Find names of sailors who’ve reserved boat #103

Solution 1:
\[ \pi_{\text{sname}}((\sigma_{\text{bid}=103}\text{Reserves}) \bowtie \text{Sailors}) \]

Solution 2:
\[ \rho(\text{Temp1}, \sigma_{\text{bid}=103}\text{Reserves}) \]
\[ \rho(\text{Temp2}, \text{Temp1} \bowtie \text{Sailors}) \]
\[ \pi_{\text{sname}}(\text{Temp2}) \]

Solution 3:
\[ \pi_{\text{sname}}(\sigma_{\text{bid}=103}(\text{Reserves} \bowtie \text{Sailors})) \]

Sailors (sid, sname, rating, age)
Reserves (sid, bid, day)
Boats (bid, bname, color)
Find names of sailors who’ve reserved a red boat

• Join relations?
  – Sailor, Reserves, Boats (for color)

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

A more efficient solution:

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

A query optimizer can find the most efficient solution!
Find sailors who’ve reserved a red or a green boat

- Identify all red or green boats, then
- find sailors who’ve reserved one of these boats:

\[ \rho (Tempboats, (\sigma \text{color}='\text{red}' \lor \text{color}='\text{green}' Boats)) \]

\[ \pi_{\text{sname}} (Tempboats \bowtie Reserves \bowtie Sailors) \]

- Can also define Tempboats using union! (How?)
- What happens if \( \lor \) is replaced by \( \land \) in this query?
Find sailors who’ve reserved a red and a green boat

1. Identify
   – sailors who’ve reserved red boats
   – sailors who’ve reserved green boats

2. Then find the intersection (sid is a key for Sailors):

$$\rho (\text{Tempred}, \pi \text{sid} ((\sigma \text{color='red'} \text{Boats}) \bowtie \text{Reserves}))$$

$$\rho (\text{Tempgreen}, \pi \text{sid} ((\sigma \text{color='green'} \text{Boats}) \bowtie \text{Reserves}))$$

$$\pi \text{sname}((\text{Tempred} \cap \text{Tempgreen}) \bowtie \text{Sailors})$$
Find the names of sailors who’ve reserved all boats

- Uses division; schemas of the input relations to / must be carefully chosen:

\[
\rho \left( \text{Tempsids} \left( \pi \text{sid,bid} \mathcal{R} \right) / \left( \pi \text{bid} \mathcal{B} \right) \right) \\
\pi \text{sname} \left( \text{Tempsids} \bowtie \mathcal{S} \right)
\]

- To find sailors who’ve reserved all ‘470’ boats:

\[
\ldots / \pi \text{bid} \left( \sigma \text{bname='470'} \mathcal{B} \right)
\]