

CS 631 - ASSIGNMENT 4 Solutions

Due date: See the Assignment page on Canvas

Do answer all items below and **submit** a word/pdf file via Canvas. If you have a question, email me or ask during class hours.

This assignment has two parts; Part I and Part II.

PART I- (55 points) Suppose we have a database consisting of the following three relations

FREQUENTS(DRINKER, BAR)

SERVES(BAR, BEER)

LIKES(DRINKER, BEER)

The first indicates the bars each drinker visits,
the second tells what beer each bar serves,
the last indicates which beer each drinker likes to drink.

Assume that each drinker likes at least one beer and frequent at least one bar and that a bar serves at least one beer.

FREQUENTS

Drinker	Bar
Ann	Joe's Bar
Bob	Sue's Bar
Cal	ABC's Bar
John Smith	Sue's Bar

SERVES

Bar	Beer
Joe's Bar	Bud
Joe's Bar	Miller
Sue's Bar	Bud
Sue's Bar	Pete's Ale
Sue's Bar	Bud Lite
ABC's Bar	Miller

LIKES

Drinker	Beer
Ann	Miller
Ann	Bud
Ann	Pete's Ale
Bob	Bud
Bob	Miller
Cal	Miller
Cal	Bud Lite
John Smith	Pete's Ale
John Smith	Bud

Express the queries below in SQL (5 points each).

1. print the bars that serve a beer John Smith likes.

```
SELECT DISTINCT s.bar
FROM serves S, likes L
WHERE L.Drinker='John Smith' AND L.beer=s.beer;/
```

2. print the drinkers that frequent at least one bar that serve a beer John Smith likes.

```
SELECT DISTINCT F.DRINKER
FROM FREQUENTS F, SERVES S, LIKES L
WHERE L.DRINKER='John Smith' AND L.BEER=S.BEER AND S.BAR=F.BAR;/
```

3. print the drinkers that frequent **at least one** bar that serves a beer they like.

```
SELECT DISTINCT F.DRINKER
FROM FREQUENTS F, LIKES L, SERVES S
WHERE S.BEER=L.BEER
AND L.DRINKER=F.DRINKER
AND S.BAR=F.BAR;/
```

write it with a subquery:

```
SELECT F.drinker
FROM Frequents F
WHERE EXISTS (SELECT *
              FROM Serves S, Likes L
              WHERE F.bar=S.bar AND F.drinker=L.drinker AND S.beer = L.beer);/
```

Print the drinkers that frequent some bar that serves only beers they don't like

Is equal to

NOT (print the drinkers that frequent **at least one** bar that serves a beer they like)

```
SELECT F.drinker
FROM Frequents F
WHERE NOT EXISTS (SELECT *
                  FROM Serves S, Likes L
                  WHERE F.bar=S.bar AND F.drinker=L.drinker AND S.beer = L.beer);/
```

4. print the drinkers that frequent **only** bars that serve some beer they like.

Equivalent to:

Not (drinkers that frequent at least one bar that do not serve any beer they like)

```
SELECT DRINKER
FROM FREQUENTS
WHERE DRINKER NOT IN (SELECT DRINKER
                      FROM FREQUENTS F
                      WHERE (F.DRINKER, F.BAR) NOT IN
                          (SELECT L. DRINKER, S.BAR
                           FROM LIKES L, SERVES S
                           WHERE L.BEER=S.BEER))
```

5. print the drinkers that frequent **all** the bars that serve a beer they like.

Equivalent to:

Not (drinkers that do not frequent at least one bar that serves a beer they like)

```
SELECT F.DRINKER
FROM FREQUENTS F
WHERE F.DRINKER NOT IN
    (SELECT L.DRINKER
     FROM SERVES S, LIKES L
     WHERE L.BEER=S.BEER AND (L.DRINKER, S.BAR) NOT IN
        (SELECT F1.DRINKER, F1.BAR
         FROM FREQUENTS F1)
    );/
```

6. print the drinkers that frequent **no** bar that serves a beer that they like.

Equivalent to:

Not (drinkers that frequent at least one bar that serves a beer they like)

```
SELECT DRINKER
FROM FREQUENTS
WHERE DRINKER NOT IN
    (SELECT DISTINCT F.DRINKER
     FROM FREQUENTS F, LIKES L, SERVES S
     WHERE S.BEER=L.BEER
     AND L.DRINKER=F.DRINKER
     AND S.BAR=F.BAR);/
```

7. print the drinkers that frequent **all** the bars that serve a beer John Smith likes.

Equivalent to: Not(drinkers that do not frequent at least one bar that serves a beer John Smith likes)

```
SELECT DRINKER
FROM FREQUENTS
WHERE DRINKER NOT IN (SELECT F.DRINKER
                      FROM SERVES S, LIKES L, FREQUENTS F
                      WHERE L.BEER=S.BEER
                      AND L.DRINKER='John Smith'
                      AND F.DRINKER NOT IN
                          (SELECT F.DRINKER
                           FROM FREQUENTS F
                           WHERE F.BAR=S.BAR));/
```

8. print pairs of drinkers that frequent at least one common bar.

```
SELECT F1.DRINKER, F2.DRINKER
FROM FREQUENTS F1, FREQUENTS F2
WHERE F1.BAR=F2.BAR
AND F1.DRINKER<F2.DRINKER;
/
```

9. print pairs of drinkers that frequent exactly the same bars.

```
SELECT F1.DRINKER, F2.DRINKER
FROM FREQUENTS F1, FREQUENTS F2
WHERE F1.BAR=F2.BAR
AND F1.DRINKER<>F2.DRINKER;
/
```

10. print the number of beer served per bar.

```
SELECT S.BAR, COUNT(*)
FROM SERVES S
GROUP BY S.BAR;
/
```

11. Which bar is the most popular?

```
SELECT F.BAR, COUNT(*) AS LIST
FROM FREQUENTS F
GROUP BY F.BAR
ORDER BY LIST DESC;
/
```