Case Study 1: Online Course Registration System
Objective:
Allow students to register/unregister for courses and view course details.

 Table Structure:

```
CREATE DATABASE course db;
USE course db;
CREATE TABLE courses (
course id INT PRIMARY KEY,
course name VARCHAR(100),
faculty VARCHAR(100),
credits INT
);
```
JDBC Operations:
Creating Table:
```java
package jdbc.demo;

import java.sql.Connection;
import java.sql.DriverManager;

public class CourseManager {

    public static void main(String[] args) {

        //  Connection details
        String url = "jdbc:mysql://localhost:3306/course_db";
        String user = "root";
        String password = "dascme@123";

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

            //  Connect to database
            Connection conn = DriverManager.getConnection(url, user, password);
            System.out.println(" Connected to course_db database!");

            //  Close connection
            conn.close();

        } catch (Exception e) {
            System.out.println(" Connection error: " + e);
        }
    }
}
```

OUTPUT:
 Connected to course_db database!

INSERT: Add new courses.
```java
package jdbc.demo;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;

public class InsertedCourses {

    public static void main(String[] args) {

        String url = "jdbc:mysql://localhost:3306/course_db";
        String user = "root";
```

```java
        String password = "dascme@123";

        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection conn = DriverManager.getConnection(url, user, password);
            System.out.println("Connected to course_db");

            String sql = "INSERT INTO courses (course_id, course_name, faculty,
credits) VALUES (?, ?, ?, ?)";
            PreparedStatement ps = conn.prepareStatement(sql);

            ps.setInt(1, 101);                       // course_id
            ps.setString(2, "Java");      // course_name
            ps.setString(3, "Mr.S.S.Das");           // faculty
            ps.setInt(4, 3);                         // credits

            int rowsInserted = ps.executeUpdate();

            if (rowsInserted > 0) {
                System.out.println("Course inserted successfully.");
            }

            conn.close();

        } catch (Exception e) {
            System.out.println("Error: " + e);
        }
    }
}
```

OUTPUT:
Connected to course_db
Course inserted successfully.

SELECT: List available courses.

```java
package jdbc.demo;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.ResultSet;
import java.sql.Statement;

public class SelectCourses {

    public static void main(String[] args) {

        String url = "jdbc:mysql://localhost:3306/course_db";
        String user = "root";
        String password = "dascme@123";

        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection conn = DriverManager.getConnection(url, user, password);
            System.out.println("Connected to course_db");

            String sql = "SELECT * FROM courses";
            Statement stmt = conn.createStatement();
            ResultSet rs = stmt.executeQuery(sql);

            System.out.println("Course List:");
            System.out.println("----------------------------------------------");
            System.out.printf("%-10s %-20s %-15s %-10s%n", "ID", "Course Name",
```

```
"Faculty", "Credits");
              System.out.println("---------------------------------------------");

              while (rs.next()) {
                  int id = rs.getInt("course_id");
                  String name = rs.getString("course_name");
                  String faculty = rs.getString("faculty");
                  int credits = rs.getInt("credits");

                  System.out.printf("%-10d %-20s %-15s %-10d%n", id, name,
faculty, credits);
              }

              conn.close();

        } catch (Exception e) {
            System.out.println("Error: " + e);
        }
    }
}
```

```
OUTPUT:
Connected to course_db
Course List:
---------------------------------------------
ID          Course Name        Faculty        Credits
---------------------------------------------
101         Java               Siva           5
301         Java               Mr.S.S.Das     3
```

UPDATE: Modify faculty or credit values.

```
package jdbc.demo;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.util.Scanner;

public class UpdateCourse {

    public static void main(String[] args) {

        String url = "jdbc:mysql://localhost:3306/course_db";
        String user = "root";
        String password = "dascme@123";

        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection conn = DriverManager.getConnection(url, user, password);
            System.out.println("Connected to course_db");

            Scanner sc = new Scanner(System.in);

            // Get input from user
            System.out.print("Enter Course ID to update: ");
            int courseId = sc.nextInt();
            sc.nextLine(); // consume newline

            System.out.print("Enter new Faculty Name: ");
            String newFaculty = sc.nextLine();

            System.out.print("Enter new Credits: ");
            int newCredits = sc.nextInt();
```

```java
            // Update query
            String sql = "UPDATE courses SET faculty = ?, credits = ? WHERE
course_id = ?";
            PreparedStatement ps = conn.prepareStatement(sql);

            ps.setString(1, newFaculty);
            ps.setInt(2, newCredits);
            ps.setInt(3, courseId);

            int rowsUpdated = ps.executeUpdate();

            if (rowsUpdated > 0) {
                System.out.println("Course updated successfully.");
            } else {
                System.out.println("Course ID not found.");
            }

            conn.close();
            sc.close();

        } catch (Exception e) {
            System.out.println("Error: " + e);
        }
    }
}
```

OUTPUT:
Connected to course_db
Enter Course ID to update: 301
Enter new Faculty Name: ssdmemer
Enter new Credits: 5
Course updated successfully.

DELETE: Remove obsolete courses.
```java
package jdbc.demo;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.util.Scanner;

public class DeleteCourse {

    public static void main(String[] args) {

        String url = "jdbc:mysql://localhost:3306/course_db";
        String user = "root";
        String password = "dascme@123";

        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection conn = DriverManager.getConnection(url, user, password);
            System.out.println("Connected to course_db");

            Scanner sc = new Scanner(System.in);

            // Get Course ID from user
            System.out.print("Enter Course ID to delete: ");
            int courseId = sc.nextInt();

            // Delete query
```

```java
            String sql = "DELETE FROM courses WHERE course_id = ?";
            PreparedStatement ps = conn.prepareStatement(sql);
            ps.setInt(1, courseId);

            int rowsDeleted = ps.executeUpdate();

            if (rowsDeleted > 0) {
                System.out.println("Course deleted successfully.");
            } else {
                System.out.println("Course ID not found.");
            }

            conn.close();
            sc.close();

        } catch (Exception e) {
            System.out.println("Error: " + e);
        }
    }
}
```

```
OUTPUT:
Connected to course_db
Enter Course ID to delete: 301
Course deleted successfully.
```


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Case Study 2: Product Inventory System

Objective:Track product stock in a retail store.

Table Structure:C

```sql
CREATE DATABASE inventory_db;
USE inventory_db;

CREATE TABLE products (product_id INT PRIMARY KEY, product name VARCHAR(100),
quantity INT, price DECIMAL(10,2));
```

JDBC Operations:
Creating Table:

```java
package jdbc.demo;

import java.sql.Connection;
import java.sql.DriverManager;

public class InventoryConnection {

    public static void main(String[] args) {

        String url = "jdbc:mysql://localhost:3306/inventory_db";
        String user = "root";
        String password = "dascme@123";

        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection conn = DriverManager.getConnection(url, user, password);
            System.out.println("Connected to inventory_db");
```

```java
                conn.close();
        } catch (Exception e) {
            System.out.println("Error: " + e);
        }
    }
}
```

OUTPUT:
Connected to inventory_db

INSERT: Add new products to inventory.
```java
package jdbc.demo;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;

public class InsertProduct {

    public static void main(String[] args) {

        String url = "jdbc:mysql://localhost:3306/inventory_db";
        String user = "root";
        String password = "dascme@123";

        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection conn = DriverManager.getConnection(url, user, password);
            System.out.println("Connected to inventory_db");

            String sql = "INSERT INTO products (product_id, product_name,
quantity, price) VALUES (?, ?, ?, ?)";
            PreparedStatement ps = conn.prepareStatement(sql);

            // Set product details
            ps.setInt(1, 101);                      // product_id
            ps.setString(2, "Pen");                 // product_name
            ps.setInt(3, 50);                       // quantity
            ps.setDouble(4, 10.50);                 // price

            int rowsInserted = ps.executeUpdate();

            if (rowsInserted > 0) {
                System.out.println("Product inserted successfully.");
            }

            conn.close();

        } catch (Exception e) {
            System.out.println("Error: " + e);
        }
    }
}
```

OUTPUT:
Connected to inventory_db
Product inserted successfully.

SELECT: View stock levels and prices.
```java
package jdbc.demo;

import java.sql.Connection;
import java.sql.DriverManager;
```

```java
import java.sql.ResultSet;
import java.sql.Statement;

public class SelectProducts {

    public static void main(String[] args) {

        String url = "jdbc:mysql://localhost:3306/inventory_db";
        String user = "root";
        String password = "dascme@123";

        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection conn = DriverManager.getConnection(url, user, password);
            System.out.println("Connected to inventory_db");

            String sql = "SELECT * FROM products";
            Statement stmt = conn.createStatement();
            ResultSet rs = stmt.executeQuery(sql);

            System.out.println("Product List:");

System.out.println("-----------------------------------------------------------");
            System.out.printf("%-10s %-20s %-10s %-10s%n", "ID", "Product Name",
"Quantity", "Price");

System.out.println("-----------------------------------------------------------");

            while (rs.next()) {
                int id = rs.getInt("product_id");
                String name = rs.getString("product_name");
                int qty = rs.getInt("quantity");
                double price = rs.getDouble("price");

                System.out.printf("%-10d %-20s %-10d %-10.2f%n", id, name, qty,
price);
            }

            conn.close();

        } catch (Exception e) {
            System.out.println("Error: " + e);
        }
    }
}
```

OUTPUT:
Connected to inventory_db
Product List:

ID   Product Name   Quantity   Price
----
101   Pen   50   10.50

UPDATE: Update quantity after sale/purchase.
```java
package jdbc.demo;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.util.Scanner;

public class UpdateProductQuantity {
```

```java
    public static void main(String[] args) {

        String url = "jdbc:mysql://localhost:3306/inventory_db";
        String user = "root";
        String password = "dascme@123";

        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection conn = DriverManager.getConnection(url, user, password);
            System.out.println("Connected to inventory_db");

            Scanner sc = new Scanner(System.in);

            // Get product ID and quantity change from user
            System.out.print("Enter Product ID to update quantity: ");
            int productId = sc.nextInt();

            System.out.print("Enter new quantity: ");
            int newQuantity = sc.nextInt();

            // Update query
            String sql = "UPDATE products SET quantity = ? WHERE product_id
= ?";
            PreparedStatement ps = conn.prepareStatement(sql);

            ps.setInt(1, newQuantity);
            ps.setInt(2, productId);

            int rowsUpdated = ps.executeUpdate();

            if (rowsUpdated > 0) {
                System.out.println("Product quantity updated successfully.");
            } else {
                System.out.println("Product ID not found.");
            }

            conn.close();
            sc.close();

        } catch (Exception e) {
            System.out.println("Error: " + e);
        }
    }
}
```

OUTPUT:
Connected to inventory_db
Enter Product ID to update quantity: 101
Enter new quantity: 6
Product quantity updated successfully.

DELETE: Remove discontinued products.

```java
package jdbc.demo;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.util.Scanner;

public class DeleteProduct {

    public static void main(String[] args) {

        String url = "jdbc:mysql://localhost:3306/inventory_db";
```

```java
        String user = "root";
        String password = "dascme@123";

        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection conn = DriverManager.getConnection(url, user, password);
            System.out.println("Connected to inventory_db");

            Scanner sc = new Scanner(System.in);

            // Get product ID to delete
            System.out.print("Enter Product ID to delete: ");
            int productId = sc.nextInt();

            String sql = "DELETE FROM products WHERE product_id = ?";
            PreparedStatement ps = conn.prepareStatement(sql);
            ps.setInt(1, productId);

            int rowsDeleted = ps.executeUpdate();

            if (rowsDeleted > 0) {
                System.out.println("Product deleted successfully.");
            } else {
                System.out.println("Product ID not found.");
            }

            conn.close();
            sc.close();

        } catch (Exception e) {
            System.out.println("Error: " + e);
        }
    }
}
```

OUTPUT:
Connected to inventory_db
Enter Product ID to delete: 101
Product deleted successfully.