UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

COS 221 Practical Assignment 4

- Date Issued: **6th April 2022**
- Date Due: **4th May 2022** before **11:00 (in the morning)**
- Submission Procedure: **Upload to ClickUP**
- Submission Format: **zip or tar + gzip/bzip2 archive**
- This assignment consists of **5 tasks** for a total of **76 marks**.

1 Introduction

The Sakila database was originally designed and developed by Mike Hillyer a former staff member of the MySQL AB team. This sample database provides a very well defined normalised database for a DVD rental store. In addition, the database highlights various features of the MySQL family of databases, that is to say including MariaDB. Features highlighted include Views, Stored Procedures and Triggers. The database models various concepts one would expect to find in a store where stock is managed. The Sakila database can be downloaded from here: `https://dev.mysql.com/doc/index-other.html`. For more information around the Sakila database be sure to visit `https://dev.mysql.com/doc/sakila/en/sakila-introduction.html`.

In a business context, the owner would first proceed to represent the physical store by creating a tuple in the Store relation. This would be followed by the creation of a film with appropriate stock items to represent the physical DVD stock available on the shelf. Where the DVD is located in the store, would be represented by the category that a DVD is assigned to, such as Sci-Fi, Horror, Romantic, Comedy, etc. Staff would be required in the store to assist customers looking to do a rental on a DVD.

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

- analyse and understand database extensions from other sources;
- be able to execute a connection to an RDBMS from a programming language;
- query and manipulate a relational database a programming language;
- 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, source code and GUI will be marked.
4. The GUI interfaces:
   (a) which run and perform what they are supposed to do get full marks
   (b) which run but do not perform as required, will receive partial marks
   (c) which do not run will be allocated partial marks based on the functionality they would have exhibited.

5. You need to use your MariaDB, MySQL Workbench, Maven, Java and Java Swing to complete the practical assignment.
6. You may utilise any text editor or IDE, upon an OS of your choice.
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.

3 Submission Instructions

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

- An archive containing your Maven project representing your GUI application using Java Swing.
- 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 a Java Swing application.

- Git: `https://git-scm.com`
- GitHub: `https://github.com`
- Java: `https://www.java.com/en/`
- MariaDB: `https://mariadb.com`
- Maven: `https://maven.apache.org`
- Oracle Java Swing: `https://docs.oracle.com/javase/tutorial/uiswing/index.html`

Wikipedia provides general information on Java Swing: `https://en.wikipedia.org/wiki/Swing_(Java)`

Java Swing Tutorial – `https://www.javatpoint.com/java-swing`

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/`

There are many other resources online for example Stack overflow – `https://stackoverflow.com/` a platform for developers to learn, share knowledge and build career.

5 Rubric for marking

Sakila database	2
E(E)R-diagram	
Generated Diagram	3
Store Table	5
Maven Managed Project	
Generated Project	2
Developer Information	3
README	3
Graphical User Interface	
JTabbedPane	5
Staff Listing	6
Staff Filter	4
Films Listing	2
Films Creation	6
Genre Consolidate Report	6
Client Listing	2
Client Creation	6
Client Update	6
Client Deletion	4
Total	**65**
Bonus Marks	
Secured Credentials	6
Git & GitHub Usage	8
Advanced SQL	6
Bonus	**20**
Possible Marks	**85**

6 Assignment Instructions

Task 1: Obtain the Sakila database ..... (2 marks)

Obtain the Sakila database by downloading and importing the database into your MariaDB instance and name it `uXXXXXXXX_sakila` where `XXXXXXXX` is your student number.

Task 2: E(E)R-diagram ..... (8 marks)

Use MySQL Workbench to explore and understand the schema better. For the below tasks ensure that in your screenshot your database name **WITH** your student number is **CLEARLY** visible.

2.1 Generate an EER diagram using MySQL Workbench. (3)

2.2 Explore the `Store` 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. (5)

Task 3: Maven Managed Project ..... (7 marks)

3.1 Generate a new Maven managed Java project with the following properties: (2)

- Artifact Id: `prac04`
- Group Id: `za.ac.up.cs.cos221`
- Archetype Artifact Id: `maven-archetype-quickstart`

3.2 Maven provides `developer` tags in the pom.xml file that can be used to add details about the developers working on the project. Do research about the syntax of this tag and ensure to add the following information for each member working on this practical assignment. (3)

- Name and Surname
- University of Pretoria @tuks.co.za email address
- Add the XML tag `upNumber` with your student number to an appropriate tag provided by Maven

3.3 Be sure to add a README file that provides all required setup, steps etc to get your project running. (2)

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

4.1 Use the JTabbedPane to add Staff, Films, Inventory and Clients to your application. (4)

4.2 For the Staff tab add a JTable component to show at a minimum the first name, last name, address, address2, district, city, postal code, phone, store where employee works, and whether they are active. (6)

4.3 Add to the Staff tab a textbox allowing the user to filter the returned results. **Hint**: How to Use Tables (4)

4.4 On the Films tab add a button to trigger a popup which allows the user to add new data to the database. Make sure that when the user adds the data and closes the popup, that the original table reloads the new data. (8)

4.5 The owner would like a consolidated report to provide him with the number of movies in each store for each genre. You should return the store name, the genre name and the number of movies in the genre. (6)

4.6 The owner uses the DVD rental store system to send his clients notifications on specials and new 'files' that are added to the inventory. Your application should allow the owner to create, update, delete and list all clients in the system. (18)

Task 5: Bonus Marks ..... (13 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. (6)

- SAKILA_DB_PROTO
- SAKILA_DB_HOST
- SAKILA_DB_PORT
- SAKILA_DB_NAME
- SAKILA_DB_USERNAME

- SAKILA_DB_PASSWORD

5.2 One (Individual)/ both (Pair) member(s) committing code using git and more than 8 commits on GitHub.com (5)

5.3 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 – 27 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.