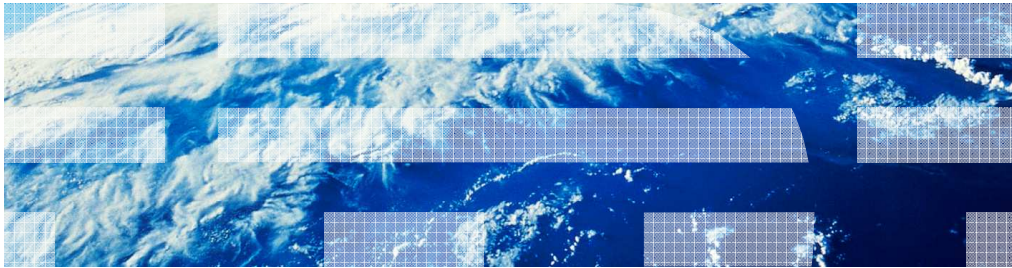

IBM WebSphere Adapters V7.0

WebSphere adapter for IBM i



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This presentation will provide details on the functionality supported by WebSphere® Adapter for IBM i V7.0.

Agenda

- Overview
- Enterprise metadata discovery
- Outbound
- Inbound
- Business object structure
- Problem determination
- Summary

This section provides an overview of the WebSphere Adapter for IBM i V7.0

Overview: WebSphere Adapter for IBM i

- IBM WebSphere Adapter for IBM i
 - Implements the Java 2 Enterprise Edition (J2EE) Connector Architecture (JCA), version 1.5 specification
 - Enables bi-directional connectivity
 - Read, write and monitor queues
 - Run report program generator (RPG) program calls
 - Support calling of Service Programs (SRVPGM)
 - Support calling of COBOL programs
 - Support for faults



With WebSphere Adapter for IBM i, you can create modules that include the exchange of information with an IBM i system. By using the adapter, a module can send requests to read from or write to an IBM i data queue or run report program generator (RPG) programs without the need for special coding. It supports bi-directional connectivity, both inbound and outbound. You can make calls to the IBM i system and monitor any events happening on the IBM i system. Support for calling service programs and COBOL programs is added in V7.0. IBM i adapter now supports generation of fault business objects based on generated exception. You no longer need to specify bindings manually by editing the import and other WSDL files.

Enhancements and new features in version 7.0



- Discovery enhancements
 - Support more than one <program> element inside PCML file

- Outbound enhancements
 - Support for Service Programs (SRVPGM) and COBOL programs
 - Support for structure and array data types as parameters to program calls
 - Support for execution of pre-commands and post-commands for program calls
 - Support binary message content for (PutQueue/GetQueue) operations on IBM i data queues

This slide lists all the enhancements made in version 7.0. External service wizard is used to discover the backend resources, configure the adapter and generate the necessary artifacts. The adapter will support one PCML file with multiple programs defined in it.

On outbound, IBM i adapter now supports calling COBOL and service programs. Support for report program generation calls was already available in previous version. You can also call COBOL program, service program and report generation programs that have structure and array type parameters. In the previous version only programs with parameters of simple type are supported.

Enhancements made for the data queue interface include the ability to place and retrieve binary message content from the data queues.

Configuration steps

- **Discovery:** Discovering EIS metadata and automatic creation of components to access the EIS
- **Development:** Create application which make use of the discovered components
- **Enablement:** Configuring the runtime with the location of the EIS provider jars/native libraries
- **Administration:** Deploy all required components to runtime, and administer them



This slide summarizes the steps involved in using adapter as part of your application and how to administer them. At a high level the interaction steps can be broken down into four steps. The first step is the Discovery phase where you use the external service wizard to configure the adapter and generate the necessary artifacts. The next step is the development phase where you use the generated artifacts to create your application. The third step is Enablement, where you specify the necessary dependency files required at runtime by the adapter. For example the SAP adapter uses the sapjco.jar file to communicate with the SAP system. The last step is to create the Enterprise Broker Archive (EAR) file, deploy it to the runtime, and administer the application. For the IBM i adapter, there is no enablement step as it requires no dependencies.



Section

Enterprise metadata discovery

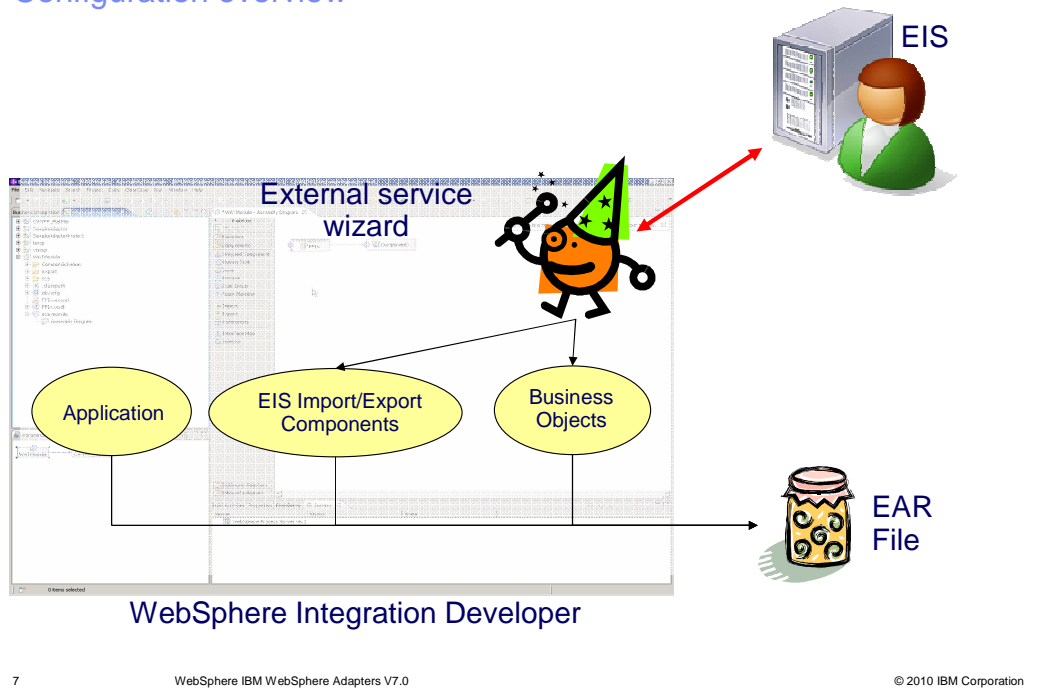
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This section provides an overview of the discovery process for WebSphere Adapter for IBM i.

Configuration overview



This slide depicts the steps involved in configuring the adapters and creating a deployable application. WebSphere Integration Developer provides an external service wizard that connects to the EIS, introspects and imports the metadata information and creates the necessary artifacts. The artifacts generated by the wizard are the import or export components and the business object definitions. The interaction style you choose when configuring using the wizard defines the generation of either an import or an export component. The supported interaction styles are inbound and outbound. Once the artifacts are created, you can use these generated artifacts as part of your application flow. The finished application project is exported as an ear file that you deploy to the runtime.

Outbound support

This section provides an overview of outbound operations and interfaces supported by WebSphere Adapter for IBM i.

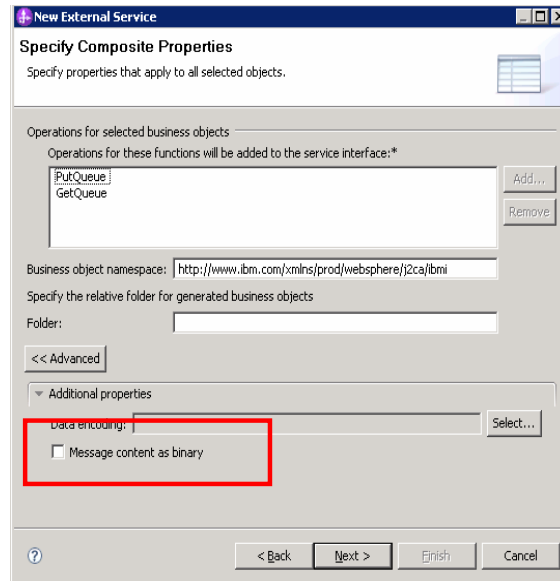
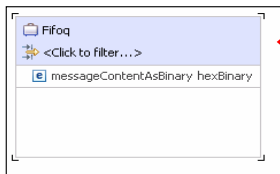
Outbound support

- Outbound
 - Support for retrieve and placing data on queues
 - Queues can be first in first out (FIFO), last in first out (LIFO) or keyed data queues
 - Operations supported getqueue and putqueue
 - Support for bidirectional character set
 - Support for calling report program generation (RPG) programs
 - Support for calling COBOL and Service programs

The adapter supports four different interfaces for outbound. One is the data queue interface which is used to interact with the data queues in the IBM i system. The queues can either be first in first out, last in last out or a keyed data queue. With a keyed data queue, there is a key associated with the data that is being stored in the queue. You must provide the key to retrieve the data associated with that key. Adapter supports placing and retrieving only string type data from the queues. The supported operations are getqueue and putqueue. The second interface is the report program generation (RPG) interface, which allows you to call RPG programs. Two new interfaces to support calling COBOL and service programs are added in version 7.0. Details regarding these two interfaces are provided in the slides that follow.

Binary message format support for data queues

- Support binary message content for put/get queue operation
 - Not supported for inbound



You can now configure the adapter to be able to place and retrieve data in binary format from the data queues. Shown on the slide is the screen capture from the external service wizard where you can enable the support for binary message format. The support for binary format is only applicable for the two outbound operations and still not supported for the inbound operation.

Program call support

- Support for calling report program generation (RPG) programs
 - External service wizard requires the location of Program Call Markup Language (PCML) to generate business objects
 - Pre-requisite: To get the PCML, you need to compile RPG program and create PCML and save it in IBM i system.
 - Can use Rational Developer for System i or use CRTBNL command in the terminal

- **New for version 7.0**



- Support for SRVPGM and COBOL program on outbound is added.
- support for arrays or structures is added

For the adapter to be able to generate appropriate business objects that represent your report generation program (RPG), you must satisfy some prerequisites. The RPG program should be compiled with an option to generate a PCML definition. You can either use the Rational Developer for System i or the command CRTBNL. Once you generate the PCML, you can copy the file to your IBM i system. In the external service wizard, you are prompted to provide a path to the location to find the PCML file for the RPG program. Adapter will look up all the programs under the location and display them in the tree format. You can select the programs you are interested in and add to the import list. The external service wizard creates a business object modeling each RPG that is selected for import. PCML treats all attributes as input attributes. You can change them by manually editing the PCML or use the properties view for the attributes in the business object in WebSphere Integration Developer to achieve this.

Support is added for calling service and COBOL programs. The prerequisites are the same as for the RPG. You can call COBOL program, service program and report generation programs that have structure and array type parameters. In the previous version only programs with parameters of simple type are supported.

Pre and post command support for program calls

- Support to specify pre and post commands
 - when configuring adapter for COBOL, Report program generation and Service program calls
 - Can provide more than one pre or post commands.
 - Specify if you want to stop further processing by setting stop on error flag for each of the command specified

You can specify pre and post commands when configuring the adapter for COBOL, service program and report program calls. A scenario where this can be useful is when you need a library to be loaded into memory before you can make a program call. In such case you can load the library using the pre command and the unload the library from memory using post commands.

You can also specify how you want the adapter to process the pre and post commands. For each command you have an option to specify if you want the adapter to continue processing the rest of commands if the present commands encounters any errors or just stop processing when an error occurs.

Pre and post command support

The screenshot shows a sequence of five windows in the external service wizard:

- Step 1:** A window titled "Find Objects in the Enterprise System" with a list of objects including "shashi", "A1.PCML", "ASAC.PCML", "ACOMPLEX.PCML", and "ADD2NUM.PCML".
- Step 2:** A button labeled "Add" is highlighted, with a callout indicating to click it to add the selected object to the import list.
- Step 3:** A window titled "Configuration Properties for 'ADD2NUM.PCML'" with two sections: "Commands to be executed before the program execution on IBM i:" and "Commands to be executed after the program execution on IBM i:". Each section has a table with "Command" and "Stop On Error" columns, and "Add...", "Edit...", and "Remove" buttons.
- Step 4:** A window titled "Add/Edit" with a "Command:" text field and a "Stop On Error" checkbox.
- Step 5:** The "Add/Edit" window with the "Command:" field filled with text and the "Stop On Error" checkbox checked.

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This slide shows the series of panels in the external service wizard that you can configure the pre and post commands and flag to stop processing on error for each command.

Multiple program elements in a PCML file

- Support for generation of artifacts from a PCML file with more than one program defined in it
- Following should generate four business objects

```

<pcml version="4.0">
  <!-- RPG module NFS404 -->
  <!-- created: 2009-03-01 22:31:01 -->
  <!-- source: FLGHT400M/QRPGLESRC(NFS404) -->
  <struct name="FLIGHTINFO">
    <data name="AIRLINE" type="char" length="3" usage="inherit" /> |
    <data name="FLIGHT" type="char" length="7" usage="inherit" />
    <data name="DOW" type="char" length="2" usage="inherit" />
    <data name="DEPARTCITY" type="char" length="3" usage="inherit" />
    <data name="ARRIVECITY" type="char" length="3" usage="inherit" />
  </struct>
  <program name="GETFLIGHTINFO" entrypoint="GETFLIGHTINFO" path="/QSYS.LIB/TUSHAR1.LIB/NFS400.SRVPGM">
    <data name="FLIGHTNUMBER" type="char" length="7" usage="input" />
    <data name="FLIGHTNUMBER" type="char" length="7" usage="input" />
    <data name="FLIGHT" type="struct" struct="FLIGHTINFO" usage="output" />
  </program>
  <program name="FINDFLIGHTS" entrypoint="FINDFLIGHTS" path="/QSYS.LIB/TUSHAR1.LIB/NFS400.SRVPGM">
    <data name="FROMCITY" type="char" length="16" usage="input" />
    <data name="TOCITY" type="char" length="16" usage="input" />
    <data name="FLIGHTDATE" type="char" length="8" usage="input" />
    <data name="FLIGHTCOUNT" type="int" length="4" precision="31" usage="output" />
    <data name="FLIGHTS" type="struct" struct="FLIGHTINFO" count="50" usage="output" />
  </program>
  <program name="FINDFLIGHTSDOWN" entrypoint="FINDFLIGHTSDOWN" path="/QSYS.LIB/TUSHAR1.LIB/NFS400.SRVPGM">
    <data name="FROMCITY" type="char" length="16" usage="input" />
    <data name="TOCITY" type="char" length="16" usage="input" />
    <data name="FLIGHTDOWN" type="char" length="16" usage="input" />
    <data name="FLIGHTCOUNT" type="int" length="4" precision="31" usage="output" />
    <data name="FLIGHTS" type="struct" struct="FLIGHTINFO" count="50" usage="output" />
  </program>
</pcml>

```

IBM i adapter supports PCML files which contain more than one program element. Program elements are used to mark the start and end of a program definition. When the file contains more than one program element, external service wizard will generate appropriate artifacts like business objects and interfaces for each one of the programs in the PCML file.



Section

Inbound support

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This section provides an overview of inbound support provided by WebSphere Adapter for IBM i.

Inbound support

- Inbound
 - Support for polling data queues
 - Data queues – Last in first out, first in first out (LIFO, FIFO)
 - Keyed data queues

For inbound, the adapter supports monitoring activity on data queues. The queues can be either first in first out, last in first out, or keyed data queues.

Inbound data queue support (1 of 3)

- Support for polling data queues
 - Data queues – Last in first out, first in first out (LIFO, FIFO)
 - You need to create a staging which is a keyed data queue – *“PayloadStagingQueue”*
 - Key length of 18 characters
 - Used to transfer data from data queue
 - Script provided in adapter samples to move data from the polled queue to staging queue
 - Key value for the staging queue used as event id

Adapters poll a data queue continuously for new messages. If it is FIFO queue, the adapter will fetch the oldest message from the queue. If it is a LIFO queue, the adapter will fetch the latest message from the queue. The adapter will use a temporary staging queue to store the messages retrieved from the queue. The staging queue is a keyed data queue and stores the messages that were read from the polled queue. Once the message has been read from the poll queue, it will get deleted, so the staging queue is used to store the message until the adapter delivers the event to the end point. Adapter will not create the staging queue, you have to create the temporary queue before you can configure the adapter for inbound. You are prompted to enter the full path to the staging queue in the activation specification property called `StagingPayloadQueue`. The key length of the staging queue should be 18 characters. Adapter provides a sample program which must be copied and compiled in the IBM i system. The program is used to move the messages from the poll queue to the staging queue. As the staging queue is a keyed queue, the program also generates a unique key to write to the keyed data queue. Adapter assigns a unique identification number to each message polled. The same key is also used in the event table as event ID. Adapter polls the poll queue specified during configuration and then moves the data to the staging queue and assigns a unique key to the data being placed in the staging queue. The same unique identifier is used as event ID in the event table used to provide assured once and only once delivery.

Inbound data queue support (2 of 3)

- External Service Wizard

New
Service Generation and Deployment Configuration

Warning: Sensitive values, such as passwords, should not be saved.

Service operations
If you want to modify the names, or add a description to the operations to be generated in the interface file, press the 'Edit Operations' button.

Deployment properties
 Specify a Java Authentication and Authorization Services (JAAS) alias security credential.
 J2C Authentication Data Entry: _____
 Deploy connector project: With module for use by single application
 Specify the settings used to connect to the Enterprise Information System at runtime:
 Connection properties: Specify connection properties

Connection properties
 IBM i Connection Properties
 Host name: jchan.in.ibm.com
 User name: beta
 Password: *****
 Queue Path: /QSYS.LIB/RAJA1.LIB/PERDQ.DTAQ
 Load Staging Queue Path: /QSYS.LIB/RAJA1.LIB/STAGINGQ.DTAQ
 Control Language Program Path: /QSYS.LIB/SWAMY1.LIB/MSGQCL2.PGM

Buttons: [Advanced >>], < Back, Next >, Finish, Cancel

Provide path to the staging queue that you created. This queue is used to store the data polled from the queue

Provide path to the program that is provided as part of the adapter samples to move the data to the staging queue

Shown here is a screen capture of the panel from the external service wizard. You are prompted to provide a path to the staging queue and the control language program used to move data from the poll queue to the staging queue.

Inbound data queue support (3 of 3)

- External Service wizard panel for Keyed Data Queue

Provide path to the staging queue that you created. This queue is used to store the data polled from the queue

Provide path to the program that is provided as part of the adapter samples to move the data to the staging queue

Provide a key value that the adapter needs to look for

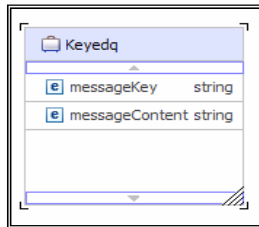
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If you have chosen a keyed data queue to be monitored, you are prompted to enter the key value for the queue you are interested in monitoring.

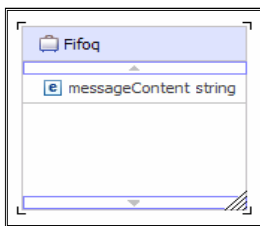
Business object structure

This section provides an overview of the business objects created by the external service wizard for pass-through and user defined scenarios.

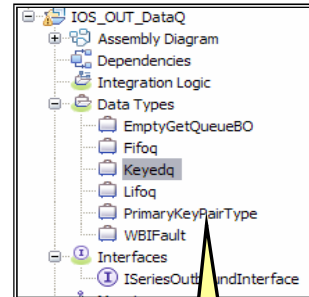
Business object structure



business object created when you select a keyed data queue



business object created when you select a data queue



List of business objects and other artifacts created

Shown here is a screen capture of the business objects created and the business object structure for both keyed and non keyed data queues.

Problem determination

This section provides an overview of the problem determination for WebSphere Adapter for IBM i

Problem determination

- Covered in the Adapters Overview presentation – Recap:
 - WebSphere Process Server log files
 - SystemOut.log and SystemErr.log
 - Adapter Log and Trace files configured in WebSphere Integration Developer External service wizard
 - Also can set RAR custom properties in the Administrative console of the Process Server
 - Different logging level levels can be set
- Enabling trace for Adapters in WebSphere Process Server :
 - Set the tracing level string as "com.ibm.j2ca.*=finest"

Listed here are the log files for WebSphere Process Server. The adapter logs the entries in the SystemOut.log and SystemErr.log files. You can also enable tracing for more detailed information.

Summary

This section provides a summary of the topics covered in this presentation

Summary

- With WebSphere Adapter for IBM i, you can create modules that include the exchange of information with an IBM i system
 - Inbound and outbound support
- Provides support for enterprise service discovery for discovering services

In this presentation, you learned that the WebSphere Adapter for IBM i enables SCA business integration applications to exchange information with an IBM i system . The adapter supports both inbound and outbound interaction. Enterprise service discovery is used to create the service description and to provide the managed connection factory, activation specification properties and any specific custom adapter properties. It also covered the data queue and the remote program generation, COBOL and service program interfaces supported by the adapter to interact with the IBM i system.

Reference information

- WebSphere Adapter for IBM i User Guide
- Java Connector Architecture
 - <http://java.sun.com/j2ee/connector/index.jsp>
- Enterprise metadata discovery
 - <http://www.ibm.com/developerworks/java/library/j-emd/>
- WebSphere Adapters information center
 - <http://www-01.ibm.com/software/integration/wbiadapters/library/infocenter/>
- WebSphere Business Process Management information center
 - <http://publib.boulder.ibm.com/infocenter/dmndhelp/v6r2mx/index.jsp>

Additional reference information can be found at these addresses.



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