

# BIRT Data Set Output Parameter Support Functional Specification

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## Abstract

*This is the functional specification of the BIRT 2.0 project to provide support for data set output parameters.*

## Document Revisions

Version	Date	Author	Description of Changes
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## 1. Introduction

Many data sources used for enterprise reporting support the concept of output parameters. An output parameter is a scalar or structural value that is returned by the data source as the result of a query execution or a procedure call. One common type of data source that can provide output parameters is Database Stored Procedures. JDBC, which defines a common framework to support stored procedures, has extensive support for output parameters.

The ability for a report data source to provide output parameters is already built into the Open Data Access (ODA) framework, which is the standard way to provide data access extensions to BIRT. In BIRT 2.0, we seek to provide complete support for output parameters by allowing report designers to examine and define output parameters for a data set, and to bind values for output parameters to report controls.

## 2. Features and Requirements

### 2.1 Examine and Define Output Parameters

The report designer can use the data set editor to view the definition of output parameters provided by a data set that supports such parameters. He or she may also define output parameters for a data set for which no output parameter metadata is provided by the ODA driver.

### 2.2 Binding Output Parameters to Report Controls

Data set output parameters can be bound to report controls the same way that data set output columns are bound. The BIRT report designer provides visual help (such as drag-and-drop) to facilitate the creation of such bindings.

### 2.3 Support for Input/Output Parameters

A data set may declare a parameter to be an Input/Output parameter. Such a parameter is used to pass in value to the external data source during query execution time, and to receive an output value when the execution completes.

### 2.4 Script Access to Output Parameters

BIRT Scripts will access to values of output parameters at runtime.

### 2.5 Out-of-the-Box Support for JDBC Stored Procedures

The ODA-JDBC bridge driver will provide support for JDBC stored procedures. Output parameters produced by JDBC stored procedure calls are mapped to BIRT data set output parameters.

### 3. Using Data Set Output Parameters

#### 3.1 Viewing and Defining Data Set Output Parameters

The *Parameters* tab view of the BIRT Designer's data set editor is where a data set's output parameter definition is viewed and edited.

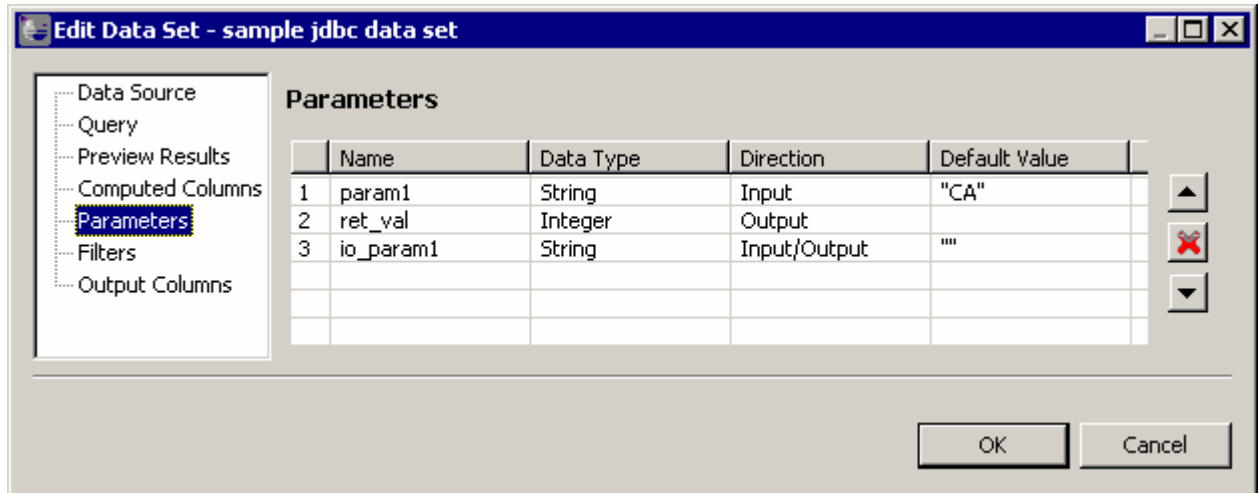


Figure 1 Data Set Parameter Definition

If the underlying ODA data set driver provides metadata about output parameters defined in the data set's query, such parameter is displayed with *Direction* column listed as *Output*. Input/Output parameters are also identified as such in the *Direction* column.

Since all BIRT data set parameters require a name, a name is automatically generated for a parameter for which the underlying driver has only provided a position. For input parameters, the automatically generated name is "param" suffixed with the parameter position. The prefix for auto-generated output parameter name is "out\_param". It is "io\_param" for in/output parameters.

Like input parameters, input/output parameters require a default value, which must be defined by the report designer in this dialog.

If the underlying ODA data set driver provides no metadata about output parameters, or if the metadata is incomplete, the report designer can manually create output or in/out parameters in this dialog.

#### 3.2 Binding Output Parameter to Report Controls

##### 3.2.1 BIRT Script Reference to Data Set Output Parameters

The BIRT Report Object Model for Scripting is enhanced to provide access to a runtime data set's output parameter values. The *DataSet* script class is enhanced with an additional property, *outputParams*, which returns a collection of output parameter values associated with the open data set runtime. Output parameter values can be accessed

by name of position of the output parameter. Values for both output and input/output parameters are accessible in the *outputParams* collection.

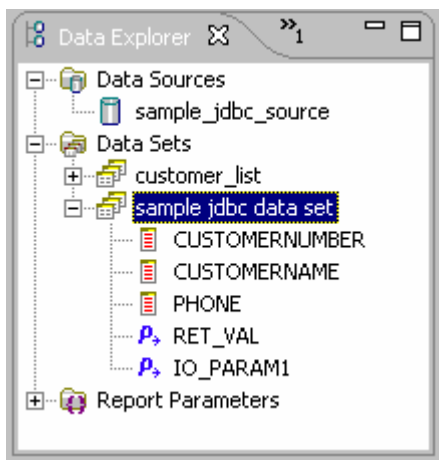
For example, JavaScript expressions *outputParams["RET\_VAL"]* and *outputParams.RET\_VAL* both return the value of the referenced data set's output parameter named *RET\_VAL*. Expression *outputParam[2]* returns value of the output parameter with position index 2 (index starts at 1).

For more information refer to updated document *BIRT Report Object Model – Expressions and Scripting*.

To bind a Data element to its associated data set's output parameter, the report designer sets the Data element's expression to *outputParams["param\_name"]* or *outputParams[param\_index]*. Such binding can also be created with visual aid from the report designer, as described in the following sections.

### 3.2.2 Selecting Data Set Output Parameters from Data Explorer

From BIRT Report Designer's Data Explorer view, the report designer can view a list of output parameters defined for a data set by expanding the tree view rooted in the data set. The output parameters appear immediately after the list of output columns. They are identified by a different icon. The follow UI mockup illustrates what's seen in the data explorer for a data set that has 3 output columns (CUSTOMERNUMBER, CUSTOMERNAME and PHONE) and 2 output parameters (RET\_VAL and IO\_PARAM1).



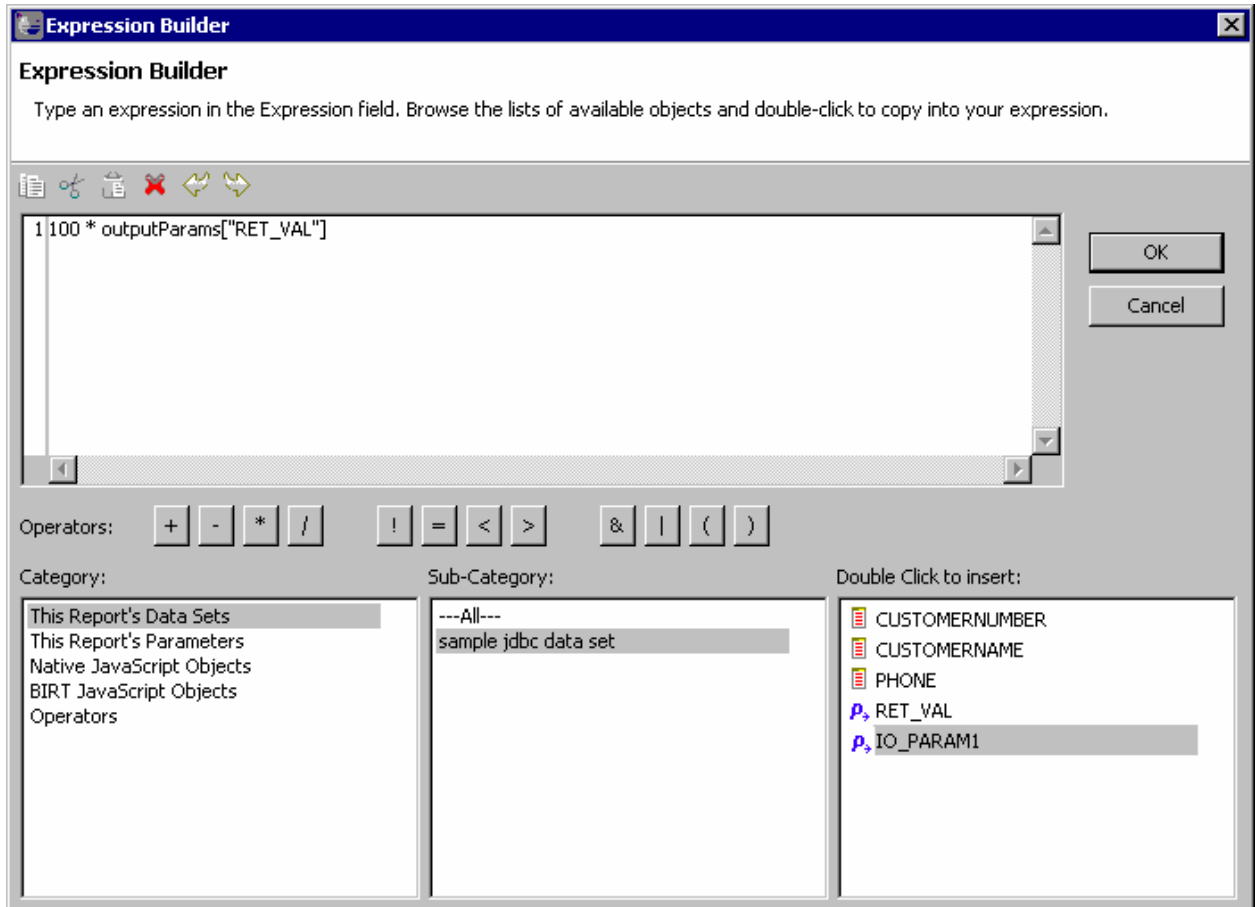
**Figure 2 Data Explorer View with Output Parameters**

If the report designer drags an output parameter from the Data Explorer view to the report layout view, a Data element with binding expression *outputParams["param\_name"]* is automatically inserted to the report design. This is similar to how the user could drag an output column to the report layout.

### 3.2.3 Selecting Data Set Output Parameters from Expression Builder

The report designer can also view and select data set output parameters from the Expression Builder dialog. Output parameters for a data set (if one is available) are

listed together with its output columns. The user can double click on an output parameter to create an expression that refers to the selected parameter. The following mockup illustrates how the user creates an expression that evaluates to 100 times the value of output parameter *RET\_VAL*. The subexpression *outputParams["RET\_VAL"]* is automatically inserted to the expression text when the user double clicks on the parameter named *RET\_VAL*.



## 4. Supporting JDBC Stored Procedures

In JDBC data sources, output parameters are typically associated with Stored Procedures. In BIRT 2.0, the ODA-JDBC bridge driver will be enhanced to provide support for stored procedures and their output parameters.

### 4.1 New Data Set Type for JDBC Data Sources

In BIRT 1.x, “JDBC Select Query” is the only available data set type for JDBC Data Sources. In order to provide proper mapping of ODA API calls to JDBC API calls, and support data set output parameters, a new data set type, “Stored Procedure Call”, will be added as an available data set type when creating a data set under a JDBC data source.

The report designer should create a *Stored Procedure Call* data set when the data set makes any stored procedure calls, or otherwise uses JDBC output parameters.

The Data Set Editor layout and functions for Stored Procedure Call data set is identical to that of a JDBC Select Query Data Set in BIRT 2.0.

## 4.2 JDBC Output Parameter Support

The ODA-JDBC bridge driver maps a stored procedure call's output parameters to ODA output parameters. It provides metadata about such parameters via ODA API interface *IParameterMetaData*.

In order to support data set output parameters, the ODA-JDBC bridge driver must implement ODA's *IAdvancedQuery* interface for stored procedure calls.

## 4.3 Stored Procedure Limitations

In BIRT 2.0, only stored procedure calls which return 0 or 1 result sets are supported. Stored procedure can, however, return both a result set and any number of output and in/out parameters.

If a stored procedure call returns multiple result sets, only the first result set is processed by the BIRT engine and bound to report controls.