

CS186 Vitamin #2

* Required

Fun with SQL

Pete loves the sea and he wants to keep track of all his boats. Below is the schema he implemented for his boats:

```
Boats {
  bid int,
  color varchar(20),
  primarykey(bid)
}

Sailors {
  sid int,
  sname varchar(50),
  primarykey(sid)
}

Reserves {
  sid int,
  bid int,
  r_date char(10),
  primarykey(sid, bid, r_date),
  foreignkey(sid) references Sailors,
  foreignkey(bid) references Boats
}
```

Matthew wanted to test Pete's brain by asking him to decode challenging SQL queries based on his boats database! Help Pete out by telling him what each query returns.

```
[A]
SELECT S.sname
FROM Sailors S
WHERE NOT EXISTS
  (SELECT B.bid FROM Boats B
   WHERE B.color='pink'
   AND EXISTS
     (SELECT R.bid
      FROM Reserves R
      WHERE R.bid=B.bid AND R.sid!=S.sid));
```

```
[B]
SELECT S.sname
FROM Sailors S, Reserves R
WHERE S.sid = R.sid
GROUP BY S.sname, S.sid
HAVING COUNT(DISTINCT R.bid)=
  (SELECT COUNT (*)
   FROM Boats
   WHERE color='pink');
```

```

[C]
SELECT sname
FROM
  (SELECT sid
   FROM Reserves
   EXCEPT
    (SELECT sid
     FROM
       (SELECT Reserves.sid, PinkBoats.bid
        FROM Reserves,
            (SELECT bid
             FROM Boats
             WHERE color='pink') PinkBoats
        EXCEPT
         (SELECT sid, bid
          FROM Reserves))))))
R, Sailors S
WHERE R.sid = S.sid;

```

1. **Q1: What does query A return? ***

Mark only one oval.

- ☐ Names of sailors for whom some pink boats have been reserved by some other sailor
- ☐ Names of sailors for whom all pink boats have been reserved by some other sailor
- ☐ Names of sailors for whom all pink boats have been reserved by no other sailor
- ☐ Names of sailors for whom some pink boats have been reserved by no other sailor

2. **Q2: What does query B return? ***

Mark only one oval.

- ☐ Names of sailors who have reserved as many distinct boats as the number of all pink boats
- ☐ Names of sailors who have reserved as many distinct boats as the number of all pink boats that have ever been reserved
- ☐ Names of sailors who have reserved only pink boats
- ☐ Names of sailors who have reserved all pink boats

3. **Q3: What does query C return? ***

Mark only one oval.

- ☐ Names of sailors who have never reserved a pink boat
- ☐ Names of sailors who have reserved all pink boats
- ☐ Names of sailors who have reserved some boat
- ☐ Names of sailors who have reserved some pink boat

Buffer Management

Supposed we have a buffer pool size of 4 pages, and the following access pattern:

A P P L E S A N D B A N A N A S A N D O R A N G E S

Assume that pages are unpinned immediately (ignore pinning).

4. Q4: What is the number of cache hits if we use an LRU replacement policy?

Assume we are starting from a cold (empty) cache.

.....

5. Q5: What is the number of cache hits if we use an MRU replacement policy?

Assume we are starting from a cold (empty) cache.

.....

6. Q6: What is the number of cache hits if we use a CLOCK replacement policy?

Assume we are starting from a cold (empty) cache.

.....

7. Q7: What is the number of set reference bits at the end of Q6?

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