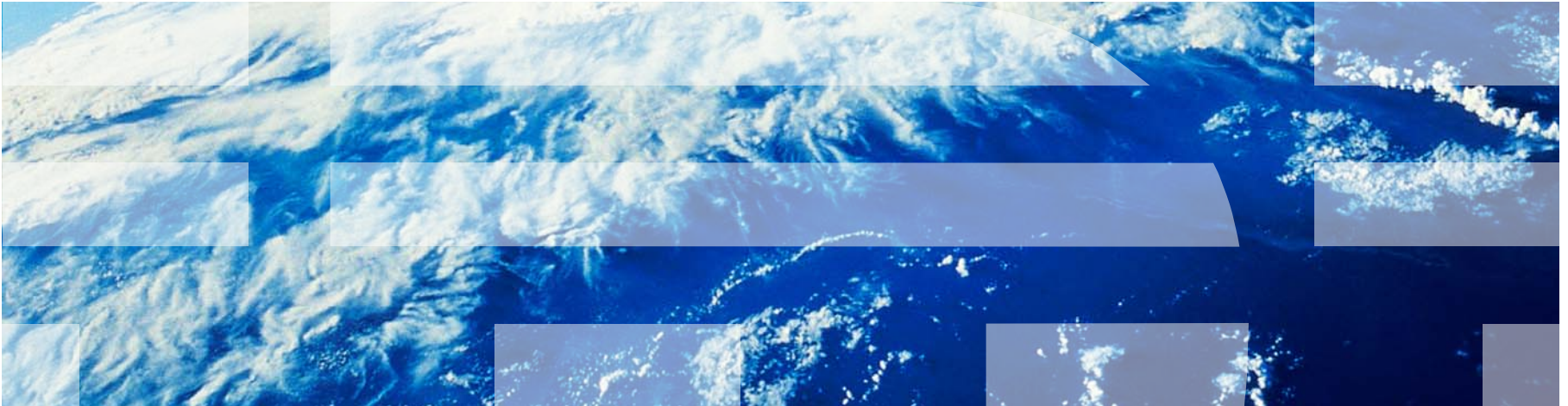# IBM Worklight V6.1.0
Getting Started

SQL adapter – Communicating with SQL database

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Agenda

- What is it?
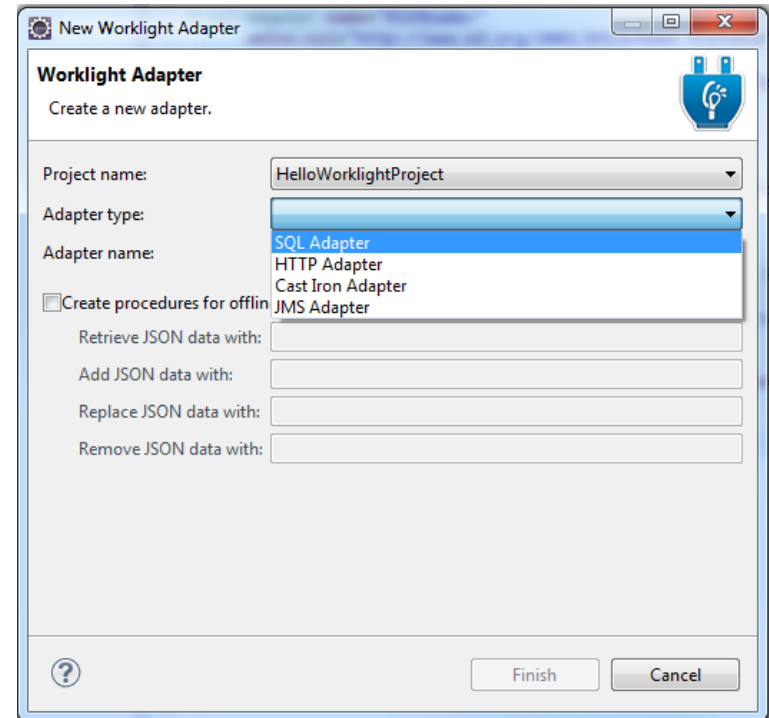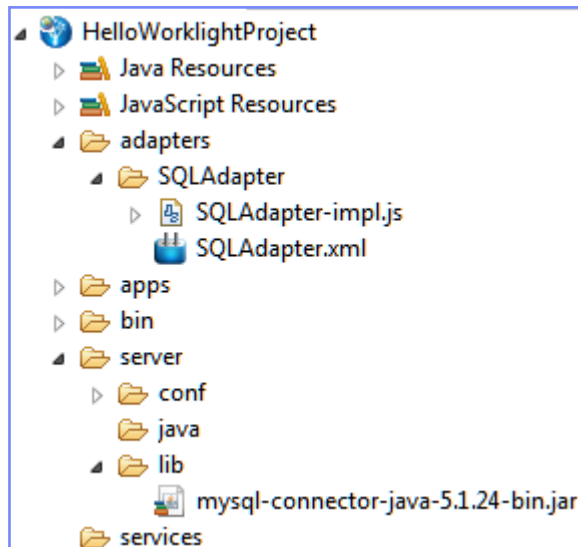
- Creating an adapter

- Exercise

What is it?

- An IBM 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 appropriat 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

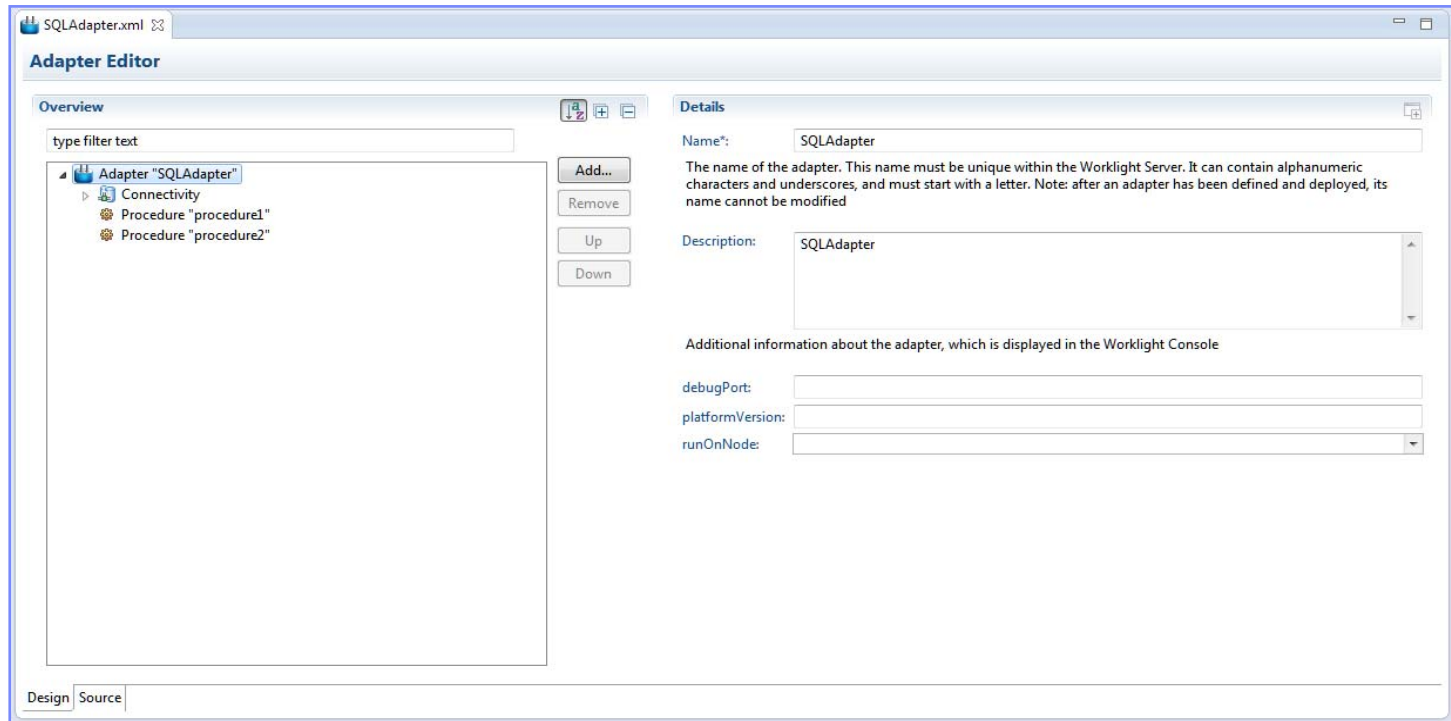- In Worklight Studio, create a Worklight Adapter.

  – 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

```xml
<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="GetAccounts"/>
```

- 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.createSQLStatement` API method to prepare a SQL query.

    2) `WL.Server.createSQLStatement` 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.

```
var procedure1Statement =
    WL.Server.createSQLStatement("select FirstName, LastName from Customers where CustomerID = ?");
function GetAccounts(param) {
    return WL.Server.invokeSQLStatement({
        preparedStatement : procedure1Statement,
        parameters : [param]
    });
}
```

1

4

3

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.

```
function GetAccounts(param) {
    return WL.Server.invokeSQLStoredProcedure({     1
        procedure : "GetAccountsByUsedID",          2
        parameters : [param]                        3
    });
}
```

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.

```
Invocation Result from the WorkLight Server:
{
  "isSuccessful": true,
  "resultSet": [
    {
      "accountId": "12345",
      "accountType": "Checking",
      "userId": "bjones"
    },
    {
      "accountId": "54321",
      "accountType": "Savings",
      "userId": "bjones"
    }
  ]
}
```

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
```
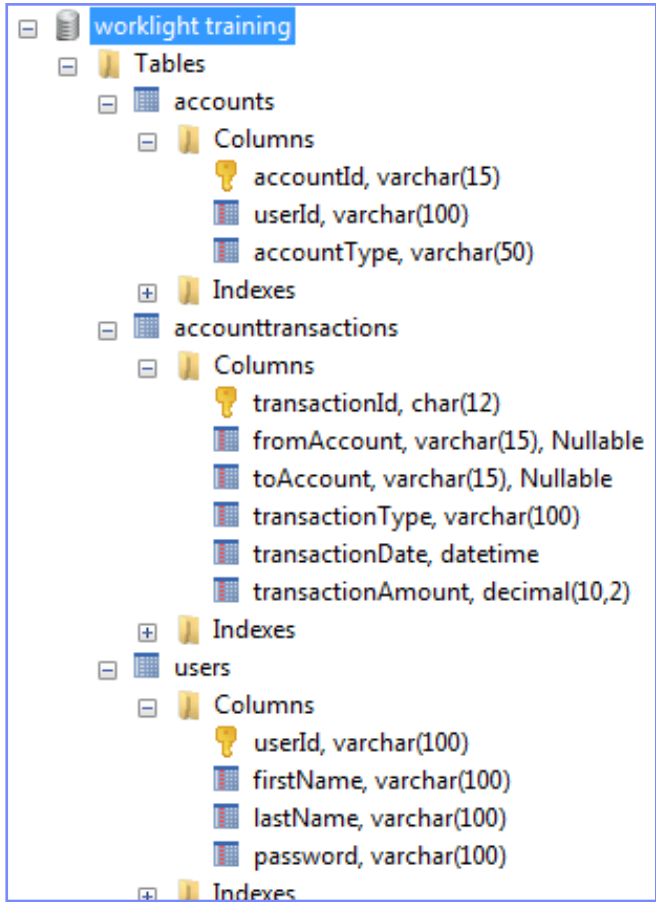
- worklight training
  - Tables
    - accounts
      - Columns
        - accountId, varchar(15)
        - userId, varchar(100)
        - accountType, varchar(50)
      - Indexes
    - accounttransactions
      - Columns
        - transactionId, char(12)
        - fromAccount, varchar(15), Nullable
        - toAccount, varchar(15), Nullable
        - transactionType, varchar(100)
        - transactionDate, datetime
        - transactionAmount, decimal(10,2)
      - Indexes
    - users
      - Columns
        - userId, varchar(100)
        - firstName, varchar(100)
        - lastName, varchar(100)
        - password, varchar(100)
      - Indexes

Exercise

<div style="border: 2px solid orange; padding: 10px;">

Account Transactions

An adapter that retrieves account transactions details

</div>

- Create an SQL adapter:

  - In the connectivity section, supply the JNDI name as follows:

```xml
<connectivity>
    <connectionPolicy xsi:type="sql:SQLConnectionPolicy">
        <dataSourceDefinition>
            <driverClass>com.mysql.jdbc.Driver</driverClass>
            <url>jdbc:mysql://127.0.0.1:3306/worklight_training</url>
            <user>Worklight</user>
            <password>Worklight</password>
        </dataSourceDefinition>
    </connectionPolicy>
    <loadConstraints maxConcurrentConnectionsPerNode="5" />
</connectivity>
```

- Create an adapter procedure `getAccountTransactions`:

  - Accepts a single parameter: `accountId`

  - Get `resultSet` with the following fields:

    - `transactionId, transactionType, transactionDate, transactionAmount, fromAccount, toAccount`

Exercise

<div style="border: 2px solid orange;">

Account Transactions
An adapter that retrieves account transactions details

</div>

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

```
var getAccountsTransactionsStatement = WL.Server.createSQLStatement(
    "SELECT transactionId, fromAccount, toAccount, transactionDate, transactionAmount, transactionType " +
    "FROM accounttransactions " +
    "WHERE accounttransactions.fromAccount = ? OR accounttransactions.toAccount = ? " +
    "ORDER BY transactionDate DESC " +
    "LIMIT 20;"
);
```
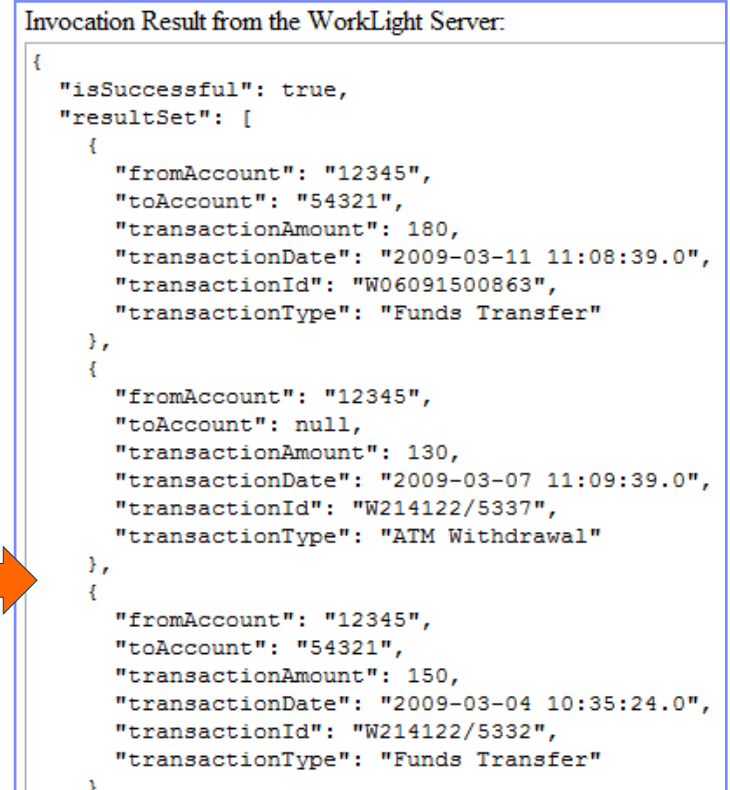
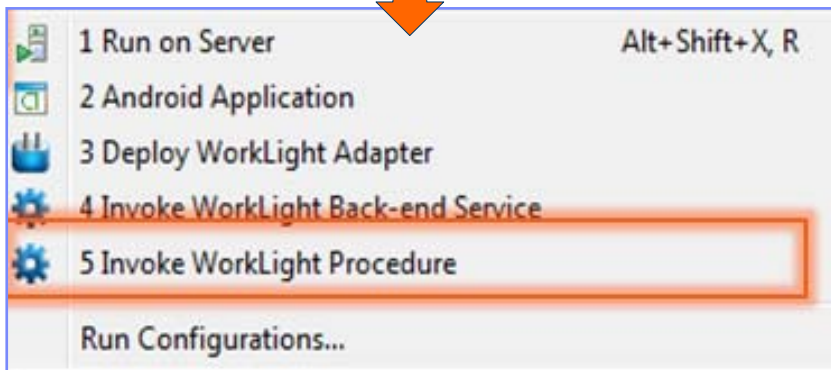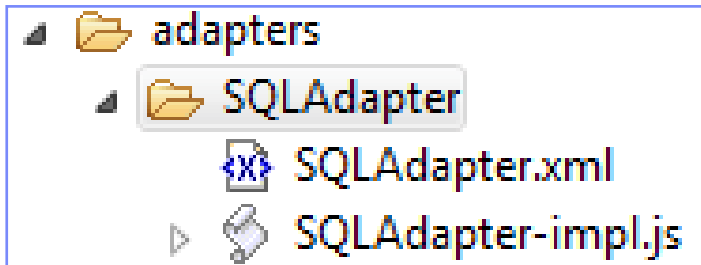 - Start the `getAccountTransactions` Stored Procedure that is created as part of the Worklight Training schema.

```
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 IBM Worklight documentation website at http://www.ibm.com/mobile-docs


```
▲ 📁 adapters
  ▲ 📁 SQLAdapter
      <x> SQLAdapter.xml
    ▷ 📜 SQLAdapter-impl.js
```

```
📄  1 Run on Server          Alt+Shift+X, R
📱  2 Android Application
🔨  3 Deploy WorkLight Adapter
⚙  4 Invoke WorkLight Back-end Service
⚙  5 Invoke WorkLight Procedure

    Run Configurations...
```

Invocation Result from the WorkLight Server:

```
{
  "isSuccessful": true,
  "resultSet": [
    {
      "fromAccount": "12345",
      "toAccount": "54321",
      "transactionAmount": 180,
      "transactionDate": "2009-03-11 11:08:39.0",
      "transactionId": "W06091500863",
      "transactionType": "Funds Transfer"
    },
    {
      "fromAccount": "12345",
      "toAccount": null,
      "transactionAmount": 130,
      "transactionDate": "2009-03-07 11:09:39.0",
      "transactionId": "W214122/5337",
      "transactionType": "ATM Withdrawal"
    },
    {
      "fromAccount": "12345",
      "toAccount": "54321",
      "transactionAmount": 150,
      "transactionDate": "2009-03-04 10:35:24.0",
      "transactionId": "W214122/5332",
      "transactionType": "Funds Transfer"
    },
```

Check yourself questions

- 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.

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