Practice Questions on SQL

You can test out your queries using SQL Plus.

Consider the following relational schemas.

Sailors(sid, sname, rating, age)
Boats(bid, bname, color)
Reserves(sid, bid, date)

Write each of the following queries in SQL.
1. Find the colors of boats reserved by Albert.
2. Find all sailor id's of sailors who have a rating of at least 8 or reserved boat 103.
3. Find the names of sailors who have not reserved a boat whose name contains the string "storm". Order the names in ascending order.
4. Find the sailor id's of sailors with age over 20 who have not reserved a boat whose name includes the string "thunder".
5. Find the names of sailors who have reserved at least two boats.
6. Find the names of sailors who have reserved all boats.
7. Find the names of sailors who have reserved all boats whose name starts with "typhoon".
8. Find the sailor id's of sailors whose rating is better than some sailor called Bob.
9. Find the sailor id's of sailors whose rating is better than every sailor called Bob.
10. Find the sailor id's of sailors with the highest rating.
11. Find the name and age of the oldest sailor.
12. Find the names of sailors who have reserved every boat reserved by those with a lower rating.
13. For each rating, find the average age of sailors at that level of rating.
14. For each boat which was reserved by at least 5 distinct sailors, find the boat id and the average age of sailors who reserved it.
15. For each boat which was reserved by at least 5 sailors with age >= 40, find the boat id and the average age of such sailors.
16. For each boat which was reserved by at least 5 sailors with age >= 40, find the boat id and the average age of all sailors who reserved the boat.

    This is different from question 15 as sailors who are younger than 40 would be included in this average whereas in question 15, we are only taking the average of the sailor's age that is 40+.

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Schema

- sailor (sid, sname, rating, age)
- boat (bid, bname, color)
- reserve (sid, bid, date)

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1. Find the colors of boats reserved by Albert.
   SELECT b.color
   FROM sailor s, boat b, reserve r
   WHERE s.sid = r.sid and r.bid = b.bid and s.sname = 'Albert';

2. Find all sailor id's of sailors who have a rating of at least 8 or reserved boat 103.
   SELECT sid
   FROM Sailor s, Reserved r
   WHERE s.sid = r.sid AND r.bid = 103

   UNION

   SELECT sid
   FROM Sailor
   WHERE rating >= 8

3. Find the names of sailors who have not reserved a boat whose name contains the string "storm". Order the names in ascending order.

   If we assume all sailors have reserved a boat:

   SELECT s.sname
   FROM sailor s, boat b, reserve r
   WHERE s.sid = r.sid AND r.bid = b.bid AND b.bid NOT IN (SELECT bid
                                                           FROM boat
                                                           WHERE bname like '%storm%')
   ORDER BY s.sname ASC;

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If we do not assume that all sailor have reserved a boat once:

SELECT s.name
FROM sailor s
WHERE s.sid in (SELECT s2.sid
                FROM sailor s2
                EXCEPT (SELECT FROM sailor s3, reserve r
                      WHERE s3.sid = r.sid AND r.bid IN (SELECT bid
                                        FROM boat
                                        WHERE bname like
                                        '%storm%')))
ORDER BY s.name ASC;

4. Find the sailor id's of sailors with age over 20 who have not reserved a boat whose name includes the string "thunder".

If we assume all sailors have reserved a boat:

SELECT s.sid
FROM sailor s, boat b, reserve r
WHERE s.sid = r.sid AND r.bid = b.bid AND s.age > 20 AND b.bid NOT IN
        (SELECT bid
        FROM boat
        WHERE bname like '%thunder%');

If we do not assume that all sailor have reserved a boat once:

SELECT s.sid
FROM sailor s
WHERE s.age > 20
EXCEPT (SELECT s3.sid FROM sailor s3, reserve r
        WHERE s3.sid = r.sid AND r.bid IN (SELECT bid
                                    FROM boat
                                    WHERE bname like
                                    '%thunder%')));

5. Find the names of sailors who have reserved at least two boats.
SELECT s.sname
FROM Reserve r1, Reserve r2, Sailor s
WHERE r1.sid = s.sid AND r2.sid = s.sid AND r1.bid <> r2.bid;

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6. Find the names of sailors who have reserved all boats.
   SELECT s.sname
   FROM Sailor s
   WHERE NOT EXISTS ((SELECT bid FROM boat)
                               MINUS
                               (SELECT r.bid FROM Reserve r WHERE s.sid = r.sid));

7. Find the names of sailors who have reserved all boats whose name starts with "typhoon".
   SELECT s.sname
   FROM sailor s
   WHERE NOT EXISTS ((SELECT bid FROM boat WHERE name LIKE 'typhoon%')
                      EXCEPT
                      (SELECT r.bid FROM reserve r WHERE s.sid = r.sid));

8. Find the sailor id's of sailors whose rating is better than some sailor called Bob.
   SELECT s.sid
   FROM Sailor S
   WHERE S.Rating > ANY (SELECT rating
                                 FROM Sailor
                                 WHERE sname = 'Bob')

   OR

   SELECT s1.sid
   FROM Sailor s1, Sailor s2
   WHERE s1.rating > s2.rating AND s2.sname = 'Bob';

9. Find the sailor id's of sailors whose rating is better than every sailor called Bob.
   SELECT sid
   FROM sailor
   WHERE rating > (SELECT MAX(s.rating) FROM sailor s WHERE s.sname = 'Bob');

10. Find the sailor id's of sailors with the highest rating.
    SELECT s.sid
    FROM sailor s
    WHERE s.rating = (SELECT MAX(s2.rating) FROM sailor s2)

11. Find the name and age of the oldest sailor.
    SELECT s.sname, s.age
    FROM sailor
    WHERE s.age = (SELECT MAX(s2.age) FROM sailor s2)

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12. Find the names of sailors who have reserved every boat reserved by those with a lower rating.
    SELECT s1.sname
    FROM sailor s1
    WHERE NOT EXISTS ((SELECT b1.bid
                       FROM boat b1, reserve r1, sailor s2
                       WHERE b1.bid = r1.bid and r1.sid = s2.sid and s2.rating < s1.rating)
                       MINUS
                       (SELECT b2.bid
                       FROM boat b2, reserve r2
                       WHERE r2.bid = b2.bid AND r2.sid = s1.sid));

13. For each rating, find the average age of sailors at that level of rating.
    SELECT rating, avg(age)
    FROM sailor
    GROUP BY rating;

14. For each boat which was reserved by at least 5 distinct sailors, find the boat id and the average age of sailors who reserved it.

    With duplicates occurring when one sailor may reserve one boat multiple times:

    SELECT bid, avg(age)
    FROM sailor s, boat b, reserve r
    WHERE s.sid = r.sid and b.bid = r.bid
    GROUP BY bid
    HAVING 5 <= COUNT(DISTINCT s.sid);

    Note: You don't need to join with B but the solution above is still correct.

    Without duplicates:

    SELECT T.bid, avg(T.age)
    FROM (SELECT DISTINCT s.sid AS sid, b.bid AS bid, s.age AS age
          FROM sailor s, boat b, reserve r
          WHERE s.sid = r.sid and b.bid = r.bid) T
    GROUP BY T.bid
    HAVING 5 <= COUNT(T.sid);

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15. For each boat which was reserved by at least 5 sailors with age >= 40, find the boat id and the average age of such sailors.

With duplicates occurring when one sailor may reserve one boat multiple times:

SELECT bid, avg(age)
FROM sailor s, boat b, reserve r
WHERE s.sid = r.sid AND b.bid = r.bid AND age >= 40
GROUP BY bid
HAVING 5 <= COUNT (DISTINCT s.sid);

Note: You don't need to join with B but the solution above is still correct.

Without duplicates:

SELECT T.bid, avg(T.age)
FROM (SELECT DISTINCT s.sid AS sid, b.bid AS bid, s.age AS age
        FROM sailor s, boat b, reserve r
        WHERE s.sid = r.sid and b.bid = r.bid and s.age >= 40) T
GROUP BY T.bid
HAVING 5 <= COUNT(T.sid);

16. For each boat which was reserved by at least 5 sailors with age >= 40, find the boat id and the average age of all sailors who reserved the boat.

With duplicates when one sailor may potentially reserve one boat multiple times:

CREATE VIEW demboats(bid) AS SELECT bid
                        FROM sailor s, boat b, reserve r
                        WHERE s.sid = r.sid AND b.bid = r.bid AND age >= 40
                        GROUP BY bid
                        HAVING 5 <= COUNT (DISTINCT s.sid);

SELECT demboats.bid, AVG(s.age)
FROM sailor s, reserve r, demboats
WHERE s.sid = r.sid AND r.bid = demboats.bid
GROUP BY demboats.bid;

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Without duplicates:

```
CREATE VIEW demboats(bid) AS
(SELECT T.bid
FROM (SELECT DISTINCT s.sid AS sid, b.bid AS bid, s.age AS age
        FROM sailor s, boat b, reserve r
        WHERE s.sid = r.sid and b.bid = r.bid and s.age >= 40) T
GROUP BY T.bid
HAVING 5 <= COUNT(T.sid));

SELECT T.bid, avg(T.age)
FROM (SELECT DISTINCT s.sid AS sid, b.bid AS bid, s.age AS age
        FROM sailor s, demboats b, reserve r
        WHERE s.sid = r.sid and b.bid = r.bid and s.age >= 40) T
GROUP BY T.bid;
```