Accessing JDBC in Web applications

This application will deal with populating an image on a database and later retrieving the same from the database. This tutorial will help you understand how to deal with data of type Blob. We will be using Derby database in this application. Please use images of smaller sizes to upload on to database. This is because there are some limitations associated with the derby database.

To run this tutorial, as a minimum you will be required to have installed the following prerequisite software:

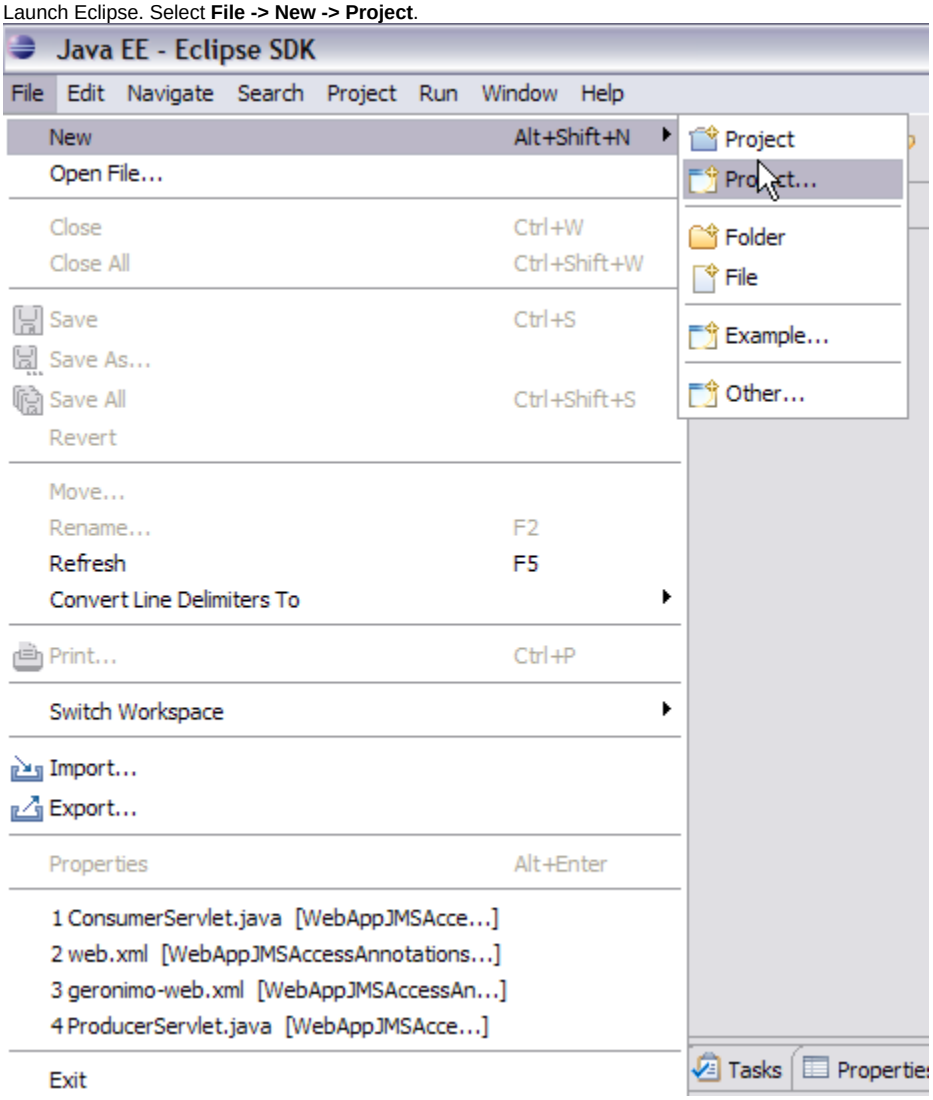
1. Sun JDK 6.0+ (J2SE 1.6)
2. Eclipse IDE for Java EE Developers, which is platform specific
3. Apache Geronimo Eclipse Plugin 2.1.x
4. Apache Geronimo Server 2.1.x

> Geronimo version 2.1.x, Java 1.5 runtime, and Eclipse Ganymede are used is used in this tutorial but other versions can be used instead (e.g., Geronimo version 2.2, Java 1.6, Eclipse Europa)

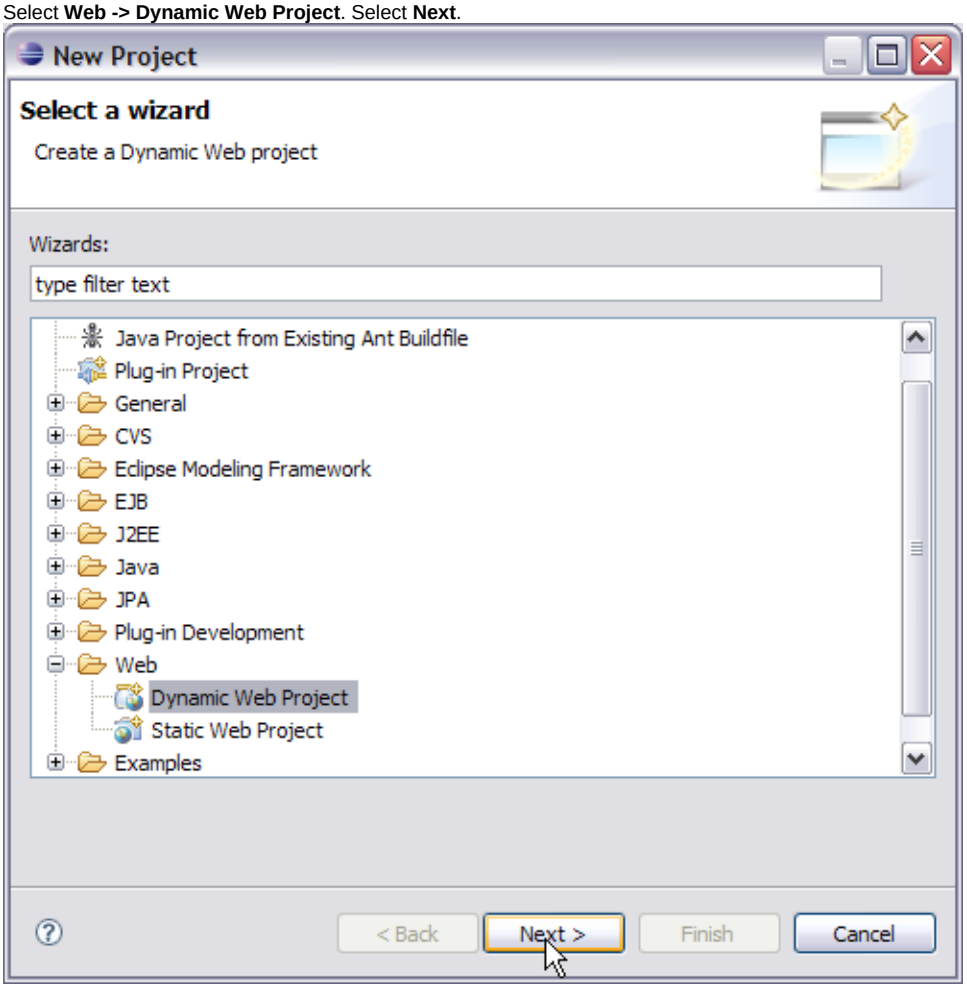
Details on installing eclipse are provided in the Development environment section. This tutorial is organized in the following sections:

Creating a dynamic Web project

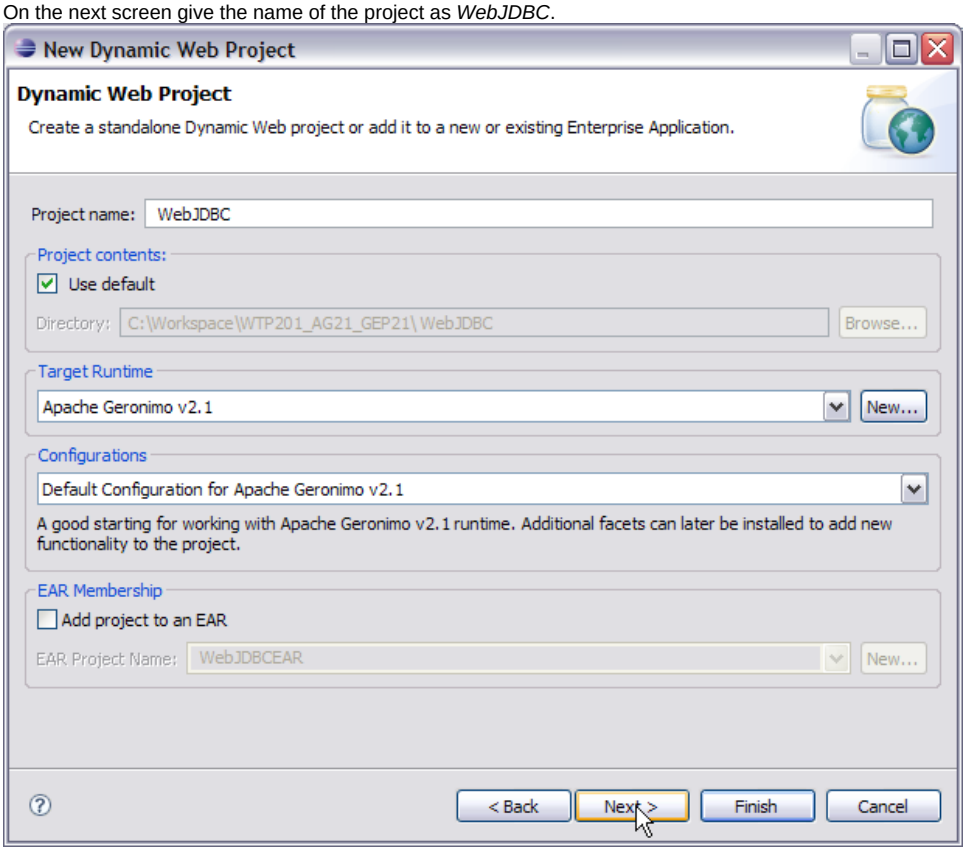
1. Launch Eclipse. Select **File -> New -> Project**.



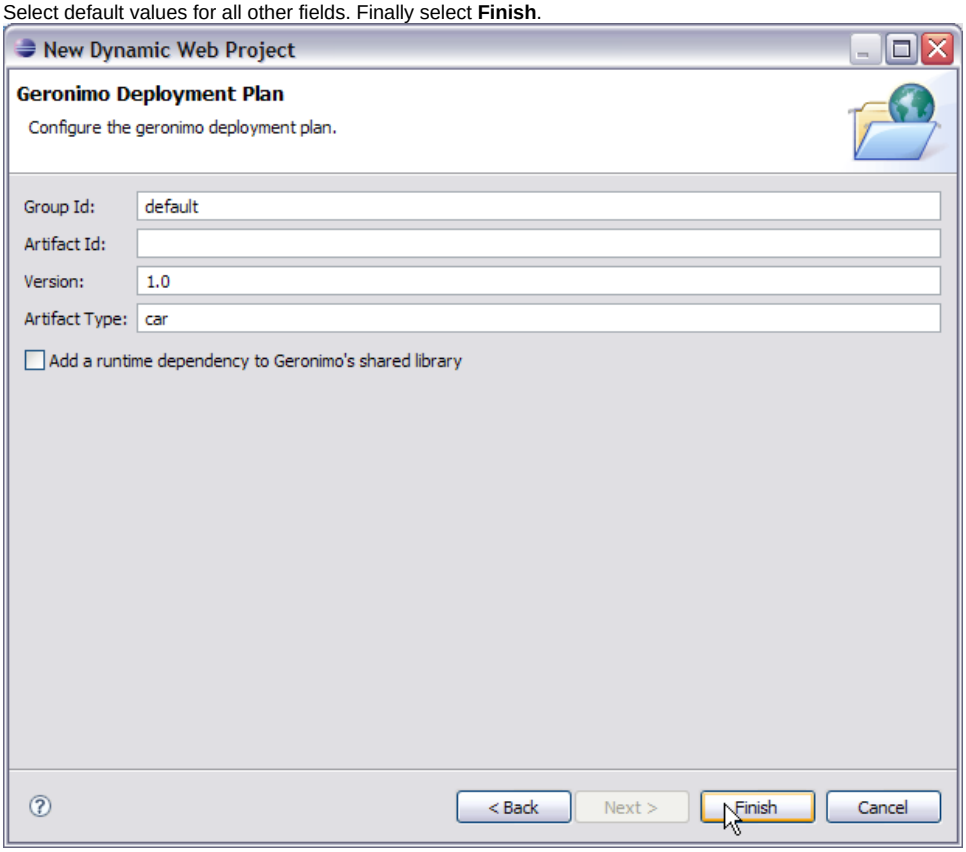
2. Select **Web -> Dynamic Web Project**. Select **Next**.



3. On the next screen give the name of the project as *WebJDBC*.



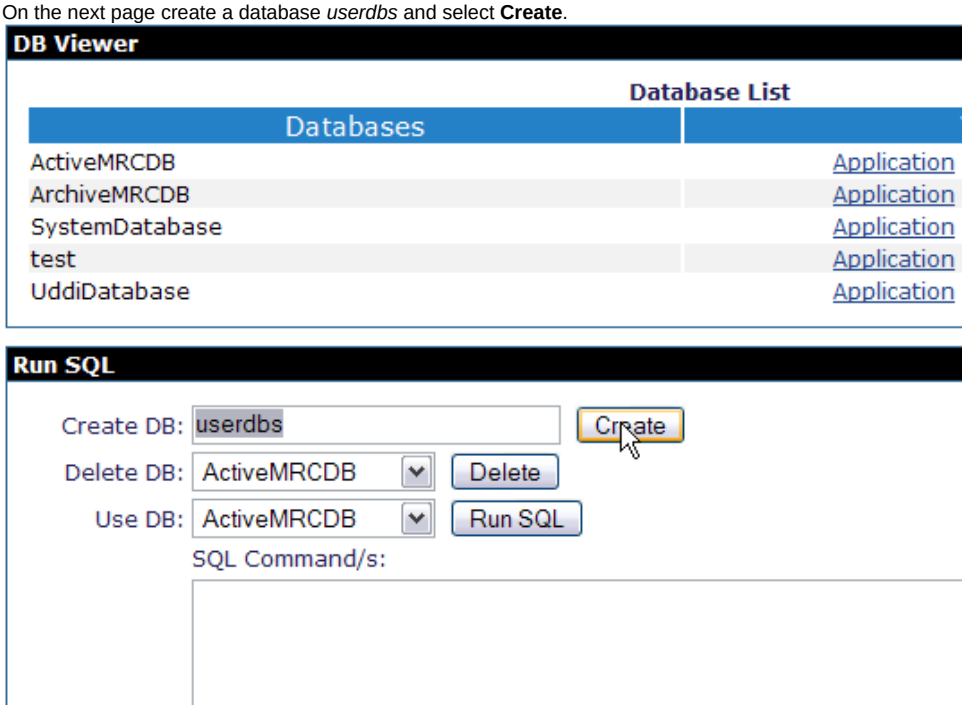
4. Select default values for all other fields. Finally select **Finish**.



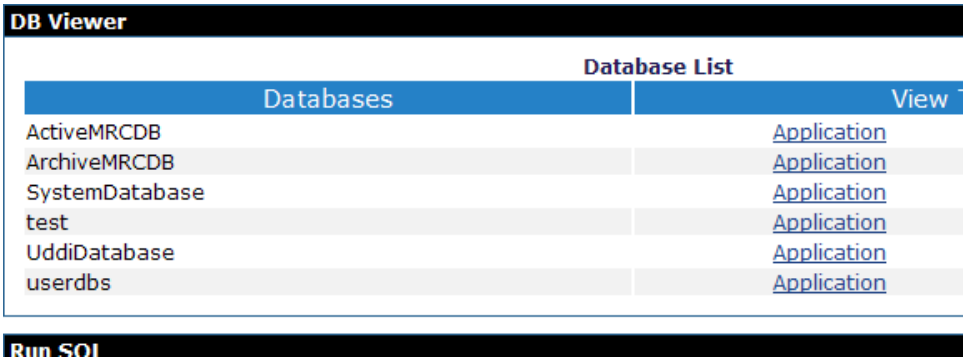
Creating a database using the administrative console

1. Start the server and Launch the Administrative Console using the URL http://localhost:8080/console.
2. Enter default username and password.
3. In the welcome page, Under *Embedded DB*, select **DB Manager**.

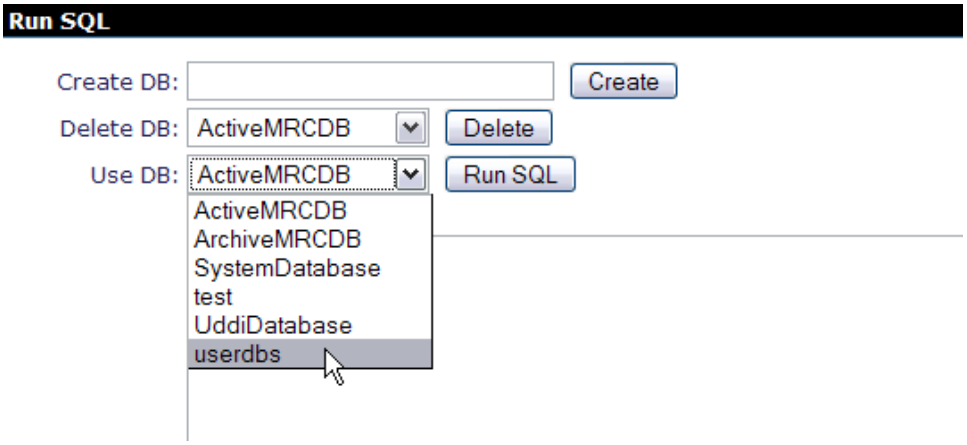
4. On the next page create a database *userdbs* and select **Create**.



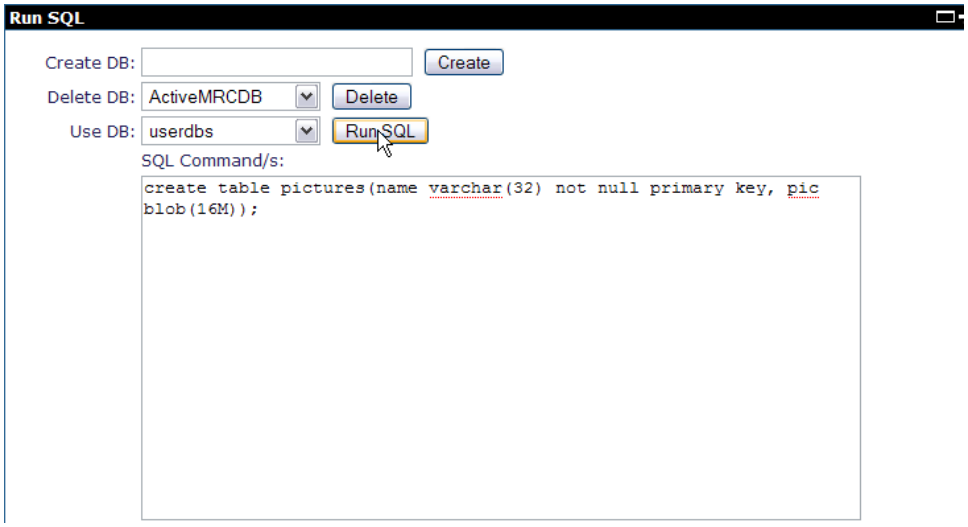
5. Once done you can see the *userdbs* database listed in DB Viewer portlet under *Databases*. This confirms that the database has been successfully created.



6. As shown in the figure below, select **userdbs** from the dropdown box.



7. Run the query as shown in the figure. This query will create table *PICTURES* with the columns *name* and *pic*.

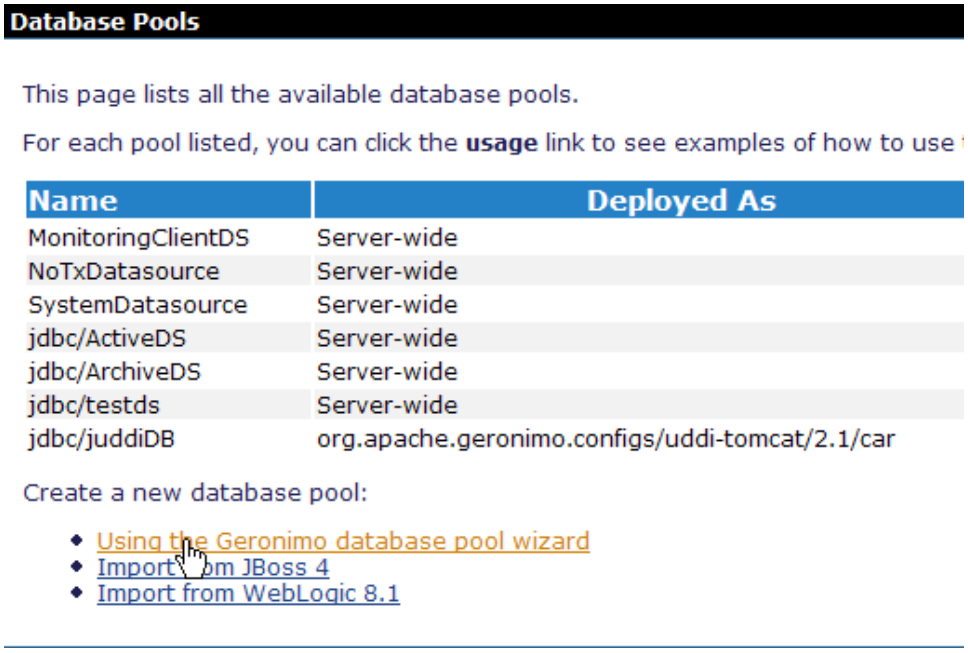


CreateTable.sql
`create table pictures(name varchar(32) not null primary key, pic blob(16M));`

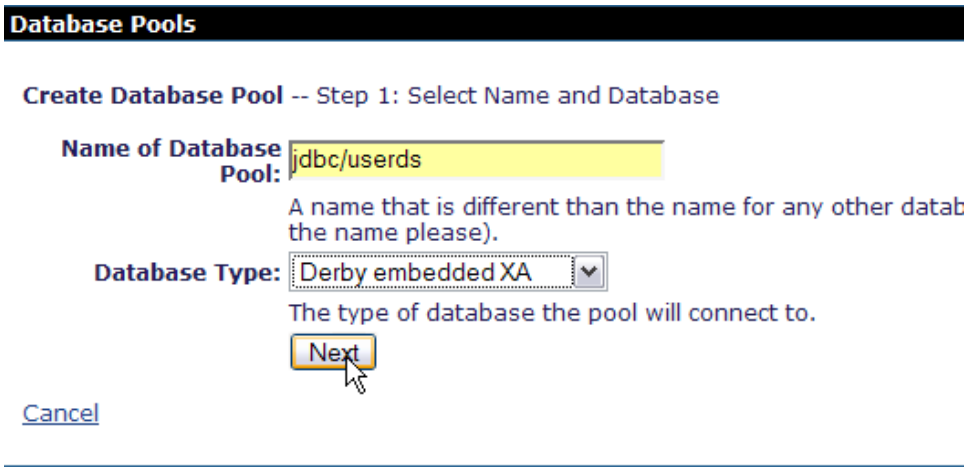
Creating a datasource using the administrative console

1. Start the server and Launch the Administrative Console using the URL http://localhost:8080/console.
2. Enter default username and password.
3. Once in the welcome page. In console navigation, Under *Services*, select **Database Pools**.

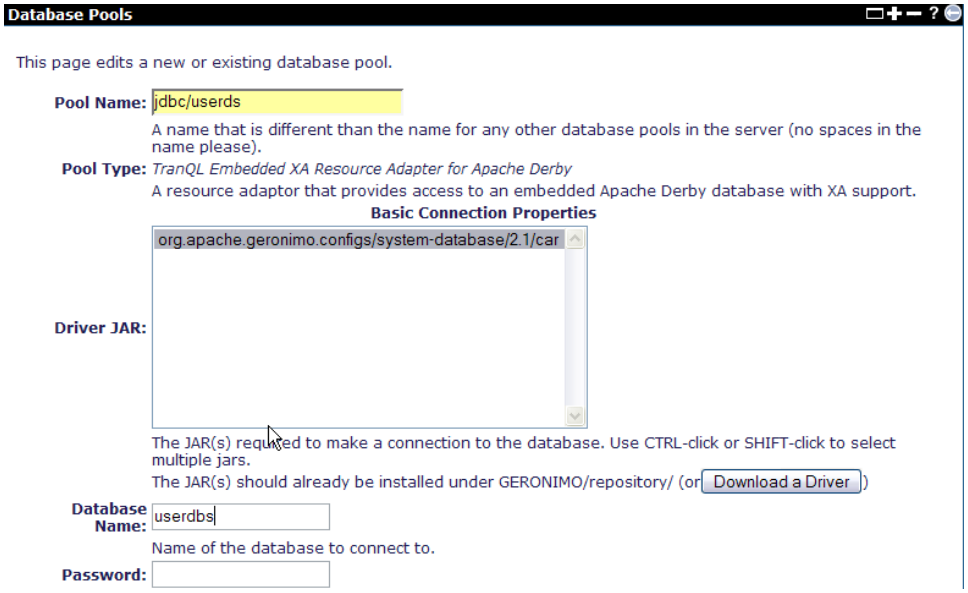
4. On the next screen, Create a new database pool **Using the Geronimo database pool wizard**.



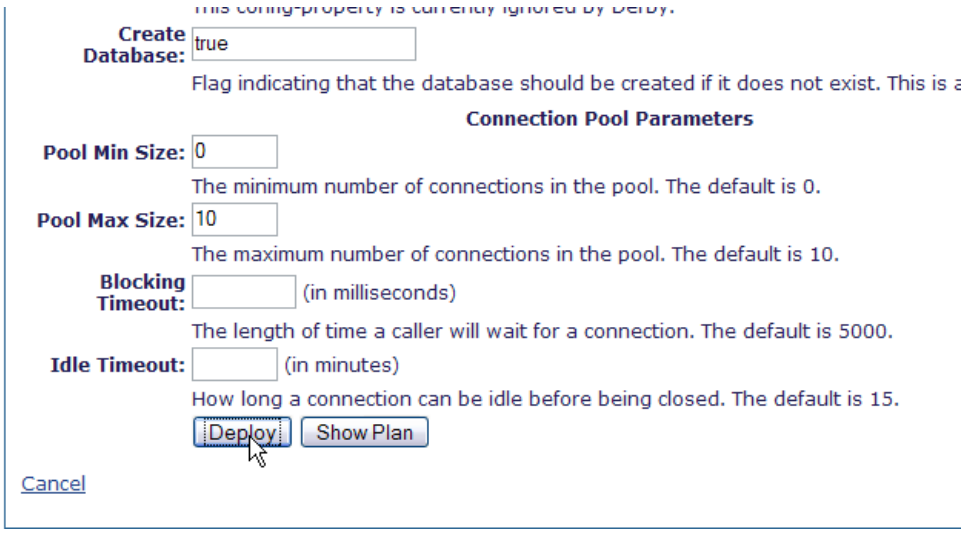
5. On the next screen give the name as suggested in the figure *jdbc/userds*. This will initiate the process to create a Derby Embedded XA datasource.



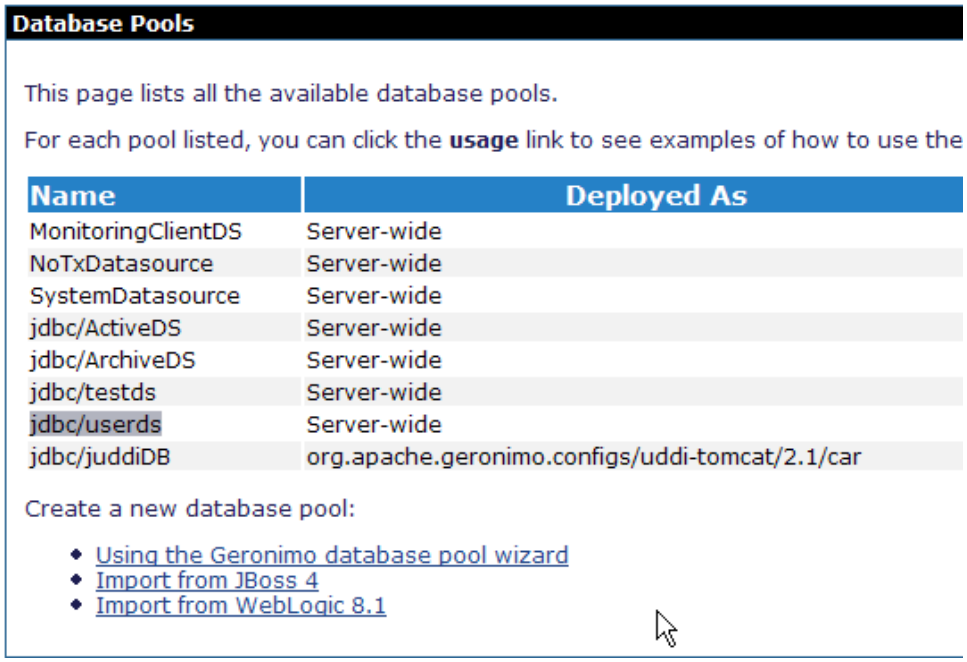
6. Select the **Driver Jar** and give the database name as *userdbs* (remember this is the database we created in the previous step). All other fields can be set to default.



7. Select **Deploy** to deploy the connector plan.

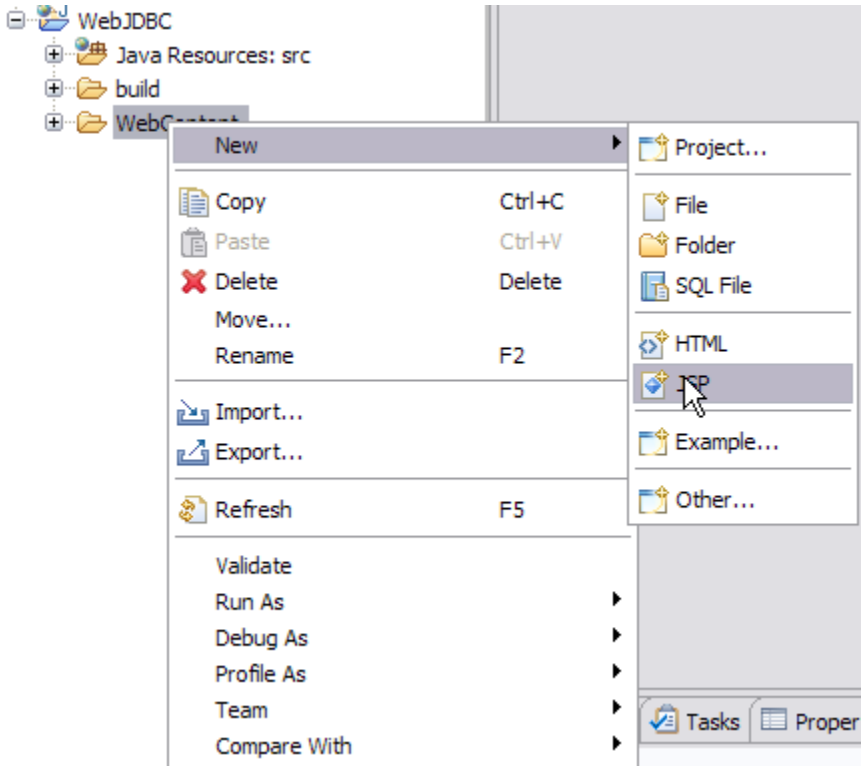


8. Once done you can see the Database Pool *jdbc/userds* listed in the available database pools.

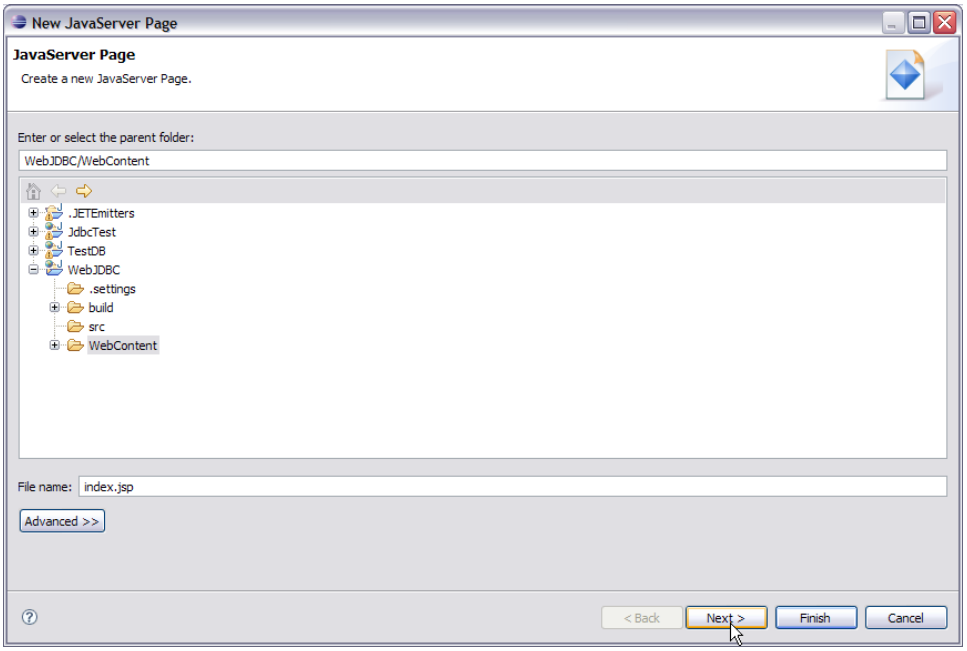


Adding code for image upload to derby database

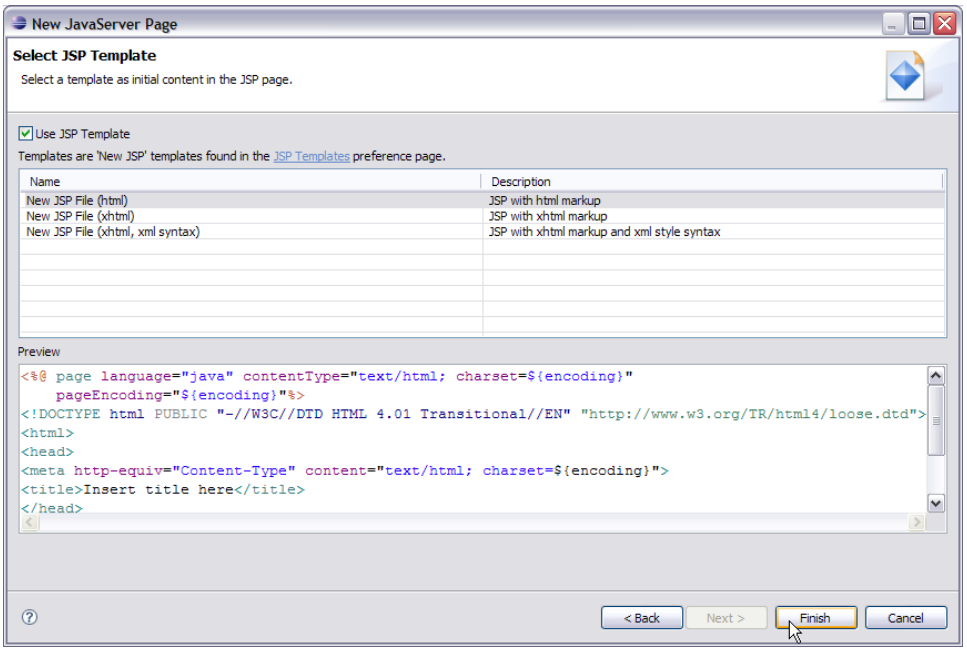
1. Right click on **WebContent** and select **New -> JSP**.



2. Name the JSP as *index.jsp* and select **Next**.



3. Select **Finish**. This will create a template for `index.jsp`.



4. Add the following code to `index.jsp`.

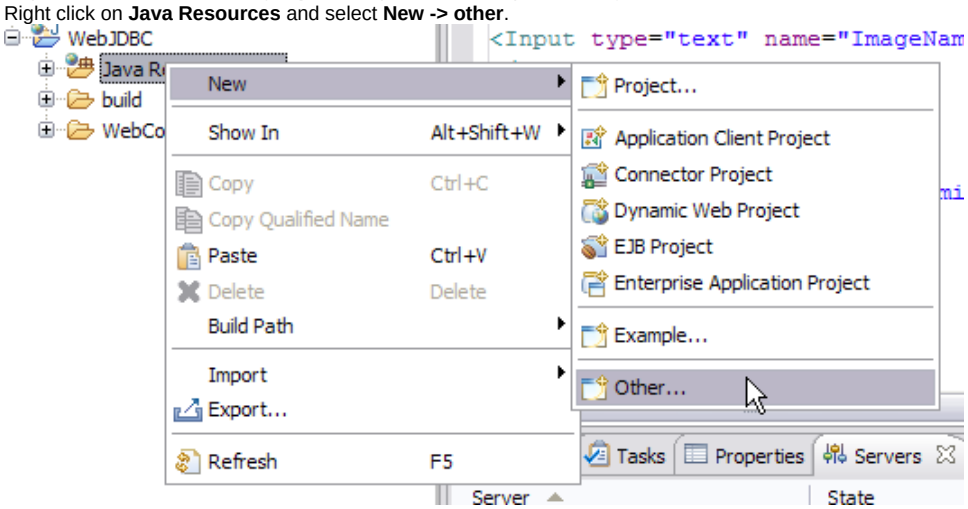
index.jsp

```
<%@ page language="java" contentType="text/html; charset=ISO-8859-1"
    pageEncoding="ISO-8859-1"%>
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
<title>Image Upload</title>
</head>
<body>
<h2>Select a Image and Upload it</h2>
```

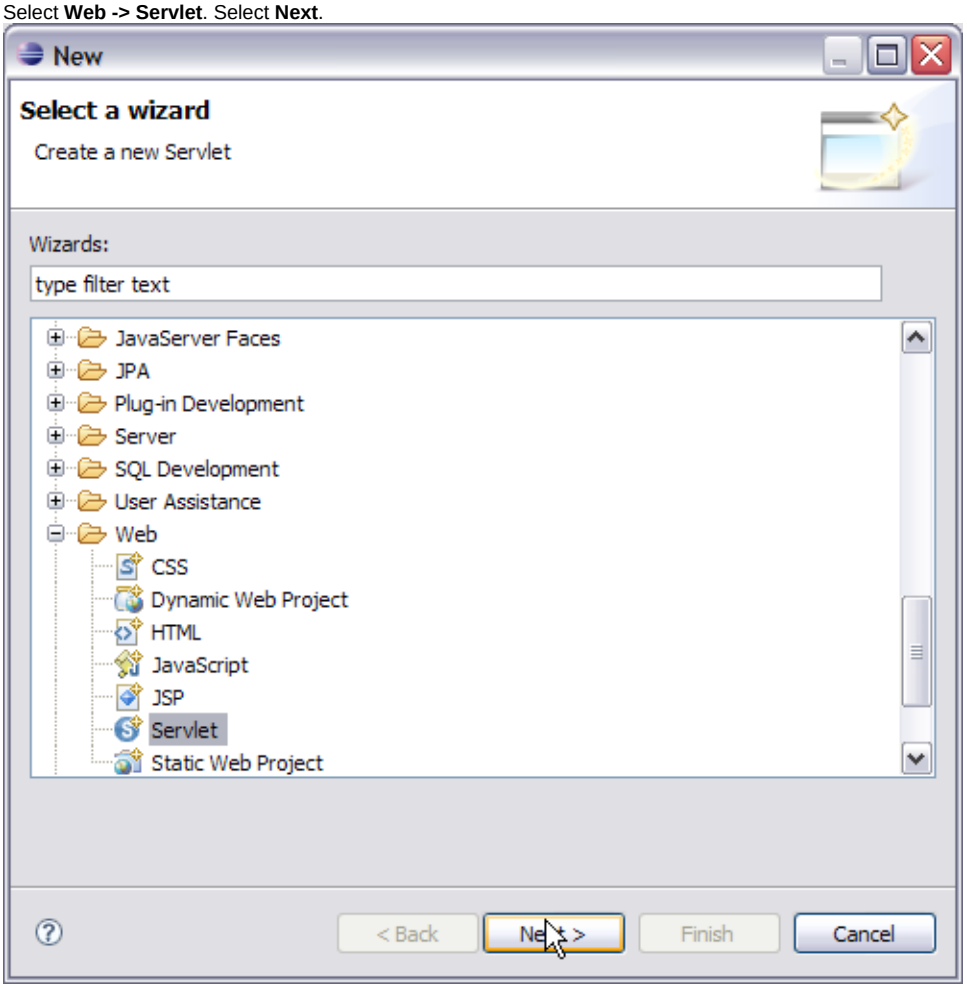
```
<form action="/WebJDBC/ImageUpload">
<table>
<tr>
<td>
Location of the Image(full path)
</td>
<td>
<Input type="text" name="ImageLoc">
</td>
</tr>
<tr>
<td>
Name of the Image(Unique Name)
</td>
<td>
<Input type="text" name="ImageName">
</td>
</tr>
<tr>
<td>
<Input type="submit" value="submit">
</td>
<tr>
</table>
</form>
</body>
</html>
```

The **<form action="/WebJDBC/ImageUpload">** suggests that once the form is submitted the request will be passed to **ImageUpload**. The next step is to add the servlet **ImageUpload** to process the request sent by the JSP client.

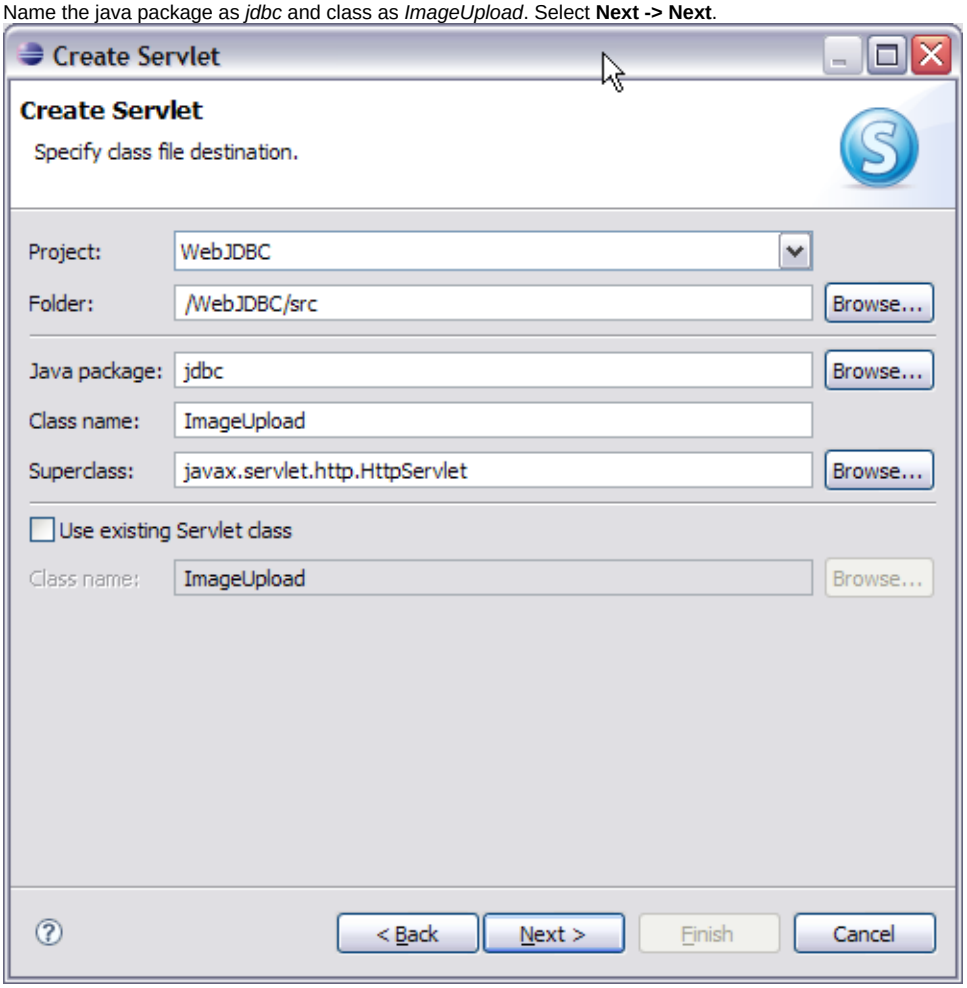
5. Right click on **Java Resources** and select **New -> other**.



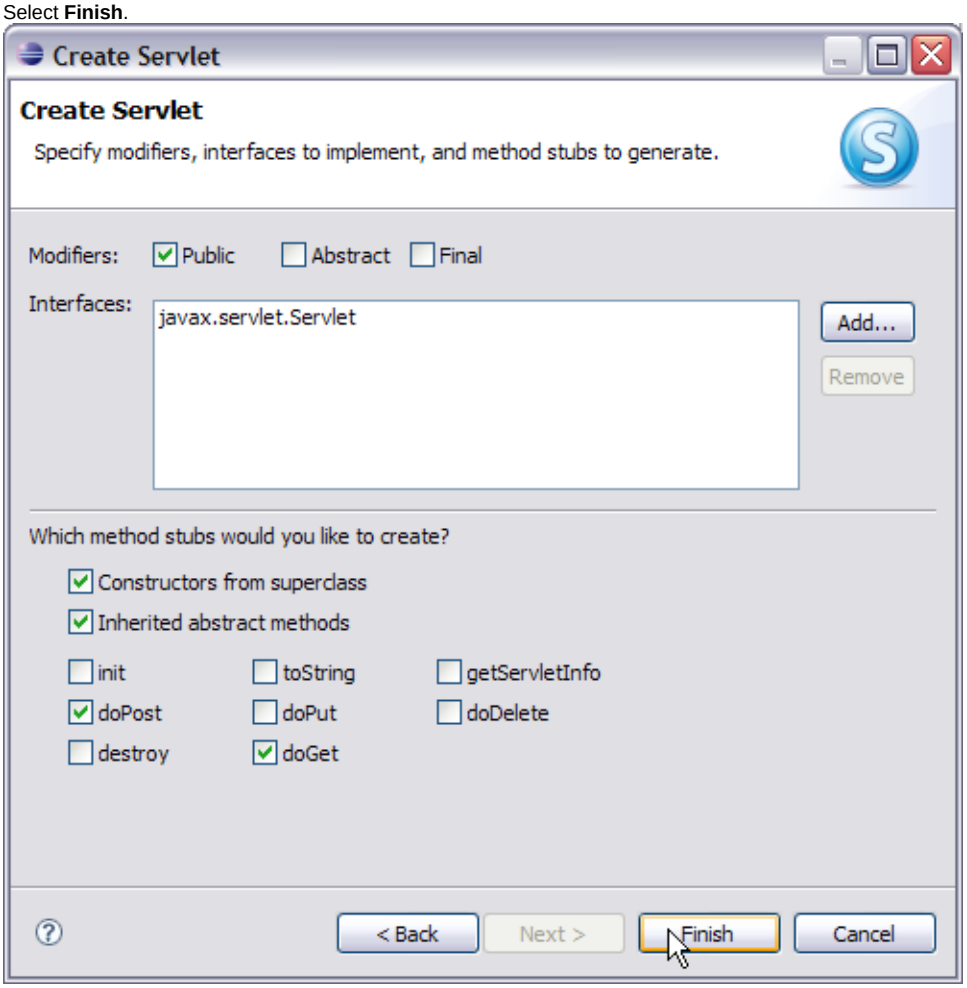
6. Select **Web -> Servlet**. Select **Next**.



7. Name the java package as *jdbc* and class as *ImageUpload*. Select **Next -> Next**.



8. Select **Finish**.



9. Add the following code to `ImageUpload.java`.

ImageUpload.java

```
package jdbc;

import java.io.File;
import java.io.FileInputStream;
import java.io.IOException;
import java.io.PrintWriter;
import java.sql.Connection;
import java.sql.PreparedStatement;
import java.sql.SQLException;
import javax.annotation.Resource;
import javax.servlet.ServletException;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import javax.sql.DataSource;

public class ImageUpload extends javax.servlet.http.HttpServlet implements javax.servlet.Servlet {
        @Resource(name="jdbc/userds")
         private DataSource ds;
   static final long serialVersionUID = 1L;

         public ImageUpload() {
                super();
        }
        protected void doGet(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
doProcess(request, response);
        }
```

```
        protected void doProcess(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
                Connection dbconnect = null;
                PreparedStatement stmnt = null;
                String pic=request.getParameter("ImageLoc");
                String name=request.getParameter("ImageName");
                try{
                        File f= new File(pic);
                        FileInputStream fis=new FileInputStream(f);
                        dbconnect= ds.getConnection();
                        stmnt = dbconnect.prepareStatement("INSERT INTO PICTURES (" + "NAME," + "PIC )"
+ " VALUES(?,?)");
                        stmnt.setString(1, name);
                        stmnt.setBinaryStream(2, fis, (int)f.length());
                        stmnt.execute();
                        PrintWriter out= response.getWriter();
                        out.println("Congratulations your image has been successfully
uploaded");
                }
                catch(Exception e)
                {
                        e.printStackTrace();
                }
                finally
                {
                try{
                    dbconnect.close();
                    stmnt.close();
            }catch(SQLException e){
                    e.printStackTrace();
            }
                }
        }


        protected void doPost(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
doProcess(request, response);
        }
}
```

Once a request is submitted from `index.jsp` for an image upload with the name and exact location of image the request is send to the **ImageUpload** servlet.

- String pic=request.getParameter("ImageLoc");- Retrieves the location of the image
- String name=request.getParameter("ImageName");- Retrieves the name of the image

Once we have the image available a new File object is created from the image. Thereafter the image file is read as a binary stream. **PreparedStatement** is used to insert the image onto database. This completes the code for **ImageUpload**.

Code to retrieve the image from derby database

1. Create a **JSP** page with the name `ImageDownload.jsp`.
2. Add the following code to `ImageDownload.jsp`:

ImageDownload.jsp

```
<%@ page language="java" contentType="text/html; charset=ISO-8859-1"
    pageEncoding="ISO-8859-1"%>
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
<title>Download Image</title>
</head>
<body>
<h2>Name a Image to download</h2>
```

```
<form action="/WebJDBC/ImageDownload">
<table>
<tr>
<td>
Name of the Image
</td>
<td>
<Input type="text" name="ImageName">
</td>
</tr>
<tr>
<td>
<Input type="submit" value="submit">
</td>
<tr>
</table>
</form>
</body>
</html>
```

As can be seen from **<form action="/WebJDBC/ImageDownload">** this JSP requests the **ImageDownload** servlet when the form is submitted.

3. Create a new servlet `ImageDownload.java` and add the following code:

ImageDownload.java

```
package jdbc;

import java.io.IOException;
import java.io.OutputStream;
import java.sql.Blob;
import java.sql.Connection;
import java.sql.PreparedStatement;
import java.sql.ResultSet;
import java.sql.SQLException;

import javax.annotation.Resource;
import javax.servlet.ServletException;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import javax.sql.DataSource;

 public class ImageDownload extends javax.servlet.http.HttpServlet implements javax.servlet.Servlet {
         @Resource(name = "jdbc/userds")
                 private DataSource ds;
   static final long serialVersionUID = 1L;

        public ImageDownload() {
                super();
        }

        protected void doGet(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
                doProcess(request, response);
        }
        protected void doProcess(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
                Connection dbconnect = null;
                ResultSet rs = null;
                PreparedStatement stmnt = null;
                try {
                        dbconnect = ds.getConnection();
                        String s=request.getParameter("ImageName");
                        stmnt = dbconnect.prepareStatement("SELECT PIC FROM PICTURES WHERE NAME=?");
                        stmnt.setString(1, s);
                        rs = stmnt.executeQuery();
                        if (rs.next()) {
                                // Get as a BLOB
                                Blob aBlob = rs.getBlob(1);
```

```
                                byte[] b = new byte[4096];
                                java.io.InputStream ip = aBlob.getBinaryStream();
                                OutputStream out = null;
                                int c = 0;
                                out = response.getOutputStream();
                                response.setContentType("image/jpeg");
                                while (c != -1) {
                                     c = ip.read(b);
                                     if (c > 0) {
                                       out.write(b, 0, c);
                                       out.flush();
                                         }
                                ip.close();

                        }

                } catch (Exception e) {
                        e.printStackTrace();
                } finally {
                try{
                        dbconnect.close();
                        stmnt.close();
                    rs.close();
                }catch(SQLException e){
                        e.printStackTrace();
                }
        }

        }
        protected void doPost(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
                doProcess(request, response);
        }
}
```

The **ImageDownload** servlet works in a similar way once the request is sent from `ImageDownload.jsp` to it. The servlet uses

- String s=request.getParameter("ImageName");- To retrieve the name of the image to be downloaded
- rs = stmnt.executeQuery();- To execute the PreparedStatement
- Blob aBlob = rs.getBlob(1);- Data is stored as a Blob datatype
- java.io.InputStream ip = aBlob.getBinaryStream();- Blob data is retrieved as a binary stream
- response.setContentType("image/jpeg");- sets the output content type as a Image datatype
- c = ip.read(b);, out.write(b);, out.flush();- Data is read as a byte buffer and written on the web page. After each write the buffet is flushed.

This completes the code for Image download.

Modifying deployment plan

The next step is to modify the `geronimo-web.xml` deployment plan. We need to add the dependency element for the **JDBC** resource. Also we need to add a resource reference element for the *userds* datasource.

geronimo-web.xml

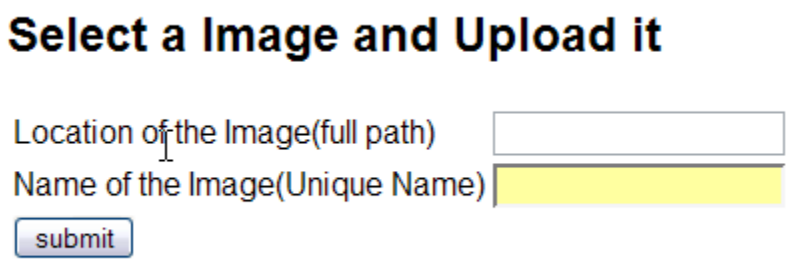
```
<?xml version="1.0" encoding="UTF-8"?>
<web-app xmlns="http://geronimo.apache.org/xml/ns/j2ee/web-2.0.1"
         xmlns:nam="http://geronimo.apache.org/xml/ns/naming-1.2"
         xmlns:sec="http://geronimo.apache.org/xml/ns/security-2.0"
         xmlns:sys="http://geronimo.apache.org/xml/ns/deployment-1.2">
  <sys:environment>
    <sys:moduleId>
      <sys:groupId>default</sys:groupId>
      <sys:artifactId>WebJDBC</sys:artifactId>
      <sys:version>1.0</sys:version>
      <sys:type>car</sys:type>
    </sys:moduleId>
   <sys:dependencies>
           <sys:dependency>
               <sys:groupId>console.dbpool</sys:groupId>
```

```
                <sys:artifactId>jdbc_userds</sys:artifactId>
            </sys:dependency>
    </sys:dependencies>
  </sys:environment>
  <context-root>/WebJDBC</context-root>
  <nam:resource-ref>
        <nam:ref-name>jdbc/userds</nam:ref-name>
        <nam:pattern>
          <nam:groupId>console.dbpool</nam:groupId>
          <nam:artifactId>jdbc_userds</nam:artifactId>
          <nam:name>jdbc/userds</nam:name>
        </nam:pattern>
    </nam:resource-ref>
</web-app>
```

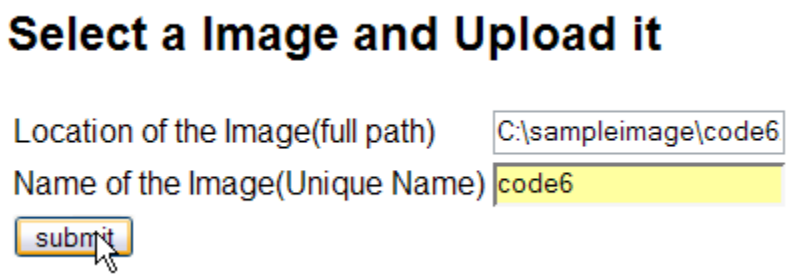
- <sys:dependency>- The dependency element is to suggest the dependency of the application on the database pool. In our case we have **userds** as a dependency module.
- <nam:resource-ref>- This element is used to map the JDBC connenction pool with a user defined name. In our case we have mapped **jdbc /userds** with **jdbc_userds**.

Deploy and run

1. Start the server within Eclipse.
2. Right click on **WebJDBC** project and select **Run as - > Run on server**.
3. Once done the application will be deployed on the server.
4. Launch the application with the following link http://localhost:8080/WebJDBC/



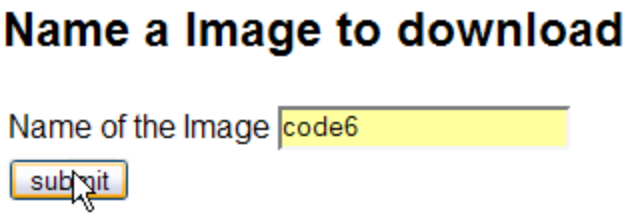
5. Fill up the form with the a image location and name. The same name will be used while populating the database with the image data. Select **Submit** once done.



6. If your image is successfully inserted into the database you will get a Congratulation message.

```
Congratulations your image has been successfully uploaded
```

7. To retrieve an image from the database launch the following portlet http://localhost:8080/WebJDBC/ImageDownload.jsp. Select **submit** once done.



8. This will display the image in the browser.