Log4Shell vulnerabilities in Log4J2

CVE-2021-44228
CVE-2021-45046
CVE-2021-45105

Slides and demo code:

https://github.com/mschmnet/Log4Shell-demo

Logo by Lunasec, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=113465600

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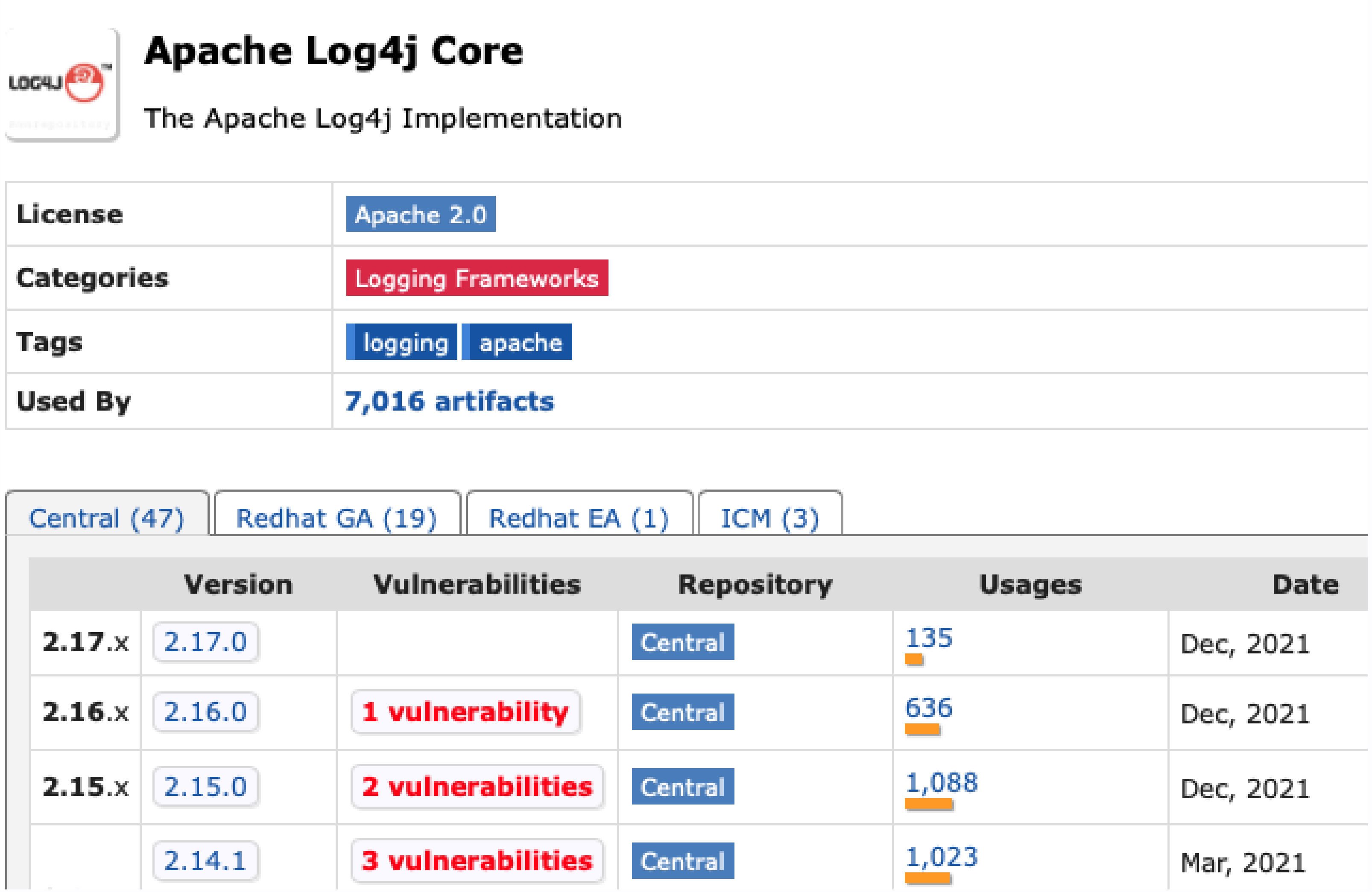
Introduction

- Vulnerability exists since 2013 (log4j-core 2.0-beta9 from September 2013)
- CVE-2021-44228 has been privately disclosed to Apache Software Foundation on November 24
- Patched the first time on December 6 (2.15.0)
- Publicly disclosed on December 9
- Patched again on December 13 (2.16.0)
- Patched for the 3rd time on December 18 (2.17.0)

Introduction



Apache Log4j Core

The Apache Log4j Implementation

License	Apache 2.0
Categories	Logging Frameworks
Tags	logging apache
Used By	**7,016 artifacts**

Central (47) | Redhat GA (19) | Redhat EA (1) | ICM (3)

	Version	Vulnerabilities	Repository	Usages	Date
2.17.x	2.17.0		Central	135	Dec, 2021
2.16.x	2.16.0	**1 vulnerability**	Central	636	Dec, 2021
2.15.x	2.15.0	**2 vulnerabilities**	Central	1,088	Dec, 2021
	2.14.1	**3 vulnerabilities**	Central	1,023	Mar, 2021

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CVE-2021-44228

- CVSS Score of 10.0 / 10
- Log4J versions greater than 2.0-beta9 (2013)
- The worst vulnerability (but not the only!!!) on Java versions older than: 6u211, 7u201, 8u191, 11.0.1
- Remote code execution by **simply being able of logging a specific string**!!
- Other many attack vectors exist, so **do not rely** on the Java version!!

CVE-2021-44228

Fixes

- Update to Log4J 2.17.0
- As a really quick fix: Remove `JndiLookup.class` from classpath (it's in the log4j-core.jar)
- Many incomplete fixes were initially suggested
- Use the exploit to *patch* a Java application: https://github.com/Cybereason/Logout4Shell - I would do this, but it's a curious project

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CVE-2021-45046

- Fix of 2.15.0 version was incomplete
- Still vulnerable on non default Log4J configurations

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CVE-2021-45105

- Require non default Log4j configurations
- Remote code execution not possible anymore
- Infinite recursion can be forced logging a malicious String what leeds to a *stack overflow* / application to crush

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Learnings

- Be humble
- There are bad people out there
- Don't trust data from outside of your system, ever
- No matter what, protect you code from an infinite loop or recursion
- Try not to do things differently depending on X. If something fails, it should always fail,
  end if it doesn't, it shouldn't fail ever
- Have in mind you'll need at some point redeploy everything (Infrastructure as Code)

Questions?

To de demo :-)