Task 1: Establishing Database Connections

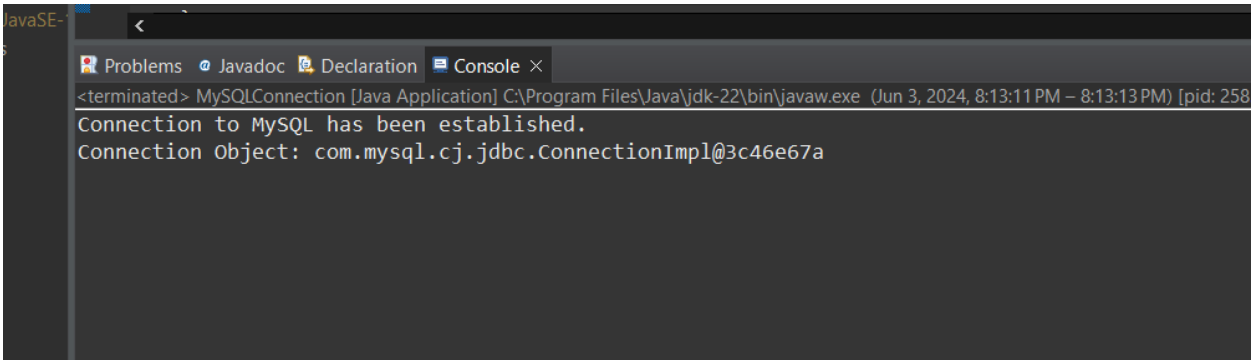
Write a Java program that connects to a SQLite database and prints out the connection object to confirm successful connection.

Ans:

```
package Practice2;


import java.sql.Connection;

import java.sql.DriverManager;

import java.sql.SQLException;


public class MySQLConnection {


   public static void main(String[] args) {


      String url = "jdbc:mysql://localhost:3306/wipdb";

      String user = "root";

      String password = "root";


      try (Connection conn = DriverManager.getConnection(url, user, password)) {

         if (conn != null) {

            System.out.println("Connection to MySQL has been established.");

            System.out.println("Connection Object: " + conn);

         } else {

            System.out.println("Failed to make connection!");

         }

      } catch (SQLException e) {

         System.out.println(e.getMessage());

      }

   }
```

}

OutPut:



Task 2: SQL Queries using JDBC

Create a table 'User' with a following schema 'User ID' and 'Password' stored as hash format (note you have research on how to generate hash from a string), accept "User ID" and "Password" as input and check in the table if they match to confirm whether user access is allowed or not.

```
package Practice2;


import java.security.MessageDigest;

import java.security.NoSuchAlgorithmException;

import java.sql.*;

import java.util.Scanner;


public class UserAuthentication {


    private static final String DB_URL = "jdbc:mysql://localhost:3306/new";
```

```
    private static final String DB_USER = "root";
    private static final String DB_PASSWORD = "root";

    public static void main(String[] args) {
        try (Connection connection = DriverManager.getConnection(DB_URL, DB_USER,
DB_PASSWORD)) {
            Scanner scanner = new Scanner(System.in);

            System.out.println("Enter 1 to register, 2 to login:");
            int choice = scanner.nextInt();
            scanner.nextLine();

            if (choice == 1) {
                registerUser(connection, scanner);
            } else if (choice == 2) {
                loginUser(connection, scanner);
            } else {
                System.out.println("Invalid choice.");
            }

        } catch (SQLException e) {
            e.printStackTrace();
        }
    }

    private static void registerUser(Connection connection, Scanner scanner) throws
SQLException {
        System.out.print("Enter User ID: ");
```

```
    String userId = scanner.nextLine();
    System.out.print("Enter Password: ");
    String password = scanner.nextLine();

    String hashedPassword = hashPassword(password);

    String sql = "INSERT INTO User (UserID, PasswordHash) VALUES (?, ?)";
    try (PreparedStatement statement = connection.prepareStatement(sql)) {
        statement.setString(1, userId);
        statement.setString(2, hashedPassword);
        statement.executeUpdate();
        System.out.println("User registered successfully.");
    }
}

private static void loginUser(Connection connection, Scanner scanner) throws SQLException {
    System.out.print("Enter User ID: ");
    String userId = scanner.nextLine();
    System.out.print("Enter Password: ");
    String password = scanner.nextLine();

    String hashedPassword = hashPassword(password);

    String sql = "SELECT * FROM User WHERE UserID = ? AND PasswordHash = ?";
    try (PreparedStatement statement = connection.prepareStatement(sql)) {
        statement.setString(1, userId);
        statement.setString(2, hashedPassword);
```

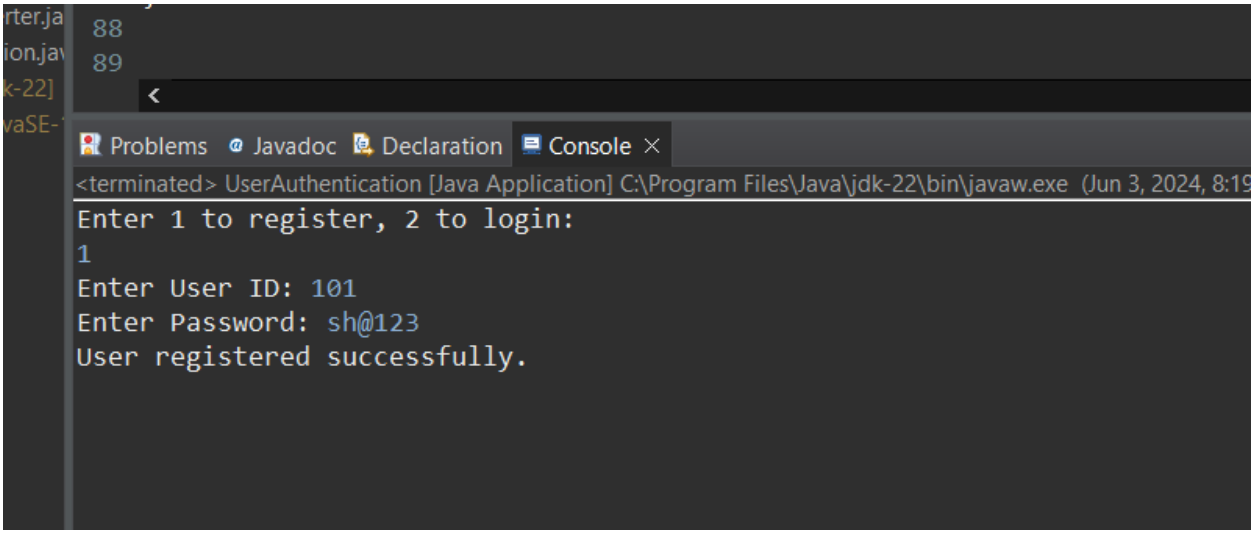
```
            ResultSet resultSet = statement.executeQuery();

            if (resultSet.next()) {
                System.out.println("Login successful.");
            } else {
                System.out.println("Invalid User ID or Password.");
            }
        }
    }

    private static String hashPassword(String password) {
        try {
            MessageDigest md = MessageDigest.getInstance("SHA-256");
            byte[] hashBytes = md.digest(password.getBytes());
            StringBuilder sb = new StringBuilder();
            for (byte b : hashBytes) {
                sb.append(String.format("%02x", b));
            }
            return sb.toString();
        } catch (NoSuchAlgorithmException e) {
            throw new RuntimeException("SHA-256 algorithm not found.", e);
        }
    }
}
```

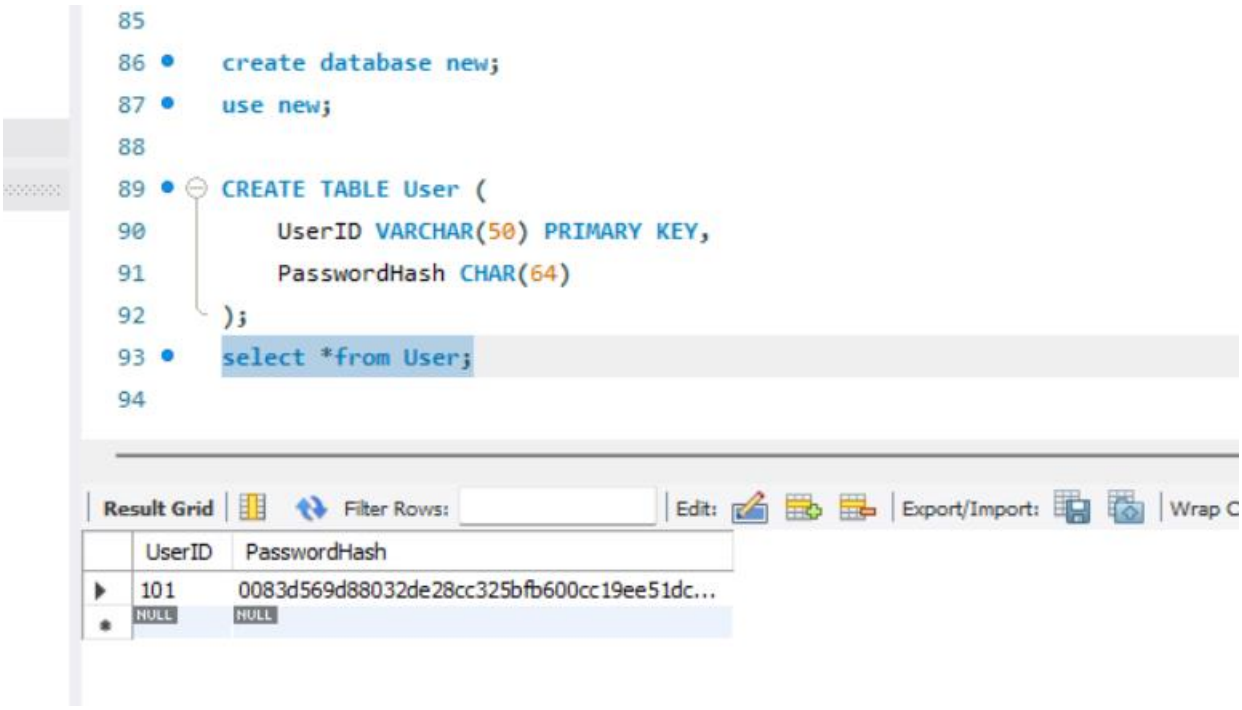
Sql-query:

```
CREATE TABLE User (
```

```
    UserID VARCHAR(50) PRIMARY KEY,
    PasswordHash CHAR(64)
);
```

Output:





Task 3: PreparedStatement

Modify the SELECT query program to use PreparedStatement to parameterize the query and prevent SQL injection.

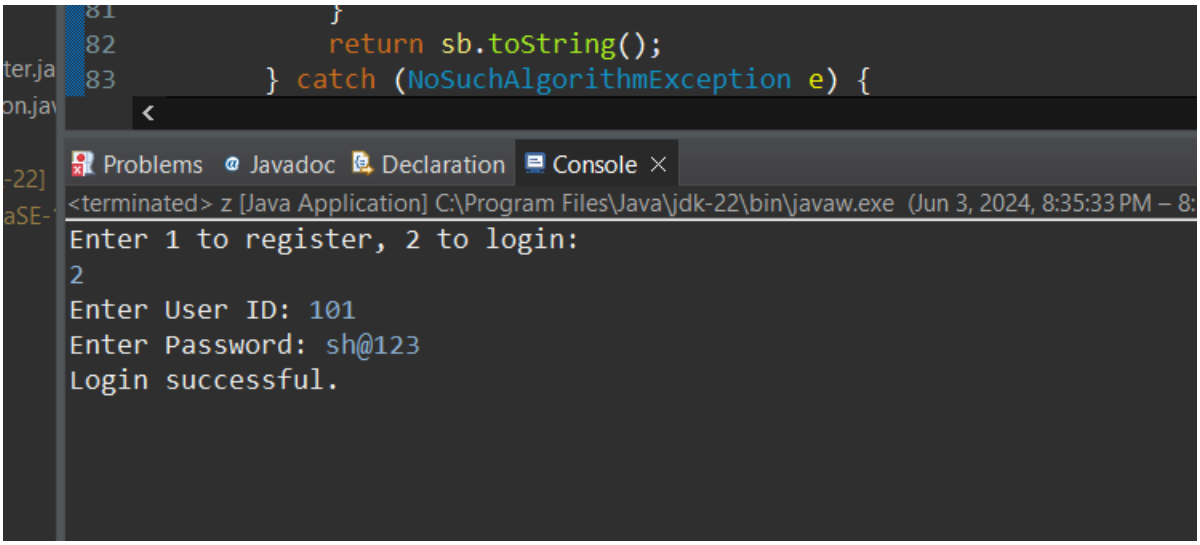
Ans:

```
package Practice2;

import java.security.MessageDigest;
import java.security.NoSuchAlgorithmException;
import java.sql.*;
import java.util.Scanner;

public class z {

   private static final String DB_URL = "jdbc:mysql://localhost:3306/new";
   private static final String DB_USER = "root";
   private static final String DB_PASSWORD = "root";

   public static void main(String[] args) {
      try (Connection connection = DriverManager.getConnection(DB_URL, DB_USER, DB_PASSWORD)) {
         Scanner scanner = new Scanner(System.in);

         System.out.println("Enter 1 to register, 2 to login:");
```

```
            int choice = scanner.nextInt();
            scanner.nextLine();

            if (choice == 1) {
                registerUser(connection, scanner);
            } else if (choice == 2) {
                loginUser(connection, scanner);
            } else {
                System.out.println("Invalid choice.");
            }

        } catch (SQLException e) {
            e.printStackTrace();
        }
    }

    private static void registerUser(Connection connection, Scanner scanner)
throws SQLException {
        System.out.print("Enter User ID: ");
        String userId = scanner.nextLine();
        System.out.print("Enter Password: ");
        String password = scanner.nextLine();

        String hashedPassword = hashPassword(password);
```

```
        String sql = "INSERT INTO User (UserID, PasswordHash) VALUES (?, ?)";
        try (PreparedStatement statement = connection.prepareStatement(sql)) {
            statement.setString(1, userId);
            statement.setString(2, hashedPassword);
            statement.executeUpdate();
            System.out.println("User registered successfully.");
        }
    }

    private static void loginUser(Connection connection, Scanner scanner) throws
SQLException {
        System.out.print("Enter User ID: ");
        String userId = scanner.nextLine();
        System.out.print("Enter Password: ");
        String password = scanner.nextLine();

        String hashedPassword = hashPassword(password);

        String sql = "SELECT * FROM User WHERE UserID = ? AND PasswordHash = ?";
        try (PreparedStatement statement = connection.prepareStatement(sql)) {
            statement.setString(1, userId);
            statement.setString(2, hashedPassword);
            ResultSet resultSet = statement.executeQuery();

            if (resultSet.next()) {
```

```
            System.out.println("Login successful.");
        } else {
            System.out.println("Invalid User ID or Password.");
        }
    }
}

private static String hashPassword(String password) {
    try {
        MessageDigest md = MessageDigest.getInstance("SHA-256");
        byte[] hashBytes = md.digest(password.getBytes());
        StringBuilder sb = new StringBuilder();
        for (byte b : hashBytes) {
            sb.append(String.format("%02x", b));
        }
        return sb.toString();
    } catch (NoSuchAlgorithmException e) {
        throw new RuntimeException("SHA-256 algorithm not found.", e);
    }
}
}
```


}
return sb.toString();
} catch (NoSuchAlgorithmException e) {
Problems
Javadoc
Declaration
Console
<terminated> z [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe (Jun 3, 2024, 8:35:33 PM – 8:
Enter 1 to register, 2 to login:
2
Enter User ID: 101
Enter Password: sh@123
Login successful.