IBM Software Group

IBM® WebSphere® Application Server V7

Isolated shared libraries

This presentation will discuss isolated shared libraries for WebSphere Application Server V7.0 on z/OS®.

Agenda

- Isolated shared libraries

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This presentation will briefly discuss isolated shared libraries.

Isolated shared libraries

- Share a common set of classes across subset of applications

- Not generally shared across all applications

- Do not have visibility to application classes loaded by application class loader

An Isolated Shared Library is another way to deploy application artifacts into the WebSphere runtime environment. An Isolated Shared Library can be associated or shared with one or many WebSphere application and Web module class loaders. The Isolated Shared Library will provide a mechanism where you can share a common set of classes across a subset of the applications within the WebSphere Application Server.   This is similar to the server associated shared library, but an Isolated Shared Library is not typically used across **ALL** applications.

An Isolated Shared Library associated with the application class loader can be thought of as an application associated shared library that can be shared across a subset of the applications in the WebSphere Application Server. However, unlike application associated shared libraries, Isolated Shared Libraries **DO NOT** have visibility to application classes loaded by the application class loader

Isolated shared libraries

- Types of shared libraries
  - ▶ Application/module associated shared libraries
    - Each application/module has a copy of a library
    - Allows different applications/modules to use different versions of a library
    - Duplicate copies of the same class can be loaded
  - ▶ Server associated shared libraries
    - All applications share one copy of a library
    - Prevents using multiple versions of the library

Application associated shared libraries have their classpath added to the application's class loader classpath. Each application will have its own instances of the shared libraries classes. This allows one application to specify version x while another application can specify version y. The draw back with using application shared libraries is that every application using the shared library will have their own class instances. For example if you want six applications to have version x and two applications to have version y, each will have its own set of class objects resulting in eight instances of an object loaded into memory.

Server associated shared libraries have their own class loader in the WebSphere Application Server Class Loaders hierarchy. This allows a single instance of the classes to be shared by all applications. The drawback with using the server associated shared libraries is they are shared across all applications on that server which prevents version handling of classes. If one shared library contained version x and one contained version y, the version higher (assuming parent-first) in the class loader hierarchy will win.

Application and Web module associated shared libraries do not default to be Isolated Shared Libraries. Specifying a server associated shared library as an Isolated Shared Library has no effect.

Isolated shared libraries

- Isolated shared libraries
  - To save memory footprint, avoid loading the same class multiple times.
  - A set of applications exclusively share a copy of a shared library
  - Allows version handling with the minimum number of library copies loaded
  - No visibility to application classes loaded by the application class loader

WebSphere Application Server version 7.0 includes a new feature, Isolated Shared Libraries, to provide a way to share a common set of classes across a subset of the applications within the WebSphere Application Server. The major benefit to Isolated Shared Libraries is the ability to reduce the number of class instances that are loaded in a JVM reducing the JVM's memory footprint. To better understand the benefit of Isolated Shared Libraries, look at how a solution deployer can decide to share an application associated shared library across multiple applications. The solution deployer has several possibilities:

Using an Isolated Shared Library, the solution deployer can combine pieces of the prior two solutions. Isolated Shared Libraries each have their own class loader allowing a single instance of the classes to be shared across the applications. Each application can specify which Isolated Shared Libraries it wants to reference and different applications can reference different versions of the Isolated Shared Library resulting in a set of applications sharing an Isolated Shared Library. The advantage here is seen in comparison to the previous example: with Isolated Shared Libraries, you are now sharing a single copy of version x and a single copy of version y for a total of two instances in memory.

Isolated Shared Libraries do not have visibility to application classes loaded by the application class loader.

Use and behavior
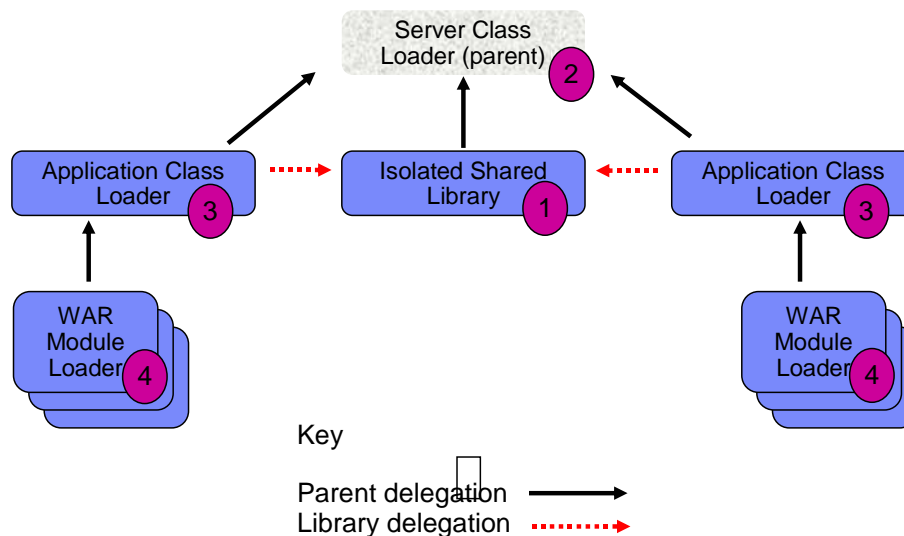
The JDK defines the class loader delegation model, which provides a way to establish parent-child relationships between two class loaders. This is necessary for creating multiple class loaders in an hierarchal environment as it defines the algorithm that standardizes loading behavior. Under the delegation model every class loader has an associated parent class loader (except for the JVM's Bootstrap class loader).

The order of searching libraries changes when Isolated Shared Libraries are used. The hierarchy or order of search without the new Isolated Shared Libraries present follows the delegation path from bottom to top. The root is always the JDK bootstrap loader. The only variation is to select either parent first or parent last. In both cases, the child looks to see if it has already loaded the class and uses that instance if found and delegates otherwise. In parent first mode, the child delegates to the parent and then tries to load the class if the parent can not load it. In parent last mode, the child tries to load the class then delegates to the parent if it can't load the class. In all cases, a child will delegate to all Isolated Shared Libraries present before delegating to a parent.

In this picture an Isolated Shared Library is shared between two application servers. When an artifact needs to be loaded for a Web module with parent first delegation, the search order is 1 (Isolated Shared Library), 2 (server class loader), 3 (application class loader) and finally 4 (Web module class loader). If parent last delegation is used on the Web module and application class loaders, the order is 4, 3, 1 and then 2.

Not shown on this slide are several WebSphere loaders and the JDK bootstrap loader. They are all higher in the hierarchy tree. Also note that the server, application, library, and Web module shared loaders are optional and might not be present. Here is a library, server, and application shared loaders, but not a WebSphere Application Server shared loader.

Integrated solutions console

Integrated Solutions Console   Welcome ericvn

Cell=ERICVNTPNode01Cell, Profile=AppSrv01

View: All tasks

- Welcome
- Guided Activities
- Servers
- Applications
- Resources
- Security
- Environment
  - Virtual Hosts
  - Update global Web server plug-in configuration
  - WebSphere Variables
  - Shared Libraries
  - Replication domains
  - Naming
- Services
- System administration
- Users and Groups
- Monitoring and Tuning
- Troubleshooting
- Service integration
- UDDI

Shared Libraries

Shared Libraries > JWLLib

Use this page to define a container-wide shared library that can be used by deployed applications.

Configuration

General Properties

* Scope
cells:ERICVNTPNode01Cell:nodes:ERICVNTPNode01:servers:server1

* Name
JWLLib

Description

* Classpath
${WAS_INSTALL_ROOT}/optionalLibraries/IBM/JWL/2
.0/odc-jsf.jar
${WAS_INSTALL_ROOT}/optionalLibraries/IBM/JWL/2
.0/jsf-ibm.jar

Native Library Path

Class Loading
☐ Use an isolated class loader for this shared library

Apply OK Reset Cancel

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To interactively control Isolated Shared Libraries, the Integrated Solution Console system application provides a new check box. The check box specifies whether this shared library will have a single instance when it is associated with an application or Web module. The default value for this attribute is false (unchecked). If an Isolated Shared Library is used for a shared library associated with an application or Web module class loader, the shared library will have its own class loader. Specifying a server associated shared library as isolated will have no effect.

Summary

- This presentation has covered isolated shared library enhancements provided by WebSphere Application Server V7.0

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This presentation has reviewed the isolated shared libraries available in WebSphere Application Server for z/OS V7.

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Isolated shared libraries

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