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CS300-ON  
Database Management Systems

Writing Queries using Relational Algebra (50 points)

Goal: To understand and execute queries using relational algebra which provides the basis for SQL.  
  
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)

Note: The symbol selection σ selects a subset of rows from relation (horizontal).

List only the bid from Reserves for boat number 4.

π(σbid=4(R))

Note: The symbol Projection retains only wanted columns from relation (vertical).

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 (σ sname, rating (S))

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

π sid (σ rating>8 (S))

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

π bid(σ color=’red’ (B))

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

π bid (σ color<= ‘red’ ⋃ color ‘green’ (B))

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

π sname (σ age <= 16 (S))

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

π sname (σ rating <= 7 (S))

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

π(COUNT bid=4 (R))

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

π *sname* ((σ *bid*=103R) ⋈ *S*)

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

π sname ((π color = ‘red‘ B) ⋈ R ⋈ S)

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

π color σ name = ‘Lubber’ B

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

π sname (σ color = ‘red = color = ‘green’ B ⋈ R ⋈ S)

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

π sname (σ age > 20 (S) - color = ‘red’ (R,B))