Database Management System (DBMS)

Lecture-27

Dharmendra Kumar

October 25, 2020

Example

Consider the following database schemas and corresponding its database:-

Sailors(sid: integer, sname: string, rating: integer, age: real)
Boats(bid: integer, bname: string, color: string)
Reserves(sid: integer, bid: integer, day: date)

SQL

sid	*sname*	*rating*	*age*
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

Instance S_3 of sailors

sid	*bid*	*day*
22	101	10/10/98
22	102	10/10/98
22	103	10/8/98
22	104	10/7/98
31	102	11/10/98
31	103	11/6/98
31	104	11/12/98
64	101	9/5/98
64	102	9/8/98
74	103	9/8/98

Instance R_2 of Reserves

bid	*bname*	*color*
101	Interlake	blue
102	Interlake	red
103	Clipper	green
104	Marine	red

Instance B_1 of Boats Reserves

Example

Write the following queries in SQL:-

(1) Find the names of sailors who have reserved boat number 103.
(2) Find all sailors with a rating above 7.
(3) Find the sids of sailors who have reserved a red boat.
(4) Find the names of sailors who have reserved a red boat.
(5) Find the colors of boats reserved by Lubber.
(6) Find the names of sailors who have reserved at least one boat.
(7) Compute increments for the ratings of persons who have sailed two different boats on the same day.

(8) Find the ages of sailors whose name begins and ends with B and has at least three characters.

(9) Find the names of sailors who have reserved a red or a green boat.

(10) Find the names of sailors who have reserved both a red and a green boat.

(11) Find the sids of all sailors who have reserved red boats but not green boats.

(12) Find the names of sailors who have not reserved a red boat.

(13) Find sailors whose rating is better than some sailor called Horatio.

(14) Find the sailors with the highest rating.

SQL

(15) Find the average age of all sailors.
(16) Find the names of sailors who have reserved all boats.
(17) Find the average age of sailors with a rating of 10.
(18) Find the name and age of the oldest sailor.
Count the number of different sailor names.
(19) Find the names of sailors who are older than the oldest sailor with a rating of 10.
(20) Find the age of the youngest sailor for each rating level.
(21) Find the age of the youngest sailor who is eligible to vote (i.e., is at least 18 years old) for each rating level with at least two such sailors.

SQL

(22) For each red boat, find the number of reservations for this boat.

(23) Find the average age of sailors for each rating level that has at least two sailors.

(24) Find the average age of sailors who are of voting age (i.e., at least 18 years old) for each rating level that has at least two sailors.

(25) Find the average age of sailors who are of voting age (i.e., at least 18 years old) for each rating level that has at least two such sailors.

(26) Find those ratings for which the average age of sailors is the minimum over all ratings.

Solution

1. SELECT S.sname
FROM Sailors S, Reserves R
WHERE S.sid = R.sid AND R.bid=103

2. SELECT S.sid, S.sname, S.rating, S.age
FROM Sailors AS S
WHERE S.rating > 7

3. SELECT R.sid
FROM Boats B, Reserves R
WHERE B.bid = R.bid AND B.color = ‘red’

SQL

4. SELECT S.sname
FROM Sailors S, Reserves R, Boats B
WHERE S.sid = R.sid AND R.bid = B.bid AND B.color = ‘red’

5. SELECT B.color
FROM Sailors S, Reserves R, Boats B
WHERE S.sid = R.sid AND R.bid = B.bid AND S.sname = ‘Lubber’

6. SELECT S.sname
FROM Sailors S, Reserves R
WHERE S.sid = R.sid

SQL

7. SELECT S.sname, S.rating+1 AS rating
FROM Sailors S, Reserves R1, Reserves R2
WHERE S.sid = R1.sid AND S.sid = R2.sid
AND R1.day = R2.day AND R1.bid <> R2.bid

8. SELECT S.age
FROM Sailors S
WHERE S.sname LIKE 'B_%B'

SQL

9. SELECT S.sname
FROM Sailors S, Reserves R, Boats B
WHERE S.sid = R.sid AND R.bid = B.bid
AND (B.color = ‘red’ OR B.color = ‘green’)

This query can also be written as following:-

SELECT S.sname FROM Sailors S, Reserves R, Boats B WHERE S.sid = R.sid AND R.bid = B.bid AND B.color = ‘red’ UNION SELECT S2.sname FROM Sailors S2, Boats B2, Reserves R2 WHERE S2.sid = R2.sid AND R2.bid = B2.bid AND B2.color = ‘green’

SQL

10. SELECT S.sname
FROM Sailors S, Reserves R1, Boats B1, Reserves R2, Boats B2
WHERE S.sid = R1.sid AND R1.bid = B1.bid
AND S.sid = R2.sid AND R2.bid = B2.bid
AND B1.color=‘red’ AND B2.color = ‘green’

This query can also be written as following:-

SELECT S.sname
FROM Sailors S, Reserves R, Boats B
WHERE S.sid = R.sid AND R.bid = B.bid AND B.color = ‘red’
INTERSECT
SELECT S2.sname
FROM Sailors S2, Boats B2, Reserves R2
WHERE S2.sid = R2.sid AND R2.bid = B2.bid AND B2.color = ‘green’

SQL

11. SELECT S.sid
FROM Sailors S, Reserves R, Boats B
WHERE S.sid = R.sid AND R.bid = B.bid AND B.color = ‘red’
EXCEPT
SELECT S2.sid
FROM Sailors S2, Reserves R2, Boats B2
WHERE S2.sid = R2.sid AND R2.bid = B2.bid AND B2.color = ‘green’

12. SELECT S.sname
FROM Sailors S
WHERE S.sid NOT IN (SELECT R.sid
FROM Reserves R
WHERE R.bid IN (SELECT B.bid
FROM Boats B
WHERE B.color = ‘red’))

SQL

13. SELECT S.sid
FROM Sailors S
WHERE S.rating > ANY (SELECT S2.rating
FROM Sailors S2
WHERE S2.sname = 'Horatio')

14. SELECT S.sid
FROM Sailors S
WHERE S.rating >= ALL (SELECT S2.rating
FROM Sailors S2)

15. SELECT AVG (S.age)
FROM Sailors S

SQL

16. SELECT S.sname
FROM Sailors S
WHERE NOT EXISTS ((SELECT B.bid
FROM Boats B)
EXCEPT
(SELECT R.bid
FROM Reserves R
WHERE R.sid = S.sid))

An alternative way to do this query without using EXCEPT follows:

SELECT S.sname
FROM Sailors S
WHERE NOT EXISTS (SELECT B.bid
FROM Boats B
WHERE NOT EXISTS (SELECT R.bid
FROM Reserves R
WHERE R.bid = B.bid
AND R.sid = S.sid))

SQL

17. SELECT AVG (S.age)
FROM Sailors S
WHERE S.rating = 10

18. SELECT S.sname, S.age
FROM Sailors S
WHERE S.age = (SELECT MAX (S2.age)
FROM Sailors S2)

19. SELECT COUNT (DISTINCT S.sname)
FROM Sailors S

20. SELECT S.sname
FROM Sailors S
WHERE S.age > (SELECT MAX (S2.age)
FROM Sailors S2
WHERE S2.rating = 10)

This query could alternatively be written as follows:

SELECT S.sname
FROM Sailors S
WHERE S.age > ALL (SELECT S2.age
FROM Sailors S2
WHERE S2.rating = 10)

SQL

21. SELECT S.rating, MIN (S.age)
FROM Sailors S
GROUP BY S.rating

22. SELECT S.rating, MIN (S.age) AS minage
FROM Sailors S
WHERE S.age >= 18
GROUP BY S.rating
HAVING COUNT (*) > 1

23. SELECT B.bid, COUNT (*) AS sailorcount
FROM Boats B, Reserves R
WHERE R.bid = B.bid AND B.color = 'red'
GROUP BY B.bid

SQL

24. SELECT S.rating, AVG (S.age) AS average
FROM Sailors S
GROUP BY S.rating
HAVING COUNT (*) $>$ 1

25. SELECT S.rating, AVG (S.age) AS average
FROM Sailors S
WHERE S. age $>=$ 18
GROUP BY S.rating
HAVING 1 $<$ (SELECT COUNT (*)
FROM Sailors S2
WHERE S.rating $=$ S2.rating)

SQL

26. SELECT S.rating, AVG (S.age) AS average
FROM Sailors S
WHERE S. age >18
GROUP BY S.rating
HAVING 1 < (SELECT COUNT (*)
FROM Sailors S2
WHERE S.rating = S2.rating AND S2.age >= 8)

27. SELECT S.rating
FROM Sailors S
WHERE AVG (S.age) = (SELECT MIN (AVG (S2.age))
FROM Sailors S2
GROUP BY S2.rating)