Security Vulnerability Notice

SE-2012-01-ORACLE-8

[Security vulnerabilities in Java SE, Issues 51 and 52]
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Security Explorations discovered two security vulnerabilities in Java SE Platform, Standard Edition. They are similar to the weaknesses discussed in our previous reports (problems with Class Loader’s access and Reflection API). A table below, presents their technical summary:

<table>
<thead>
<tr>
<th>ISSUE #</th>
<th>TECHNICAL DETAILS</th>
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<tbody>
<tr>
<td>51</td>
<td>origin: com.sun.org.apache.xalan.internal.xsltc.trax.TemplatesImpl, cause: the possibility to define user provided classes in a privileged (no package access in loadClass method) class loader (TransletClassLoader), impact: arbitrary access to restricted classes, type: partial security bypass vulnerability</td>
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Issue 51 relies on a definition of a custom instance of TemplatesImpl subclass that is further instantiated with the use of serialization. Due to the complexity of the exploit implementation (BlackBox class deserializes TemplatesImpl instance from the ObjectInputStream defined in an array of bytes), we provide the source code for the translet class that is defined by the instantiated object (Helper.java file from translet directory).

The whole exploitation process takes place inside the constructor of the Helper class, which is a user provided subclass of AbstractTranslet class. The bytecodes for the body of this class are initialized at the time of deserialization of TemplatesImpl instance (_bytecodes field). As an exploitation vector we again rely on DefiningClassLoader class from sun.org.mozilla.javascript.internal package.

Issue 52 relies on the possibility to call no-argument methods on arbitrary objects or classes. For the purpose of our Proof of Concept code we invoke getDeclaredMethods of java.lang.Class class to get access to methods of restricted classes. This is accomplished with the use of the following code sequence:

```
    Introspector.elementFromComplex((Object)clazz,"declaredMethods")
```

Issues 51 and 52, when combined together can be used to successfully achieve a complete JVM sandbox bypass in a target system. It might be possible that Issue 52 could be used alone to achieve a complete sandbox bypass. That however requires more thorough investigation.

Attached to this report, there is a Proof of Concept codes that illustrate the abovementioned impact of both vulnerabilities. It has been successfully tested in the environment of Java SE 7 Update 11 (JRE version 1.7.0_11-b21).

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**About Security Explorations**

Security Explorations (http://www.security-explorations.com) is a security start-up company from Poland, providing various services in the area of security and vulnerability research. The company came to life in a result of a true passion of its founder for breaking security of things and analyzing software for security defects. Adam Gowdiak is the company's founder and its CEO. Adam is an experienced Java Virtual Machine hacker, with over 50 security issues uncovered in the Java technology over the recent years. He is also the hacking contest co-winner and the man who has put Microsoft Windows to its knees (vide MS03-026). He was also the first one to present successful and widespread attack against mobile Java platform in 2004.