OSGi RFP-176 Malicious Bundle Test Framework - Readme

Table of Content

1 Test framework installation....3
2 Test framework execution....4
2.1 Configuration file and remote server 4
2.2 Tests execution....4
3 OSGi Attack cases and countermeasures....6
3.1 OS attacks....6
3.1.1 Files & Data leakage....6
3.2 OSGi Framework attacks....6
3.2.1 Denial-of-Service attacks - Malicious service operations....6
4 Authors....7

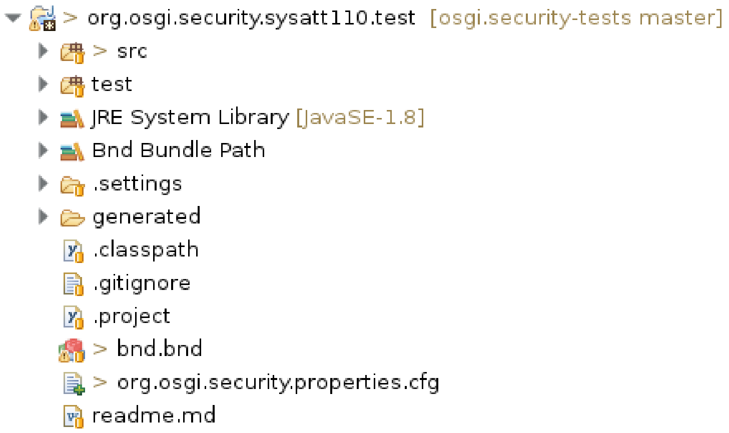
1 Test framework installation

This framework uses OSGi enRoute, a project which provides a programming model of OSGi applications. It includes a tool chain and libraries which permit to develop OSGi applications quickly. In this section, we will describe the installation procedure on a Linux target. Further information is available on enRoute website : prerequisites (http://enroute.osgi.org/tutorial_base/100-prerequisites.html) and enRoute environment setup (http://enroute.osgi.org/tutorial_base/200-workspace.html).

2 Test framework execution

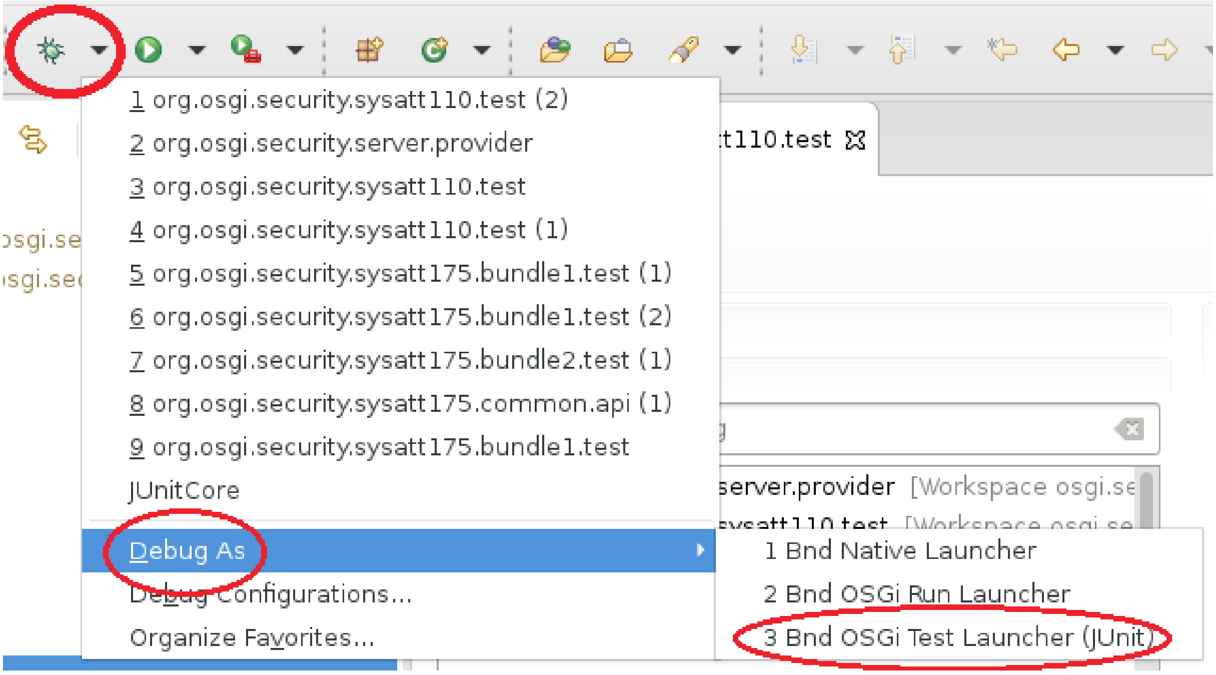
In this part, we will detail how to use the test framework with OSGi enRoute.

Each test has the following structure :

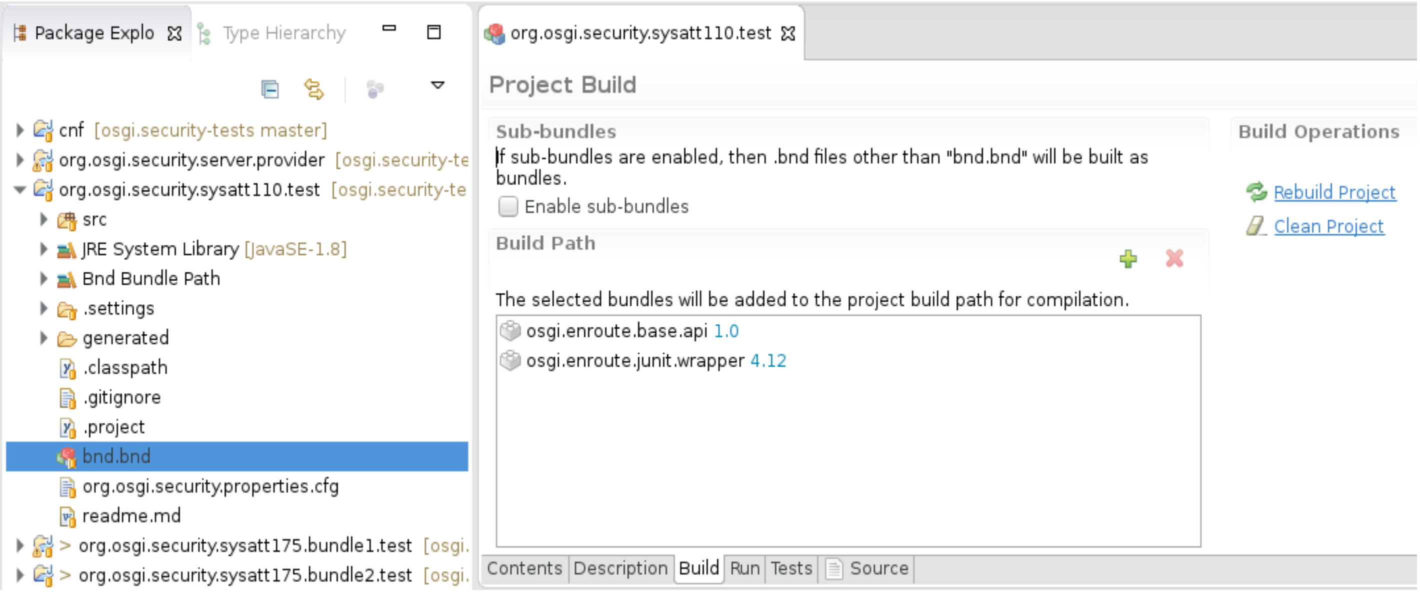


```
> org.osgi.security.sysatt110.test [osgi.security-tests master]
    > src
    test
    JRE System Library [JavaSE-1.8]
    Bnd Bundle Path
    .settings
    generated
    .classpath
    .gitignore
    .project
    > bnd.bnd
    > org.osgi.security.properties.cfg
    readme.md
```

Test bundles are already generated, so you normally just need to run them without doing anything else. To do this, select the little arrow button just next to the « Debug As... » button. Then, select « Debug As » menu, and « 3 Bnd OSGi Test Launcher (JUnit) », as shown on the picture below :


1 org.osgi.security.sysatt110.test (2)
2 org.osgi.security.server.provider
3 org.osgi.security.sysatt110.test
4 org.osgi.security.sysatt110.test (1)
5 org.osgi.security.sysatt175.bundle1.test (1)
6 org.osgi.security.sysatt175.bundle1.test (2)
7 org.osgi.security.sysatt175.bundle2.test (1)
8 org.osgi.security.sysatt175.common.api (1)
9 org.osgi.security.sysatt175.bundle1.test
JUnitCore
Debug As
Debug Configurations...
Organize Favorites...
1 Bnd Native Launcher
2 Bnd OSGi Run Launcher
3 Bnd OSGi Test Launcher (JUnit)

If you need to rebuild all the bundles, you can do it with the **bnd** file. Open it, then select the « Build » tab :


Package Explo
Type Hierarchy
cnf [osgi.security-tests master]
org.osgi.security.server.provider [osgi.security-te
org.osgi.security.sysatt110.test [osgi.security-te
src
JRE System Library [JavaSE-1.8]
Bnd Bundle Path
.settings
generated
.classpath
.gitignore
.project
bnd.bnd
org.osgi.security.properties.cfg
readme.md
> org.osgi.security.sysatt175.bundle1.test [osgi.
> org.osgi.security.sysatt175.bundle2.test [osgi.
org.osgi.security.sysatt110.test
Project Build
Sub-bundles
Build Operations
Rebuild Project
Clean Project
Build Path
Contents
Description
Build
Run
Tests
Source

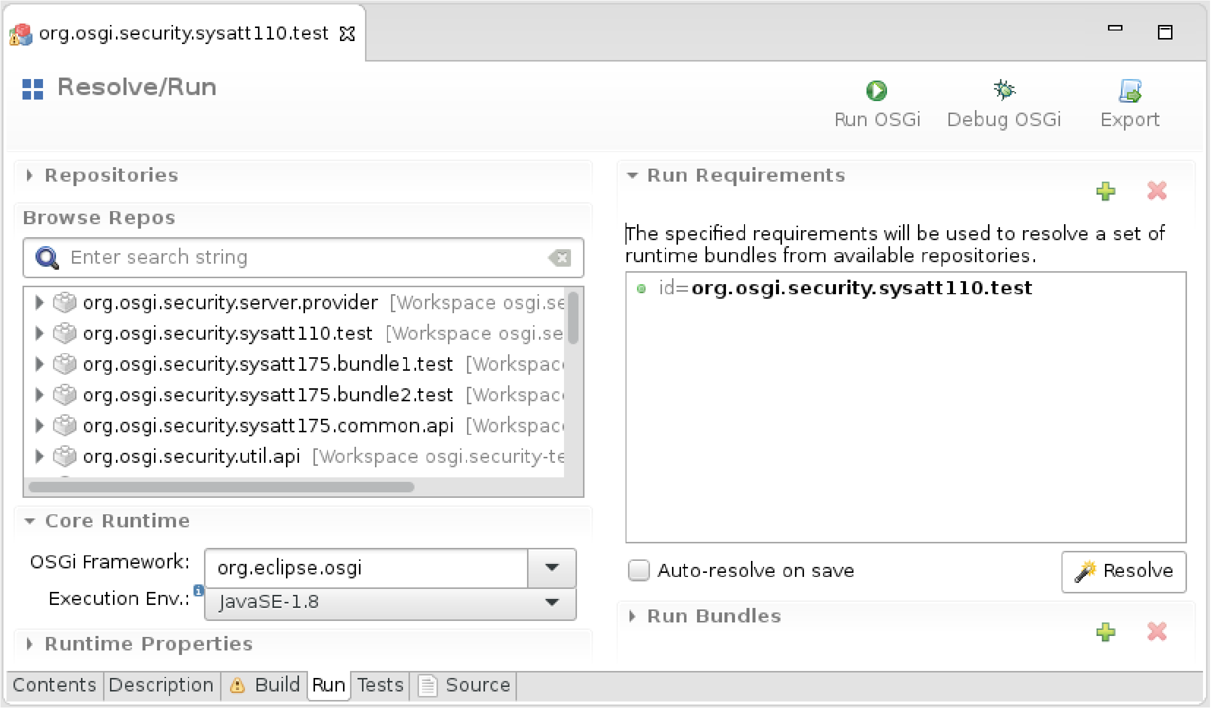
If sub-bundles are enabled, then .bnd files other than "bnd.bnd" will be built as bundles.

□ Enable sub-bundles

The selected bundles will be added to the project build path for compilation.

osgi.enroute.base.api 1.0
osgi.enroute.junit.wrapper 4.12

Click on the « Rebuild project » button, then go in the « Run » tab :


org.osgi.security.sysatt110.test
Resolve/Run
Run OSGi
Debug OSGi
Export
Repositories
Browse Repos
Enter search string
org.osgi.security.server.provider [Workspace osgi.se
org.osgi.security.sysatt110.test [Workspace osgi.se
org.osgi.security.sysatt175.bundle1.test [Workspac
org.osgi.security.sysatt175.bundle2.test [Workspac
org.osgi.security.sysatt175.common.api [Workspac
org.osgi.security.util.api [Workspace osgi.security-te
Core Runtime
Runtime Properties
Run Requirements
Resolve
Run Bundles
Contents
Description
Build
Run
Tests
Source

OSGi Framework: org.eclipse.osgi

Execution Env.: JavaSE-1.8

The specified requirements will be used to resolve a set of runtime bundles from available repositories.

id=**org.osgi.security.sysatt110.test**

□ Auto-resolve on save

Hit the « Resolve » button, click on « Finish » button, then run the bundle in the same way as described before.

3 OSGi Attack cases and countermeasures

Reader will find here below a detailed list of potential cyber-attacks that are achievable on OSGi platforms, through different attack targets:

- **OS** attacks, which are performed via OSGi bundles and target the OS.
- **OSGi Framework** attacks, which are performed via OSGi bundles and target the framework.

3.1 OS attacks

OS attacks group contains 9 attacks, which are divided in three types: **file/data leakage**, **code execution** and **file manipulation**. As the name suggests it, these attacks target the OS. The aim here is to hijack critical system data, manipulate system files or execute native code.

3.1.1 Files & Data leakage

SYS-ATT-110: Log files hijacking	
Description	System log pertinent files hijacking, and sending of these files on the network to malicious distant server. This attack need a launched server.
Impact	Log files can contain some informations about system components/libraries/softwares (type, used version…). These informations can permit to perform attacks.
Recommendations	Set a sandbox system for bundle execution, in order to limit access to files and/or properties of the system.

3.2 OSGi Framework attacks

OSGi attacks group is composed of 14 attacks, separated in four types: **data/information extraction badly formatted input data or files**, **Denial-of-Service** and **framework services manipulation**. Attacks of this group are more offensive than OS attacks group, as a large part of these attacks belongs to Denial-of-Service attack type. The goal here is to put the system out of service by Denial-of-Service attacks and manipulation of framework services.

3.2.1 Denial-of-Service attacks - Malicious service operations

SYS-ATT-175: Infinite loop: mutually dependant services	
Description	Resource exhaustion by mutually dependant service subscriptions (ex: in a bilateral scenario, bundle A subscribes at bundle B services and conversely : bundle A state change provokes event sending, processed by bundle B which change its state, which provoke a event sending... etc, as an infinite loop plan).
Impact	The system may be not accessible when the infinite loop occurs. A restart may be necessary to access again to the system.
Recommendations	Resource Monitoring: Setup a quota system and a runtime conflict resolution and monitoring system.

4 Authors

For any suggestion or support, please contact :

Julien Helmer
Cyber-security Technical leader
julien.helmer@sogeti.com

Romain Siche
Cyber-security engineer
romain.siche@sogeti.com

Thibault Mainand
Cyber-security apprentice
thibault.mainand@sogeti.com