

 <div style="display: inline-block; vertical-align: middle;"> Software Engineering <small>The University of Auckland</small> </div>	SOFTENG 351 S1 C – Lab 04 Due Date: Sunday 12 April 2020 at 11:59pm
--	---

10 marks in total = 1% of the final grade

Basic SQL

1. Using the SQL DDL Statements taught in the lectures to create the following COMPANY database schema in the *phpMyAdmin* tool.

EMPLOYEE

Fname	Minit	Lname	<u>Ssn</u>	Bdate	Address	Sex	Salary	Super_ssn	Dno
-------	-------	-------	------------	-------	---------	-----	--------	-----------	-----

DEPARTMENT

Dname	<u>Dnumber</u>	Mgr_ssn	Mgr_start_date
-------	----------------	---------	----------------

DEPT_LOCATIONS

<u>Dnumber</u>	<u>Dlocation</u>
----------------	------------------

PROJECT

Pname	<u>Pnumber</u>	Plocation	Dnum
-------	----------------	-----------	------

WORKS_ON

<u>Essn</u>	<u>Pno</u>	Hours
-------------	------------	-------

DEPENDENT

<u>Essn</u>	<u>Dependent_name</u>	Sex	Bdate	Relationship
-------------	-----------------------	-----	-------	--------------

Once the structure of the database has been defined, you can populate the database using the INSERT commands in SQL, e.g.,

INSERT INTO EMPLOYEE

```
VALUES ('John', 'B', 'Smith', '123456789', '1942-06-21', '731 Fondren, Houston, TX', 'M', 30000, '333445555', 1);
```

INSERT INTO DEPARTMENT

```
VALUES ('Research', 5, '333445555', '1988-05-22');
```

INSERT INTO PROJECT

```
VALUES ('ProductX', 1, 'Bellaire', 5);
```

Populate some more data (rows) into the above tables according to the example database state given below (in Lab #03 question 3).

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

DEPT_LOCATIONS

Dnumber	Dlocation
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

WORKS_ON

Essn	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

PROJECT

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

DEPENDENT

Essn	Dependent_name	Sex	Bdate	Relationship
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-05-03	Spouse
987654321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1967-05-05	Spouse

Using proper SQL commands to define the following updates to the database.

(a) Insert < 'Robert', 'F', 'Scott', '943775543', '1942-06-21', '2365 Newcastle Rd, Bellaire, TX', 'M', 58000, '888665555', 1 > into EMPLOYEE.

(b) Insert < 'ProductA', 4, 'Bellaire', 2 > into PROJECT.

- (c) Insert < 'Production', 4, '943775543', '1988-10-01' > into DEPARTMENT.
- (d) Insert < '677678989', null, '40.0' > into WORKS_ON.
- (e) Insert < '453453453', 'John', M, '1960-12-12', 'SPOUSE' > into DEPENDENT.
- (f) Delete the WORKS_ON tuples with ESSN= '333445555'.
- (g) Delete the EMPLOYEE tuple with SSN= '987654321'.
- (h) Delete the PROJECT tuple with PNAME= 'ProductX'.
- (i) Modify the MGR_SSN and MGR_START_DATE of the DEPARTMENT tuple with DNUMBER=5 to '123456789' and '1988-10-01', respectively.
- (j) Modify the SUPER_SSN attribute of the EMPLOYEE tuple with SSN= '999887777' to '943775543'.
- (k) Modify the HOURS attribute of the WORKS_ON tuple with ESSN= '999887777' and PNO= 10 to '5.0'.

[5 marks]

2. Consider the following partial database schema of the Lab 01 database that stores the student and course information. What are the referential integrity constraints that should hold on the schema? Write appropriate SQL DDL statements to define the database.

STUDENT

Name	Student_number	Class	Major
------	----------------	-------	-------

COURSE

Course_name	Course_number	Credit_hours	Department
-------------	---------------	--------------	------------

PREREQUISITE

Course_number	Prerequisite_number
---------------	---------------------

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
--------------------	---------------	----------	------	------------

GRADE_REPORT

Student_number	Section_identifier	Grade
----------------	--------------------	-------

[5 marks]

The following question is not assessed for this lab and for practice only.

3. Suppose the database in question 2 has been populated with the data (rows) shown in the figure below, specify the following queries in SQL on the database.

STUDENT

Name	Student_number	Class	Major
Smith	17	1	CS
Brown	8	2	CS

COURSE

Course_name	Course_number	Credit_hours	Department
Intro to Computer Science	CS1310	4	CS
Data Structures	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database	CS3380	3	CS

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
85	MATH2410	Fall	07	King
92	CS1310	Fall	07	Anderson
102	CS3320	Spring	08	Knuth
112	MATH2410	Fall	08	Chang
119	CS1310	Fall	08	Anderson
135	CS3380	Fall	08	Stone

GRADE_REPORT

Student_number	Section_identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

PREREQUISITE

Course_number	Prerequisite_number
CS3380	CS3320
CS3380	MATH2410
CS3320	CS1310

- (a) Retrieve the names of all students majoring in 'CS' (computer science).
- (b) Retrieve the names of all courses taught by professor King in 85 and 86.
- (c) For each section taught by professor King, retrieve the course number, semester, year, and number of students who took the section.
- (d) Retrieve the name and transcript of each senior student (Class=5) majoring in CS. Transcript includes course name, course number, credit hours, semester, year, and grade for each course completed by the student.
- (e) Retrieve the names and major departments of all straight A students (students who have a grade of A in all their courses).
- (f) Retrieve the names and major departments of all students who do not have any grade of A in any of their courses.