LAB 6 Notes

The Relational Algebra

- Any questions on the project (Discuss)
- We will discuss the java program
- We will continue our discussion on SQL
- We will finish the postgres manual

Outline

1-4) More on SQL Operators. I will try to emphasize on the most important aspects and then jump into examples
5) Examples on SQL.
6) If time permits we will look at the project manual.

1) ANY, ALL

```
SELECT [DISTINCT] a
FROM from-list
WHERE attribute <=!> ALL/ANY (SELECT attribute FROM X)
```

"Find the oldest employee"

We have already seen

```
SELECT *
FROM Employee e
WHERE e.age = (SELECT MAX(age) FROM EMPLOYEE);
```

OR

```
SELECT *
FROM EMPLOYEE
WHERE E.age > ALL (SELECT E2.age FROM
EMPLOYEE E2
WHERE E2.ssn!=E.ssn);
```

* ALL => ALL in the set
* ANY => At least 1 in the set
ANY HERE WOULD PRODUCE: Find employees who’s age is bigger than AT least somebody’s else age.

2) GROUP BY and HAVING CLAUSE

Example: Find how many sailors belong to each group that has more than 30 members

<table>
<thead>
<tr>
<th></th>
<th>Chris</th>
<th>20</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Chris</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Chris</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>John</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

Sailors(sid, name, rating, age, group)

SELECT COUNT(id)
FROM Sailors
WHERE group = 1  i={1,2,3…}

SELECT group, count(*) as c
FROM Sailors
GROUP BY group, c
HAVING c>30

- Everything that appears in GROUP BY is also part of the select clause

Query: Find the age of the youngest sailor who is eligible to vote (older than 18 years) for each group with at least 2 such sailors.

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</tr>
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<td>John</td>
<td>15</td>
<td>2</td>
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</tbody>
</table>

SELECT group, MIN(age)
FROM Sailor
WHERE age>18
GROUP BY group
HAVING COUNT(*)>1;
### 3) NULLs

*unknown or inapplicable.*

Student(ssn, name, age, addressed)
1321, “John”, null
1421, “John”, 15
1521, “John”, 10
1621, “John”, 15

```sql
SELECT AVG(age)
FROM Student
.setHeader
15+10+15+0 /4 = 10
```

```sql
SELECT AVG(age)
FROM Student
WHERE age IS NOT NULL
.setHeader
15 + 10 + 15 /4 = 13.33
```

*Find all student that don’t have their age in the system*

SELECT * FROM Student WHERE AGE IS NULL;

### 4) Nested Queries in the FROM clause

(Not implemented in many DBMS systems)

```sql
// give me a list of salaries (above $20000) where each salary represents the MAX salary of some particular age.

SELECT TEMP.salary
FROM (SELECT E.age, MAX(salary) AS salary
     FROM EMPLOYEE
     GROUP BY E.age
```
) AS TEMP
WHERE TEMP.salary>2000;