FUNDAMENTAL PROGRAMMING TECHNIQUES

ASSIGNMENT 3 - SUPPORT PRESENTATION (PART I)

Problem and solution

PROBLEM: "Managing the products, the clients and the orders for a warehouse using handwritten registries is difficult and time consuming"



SOLUTION: order management application

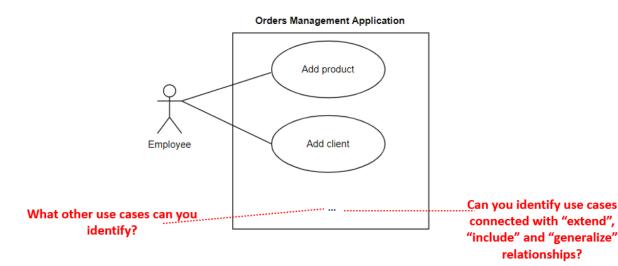


- 1. Clearly state the main objective and the sub-objectives required to reach it.
- 2. Analyze the problem and define the functional and non-functional requirements.
- 3. Design the solution
- 4. Implement the solution
- 5. Test the solution

Objectives

- Main objective
 - Design and implement an application for managing the client orders for a warehouse
- Sub-objectives
 - Analyze the problem and identify requirements
 - Design the orders management application
 - Implement the orders management application
 - Test the orders management application

Analysis



Use Case: add product Primary Actor: employee Main Success Scenario:

- 1. The employee selects the option to add a new product
- 2. The application will display a form in which the product details should be inserted
- The employee inserts the name of the product, its price and current stock
- 4. The employee clicks on the "Add" button
- 5. The application stores the product data in the database and displays an acknowledge message

Alternative Sequence: Invalid values for the product's data

- The user inserts a negative value for the stock of the product
- The application displays an error message and requests the user to insert a valid stock
- The scenario returns to step 3

Define requirements

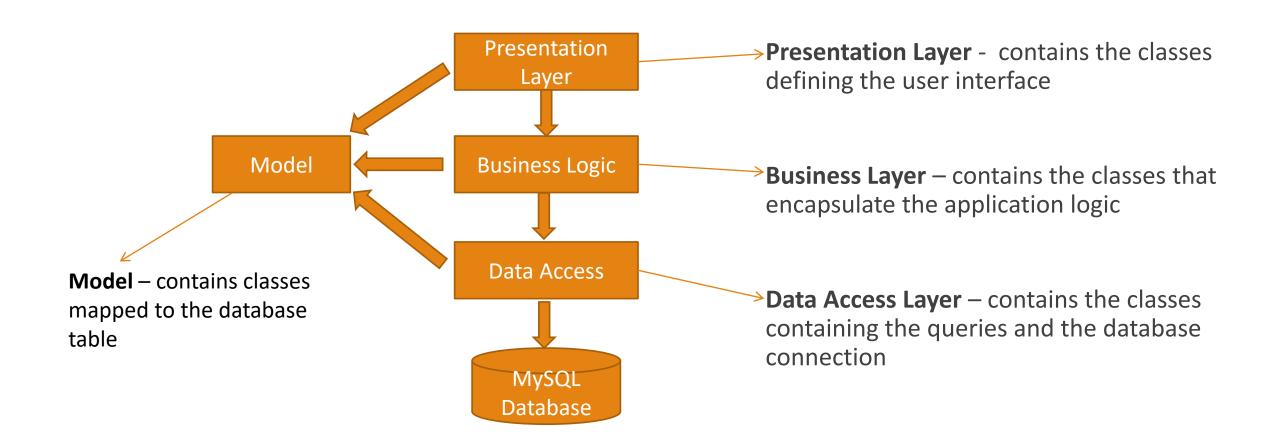
Functional requirements:

- The application should allow an employee to add a new client
- The application should allow an employee to add a new product
- ... what other functional requirements can you define? ...

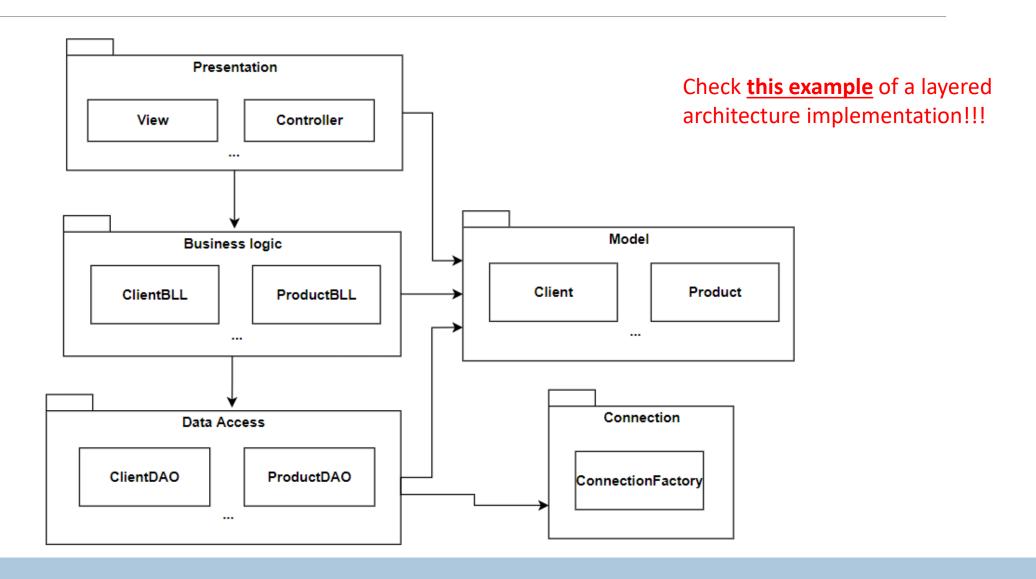
Non-Functional requirements:

- The application should be intuitive and easy to use by the user
- ... what other non-functional requirements can you define? ...

Design – Conceptual Architecture

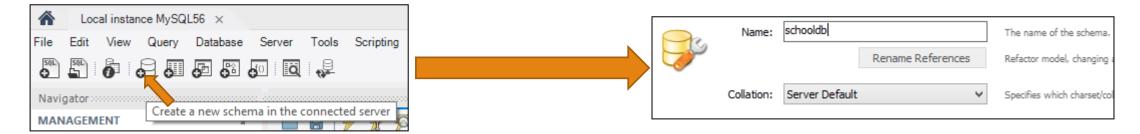


Design – Detailed Architecture



JDBC Basics - Prerequisites

- Install MySQL and MySQL Workbench (see document)
- Create a database in MySQL Workbench set "schooldb" as the name of the schema



 Create a table called "student" student Table Name: Schema Default ▼ ■ schooldb Tables Comments: Create Table... Create Table Like... Column Name Datatype PK NN UQ BIN UN ZF AI Default Search Table Data... 💡 id name VARCHAR(45) Refresh All address VARCHAR(45) email VARCHAR(45) age INT

JDBC Basics – Processing SQL Statements

Steps

- Establish a connection with the data source
- Create a statement
- Execute the query
- Process the ResultSet object
- Close the connection

JDBC Basics – Establishing a Connection

 This class contains the name of the driver (initialized through reflection), the database location (DBURL), and the user and the password for accessing the MySQL Server

 The connection to the DB will be placed in a Singleton* object

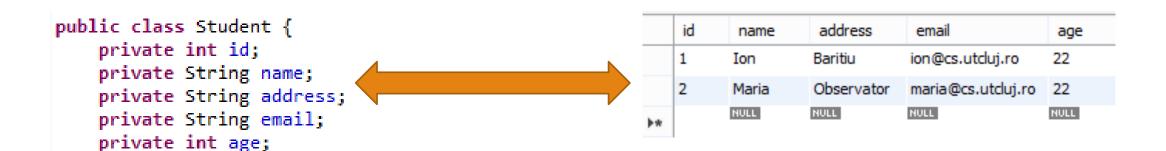
 The class contains methods for creating a connection, getting an active connection and closing a connection, a Statement or a ResultSet

```
public class ConnectionFactory {
   private static final Logger LOGGER = Logger.getLogger(ConnectionFactory.class.getName());
   private static final String DRIVER = "com.mysql.cj.jdbc.Driver";
    private static final String DBURL = "jdbc:mysql://localhost:3306/schooldb";
   private static final String USER = "root";
   private static final String PASS = "root";
    private static ConnectionFactory singleInstance = new ConnectionFactory();
   private ConnectionFactory() {
        try {
            Class.forName(DRIVER);
        } catch (ClassNotFoundException e) {
            e.printStackTrace();
   private Connection createConnection() {[]
   public static Connection getConnection() {
   public static void close(Connection connection) {
   public static void close(Statement statement) {[]
   public static void close(ResultSet resultSet) {[]
```

*Singleton Design Pattern: https://en.wikipedia.org/wiki/Singleton pattern

JDBC Basics – Table Mapping

- In order to extract elements from the DB table, a special class (named entity) must be created.
- This class MUST have the fields exactly the same type as the columns from the corresponding table.
- The class must have also constructors, getters and setters.



JDBC Basics - Dependencies

• In order for the Java application to interact with the DB, a special .jar library must be added to the application

• It can be added either as an external jar file dependency or as a maven dependency, in case of a Maven project

ocs			File folder
c			File folder
ysql-connector-java-5.1.41-bin.jar	992,808 94	4,711	Executable Jar File
HANGES	242,633 8	0,747	File
DPYING	18,122	6,787	File
EADME	61,407 1	3,437	File
EADME.txt	63,658 1	6,116	Text Document
uild.xml	91,463 1	3,940	XML File
HANGES DPYING EADME EADME.txt	242,633 8 18,122 61,407 1 63,658 1	6,747 6,787 3,437 6,116	File File File Text Document

```
<dependency>
     <groupId>mysql</groupId>
     <artifactId>mysql-connector-java</artifactId>
     <version>8.0.23</version>
</dependency>
```

- The Java application uses this external library to communicate with the MySQL server
- It sends queries to the server using **Statements** and it receives the results of the queries as **ResultSet**

JDBC Basics – Creating and Executing Statement

1. Define a string with the query

5. Execute the query

3. Initialize the query

JDBC Basics - Process the ResultSet object

The results of the query execution are stored in a result set:

- Each element of the result set corresponds to a row from the table
- The result set can be iterated
- The properties/values from the columns can be extracted if the column name is known

```
rs = findStatement.executeQuery();
rs.next();

String name = rs.getString("name");
String address = rs.getString("address");
String email = rs.getString("email");
int age = rs.getInt("age");
```

JDBC Basics – Closing the connection

After each operation the connection must be closed: