COS 221 Practical Assignment 4

- Date Issued: **4th April 2025**
- Date Due: **23rd April 2025** before **11:00 (in the morning)**
- Submission Procedure: **Upload to ClickUP**
- Submission Format: **zip or tar + gzip/bzip2 archive**
- This assignment consists of **6 tasks** for a total of **70 marks**.

1 Introduction

You are required to use the Northwind Sample Trading database. Northwind provides a well-defined normalized database for an international food trading company, Northwind Traders. The database models various concepts one would expect to find in a business use-case where products, orders, and customer relationships are managed.

In the given database, you can find various tables such as customers, orders, products, suppliers, employees, categories, and more. Explore the tables to gain an understanding of what the database represents. The database also includes a category to which a product is assigned, such as beverages, condiments, confectionery, dairy products, seafood, etc. You are given an employees table to manage sales and assist customers placing orders for products.

After successful completion of this assignment you should be able to:

- model an existing database;
- analyse and understand database extensions from other sources;
- build a Graphical User Interface (GUI); and
- utilise the GUI to query and manipulate a relational database.

2 Constraints

1. You must complete this assignment individually or in pairs.

2. You may ask the Teaching Assistants for help but they will not be able to give you the solutions.

3. The PDF, database dump, and GUI will be marked.

4. The GUI interfaces:

   (a) which runs and performs what they are supposed to do get full marks

   (b) which runs but does not perform as required, will receive partial marks

   (c) which does not run will be allocated partial marks based on the functionality they would have exhibited.

5. You need to use your MariaDB or MySQL Workbench.

6. You may utilize any text editor or IDE, upon an OS of your choice (i.e: pgAdmin).

7. **Hint:** You **ARE NOT REQUIRED** to use git source code revision for **THIS** practical. Usage of Git will be **REQUIRED** for Practical Assignment 5. You would thus find it beneficial to start learning Git and GitHub.com to code simultaneously on your project if you working in pairs. For individuals working individually, you will still find the exercise valuable to use Git.

3 Submission Instructions

You are required to upload a single archive that includes the following files:

- An archive containing your project representing your GUI application.

- A pdf containing the answers to the tasks where required.

- A **readme.txt** file informing the marker what they should do to build, connect your application to the database, and execute your application.

Upload your archive to ClickUP. No late submissions will be accepted, so make sure you upload in good time.

4   Online resources

The following resources will help with creating your GitHub

- Git: `https://git-scm.com`

- GitHub: `https://github.com`

- MariaDB: `https://mariadb.com`

Getting Started with MariaDB at: `https://mariadb.com/get-started-with-mariadb/`

To download MariaDB and access the documentation on your computer. Use the official MariaDB site – `https://www.mariadb.com/`

5   Assignment Instructions

Task 1: Obtain the database ....(4 marks)

Obtain the database by downloading the archive from:
`https://drive.google.com/file/d/1nXTeArR336OpooQYEWxcyWkzp9mlP2im/view?usp=sharing`.
Import the database into your MariaDB instance and name it `uXXXXXXXX_northwind` where XXXXXXXX is your student number. If you are working in a pair, include both student numbers in the naming of the database, that is `uXXXXXXXX_uYYYYYYYY_northwind`. Make sure that your instance has correctly imported.

Task 2: Choose a Pre-Packaged Application (DB Tool) .... (4 marks)

Use a canned application to explore and better understand the schema.

   2.1 Specify the pre-packaged application.   (2)

   2.2 Provide a screenshot of the canned application showing the imported database tables. Make sure the database name is clearly visible in the screenshot.   (2)

Task 3: (E)ER-diagram .... (6 marks)

   3.1 Generate an (E)ER-diagram using the chosen pre-packaed application. Include the (E)ER-diagram in your PDF submission.   (2)

   3.2 Explore the `Products` table structure by explaining in your PDF the data this relation holds, the data types, constraints present as well as how it links to other relations in the schema.   (4)

Note: For the tasks given above, ensure that in your screenshot your database name **WITH** your student number is **CLEARLY** visible.

Task 4: Graphical User Interface ....(46 marks)

Design and implement a Graphical User Interface (GUI) in Java that defines a front-end to the database. The GUI must include at least 4 tabs. The details of which are given in the instructions below.

   4.1 For the Employees tab, add a table component to show at a minimum the first name, last name, address, address line 2, city, region, postal code, phone, office where the employee works, and whether they are active (e.g., still employed).   (6)

   4.2 Add to the Employees tab a textbox allowing the user to filter the returned results (e.g., by name or city).   (4)

   4.3 On the Products tab, add a button to trigger a popup that allows the user to add new product data to the database. The popup must include dropdown menus for selecting the product's supplier and category. Ensure that when the user adds the data and closes the popup, the original table reloads to display the new product.   (8)

   4.4 The owner would like an up-to-date consolidated report to be generated each time the Report tab is opened. This report must provide the number of products in each warehouse for each category. You should return the warehouse name, the category name, and the number of products in the category.   (6)

   4.5 The owner uses the trading system to send clients notifications about specials and new products added to the inventory. Your application should allow the owner to create, update, delete, and list all clients in the system in the Notifications tab.   (17)

   4.6 Add a table of clients who have stopped placing orders (inactive clients). Include a searchable list of all clients, past and present, in the Notifications tab.   (5)

Hint: Use a build tool such as Maven, or download and install the jar file that provides the API to access your database from a Java application.

Task 5: Securing Credentials ....(5 marks)

   5.1 Storing your database credentials inside a configuration file, allows for easy exposure of your credentials. Amend your application to use the following environment variables to connect to your database instance.   (5)

- dvdrental_DB_PROTO
- dvdrental_DB_HOST
- dvdrental_DB_PORT

- dvdrental_DB_NAME

- dvdrental_DB_USERNAME

- dvdrental_DB_PASSWORD

Task 6: Bonus Marks . . . . (5 marks)

6.1 One (Individual)/ both (Pair) member(s) committing code using git and more than 8 commits on GitHub.com (3)

6.2 Make sure to mention in your uploaded PDF any advanced, non-standard use of SQL in your application. Note that SQL presented in lectures 1 - 17 will be considered standard SQL. (2)

IMPORTANT NOTE(S):

- Please refer to the rubric for the detailed allocation of marks.

- Plan your study time and start well in advance with this practical.

6 Rubric for marking

Obtain and install the database	**4**
Obtain and install the database	4
Choose a canned application (DB Tool)	**4**
Specify the preferred DB Tool and a screenshot of installation	2
Imported database tables	2
(E)ER-diagram	**6**
Generated Diagram	2
Products Table	4
Graphical User Interface	**46**
Employee Listing	6
Employee Filter	4
Products Listing	2
Products extension	6
Category Consolidate Report	6
Client Notification	2
Client Creation	3
Client Update	6
Client Deletion	4
Client Listing	2
Client drop	5
Securing Credentials	**5**
Use of environment variables to connect to database	5
Bonus Marks	**5**
Git & GitHub Usage	3
Advanced SQL	2
Possible Marks	**75**
Full Marks	**70**