SESSION MANAGEMENT

(*Exercise-IV*)

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Session Management

- Http protocol is a stateless protocol, when a client sends a request to the server, every time server will treat as a new request, to avoid this problem we can manage session.
- To maintain the state of client for a specified time i.e. call session management.
- We can manage session for a particular page of an application or for entire application

We can manage session by using

1. Cookie
2. HttpSession
3. Hidden form field
4. url re-writing

Session Management using Cookies

- ✓ A cookie is a small amount of information sent by a Servlet to a Web browser. It is saved by the browser, and later sent back to the server with request. A cookie's value can uniquely identify a client, so cookies are commonly used for session management.
- ✓ A cookie has a name, a single value, and optional attributes such as a comment, path and domain qualifiers, a maximum age, and a version number.
- ✓ The browser supports 20 cookies for each Web server and 300 cookies total. The Cookie size is 4 KB per cookie.
- ✓ Cookie is worked at client side, so if it is disabled from the browser then it will not work.
- ✓ In Servlet API's, Cookie is a class -**javax.servlet.http.Cookie**
- ✓ Constructor: **Cookie(**String **cookieName,** String **cookieValue);**

Steps:

- **Creating Cookie**

- **Add Cookie to the response**

  response.**addCookie** (**cookie**);

- **Get Cookie from request**

```
// It will return array of Cookie
Cookie [] cookies = request.getCookies ();
```

Methods of Cookie class

Methods	Description
String getName()	Returns the name of the cookie.
String getValue()	Returns the value of the cookie
int getMaxAge()	Returns the maximum age of the cookie, specified in seconds, By default, -1 indicating the cookie will persist until browser shutdown
String getComment()	Returns the comment describing the purpose of this cookie, or null if the cookie has no comment.
String getPath()	Returns the path on the server to which the browser returns this cookie.
String getDomain()	Returns the domain name set for this cookie
boolean getSecure()	Returns **true** if the browser is sending cookies only over a secure protocol, or **false** if the browser can send cookies using any protocol.
int getVersion()	Returns the version of the protocol this cookie complies with.
void setValue(String newValue)	Assigns a new value to a cookie after the cookie is created.
void setMaxAge(int expiry)	Sets the maximum age of the cookie in seconds.

void setComment(String purpose)	Specifies a comment that describes a cookie's purpose.
void setPath(String uri)	Specifies a path for the cookie to which the client should return the cookie.
void setDomain(String pattern)	Specifies the domain within which this cookie should be presented.
void setSecure(boolean flag)	Indicates to the browser whether the cookie should only be sent using a secure protocol, such as HTTPS or SSL
void setVersion(int version)	Sets the version of the cookie protocol this cookie complies with.

Manage Session Using Cookie (Application)

Index.html

```
<!DOCTYPE html>
<html>
<head>
<meta charset="ISO-8859-1">
<title>Servlet Cookie Application</title>
</head>
<body>
<h1>Servlet Cookie Application</h1>
<form action="FirstServlet">
User Name: <input type="text" name="userName">
<input type="submit" value="Submit" >
</form>
</body>
</html>
```

FirstServlet.java

```
package com.kalibermind.servlet;

import java.io.IOException;
import java.io.PrintWriter;
import javax.servlet.ServletException;
import javax.servlet.annotation.WebServlet;
import javax.servlet.http.Cookie;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;

@WebServlet("/FirstServlet")
public class FirstServlet extends HttpServlet {
                private static final long serialVersionUID = 1L;
                protected void doGet(HttpServletRequest request, HttpServletResponse response)
                                throws ServletException, IOException {
                // TODO Auto-generated method stub
                response.setContentType("text/html");
                PrintWriter out = response.getWriter();
                String name = request.getParameter("userName");

                //creating the cookie
                Cookie cookie = new Cookie("user", name);
                //adding cookie to the response
                response.addCookie(cookie);
                out.print("User Name: "+name+"<br>");
                out.println("<a href=\"SecondServlet\">Test Your Cookie</a>");
                }
                }
```

SecondServlet.java

```
package com.kalibermind.servlet;

import java.io.IOException;
import java.io.PrintWriter;

import javax.servlet.ServletException;
import javax.servlet.annotation.WebServlet;
import javax.servlet.http.Cookie;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;

@WebServlet("/SecondServlet")
public class SecondServlet extends HttpServlet {
		private static final long serialVersionUID = 1L;

		protected void doGet(HttpServletRequest request, HttpServletResponse response)
			throws ServletException, IOException {
		// TODO Auto-generated method stub
		response.setContentType("text/html");
		PrintWriter out = response.getWriter();

		//getting cookies from the client
		Cookie[] cookies = request.getCookies();

		for(int i=0; i < cookies.length; i++) {
			out.println("Cookie Name: "+cookies[i].getName()+"<br>");
			out.println("Cookie Value: "+cookies[i].getValue()+"<br>");
		}
	}
}
```

Note: Here we are using **@webservlet** annotation so there is no need to configure Servlet only pass the welcome page(**index.html)**

Web.xml

```
<web-app>
    <welcome-file-list>
   <welcome-file>index.html</welcome-file>
    </welcome-file-list>
</web-app>
```

HttpSession

- ✓ HttpSession is an interface that provides a way to identify a user across more than one page request.
- ✓ By using this interface, servlet container creates a session between an HTTP client and an HTTP server. The session persists for a specified time period, across more than one connection or page request from the user.

So HttpSession is commonly used for session management.

- ➢ Servlet can view and manipulate all information about a session, such as the session identifier, creation time, and last accessed time etc.
- ➢ Servlet can bind objects to sessions, allowing user information to persist across multiple user connections.

Methods of HttpSession

Methods	Description
Object getAttribute(String name)	Returns the **object** bound with the specified name in this session, or **null** if no object is bound under the name.
Enumeration getAttributeNames()	Returns an **Enumeration** of **String** objects containing the names of all the objects bound to this session.
long getCreationTime()	Returns the time when this session was created.
String getId()	Returns a string containing the unique identifier assigned to this session.
int getLastAccessedTime()	Returns the last time the client sent a request associated with this session.
long getMaxInactiveInteval()	Returns the maximum time interval, in seconds, that the servlet container will keep this session open between client accesses
ServletContext getServletContext()	Returns the ServletContext to which this session belongs.
void invalidate()	Invalidates this session then unbinds any objects bound to it.
boolean isNew()	Returns true if the client does not yet know about the session or if the client chooses not to join the session.
void setAttribute(String name, Object obj)	Binds an object to this session, using the name specified.
void setMaxInactiveInterval(int interval)	Specifies the time, in seconds, between client requests before the servlet container will invalidate this session.

Manage Session Using HttpSession –(Application-I)

index.html

```
<h3>Session Example</h3>
<form action="s1" method="post">
    <input type="text" name="name"/><br><br>
    <input type="submit"/>
```

```
</form>
```

ManageSession.java

```
package com.kalibermind.servlet;

import java.io.IOException;
import java.io.PrintWriter;
import javax.servlet.ServletException;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import javax.servlet.http.HttpSession;

public class ManageSession extends HttpServlet
{
   private static final long serialVersionUID = 1L;
   protected void doPost(HttpServletRequest request,
      HttpServletResponse response) throws ServletException, IOException
   {
      response.setContentType("text/html");
      PrintWriter out=response.getWriter();
      String name=request.getParameter("name");
      out.print("<h3>Welcome: "+name+"</h3>");

      HttpSession session=request.getSession();
      session.setAttribute("uname",name);
      out.print("<br><a href="s2">Click Here</a> to visit");
      out.close();
   }
}
```

SecondServlet.java

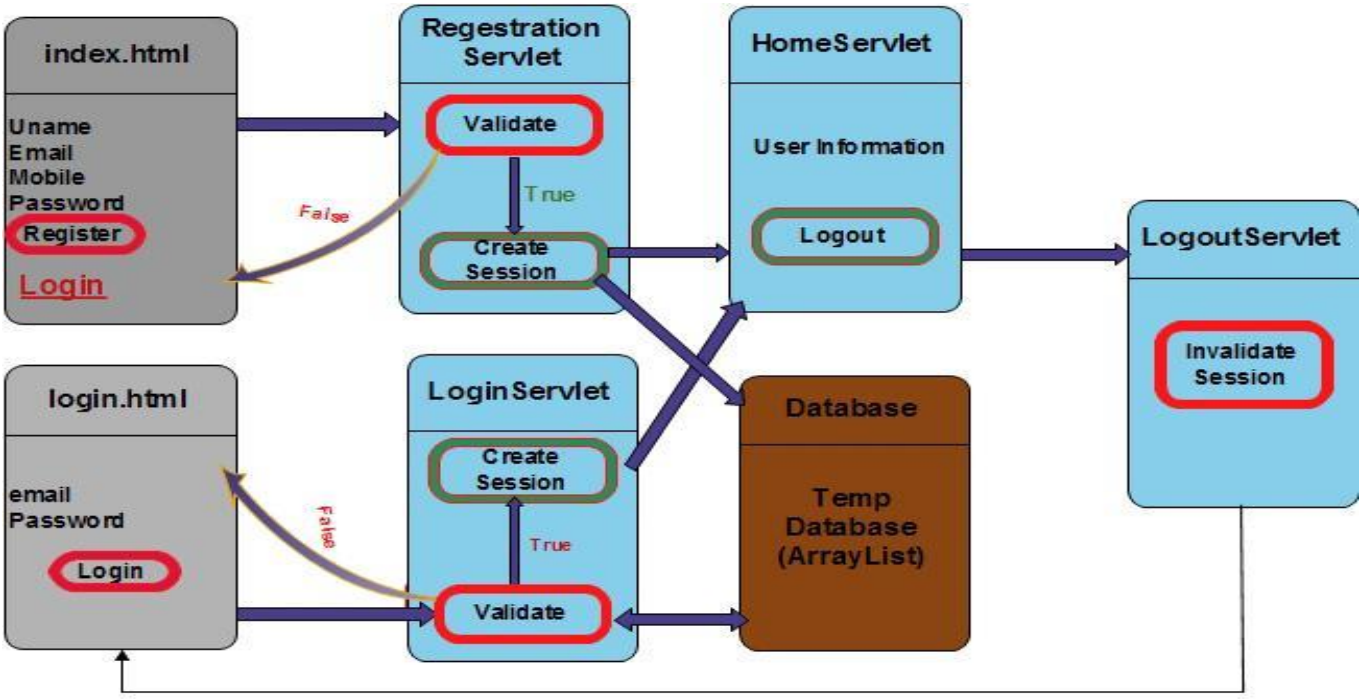
```
package com.kalibermind.servlet;

import java.io.IOException;
import java.io.PrintWriter;
import javax.servlet.ServletException;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import javax.servlet.http.HttpSession;

public class SecondServlet extends HttpServlet
{
   private static final long serialVersionUID = 1L;
   protected void doGet(HttpServletRequest request,
      HttpServletResponse response) throws ServletException, IOException
   {
      response.setContentType("text/html");
      PrintWriter out=response.getWriter();

      HttpSession session=request.getSession(false);
      String name=(String) session.getAttribute("uname");
      out.print("<h3>Hello: </h3>"+name);
      out.close();
   }
}
```

Web.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app>
  <welcome-file-list>
    <welcome-file>index.html</welcome-file>
  </welcome-file-list>
  <servlet>
    <servlet-name>manage_servlet1</servlet-name>
    <servlet-class>
    com.kalibermind.servelt.ManageSession
    </servlet-class>
  </servlet>
  <servlet-mapping>
    <servlet-name>manage_servlet1</servlet-name>
    <url-pattern>/s1</url-pattern>
  </servlet-mapping>
  <servlet>
    <servlet-name>manage_servlet2</servlet-name>
    <servlet-class>
    com.kalibermind.servlet.SecondServlet
    </servlet-class>
  </servlet>
  <servlet-mapping>
    <servlet-name>manage_servlet2</servlet-name>
    <url-pattern>/s2</url-pattern>
  </servlet-mapping>
</web-app>
```

Session Management Using HttpSession with Temp Database

Application Flow Diagram



Project Structure

Index.html

```
<form action="RegistrationServlet">
    <table>
        <tr>
            <td>Name:</td>
            <td><input type="text" name="userName" required></td>
        </tr>
        <tr>
            <td>E-mail:</td>
            <td><input type="email" name="email" required></td>
        </tr>
        <tr>
            <td>Mobile:</td>
            <td><input type="tel" name="mobile" required></td>
        </tr>
        <tr>
            <td>Password:</td>
            <td><input type="password" name="password" required></td>
        </tr>
        <tr>
            <td><input type="submit" value="Register"></td>
            <td><a href="login.html">Login Here</a></td>
        </tr>
    </table>
</form>
```

login.html

```
<form action="RegistrationServlet">
    <table>
        <tr>
            <td>Name:</td>
            <td><input type="text" name="userName"
        required></td> </tr>
        <tr>
            <td>E-mail:</td>
            <td><input type="email" name="email" required></td>
        </tr>
        <tr>
            <td>Mobile:</td>
            <td><input type="tel" name="mobile" required></td>
        </tr>
        <tr>
            <td>Password:</td>
            <td><input type="password" name="password" required></td>
        </tr>
        <tr>
            <td><input type="submit" value="Register"></td>
            <td><a href="login.html">Login Here</a></td>
        </tr>
    </table>
</form>
```

RegistrationServlet.java

```
package com.kalibermind.servlet;
import java.io.IOException;
import java.io.PrintWriter;
import javax.servlet.RequestDispatcher;
import javax.servlet.ServletException;
import javax.servlet.annotation.WebServlet;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import javax.servlet.http.HttpSession;

@WebServlet("/RegistrationServlet")
public class RegistrationServlet extends HttpServlet {
   private static final long serialVersionUID = 1L;

   protected void doGet(HttpServletRequest request, HttpServletResponse response)
      throws ServletException, IOException {

      response.setContentType("text/html");
      PrintWriter out = response.getWriter();

      String userName = request.getParameter("userName");
      String email = request.getParameter("email");
      String mobile = request.getParameter("mobile");
      String password = request.getParameter("password");

      if(userName =="" || email == "" || mobile == "" || password == "")
      {
         out.println("<h4 style=\"color:red;\">Please fill all the fields!</h4>");
         RequestDispatcher dispatcher = request.getRequestDispatcher("index.html");
         dispatcher.include(request, response);
      }
      else
      {
         User user = new User();
         user.setUserName(userName);
         user.setEmail(email);
         user.setMobile(mobile);
         user.setPassword(password);

         Database.saveUser(user);
         HttpSession session = request.getSession();
         session.setAttribute("currentUser", user);

     out.println("<h4 style=\"color:green;\">You have registered successfully!</h4>");

         RequestDispatcher dispatcher = request.getRequestDispatcher("/HomeServlet");
         dispatcher.include(request, response);
      }
   }
}
```

HomeServlet.java

```
package com.kalibermind.servlet;

import java.io.IOException;
import java.io.PrintWriter;
import javax.servlet.ServletException;
import javax.servlet.annotation.WebServlet;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import javax.servlet.http.HttpSession;

/**
 * Servlet implementation class HomeServlet
 */
@WebServlet("/HomeServlet")
public class HomeServlet extends HttpServlet {

    private static final long serialVersionUID = 1L;

    protected void doGet(HttpServletRequest request, HttpServletResponse
        response) throws ServletException, IOException {
        // TODO Auto-generated method stub
        response.setContentType("text/html");

        PrintWriter out = response.getWriter();

         HttpSession session = request.getSession();

        if(session.getAttribute("currentUser") == null)
        {
            response.sendRedirect("login.html");
        }
        else{

            User user = (User)session.getAttribute("currentUser");

            out.print("<h1>Welcome to Home Page</h1>");
            out.print("User Name: "+user.getUserName()+"<br>");
            out.print("Email: "+user.getEmail()+"<br>");
            out.print("Mobile: "+user.getMobile()+"<br>");

            out.print("<a href=\"LogoutServlet\">Logout</a>");
        }
    }

}
```

LoginServlet.java

```
package com.kalibermind.servlet;

import java.io.IOException;
import java.io.PrintWriter;
import java.util.Iterator;
import java.util.List;
import javax.servlet.RequestDispatcher;
import javax.servlet.ServletException;
import javax.servlet.annotation.WebServlet;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import javax.servlet.http.HttpSession;

/**
 * Servlet implementation class LoginServlet
 */
@WebServlet("/LoginServlet")
public class LoginServlet extends HttpServlet {

    private static final long serialVersionUID = 1L;

    /**
     * @see
     HttpServlet#HttpServlet() */
    protected void doGet(HttpServletRequest request, HttpServletResponse
            response) throws ServletException, IOException {
        response.setContentType("text/html");
        doPost(request,response);
    }
    protected void doPost(HttpServletRequest request, HttpServletResponse
            response) throws ServletException, IOException {
        response.setContentType("text/html");
        PrintWriter out = response.getWriter();

        String userName = request.getParameter("userName");
        String password = request.getParameter("password");

        if(!userName.equals("") || !password.equals("")
        {
            User user = Database.getUser(userName,password);

            if(user == null)
            {
          out.println("<h4 style=\"color:red;\">User ID and Password did not Match!</h4>");
                RequestDispatcher dispatcher = request.getRequestDispatcher("login.html");
                dispatcher.include(request, response);
            }
            else
            {
                HttpSession session = request.getSession();
                session.setAttribute("currentUser", user);

                response.sendRedirect("HomeServlet");
            }
        }
    }
}
```

LogoutServlet.java

```
package com.kalibermind.servlet;

import java.io.IOException;
import javax.servlet.ServletException;
import javax.servlet.annotation.WebServlet;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
import javax.servlet.http.HttpSession;

/**
 * Servlet implementation class LogoutServlet
 */
@WebServlet("/LogoutServlet")
public class LogoutServlet extends HttpServlet {

    private static final long serialVersionUID = 1L;

    protected void doGet(HttpServletRequest request, HttpServletResponse
            response) throws ServletException, IOException {

        HttpSession session = request.getSession();

        if(session != null) {

            if(session.getAttribute("currentUser") != null)
            {
                session.setAttribute("currentUser", null);
                session.invalidate();
            }

            response.sendRedirect("login.html");
        }
        //else
            //response.sendRedirect("login.html");
    }
}
```

User.java

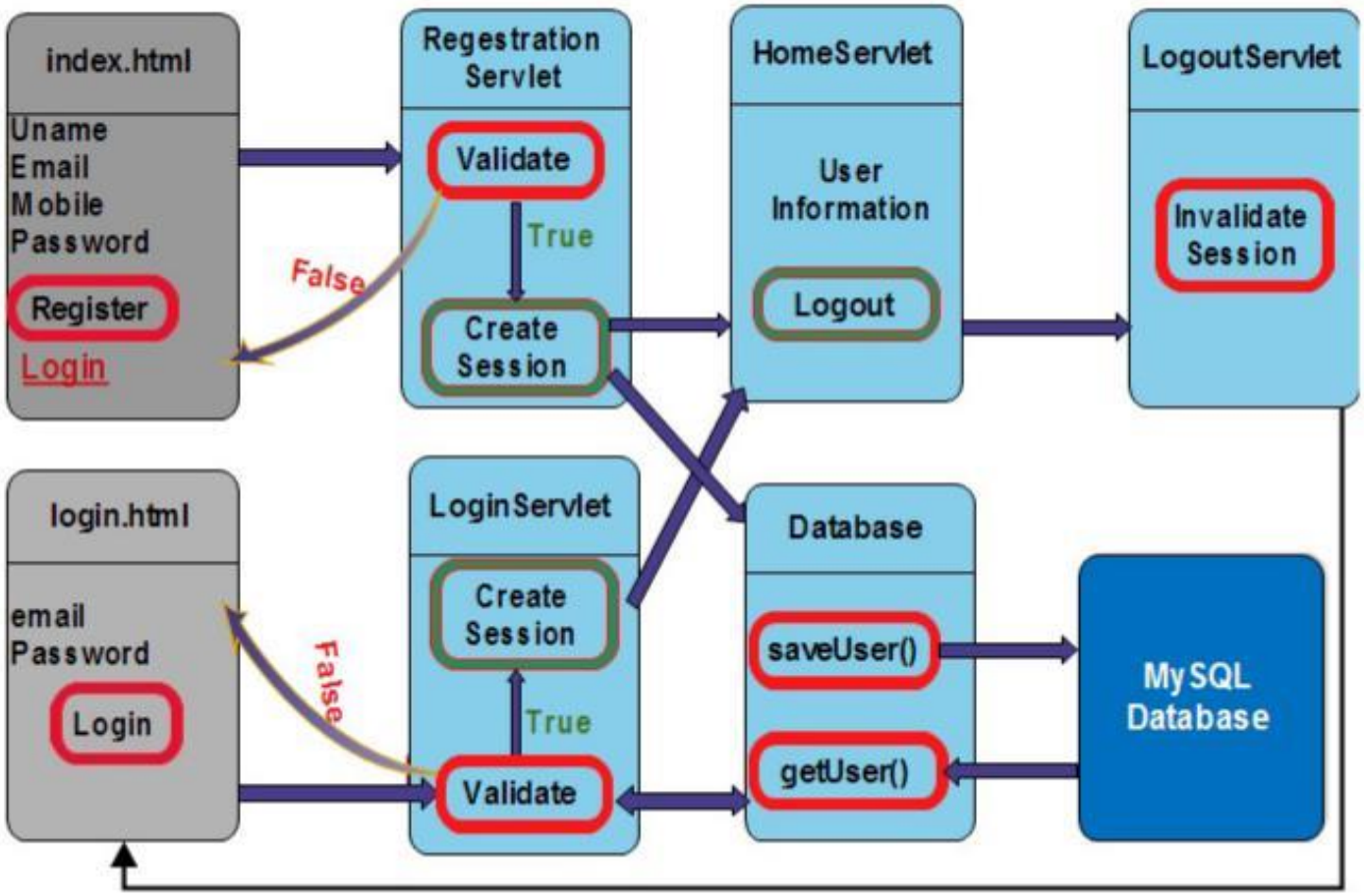
```
package com.kalibermind.servlet;

public class User {

    private String userName;
    private String email;
    private String mobile;
    private String password;

  // public default constructor

  // required public setter and getter

}
```

Database.Java

```
package com.kalibermind.servlet;

import java.util.ArrayList;
import java.util.Iterator;
import java.util.List;

public class Database {

    private static List<User> userlist = null;

    public static void saveUser(User user)
    {
        if(userlist == null)
            userlist = new ArrayList<User>();

        userlist.add(user);
    }

    public static User getUser(String userName, String password)
    {
        if(userlist != null) {
            Iterator<User> itr = userlist.iterator();

            while(itr.hasNext())
            {
                User user = (User)itr.next();

               if(userName.equals(user.getEmail()) && password.equals(user.getPassword()))
               {
                   return user;
               }
            }
             return null;
        }
        else {
            return null;
        }
    }

}
```

Session Management Using HttpSession with MySQL Database

Application Flow Diagram



- **In this application project structure and all the files are same, we have to change only Database.java file**

Database.java

```
package com.kalibermind.servlet;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.ResultSet;
import java.sql.Statement;

public class Database {
   private static Connection connection = null;
   private static final String dbUrl = "jdbc:mysql://localhost:3306/j2ee";
   private static final String username = "root";
   private static final String password = "password";

   private static Connection getConnection() {
      try {
         if(connection == null) {
            Class.forName("com.mysql.jdbc.Driver");
            connection = DriverManager.getConnection(dbUrl,username,password);
         }
```

```
    }catch(Exception ex) {
       ex.printStackTrace();
    }
    return connection;
  }
  public static boolean saveUser(User user)
  {
    String sql = "INSERT INTO user_master(user_name,email,mobile,password) " +"VALUES (?,?,?,?)";
    try {
       Connection con = getConnection();
       PreparedStatement pstmt = con.prepareStatement(sql);
       pstmt.setString(1, user.getUserName());
       pstmt.setString(2,user.getEmail());
       pstmt.setString(3, user.getMobile());
       pstmt.setString(4, user.getPassword());

       if(pstmt.executeUpdate() > 0)
          return true;
       else
          return false;
    }catch(Exception ex) {
       ex.printStackTrace();
       return false;
    }
  }
  public static User getUser(String email, String password)
  {
    String sql = "SELECT * FROM user_master WHERE "
          +"email='"+email+"' and "
          +"password= '"+password+"'";
    try {
       Connection con = getConnection();
       Statement stmt = con.createStatement();
       ResultSet rs = stmt.executeQuery(sql);

       if(rs.next())
       {
          User user = new User();
          user.setUserName(rs.getString(2));
          user.setEmail(rs.getString(3));
          user.setMobile(rs.getString(4));
          return user;
       }
    }catch(Exception ex) {
       ex.printStackTrace();
    }
    return null;
  }
}
```