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# COS 221 Practical Assignment 1

- Date Issued: **20th February 2019**
- Date Due: **27th February 2019** before **08:00 (morning)**
- Submission Procedure: **Upload to the web server (`whaetley`) and CS web**
- This assignment consists of **9 tasks** for a total of **75 marks**.

## 1 Introduction

During this practical assignment you will be required to create Employees sample database using MySQL cli commands. The Employees sample database was developed by Patrick Crews and Giuseppe Maxia and provides a combination of a large base of data (approximately 160MB) spread over six separate tables and consisting of 4 million records in total. An ER-diagram of the database is given in Figure 1.

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

- create databases, tables and populate them with data;
- interpret ER-diagrams;
- implement referential integrity constraints like the primary key, foreign key and composite key in different relationships between entities; and
- learn how to export databases (database dump) for purposes of backing up a database so that its contents can be restored in the event of data loss.

## 2 Constraints

1. You MUST complete this assignment individually.
2. The SQL scripts will be marked
   (a) Scripts which run and perform what they are supposed to do get full marks
   (b) Scripts which run but do not perform as required, will receive partial marks
   (c) Scripts which do not run will be allocated partial marks based on the functionality they would have exhibited.
3. You may ask the Teaching Assistants for help but they will not be able to give you the solutions.
4. You may utilise any text editor or IDE, upon an OS of your choice. In the Informatorium your will need to use MySQL Workbench to access your databases on `wheatley`.

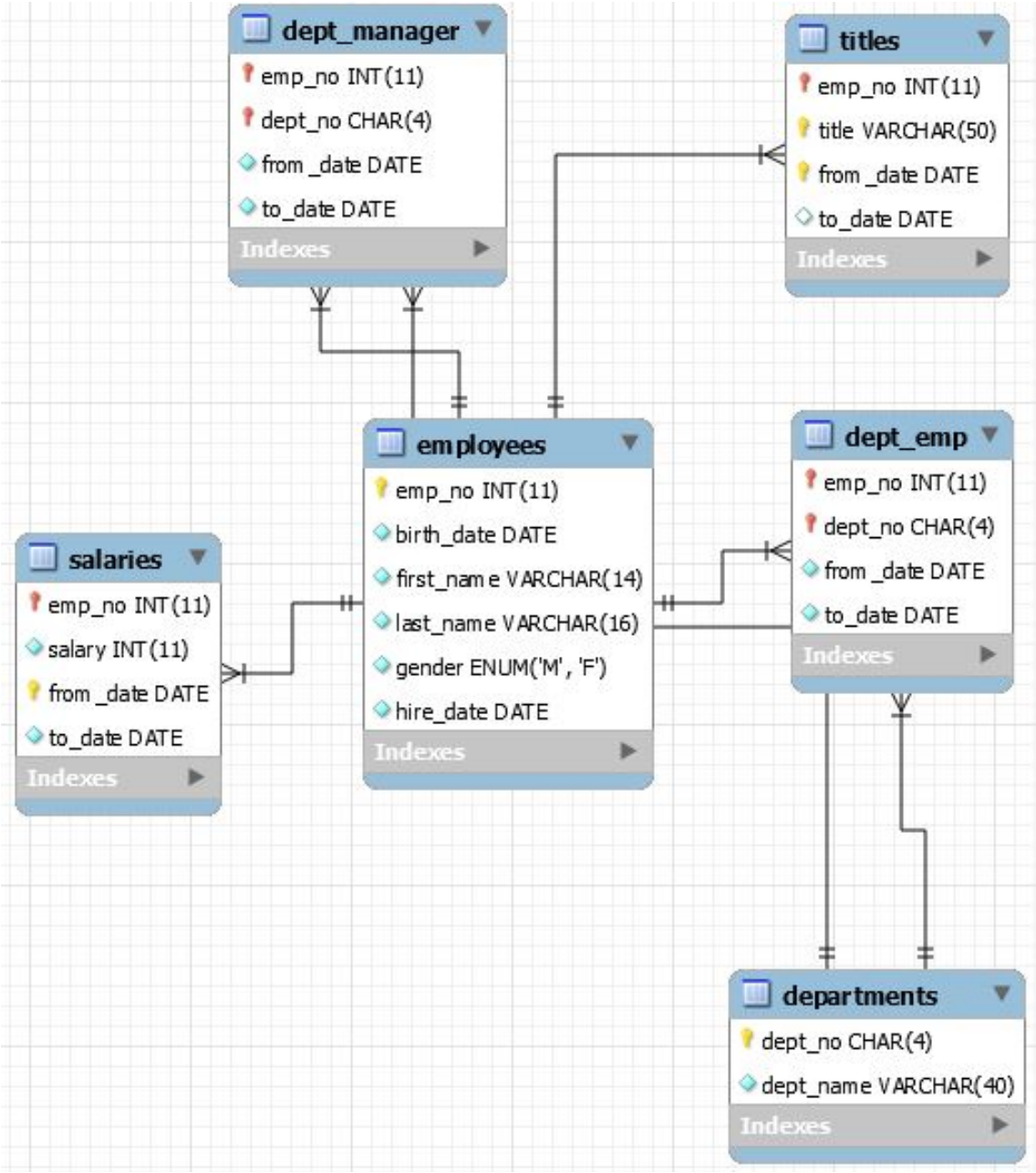


Figure 1: The ERD

## 3 Submission Instructions

You are required to upload all your source files (e.g. Entity definitions and sets as a text file) to the Computer Science web-portal. You also need to make sure that `wheatley` mirrors what you uploaded to CS web and works on the web server before the deadline. No late submissions will be accepted, so make sure you upload in good time. You will be required to download the files you uploaded to CS web and load them onto `wheatley` as part of the assessment of the practical assignment.

**Note: `Wheatley` is currently available from anywhere. But do not rely that outside access from the UP network will always work as intended.**
You must therefore make sure that you `ftp` your assignment to the server. Also make sure that you do this in good time because `ftp` access will be limited when marking `COS216 Netcentric Computer Systems` practical assignments.

## 4 Online resources

You can access free SQL Tutorial at: `https://www.w3schools.com/sql/sql_create_table.asp`

Getting Started with MySQL at: `https://dev.mysql.com/doc/mysql-getting-started/en/`

To download MySql and access the documentation on your computer. Use the official MySql site at: `https://www.mysql.com/`

How to install MySql tutorial is also available on YouTube at: `https://www.youtube.com/watch?v=WuBcTJnIuzo`

MySQL Cheat Sheet at: `http://www.dusun-think.net/dosya/czyayin/mysqlcheatsheet.pdf`

SQL Teaching at: `https://www.sqlteaching.com/`

MySQL-CLI at: `https://www.youtube.com/playlist?list=PLfdtiltiRHWEw4-kRrh1ZZy_3OcQxTn7P`

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

**IMPORTANT NOTE:** Bring to the practical session your textbook[1] and/or the lecture notes for ER-diagrams and Introduction to SQL in which the content was explained.

## 5 Rubric for marking

| | |
|---|---|
| Connecting to MySQL on `wheatley` | 5 |
| Displaying available databases | 2 |
| Creating a database | 2 |
| **Creating tables** | |
| Table names | 6 |
| Column names | 6 |
| Use of datatypes | 6 |
| implementation of primary keys and foreign constraints | 6 |
| **Population of tables** | |
| Use of correct clauses | 6 |
| correct data entry | 12 |
| Query | 2 |
| Database dump | 2 |
| **ERD** | |
| Entity types | 6 |
| Attributes | 6 |
| Relationships | 4 |
| Constraints | 4 |
| **Total** | **75** |

[1] All references in the practical will be to pages in Edition 7 [1]

## 6 Assignment Instructions

**Task 1: Installing a MySQL client on Windows** ..... (0 marks)

You can install either the MariaDB or the MySQL Workbench client on Windows. Both these are available on the Computer Science `ftp`-site by using the link: `https://ftp.cs.up.ac.za/installers/windows/mysql-workbench-community-8.0.15-winx64.msi`.

To run the MySQL client do the following:

- For **MySQL Workbench**, install it on Windows, open cmd and navigate to where it is installed to find the MySQL client.

**Task 2: Connecting to MySQL on `wheatley`** ..... (5 marks)

Use command `mysql -u{username} -p{password} -h{host server ip}` where `{username}` is your student number starting with u, `{password}` is your CS password and `{host server ip}` as `wheatley.cs.up.ac.za` to launch mysql on the `wheatley` web server.

**Task 3: Displaying available databases** ..... (2 marks)

After launching MySQL, type the command `show databases;` you should be able to see a database named `uXXXXXXXX` where `XXXXXXXX` is user student number.

**Task 4: Creating a database** ..... (2 marks)

Create the database and name it `uXXXXXXXX_Employees` where `XXXXXXXX` is your student number.

**Task 5: Creating tables** ..... (24 marks)

Create the corresponding six Tables as shown in the ER-diagram in Figure 1 with the appropriate constraints and attributes.
*Please refer to page 215 of the prescribed textbook (7th Edition).*

**Task 6: Populating tables** ..... (18 marks)

Populate the tables with the following records:

- Any 9 departments using dept_no between d001 to d009.
- 10 employees using emp_no between 10001 and 10010.
- 4 departments (i.e. d001 to d004) should be managed by all these employees. A department can be managed by more than one employee. Allocate 2 or 3 employees to take over the managerial role in any of the 4 departments.
- All your employees should belong to any of the department.
- Allocate different salaries to your employees in a given period of time (e.g. '10001', '60117', '1986-06-26', '1987-06-26')
- Assign titles to your employees in a given period of time (e.g. '10001', 'Senior Engineer', '1986-06-26', '9999-01-01')

**Task 7: Simple query** ..... (2 marks)

Write and execute a simple query to retrieve employees working for department d004.

**Task 8: Database dump** ..... (2 marks)

Export your database from MySql on `wheatley` to a text file that you will upload to the CS site before the deadline. Make use of `mysqldump` to export the database and upload the dump to the CS website.

**Task 9: ERD** ..... (20 marks)

Using ERD notations discussed in class (including structural constraints), convert the ERD in Figure 1 to a conceptual ERD used in `Chapter 3` of the textbook. You can use any software tool of your choice or draw it on paper and scan it for submission as a `pdf` file.

## References

[1] R. Elmasri and S. Navathe, *Fundamentals of database systems*, 7th ed. Addison-Wesley Publishing Company, 2015.