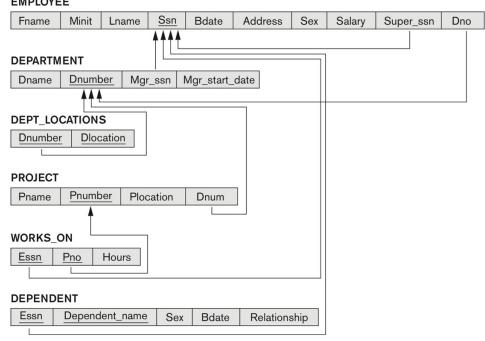SE | Software Engineering
The University of Auckland

SOFTENG 351 S1 C – Lab 05
Due Date: Sunday 3 May 2020 at 11:59pm

10 marks in total = 1% of the final grade

The following questions use the COMPANY database schema:

and the sample database state shown below:

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

More SQL: Complex Queries, Triggers, Views, and Schema Modification

1. Specify the following additional queries on the above database in SQL. Show the query results if applied to the database.

(a) For each department whose average employee salary is more than $30,000, retrieve the department name and the number of employees working for that department.

[2 marks]

(b) Suppose we only want to retrieve the number of *male* employees in each department rather than all employees in the above query (a). Can we specify this query in SQL? Why or why not?

[2 marks]

THE RELATIONAL ALGEBRA

2. Specify the following queries on the COMPANY relational database schema shown above in the relational algebra expressions (i.e. using relational algebra operations, such as 'σ', 'π', 'ρ' and the set operators) learned in this topic. Also show the result of each query as it would apply to the above sample database state.

(a) Retrieve the names of employees (show first and last names) who either work in department 4 and make over $40,000 per year, or work in department 5 and make less than $30,000 per year.

[2 marks]

(b) Retrieve the social security numbers of all employees (show Ssn) who either work in department 4 or directly supervise an employee who works in department 4.

[2 marks]

(c) Retrieve the names of employees (show Fname as 'First_Name' and Lname as 'Last_Name') who has no supervisor and earns more than $50,000 per year.

[2 marks]