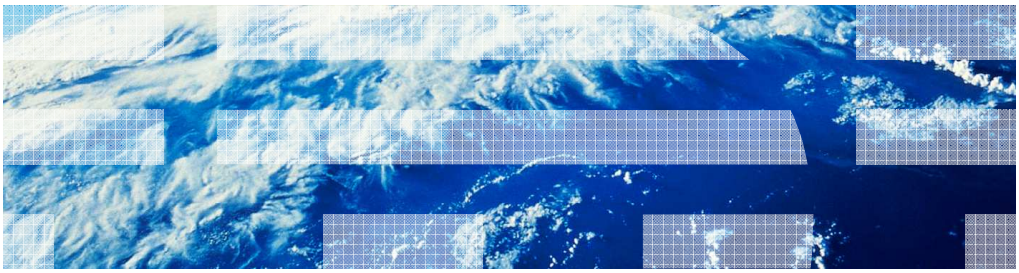
WebSphere Business Process Management Suite V7.0

WebSphere adapters for Oracle E-Business suite V7.0



This presentation covers WebSphere® Adapter for Oracle E-Business Suite V7.0.

Agenda

- Overview
- Business objects models
- Event Management
- What is new in this release
- Summary and references

This presentation covers in detail the IBM WebSphere Adapter for Oracle E-Business Suite (EBS). It starts with the overview of Oracle adapter with preparation steps in installation. It also captures different business object models with inbound and outbound operations. The next section provides information about event management in inbound processing. Last, Oracle EBS adapter provides different sample scenarios in V7.0

Section

Overview

This section provides an overview and new enhancements in installations of the WebSphere Adapter for Oracle E-Business Suite V7.0

Overview

- WebSphere Adapter for Oracle E-Business Suite
  - Creates bi-directional integrated applications which can interact and exchange information with Oracle E-Business Suite
  - Enables two-way communication between application running on WebSphere Process Server and WebSphere Enterprise Service Bus
- Supports Oracle E-Business Suite release 11.5, 12.0 and 12.1

WebSphere adapter for Oracle EBS is a solution that uses existing WebSphere components to enable bidirectional communication between Oracle EBS and the WebSphere Business Integration system. This solution uses WebSphere Adapter for Oracle EBS to interact with the database components in Oracle EBS to process data to and from external sources. With WebSphere® Adapter for Oracle E-Business Suite, you can create service-oriented integrated applications, which can interact and exchange information with Oracle E-Business Suite.

The adapter enables a two-way communication between the application running on WebSphere Process Server or WebSphere Enterprise Service Bus and the underlying Oracle database of Oracle E-Business Suite. Using the adapter, an application can send requests to read, create, modify, or delete data in the Oracle database, in many cases without writing any SQL code. To process requests received from an application, the adapter updates the Oracle database tables using SQL queries or stored procedures. An application can also receive events from the Oracle E-Business Suite, for example, it can be notified that specific objects in Oracle E-Business Suite are updated.

WebSphere Adapter for Oracle E-Business Suite V7.0 supports Oracle E-Business Suite Release 11.5, 12, and 12.1

Overview: installation preparation steps

- WebSphere Adapter for Oracle E-Business Suite is included in resource adapter directory of WebSphere integration developer
- JDBC 2.0 driver dependent jar file for database
- Event store table
  - Require for inbound event processing
  - Sample script provided for Oracle
  - Use Oracle business event system to look for changes to Oracle data
    - Populate necessary key values to the adapter's event table

The JCA adapters are packaged as resource adapter archive (RAR) files. The adapter for Oracle EBS is packaged in WebSphere Integration Developer. The RAR files are located in resource adapter directory.

Any JDBC 2.0 driver specific to the database that you are integrating with must be added to the class path. Other information necessary in preparation for use of the adapter are the databases and tables used by the adapter.

The sample script is provided for the Oracle event table for inbound processing. The WebSphere Adapter for Oracle EBS uses its own event system to look for change to Oracle data by populating necessary key values to the adapter's event table.

Section

Business object models

This section provides an overview of the business object models.

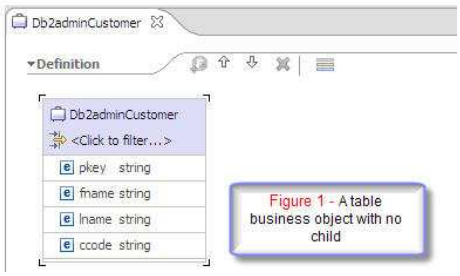
Business object: models (1 of 4)

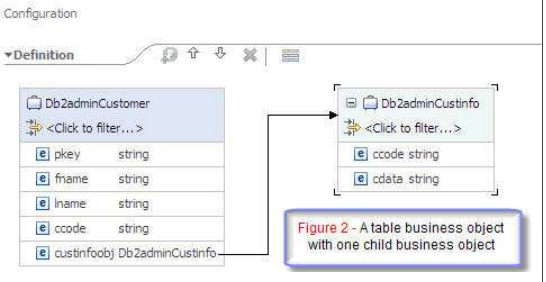
- Supports generating business objects from different types of objects
  - Tables and views
  - Synonyms and nicknames
  - Stored procedures and stored functions
- User-defined SQL query

A business object is a structure that consists of data, the action to be performed on the data, and additional instructions, if any, for processing the data. WebSphere adapter for Oracle EBS uses business objects to represent tables and views in the database and the results of database queries, stored procedures, and stored functions. Business objects can also create a hierarchy of objects from your database and group unrelated tables. Your component communicates with the adapter using business objects.

The adapter uses business objects to represent different type of objects in a database. They include tables and view, synonyms and nicknames, stored procedures and stored functions. Query business objects do not represent database objects. Query business objects represent a user-defined SQL query to run against the database

Business object: models (2 of 4)





- Table or view business object
  - Represents by a simple attribute of the table or view business object
  - Simple attributes within same business objects must be stored in same database tables
  - Must always have a primary key
    - Prompt by external wizard for primary key if the corresponding database table does not have primary key
  - Supports multiple composite, or multiple, primary keys
- Stored procedure and stored function business object
  - Input and output parameters have corresponding attributes in business object
  - Attributes of array or structure have corresponding child business object

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For tables and views, each column in the table or view is represented by a simple attribute of the table or view business object. A simple attribute is an attribute that represents a single value, such as a String, Integer, or Date. Other attributes represent a child business object or an array of child business objects. Simple attributes within the same business object cannot be stored in different database tables; however, some situations are possible. For example, the database table can have more columns than the corresponding business object has simple attributes; that is, some columns in the database are not represented in the business object. Only those columns needed for your application's processing of the business object must be included in your design. Or the business object can have more simple attributes than the corresponding database table has columns; that is, some attributes in the business object are not represented in the database. The attributes that do not have a representation in the database either have no application-specific information, are set with default values, or are parameters for stored procedures or stored functions. Last but not least, the business object can represent a view that spans multiple database tables.

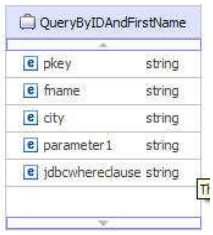
A table business object must always have a primary key, even if the corresponding database table does not have a primary key. In that case, the external service wizard prompts for primary key information when discovering and configuring that business object. The adapter uses that column specified in the primary key attribute when it retrieves table business objects. The adapter supports tables that have composite, or multiple, primary keys. If a database table has one or more primary keys, the wizard sets the primary key property for those columns in the table business object.

In a business object for a stored procedure or stored function, all the input and output parameters for the stored procedure or stored function have corresponding attributes in the business object. If any of the input or output parameters is of a complex type, then the corresponding business object attribute is a child business object containing the attributes of the array or structure. If the stored procedure returns a result set, a child business object is created that contains the attributes of the returned result set.

Business object: models (3 of 4)

```
select C.pkey, C.fname, A.city from customer C, address A
    WHERE (C.pkey = A.custid) AND (C.fname like ?)
```

- Query business object
  - User-defined SELECT statements
  - Returns matching records in business object
  - Uses question mark (?) in place of substitutable parameters



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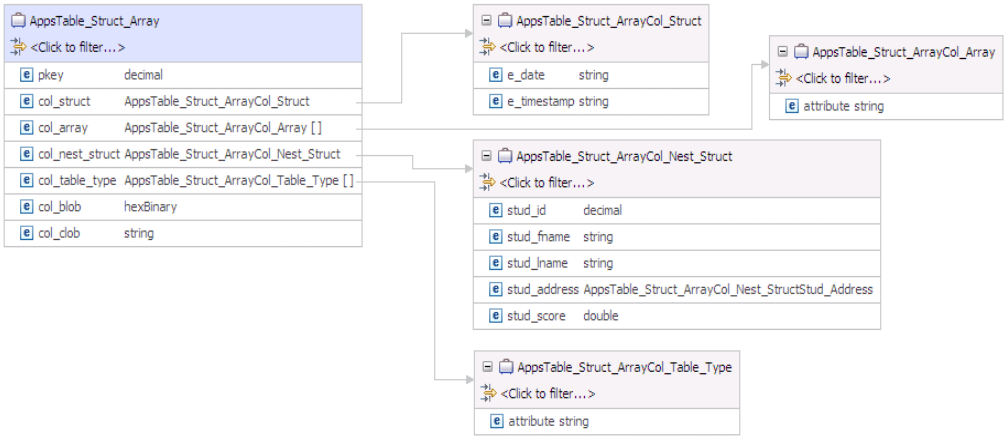
Query business objects run a user-defined SELECT statement against the database and return the matching records in business objects.

The external service wizard helps you build query business objects that run user-defined SELECT statements against the database. You specify the SELECT statement, using ? (the question mark) in place of any substitutable parameters in the SELECT statement. The wizard then provides an area where you specify the data type of each parameter and provide a sample value. The sample value must match data in the database because the wizard uses the SELECT statement's results to create the query business object.

Before you save the configuration of the query in the wizard, you validate it. When you validate, the wizard runs the SELECT statement using the sample values. After obtaining the result set, the wizard analyzes the metadata to obtain the column name and column type of all columns. For each column of the returned result set, the wizard generates one corresponding attribute in the query business object. For each parameter in the WHERE clause, the wizard generates one jdbcwhereclause attribute in the query business object and sets this attribute's default value to be the WHERE clause. These attributes are used to generate one dynamic WHERE clause at run time to replace the default WHERE clause.

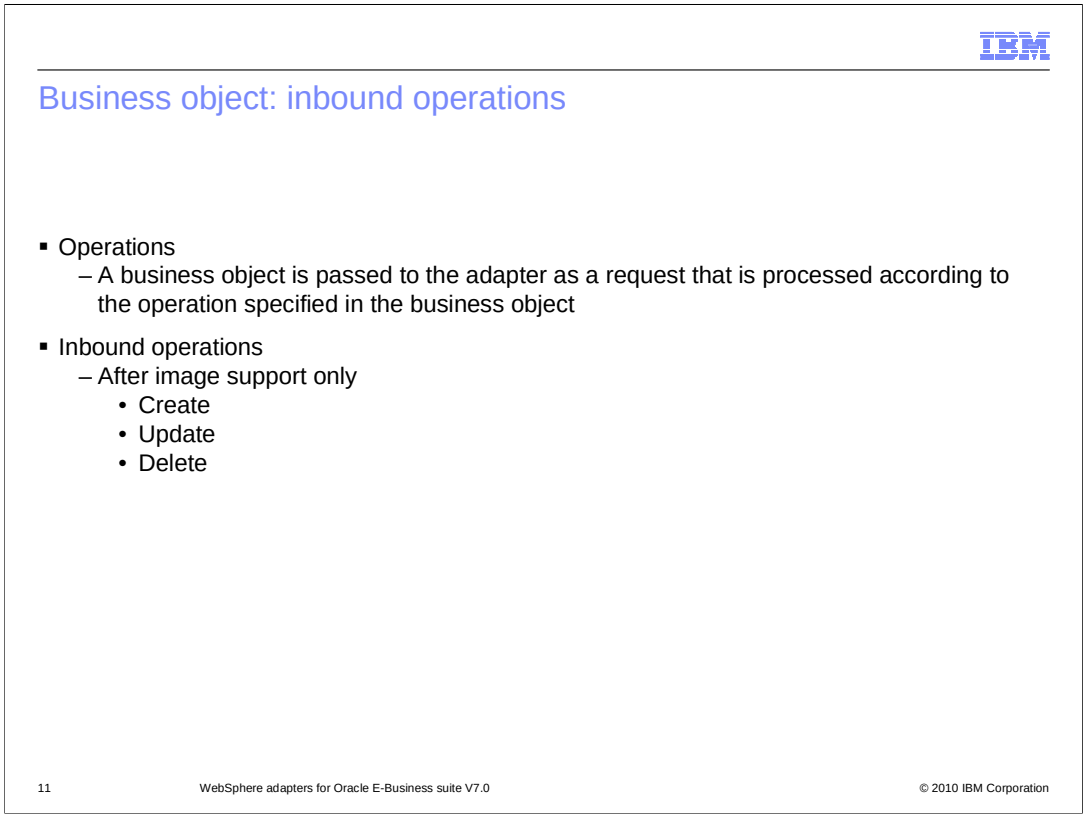
For Oracle databases, the adapter supports complex data types such as array, table, structure, or nested structure in the query result of the business object. The adapter does not support these complex types as parameters in query business objects.

Business object: models (4 of 4)



For Oracle databases, the adapter supports complex data types such as array, table, structure, or nested structure in table business objects. The type name and the sub attribute details are automatically discovered and displayed for these types. The adapter processes these data types as child business objects of the table business object.

For Oracle databases, the adapter supports complex data types such as array, table, structure, or nested structure in the query result of the business object. The adapter does not support these complex types as parameters in query business objects.



A business object's content is related to the amount and purpose of the information conveyed by the business object. There are two categories of business object content, "After image" and "Delta". After image content represents the state of the business object after all changes have been made. This type of content is indicated by the presence of a top-level verb in the business graph of the business object.

Delta content represents the changes that have happened to the business object content. This type of content is indicated by the absence of a top-level verb.

The operations specified in the business object indicate what type of processing is being requested. Business objects are passed to the adapter and processed according to the operations they specify. In the case of inbound operations, only after-image support is available for the operations, which include Create, Update, and Delete.

Business objects: outbound operations

- After Image
  - Create
  - Update
  - Delete
    - Supports physical and logical deletes
- Delta support
  - ApplyChanges only handles ChangeSummary

In the case of outbound operations, after-image support is available for the Create, Update, and Delete operations. Delete operations can include both physical and logical deletes. For Delta support, outbound operations also include the ApplyChanges operation.

Business object: outbound operations

- Other supported operations
  - Retrieve
  - RetrieveAll
    - Allows an array of business objects to be retrieved from the database
    - ResultSetLimit property determines number of records to return
    - Supports user defined SQL statements
  - Execute
    - Stored procedures and stored functions
  - Exists
    - Tables/Views/Synonyms/Nicknames

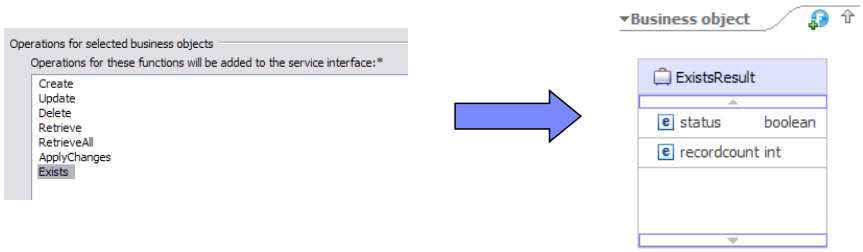
Outbound supports three other operations as well, retrieve, retrieveAll and execute. The retrieve operation, when passed a hierarchical business object, starts processing by first making a copy of the top level business object without any of its children. It then recursively retrieves the child business objects starting with the parent of the incoming business object.

RetrieveAll is an operation that will direct the Oracle EBS adapter to retrieve an array of business objects from the database. The value of the ResultSetLimit property determines the number of records to return. This value can be set during the external service wizard or by specifying the value for MaxRecords on the Configure Objects panel for the outbound ServiceType.

The Execute operation is used to run stored procedures and stored functions. The external service wizard generates the required stored procedure business object that corresponds to the stored procedure or stored function definition in the database. The adapter uses the Execute operation to process the stored procedure business object.

The Exists operation determines whether the database table contains records that match the attributes set in a business object. The Exists operation is supported by the table business object, the views business object, the synonyms, and nicknames business object. More detail is covered in the next few slides.

Business objects: outbound operations



- Exists operation
  - Generates output business object – ExistsResult
    - Return in boolean if the record is found
    - Return number of records for specified query
  - Query records based on any attribute value
    - Not just on primary key attributes
    - For example
      - Customer { custid primary key, firstName, lastName, Organization }
      - Query the existence of a customer based on any of the attributes in Customer business object

Continued from the previous slide, the results of the Exist operation is returned in a different business object then the input business object. It actually generates a new business object called ExistsResults, which is used in the output result based on query criteria set on the attributes of input business object. The business object ExistsResult has two attributes. Status attribute returns with a Boolean value if the record is found in the database and the recordcount attribute returns the number of records found in the databases for the specified query. The default value for the recordcount attribute is 0. The screen capture illustrates the structure of the ExistsResult business object returned from an Exists operation.

The Exists operation also supports both key and non-key attributes in the selection criteria. It sends that object as an input to query records in the database. For example, if you have generated a business object for a customer table that has a primary key and non-primary keys attributes, then you can query the existence of a customer based on any of the attributes in customer business object, and not just query based on primary key attributes only.

Section

Event management

This section provides an overview of the event management of the WebSphere Adapter for Oracle EBS V7.0.

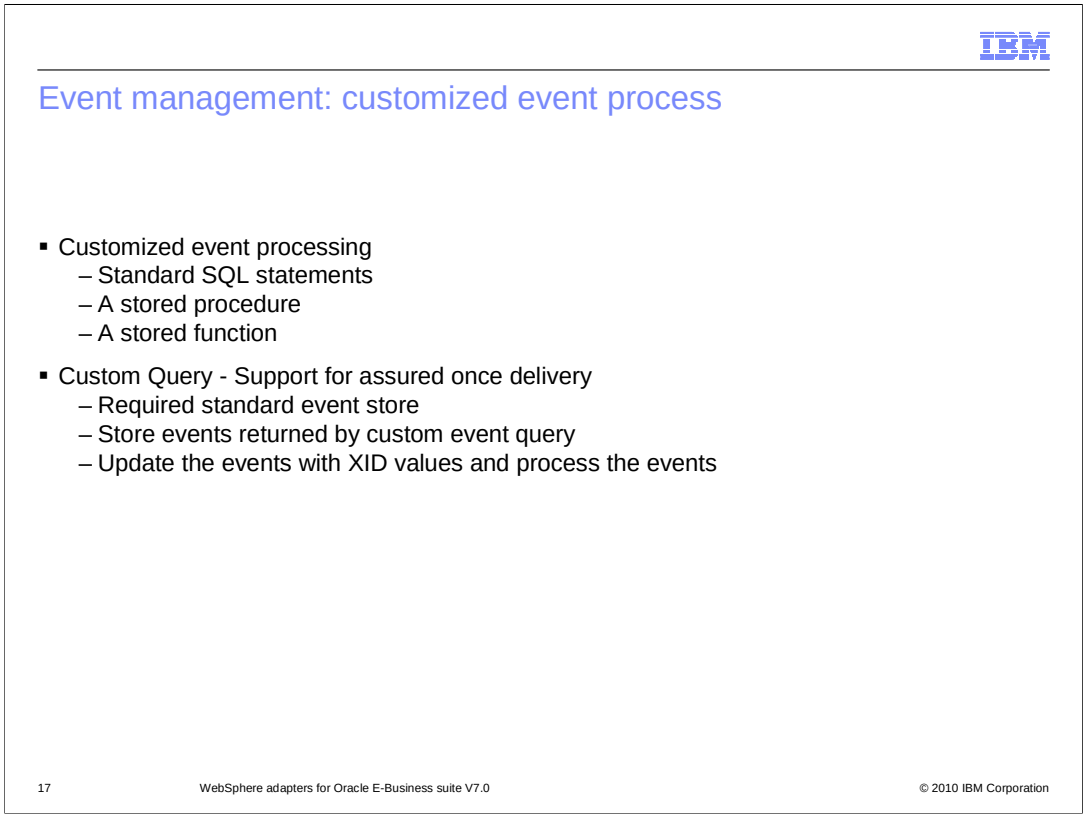
Event management: standard event process

- Standard event processing using Event store (event table)
  - Triggers on user tables to record events
  - If “AssuredOnceDelivery” is set to true, an XID value is set and is updated in the event table
  - XID column ensures that the events is reprocessed in case of failure
  - Filter events to be processed by business objects type

In standard event processing, the adapter provides the SQL queries that poll for events and ensure that the event is delivered exactly one time. Database triggers or tools such as Oracle Change Data Capture run when records are created, updated, or deleted in tables in the database. You can define the triggers or set up other tools to report changes to the database tables about which you want to receive events. A trigger or other tool writes an event record into the *event store.* It is implemented as a table in the same database as user tables, which are the tables that contain the database objects accessed by the adapter.

The adapter offers assured once delivery, which guarantees that each event is delivered once and only once to the export. If you enable assured once delivery for the module, a transaction ID (XID) is set for each event in the event store. After an event is obtained for processing, the XID value for that event is updated in the event store. The event is then delivered to its corresponding export, and subsequently deleted from the event store. If the database connection is broken or the application is stopped before the event can be delivered, the event cannot be processed completely. In this case, the XID column indicates that the event must be reprocessed and sent to the export again. After the database connection is reestablished or the adapter starts again, the adapter checks for events in the event store that have a value in the XID column. The adapter processes these events first, and then polls the other events during the poll cycles.

The adapter can also filter the events to be processed by business object type, or timestamp. The filter is set in the EventFilterType property specified in the adapter foundation classes. This property has a comma-delimited list of business object types and only the types specified in this property is picked for processing. If no value is specified for the property, no filter is applied and all the events are picked up for processing. If the FilterFutureEvents property in the adapter foundation classes is set to true, the adapter will filter events based on their timestamp. The adapter will retrieve the system-time in each poll cycle and compare it to the timestamp on each event. If the event is set to occur in the future, it is not picked up for processing until that future time.



In custom event processing, you provide the SQL queries or stored procedures that poll for events. With custom event processing, you control which events are delivered to the export by providing a database *custom event query* for the adapter to run in place of the SQL query it uses to poll the event store in standard event processing. They can be either a standard SQL statement, a stored procedure, or a stored function. The custom event query must perform any necessary filtering. You specify that you want custom event processing by selecting an option in the wizard or by setting the EventQueryType activation specification property in the administrative console.

Custom event processing supports assured once delivery if you create the standard event store for storing XID values. The adapter stores the events returned by the custom event query in the event store and it updates the events with XID values. The adapter processes the events in the same way as for standard event processing. Do not create a custom query that queries the standard event store, because that table temporarily holds the events when the adapter is configured for assured once delivery. In addition, in this situation the event store must not have an automatic generation of event ID values, because the adapter populates the event ID value it retrieves from the custom query in the event store.

Section

What is new in this release

This section includes new features that enhance the business flexibility, user experience, and performance of the WebSphere Adapter for Oracle E-Business Suite V7.0

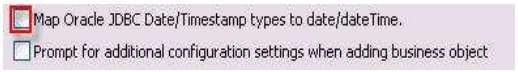
Flexible mapping for SQL date types (1 of 2)

- Previously
  - SQL date types were mapped to xsd:string
  - Required data format conversions between String and Date types
- With V7.0 and later
  - Capability to specify the mappings for SQL date types
  - Maps SQL date types to xsd:date
  - Avoid the data format in business scenarios

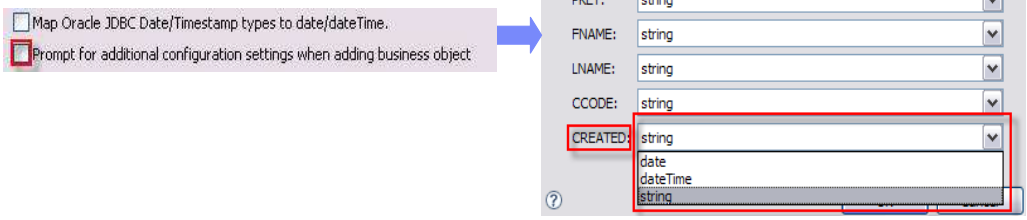
Previously, the SQL date types are mapped to the string data type for business object by default. That means it requires some data format conversions between string and date types. With V7.0 and later, the Oracle E-Business Suite adapter is capable to map SQL data types Date, Time, and Timestamp to string or date, time, dateTime XSD types as required in the business objects. Thus, you can avoid additional data format in business scenarios.

Flexible mapping for SQL date types (2 of 2)

- Option one
  - Maps to xsd:string by default
- Option two
  - Maps Date/Time/Timestamp to date/time/dateTime



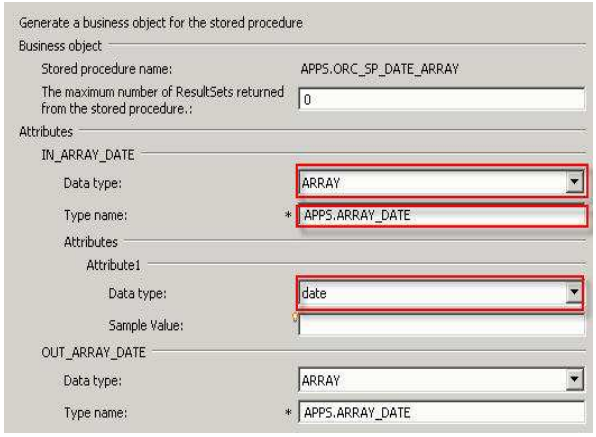
- Option three
  - Allows user to configure data type mapping
  - Advanced option for additional configuration settings



Continue from previous slide, the Oracle E-Business Suite adapter provide flexible mapping option for SQL date types. The table, stored procedure, and stored function objects with the date and timestamp data types are mapped to the string data type by default. If you want to map these objects to the actual data types that are supported by the JDBC driver, select the Map Oracle JDBC Date/Timestamp types to date/dateTime check box. However, the default data type mapping differs based on the different Oracle JDBC driver versions, for example, the JDBC driver version ojdbc6.jar maps the Date to dateTime data type instead of mapping it to Date. In such cases, the appropriate data type must be manually selected in the Specify the Configuration Properties for 'object' window. If you want to customize the format of the Date and Timestamp data types in the Application Info section of the Properties view, clear the Map Oracle JDBC Date/Timestamp types to date/dateTime check box. Also, ensure that the data types are mapped to the default string data type in the Specify the Configuration Properties for 'object' window.

Automatic discovery of complex data

- Automatically discovered and displayed complex data type in stored procedure parameter list
  - Previously
    - Input exact name and type name for stored procedure and function parameter (Array/Struct)
  - With V7.0 and later
    - Apply to simple and complex data type
    - Discover and display hierarchy of this data type automatically
    - Eliminate manual configurations which are complex and difficult



One enhancement in this version is the automatic discovery of the complex data structures (such as Object, Array, and Table) of the parameters of Oracle stored procedure and stored function. Previously, the adapter required to input exact name and type name for stored procedure and function parameter. With V7.0 or later, if the stored procedure contains any complex data type, the type name and the sub attribute details are also automatically discovered and displayed. This enhancement eliminates manual configurations required from user which can be complex and difficult.

Oracle E-Business Suite adapter

- Support PL/SQL RECORD type with wrapper SP/SF
  - Previously
    - The PL/SQL RECORD data is not supported in Oracle JDBC thin driver
  - With V7.0 and later
    - Create a wrapper SP/SF to convert the RECORD data type to JDBC driver supported type OBJECT automatically
    - Naming convention
      - Include original package name and stored procedure name
      - Include appropriate suffixes
      - Example, PKGA_PROC1_REC_TAB_**WPKG**.PKGA_PROC1_REC_TAB_**W**

The Oracle E-Business suite now supports for the stored procedures and stored functions which have parameters defined with Oracle PL/SQL Record data type. Stored procedures that are defined in PL/SQL packages are displayed in the format SPName(PackageName).

During external service, the wizard lists the attributes of the stored procedure business object. It includes the names and data types of the parameters of the stored procedure, and information about the result sets that are returned. If the stored procedure contains the Oracle PL/SQL Record data type, the adapter creates a wrapper package with a wrapper stored procedure. This wrapper stored procedure converts the Record data type to Object data type so that the Oracle E-Business Suite adapter can support the PL/SQL Record data type. These conversions are done automatically by adapter, from detect record type, convert record type and create wrapper stored procedure with object type.

The names of the wrapper packages and stored procedures created to comply with the Oracle database object naming conventions. These wrapper packages add the appropriate suffixes to differentiate them from the Oracle database object names. The names of the wrapper package and wrapper stored procedure consists of both the original package and stored procedure names along with the appropriate suffixes such as “_WPKG” and “_W”. For example, the new package name is PKGA_PROC7_REC_TAB_WPKG.PKGA_PROC7_REC_TAB_W. The “PKGA” is the original package name, the “PROC7_REC_TAB” is the original stored procedure name, the “_WPKG” is the suffix for the package, and the “_W” is the suffix for stored procedure.

Section

Summary and references

This section provides a summary of the WebSphere Adapter for Oracle E-Business Suite version 7.0.

Summary

- This presentation covered an overview of the new and enhanced IBM WebSphere Adapters for Oracle E-Business Suite V7.0
  - Learned different business object models
  - Learned what is new in this release
    - Flexible mapping for SQL date type
    - Automatic discovery of complex data
    - Supports PL/SQL

To summarize this presentation, WebSphere Adapter for Oracle E-Business Suite allows bi-directional connectivity, both inbound and outbound, with Oracle E-Business Suite applications using Oracle E-Business Suite adapter. The adapter supports both inbound and outbound interaction. In this presentation, you have reviewed how to develop and deploy Oracle E-Business Suite adapter with different business object models that it offers. You have also learned about flexible mapping for SQL date type, and automatic discovery of complex data in stored procedures and stored functions. Last but not least, you've learned that Oracle E-Business Suite now supports PL/SQL Record data type using wrapper stored procedure and stored functions.

Reference information

- WebSphere Adapter for Oracle EBS Quick Start tutorials
  - http://publib.boulder.ibm.com/bpcsamp/index.html
- Java Connector Architecture
  - http://java.sun.com/j2ee/connector/index.jsp
- WebSphere Adapter information center
  - http://www.ibm.com/software/integration/wbiadapters/library/infocenter/
- WebSphere Process Integration information center
  http://publib.boulder.ibm.com/infocenter/dmndhelp/v6r2mx/topic/com.ibm.websphere.wps.620.doc/welcome_wps.html

Additional reference information can be found at these addresses.

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