GENAPP 5.1 Java

Policy Search GENAPP Extension using Java & OSGi

Overview

Java™ and OSGi in CICS®

CICS provides the tools and runtime environment to develop and run Java enterprise applications in a Java virtual machine (JVM) that is under the control of a CICS region. Java applications can interact with CICS services and applications that are written in other languages.

CICS TS 4.2 additionally introduced support for the OSGi Service Platform, which provides a mechanism for developing applications by using a component model and deploying those applications into an OSGi framework. The OSGi architecture is separated into a number of layers that provide benefits to creating and managing Java applications.

Using OSGi for Java applications provides the following benefits:

- Your Java applications are more portable, easier to re-engineer, and more adaptable to changing requirements.
- You can follow the Plain Old Java Object (POJO) programming model, giving you the option of deploying an application as a set of OSGi bundles with dynamic lifecycles.
- You can more easily manage and administer application bundle dependencies and versions.

Policy search

Policy Search is a general insurance application (GENAPP) extension that demonstrates how you can use Java and OSGi together with COBOL to create rich CICS applications.

The Policy Search sample demonstrates OSGi support for CICS. It provides two versions of the application:

- The initial version that returns a single policy per customer number.
- The updated version that returns up to five policies per customer number

The two versions can be used interchangeably, while transactions are running.

Policy Search consists of three core programs:

- LGTESTC2
- IPPROG
- IPDB

LGTESTC2 is a COBOL program that outputs to the 3270 terminal. It takes the user input, passes it on to com.ibm.cics.genapp.bundle using a COMMAREA and outputs the result.

IPPROG is a CICS program that runs the Java program that is contained in the com.ibm.cics.genapp.bundle. The Java OSGi program within the CICS bundle takes the data from LGTESTC2 and adds it into a CICS container. It then passes the container on to IPDB. Finally, it adds the content that is returned from IPDB into the COMMAREA and passes it back to LGTESTC2.

IPDB is a CICS program that runs the Java program that is contained in the com.ibm.cics.genapp.db.bundle. The Java OSGi program handles the database connection and calls. The content that is returned from the database is added in to a container, which is passed back to IPPROG.

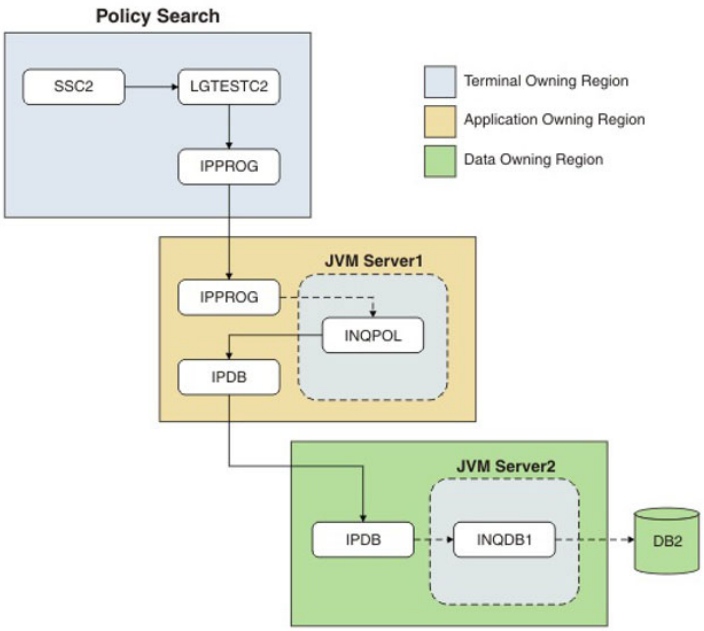

Figure 1. Application overview

Related information:

General insurance application (GENAPP) for IBM CICS Transaction Server

Java support in CICS

Updating an OSGi bundle

Prerequisites

You must use CICS Transaction Server version 4.2 or later.

These instructions are based on a three region installation of GENAPP: CICSTOR1 (Terminal Owning Region), CICSAOR1 (Application Owning Region) and CICSDOR1 (Data Owning Region). The changes that are required to run on a single region instance, are available in Single Region Configuration.

There are a number of actions that must be completed before Policy Search can be set up:

- You must install the CICS Explorer® SDK plug-in into an Eclipse environment and set up a z/OS® and CICS SM connection.

  The CICS Explorer SDK is an Eclipse-based framework for developing extensions to the CICS Explorer. It also provides support for developing Java applications to run in any supported release of CICS. It provides support for JCICS and packaging applications to comply with the OSGi specifications. For more information about installing CICS Explorer SDK, see http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.java.doc/topics/installing_sdk.html
- You must establish a connection between CICS Explorer® and your CICS® systems by providing details about the system connection, its location, and authentication requirements. By default, CICS Explorer attempts to connect by using the SSL protocol. If the SSL connection is not successful, the connection is attempted without SSL. For more information about configuring z/OS and CICS SM connections, see http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.installation.doc/topics/explorer_configure_connection.html
- You must set up the target environment for Java development in CICS Explorer to be able to use the JCICS API. Ensure that com.ibm.cics.server and org.eclipse.osgi are selected in the Content tab of the New Target Definition window. See http://pic.dhe.ibm.com/infocenter/ratdevz/v8r5/topic/com.ibm.cics.server.sdk.help/topics/setup_target_environment.html
- All JVM profiles must be placed in a directory that is accessible to the CICS region.

Configuring a JVM server

A JVM server is required to run Java applications in CICS.

Before you begin

Ensure the CICS DB2® Environment Plan used has support for JDBC calls. See the @DB2BIND.jcl for a sample BIND job.

An example of the CICSDOR1 JVM profile is shown in the following figure:

```
######################################################################
# JVM profile: DFHOSGI                                               #
#                                                                    #
#   This sample CICS JVM profile is for a JVM server.                #
#                                                                    #
######################################################################
JAVA_HOME=/java/java70_bit64_sr1fixed/J7.0_64
WORK_DIR=/cicsts_var/GNAPPLEX/workdir
LIBPATH_SUFFIX=/usr/lpp/db2v10/jdbc/lib
OSGI_BUNDLES=/usr/lpp/db2v10/jdbc/classes/db2jcc4.jar,\
             /usr/lpp/db2v10/jdbc/classes/db2jcc_license_cisuz.jar
OSGI_FRAMEWORK_TIMEOUT=60
-Xgcpolicy:gencon
-Ddb2sqljjdbcprogram=dsnjdbc
JAVA_DUMP_OPTS="ONANYSIGNAL(JAVADUMP,SYSDUMP),ONINTERRUPT(NONE)"
```

Figure 2. CICSDOR1 JVM profile example

Procedure

Create and install an OSGi enabled JVM Server in CICS region CICSAOR1 and an OSGi and DB2 enabled JVM Server in CICSDOR1:

- Create a JVM profile for the JVM server.

  You can copy the supplied profile, DFHOSGI, from the installation directory to the directory that is specified by the JVMPROFILEDIR system initialization parameter. The profile that you copy requires further changes to make it suitable for your environment. If you change the name of the profile, it must be 1 - 8 characters in length. Each CICS region that needs the JVM server must specify the JVMPROFILEDIR system initialization parameter.

  For a sample JVM profile to be used by an OSGi enabled JVM server, see http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.java.doc/topics/dfhosgi_sample.html
- For instructions on how to set up a JVM server with DB2 support, see http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/index.jsp?topic=%2Fcom.ibm.cics.ts.java.doc%2FJVMserver%2Fconfig_jvm_db2.html

Related information:

http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/index.jsp?topic=%2Fcom.ibm.cics.ts.java.doc%2Ftopics%2Fdfhpj69.html

Deploying the Java programs

You must install both the Java and COBOL components to run Policy Search.

Procedure

1. In the Java perspective, import the com.ibm.cics.genapp and com.ibm.cics.genapp.db OSGi projects from the archive.
2. The sample assumes that the database is named `GENASA1`. If your database is named differently, you must update the SQL statement in the `DB2InquirePolicy.java` file in the com.ibm.cics.genapp.db bundle.
3. Create two new CICS bundle projects (com.ibm.cics.genapp.bundle and com.ibm.cics.genapp.db.bundle), one for each of the OSGi projects.
4. Deploy them to zFS. For more information, see http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.scenarios.doc/java_workload/topics/java_deploy.html

Deploying the COBOL program

You must install both the Java and COBOL components to run Policy Search.

Procedure

1. In ASCII mode, FTP the content of the GENAPP.SOURCE and GENAPP.CNTL folders from the archive provided onto the respective SOURCE and CNTL data sets of your GENAPP installation.
2. Re-run the EXEC job to customize the JCL as described in the main GENAPP documentation. This generates @ASMEMAP and @COBOLE.
3. Submit the job @ASMEMAP to build the BMS map for the 3270 interface (SSEMAP).
4. Submit the job @COBOLE to compile the COBOL program LGTESTC2.

Creating the CICS resources

Procedure

1. Define and install the following bundles:
   - INQPOL for the com.ibm.cics.genapp.bundle
   - INQDB1 for the com.ibm.cics.genapp.db.bundle

   For step-by-step instructions, follow Steps 1-3 in: http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.scenarios.doc/java_workload/topics/installing_app.html
2. Define and install the following Java programs:
   - IPPROG in the CICSAOR1 region. The **Service Name** is genapp.policy.InquirePolicy and **JVM Server** is the name of the server that is set up in CICSAOR1
   - IPDB in the CICSDOR1 regions. The **Service Name** is genapp.policy.DB2InquirePolicy and **JVM Server** is the name of the server that is set up in CICSDOR1

   For step-by-step instructions, follow Step 4 in: http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.scenarios.doc/java_workload/topics/installing_app.html

   See the following figure for more details about the attributes of a Java program:

Name	CICS Name	Value
◢ Basic		
CSDGroup	CSDGROUP	GENAPP
Description	DESCRIPTION	
Name	NAME	IPPROG
Version	DEFVER	0
▷ Definition Signature		
◢ Details		
Api	API	CICSAPI
Cedf	CEDF	YES
Concurrency	CONCURRENCY	REQUIRED
Datalocation	DATALOCATION	BELOW
Execkey	EXECKEY	CICS
Language	LANGUAGE	N_A
Reload	RELOAD	NO
Resident	RESIDENT	NO
Status	STATUS	ENABLED
Usage	USAGE	NORMAL
Uselpacopy	USELPACOPY	NO
◢ Java		
Hotpool	HOTPOOL	NO
JVM	JVM	YES
JVM Profile	JVMPROFILE	
JVM Server	JVMSERVER	OSGIJVMS
Service Name	JVMCLASS	genapp.policy.InquirePolicy
▷ Remote		

Figure 3. Attributes of a Java program

3. Define and install the following remote Java programs:
   - IPPROG in the CICSTOR1 region, routing to a program with the same name in the AOR1.
   - IPDB in the CICSAOR1 region, routing to a program with the same name in the DOR1.

   For more information, see http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.intercommunication.doc/topics/dfht1c00171.html
4. Define and install the following COBOL programs:
   - LGTESTC2 in the CICSTOR1 region

- SSEMAP in the CICSTOR1 region

5. Define and install the following transaction:
   - SSC2 with **Program Name** field set to LGTESTC2

Updating the Java application

When querying on a customer number, the initial behavior of Policy Search is to return one matching record. You can create a second version of the OSGi bundle that returns 5 records instead of 1 by following these steps.

Procedure

1. 1.Update the DB2 Java code to return five records by changing the following code snippet:

   ```
   while(result.next()==true && cnt<1)
   ```

   to:

   ```
   while(result.next()==true && cnt<5)
   ```

2. Update the Bundle-Version attribute of the OSGi bundle to be 2.0.0 by editing the manifest file META-INF/MANIFEST.MF.
3. Create a CICS bundle project (com.ibm.cics.genapp.db.bundle2) to include the updated com.ibm.cics.genapp.db OSGi project. Deploy it to zFS. For more information, see http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.scenarios.doc/java_workload/topics/java_deploy.html
4. 4.Define and install the following bundle:
   - INQDB2 for the com.ibm.cics.genapp.db.bundle2

   For step-by-step instructions, follow Steps 1-3 in: http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.scenarios.doc/java_workload/topics/installing_app.html

Deploying the application update

To update from the initial OSGi bundle to the updated version:

About this task

For more information about how to complete the steps in this task, see http://pic.dhe.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.java.doc/JVMserver/updating_osgi.html. For a video demonstration of the steps, see the video included with the SupportPac.

Procedure

1. In CICS Explorer, open the CICS SM perspective.
2. In the CICSPlex® Explorer view, select CICSDOR1 in GNAPPLEX. In the OSGi Services view, version 1.0.0 from bundle INQDB1 is displayed as ACTIVE. In the Bundles view, INQDB1 is displayed as ENABLED.
3. In the Bundles Definitions view, right-click on INQDB2 and install to CICG0D1. In the OSGi Services view, version 2.0.0 from bundle INQDB2 is now displayed as INACTIVE. In the Bundles view, INQDB1 and INQDB2 are displayed as ENABLED. The two applications are now ready for updating an OSGi bundle.
4. In the Bundles view, right-click INQDB1 and select disable. INQDB1 is now shown as DISABLED and in the OSGi Services view. Only version 2.0.0 from bundle INQDB2 is displayed as ACTIVE.

Single region configuration

If you are running in a single region environment, make the following changes:

- Install a single OSGi and DB2 enabled JVM Server.
- Skip the define and install of the remote programs IPDB and IPPROG.

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