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DBMS - Assgn 1

1. Show names of all sailors who have operated / used red colour boats

Π_{sname} (Π_{sid} ((Π_{bid} $\sigma_{color='red'}$ Boats) ⋈ Reserves) ⋈ sailors)

select rows where color = 'red'

ⓐ→ take select bid's of boats where color = 'red'

Π_{sname} (Π_{sid} (ⓐ ⋈ Reserves) ⋈ sailors)

join both tables where common attributes is 'bid'

ⓑ table with attributes = bid, sid, day

Π_{sname} (Π_{sid} ⓑ } ⋈ sailors)

take sid from ⓑ and join with sailors where common attribute is sid

ⓒ- new table with attributes sid, sname, rating, age

Π_{sname} ⓒ

→ name of all sailors from this table ⓒ

2. Show names of all sailors who have operated / used either red or green colour boats

ρ(TempBoats, ($\sigma_{color='red'}$ ∨ color='green' Boats)

select rows where color= 'red' or 'green'
then rename this table of rows as TempBoats

Πsname (Tempboats $\bowtie$ Reserves $\bowtie$ sailors)

  (a) join both tables where common attribute is
   bid, so it contains bid, bname, be color, sid, day
   & color has values as 'red' or green

Πsname ((a) $\bowtie$ sailors)

    (b) join both tables where common
     attribute is sid to give final
   table with bid, bname, color, sid, day,
    sname, rating, age

Πsname (b)

   name of all sailors from table (b)

3.   show names of all sailors that have operated both
   red and green color boats

  $\int$ (Temp1, Πbid(($\sigma_{color = 'red'}$ Boats) $\bowtie$ Reserves)

      (a) select rows where
       colour = 'red'

  $\int$(Temp1, Πsid ((a) $\bowtie$ Reserves)

      join tables where common
      attribute is ~~red~~ bid
     so final table has bid, bname, color,
      sid, day

     sids of all sailors from this table
     & name it as Temp1

$\rho(Temp\ 2, \pi_{sid}\ \mathcal{E}\ (\ \sigma_{color='green'}\ Boats\ ) \bowtie\ Reserves\ )$

→ ⓔ select rows where color = 'green'

$\rho(Temp\ 2, \pi_{sid}\ (\ ⓔ \bowtie\ Reserves\ )$

→ join tables where common attribute is bid, so final table has bid, bname, color, sid, day

→ sids of all sailors from this table & name it as Temp 2

$\pi_{sname}\ (\ (\ Temp\ 1 \cap Temp\ 2\ ) \bowtie\ Sailors\ )$

→ ⓒ take intersection of both tables which gives us sids of all sailors who have operated red & green boats

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

→ join both tables where common attribute is sid, to give us table of sid, sname, rating, age

name of all sailors from this table

4. show names of all sailors that have operated more than 1 different boat.

$\rho(Reserves,\ \pi_{sid, sname, bid}\ (\ Sailors \bowtie\ Reserves\ )$

→ ⓐ join both tables where common attribute is sid to give us table with sid, sname, rating, age, bid, day

$\rho(Reserves,\ \pi_{sid, sname, bid}\ ⓐ\ )$

→ select rows where Take sid, sname, bid from the table ⓐ & rename it as Reserves

ρ (ReservationPairs (1 $\rightarrow$ sid1, 2 $\rightarrow$ sname1, 3 $\rightarrow$ bid1, 4 $\rightarrow$ sid2, 5 $\rightarrow$ sname2, 6 $\rightarrow$ bid2), Reservations $\times$ Reservations)

take cartesian product of both tables such that each tuple from 'first' Reservations has a combination with each tuple from 'second' Reservations & rename ~~for res~~ first column as sid1, second as sname1 and so on.
Rename entire table ReservationPairs.

Π sname1 σ (sid = sid2) $\wedge$ (bid1 $\neq$ bid2) ReservationPairs

ⓚ select rows where sid1 = sid2 & bid1 $\neq$ bid2 from ReservationPairs, which gives us sid of all sailors which have operated more than 1 different boat.

Π sname1 ⓚ
↪ take sname1 from table ⓚ to give us name of all sailors who satisfy above condition

5. show IDs of sailors with age greater than 20 except those who have operated red boats.

Π sid (~~age~~ σ age > 20 sailors)
→ select rows where age > 20
→ take sids of all such rows ⓐ

Π sid ((σ color = 'red' Boats) $\bowtie$ Reserves $\bowtie$ sailors)
↳ ① select rows where color = 'red'

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$\Pi_{bid}(\text{(b)} \bowtie \text{Reserves} \bowtie \text{Sailors})$

→ (c) join both tables where common attribute is bid. to give bid, bname, color, sid, day & color = 'red'

$\Pi_{sid}(\text{(c)} \bowtie \text{Sailors})$

→ join both tables where common attribute is sid, to give bid, bname, color, sid, day, sname, rating, age

(d) show sid's from this table

(a) - (d)

set difference b/w (a) & (d) which entire (a) except those where (a) ∩ (d) in (a)