BİL 354 – Veritabanı Sistemleri

SQL Examples
(SQL Örnekleri)
Sailor Examples

- In this example, we want to keep track of sailors who reserve boats.
- We assume that a sailor reserves a boat for the full day.
- We know the names of sailors and boats, but since two sailors or boats may have the same name, we also keep an id value for them.
- We also keep track of Sailor ages, a rating value, and boat colors.
- Obviously, a sailor might have done a lot of reservations in the past....
Example Tables

- Instance $S_3$ of Sailors:

<table>
<thead>
<tr>
<th>sid</th>
<th>sname</th>
<th>rating</th>
<th>age</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Dustin</td>
<td>7</td>
<td>45.0</td>
</tr>
<tr>
<td>29</td>
<td>Brutus</td>
<td>1</td>
<td>33.0</td>
</tr>
<tr>
<td>31</td>
<td>Lubber</td>
<td>8</td>
<td>55.5</td>
</tr>
<tr>
<td>32</td>
<td>Andy</td>
<td>8</td>
<td>25.5</td>
</tr>
<tr>
<td>58</td>
<td>Rusty</td>
<td>10</td>
<td>35.0</td>
</tr>
<tr>
<td>64</td>
<td>Horatio</td>
<td>7</td>
<td>35.0</td>
</tr>
<tr>
<td>71</td>
<td>Zorba</td>
<td>10</td>
<td>16.0</td>
</tr>
<tr>
<td>74</td>
<td>Horatio</td>
<td>9</td>
<td>35.0</td>
</tr>
<tr>
<td>85</td>
<td>Art</td>
<td>3</td>
<td>25.5</td>
</tr>
<tr>
<td>95</td>
<td>Bob</td>
<td>3</td>
<td>63.5</td>
</tr>
</tbody>
</table>

- Instance $R_2$ of Reserve

<table>
<thead>
<tr>
<th>sid</th>
<th>bid</th>
<th>day</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>101</td>
<td>10/10/98</td>
</tr>
<tr>
<td>22</td>
<td>102</td>
<td>10/10/98</td>
</tr>
<tr>
<td>22</td>
<td>103</td>
<td>10/8/98</td>
</tr>
<tr>
<td>22</td>
<td>104</td>
<td>10/7/98</td>
</tr>
<tr>
<td>31</td>
<td>102</td>
<td>11/10/98</td>
</tr>
<tr>
<td>31</td>
<td>103</td>
<td>11/6/98</td>
</tr>
<tr>
<td>31</td>
<td>104</td>
<td>11/12/98</td>
</tr>
<tr>
<td>64</td>
<td>101</td>
<td>9/5/98</td>
</tr>
<tr>
<td>64</td>
<td>102</td>
<td>9/8/98</td>
</tr>
<tr>
<td>74</td>
<td>103</td>
<td>9/8/98</td>
</tr>
</tbody>
</table>

- Instance $B_1$ of Boats:

<table>
<thead>
<tr>
<th>bid</th>
<th>bname</th>
<th>color</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Interlake</td>
<td>blue</td>
</tr>
<tr>
<td>102</td>
<td>Interlake</td>
<td>red</td>
</tr>
<tr>
<td>103</td>
<td>Clipper</td>
<td>green</td>
</tr>
<tr>
<td>104</td>
<td>Marine</td>
<td>red</td>
</tr>
</tbody>
</table>
Find the names and ages of all sailors.
Find all sailors with a rating above 7.
Find the sids of sailors who have reserved a red boat.
Find the names of sailors who have reserved a red boat.
Find the colors of boats reserved by Lubber.
Find the names of sailors who have reserved at least one boat.
Compute increments for the ratings of persons who have sailed two different boats on the same day.
Find the ages of sailors whose name begins and ends with B and has at least three characters.
Find the names of sailors who have reserved a red or a green boat.
Find the names of sailors who have reserved a red and a green boat.
Find the sids of all sailors who have reserved red boats but not green boats.
Find all sids of sailors who have a rating of 10 or have reserved boat 104.
Find the names of sailors who have reserved boat 103.
Find the names of sailors who have reserved a red boat.
Find the names of sailors who have not reserved a red boat.
Find sailors whose rating is better than some sailor called “Horatio”.
Find the names and ages of all sailors.

Sailors\((sid: \text{integer}, \ sname: \text{string}, \ rating: \text{integer}, \ age: \text{real})\)
Boats\((bid: \text{integer}, \ bname: \text{string}, \ color: \text{string})\)
Reserves\((sid: \text{integer}, \ bid: \text{integer}, \ day: \text{date})\)

\begin{verbatim}
SELECT DISTINCT S.sname, S.age
FROM Sailors S
\end{verbatim}
Find all sailors with a rating above 7

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

SELECT S.sid, S.sname, S.rating, S.age
FROM Sailors AS S
WHERE S.rating > 7
Find the sids of sailors who have reserved a red boat

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

```
SELECT R.sid
FROM Boats B, Reserves R
WHERE B.bid = R.bid AND B.color = 'red'
```
Find the names of sailors who have reserved a red boat

\[
\text{Sailors(}sid: \text{ integer, } sname: \text{ string, } rating: \text{ integer, } age: \text{ real)}\\
\text{Boats(}bid: \text{ integer, } bname: \text{ string, } color: \text{ string)}\\
\text{Reserves(}sid: \text{ integer, } bid: \text{ integer, } day: \text{ date)}
\]

\[
\text{SELECT } S.sname \\
\text{FROM } \text{Sailors } S, \text{ Reserves } R, \text{ Boats } B \\
\text{WHERE } S.sid = R.sid \text{ AND } R.bid = B.bid \text{ AND } B.color = 'red'
\]
Find the colors of boats reserved by Lubber

\[
\begin{align*}
\text{Sailors} & \quad \text{sid: integer, sname: string, rating: integer, age: real} \\
\text{Boats} & \quad \text{bid: integer, bname: string, color: string} \\
\text{Reserves} & \quad \text{sid: integer, bid: integer, day: date}
\end{align*}
\]

\[
\begin{align*}
\text{SELECT} & \quad \text{B.color} \\
\text{FROM} & \quad \text{Sailors S, Reserves R, Boats B} \\
\text{WHERE} & \quad \text{S.sid = R.sid AND R.bid = B.bid AND S.sname = 'Lubber'}
\end{align*}
\]
Find the names of sailors who have reserved at least one boat

Sailors\((\text{sid}: \text{integer}, \text{sname}: \text{string, rating}: \text{integer, age}: \text{real})\)
Boats\((\text{bid}: \text{integer, bname}: \text{string, color}: \text{string})\)
Reserves\((\text{sid}: \text{integer, bid}: \text{integer, day}: \text{date})\)

```
SELECT  S.sname
FROM     Sailors S, Reserves R
WHERE    S.sid = R.sid
```
Compute increments for the ratings of persons who have sailed two different boats on the same day.

```sql
SELECT S.sname, S.rating+1 AS rating
FROM Sailors S, Reserves R1, Reserves R2
WHERE S.sid = R1.sid AND S.sid = R2.sid
     AND R1.day = R2.day AND R1.bid <> R2.bid
```
An Example

SELECT  S1.sname AS name1, S2.sname AS name2
FROM    Sailors S1, Sailors S2
WHERE   2*S1.rating = S2.rating-1
Find the ages of sailors whose name begins and ends with B and has at least three characters

```
SELECT S.age
FROM Sailors S
WHERE S.sname LIKE 'B_%B'
```
Find the names of sailors who have reserved a red or a green boat

```
SELECT  S.sname
FROM    Sailors S, Reserves R, Boats B
        AND (B.color = 'red' OR B.color = 'green')
```

```
SELECT  S.sname
FROM    Sailors S, Reserves R, Boats B
WHERE   S.sid = R.sid AND R.bid = B.bid AND B.color = 'red'
UNION
SELECT  S2.sname
FROM    Sailors S2, Boats B2, Reserves R2
WHERE   S2.sid = R2.sid AND R2.bid = B2.bid AND B2.color = 'green'
```
Find the names of sailors who have reserved a red and a green boat.

```
SELECT S.sname
FROM Sailors S, Reserves R1, Boats B1, Reserves R2, Boats B2
WHERE S.sid = R1.sid AND R1.bid = B1.bid
    AND S.sid = R2.sid AND R2.bid = B2.bid
    AND B1.color = 'red' AND B2.color = 'green'

SELECT S.sname
FROM Sailors S, Reserves R, Boats B
WHERE S.sid = R.sid AND R.bid = B.bid AND B.color = 'red'
INTERSECT
SELECT S2.sname
FROM Sailors S2, Boats B2, Reserves R2
WHERE S2.sid = R2.sid AND R2.bid = B2.bid AND B2.color = 'green'
```
Find the sids of all sailors who have reserved red boats but not green boats

```
SELECT  S.sid
FROM     Sailors S, Reserves R, Boats B
WHERE    S.sid = R.sid AND R.bid = B.bid AND B.color = 'red'
EXCEPT
SELECT  S2.sid
FROM     Sailors S2, Reserves R2, Boats B2
WHERE    S2.sid = R2.sid AND R2.bid = B2.bid AND B2.color = 'green'

SELECT  R.sid
FROM     Boats B, Reserves R
WHERE    R.bid = B.bid AND B.color = 'red'
EXCEPT
SELECT  R2.sid
FROM     Boats B2, Reserves R2
WHERE    R2.bid = B2.bid AND B2.color = 'green'
```
Find all sids of sailors who have a rating of 10 or have reserved boat 104

```
SELECT S.sid
FROM Sailors S
WHERE S.rating = 10
UNION
SELECT R.sid
FROM Reserves R
WHERE R.bid = 104
```
Find the names of sailors who have reserved boat 103

```
SELECT   S.sname
FROM     Sailors S
WHERE    S.sid IN ( SELECT   R.sid
                    FROM     Reserves R
                    WHERE    R.bid = 103 )
```
Find the names of sailors who have reserved a red boat

```
SELECT S.sname
FROM Sailors S
WHERE S.sid IN ( SELECT R.sid
    FROM Reserves R
    WHERE R.bid IN ( SELECT B.bid
        FROM Boats B
        WHERE B.color = 'red' )
)```
Find the names of sailors who have not reserved a red boat

```
SELECT S.sname
FROM Sailors S
WHERE S.sid NOT IN ( SELECT R.sid
                    FROM Reserves R
                    WHERE R.bid IN ( SELECT B.bid
                                      FROM Boats B
                                      WHERE B.color = 'red' ) )
```

How about replacing the inner occurrence of IN with NOT IN?

Who have reserved a boat that is not red.
How about replacing both occurrences of IN with NOT IN?

This variant finds the names of sailors who have not reserved a boat that is not red, i.e., who have only reserved red boats (if they've reserved any boats at all).
Find sailors whose rating is better than some sailor called “Horatio”

```sql
SELECT S.sid
FROM Sailors S
WHERE S.rating > ANY ( SELECT S2.rating
FROM Sailors S2
WHERE S2.sname = 'Horatio' )
```
Find sailors whose rating is better than every sailor called “Horatio”

Just replace ANY with ALL!
Find the sailors with highest rating

```
SELECT S.sid
FROM Sailors S
WHERE S.rating >= ALL ( SELECT S2.rating
                          FROM    Sailors S2 )
```
Find the names of sailors who have reserved both a red and a greed both

```
SELECT S.sname
FROM Sailors S, Reserves R, Boats B
WHERE S.sid = R.sid AND R.bid = B.bid AND B.color = 'red'
AND S.sid IN ( SELECT S2.sid
    FROM Sailors S2, Boats B2, Reserves R2
    WHERE S2.sid = R2.sid AND R2.bid = B2.bid
    AND B2.color = 'green' )

SELECT S3.sname
FROM Sailors S3
WHERE S3.sid IN (( SELECT R.sid
    FROM Boats B, Reserves R
    WHERE R.bid = B.bid AND B.color = 'red' )
INTERSECT
(SELECT R2.sid
    FROM Boats B2, Reserves R2
    WHERE R2.bid = B2.bid AND B2.color = 'green' )))
```
Find the names of sailors who have reserved all boats

```sql
SELECT S.sname
FROM Sailors S
WHERE NOT EXISTS (( SELECT B.bid
                     FROM Boats B )
                  EXCEPT
                  (SELECT R.bid
                   FROM Reserves R
                   WHERE R.sid = S.sid ))
```

Intuitively, for each sailor we check that there is no boat that has not been reserved by this sailor.
Find the average age of all sailors

```
SELECT AVG (S.age)
FROM Sailors S
```

Find the average age of all sailors with a rating 10

```
SELECT AVG (S.age)
FROM Sailors S
WHERE S.rating = 10
```
Find the name and age of the oldest sailor

```
SELECT  S.sname, S.age 
FROM    Sailors S 
WHERE   S.age = ( SELECT MAX (S2.age) 
               FROM    Sailors S2 ) 
```

```
SELECT  S.sname, MAX (S.age) 
FROM    Sailors S
```
Count the number of sailors

```
SELECT COUNT (*)
FROM   Sailors S
```

Count the number of different sailor names.

```
SELECT COUNT ( DISTINCT S.sname )
FROM   Sailors S
```
Find the names of sailors who are older than the oldest sailor with a rating 10.

```
SELECT  S.sname
FROM    Sailors S
WHERE   S.age > ( SELECT  MAX ( S2.age )
                  FROM    Sailors S2
                  WHERE   S2.rating = 10 )
```

```
SELECT  S.sname
FROM    Sailors S
WHERE   S.age > ALL ( SELECT  S2.age
                  FROM    Sailors S2
                  WHERE   S2.rating = 10 )
```
Find the ages of the youngest sailor for each rating level

```
SELECT   S.rating, MIN (S.age)
FROM      Sailors S
GROUP BY  S.rating
```
Find the ages of the youngest sailor who is eligible to vote (>= 18) for each rating level with at least two sailors.

```
SELECT S.rating, MIN (S.age) AS minage
FROM Sailors S
WHERE S.age >= 18
GROUP BY S.rating
HAVING COUNT(*) > 1
```
For each red boat, find the number of reservations for this boat

```
SELECT B.bid, COUNT (*) AS sailorcount
FROM Boats B, Reserves R
WHERE R.bid = B.bid AND B.color = 'red'
GROUP BY B.bid
```
Find the average of sailors for each rating level that has at least two sailors

```sql
SELECT S.rating, AVG (S.age) AS avgage
FROM Sailors S
GROUP BY S.rating
HAVING COUNT(*) > 1
```

```sql
SELECT S.rating, AVG ( S.age ) AS avgage
FROM Sailors S
GROUP BY S.rating
HAVING 1 < ( SELECT COUNT(*)
    FROM Sailors S2
    WHERE S.rating = S2.rating )
```