Outer Joins

Inner Joins Vs Outer Joins

When combining two tables an inner join is frequently performed to combine correct rows from the first table with correct rows from the second. In SQL this is achieved by adding a condition that matches some shared attribute in some way

e.g. `emp.deptno=dept.deptno`, or `sal>=losal and sal<=hisal`

Unfortunately the way that a join is implemented in SQL (a cartesian product, followed by a selection) may throw away extra rows which we actually require.

Example Get a list of the department names with location, along with the employee names who work in them. This is to include departments which do not have any staff allocated to them at present.

A first (incorrect) attempt may look like this:

```
SELECT dname, loc, ename
from dept, emp
where emp.deptno=dept.deptno
order by dname
```

But running this query does not show the employees working in Operations (as there are currently no employees in the Operations department).

dname	loc	ename
ACCOUNTING	LONDON	BLACK
ACCOUNTING	LONDON	PARKER
ACCOUNTING	LONDON	POLLARD
RESEARCH	YORK	GIBSON
RESEARCH	YORK	HAYES
RESEARCH	YORK	REES
RESEARCH	YORK	BIRD
RESEARCH	YORK	MARCH
SALES	BIRMINGHAM	CASSY
SALES	BIRMINGHAM	TURNER
SALES	BIRMINGHAM	COX
SALES	BIRMINGHAM	AHMAD
SALES	BIRMINGHAM	BELL
SALES	BIRMINGHAM	BYRNE

In fact we need to ask for all rows that match, plus any rows from the *dept* table that don't have a match (i.e. the Operations department). In Relational Algebra this is called an outer join (to include rows from the Department table that don't match rows in the Employee table). In mySQL *left* and *right* outer joins are achieved by using the following syntax:

```
FROM table1 [ LEFT | RIGHT ] JOIN table2
ON table1.field1 operator table2.field2
```

Where ***table1*** and ***table2*** are the two tables being combined with the operator using fields ***table1.field1*** and ***table2.field2***. The Left Outer Join includes extra rows from the relation on the 'left' of the join, the Right Outer Join includes rows from the 'right'.

```
SELECT dname, loc, ename
from dept left join emp
on emp.deptno=dept.deptno
```

Note that this can be different in other SQL implementations – Oracle SQL uses (+) next to the table in the where clause:

```
SELECT dname, loc, ename
from dept, emp
where emp.deptno=dept.deptno (+)
```

Activities: Writing your own Outer Join statements

1. Get all the employees and their manager, but include those staff that don't have a manager

2. Show all employees that don't manage anyone