Giving a database schema:

* Sailors(sid: *integer*, sname: *string*, rating: *integer*, age:*real*)
* Boats(bid:*integer* , bname: *string*, color: *string*)
* Reserves(sid: *integer*, bid: *integer* , day: *date* )

|  |  |  |  |
| --- | --- | --- | --- |
| ***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 |

|  |  |  |
| --- | --- | --- |
| ***Sid*** | ***Bid*** | ***Day*** |
| 22 | 101 | 10/10/08 |
| 22 | 102 | 10/10/08 |
| 22 | 103 | 10/08/08 |
| 22 | 104 | 10/07/08 |
| 31 | 102 | 11/10/08 |
| 31 | 103 | 11/06/08 |
| 31 | 104 | 11/12/08 |
| 64 | 101 | 9/05/08 |
| 64 | 102 | 9/08/08 |
| 74 | 103 | 9/08/08 |

|  |  |  |
| --- | --- | --- |
| ***Bid*** | ***Bname*** | ***Color*** |
| 101 | Interlake | Blue |
| 102 | Interlake | Red |
| 103 | Clipper | Green |
| 104 | Marine | Red |

**Sailors**

**Reserves**

**Boats**

**Using relational algebra expression to answer below queries**

1. Find the names of sailors who have reserved boat 103

π Sname(σ Bid=103 (Sailor ⋈ Reserves))

1. Find the names of sailors who have reserved a red boat

π Sname(σ Color = “Red” (Sailor ⋈ Reserves ⋈Boats))

1. Find the colors of boats reserved by Lubber.

π Color(σ Sname=”Lubber” (Sailor ⋈ Reserves ⋈Boats))

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

Sname (Sailor ⋈ Reserves)

1. Find the names of sailors who have reserved a red or a green boat

π Sname(σ Color = “Red” or “Green” (Sailor ⋈ Reserves ⋈Boats))

1. Find the names of sailors who have reserved a red and a green boat

π Sname(σ Color = “Red” (Sailor ⋈ Reserves ⋈Boats))  π Sname(σ Color = “Green” (Sailor⋈ Reserves ⋈Boats))

1. Find the sids of sailors with age over 20 who have not reserved a red boat

π Sid(σ Age>20 AND Color ≠ “Red” (Sailor ⋈ Reserves ⋈Boats))

1. Find the names of sailors who have reserved all boats

π Sname(σ Bid=101 (Sailor ⋈ Reserves))  π Sname(σ Bid=102 (Sailor ⋈ Reserves))  π Sname(σ Bid=103 (Sailor ⋈ Reserves))  π Sname(σ Bid=104 (Sailor ⋈ Reserves))

1. Find the names of sailors who have reserved all boats called Interlake

π Sname(σ Bid=101 (Sailor ⋈ Reserves))  π Sname(σ Bid=102 (Sailor ⋈ Reserves))

1. Find the names of sailors who have reserved at least two boats

π Sname (Sailor ⋈(σ Reserves.Sid = R2.Sid and Reserves.Bid != R2.Bid (Reserves ><p R2(Sid, Bid, Day) (Reserves))))