More Practice
SQL ⇔ RA

CS 4750
Database Systems

Recap 1

Find the names of sailors who have reserve boat 103

```
Boats (bid, bname, color)
Sailors (sid, sname, rating, age)
Reserves (sid, bid, day)
```

$$\Pi_{sname}(\sigma_{bid=103}(Sailors \bowtie Reserves))$$

```
SELECT sname
FROM Sailors NATURAL JOIN Reserves
WHERE bid = 103;
```

Recap 2

Find the color of the boats reserved by 'Lubber'

```
Boats (bid, bname, color)
Sailors (sid, sname, rating, age)
Reserves (sid, bid, day)
```

$\Pi_{color}(\sigma_{sname='Lubber'}(Sailors \bowtie Reserves \bowtie Boats))$

```
SELECT DISTINCT color
FROM Boats NATURAL JOIN Reserves NATURAL JOIN Sailors
WHERE sname = 'Lubber';
```

Recap 3

Find the names of sailors who have reserved a red boat

```
Boats (bid, bname, color)
Sailors (sid, sname, rating, age)
Reserves (sid, bid, day)
```

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

```
SELECT DISTINCT sname
FROM Sailors NATURAL JOIN Reserves NATURAL JOIN Boats
WHERE color = 'Red';
```

Recap 4

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

Boats (bid, bname, color)
Sailors (sid, sname, rating, age)
Reserves (sid, bid, day)

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

```
SELECT DISTINCT sname
FROM Sailors NATURAL JOIN Reserves NATURAL JOIN Boats
WHERE color='Red'
  AND sname IN (SELECT sname
                FROM Sailors NATURAL JOIN Reserves NATURAL JOIN Boats
                WHERE color='Green');

-- another solution --

(SELECT DISTINCT sname
 FROM Sailors NATURAL JOIN Reserves NATURAL JOIN Boats
 WHERE color='Red')
INTERSECT
(SELECT sname
 FROM Sailors NATURAL JOIN Reserves NATURAL JOIN Boats
 WHERE color='Green');
```

Recap 5

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

Boats (bid, bname, color)
Sailors (sid, sname, rating, age)
Reserves (sid, bid, day)

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

```
(SELECT DISTINCT sname
 FROM Sailors NATURAL JOIN Reserves NATURAL JOIN Boats
 WHERE color = 'Red')
UNION
(SELECT DISTINCT sname
 FROM Sailors NATURAL JOIN Reserves NATURAL JOIN Boats
 WHERE color = 'Green')
```

Recap 6

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

```
Boats (bid, bname, color)
Sailors (sid, sname, rating, age)
Reserves (sid, bid, day)
```

$$\Pi_{sname,\ bid}(Sailors \bowtie Reserves) \div \Pi_{bid}(Boats)$$

For each sailor, there is no boats that this sailor has not reserved (note: double negation)

```
SELECT sname
FROM   Sailors
WHERE NOT EXISTS
          (SELECT bid
           FROM   Boats
           WHERE NOT EXISTS
                     (SELECT Reserves.bid
                      FROM   Reserves
                      WHERE  Reserves.bid = Boats.bid
                      AND    Reserves.sid = Sailors.sid) );
```

Recap 7

Find the names of sailors who have not reserved a boat.

```
Boats (bid, bname, color)
Sailors (sid, sname, rating, age)
Reserves (sid, bid, day)
```

$$\Pi_{sid,sname}(Sailors) - \Pi_{sid,sname}(Sailors \bowtie Reserves)$$

Thought questions: Should sid be included? How about sailors with the same name?

```
SELECT sid, sname
FROM Sailors LEFT JOIN Reserves ON Sailors.sid = Reserves.sid
WHERE bid IS NULL;
```

Recap 8

Find the sid's of the sailors who have reserved a boat whose name begins with the letter "M" (the boat's name, not the sailor's)

```
Boats (bid, bname, color)
Sailors (sid, sname, rating, age)
Reserves (sid, bid, day)
```

Cannot write RA to solve this.
There is no such thing as a "wild card" in RA.

```
SELECT DISTINCT Sailors.sid
FROM Sailors NATURAL JOIN Reserves NATURAL JOIN Boats
WHERE bname LIKE 'M%';
```