CIT Assignment 4 – Web service and Data Layer

This assignment consists of two components. The first part involves the creation of a domain model and a data service. The data service serves as the intermediary layer responsible for communicating with the database, offering an interface to the rest of the system, and handling the transformation between the database model and the domain model. In the second part, scheduled for Friday, October 19th, we will add a RESTful web service layer on top of the data layer developed in the first part. Like the third assignment, you will receive test suites to ensure your code meets the required functionality. However, this assignment places a greater emphasis on the structure of your code and your design choices. We aim for clean and well-structured code[1].

Instructions for Submission

Please submit the following items:

1. A concise 1–2-page document containing the following information:
   - List of group members.
   - The URL to your GitHub repository (or a similar platform) where the source code is accessible.
   - A table or screenshot (from your testing environment) displaying the status of the tests in the two test suites for this assignment.
2. Upload the document to the Moodle platform under "Assignment 4" by no later than October 19 at 23:59.

Important

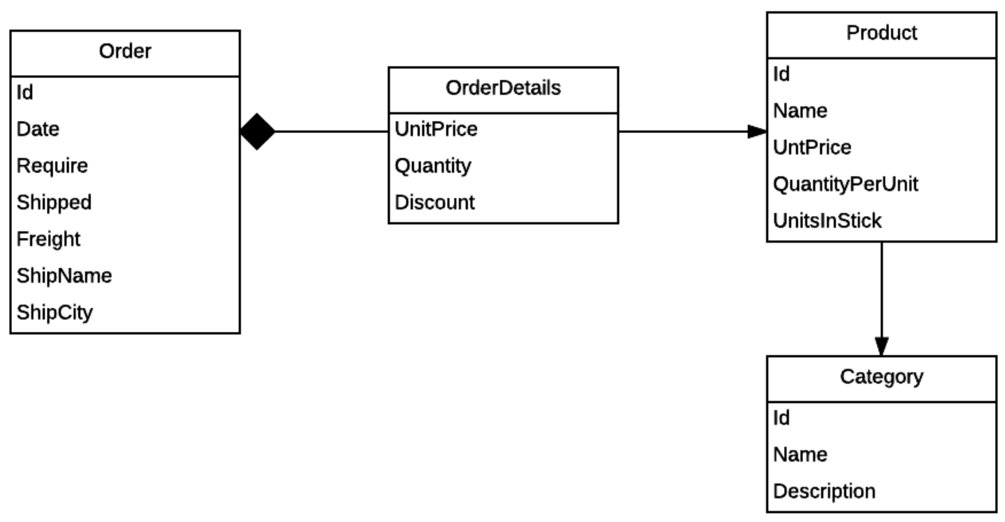
Submit a single group submission but ensure that the names of all participants in your group are clearly listed at the top of the file.

Part I – The Data Layer

In this assignment, the overall objective is to create a RESTful web service that interfaces with a small testing database called "Northwind". This database is a sample provided with earlier versions of Microsoft SQL Server, and you can find a diagram of the database here: https://northwinddatabase.codeplex.com/. The database for this assignment can be downloaded from Moodle.

For this assignment, our focus will be on the following tables from the Northwind database: "orders," "orderdetails," "products," and "categories." We will disregard all other tables. The data service, which will be developed in the first part, will expose the following domain model to the subsequent layers.

[1] https://blog.goyello.com/2013/01/21/top-9-principles-clean-code/



The mapping between the database model and the object-oriented model (the provided domain model) will be handled using Entity Framework Core (EF Core), an object-relational mapper that facilitates data movement between the data service and the database, bridging the gap between object-oriented and relational models.

The following are the requirements for the data service:

Order

1. Get a single order by ID: Retrieve the complete order, including all its attributes and the entire list of order details. Each order detail should include the product, which must also include the category.
2. Get orders by shipping name: Return a list of orders with their ID, date, shipping name, and city.
3. List all orders: Provide a list of orders with the same information as in requirement 2.

Order Details

4. Get details for a specific order ID: Retrieve the order details, including the product.
5. Get details for a specific product ID: Obtain the complete list of details, including the product and the order. Order the details by Order Id.

Product

6. Get a single product by ID: Return Id, Name, UnitPrice, QuantityPerUnit and UnitsInStock from product plus the name of the category.
7. Get a list of products containing a substring: Search for products with names matching the given substring and return a list containing only the product names and category names. [Hint: This requires a new object with only these two attributes]
8. Get products by category ID: Retrieve a list of products belonging to the given category, including information as described in requirement 6.

Category

9. Get category by ID: Return the category if found; otherwise, return null.
10. Get all categories: Provide a list of categories, including their ID, name, and description.
11. Add a new category: Add a new category to the system, accepting name and description as arguments. The system should generate a new ID and return the newly created category.
12. Update category: Accept ID, name, and description as arguments and update the category with the provided information. If the category is found, update it, and return true; otherwise, return false.
13. Delete category: Accept the category's ID as an argument. Return true if the category is successfully deleted; otherwise, return false.

Important Note: It might be essential to create multiple distinct objects (classes) to facilitate the retrieval of the necessary information. These objects are commonly known as Data Transfer Objects (DTOs) [2] and form a crucial part of the abstractions required to reduce dependencies between the various layers.

The data service should be implemented as a library that can be referenced by other projects. You can refer to an example in the solution with the test suite, where a dummy data service project is included. You can find the test suite for the first part here:

https://github.com/bulskov/CIT_2025_Assignment4PartI

[2] https://en.wikipedia.org/wiki/Data_transfer_object