Introducing Open Data Access Framework in Data Tools Platform

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Topics

• What is Open Data Access, (ODA)? Why?
• Overview – ODA Framework
• Build a Custom ODA Data Provider
• Consume any ODA Data Providers
• Q & A

¹ Actuate® patent pending
Business Requirements – Getting at the Data

Variety of Data Sources

• Standard sources such as RDBMS, packaged applications
• Non-standard sources such as custom & legacy applications

Use of an application layer

• Application systems often use an application layer to manage business rules and security
• Application data is typically very complex and hard to reach
  ▶ Proprietary data storage mechanism
  ▶ Complex APIs
  ▶ XML-based storage
  ▶ Web Services
Solving Application Data Access Problem

• Typical Approach:
  ◆ Export data to a “Data Mart” for easy access

• But…
  ◆ Extra complexity of additional database and exports
  ◆ Indirect mapping of application terminology to database
  ◆ Exported data does not reflect current data
Solving Application Data Access Problem

• Better approach:
  - Enable users to access data directly
    ▪ Eliminates data latency
  - Use a friendly Query Builder for direct data access
    ▪ Customized UI to adopt application brand and terminology
    ▪ Query UI can mask underlying data access complexity
Solution – Open Data Access

*Enables data access to any data source*
  - Provides an abstraction for accessing heterogeneous data sources
  - Highly scalable data retrieval and easy end-user experience
  - Built using familiar Eclipse extension points

*Extends & customizes Applications Systems*
  - Applications can provide custom data driver and query builder for accessing their data

*Provides proven framework*
  - BIRT’s built-in data connectors use ODA
  - Commercial products’ data connectors use ODA
Overview – Open Data Access Architecture

**Complete control of data access and branding**
Overview – Open Data Access Framework

• Run-time
  - Public API defines a set of Java™ interfaces that allow heterogeneous data to be accessed in a generic way

• Design-time
  - Allows data source-specific user interface to be embedded in any ODA-compliant consumer application

• ODA Consumer Helper
  - Built-in support for any ODA-compliant consumer application to consume data from any ODA data provider
ODA Run-time Framework

• Stable run-time API; no change since DTP 1.5 (Europa) release
• Integrates with DTP Connection Profile and JDBC™ Databases framework
• Implementation wraps data source-specific APIs
• Run-time plug-in implements
  ✷ extension points
    ▪ org.eclipse.datatools.connectivity.oda.dataSource
    ▪ org.eclipse.datatools.connectivity.connectionProfile
  ✷ ODA run-time API interfaces
    ▪ org.eclipse.datatools.connectivity.oda package
ODA Run-time API Interfaces

• Defines the primary run-time operations needed from an ODA data provider to access and retrieve data from a data source

• Java interfaces
  - JDBC-like, extended to support additional capabilities of non-RDBMS data sources
  - Emphasis on scalable data retrieval

• Main run-time operations
  - Data Source Connection – IConnection
    - Establishes a live connection to any type of data source
    - Obtains provider capabilities for each type of data set queries
    - Creates one, or multiple, concurrent data set-specific queries
ODA Run-time API Interfaces

• Main run-time operations (cont’d)
  ❖ Data Set Query – IQuery, IAdvancedQuery
    ▪ Prepares and executes a data set-specific query text command, e.g. XPath, MDX, SQL, Stored Procedure calls
    ▪ Handles one or more sets of data rows, i.e. result sets, retrieved by a single data set query
  ❖ Query Parameters – IParameterMetaData, IParameterRowSet
    ▪ Provides run-time metadata of parameters specified in a prepared query
    ▪ Handles scalar and complex input/output parameters
  ❖ Result Sets – IResultSet, IResultSetMetaData
    ▪ Fetches tabular data rows
    ▪ Allows sequential or concurrent access to multiple result sets
ODA Design-time Framework

• Eclipse Modeling Framework (EMF) model-based design-time interfaces
  ♦ communicate connection properties, query and parameter definitions to an ODA consumer application

• Integrates with DTP Data Source Explorer view
ODA Design-time Framework

ODA Consumer Designer (e.g. BIRT Data Source Wizard)

Customized Wizard Page contributed by ODA Data Providers

ODA Design Session model
ODA Designer UI Plug-in

• Implements
  ◆ extension points
    ▪ `org.eclipse.datatools.connectivity.connectionProfile`
    ▪ `org.eclipse.ui.propertyPages`
    ▪ `org.eclipse.datatools.connectivity.oda.design.ui.dataSource`
    ▪ `org.eclipse.datatools.connectivity.oda.design.ui.connectionProfileImage`
      (optional)
  ◆ customizes ODA Designer UI pages
    ▪ `org.eclipse.datatools.connectivity.oda.design.ui.wizards` package

• Communicates its Data Source and Data Set design definitions in an *ODA Design Session* model
ODA Design Session model

- Eclipse Modeling Framework (EMF) model based
  - `org.eclipse.datatools.connectivity.oda.design` package
- Allows customized data source and query builders to design the slice of data to access at run-time
  - Communicates connection information, query and parameter definitions to an ODA consumer application
  - Transient Objects
- ODA design-time consumer application, e.g. BIRT Report Designer, initiates an ODA design session
  - Consumes a data provider’s UI page contributions
  - Adapts an edited data access design to host-specific design components
  - Provides persistent services for editing designs
Build a Custom ODA Data Provider

• From scratch
  ♦ PDE New Plug-in Project Wizard
    ▪ Demo

• Enhance an existing ODA provider
  ♦ driverBridge extension point
    ▪ `org.eclipse.datatools.connectivity.oda.consumer.driverBridge`
Enhance an Existing ODA Data Provider

• Modify/enhance behavior of an existing ODA data provider
  - org.eclipse.datatools.connectivity.oda.consumer.driverBridge extension point

• Ideal for minor enhancements
  - preserves existing ODA extension ID
  - Supports “chained” bridges
DriverBridge Extension Point

ODA Consumer Application (e.g. BIRT)

ODA Runtime Interfaces

oda.consumer.helper

ODA Run-time Driver

Driver Bridge

Driver Bridge

bridgeld → oda.dataSource extension id

driverType → driver class name or first matching interface name
Enhance an Existing ODA Data Provider

• DriverBridge extension implements
  • Extension Point
    ▪ `org.eclipse.datatools.connectivity.oda.consumer.driverBridge`
  • Sample driverBridge extension element
    `<bridge
driverType="org.eclipse.birt.report.data.oda.jdbc.OdaJdbcDriver"
bridgeId="org.eclipse.birt.report.data.testjdbc"></bridge>`

• Bridge driver is handed its underlying driver instance
  ▪ `IDriver.setAppContext( Map )`
    ✷ Key: `OdaDriver.ODA_BRIDGED_DRIVER`
    ✷ Value: underlying driver instance
  ▪ May use own API between Bridge and underlying Driver instances
• Sample code attached in Bugzilla 135246
ODA Data Providers

• DTP Incubation Project
  - Welcomes contribution – custom ODA data providers
  - Initial contribution – ECore ODA Data Provider (Bugzilla 132958)
ODA Data Consumers

• ODA Consumer Helper Run-time component
  - Manages the diverse behavior and capabilities of individual ODA data providers
  - Supports driverBridge extension point
  - Adopts the same ODA runtime interfaces

• ODA Designer Host API
  - Manages custom wizard and property page contributions of an ODA data source and data set
  - Collects a data source and data set design defined by custom ODA page contributions
    - org.eclipse.datatools.connectivity.oda.design.ui.designsession package
    - org.eclipse.datatools.connectivity.oda.design package
ODA Framework Enhancements

• Ganymede – DTP 1.6 release
  • Better Integration with the Connection Profile framework
  • Integrates with
    ▪ DTP JDBC Databases as an ODA data source
    ▪ DTP SQL Query Builder

• Future
  • Multi-dimensional data sources
Resources

- ODA Overview document
  - link on DTP Connectivity home page
    http://wiki.eclipse.org/Connectivity
- Developers' Guide for Connectivity Frameworks
- DTP Help Contents – Javadoc™ and Extension Points’ Schema
- Out-of-the-Box ODA Data Providers
  - `org.eclipse.datatools.connectivity.oda.flatfile`* plug-ins
  - `org.eclipse.datatools.enablement.oda.xml`* plug-ins
  - `org.eclipse.datatools.enablement.oda.ws`* plug-ins
  - `org.eclipse.birt.report.data.oda.jdbc`* plug-ins
- Presentation slides
  - https://eclipsecon.greenmeetingsystems.com/submissions/view/4
Open Data Access Framework

• Discussions, Feedbacks, Q&As
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