Experimet-09

Develop a Java Stand-alone application that connects with the database MySQL and perform CRUD operations on the database tables.

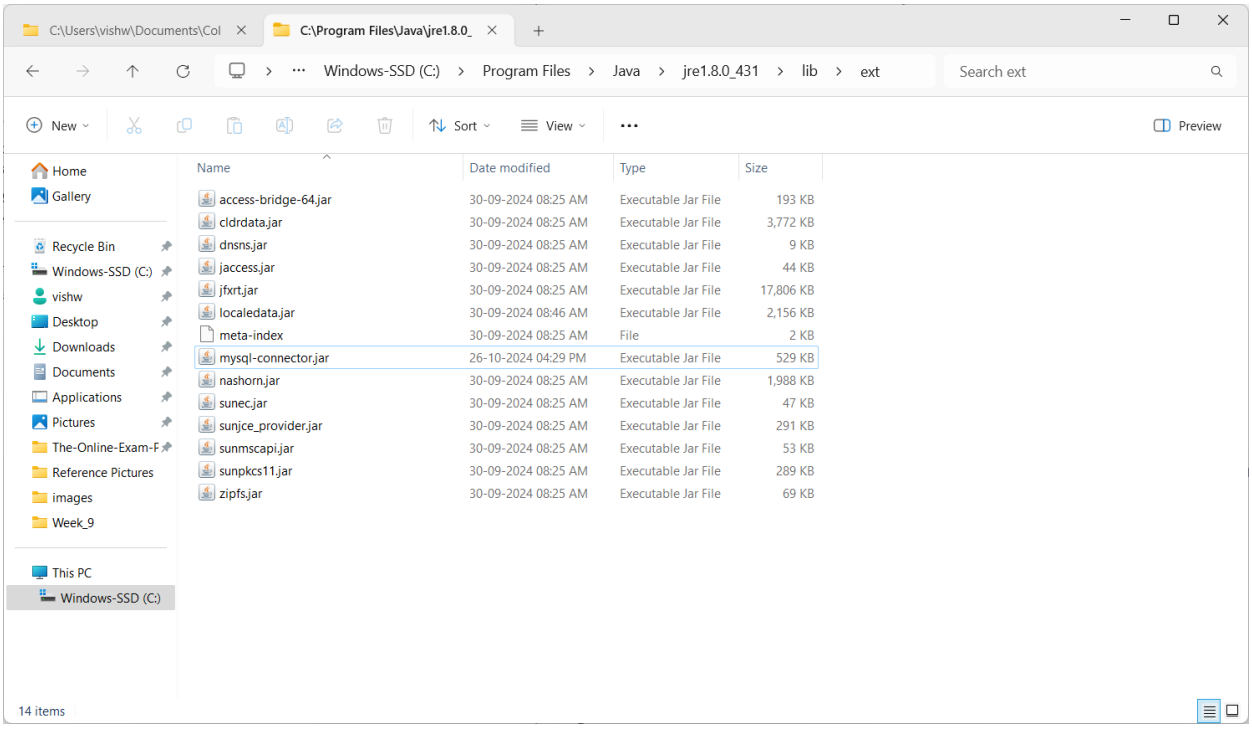
In Java applications, connection to MySQL Databases is provided using JDBC(Java Database Connectivity) API's and execute SQL queries and statements.

Step 1: Download MySQL Connector (.jar file)

- `mysql_connector.jar` file helps in establishing the connection to MySQL Database using JDBC driver class (`jdbc:mysql://localhost:3306/`)
  Download the jar file from here:
  https://static.javatpoint.com/src/jdbc/mysql-connector.jar

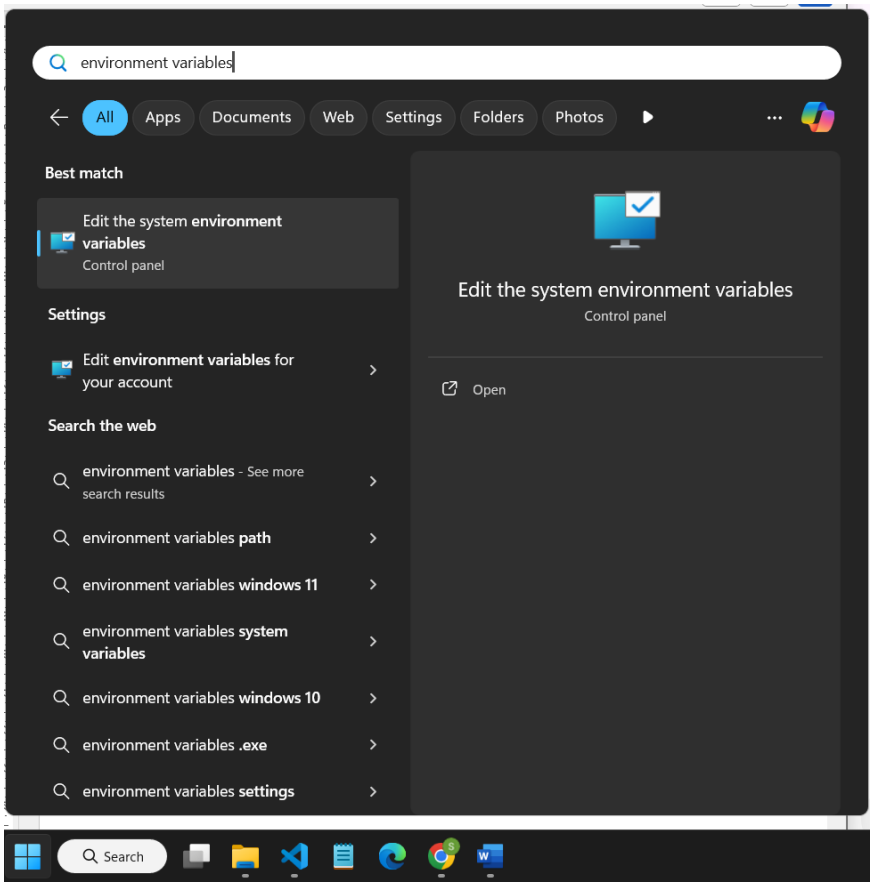
Step 2: Place the `.jar` file in `JRE folder`

- Move the .jar file to Path:
  "`C:\Program Files\Java\jre1.8.0_431\lib\ext\`"

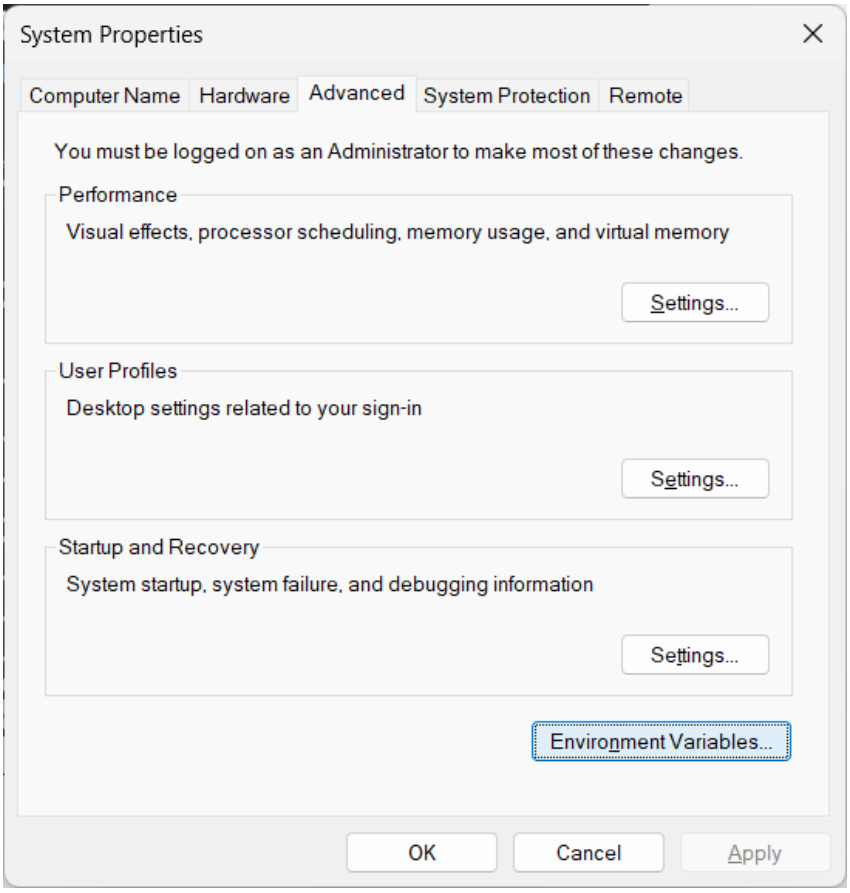


Step 3: Setting the Environment Variables

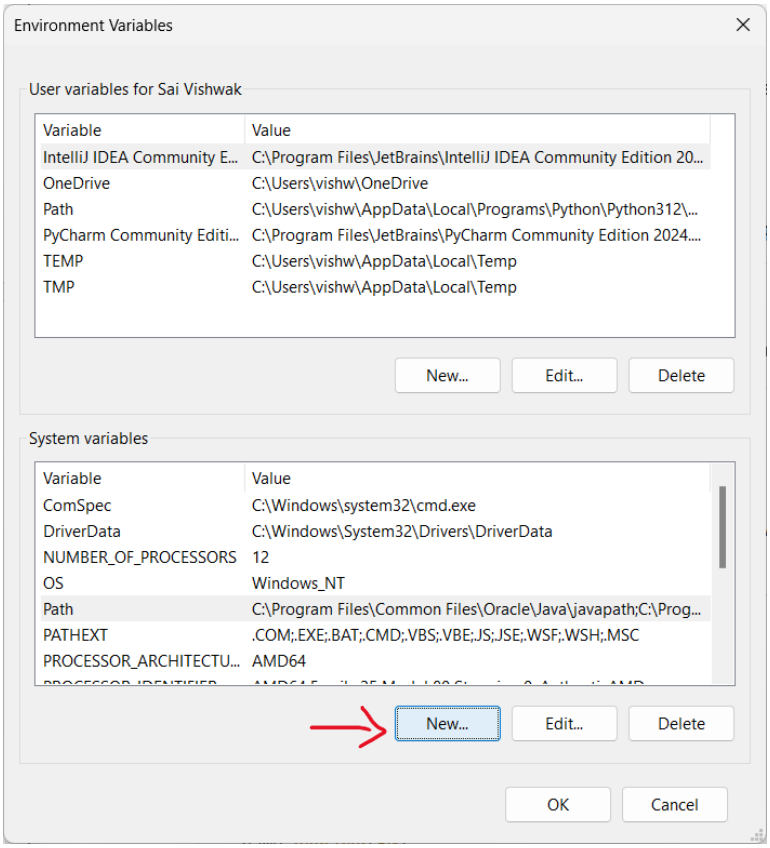
- In Windows Search Box, search for 'Environment Variables' and click on 'Edit the environment variables'



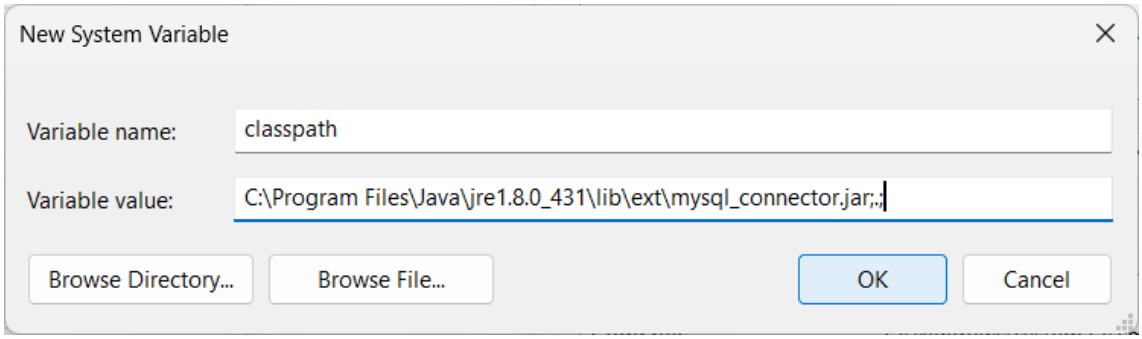
- Click on “Environment Variables” in the “System properties” dialog box



- Click on “New…” button under “System variables”



- Create a new system variable with variable name “classpath” and variable value as PATH to the .jar file placed in jre\lib\ext folder
  `C:\Program Files\Java\jre1.8.0_431\lib\ext\mysql_connector.jar;.;`



Step 4: Open XAMPP control panel and turn on MySQL server.

Step 5: Create java files to perform CRUD operations on MySQL database.

1. mysql_con.java

```
import java.sql.*;

public class mysql_con {
    public static void main(String[] args) {
        // Database credentials
        String url = "jdbc:mysql://localhost:3306/";
        String user = "root"; // Replace with your MySQL username
        String password = ""; // Replace with your MySQL password

        Connection con = null;
        Statement stmt = null;
```

```
        try {
            // Load the MySQL JDBC driver (use `com.mysql.cj.jdbc.Driver` for MySQL
Connector/J 8.0+)
            Class.forName("com.mysql.jdbc.Driver");

            // Step 1: Connect to MySQL server
            con = DriverManager.getConnection(url, user, password);
            stmt = con.createStatement();

            // Step 2: Create a new database
            String createDB = "CREATE DATABASE IF NOT EXISTS mydb";
            stmt.executeUpdate(createDB);
            System.out.println("Database 'mydb' created successfully.");

            // Step 3: Connect to the new database
            con = DriverManager.getConnection(url + "mydb", user, password);
            stmt = con.createStatement();

            // Step 4: Create a new table in the database
            String createTable = "CREATE TABLE IF NOT EXISTS emp (" +
                                 "id INT(3) PRIMARY KEY, " +
                                 "name VARCHAR(10), " +
                                 "age INT(2))";
            stmt.executeUpdate(createTable);
            System.out.println("Table 'emp' created successfully.");

        } catch (ClassNotFoundException e) {
            System.out.println("MySQL JDBC Driver not found. Please add it to your library
path.");
            e.printStackTrace();
        } catch (SQLException e) {
            System.out.println("SQL Error: " + e.getMessage());
            e.printStackTrace();
        } finally {
            // Close the resources
            try {
                if (stmt != null) stmt.close();
                if (con != null) con.close();
            } catch (SQLException e) {
                e.printStackTrace();
            }
        }
    }
}
```

Output:

```
Database 'my_db' created successfully.
Table 'emp' created successfully.
```

2. insert_db.java

```java
import java.sql.*;
import java.util.Scanner;

public class insert_db {
    public static void main(String[] args) {
        // Database connection details
        String url = "jdbc:mysql://localhost:3306/mydb";
        String user = "root"; // Replace with your MySQL username
        String password = ""; // Replace with your MySQL password

        Connection con = null;
        PreparedStatement pstmt = null;
        Scanner scanner = new Scanner(System.in);

        try {
            // Load the MySQL JDBC Driver
            Class.forName("com.mysql.jdbc.Driver");

            // Establish a connection to the database
            con = DriverManager.getConnection(url, user, password);

            // Prompt the user for employee details
            System.out.print("Enter Employee ID: ");
            int id = scanner.nextInt();
            scanner.nextLine();  // Clear the newline character

            System.out.print("Enter Employee Name (max 10 characters): ");
            String name = scanner.nextLine();

            System.out.print("Enter Employee Age: ");
            int age = scanner.nextInt();

            // Insert SQL command
            String sql = "INSERT INTO emp (id, name, age) VALUES (?, ?, ?)";

            // Create a PreparedStatement to execute the SQL command
            pstmt = con.prepareStatement(sql);
            pstmt.setInt(1, id);
            pstmt.setString(2, name);
            pstmt.setInt(3, age);

            // Execute the insertion
            int rowsAffected = pstmt.executeUpdate();
            if (rowsAffected > 0) {
                System.out.println("Record inserted successfully.");
            } else {
                System.out.println("Failed to insert the record.");
            }

        } catch (ClassNotFoundException e) {
            System.out.println("MySQL JDBC Driver not found. Please add it to your library
path.");
            e.printStackTrace();
        } catch (SQLException e) {
```

```
            System.out.println("SQL Error: " + e.getMessage());
            e.printStackTrace();
        } finally {
            // Close the resources
            try {
                if (pstmt != null) pstmt.close();
                if (con != null) con.close();
                scanner.close();
            } catch (SQLException e) {
                e.printStackTrace();
            }
        }
    }
}
```

Output:

```
Enter Employee ID: 101
Enter Employee Name (max 10 characters): Alice
Enter Employee Age: 25
Record inserted successfully.
```

3. display_db.java

```
import java.sql.*;

public class display_db {
    public static void main(String[] args) {
        // Database connection details
        String url = "jdbc:mysql://localhost:3306/mydb";
        String user = "root"; // Replace with your MySQL username
        String password = ""; // Replace with your MySQL password

        Connection con = null;
        Statement stmt = null;

        try {
            // Load the MySQL JDBC Driver
            Class.forName("com.mysql.jdbc.Driver");

            // Establish a connection to the database
            con = DriverManager.getConnection(url, user, password);

            // Create a statement to execute SQL queries
            stmt = con.createStatement();
            String sql = "SELECT * FROM emp";

            // Execute the query and get the result set
            ResultSet rs = stmt.executeQuery(sql);

            // Display the records
            System.out.println("ID   Name      Age");
```

```
            System.out.println("--------------------");
            while (rs.next()) {
                int id = rs.getInt("id");
                String name = rs.getString("name");
                int age = rs.getInt("age");
                System.out.printf("%-4d %-10s %d%n", id, name, age);
            }

        } catch (ClassNotFoundException e) {
            System.out.println("MySQL JDBC Driver not found. Please add it to your library
path.");
            e.printStackTrace();
        } catch (SQLException e) {
            System.out.println("SQL Error: " + e.getMessage());
            e.printStackTrace();
        } finally {
            // Close the resources
            try {
                if (stmt != null) stmt.close();
                if (con != null) con.close();
            } catch (SQLException e) {
                e.printStackTrace();
            }
        }
    }
}
```

Output:

```
ID   Name      Age
--------------------
101  Alice     25
102  Bob       30
103  Charlie   28
```

4. update_db.java

```
import java.sql.*;
import java.util.Scanner;

public class update_db {
    public static void main(String[] args) {
        // Database connection details
        String url = "jdbc:mysql://localhost:3306/mydb";
        String user = "root"; // Replace with your MySQL username
        String password = ""; // Replace with your MySQL password

        Connection con = null;
        PreparedStatement pstmt = null;
        Scanner scanner = new Scanner(System.in);

        try {
```

```
            // Load the MySQL JDBC Driver
            Class.forName("com.mysql.jdbc.Driver");

            // Establish a connection to the database
            con = DriverManager.getConnection(url, user, password);

            // Prompt the user for the employee ID to update
            System.out.print("Enter Employee ID to update: ");
            int id = scanner.nextInt();
            scanner.nextLine();  // Clear the newline character

            // Prompt for new name and age
            System.out.print("Enter new Employee Name (max 10 characters): ");
            String name = scanner.nextLine();

            System.out.print("Enter new Employee Age: ");
            int age = scanner.nextInt();

            // Update SQL command
            String sql = "UPDATE emp SET name = ?, age = ? WHERE id = ?";

            // Create a PreparedStatement to execute the SQL command
            pstmt = con.prepareStatement(sql);
            pstmt.setString(1, name);
            pstmt.setInt(2, age);
            pstmt.setInt(3, id);

            // Execute the update
            int rowsAffected = pstmt.executeUpdate();
            if (rowsAffected > 0) {
                System.out.println("Record updated successfully.");
            } else {
                System.out.println("No record found with ID: " + id);
            }

        } catch (ClassNotFoundException e) {
            System.out.println("MySQL JDBC Driver not found. Please add it to your library
path.");
            e.printStackTrace();
        } catch (SQLException e) {
            System.out.println("SQL Error: " + e.getMessage());
            e.printStackTrace();
        } finally {
            // Close the resources
            try {
                if (pstmt != null) pstmt.close();
                if (con != null) con.close();
                scanner.close();
            } catch (SQLException e) {
                e.printStackTrace();
            }
        }
    }
}
```

Output:

```
Enter the ID of the employee you want to update: 101
Enter new Name (max 10 characters): Alicia
Enter new Age: 26
Record updated successfully.
```

5. delete_db.java

```
import java.sql.*;
import java.util.Scanner;

public class delete_db {
    public static void main(String[] args) {
        // Database connection details
        String url = "jdbc:mysql://localhost:3306/mydb";
        String user = "root"; // Replace with your MySQL username
        String password = ""; // Replace with your MySQL password

        Connection con = null;
        PreparedStatement pstmt = null;
        Scanner scanner = new Scanner(System.in);

        try {
            // Load the MySQL JDBC Driver
            Class.forName("com.mysql.jdbc.Driver");

            // Establish a connection to the database
            con = DriverManager.getConnection(url, user, password);

            // Prompt the user for the employee ID to delete
            System.out.print("Enter Employee ID to delete: ");
            int id = scanner.nextInt();

            // Delete SQL command
            String sql = "DELETE FROM emp WHERE id = ?";

            // Create a PreparedStatement to execute the SQL command
            pstmt = con.prepareStatement(sql);
            pstmt.setInt(1, id);

            // Execute the deletion
            int rowsAffected = pstmt.executeUpdate();
            if (rowsAffected > 0) {
                System.out.println("Record deleted successfully.");
            } else {
                System.out.println("No record found with ID: " + id);
            }

        } catch (ClassNotFoundException e) {
            System.out.println("MySQL JDBC Driver not found. Please add it to your library
path.");
```

```
            e.printStackTrace();
        } catch (SQLException e) {
            System.out.println("SQL Error: " + e.getMessage());
            e.printStackTrace();
        } finally {
            // Close the resources
            try {
                if (pstmt != null) pstmt.close();
                if (con != null) con.close();
                scanner.close();
            } catch (SQLException e) {
                e.printStackTrace();
            }
        }
    }
}
```

Output:

```
Enter the ID of the employee you want to delete: 102
Record deleted successfully.
```