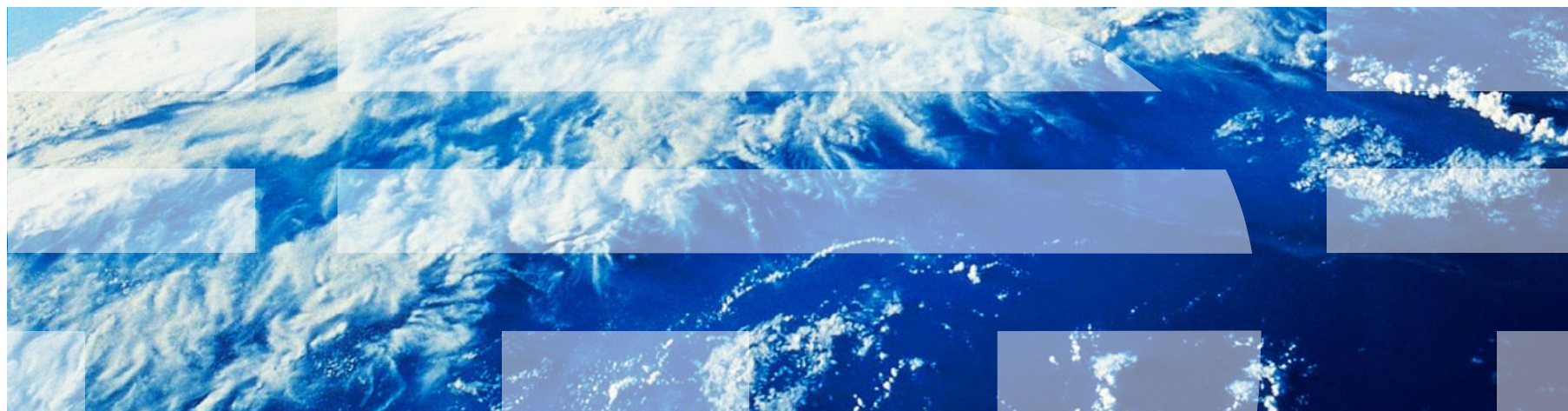


# ***IBM Worklight Foundation V6.2.0 Getting Started***

## **SQL adapter – Communicating with SQL database**



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# *Agenda*

- What is it?
- Creating an adapter
- Exercise

## ***What is it?***

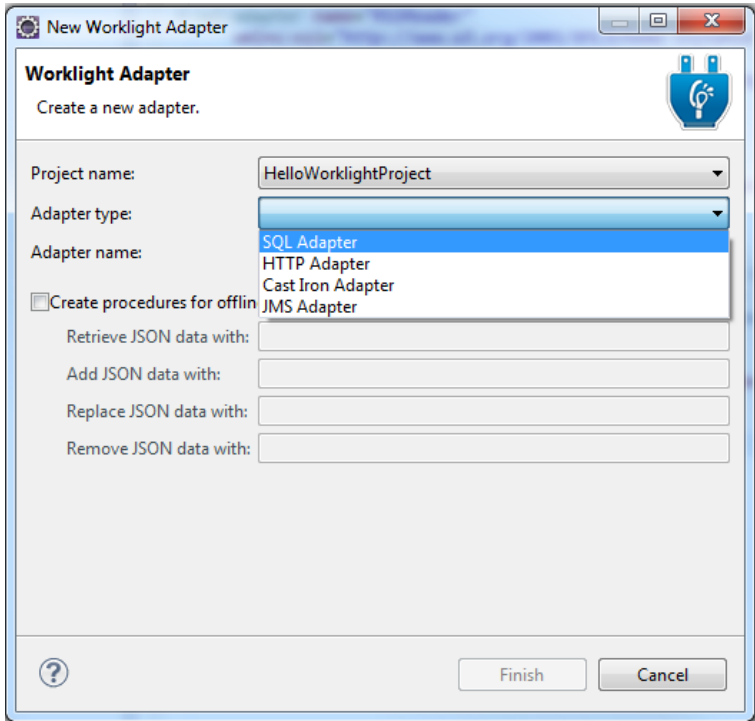
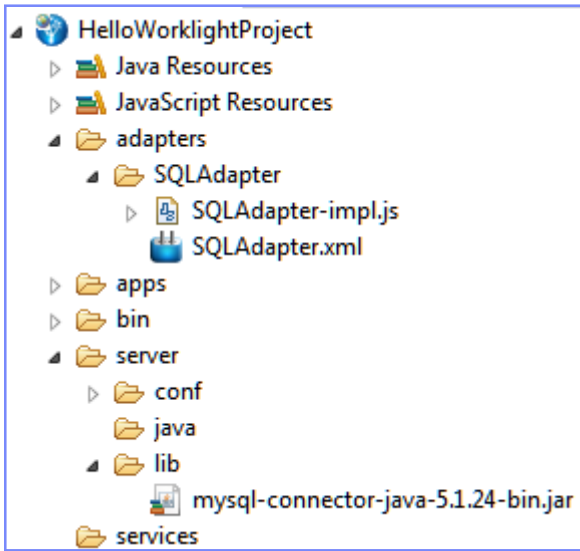
- A Worklight® SQL adapter is designed to communicate with any SQL data source.
- Plain SQL queries or stored procedures can be used.
- Worklight supports MySQL, Oracle 11g and IBM DB2® databases.
- The JDBC connector driver for the specific database type must be downloaded separately by the developer and added to the `server\lib\` folder of a Worklight project.
- The JDBC connector driver can be downloaded at the appropriate MySQL, Oracle, or IBM DB2 website.
- In this module and in the accompanying sample, you learn how to use a Worklight Adapter to connect to a MySQL database.

# *Agenda*

- What is it?
- **Creating the adapter**
- Exercise

# Creating the adapter

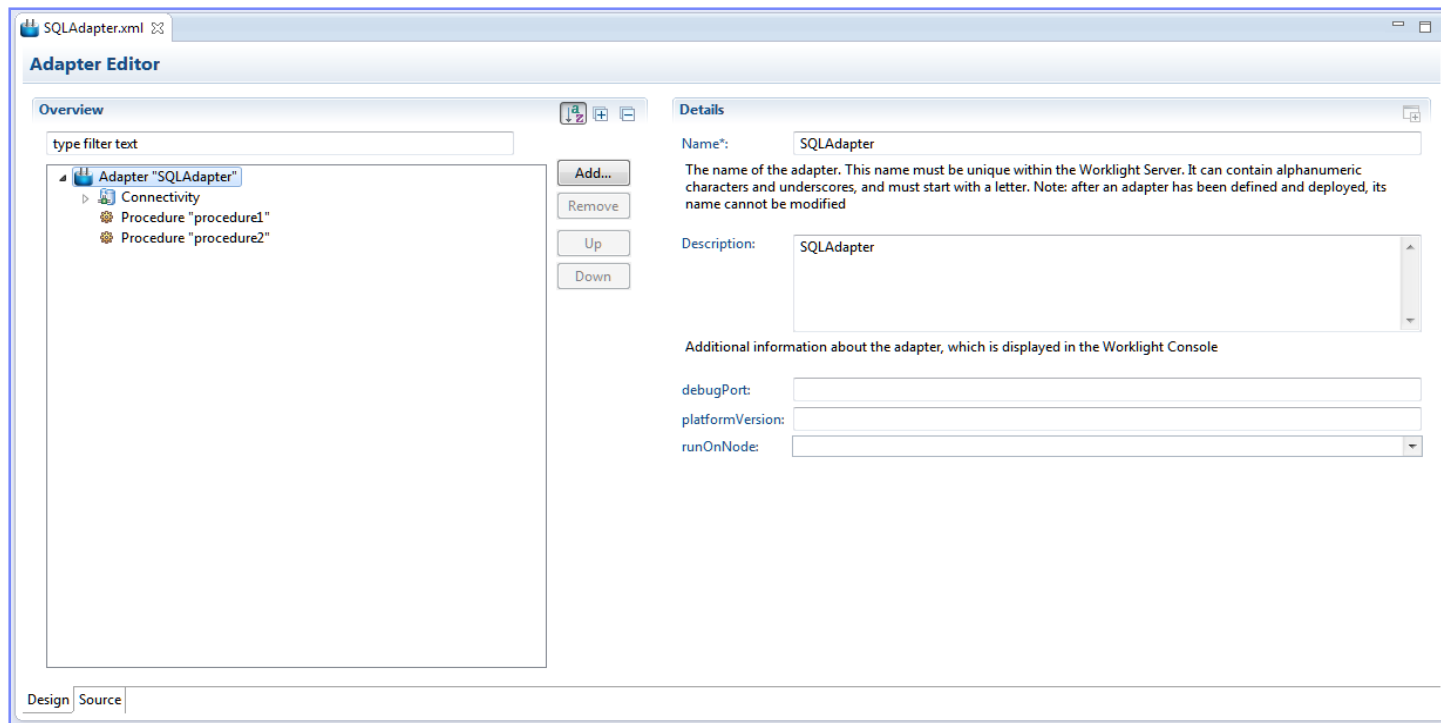
- In Worklight Studio, create a Worklight Adapter.
  - Choose the SQL Adapter type.
  - A standard SQL adapter structure is created.
- Save the downloaded JDBC connector file in the project's `server\lib` folder.



# Creating the adapter – continued

## Adapter XML editor

- Settings and metadata are stored in the adapter XML file.
- You can use either the Design or the Source editor to modify the adapter XML file.



## Creating the adapter – continued

### XML file: connectivity settings

- Four parameters must be declared in the adapter XML file:
  - Driver Class
  - Database URL
  - Username
  - Password

```
<connectivity>
  <connectionPolicy xsi:type="sql:SQLConnectionPolicy">
    <dataSourceDefinition>
      <driverClass>com.mysql.jdbc.Driver</driverClass>
      <url>jdbc:mysql://localhost:3306/mydb</url>
      <user>myUsername</user>
      <password>myPassword</password>
    </dataSourceDefinition>
  </connectionPolicy>
  <loadConstraints maxConcurrentConnectionsPerNode="5" />
</connectivity>
```



## ***Creating the adapter – continued***

### ***JS file: procedures implementation***

- A procedure must be declared in the adapter XML file.

```
<procedure name="getAccountTransactions1"/>
```

- The adapter JavaScript™ file is used to implement the procedure logic.
- **Important:** The name declared in the XML file must be used for the procedure JavaScript function.
- There are two ways of running SQL statements:
  - SQL statement query.
  - SQL Stored Procedure.

## ***Creating the adapter – continued***

### ***JS file: SQL query***

- To run a SQL query:
  - 1) Use the `WL.Server.createStatement` API method to prepare a SQL query.
  - 2) `WL.Server.createStatement` must **always** be called outside the function.
  - 3) Add more parameters, if required.
  - 4) Use the `WL.Server.invokeSQLStatement` API method to invoke prepared queries.
  - 5) Return the invocation result to the application or to another procedure.
  - 6) The following slide provides an example for the above 5 steps.

## Creating the adapter – continued

### JS file: SQL query

```
//Create SQL query
```

```
var getAccountsTransactionsStatement = WL.Server.createStatement(  
    "SELECT transactionId, fromAccount, toAccount, transactionDate,  
    transactionAmount, transactionType " + "FROM accounttransactions " +  
    "WHERE accounttransactions.fromAccount = ? OR accounttransactions.toAccount =  
    ? " + "ORDER BY transactionDate DESC " + "LIMIT 20;" );
```

```
//Invoke prepared SQL query and return invocation result
```

```
function getAccountTransactions1(accountId) {  
    return WL.Server.invokeSQLStatement({  
        preparedStatement : getAccountsTransactionsStatement,  
        parameters : [accountId, accountId]  
    });  
}
```

## Creating the adapter – continued

### JS file: SQL stored procedure

- To run a SQL Stored Procedure:
  - 1) Use the `WL.Server.invokeSQLStoredProcedure` API method to run a Stored Procedure.
  - 2) Specify a SQL Stored Procedure name as an invocation parameter.
  - 3) Add more parameters, if required.
  - 4) Return the invocation result to the application or to another procedure.

```
//Invoke stored SQL procedure and return invocation result
function getAccountTransactions2 (accountId) {
    return WL.Server.invokeSQLStoredProcedure ({
        procedure : "getAccountTransactions",
        Parameters : [accountId]
    });
}
```

The diagram illustrates the code annotations for the `getAccountTransactions2` function. Three blue circular callouts are placed to the right of the code: callout 1 is next to the `return` statement, callout 2 is next to the `procedure` parameter, and callout 3 is next to the `Parameters` parameter. Orange rectangular boxes highlight the `WL.Server.invokeSQLStoredProcedure` method call, the `procedure` parameter value, and the `Parameters` parameter value.

## Creating the adapter – continued

### Invocation result

- Result that is retrieved as a JSON object.
- The `isSuccessful` property defines whether the invocation was successful.
- `resultSet` is an array of returned records.
- Accessing a `resultSet` in the *client-side* is done by, that is: `result.invocationResult.resultSet`.
- Accessing the `resultSet` in the *server-side* is done by, that is: `result.ResultSet`.

Invocation Result of procedure: 'getAccountTransactions1' from the Worklight Server:

```
{
  "isSuccessful": true,
  "resultSet": [
    {
      "fromAccount": "12345",
      "toAccount": "54321",
      "transactionAmount": 180.00,
      "transactionDate": "2009-03-11T11:08:39.000Z",
      "transactionId": "W06091500863",
      "transactionType": "Funds Transfer"
    },
    {
      "fromAccount": "12345",
      "toAccount": null,
      "transactionAmount": 130.00,
      "transactionDate": "2009-03-07T11:09:39.000Z",
      "transactionId": "W214122\5337",
      "transactionType": "ATM Withdrawal"
    }
  ]
}
```

# *Agenda*

- What is it?
- Creating an adapter
- Exercise

# Exercise preparation

## Account Transactions

An adapter that retrieves account transactions details

- Create a fictitious bank schema.
- Run `worklightTraining.sql` (found under the Sever folder of the sample) on your local MySQL server to create a training database.
- Make sure that the `Worklight@%` user has all access permissions that are assigned to it.

```

/*!40101 SET NAMES utf8 */;

/*!40101 SET SQL_MODE=''*/;

CREATE DATABASE IF NOT EXISTS `WorkLight Training`;

USE `WorkLight Training`;

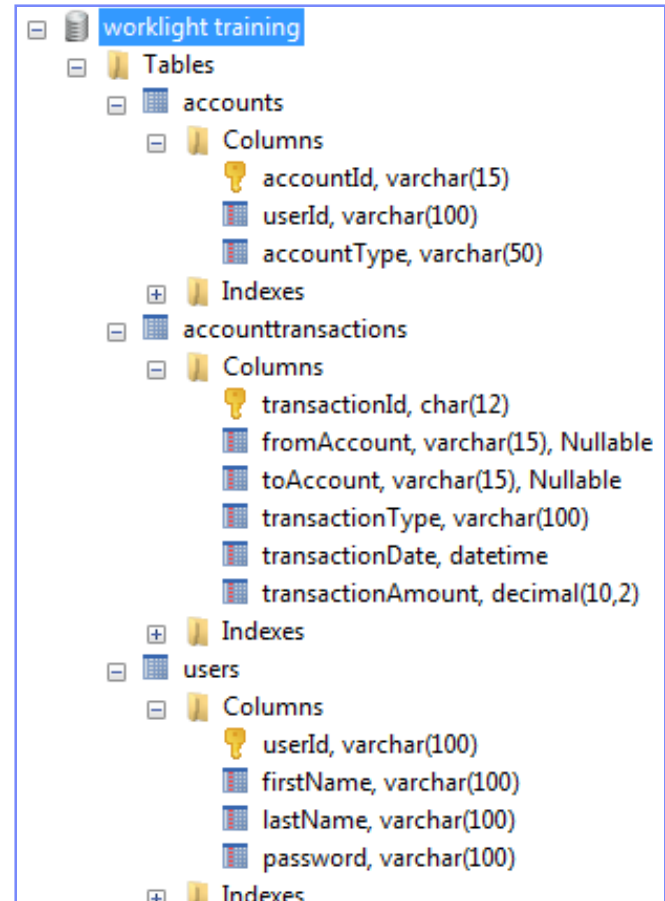
/*!40014 SET @OLD_FOREIGN_KEY_CHECKS=@@FOREIGN_KEY_CHECKS,
/*!40101 SET @OLD_SQL_MODE=@@SQL_MODE, SQL_MODE='NO_AUTO_VA

/*Table structure for table `accounts` */

DROP TABLE IF EXISTS `accounts`;

CREATE TABLE `accounts` (
  `accountId` VARCHAR(15) NOT NULL,
  `userId` VARCHAR(100) NOT NULL DEFAULT '',
  `accountType` VARCHAR(50) NOT NULL

```



## Exercise

### Account Transactions

An adapter that retrieves account transactions details

- Create an SQL adapter:
  - In the connectivity section, supply the JNDI name as follows:

```
<dataSourceDefinition>
```

```
  <driverClass>com.mysql.jdbc.Driver</driverClass>
```

```
  <url>jdbc:mysql://localhost:3306/worklight_training</url>
```

```
  <user>Worklight</user>
```

```
  <password>Worklight</password>
```

```
</dataSourceDefinition>
```

- Create an adapter procedure `getAccountTransactions`:
  - Accepts a single parameter: `accountId`.
  - Get `resultSet` with the following fields:
    - `transactionId`, `transactionType`, `transactionDate`,  
`transactionAmount`, `fromAccount`, `toAccount`



## Exercise

### Account Transactions

An adapter that retrieves account transactions details

- Repeat the exercise with both options:
  - Write the SQL query inline, as a prepared statement.

```
var getAccountsTransactionsStatement = WL.Server.createStatement (
  "SELECT transactionId, fromAccount, toAccount, transactionDate,
  transactionAmount, transactionType " + "FROM accounttransactions " +
  "WHERE accounttransactions.fromAccount = ? OR accounttransactions.toAccount =
  ? " + "ORDER BY transactionDate DESC " + "LIMIT 20;" );
```

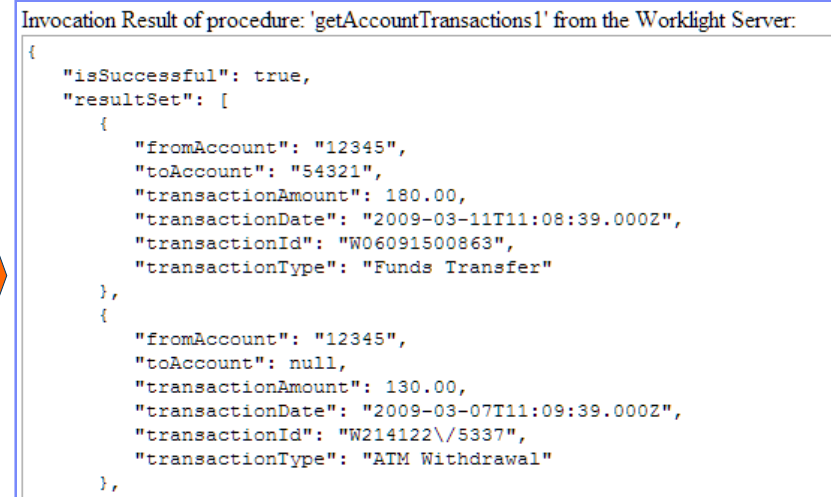
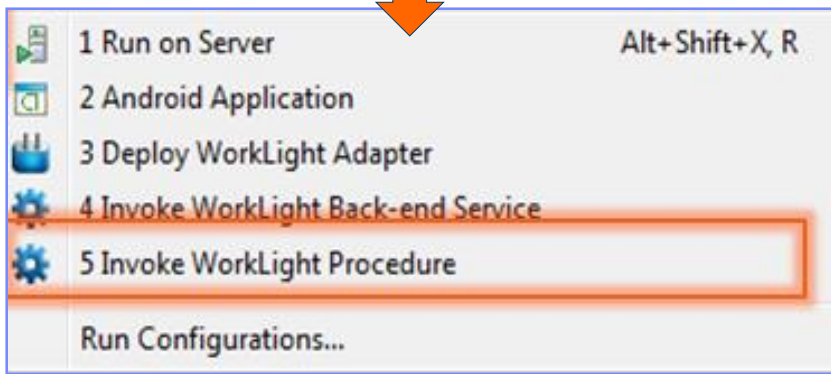
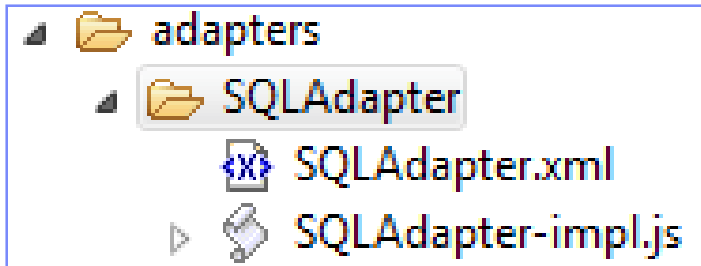
- Start the `getAccountTransactions` Stored Procedure that is created as part of the Worklight Training schema.

```
function getAccountTransactions2 (accountId) {
  return WL.Server.invokeSQLStoredProcedure ({
    procedure : "getAccountTransactions",
    Parameters : [accountId]
  });}
```

- In both cases, use **12345** as an `accountId` parameter.

## Exercise

- The sample for this training module can be found on the Getting Started page of the Worklight documentation website at <http://www.ibm.com/mobile-docs>.



# Quiz

*Test your knowledge. Answers are in the following slide.*

- The following SQL servers are supported by Worklight SQL adapter:
  - MySQL
  - Oracle 11g
  - DB2
  - All of the above.
- When you are working with an SQL adapter, the following file is manually added to the project:
  - JDBC connector driver.
  - Database schema.
  - Properties file containing SQL server credentials and configuration.
  - Startup script that connects Worklight server to a specified SQL database.
- SQL statements can be invoked in the following ways:
  - Only with SQL statement query.
  - Only with SQL Stored Procedure.
  - Only with a separate file with SQL queries.
  - With both SQL statement query and SQL Stored Procedures.

## Quiz - answers

- The following SQL servers are supported by Worklight SQL adapter:
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