

Protection Licensing Toolkit ReadyAPI 3.2.5 Code Execution / Deserialization

Authored by Moritz Bechler | Site sys.s.de

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Protection Licensing Toolkit ReadyAPI version 3.2.5 suffers from an unsafe deserialization vulnerability that allows for remote code execution.

tags | exploit, remote, code execution

advisories | CVE-2020-12835

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Advisory ID: SYSS-2019-039
Product: Protection Licensing Toolkit, SoapUI/LoadUI/ServiceV Pro
Manufacturer: jProductivity LLC, SmartBear Software
Affected Version(s): - ReadyAPI 3.2.5
Tested Version(s): ReadyAPI 3.2.5
Vulnerability Type: Unsafe deserialization/remote code execution (CWE-502)
Risk Level: High
Solution Status: Open
Manufacturer Notification: 2019-09-02
Public Disclosure: 2020-05-18
CVE Reference: CVE-2020-12835
Author of Advisory: Moritz Bechler, SysS GmbH

Overview:

jProductivity Protection! is a solution for software vendors to implement licensing checks and management in their products.

The manufacturer describes the product as follows (see [1]):

"Protection! - is a powerful multi-platform Licensing Toolkit and License Manager that provides the ability to add licensing into custom applications or components only allowing the permitted use according to the supplied license."

ReadyAPI is a suite of web service testing tools. It is using the jProductivity Protection licensing solution.

The manufacturer describes the product as follows (see [2]):

"The ReadyAPI platform accelerates functional, security, and load testing of RESTful, SOAP, GraphQL and other web services right inside your CI/CD pipeline."

The jProductivity Protection Licensing Toolkit is using RMI-based network protocols to communicate with its network license server. These protocols are susceptible to deserialization attacks, which in the case of ReadyAPI can be exploited to gain remote code execution on the client side.

Vulnerability Details:

When trying to check out a remote floating license, the client software, ReadyAPI, contacts the Licensing Server using the Java RMI protocol on port 1099. As there is no transport security, this service can be impersonated by an attacker in a suitable position on the network.

Java RMI, and the underlying JRMP protocol, heavily relies on Java serialization to transport method arguments, return values and exception data.

Java serialization has been shown ([5]) to in many cases allow the execution of arbitrary code when certain specially crafted object graphs are reconstructed during deserialization.

ReadyAPI contains multiple libraries with published gadgets that can be exploited in this way.

While the license server suffers from the same vulnerability, no gadgets were identified that lead to direct code execution.

Proof of Concept (PoC):

Setup a JRMP/RMI service that returns a malicious serialized object graph. In this case, a gadget from the commons-beanutils library is used to get command execution. Other options exist on the ReadyAPI classpath.

```
$ java -DproperXalan=true \  
-cp commons-beanutils-1.9.3.jar:target/yoserial-0.0.6-SNAPSHOT-all.jar \  
yoserial.exploit.JRMPListener 1099 CommonsBeanutils1 gnome-calculator \  
* Opening JRMP listener on 1099  
Have connection from /192.168.56.102:34834  
Reading message...  
Sending return with payload for obj [0:0:0, 0]  
Closing connection
```

When trying to check out a floating license from the rogue server, RMI calls are made which results in the deserialization of the attacker-provided serialized data. Here, this causes the gnome-calculator program to be run.

Solution:

Avoid using Java serialization-based network protocols like RMI and deserializing untrusted data in general.
If they cannot be avoided, strict whitelist-based filtering allowing only the necessary object types should be performed.

Other users of the jProductivity Protection Licensing Server are likely affected as well.

There is no vendor patch available as of now.

Mitigation in ReadyAPI may be possible adding the following serialization filter to bin/ready-api.sh (however, this may break other features):

```
JAVA_OPTS="$JAVA_OPTS -Djdk.serialFilter=java.util.*;java.security.*;  
java.lang.*;sun.security.*;com.jp.protection.pub.*;dev.util.collections.*;  
com.jp.protection.pub.pro.license.rmi.*;java.rmi.*;sun.rmi.*;;"
```

Disclosure Timeline:

2019-08-08: Vulnerability discovered
2019-09-02: Vulnerability reported to manufacturer
2019-10-10: On inquiry, "early 2020" is mentioned as the fix timeline

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2020-01-30: Requested an update, no reply
2020-03-20: Another inquiry, no clear timeline provided
2020-04-15: Final 4 week deadline set, mitigation suggested
2020-05-18: Public disclosure of vulnerability

References:

[1] Product website for jProductivity Protection!
http://www.jproductivity.com/products/protection/
[2] Product website for ReadyAPI
https://smartbear.com/product/ready-api/
[3] SySS Security Advisory SYSS-2019-039
https://www.syss.de/fileadmin/dokumente/Publikationen/Advisories/SYSS-2019-039.txt
[4] SySS Responsible Disclosure Policy
https://www.syss.de/en/news/responsible-disclosure-policy/
[5] ysoserial, "Marshalling Pickles: how deserializing objects will ruin your day"
https://github.com/trohoff/ysoserial/

Credits:

This security vulnerability was found by Moritz Bechler of SySS GmbH.

E-Mail: moritz.bechler@syss.de
Public Key:
https://www.syss.de/fileadmin/dokumente/PGPKeys/Moritz_Bechler.asc
Key ID: 0x768FE2B8B3E53DDA
Key Fingerprint: 2C8F F101 9D77 BDE6 465E CCC2 768E FE2B B3E5 3DDA

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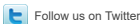
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