

# Database Engineering

## Homework #8

1. Given the beer drinker's database relations given below:

- frequents( Drinker, Bar )** which indicates the bars a drinker frequents
- serves( Bar, Beer )** which indicates the beers a bar serves
- likes( Drinker, Beer )** which indicates the beers a drinker likes

Write queries in tuple relational calculus for the following:

- happy( Drinker ) – drinkers who frequent at least one bar that serves a beer they like.
- shouldVisit( Drinker, Bar ) – drinkers and a bar that serves a beer they like (note: the drinker need not frequent the bar).
- veryHappy( Drinker ) – drinkers that frequent only bars that serves a beer that they like.
- sad( Drinker ) – drinkers that frequent no bar that serves a beer that they like.

2. Problem 6.17 (problems a-d) from the textbook using only tuple relational calculus.

3. Write queries in tuple relational calculus and show the result of your queries using the instances of the COMPANY database provided below.

- Retrieve the names of employees in department 5 who work more than 10 hours per week on the "ProductX" project.
- Retrieve the names of employees who have a dependent with the same first name as themselves.
- Retrieve the names of employees that are directly supervised by "Franklin Wong".
- Retrieve the names of employees who work on every project.
- Retrieve the names of employees who do not work on any project.
- Retrieve the names and addresses of employees who work on at least one project located in Houston but whose department has no location in Houston.
- Retrieve the last names of department managers who have no dependents.

**EMPLOYEE**

FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO
John	B	Smith	123456789	09-JAN-55	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	08-DEC-45	638 Voss, Houston, TX	M	40000	888665555	5
Alice	J	Zrzava	999887777	19-JUL-58	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Waltace	987654321	20-JUN-31	291 Berry, Bellare, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	15-SEP-52	375 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	31-JUL-82	5631 Rice, Houston, TX	F	25000	333445555	5
Anmad	V	Jacobar	987987987	29-MAR-59	380 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	10-NOV-27	450 Stone, Houston, TX	M	55000	null	1

**DEPARTMENT**

DNAME	DNUMBER	MGRSSN	MGRSTARTDATE
Research	5	333445555	22-MAY-78
Administration	4	987654321	01-JAN-85
Headquarters	1	888665555	13-JUN-71

**DEPT\_LOCATIONS**

DNUMBER	DLOCATION
1	Houston
4	Stafford
5	Bellare
5	Sugarland
5	Houston

**PROJECT**

PNAME	PNUMBER	PLOCATION	DNUM
ProductX	1	Bellare	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
NewBenefits	30	Stafford	4

**WORKS\_ON**

ESSN	PNO	HOURS
123456789	1	32.5
123456789	2	7.5
888664444	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

**DEPENDENT**

ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP
333445555	Alice	F	05-MAY-75	DAUGHTER
333445555	Theodore	M	25-OCT-73	SON
333445555	Joy	F	03-MAY-48	SPOUSE
987654321	Anner	M	29-FEB-32	SPOUSE
123456789	Michael	M	01-JAN-78	SON
123456789	Alice	F	31-DEC-79	DAUGHTER
123456789	Elizabeth	F	05-MAY-87	SPOUSE

**LOCATION**

DNUMBER	DLOCATION
1	Houston
4	Stafford
5	Bellare
5	Sugarland
5	Houston

A relational database instance (state) of the COMPANY schema.