

Relational Algebra Queries

<i>sid</i>	<i>sname</i>	<i>rating</i>	<i>age</i>
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

Figure 4.15 An Instance *S3* of Sailors

<i>sid</i>	<i>bid</i>	<i>day</i>
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

Figure 4.16 An Instance *R2* of Reserves

<i>bid</i>	<i>bname</i>	<i>color</i>
101	Interlake	blue
102	Interlake	red
103	Clipper	green
104	Marine	red

Figure 4.17 An Instance *B1* of Boats

(Q1) Find the names of sailors who have reserved boat 103

$$\pi_{sname}((\sigma_{bid=103}Reserves) \bowtie Sailors)$$

SQL> select s.sname from sailor s, reserve r where s.sid=r.sid and r.bid=103;

Result: *Dustin, Lubber and Horatio*

(Q2) Find the names of sailors who have reserved a red boat

$$\pi_{sname}((\sigma_{color='red'} Boats) \bowtie Reserves \bowtie Sailors)$$

SQL> select s.sname from sailor s where s.sid in(select r.sid from reserve r where r.bid in(select b.bid from boat b where b.color='red'));

Result: Dustin, Lubber and Horatio

An Equivalent Expression

$$\pi_{sname}(\pi_{sid}((\pi_{bid} \sigma_{color='red'} Boats) \bowtie Reserves) \bowtie Sailors)$$

(Q3) Find the colors of boats reserved by Lubber

$$\pi_{color}((\sigma_{sname='Lubber'} Sailors) \bowtie Reserves \bowtie Boats)$$

SQL>SELECT DISTINCT b.color FROM boat b, reserve r, sailor s WHERE s.sname = 'lubber' AND s.sid = r.sid AND r.bid = b.bid;

(Q4) Find the names of sailors who have reserved at least one boat

$$\pi_{sname}(Sailors \bowtie Reserves)$$

SQL> Select distinct s.sname from sailor s, reserve r where s.sid=r.sid;

(Q5) Find the names of sailors who have reserved a red or a green boat

$$\rho(\text{Tempboats}, (\sigma_{\text{color}='red'} \text{Boats}) \cup (\sigma_{\text{color}='green'} \text{Boats})) \\ \pi_{\text{sname}}(\text{Tempboats} \bowtie \text{Reserves} \bowtie \text{Sailors})$$

***SQL>select s.sname from sailor s,boat b, reserve r
where r.bid=b.bid and b.color='red'***

union

***select s2.sname from sailor s2, boat b2, reserve r2
where r2.bid=b2.bid and b2.color='green';***

***(Q6) Find the sids of sailors with age over 20 who
have not reserved a red boat***

$$\pi_{\text{sid}}(\sigma_{\text{age}>20} \text{Sailors}) - \\ \pi_{\text{sid}}((\sigma_{\text{color}='red'} \text{Boats}) \bowtie \text{Reserves} \bowtie \text{Sailors})$$

***SQL> select s.sid,s.sname
from sailors s,boats b,reserves r
where s.sid=r.sid and b.bid=r.bid and s.age>20
and b.color!='red';***

(Q7) Find the names of sailors who have reserved all boats

$$\rho(Tempsids, (\pi_{sid,bid} Reserves) / (\pi_{bid} Boats)) \\ \pi_{sname}(Tempids \bowtie Sailors)$$

***SQL> select s.sname from sailor s where
not exists (select b.bid from boat b where not exists
(select r.bid from reserve r
where r.bid=b.bid and r.sid=s.sid));***

(Q8) Find the names of sailors who have reserved all boats called Interlake

$$\rho(Tempsids, (\pi_{sid,bid} Reserves) / (\pi_{bid}(\sigma_{bname='Interlake'} Boats))) \\ \pi_{sname}(Tempids \bowtie Sailors)$$

***SQL> select * from sailor
where sid in(select sid from reserve
inner join boat on reserve.bid=boat.bid
where boat.bname='interlake');***