Relational Algebra

CS 300

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**Instructions:**Using relational algebra, write the statements to implement the following queries based on the relations provided below. For your convenience, you can copy/paste the sigma, pi, join, and union symbols from here**(σ   π  ⋈, ⋃)**. To reduce the length of your statements, you may also use **S, B, and R as aliases for your relations**.  
  
Here are some examples of what your output should look like.  
List all reservations in Reserves.

**σ(R)**

List only the bid from Reserves for boat number 4.

**π(σbid=4(R))**

Here are the relations to use for all of these problems

*Sailors(sid: integer, sname: string, rating: integer, age: real)*

*Boats(bid: integer, bname: string, color: string)*

*Reserves(sid: integer, bid: integer, day: date)*

1. List only the name and rating for all Sailors. **(4 points)**

π (sname, rating)(Sailors)

1. List all sailor information for sailors with a rating>8).  **(4 points)**

σ(rating>8)(Sailors)

1. List the boat id for boats all red boats.  **(4 points)**

π(bid) (σ(color=”red”)(Boats))

1. List the boat id for all red boats and all green boats.  **(4 points)**

π(bid)(σ(color = “red” **v** color = “green”)(Boats))

1. List the name of every sailor who is aged 16 or under.  **(4 points)**

π(sname)(σ(age <=16)(Sailors))

1. List the name and rating for all sailors who have a rating of 7 and below.  **(4 points)**

π(sname, rating) (σ(rating <=7)(Sailors))

1. Count the number of reservations for boat number 4.  **(4 points)**

ρ R (myCount) ℑ count bid (σ(bid = 4)(Reserves))

1. Find the names of sailors who have reserved boat 103.  **(4 points)**

π(sname)(σ(bid=103)(Reserves) ⋈ Sailors))

1. Find the names of sailors who have reserved a red boat.  **(4 points)**

π(sname)(σ(color = “red”)(Boats) ⋈ Reserves ⋈ Sailors)

1. Find the colors of the boats reserved by Lubber.  **(4 points)**

π(color) (σ(sname = “Lubber”)(Sailors) ⋈ Reserves ⋈ Boats)

1. Find the names of sailors who have reserved a red and green boat.  **(5 points)**

π(sname) ((σ(color = “red”) (Boats) ⋈ Reserves ⋈ Sailors) ∩ (σ(color = “green”) (Boats) ⋈ Reserves ⋈ Sailors))

1. Find the names of sailors with age over 20 who have not reserved a red boat.  **(5 points)**

π(sname) ((σ(age > 20) (Sailors) - π(sname)(σ(color = “red”)(Boats) ⋈ Reserves ⋈ Sailors)