**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**.

**Solution-**

CREATE TABLE User (

UserID VARCHAR(255) PRIMARY KEY,

PasswordHash VARCHAR(255) NOT NULL

);

desc User;

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| varchar(255) | NO | PRI |  | UserID |  |
| varchar(255) | NO |  |  | PasswordHash |  |

**Code For Password Hasher-**

package com.epwiproday\_21;

import java.security.MessageDigest;

import java.security.NoSuchAlgorithmException;

public class PasswordHasher {

public static String hashPassword(String password) throws NoSuchAlgorithmException {

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();

}

}

**Code For User DAO**

package com.epwiproday\_21;

import java.security.MessageDigest;

import java.security.NoSuchAlgorithmException;

import java.sql.Connection;

import java.sql.DriverManager;

import java.sql.PreparedStatement;

import java.sql.ResultSet;

import java.sql.SQLException;

public class UserDAO {

private static final String ***URL*** = "jdbc:mysql://localhost:3306/testdb";

private static final String ***USER*** = "root";

private static final String ***PASSWORD*** = "root";

// Hash a password using SHA-256

public static String hashPassword(String password) throws NoSuchAlgorithmException {

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();

}

// Add a user with hashed password to the database

public static void addUser(String userID, String password) throws SQLException, NoSuchAlgorithmException {

String hashedPassword = *hashPassword*(password);

String sql = "INSERT INTO User (UserID, PasswordHash) VALUES (?, ?)";

try (Connection conn = DriverManager.*getConnection*(***URL***, ***USER***, ***PASSWORD***);

PreparedStatement pstmt = conn.prepareStatement(sql)) {

pstmt.setString(1, userID);

pstmt.setString(2, hashedPassword);

pstmt.executeUpdate();

}

}

// Validate user credentials

public static boolean validateUser(String userID, String password) throws SQLException, NoSuchAlgorithmException {

String hashedPassword = *hashPassword*(password);

String sql = "SELECT PasswordHash FROM User WHERE UserID = ?";

try (Connection conn = DriverManager.*getConnection*(***URL***, ***USER***, ***PASSWORD***);

PreparedStatement pstmt = conn.prepareStatement(sql)) {

pstmt.setString(1, userID);

ResultSet rs = pstmt.executeQuery();

if (rs.next()) {

String storedHash = rs.getString("PasswordHash");

return storedHash.equals(hashedPassword);

}

}

return false;

}

}

**Execution Class-**

package com.epwiproday\_21;

import java.security.NoSuchAlgorithmException;

import java.sql.SQLException;

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.***in***);

try {

// Adding a user

System.***out***.println("Enter UserID to add:");

String userID = scanner.nextLine();

System.***out***.println("Enter Password:");

String password = scanner.nextLine();

UserDAO.*addUser*(userID, password);

System.***out***.println("User added successfully!");

// Validating a user

System.***out***.println("Enter UserID to validate:");

String validateUserID = scanner.nextLine();

System.***out***.println("Enter Password:");

String validatePassword = scanner.nextLine();

boolean isValid = UserDAO.*validateUser*(validateUserID, validatePassword);

if (isValid) {

System.***out***.println("User validated successfully!");

} else {

System.***out***.println("Invalid credentials!");

}

} catch (SQLException | NoSuchAlgorithmException e) {

e.printStackTrace();

} finally {

scanner.close();

}

}

}

**Output-**

Enter UserID to add:

digvijay

Enter Password:

Security#45

User added successfully!

Enter UserID to validate:

digvijay

Enter Password:

Security#45

User validated successfully!

Table Structure after user validation-

mysql> use testdb;

Database changed

mysql> select \* from user;

+----------------------+------------------------------------------------------------------+

| UserID | PasswordHash |

+----------------------+------------------------------------------------------------------+

| digvijay | da262285fc3ea77319bd09462c76dbce6a7b4f6d089528cb0f3fd8e6e2ff72f1 |

+----------------------+------------------------------------------------------------------+

2 rows in set (0.10 sec)