CSCI4333 Database Design & Implement

Lecture Fifteen SQL 1

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Basic form of SQL Queries

SELECT	*target-list*
FROM	*relation-list*
WHERE	*qualification*

- *target-list* A list of attributes of output relations in *relation-list*
- *relation-list* A list of relation names (possibly with a *range-variable (new name)* after each name)

  e.g. Sailors S, Reserves R
- *qualification* Comparisons (Attr *op* const or Attr1 *op* Attr2, where *op* is one of $<, >, \leq, \geq, =, \neq$) combined using AND, OR and NOT.

What's contained in an SQL Query?

SELECT	*target-list*
FROM	*relation-list*
WHERE	*qualification*

Every SQL Query must have:

- *SELECT clause: specifies columns to be retained in result*
- *FROM clause: specifies a cross-product of tables*

The WHERE clause (optional) specifies selection conditions on the tables mentioned in the FROM clause

Table Definitions

We will be using the following relations in our examples:

Sailors(sid, sname, rating, age)

Boats(bid, bname, color)

Reserves(sid, bid, day)

Sailors(S)

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(R)

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(B)

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

A Simple SQL Query

Find the names and ages of all sailors

$\pi_{s,a}$

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

A Simple SQL Query

Find the names and ages of all sailors

```
SELECT    target-list
FROM      relation-list
WHERE     qualification
```

sid	*sname*	*rating*	*age*
22	Dustin	7	45.0
29	Brutus	1	33.0
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85	Art	3	25.5
95	Bob	3	63.5

A Simple SQL Query

Find the names and ages of all sailors

target-list:
relation-list:
qualification:

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
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71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

A Simple SQL Query

Find the names and ages of all sailors

target-list: sname, age
relation-list: Sailors
qualification: None

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

Result of Previous Query

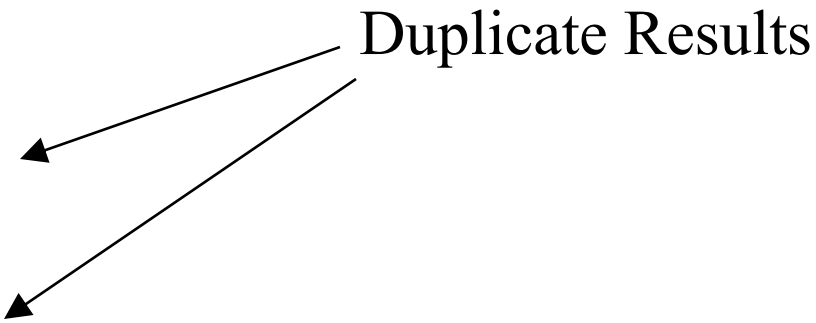
sname	*age*
Dustin	45.0
Brutus	33.0
Lubber	55.5
Andy	25.5
Rusty	35.0
Horatio	35.0
Zorba	16.0
Horatio	35.0
Art	25.5
Bob	63.5

```
SELECT sname, age
FROM Sailors;
```

Result of Previous Query

sname	*age*
Dustin	45.0
Brutus	33.0
Lubber	55.5
Andy	25.5
Rusty	35.0
Horatio	35.0
Zorba	16.0
Horatio	35.0
Art	25.5
Bob	63.5

SELECT sname, age
FROM Sailors;



Preventing Duplicate Tuples in the Result

- Use the DISTINCT keyword in the SELECT clause:
  - SELECT sname, age FROM Sailors;
  - SELECT DISTINCT sname, age FROM Sailors;
- If we use range-variable?
  - SELECT DISTINCT S.sname, S.age FROM Sailors S;

Results of Original Query without Duplicates

sname	*age*
Dustin	45.0
Brutus	33.0
Lubber	55.5
Andy	25.5
Rusty	35.0
Horatio	35.0
Zorba	16.0
Art	25.5
Bob	63.5

Example SQL Query…1

Find the names of sailors who have reserved boat 103

Relational Algebra:

$$\pi_{sname}(\sigma_{bid=103 \wedge R.sid=S.sid}(R \times S))$$

SQL:

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

A Note on Range Variables

- The previous query can also be written as:

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

Really needed only if the same relation appears twice in the FROM clause.

OR

```
SELECT  sname
FROM    Sailors, Reserves
WHERE  Sailors.sid=Reserves.sid AND bid=103;
```

However, it is a good style to always use range variables!

Example SQL Query…2

*Find the **sids** of sailors who have reserved a red boat*

Sailors(sid, sname, rating, age)

Boats(bid, bname, color)

Reserves(sid, bid, day)

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

Example SQL Query…3

*Find the **names** of sailors who have reserved a red boat*

Sailors(sid, sname, rating, age)

Boats(bid, bname, color)

Reserves(sid, bid, day)

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

Example SQL Query…4

*Find the **colors** of boats reserved by 'Lubber'*

Sailors(sid, sname, rating, age)

Boats(bid, bname, color)

Reserves(sid, bid, day)

```
SELECT B.color
FROM Sailors S, Reserves R, Boats B
WHERE S.sid=R.sid AND R.bid=B.bid AND
        S.sname= 'Lubber' ;
```

Example SQL Query…5

*Find the **names** of sailors who have reserved **at least** one boat*

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