

CS2102 Database Systems

Semester 1 2019/2020

Midterm

5 Questions

Question 1. Preliminary [1 marks]

Find all customers of PetER with a `uname` that starts with 'A' and consists of at least 5 characters. Answer the question by creating SQL view with the schema shown below:

```
CREATE VIEW qn1 (uname) AS ;
```

where `uname` is the `uname` of the customer.

```
CREATE VIEW qn1 (uname) AS
SELECT DISTINCT uname
FROM Customers
WHERE uname LIKE 'A_____';
;
```

Question 2. Disjunctive condition [1 marks]

Find all pet of `atype` 'A' or 'B' that have a `diet` type 'D1'. Answer the question by creating SQL view with the schema shown below:

```
CREATE VIEW qn2 (uname, name) AS ;
```

where `uname` is the `uname` of the pet owner and `name` is the `name` of the pet.

```
CREATE VIEW qn2 (uname, name) AS
SELECT DISTINCT uname, name
FROM Pet
WHERE ( atype = 'A' OR atype = 'B' )
AND diet = 'D1'
;
```

Question 3. Simple negation [2 marks]

Find all customers that are not simultaneously both a pet owner and a care taker. Answer the question by creating SQL view with the schema shown below:

```
CREATE VIEW qn3 (uname) AS ;
```

where `uname` is the `uname` of the customer.

```
CREATE VIEW qn3 (uname) AS
( SELECT uname FROM PetOwner EXCEPT SELECT uname FROM CareTaker )
UNION
( SELECT uname FROM CareTaker EXCEPT SELECT uname FROM PetOwner )
;
```

Question 4. Single-table selection [2 marks]

Find all pet owner who has won at least one bid for an availability of the care taker but has not given any `rating` for that bid. Answer the question by creating SQL view with the schema shown below:

```
CREATE VIEW qn4 (uname) AS ;
```

where `uname` is the `uname` of the pet owner.

```
CREATE VIEW qn4 (uname) AS
```

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```
SELECT DISTINCT pouname
FROM Bid
WHERE is_win = TRUE
AND rating IS NULL;
;
```

Question 5. Multi-table selection [2 marks]

Find all pairs of pet owners (P1, P2) that both have at least own one pet of the same atype and P1.name < P2.name. Exclude any pet owner that do not own any pet. Answer the question by creating SQL view with the schema shown below:

```
CREATE VIEW qn5 (p1uname, p2uname) AS ;
```

where p1uname is the uname of P1 and p2uname is the uname of P2.

```
CREATE VIEW qn5 (p1uname, p2uname) AS
SELECT DISTINCT P1.uname, P2.uname
FROM Pet P1, Pet P2
WHERE P1.uname < P2.uname
AND P1.atype = P2.atype
;
```

Question 6. Group-by [2 marks]

For each worker W, find the number of distinct workers besides W that work in at least one same office as W. In other words, if W is the only worker working in an office O, then the number should be 0. Answer the question by creating SQL view with the schema shown below:

```
CREATE VIEW qn6 (uname, num) AS ;
```

where uname is the uname of W and num is the number of workers besides W that work in the same office as W.

```
CREATE VIEW qn6 (uname, num) AS
SELECT W1.uname, COUNT(DISTINCT (W1.uname, W2.uname))-1
FROM Work W1, Work W2
WHERE W1.area = W2.area
GROUP BY W1.uname
;
/* The trick here is to subtract 1 because (X,X) will be in the join
Alternatively, use LEFT JOIN */
```

Question 7. Business analysis [2 marks]

We say that a pet owner is *obsessed* with a care taker if the pet owner has bid for all the availability of the care taker. For each pet owner, find all the care taker the pet owner is obsessed with. Exclude pet owner without any associated care taker. Answer your question by creating SQL view with the schema shown below:

```
CREATE VIEW qn7 (pouname, ctuname) AS ;
```

where pouname is the uname of the pet owner and ctuname is the uname of the care taker.

```
CREATE VIEW qn7 (ctuname, pouname) AS
SELECT DISTINCT B0.pouname, B0.ctuname
FROM Bid B0
```

```

WHERE NOT EXISTS (
  SELECT 1 FROM Availability A
  WHERE B0.ctuname = A.uname
  AND NOT EXISTS (
    SELECT 1 FROM Bid B
    WHERE A.uname = B.ctuname
      AND A.s_date = B.s_date
      AND A.s_time = B.s_time
      AND A.e_time = B.e_time
      AND B0.pouname = B.pouname
  )
)
;

```

Question 8. Business analysis [3 marks]

We say that a worker *W* is a *director* if the worker satisfies all of the following:

- *W* manages an office
- The office that *W* managed, has at least 3 workers that are also managers
- *W* does not work in any office that is managed by other workers besides *W*

Find all the director of PetER. Answer the question by creating SQL view with the schema shown below:

```
CREATE VIEW qn8 (uname, area) AS ;
```

where *uname* is the *uname* of the director and *area* is the area of the office the director manages.

```

CREATE VIEW qn8 (uname, area) AS
WITH HasNoManager AS (
  SELECT O.uname
  FROM Offices O
  EXCEPT
  SELECT W.uname
  FROM Work W
  WHERE EXISTS (
    SELECT 1
    FROM Offices O
    WHERE O.uname <> W.uname
      AND W.area = O.area
  )
)
SELECT M.uname, O1.area
FROM HasNoManager M NATURAL JOIN Offices O1
WHERE (
  SELECT COUNT(*)
  FROM Offices O2, Work W
  WHERE O2.uname = W.uname
    AND O2.uname <> M.uname
    AND W.area = O1.area
) >= 3
;

```

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NOTE: The `HasNoManager` is to figure out which manager has no manager. From here, the other conditions are easily derived.