

### Assignment 3 (CMPT 354): SQL Programming and Normalization

Due: Nov 25 (Sat), 11:59pm

Weight=24%

Submission instruction: (1) This assignment must be done by each student independently. (2) Submission is through coursys.sfu.ca in a single pdf file with maximum file size of 10MB. Late submission will not be accepted as answers will be posted immediately after deadline. (3) The student is responsible for submitting the assignment successfully before the deadline, and only the submission that is in the system before the deadline will be accepted.

This assignment has two parts: Part 1 on SQL programming, and Part 2 on functional dependencies and normalization. The detail of Part 2 will be added later. Since Part 1 involves the setup of DBMS servers and running SQL, you should start working on this part as early as possible.

**The note to TA: The deadline for finishing marking is Dec 4, 2023.**

## 1 Part 1: SQL Programming (52 marks)

This assignment will use the following "Department-Store Database". The underlined fields are the attributes of primary keys.

### Department Store Database

*Employee* relation:

<u>eid</u>	name	salary	dept
111	Jane	8000	Household
222	Anderson	8000	Toy
333	Morgan	10000	Cosmetics
444	Lewis	12000	Stationery
555	Nelson	6000	Toy
666	Hoffman	16000	Cosmetics

*Sales* relation:

<u>dept</u>	<u>item</u>
Stationery	pen
Cosmetics	lipstick
Toy	puzzle
Stationery	ink
Household	disk
Sports	skates
Toy	lipstick

*Types* relation:

<u>item</u>	<u>color</u>
pen	red
lipstick	red
pen	black
puzzle	black
ink	red
ink	blue

**DBMS Environments.** All SQL statements in Part 1 will be run on a DBMS server. The choices of DBMS servers are SQLite or MYSQL. Alternatively, you can also use the Microsoft SQL Server 2019 on

CYPRESS.csil.sfu.ca - the CSIL SQL Server. A SQL database on Microsoft SQL Server has been set up for each of you (but you need to create the tables and enter data into the tables). To use Microsoft SQL Server, You can log into CSIL computers that already have SQL Server Management Studio installed, and access CSIL SQL Server by following the email instruction sent to you at the beginning of this semester from helpdesk@cs.sfu.ca.

There are a lot of online materials on setting up MySQL and SQLite on your computers. Here are a few but you can find more online:

<https://www.kdnuggets.com/2022/09/free-sql-database-course.html> (Installation on Windows OS Computers, by Matthew Mayo)

<https://dev.mysql.com/doc/refman/8.0/en/> (MySQL 8.0 Reference Manual)

SQLite: <https://www.sqlite.org/index.html>, <https://www.sqlitetutorial.net/>

For each task below, write the SQL statement for finding the answer requested by the task. For submission purpose, you need to specify the DBMS environment used (i.e., MySQL, SQLite, Microsoft SQL Server) and include the screenshot of the SQL statements and the answer returned by running the SQL statements.

**Task 1 (5 marks):** Create the above database schema using CREATE TABLE statements, including primary key constraints, and the constraint that salary is integer in the range [5000, 20000]. You can assume CHAR(20) type for all other attributes.

**Task 2 (5 marks):** Insert the above records into the tables using INSERT statements.

**Task 3 (42 marks, 6 marks each):** Compute the answers to the following queries using SELECT statements. Your SQL statements should be correct for ALL instances of data, not just for the above instance. For example, to find the departments that have a larger average salary than that of "Stationery" department, we do not accept the SQL that uses 12000 as the average salary of "Stationery" department because it only works for the above instance.

1. Compute the maximum salary for each department that sells at least two distinct items.
2. Compute the names of the employees who work in a department that sells some item in black color
3. For each department that has a larger average salary than that of "Stationery" department, find its average salary.
4. Find the number of the departments that have a smaller average salary than that of "Stationery" department.
5. Which department pays every of its employees at least 7000?
6. Which departments sell all items sold by Cosmetics department
7. (1) Create the view Toy-Sta (eid, name, salary, dept) for the employees from the Toy and Stationery departments; (2) query the content of the view and display the result; (3) insert a new record (777, Peter, 10000, Toy) into the view; (4) query the content of the view and the content of Employee to confirm that the record has been inserted, and display the results.

## 2 Part 2: FD and Normalization

To be added later.