

Java Servlets 3.0

Lesson 06: Configuring Database in
WildFly

Lesson Objectives

- In this lesson, we will learn:
 - Configuring a Database for Web Applications



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Lesson Objectives:

This lesson introduces database configuration in WildFly.

The lesson contents are as follows:


Lesson 06: Configurinag Database in WildFly

6.1: Database configuration in WildFly

6.1: Database Configuration in WildFly

Persistence Options in WildFly

- Persistence tier is also sometimes referred to as database tier.
- Data can be stored in either of the following:
 - Flat files
 - XML files
 - Databases
- Databases are the most trustworthy option for persisting data.

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Persistence Options in WildFly:

Till now we have focused on designing simple web application, the focus was on the web tier. However, for any web application, the data storage is an integral part. Now, let us move to the persistence tier, which is also sometimes referred to as database tier. This is where application data is stored for a long term / persistently. While working with JEE applications, data can be stored in Flat files, XML files, or Database. Databases are the most trustworthy options for persisting data. Here, we all need to accept one simple fact. While dealing with relational databases in a JEE application, all paths some way or the other eventually lead to JDBC. We are already familiar with JDBC.


6.1: Database Configuration in WildFly

Working with Typical JDBC

■ Code Snippet

```
Connection dbCon;
String url = "jdbc:oracle:thin:@192.168.67.177:1521:trgdb";
public void init() throws ServletException {
    try {
        DriverManager.registerDriver (new oracle.jdbc.OracleDriver());
        dbCon = DriverManager.getConnection(url,"user1","user1");
    } catch (Exception e) {
        throw e;
    }

    Statement s = dbCon.createStatement();
    .....
}
```

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Working with Typical JDBC:

In the previous chapter (Request-Response-DBServlet), already typical JDBC code in a Servlet is shown to interact with the database. The above slide shows a snippet of the code.

While this code definitely works, it does have some drawbacks:

Every time that we connect and disconnect from the database, the physical database connection is created and destroyed. This leads to an overhead.

If there are any transactions related to the applications, then they need to be managed by developer.

If the application deals with only local transactions within the database, it is fine.


However, in case it interacts with other resources, then managing the transactions and other aspects is difficult within the application.

6.1: Database Configuration in WildFly

Working with Data Source

■ Code Snippet

```
try {
    InitialContext ic = new InitialContext();
    DataSource ds = (DataSource) ic.lookup("java:/jdbc/TestDS");
    Connection con = ds.getConnection();
    Statement st = con.createStatement();
    ResultSet rs = st.executeQuery("SELECT * FROM emp824177");
    while (rs.next()) {
        pw.println(rs.getInt("ID") + "<br>");
        pw.println(rs.getString("NAME") + "<br>");
        pw.println(rs.getFloat("SALARY") + "<br>");
    }
} catch (NamingException | SQLException e) {
    log("Error is:....." + e.getMessage());
}
```

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Working with DataSource:

While working with an application server, gives a lot of benefits. In the previous slide, we mentioned a few drawbacks with the typical JDBC approach of programming in a web application. However, these issues can be taken care of very easily in an Application Server like WildFly.

The above slide makes use of datasource, which is the change that is required to obtain Database connections. Instead of importing `java.sql.DriverManager`, import `javax.sql.DataSource`. Furthermore, since we would be using JNDI naming for looking up the DataSource, need to import `javax.naming.InitialContext` and `javax.naming.NamingException`.

Using the DataSource has its own advantages:

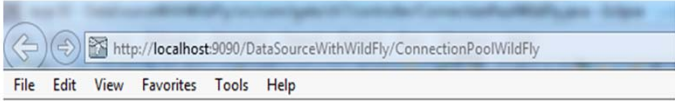
When obtaining a Database connection using DataSource, no need to create a new connection. During startup WildFly creates a DB connection pool managed by DataSource. So essentially when accessing an existing connection from the pool and when the connection is closed, it is just returned back to the pool so someone else can use it.

When we use Container Managed DataSource (In this case JBoss Server Managed), all database access for a particular Transaction commits or rollback automatically. No need to manage the transaction anymore.


Let us now take some time and understand the code.

Demo

- Configuring Database in WildFly.
- Execute the ConnectionPoolWildFly.java class



1
Rahul
50000.0
2
Anju
90000.0

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Note:

Steps to configure the database for your application in WildFly
Database Configuration:

Refer to Lab Book: Steps to configure Database connection pool in WildFly in Lab 4:

Demo

■ Partial listing of standalone.xml

```
<datasource jta="false" jndi-name="java:/jdbc/TestDS" pool-
name="TestDS" enabled="true" use-ccm="false">
  <connection-
url>jdbc:oracle:thin:@localhost:1522:XE</connection-url>
  <driver-class>oracle.jdbc.OracleDriver</driver-class>
  <driver>ojdbc6_g.jar</driver>
  <security>
    <user-name>system</user-name>
    <password>igate</password>
  </security>
  <validation>
    <validate-on-match>false</validate-on-match>
    <background-validation>false</background-validation>
  </validation>
  <statement>
    <share-prepared-statements>false</share-prepared-
statements>
  </statement>
</datasource>
```



6.1: Database Configuration in WildFly

Working with Data Source - @Resource Annotation

- The @Resource annotation is used to declare a reference to a resource, such as a data source
- The @Resource annotation is specified on a class, a method, or a field
- The container is responsible for injecting references to resources declared by the @Resource annotation and mapping it to the proper JNDI resources
- Resources can be injected only into container-managed objects



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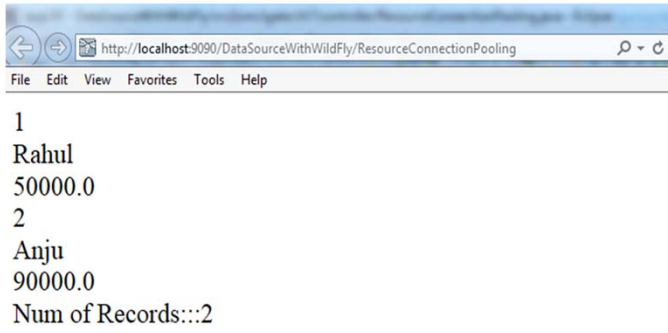

@Resource annotation is used to inject a data source into a component that needs to make a connection to the data source, as is done when using JDBC technology to access a relational database:

The container injects this data source prior to the component's being made available to the application. The data source JNDI mapping is inferred from the field name (example: TestDS) and the type, `javax.sql.DataSource`.


Container managed objects are the web components (Servlets / JSPs). Resources can be injected only into container-managed objects. Resource injection is convenient for the developer. Since a container must have control over the creation of a component it can perform the injection into a component. As a result, resources cannot be injected into objects such as simple JavaBeans components

Demo

- Configuring Database in WildFly.
- Execute the ResourceConnectionPooling.java class

1
 Rahul
 50000.0
 2
 Anju
 90000.0
 Num of Records:::2


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Execute the following servlet:

<http://localhost:9090/DataSourceWithWildFly/ResourceConnectionPoolig>

Partial listing of code is given below: which applies the field – level annotation

```

@Resource(lookup="java:/jdbc/TestDS")
DataSource ds;

try {
    Connection con = ds.getConnection();
    -----
} catch (SQLException e1) {
    log("Error is:::" + e1.getMessage());
}
  
```

Summary

- In this lesson, we have learnt:
 - Configuring Database in WildFly



Add the notes here.

Review Questions

- Question 1: The package to be imported for using DataSource is ____.
- Question 2: The Datasource lookup happens in standalone.xml
 - True/ False



Add the notes here.