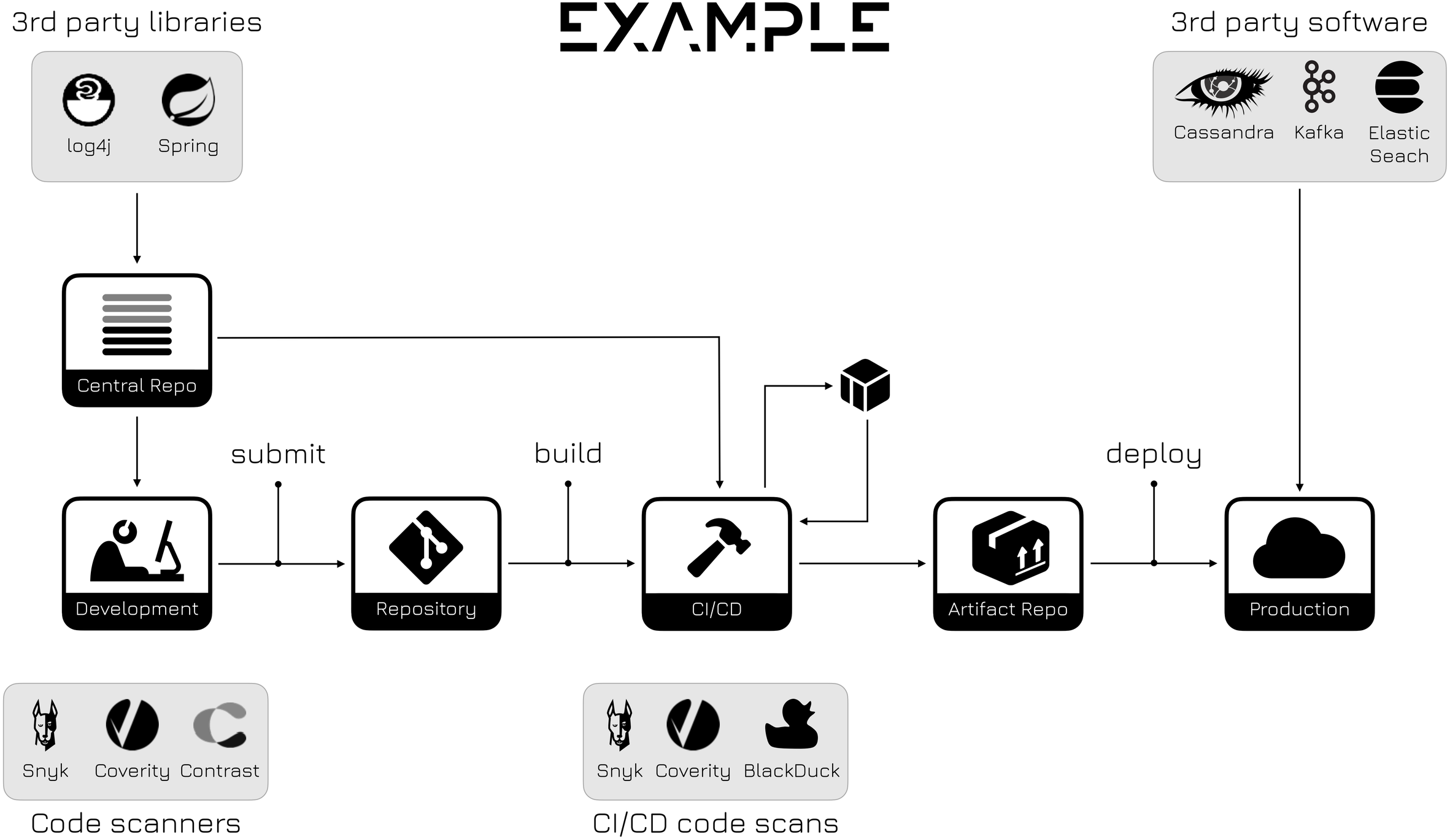
EXAMPLE



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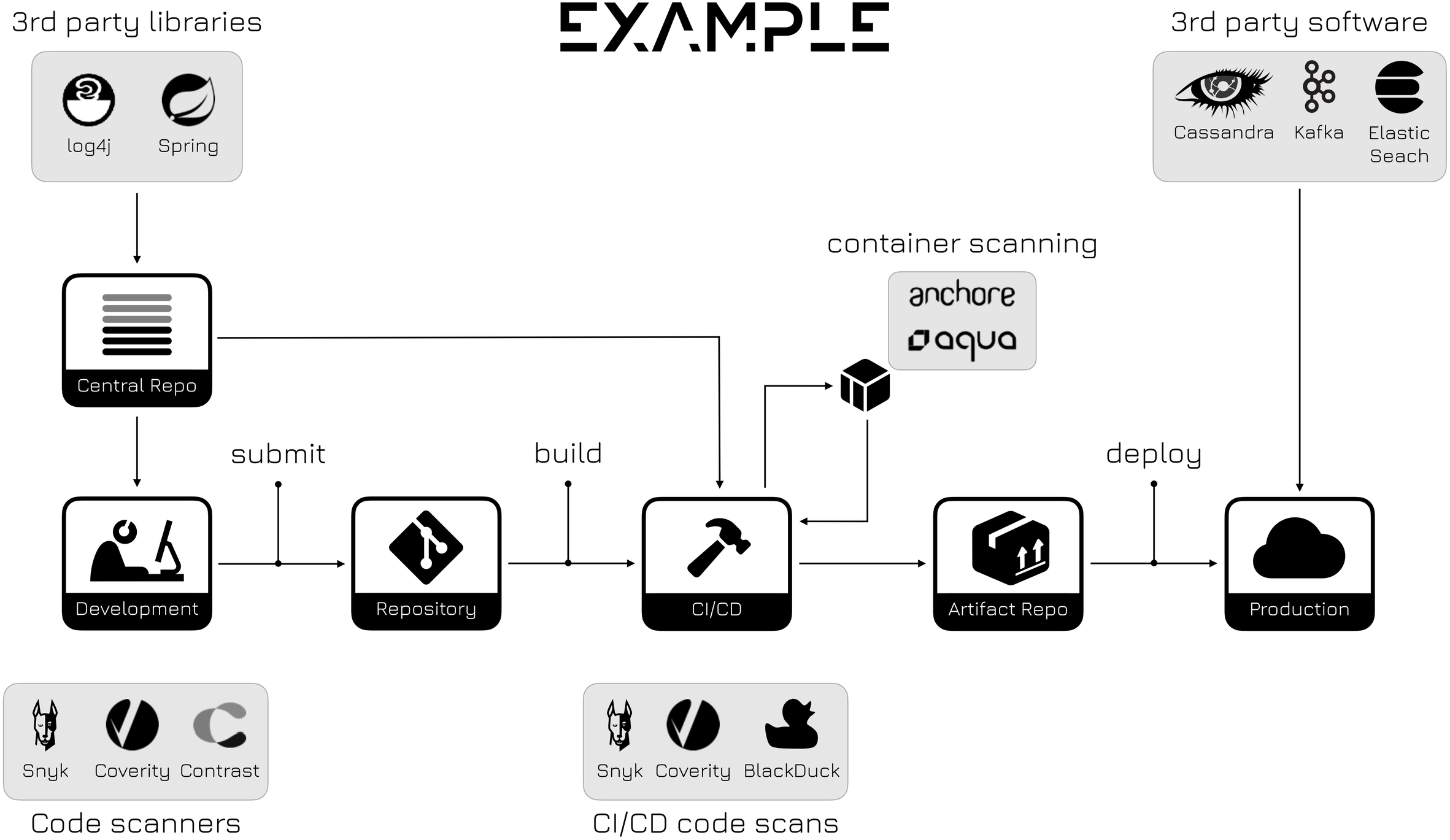
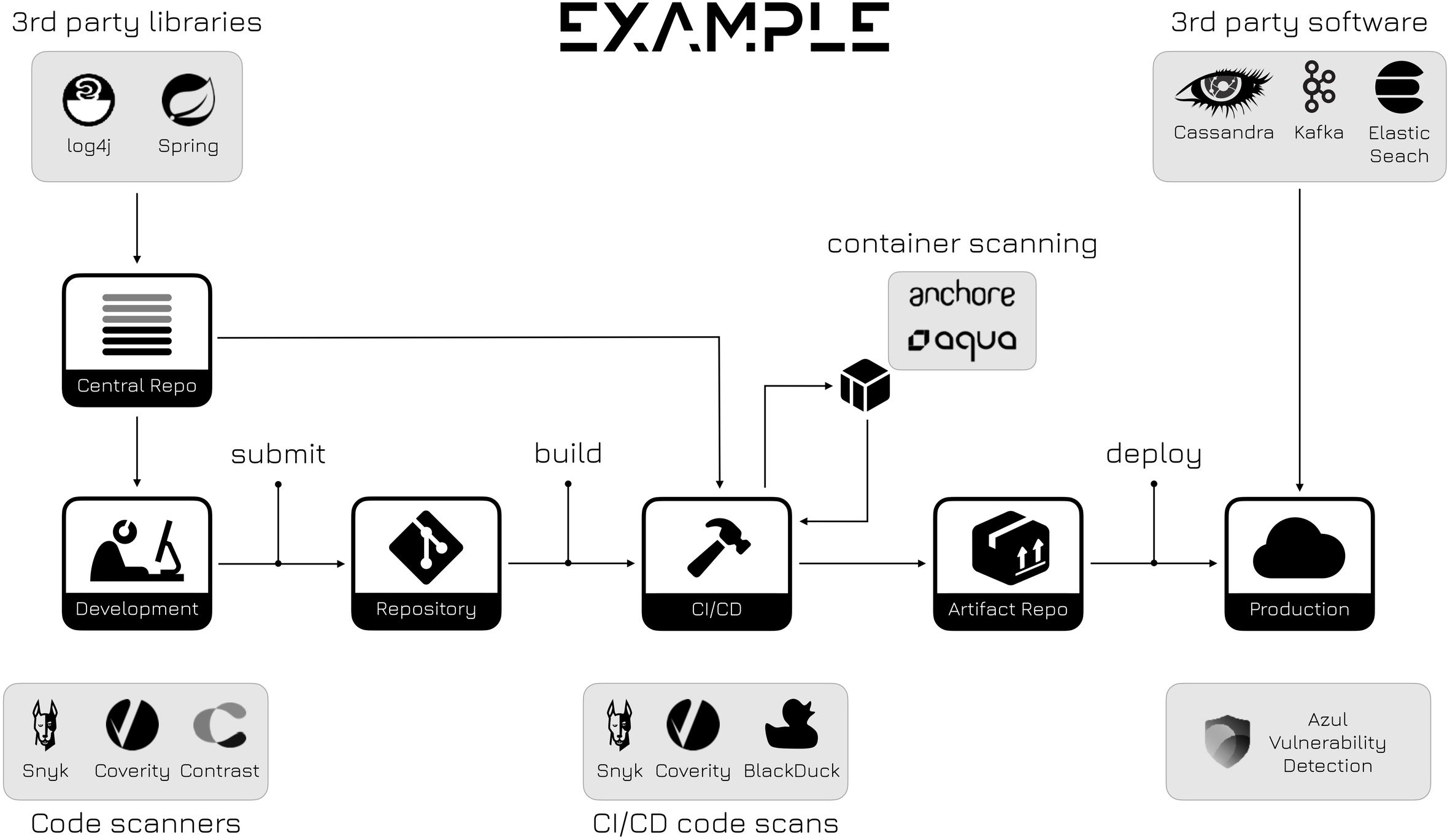
EXAMPLE



azul

EXAMPLE



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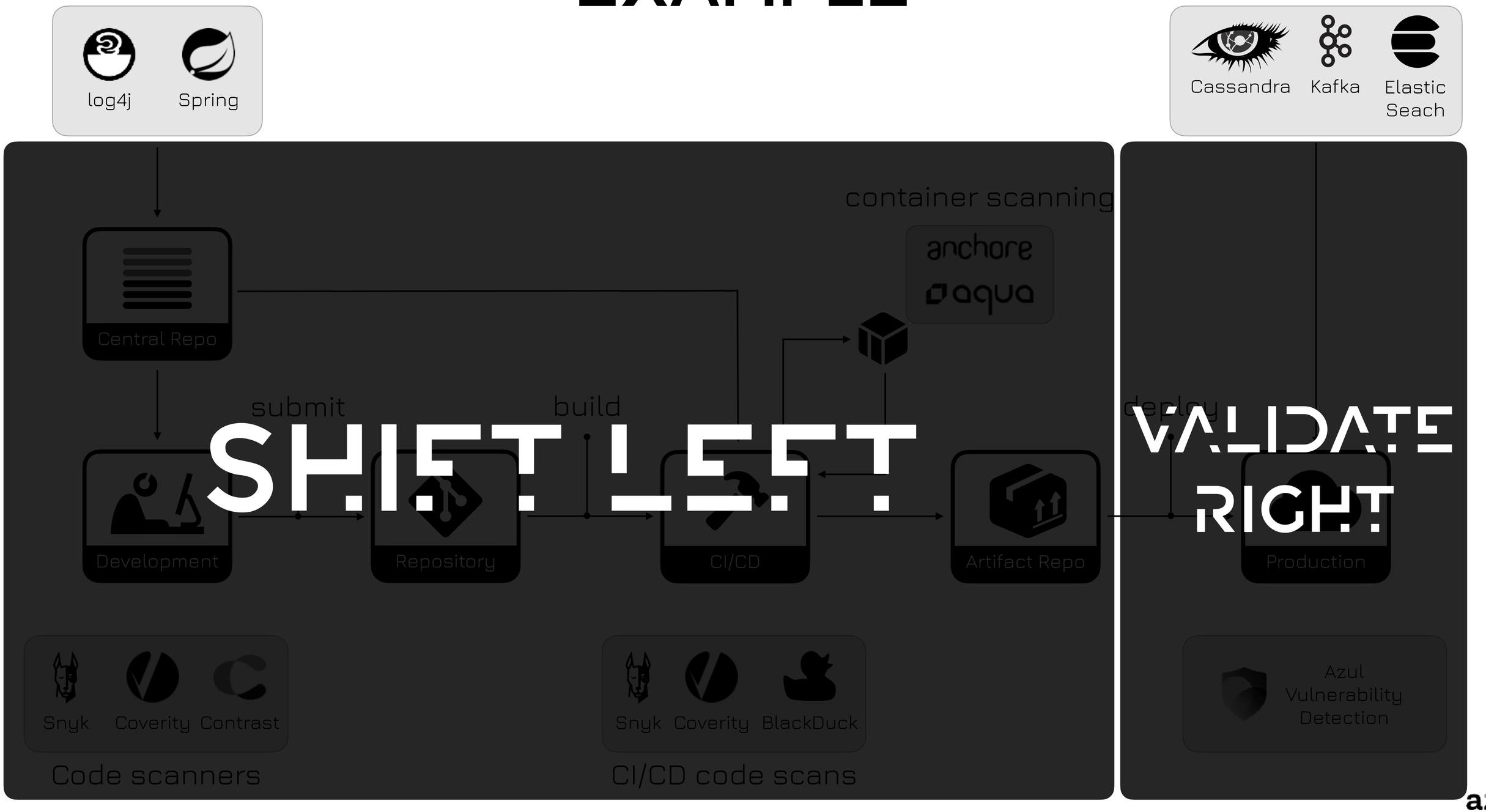
EXAMPLE



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TAKEAWAY

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- Follow an automated patch schedule
  (in line with your OpenJDK vendors quarterly patch cycle)
- Automate application packaging with jlink
  (removing modules that are not used by your application)
- Watch for CVE's in libraries
  (automate their updates in the line with the OpenJDK quarterly patch schedule)
- Use vulnerability scanners
  (not only in development and CI/CD but also in production)

NEED TO BE A SECURITY EXPERT ?

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NO...

YOU NEED TO BE AWARE

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STAY SECURE

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