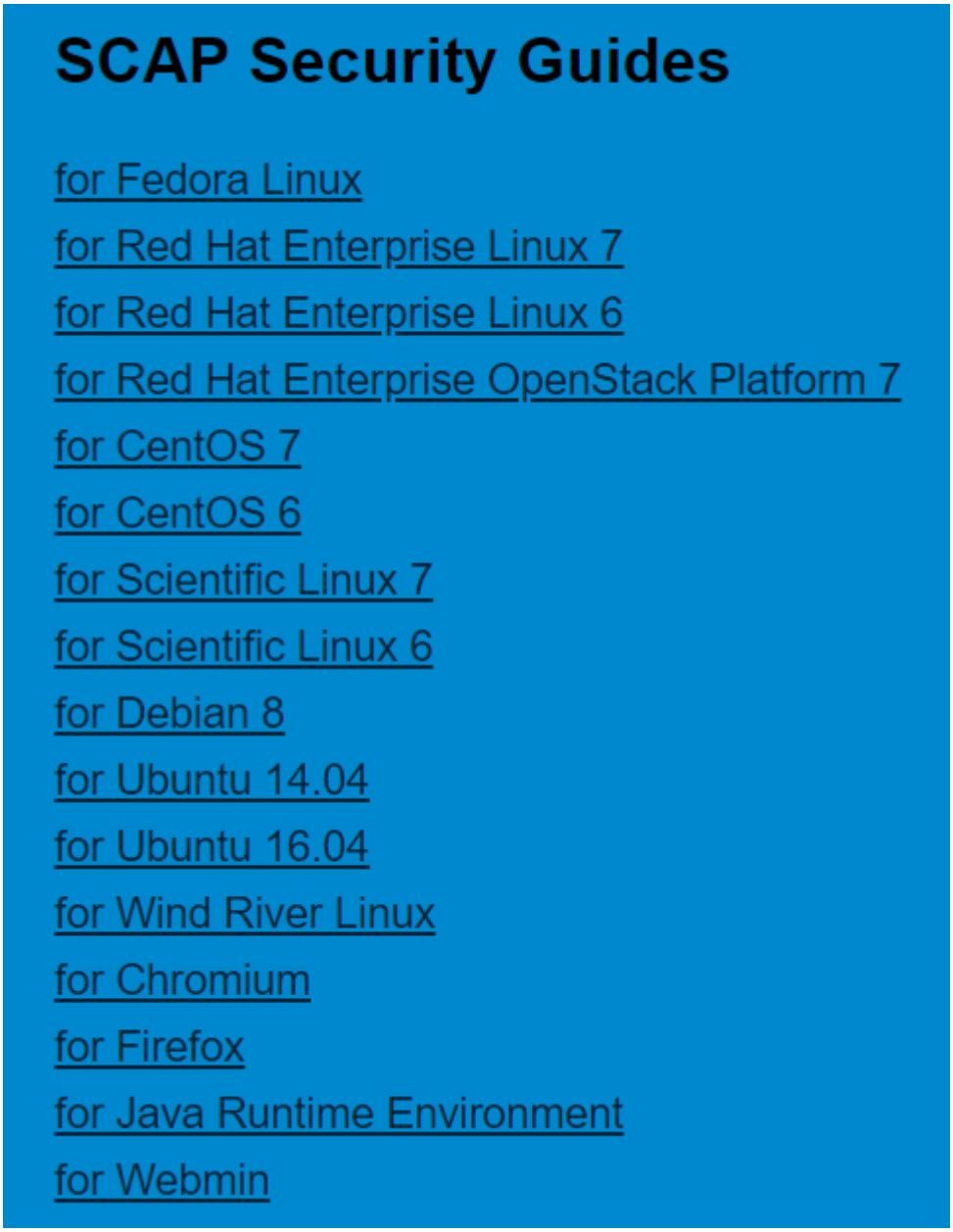
Infrastructure Security

The topics to be covered in this lab are as follows:

- The scope of infrastructure security
- Secure configuration best practices
- Network security assessments with Nmap
- CVE vulnerability scanning
- HTTPS security check with SSLyze

OpenSCAP security guide

The OpenSCAP is mainly focused on OS secure configuration guides that can be found at https://static.open-scap.org/. In addition, OpenSCAP also provides several kinds of scanning tools to check the configurations, such as OpenSCAP Base, SCAP Workbench, and OpenSCAP Daemon. We will demonstrate the uses of SCAP Workbench in the following section:

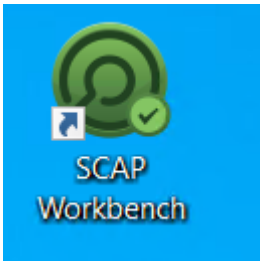


Step 1 -- installation of SCAP workbench

SCAP Workbench is one of secure configuration scanning tool that provides the GUI to do remote scanning. The SCAP Workbench tool has been downloaded in the lab environment: https://github.com/OpenSCAP/scap-workbench/releases.

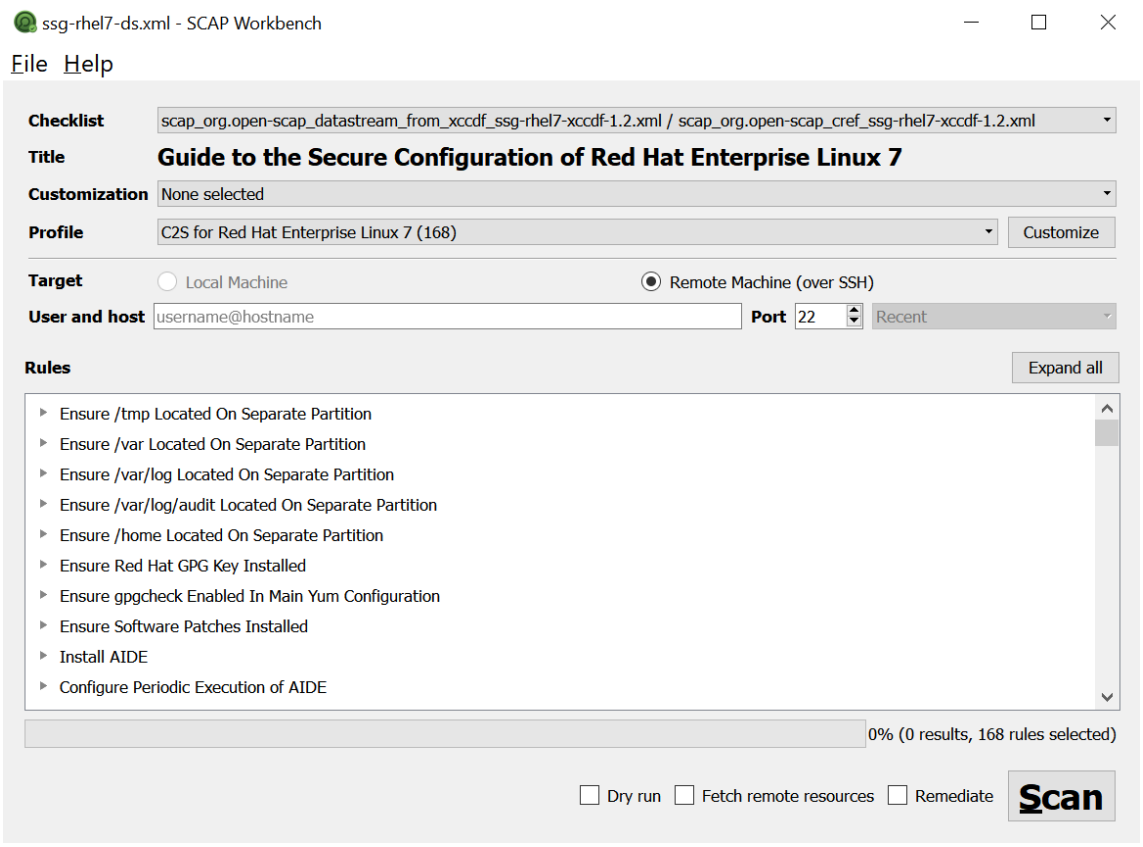
Step 2 -- OpenSCAP security guide

Launch the scap workbench located on Desktop:



It will ask you to load a security profile. We selected RHEL7 in our example. You may specify the SSH host to do the scanning.

The following screenshot shows how SCAP works:



Network security assessments with Nmap

The common network security assessment scenario and Nmap commands are listed in the following table:

Common network security assessments scenarios	Nmap command
Fast scan for listening ports	`nmap -F --open -Pn`
Scan for any missing HTTP security headers such as XSS-Protection	`nmap -p80 --script http-security-headers -Pn`
DOS attack with HTTPS Slowloris	`nmap -p80,443 --script http-slowloris --max-parallelism 500 -Pn`
Scanning for all TCP listening ports	`nmap -p1-65535 --open-Pn`
Scanning for all UDP listening ports	`nmap -p1-65535 -sU --open-Pn`
Scanning for common ports	`Nmap -p21, 23,80, 137,138, 443, 445, 1433, 3306, 1521, 3389 --open pPn`

Open terminal and run all nmap commands and observe their output:

- Fast scan for listening ports

```
nmap -F --open -Pn demo.testfire.net
```

- Scan for any missing HTTP security headers such as XSS-Protection

```
nmap -p80 --script http-security-headers -Pn demo.testfire.net
```

- DOS attack with HTTPS Slowloris

```
nmap -p80,443 --script http-slowloris --max-parallelism 500 -Pn demo.testfire.net
```

- Scanning for all TCP listening ports

```
nmap -p1-65535 --open -Pn demo.testfire.net
```

- Scanning for all UDP listening ports

```
nmap -p1-65535 -sU --open -Pn demo.testfire.net
```

- Scanning for common ports

```
Nmap -p21, 23,80, 137,138, 443, 445, 1433, 3306, 1521, 3389 --open pPn demo.testfire.net
```

Note: Some of above scans will take time to complete.

Known vulnerable components scan by OWASP dependency check

Here we demonstrate the uses of the command line version of OWASP dependency check for local files scanning.

Step 1 -- installation of OWASP dependency check

The OWASP dependency check provides JAR, which can be executed under command line.

Step 2 -- CVE scanning with OWASP dependency check

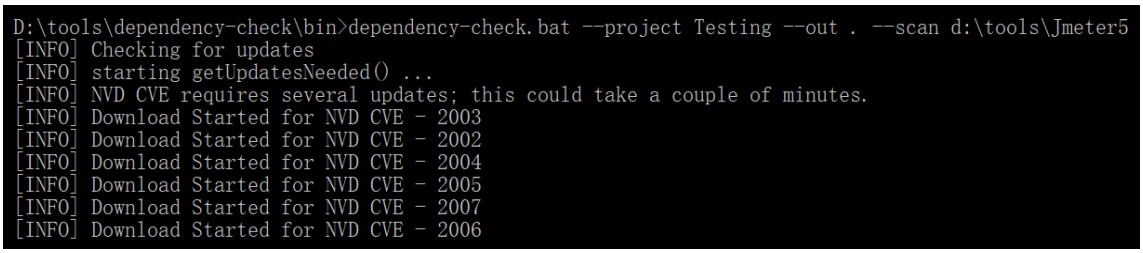
In our demonstration, we specify to scan the [C:\Users\fenago\Downloads\apache-jmeter-5.4.3], and output the testing report under existing folder which will be [\dependency-check\bin], as follows:

```
cd C:\Users\fenago\Downloads\dependency-check\bin

dependency-check.bat   --project   Testing   --out   .   --scan
C:\Users\fenago\Downloads\apache-jmeter-5.4.3
```

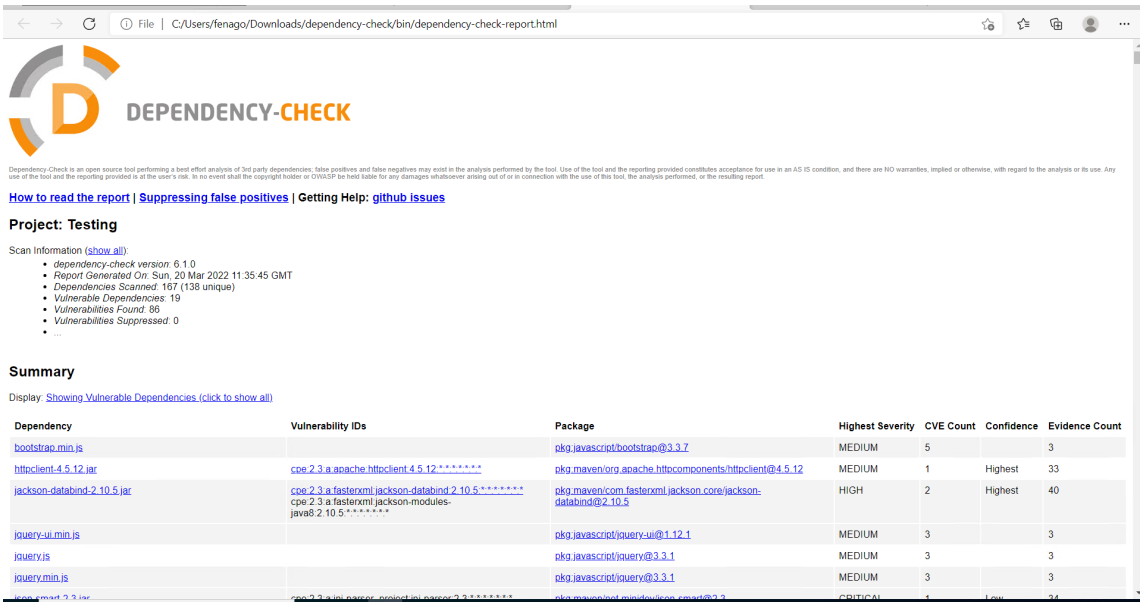
Note: It will take few minutes to complete the scan.

The following screenshot shows the execution results of executing the listed command:

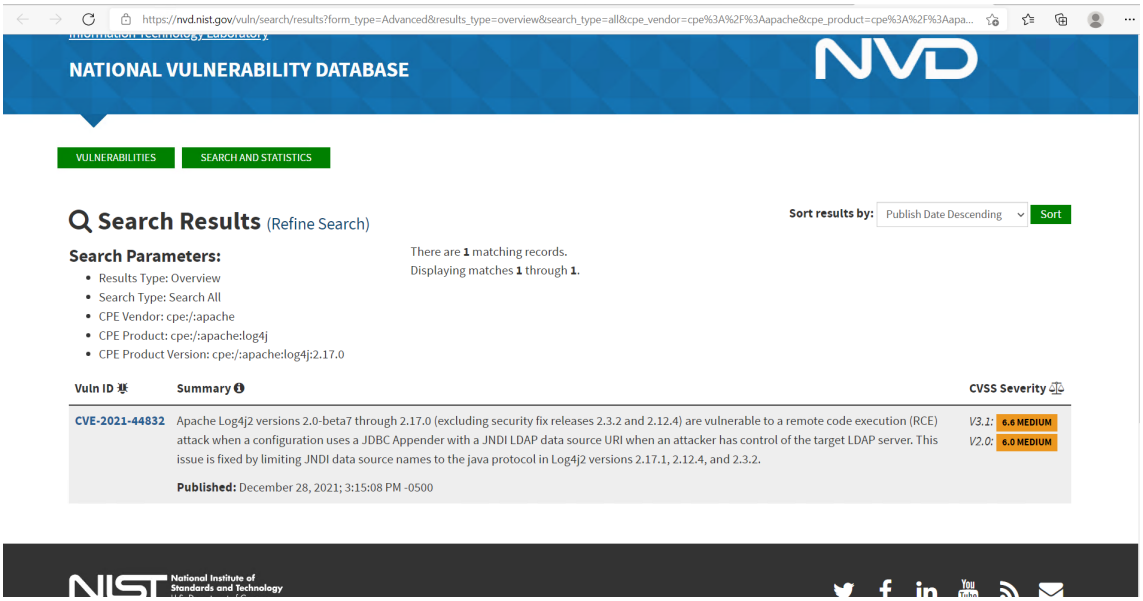


Once the scanning is done, you may find the [dependency-check-report.html] under the [\dependency-check\bin].

Here is the sample of dependency check output HTML report:



Click one of the Vulnerability to get details:



In addition to security vulnerabilities issues, the uses of open source also need to pay attention to the license types and restrictions such as GPL or LGPL. The suggested open source tools that can do the license scanning are: Askalono, Licensee, LiD, and ScanCode.

HTTPS security check with SSLyze

The following table lists common HTTPS security testing scenario and the uses of SSLyze:

HTTPS security testing scenarios	SSLyze command options
Check for Heartbleed vulnerability	`Sslyze --heartbleed`
Check for certificate validation	`Sslyze --certinfo=basic`
Check compression for CRIME attack	`Sslyze --compression`
Check for renegotiation issues	`Ssylze --reneg`

To execute the SSLyze under Windows, refer to the following command:

```
sslyze demo.testfire.net
```

Task: Try commands shown in the above table.

The [sslyze --help] will list the detailed usage of each command option:

```
CHECKING HOST(S) AVAILABILITY
-----------------------------

  demo.testfire.net:443                     => 65.61.137.117



SCAN RESULTS FOR DEMO.TESTFIRE.NET:443 - 65.61.137.117
------------------------------------------------------

 * Downgrade Attacks:
Unhandled exception while running --fallback:
timeout - timed out

 * SSLV3 Cipher Suites:
      Forward Secrecy                   INSECURE - Not Supported
      RC4                               INSECURE - Supported

    Preferred:
       None - Server followed client cipher suite preference.
    Accepted:
       TLS_RSA_WITH_RC4_128_MD5                                     128 bits      HTTP 200 OK
    Undefined - An unexpected error happened:
       TLS_RSA_WITH_RC4_128_SHA                     timeout - timed out
       TLS_RSA_WITH_CAMELLIA_256_CBC_SHA            timeout - timed out
       TLS_RSA_WITH_CAMELLIA_128_CBC_SHA            timeout - timed out
       TLS_RSA_WITH_AES_256_CBC_SHA                 timeout - timed out
       TLS_RSA_WITH_AES_128_CBC_SHA                 timeout - timed out
```

In addition to SSyze, the **Mozilla TLS Observatory** also provides a suite of tools to scan the TLS services. For an online version of TLS check, refer to https://observatory.mozilla.org.

Summary

In this lab, we discussed the infrastructure security, which includes security scanning for known vulnerable components, secure configuration, and secure communication. For the secure configuration, the CIS benchmarks, STIGs, and the OpenSCAP security guide are the guidelines we can follow. For the vulnerable components scanning, we demonstrated two technical approaches. One is CVE scanning with NMAP network scanning and the other is file scanning with OWASP dependency check. For the secure communication, we introduced SSLyze for the HTTPS commutation settings.

In the next lab, we will introduce more BDD automation frameworks to apply to security testing.