

Liberty Migration Toolkit Lab



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Liberty Migration Toolkit

In this lab we will learn to use two different migration tools. The **Liberty Migration Toolkit** determines the suitability of migrating your applications from WebSphere Application Server, or other third party Java EE servers, to WebSphere Liberty. To analyze an application for migration suitability, the application must be imported into your Eclipse-based IDE.

The Migration Toolkit Eclipse plug-in includes a number of rule sets to scan Java EE applications for the use of vendor specific deployment descriptors, JSP files with proprietary APIs, and Java code with proprietary APIs. The rules scan applications for the use of Java technologies and APIs that are not supported in WebSphere Liberty.

The **Migration Toolkit for Application Binaries** is a stand-alone tool that is capable of scanning your application binaries, without source code, to give you a report of the programming models used by your application, and where they will run. It also offers an option to generate a detailed report about which line of your application may need to be changed.

In this lab exercise, you will learn:

- ___a. Import the Sample Application onto Eclipse
- ___b. Scan the imported application
- ___c. View Migration Results and Generate Report.
- ___d. Create additional scan reports and compare.

You will also learn:

- ___i. How to install the Migration Toolkit for Application Binaries
- ___ii. Use the toolkit to scan an application
- ___iii. Generate an evaluation report
- ___iv. Generate a detailed report

As prerequisites, you should:

- ___a. Complete the Setup and discover lab to set up the lab environment, including JRE, and eclipse with WDT
- ___b. If you are not a Virtual POT Attendees, you need to install the migration toolkit on you own. From Eclipse, navigate to Help > Install WebSphere Software. Then choose "IBM Websphere Application Server Migration Toolkit"

To run this lab, your workstation must meet the following requirements:

- Approximately 8GB of storage available for the Windows 7 virtual image
- Approximately 3 GB of memory free to run the developer workbench and the server
- Connectivity to the internet is NOT required

- Please refer to the following table for file and resource location references on different operating systems.

Location Ref.	OS	Absolute Path
{LAB_HOME}	Windows	C:\WLP_<version>
	Linux	~/WLP_<version>
	Mac OSX	

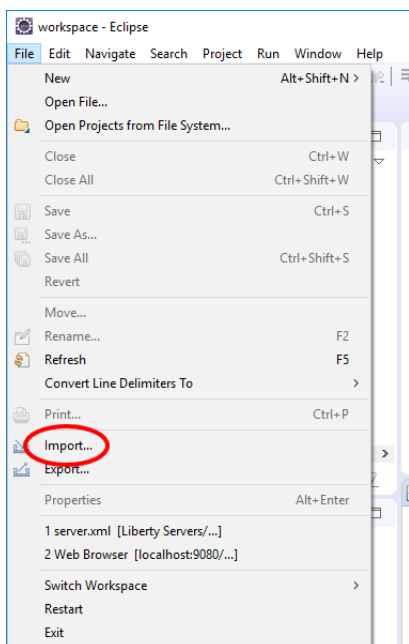
Notice

- You don't need to be an Eclipse power-user. But, a basic level of familiarity with Eclipse is beneficial.
- Efforts have been made to ensure the screen-shots in this lab are current and accurate. However, there may be subtle variations in what you actually see. The differences may be attributed to:
 - Platform (ie. Windows vs. Mac OS vs. Linux)
 - Eclipse version (ie. Luna vs. Mars vs. Neon vs Oxygen)

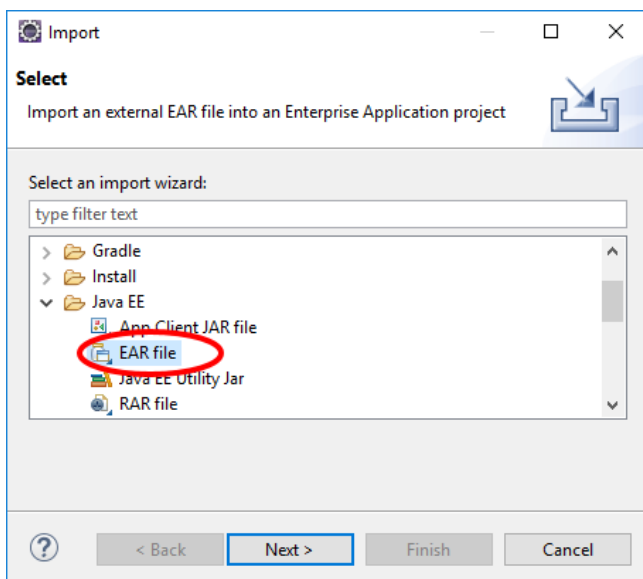
1.1 Import the Sample Day Trader Application

To analyze an application for migration suitability, the application must be imported into your Eclipse-based IDE. If the application is not already in Eclipse, an easy way to import the application and organize it in projects that reflect their structure as EAR, WAR, and EJB files is by using the Eclipse import function as illustrated in the steps below.

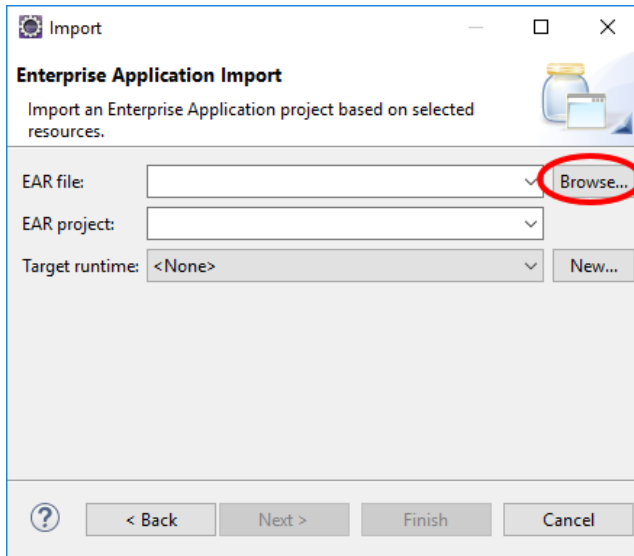
- __1. Select **File > Import** menu option.



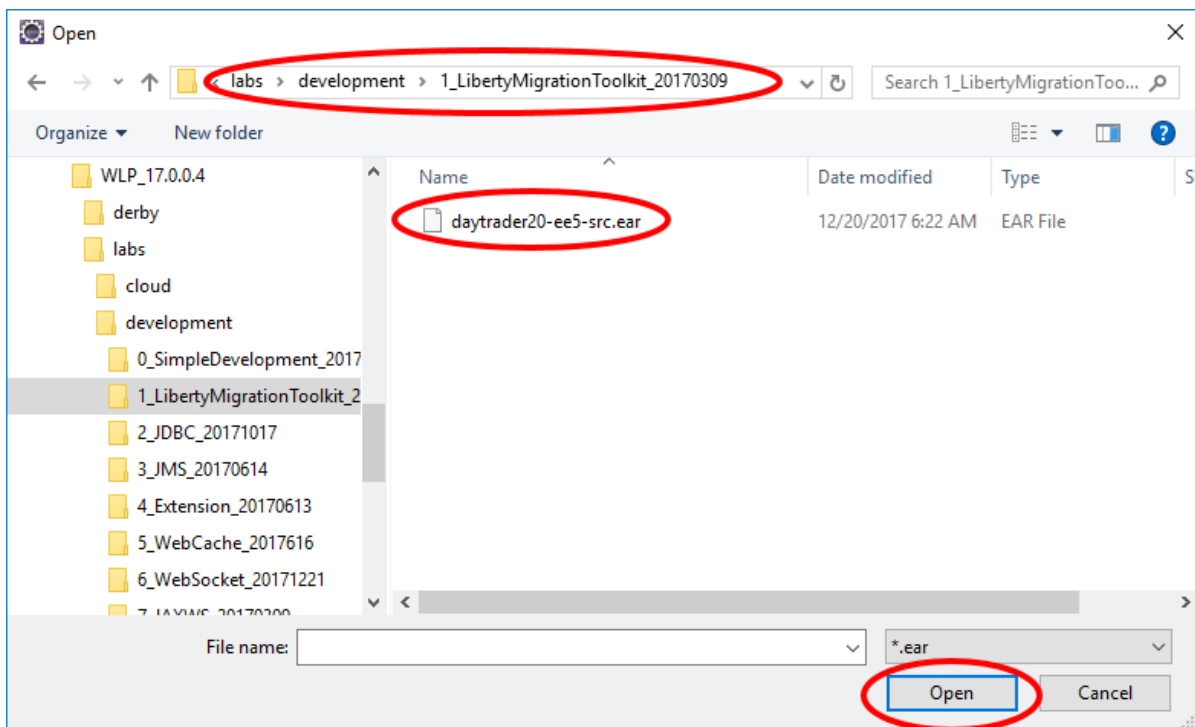
- __2. Expand **Java EE**, select **EAR File**, then click **Next**



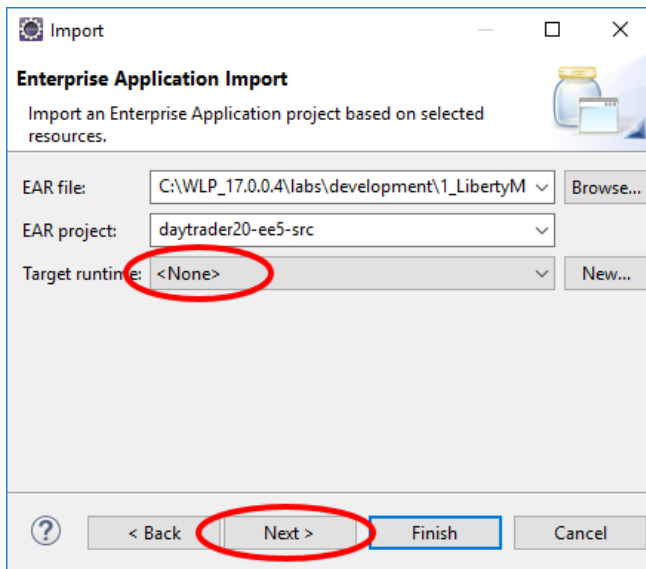
__3. Click **Browse**.



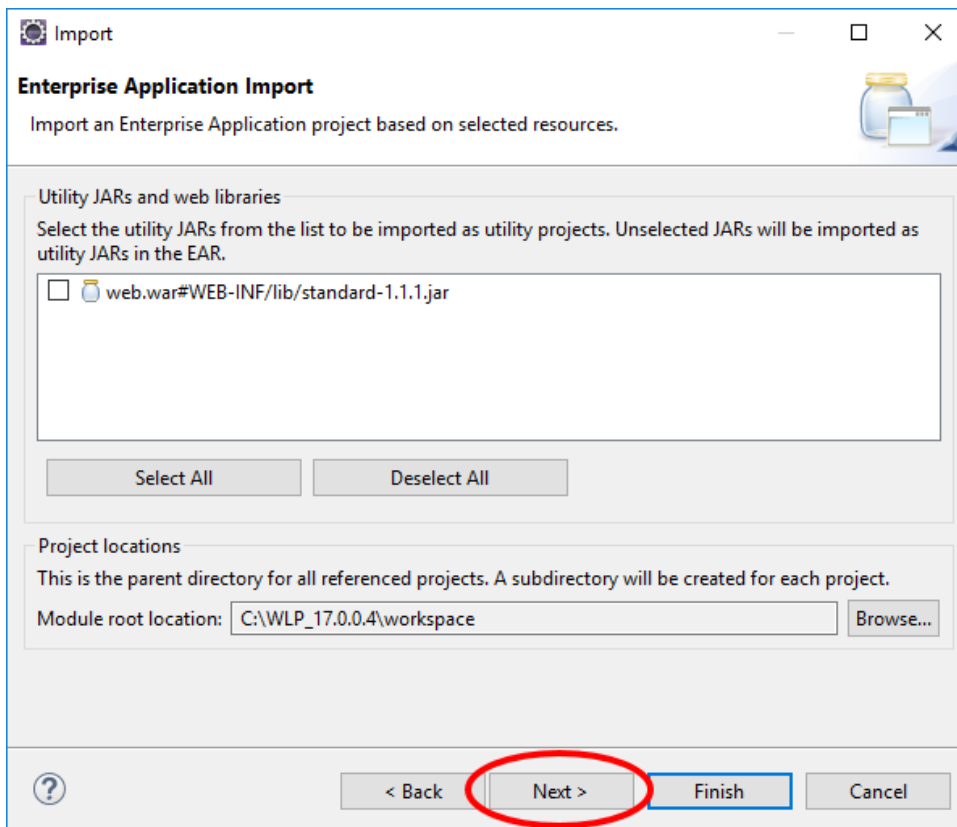
__4. Navigate to {LAB_HOME}\labs\development\1_LibertyMigrationToolkit_timestamp and select **daytrader20-ee5-src.ear**. Click **Open**



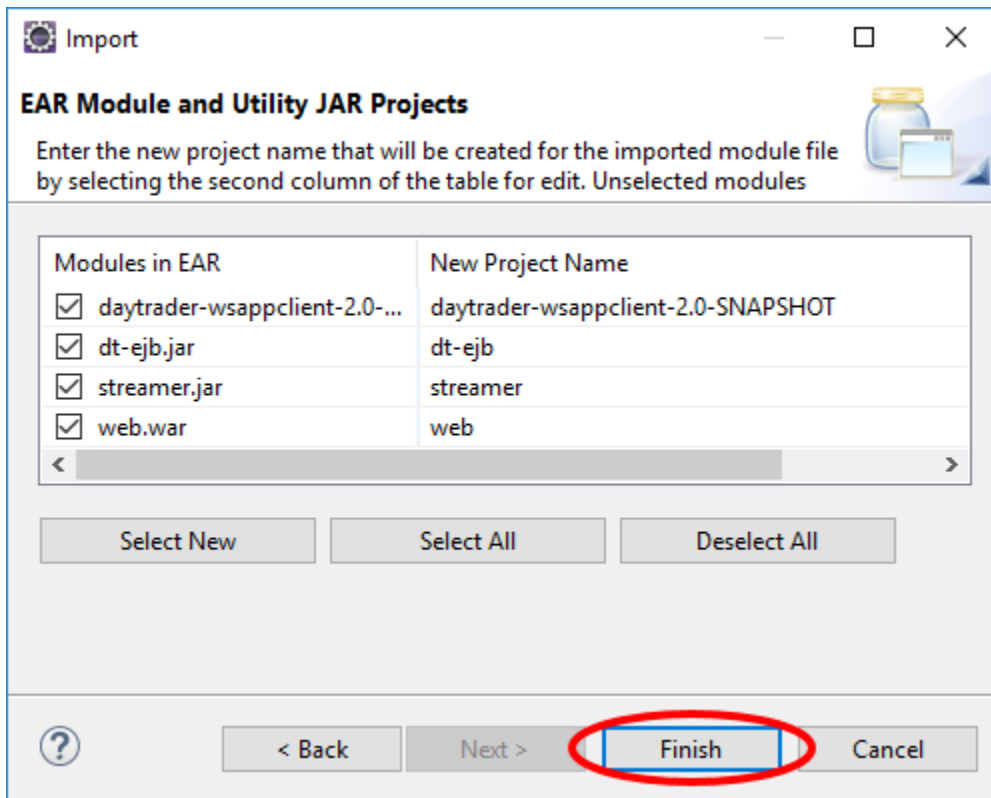
__5. Set **Target runtime** to **None**. Click **Next**



__6. Click **Next**

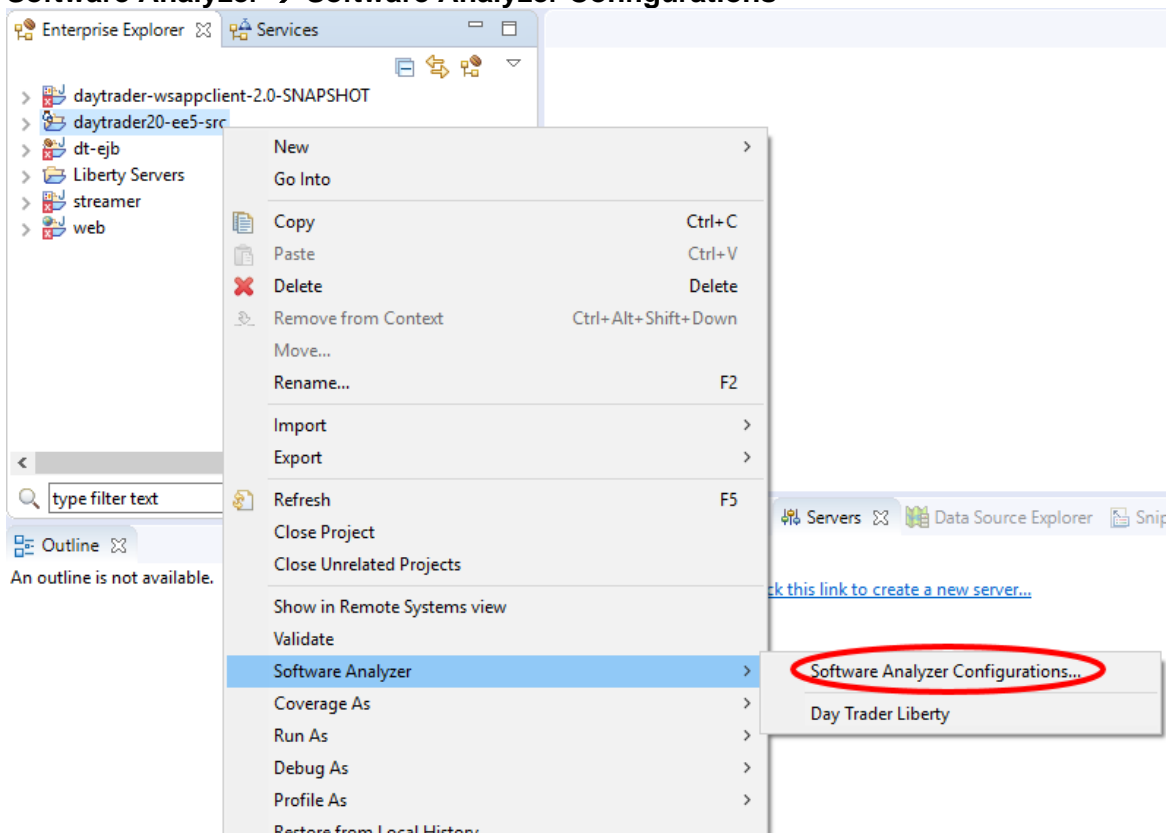


- ___7. The next panel shows different additional projects that will be created. Later we will configure the migration toolkit to scan these projects. Click **Finish**.

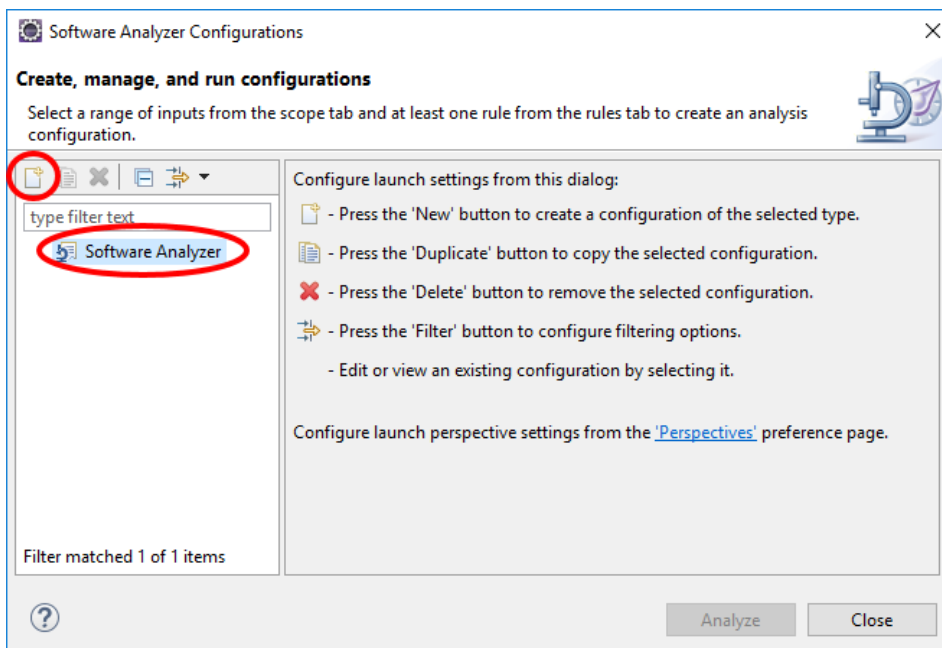


1.2 Scan the DayTrader Sample application

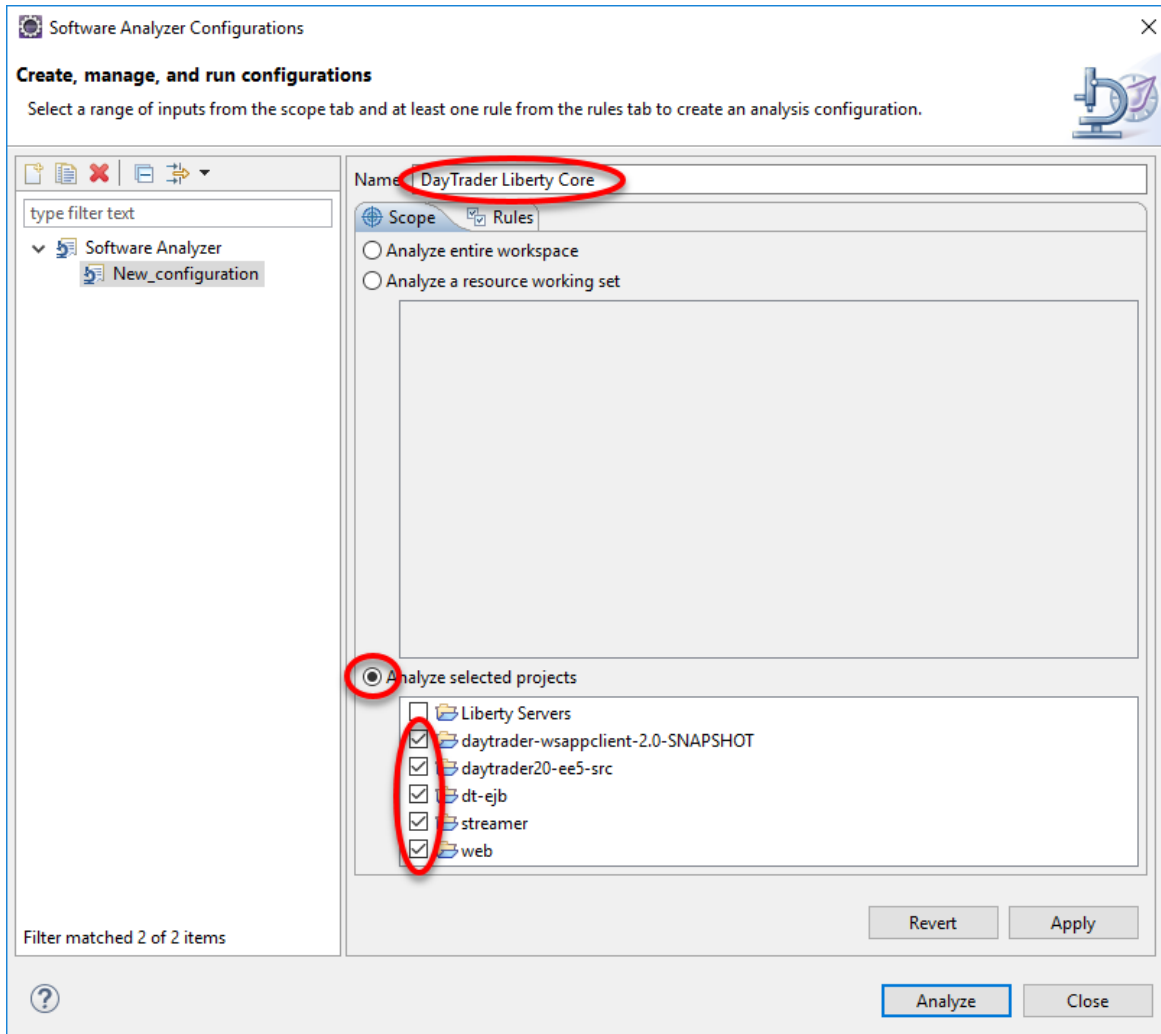
- ___1. Right-click on the **daytrader20-ee5-src** sample application that we imported, and navigate to **Software Analyzer** → **Software Analyzer Configurations**



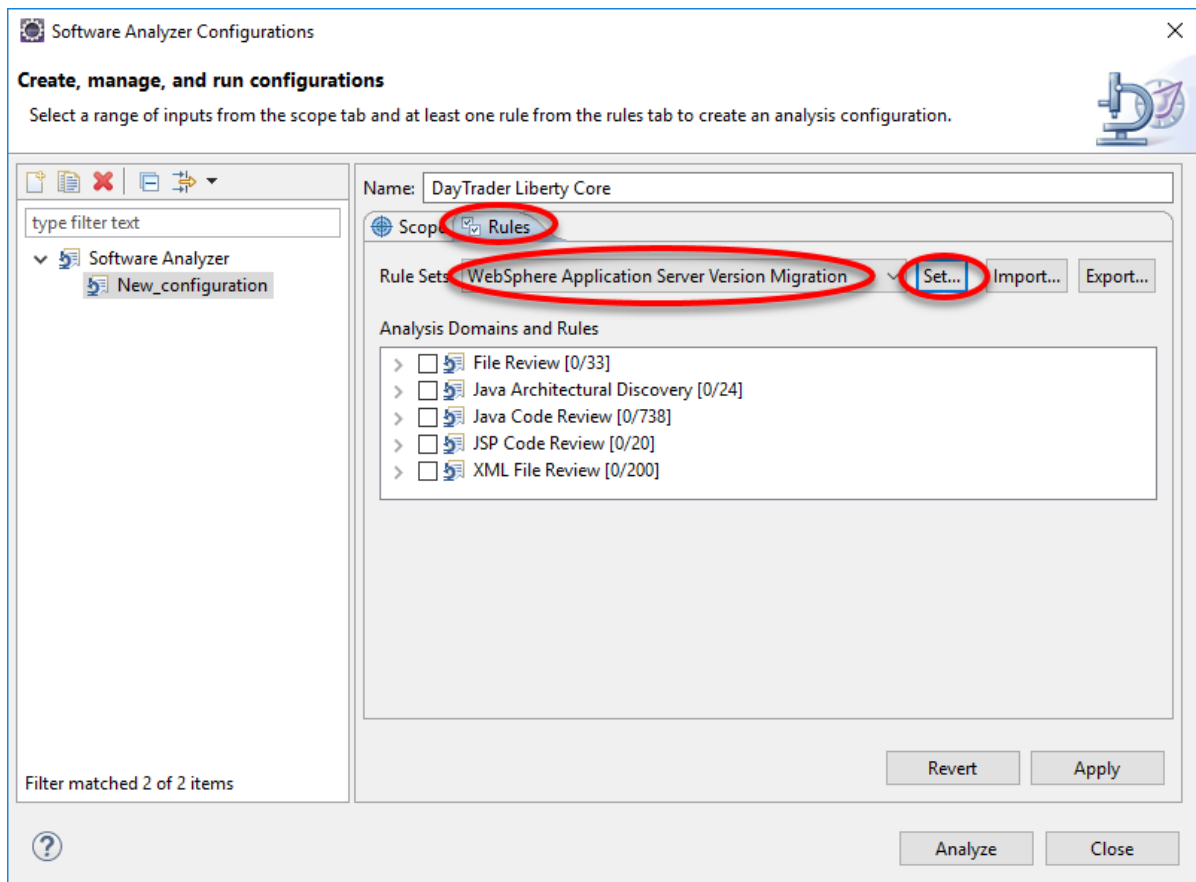
- ___2. Click **Software Analyzer** then click the **New** button



- ___3. Enter **DayTrader Liberty Core** as the name of the new configuration. Click **Analyze selected projects**, and choose the five Day Trader application related projects.



- ___4. Click **Rules**. Select **WebSphere Application Server Version Migration** from the **Rule Sets** drop-down. Then click **Set**



- ___5. In the pop-up, select **WebSphere Application Server V7.0** as the Source application server, **Liberty Core** as the Target application server, **Java EE 7** as Target Java EE version and **IBM Java 8** as the Target java version. Then click **OK**.

Rule set configuration

WebSphere Application Server Migration Tool rule selection details

Source application server: WebSphere Application Server V7.0

Target application server: Liberty Core

Target Java EE version: Java EE 7

▼ Java EE 7 Technologies

☒ CDI ☒ EL ☐ JAX-RS
☐ JMS ☐ JPA ☒ Servlet

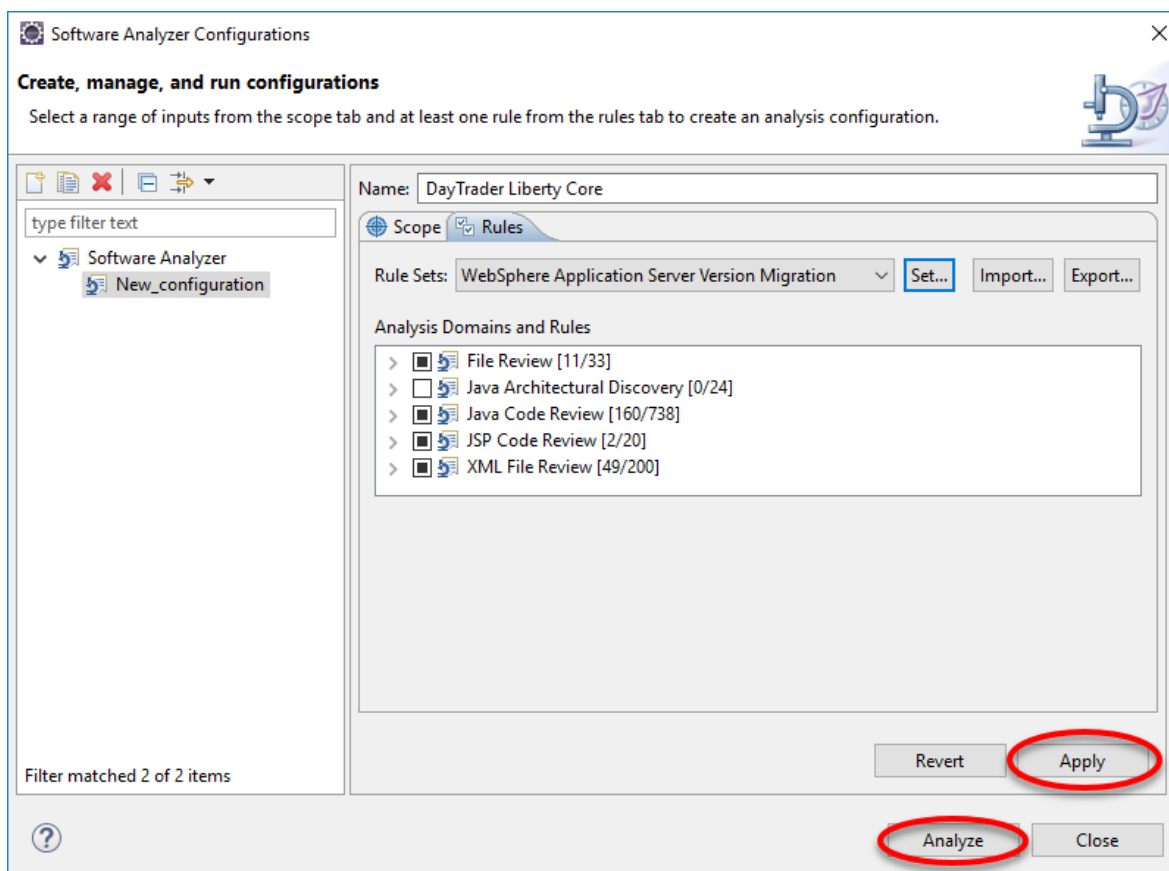
Target cloud runtime: None

Source Java version: IBM Java 6

Target Java version: IBM Java 8

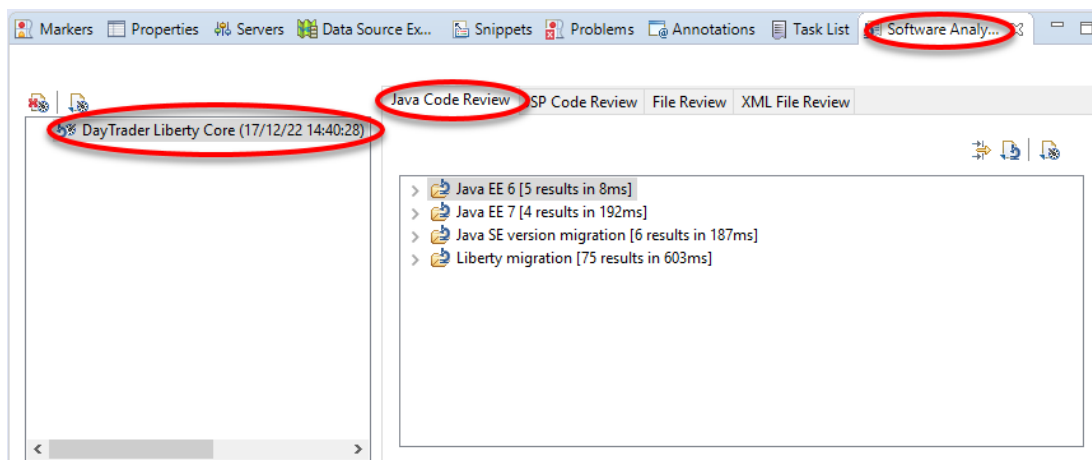
OK Cancel

- __6. Click **Apply** and then **Analyze**

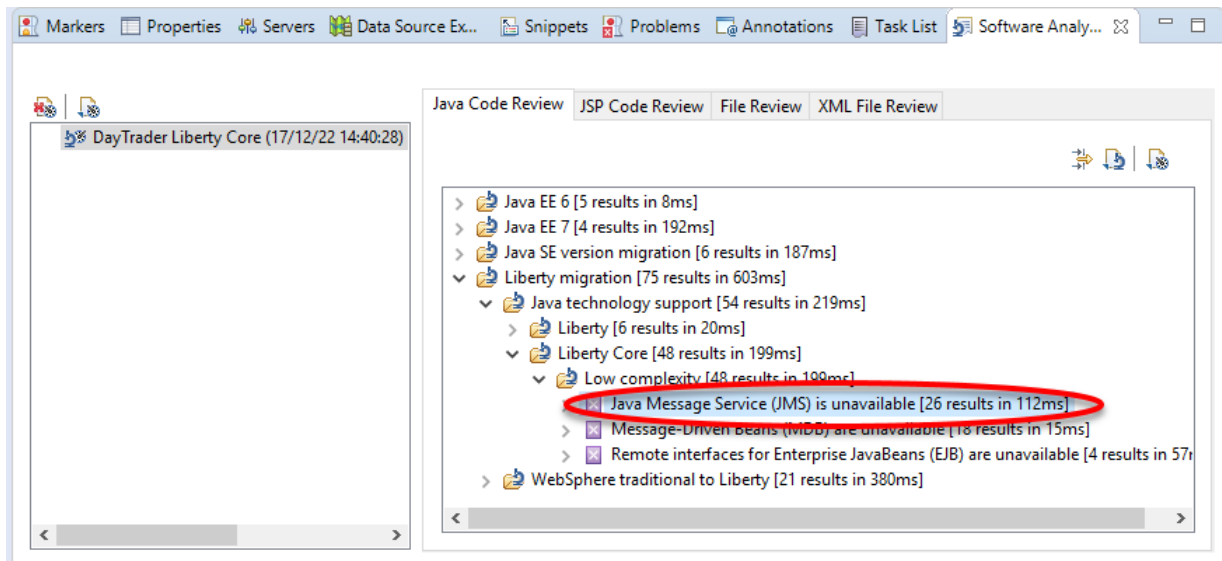


- __7. Click **Software Analyzer Results** pane, if not already selected, to inspect the scan results. On the left is the scan history. There is currently only one scan for **DayTrader Liberty Core**. Click the **Java Code review** tab to inspect the results of scanning Java code.

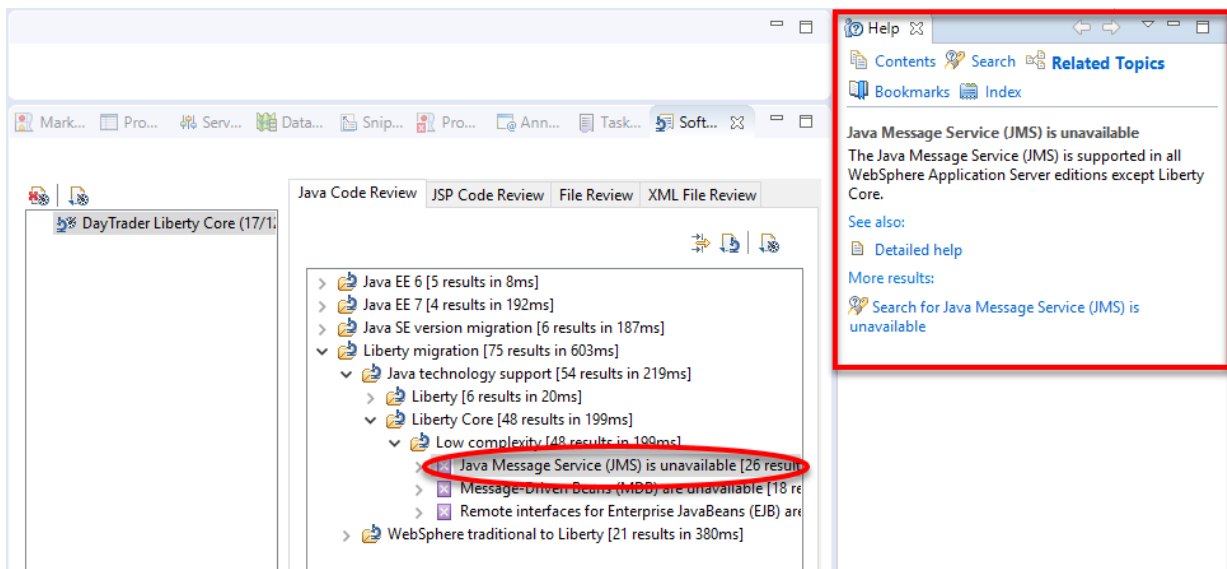
Note that there are results that apply to the **Liberty Core Edition**, and **Other Liberty Editions**.



- __8. Expand and click on **Liberty Migration** → **Java Technology Support** → **Liberty Core** → **Low complexity** → **Java Message Service**.

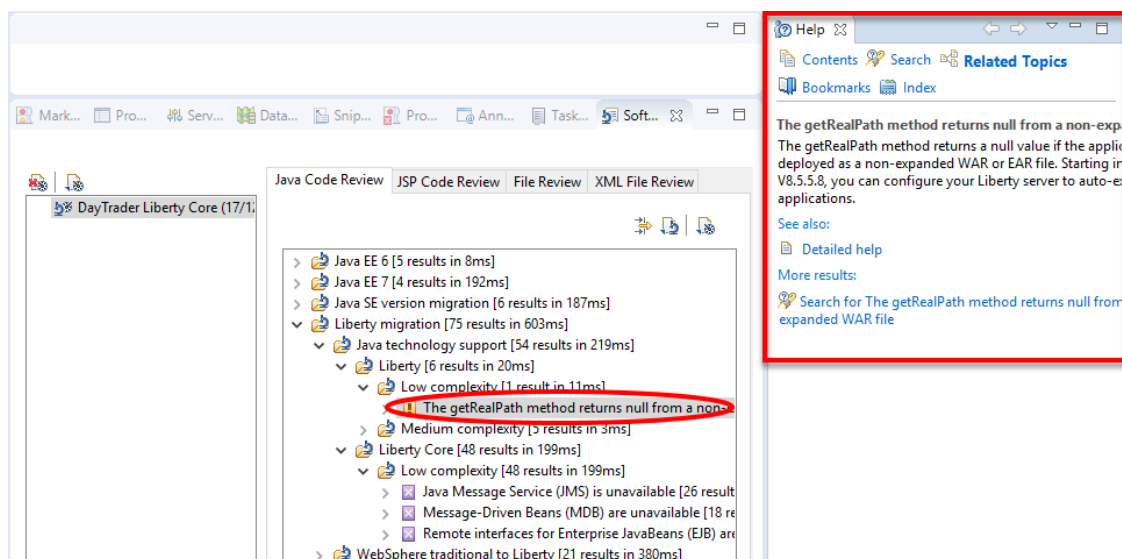


- __9. Press **F1** key to bring up the help window. Note that the help message explains that even though JMS is not supported for Liberty core edition, it is available in other editions via other features. The same restriction applies to MDB and remote EJBs. If **F1** doesn't work, **Click Window > Show View > Other > Help > Help**

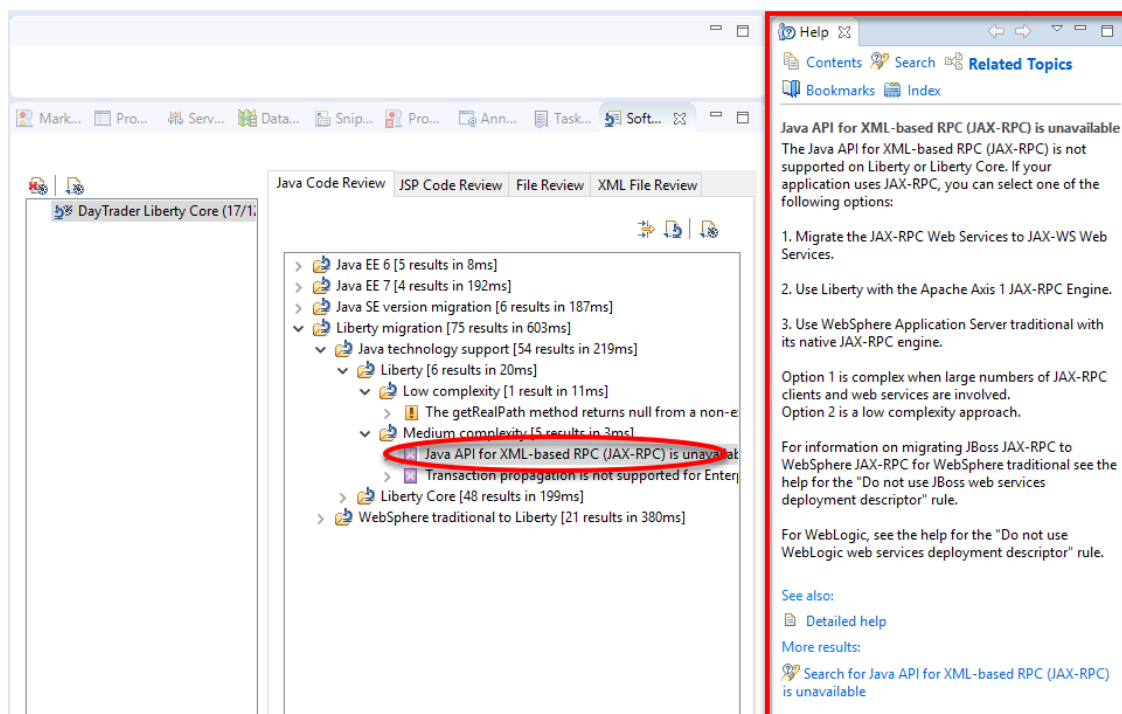


__10. Expand **Liberty** to examine additional scan results.

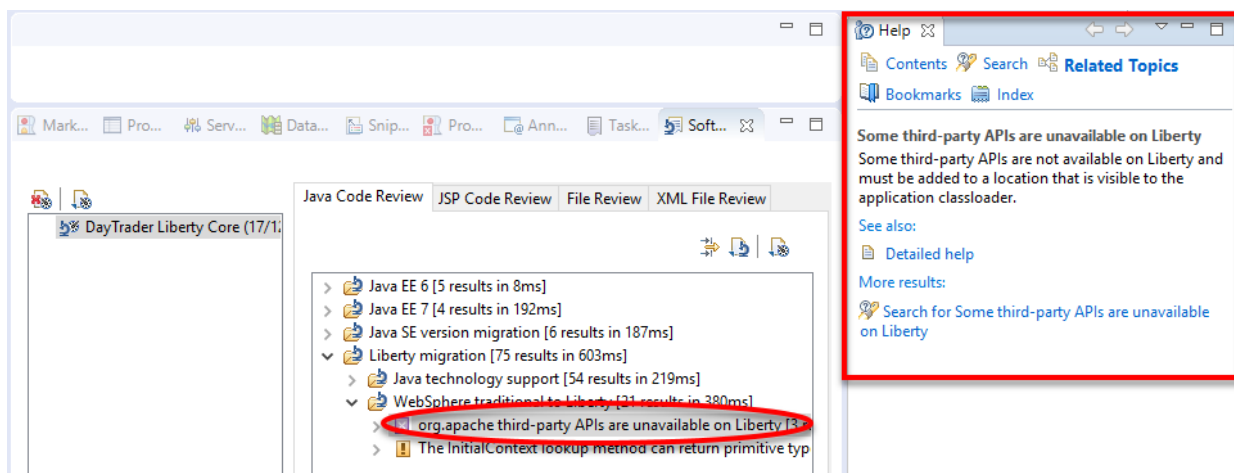
- __a. Under **Low complexity**, click on ***getRealPath()*** and read the text in the **Help** window to make it work in the Liberty.



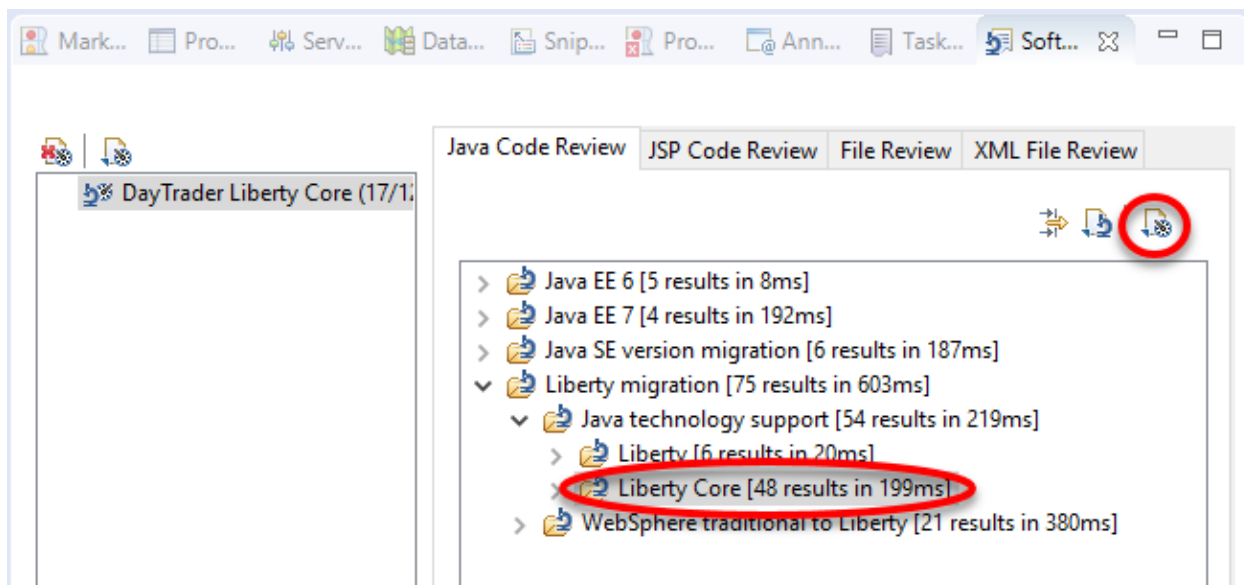
- __b. Under **Medium complexity**, click on **JAX-RPC** and read the **Help** text.



- __11. Under **WebSphere traditional to Liberty** section, examine which third party APIs are not available in the Liberty



- __12. Select **Liberty Core** and click the **Generate Report** button.



- ___13. Click **OK** to view all the **Java Code Review** results

Software Analyzer Reporting

Create a Report

Generate an analysis report for the currently selected result element.
Select the report type, then choose the file location for finished

Select Report

- Java Code Review Results
- Java Code Review Ignored Results
- Java Code Review Severity Summary
- Java Code Review Severity By Category

Report Description

Generate a report showing all results generated by Java Code Review. Rules that produced no results are not shown

Select Report Type

☒ HTML report ☐ PDF Report

? OK Cancel

The result will appear in a different pane

Java Code Review Results

Java Code Review Results

CDI

- CDI recognizes implicit bean archives**
 /dt-ejb/ejbModule/org/apache/geronimo/samples/daytrader/ejb3/DirectSLSBBean.java:34
 /dt-ejb/ejbModule/org/apache/geronimo/samples/daytrader/ejb3/TradeSLSBBean.java:55

JPA 2.0

- Java Persistence API (JPA)**
 /dt-ejb/ejbModule/org/apache/geronimo/samples/daytrader/AccountDataBean.java:26
 /web/src/org/apache/geronimo/samples/daytrader/web/prims/ejb3/PingServlet2Entity.java:30

Java SE 8 compatibility impacts

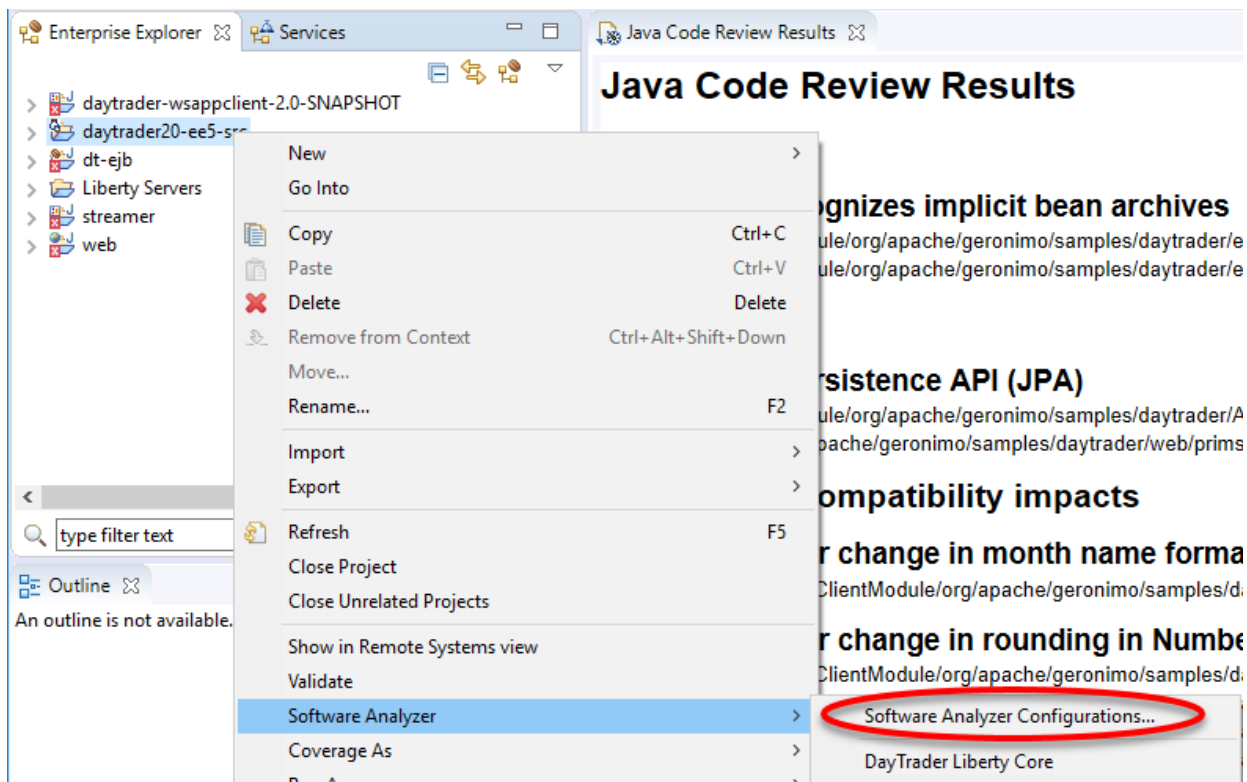
- Behavior change in month name formatting for some languages**
 /streamer/appClientModule/org/apache/geronimo/samples/daytrader/client/TradeQuoteAuditStats.java:191
- Behavior change in rounding in NumberFormat and DecimalFormat format methods**
 /streamer/appClientModule/org/apache/geronimo/samples/daytrader/client/ChangeRenderer.java:31
 /streamer/appClientModule/org/apache/geronimo/samples/daytrader/client/TradeQuoteAuditStats.java:171
 /streamer/appClientModule/org/apache/geronimo/samples/daytrader/client/TradeQuoteAuditStats.java:180
 /streamer/appClientModule/org/apache/geronimo/samples/daytrader/client/TradeQuoteAuditStats.java:183
 /streamer/appClientModule/org/apache/geronimo/samples/daytrader/client/TradeQuoteAuditStats.java:186

Low complexity

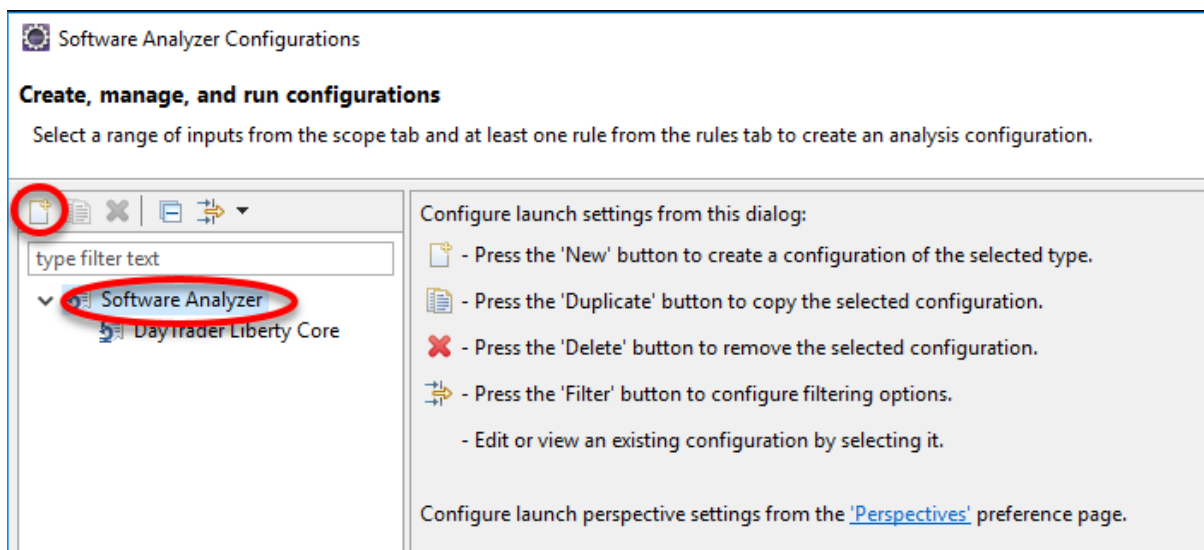
- Java Message Service (JMS) is unavailable**
 /dt-ejb/ejbModule/org/apache/geronimo/samples/daytrader/ejb3/DTBroker3MDB.java:29
 /dt-ejb/ejbModule/org/apache/geronimo/samples/daytrader/ejb3/DTBroker3MDB.java:30
 /dt-ejb/ejbModule/org/apache/geronimo/samples/daytrader/ejb3/DTBroker3MDB.java:31
 /dt-ejb/ejbModule/org/apache/geronimo/samples/daytrader/ejb3/DStream3MDB.java:28
 /dt-ejb/ejbModule/org/apache/geronimo/samples/daytrader/ejb3/DStream3MDB.java:29
 /dt-ejb/ejbModule/org/apache/geronimo/samples/daytrader/ejb3/DStream3MDB.java:30

1.3 Create Additional Scan Reports

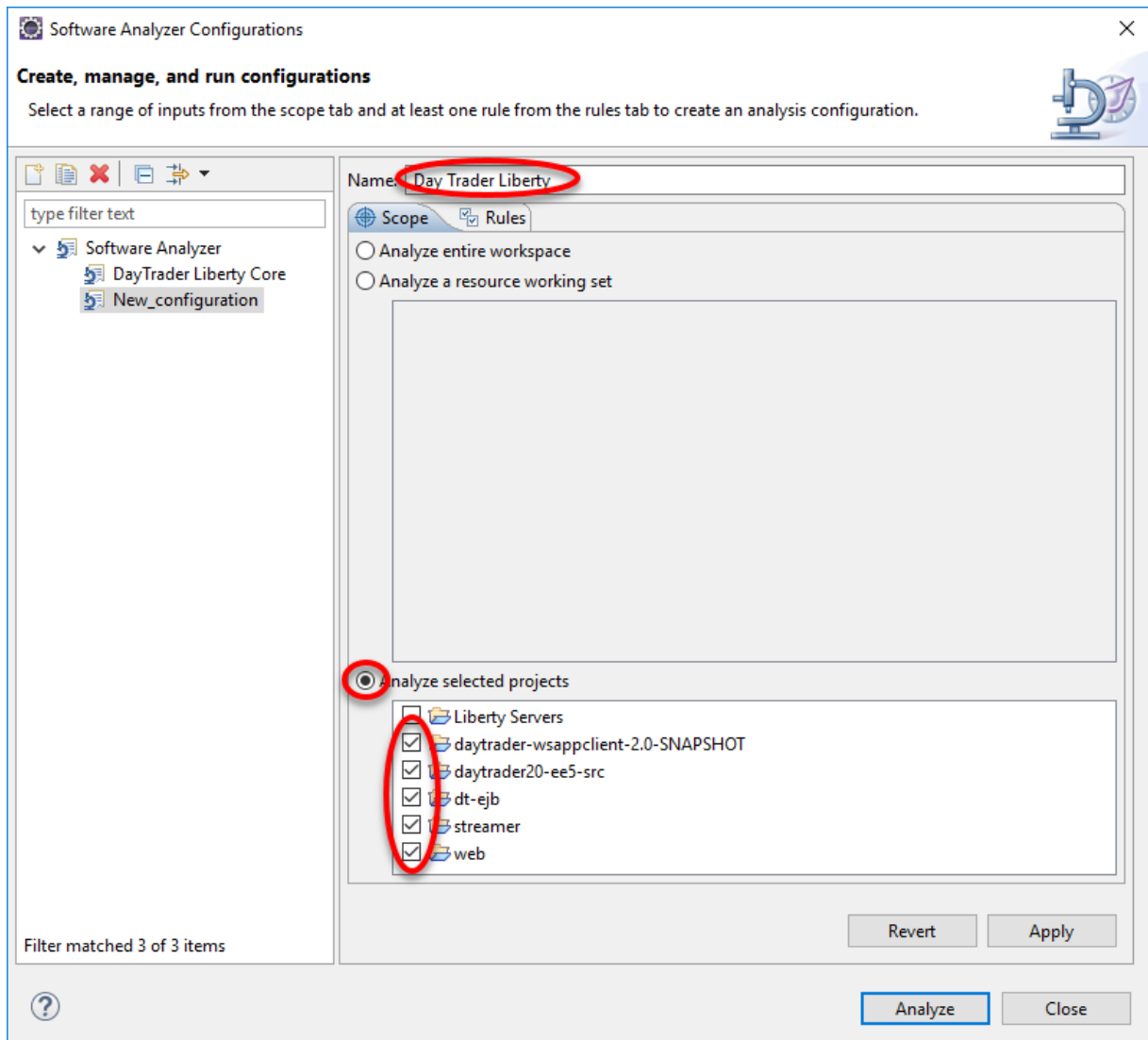
- _1. Right click on any **DayTrader** project and navigate to **Software Analyzer → Software Analyzer Configurations...**



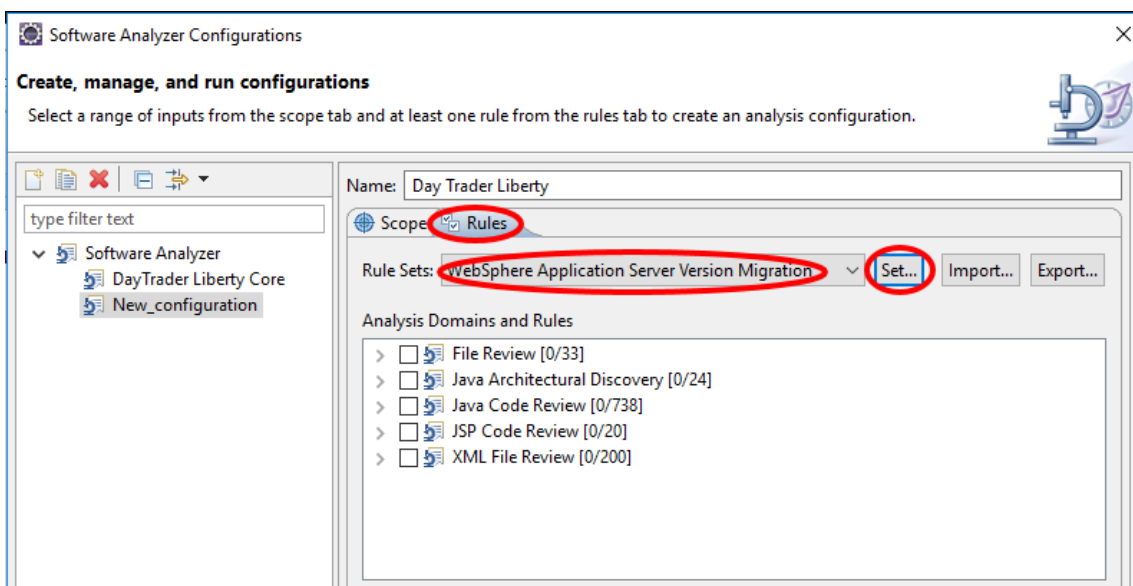
- _2. Click **Software Analyzer** then click the **New** button.



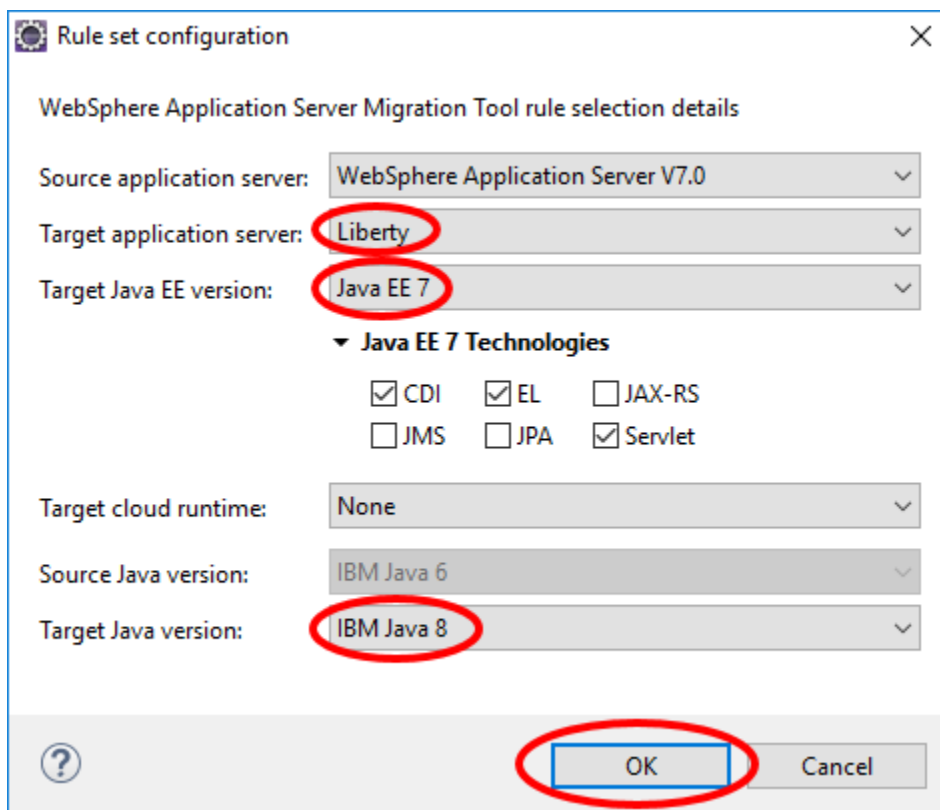
- ___3. Name the new configuration **Day Trader Liberty**, and select the same Day Trader related projects as before.



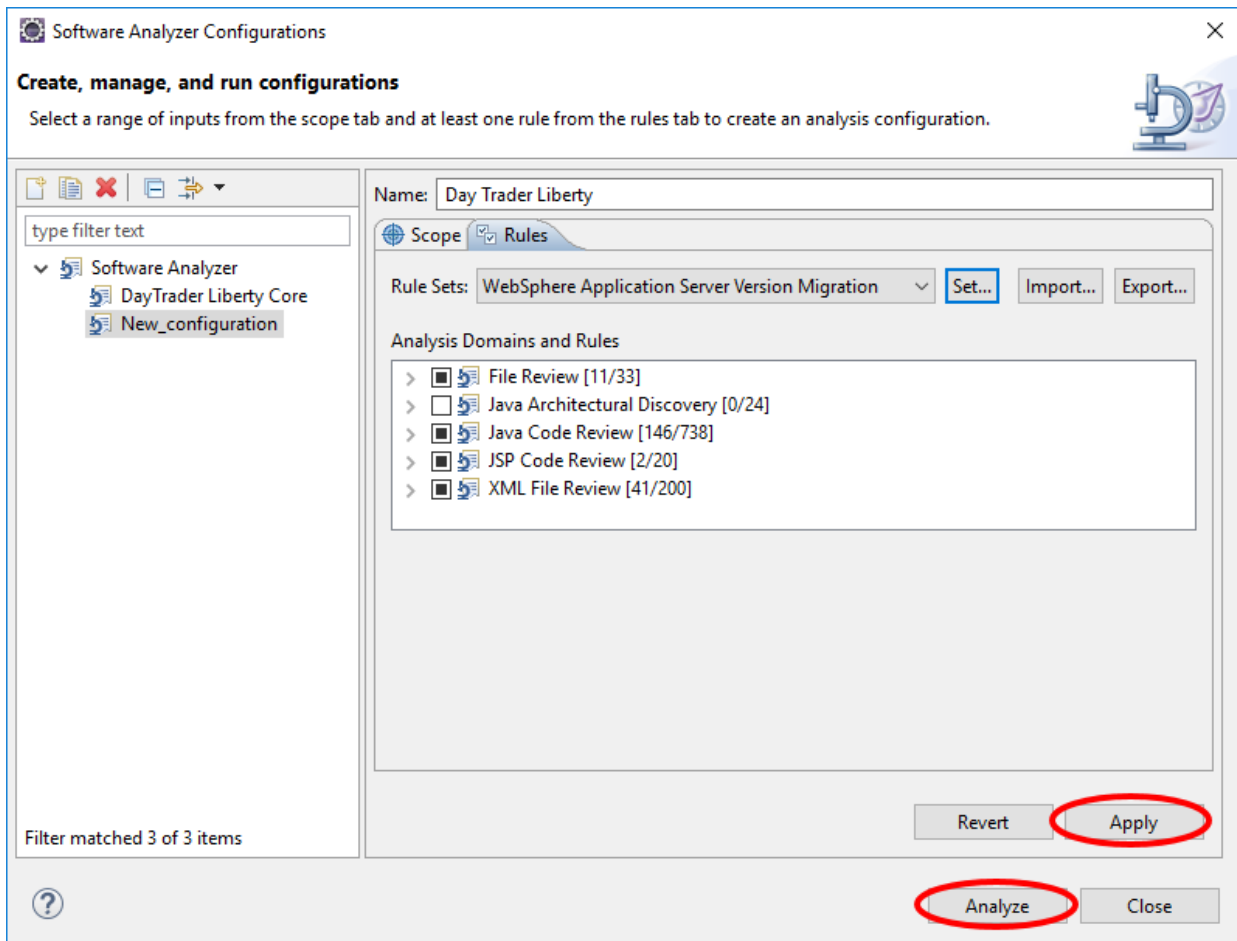
- ___4. Click **Rules** and select **WebSphere Application Server Version Migration** rule set. Click **Set**



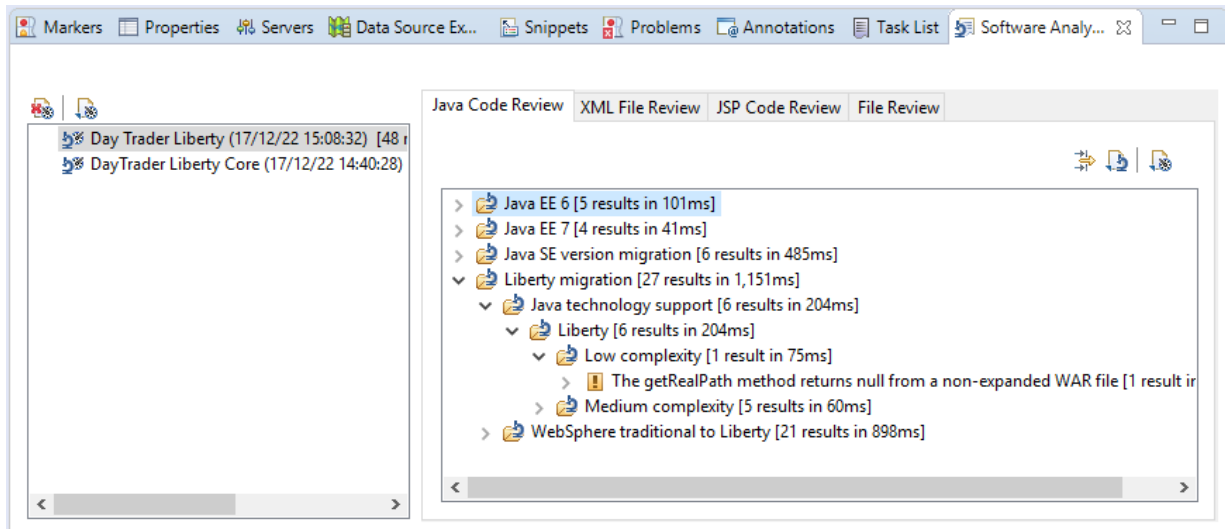
- ___5. In the popup, select **WebSphere Application Server V7.0** for source, **Liberty** for Target application server, **Java EE 7** for Target Java EE version, and **IBM Java 8** for Target Java version. Then click **OK**.



__6. Click **Apply** and then **Analyze**



- ___7. Note there are now two runs in the scan history pane. The most recent run uses the Liberty rule set. Compared to the previous run, **no JMS, MDB, or EJB** issues are reported because they only apply to the **Liberty Core Edition**



1.4 Migration Toolkit for Application Binaries

_1. Install the migration toolkit for application binaries.

_a. Set up a JAVA_HOME in your terminal window and add it to your path.

_i. Linux

```
export JAVA_HOME={LAB_HOME}/wlp/java
```

```
export PATH=$PATH:$JAVA_HOME/jre/bin
```

_ii. Windows

```
set JAVA_HOME={LAB_HOME}\wlp\java
```

```
set PATH=%PATH%;%JAVA_HOME%\jre\bin
```

_b. Install the binary scanner

```
java -jar {LAB_HOME}/MigrationToolkit/binaryAppScannerInstaller.jar {LAB_HOME} --acceptLicense
```

You should see output similar to the following

```
Before you can use, extract, or install IBM WebSphere Application
Server Migration Toolkit for Application Binaries, you must accept the
terms of International License Agreement for Non-Warranted Programs and
additional license information. Please read the following license
agreements carefully.
```

```
The --acceptLicense argument was found. This indicates that you have
accepted the terms of the license agreement.
```

```
Extracting files to c:\WLP_17.0.0.4\wamt
Successfully extracted all product files.
```

This will create a directory under {LAB_HOME}/wamt. Examine the contents of the newly created directory.

_2. To see a summary of the available command line options, run the binary scanner with the **--help** option.

```
java -jar {LAB_HOME}/wamt/binaryAppScanner.jar --help
```


Notice

- It is a best practice to identify your custom application class packages with the **--includePackages** option. By doing so, you avoid scanning Java EE and third-party packages which should not affect your migration effort.
If no **--includePackages** or **--excludePackages** options are explicitly specified, the tool now excludes Java EE and some third-party packages by default. These packages are identified as scan options near the beginning of the report.
- Previously, all classes packaged within the application were scanned, even if they were located in third-party JARs. This often caused reports to contain hundreds or even thousands of results that could and should be ignored. The inclusion of those results led to much confusion and inaccurate assessments of the migration effort.

_3. Run the command

```
java -jar {LAB_HOME}/wamt/binaryAppScanner.jar  
{LAB_HOME}/labs/development/1_MigrationToolkit_<timestamp>/daytrader20-ee5-src.ear --  
evaluate --includePackages="org.apache,wasdev.sample"
```

- __4. A browser window will open showing a report about the programming models used by the application and where they will run. Review the report to see what programming models are used in the day trader application, and where they will run:

Application Evaluation Report								
12/22/17 12:15 PM C:/WLP_17.0.0.4/labs/development/1_LibertyMigrationToolkit_20170309/daytrader20-ee5-src.ear Scan options: --baseEdition --coreEdition --libertyBuildpackEdition --ndEdition --zosEdition --traditional --liberty --includePackages=org.apache, wasdev.sample								
WebSphere Application Server V9.0								
The highlighted columns indicate which IBM platforms fully support the technologies used by the included application. Recommendation: Detailed migration analysis should be used to determine if there are migration issues that must be addressed before deploying your application.								
	Liberty for Java on IBM Cloud	Liberty Core	Liberty	WebSphere traditional	Network Deployment Liberty	Network Deployment traditional	Liberty for z/OS	WebSphere traditional for z/OS
WEB SERVICES TECHNOLOGIES								
Java API for XML-based RPC (JAX-RPC)				✓		✓		✓
WEB APPLICATION TECHNOLOGIES								
Java Servlet	✓	✓	✓	✓	✓	✓	✓	✓
JavaServer Pages / Expression Language (JSPEL)	✓	✓	✓	✓	✓	✓	✓	✓
Standard Tag Library for JavaServer Pages (JSTL)	✓	✓	✓	✓	✓	✓	✓	✓
ENTERPRISE APPLICATION TECHNOLOGIES								
Enterprise JavaBeans (EJB) Lite subset	✓	✓	✓	✓	✓	✓	✓	✓
Remote Enterprise JavaBeans (EJB)			✓	✓	✓	✓	✓	✓
Message-Driven Beans (MDB)	✓		✓	✓	✓	✓	✓	✓
Java Persistence (JPA)	✓	✓	✓	✓	✓	✓	✓	✓
Common Annotations for the Java Platform	✓	✓	✓	✓	✓	✓	✓	✓
Java Message Service (JMS) API	✓		✓	✓	✓	✓	✓	✓
Java Transaction API (JTA)	✓	✓	✓	✓	✓	✓	✓	✓
JAVA EE-RELATED SPECIFICATIONS IN JAVA SE								
Java API for XML Processing (JAXP)	✓	✓	✓	✓	✓	✓	✓	✓
Java Database Connectivity (JDBC)	✓	✓	✓	✓	✓	✓	✓	✓

- __5. Re-run the command, but this time with --analyze option.

```
java -jar {LAB_HOME}/wamt/binaryAppScanner.jar
{LAB_HOME}/labs/development/1_MigrationToolkit_<timestamp>/daytrader20-ee5-src.ear --
analyze --includePackages="org.apache,wasdev.sample"
```

- __6. A browser window will open showing detailed information about which code may have to be changed:

Detailed Migration Analysis Report

12/22/17 12:19 PM
C:/WLP_17.0.0.4/labs/development/1_LibertyMigrationToolkit_20170309/daytrader20-ee5-src.ear

[Jump To Rule](#)

13

Rules flagged

53

Total results

Source options
--sourceAppServer=was855 --sourceJava=ibm6

Target options
--targetAppServer=liberty --targetJava=ibm8 --targetJavaEE=ee6

Scan options
--includePackages=org.apache, wasdev.sample

Rule Severity Summary

SYMBOL	LABEL	RULES FLAGGED	TOTAL RESULTS	DESCRIPTION
	Severe	6	20	Severe rules indicate an API removal or behavior change that can break the application and must be addressed.
	Warning	3	23	Warning rules indicate behavior changes that might break the application and should be evaluated.
	Information	4	10	Information rules indicate the use of deprecated APIs or minor behavior changes that will not affect most applications.

Detailed Results by Rule

[Expand all](#) | [Collapse all](#)

- __7. Review the output.

1.5 Summary

In this lab you have learned:

- ✓ How to install and use Liberty Migration Toolkit on Eclipse
- ✓ How to install and use Migration Toolkit for Application Binaries

Appendix A. Notices

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<i>System z</i>	<i>Tivoli</i>	<i>WebSphere</i>	<i>Workplace</i>	<i>System p</i>	

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