

CS 5300 module3

Name

Student ID

Problem #1 (30 Points) (make sure your solution is clear and readable)

Assume the following relations:

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

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

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

Write the SQL query, relational algebra expression, and initial query tree for the following queries:

- a) Find the names of sailors who have reserved a red or a green boat

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

```
SELECT  sname
FROM    Sailors, Boats, Reserves
WHERE   Sailors.sid=Reserves.sid AND Reserves.bid=Boats.bid AND
        Boats.color='red'
UNION
SELECT  sname
FROM    Sailors, Boats, Reserves
WHERE   Sailors.sid=Reserves.sid AND Reserves.bid=Boats.bid AND
        Boats.color='green'
```

b) Find the names of sailors who have reserved both a red and a green boat

$$\Pi_{\text{sname}}(\Pi_{\text{sid}}(((\sigma_{\text{color}=\text{'red'}}\text{Boats}) \bowtie \text{Reserves}) \cap$$
$$\Pi_{\text{sid}}((\sigma_{\text{color}=\text{'green'}}\text{Boats}) \bowtie \text{Reserves})) \bowtie \text{Sailors})$$
$$\Pi_{\text{sname}}((\sigma_{\text{color}=\text{'red'}}\text{Boats}) \bowtie \text{Reserves} \bowtie \text{Sailors}) \cap$$
$$\Pi_{\text{sname}}((\sigma_{\text{color}=\text{'green'}}\text{Boats}) \bowtie \text{Reserves} \bowtie \text{Sailors})$$

```
SELECT  sname
FROM    Sailors, Boats, Reserves
WHERE   Sailors.sid=Reserves.sid AND Reserves.bid=Boats.bid AND
        Boats.color='red'
INTERSECT
SELECT  sname
FROM    Sailors, Boats, Reserves
WHERE   Sailors.sid=Reserves.sid AND Reserves.bid=Boats.bid AND
        Boats.color='green'
```

