CSCI4333 Database Design & Implement

SQL 4

Instructor: Dr. Yifeng Gao

Sailors

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

Reserves

sid	*bid*	*day*
22	101	10/10/04
22	102	10/10/04
22	103	10/08/04
22	104	10/07/04
31	102	11/10/04
31	103	11/06/04
31	104	11/12/04
64	101	09/05/04
64	102	09/08/04
74	103	09/08/04

Boats

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

Correlated Nested Queries…1

Find names of sailors who have reserved boat 103

```
SELECT  S.sname
FROM  Sailors S
WHERE  EXISTS  (SELECT  *
                FROM  Reserves R
                WHERE  R.bid=103 AND R.sid=S.sid);
```

Plug in Table S row and tests whether the set is nonempty. If it is, then return TRUE.

(For finding sailors who have **not** reserved boat 103, we would use NOT EXISTS)

Correlated Nested Queries…1

Find names of sailors who have reserved boat 103

```
SELECT  S.sname
FROM  Sailors S
WHERE  EXISTS (SELECT  *
               FROM  Reserves R
               WHERE  R.bid=103 AND R.sid=S.sid);
```

For each sailor, check the reserve table if he/she reserved boat 103

(For finding sailors who have **not** reserved boat 103, we would use NOT EXISTS)

Sailors

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

Reserves

sid	*bid*	*day*
22	101	10/10/04
22	102	10/10/04
22	103	10/08/04
22	104	10/07/04
31	102	11/10/04
31	103	11/06/04
31	104	11/12/04
64	101	09/05/04
64	102	09/08/04
74	103	09/08/04

SELECT * FROM Reserves R WHERE R.bid=103 AND R.sid=22;

Sailors

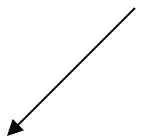
sid	*sname*	*rating*	*age*
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

Reserves

sid	*bid*	*day*
22	101	10/10/04
22	102	10/10/04
22	103	10/08/04
22	104	10/07/04
31	102	11/10/04
31	103	11/06/04
31	104	11/12/04
64	101	09/05/04
64	102	09/08/04
74	103	09/08/04

True

non-empty



SELECT * FROM Reserves R WHERE R.bid=103 AND R.sid=22;

True

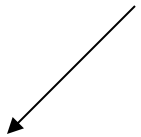
Sailors

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

Reserves

sid	*bid*	*day*
22	101	10/10/04
22	102	10/10/04
22	103	10/08/04
22	104	10/07/04
31	102	11/10/04
31	103	11/06/04
31	104	11/12/04
64	101	09/05/04
64	102	09/08/04
74	103	09/08/04

non-empty



SELECT * FROM Reserves R WHERE R.bid=103 AND R.sid=22;

Sailors

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

Reserves

sid	*bid*	*day*
22	101	10/10/04
22	102	10/10/04
22	103	10/08/04
22	104	10/07/04
31	102	11/10/04
31	103	11/06/04
31	104	11/12/04
64	101	09/05/04
64	102	09/08/04
74	103	09/08/04

True

False

empty

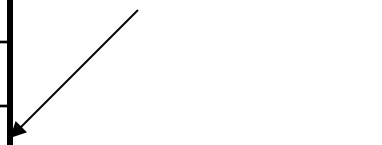
SELECT * FROM Reserves R WHERE R.bid=103 AND R.sid=29;

Sailors

	sid	*sname*	*rating*	*age*
True	22	Dustin	7	45.0
False	29	Brutus	1	33.0
True	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

Reserves

sid	*bid*	*day*
22	101	10/10/04
22	102	10/10/04
22	103	10/08/04
22	104	10/07/04
31	102	11/10/04
31	103	11/06/04
31	104	11/12/04
64	101	09/05/04
64	102	09/08/04
74	103	09/08/04



SELECT * FROM Reserves R WHERE R.bid=103 AND R.sid=31;

Sailors

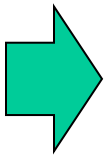
	sid	*sname*	*rating*	*age*
True	22	Dustin	7	45.0
False	29	Brutus	1	33.0
True	31	Lubber	8	55.5
False	32	Andy	8	25.5
False	58	Rusty	10	35.0
False	64	Horatio	7	35.0
False	71	Zorba	10	16.0
True	74	Horatio	9	35.0
False	85	Art	3	25.5
False	95	Bob	3	63.5

Reserves

sid	*bid*	*day*
22	101	10/10/04
22	102	10/10/04
22	103	10/08/04
22	104	10/07/04
31	102	11/10/04
31	103	11/06/04
31	104	11/12/04
64	101	09/05/04
64	102	09/08/04
74	103	09/08/04

Sailors

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



sname
Dustin
Lubber
Horatio

```
SELECT  S.sname
FROM  Sailors S
WHERE  EXISTS  (SELECT  *
                FROM  Reserves R
                WHERE  R.bid=103 AND R.sid=S.sid);
```

Correlated Nested Queries…2

Find the sid of the sailor who never reserve a red boat?

Hint: Using NOT EXISTS

Correlated Nested Queries…2

Find the sid of the sailor who never reserve a red boat?

```
SELECT R.sid FROM Reserve R
WHERE NOT EXISTS (
SELECT * FROM Boat B WHERE B.color = 'red'
AND B.bid = R.bid
)
```

Correlated Nested Queries…3

Find the sid of the sailor who previously reserve a red boat and blue boat?

Correlated Nested Queries…3

Find the sid of the sailor who previously reserve a red boat and blue boat?

```
SELECT R.sid FROM Reserve R
WHERE
EXISTS (SELECT * FROM Boat B WHERE B.color = 'red' AND
    B.bid = R.bid)
AND
EXISTS (SELECT * FROM Boat B WHERE B.color = 'blue' AND
    B.bid = R.bid)
```

Correlated Nested Query 4

Find the names of sailors who have reserved ALL boats

```
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));
```

(For each sailor S, we check to see that the set of boats reserved by S includes every boat)

Correlated Nested Query 4

Alternatively,

Find the names of sailors who have reserved ALL boats

```
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 ));
```

ANY and ALL operators

Find sailors whose rating is better than some sailor named Horatio

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

(Can you find the probable bug in this SQL query??)

Hint: what if there are several sailors named Horatio?

Using ALL operator

*Find sailors whose rating is better than **every** sailor named Horatio*

```
SELECT S.sid
FROM Sailors S
WHERE S.rating > ALL(SELECT S2.rating
                     FROM Sailors S2
                     WHERE S2.sname= 'Horatio' );
```