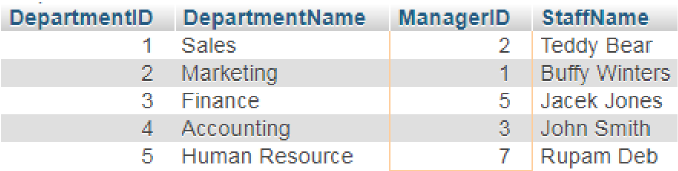
JOIN: SELECT data from 2 or more tables

Natural/Equi Join

- Are the most common join type in SQL
- Also called *simple joins or inner joins*.
- To join *n* tables together, you need *n-1* join conditions in WHERE clause
  - e.g. join four tables, three join conditions are required
  - This rule may not apply if your table has a primary key made up of more than one attribute, in which case more than one column is required to uniquely identify each row. The required number of conditions in WHERE clause is at least *n*-1

- Find the manager of each department. Show department ID, department name and its manger ID & name.

```
SELECT DepartmentID, DepartmentName, ManagerID, StaffName
FROM department, staff
WHERE department.ManagerID = staff.StaffID;
```



DepartmentID	DepartmentName	ManagerID	StaffName
1	Sales	2	Teddy Bear
2	Marketing	1	Buffy Winters
3	Finance	5	Jacek Jones
4	Accounting	3	John Smith
5	Human Resource	7	Rupam Deb

- Alternative solution (good practice!)

```
SELECT D.DepartmentID, D.DepartmentName, D.ManagerID, S.StaffName
FROM department AS D, staff AS S
WHERE D.ManagerID = S.StaffID;
```

- Another alternative solution (good practice!)

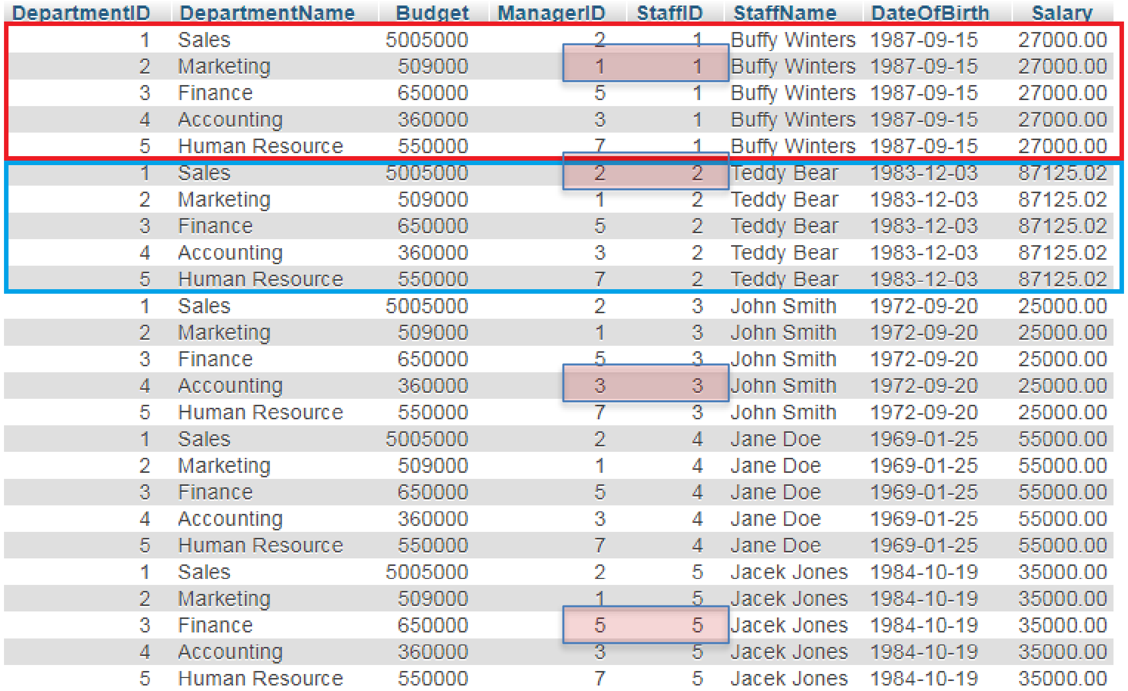
```
SELECT D.DepartmentID, D.DepartmentName, S.StaffID, S.StaffName
FROM department AS D, staff AS S
WHERE D.ManagerID = S.StaffID;
```

How does it work?

- 10 staff in Staff table
- 5 departments in Department table
- Without WHERE clause there will be 10*5 = 50 rows of data!

```
SELECT *
FROM department, staff;
```

- Can you find the managers?



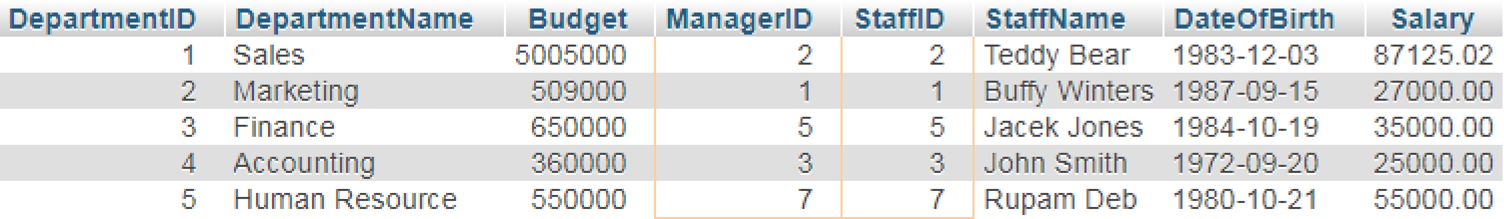
DepartmentID	DepartmentName	Budget	ManagerID	StaffID	StaffName	DateOfBirth	Salary
1	Sales	5005000	2	1	Buffy Winters	1987-09-15	27000.00
2	Marketing	509000	1	1	Buffy Winters	1987-09-15	27000.00
3	Finance	650000	5	1	Buffy Winters	1987-09-15	27000.00
4	Accounting	360000	3	1	Buffy Winters	1987-09-15	27000.00
5	Human Resource	550000	7	1	Buffy Winters	1987-09-15	27000.00
1	Sales	5005000	2	2	Teddy Bear	1983-12-03	87125.02
2	Marketing	509000	1	2	Teddy Bear	1983-12-03	87125.02
3	Finance	650000	5	2	Teddy Bear	1983-12-03	87125.02
4	Accounting	360000	3	2	Teddy Bear	1983-12-03	87125.02
5	Human Resource	550000	7	2	Teddy Bear	1983-12-03	87125.02
1	Sales	5005000	2	3	John Smith	1972-09-20	25000.00
2	Marketing	509000	1	3	John Smith	1972-09-20	25000.00
3	Finance	650000	5	3	John Smith	1972-09-20	25000.00
4	Accounting	360000	3	3	John Smith	1972-09-20	25000.00
5	Human Resource	550000	7	3	John Smith	1972-09-20	25000.00
1	Sales	5005000	2	4	Jane Doe	1969-01-25	55000.00
2	Marketing	509000	1	4	Jane Doe	1969-01-25	55000.00
3	Finance	650000	5	4	Jane Doe	1969-01-25	55000.00
4	Accounting	360000	3	4	Jane Doe	1969-01-25	55000.00
5	Human Resource	550000	7	4	Jane Doe	1969-01-25	55000.00
1	Sales	5005000	2	5	Jacek Jones	1984-10-19	35000.00
2	Marketing	509000	1	5	Jacek Jones	1984-10-19	35000.00
3	Finance	650000	5	5	Jacek Jones	1984-10-19	35000.00
4	Accounting	360000	3	5	Jacek Jones	1984-10-19	35000.00
5	Human Resource	550000	7	5	Jacek Jones	1984-10-19	35000.00

Ouput rows continue next page ... **Total 50 rows!**

How does it work?

- WHERE condition removes rows where StaffID and ManagerID do not match!
- So, we end up with 5 rows for 5 departments!

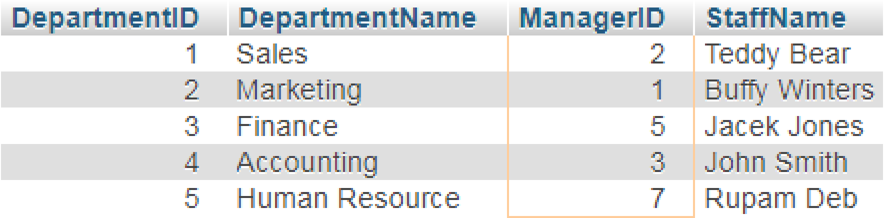
```
SELECT *
FROM department AS D, staff AS S
WHERE D.ManagerID = S.StaffID;
```



DepartmentID	DepartmentName	Budget	ManagerID	StaffID	StaffName	DateOfBirth	Salary
1	Sales	5005000	2	2	Teddy Bear	1983-12-03	87125.02
2	Marketing	509000	1	1	Buffy Winters	1987-09-15	27000.00
3	Finance	650000	5	5	Jacek Jones	1984-10-19	35000.00
4	Accounting	360000	3	3	John Smith	1972-09-20	25000.00
5	Human Resource	550000	7	7	Rupam Deb	1980-10-21	55000.00

- All columns are shown above, below we select **FOUR** specific columns that we want!

```
SELECT D.DepartmentID, D.DepartmentName, D.ManagerID, S.StaffName
FROM department AS D, staff AS S
WHERE D.ManagerID = S.StaffID;
```

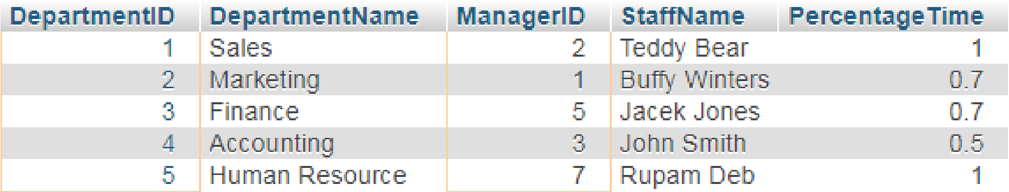


DepartmentID	DepartmentName	ManagerID	StaffName
1	Sales	2	Teddy Bear
2	Marketing	1	Buffy Winters
3	Finance	5	Jacek Jones
4	Accounting	3	John Smith
5	Human Resource	7	Rupam Deb

Join: more tables and ORDER BY

- Find each department’s manager and time fraction he/she works in that department!

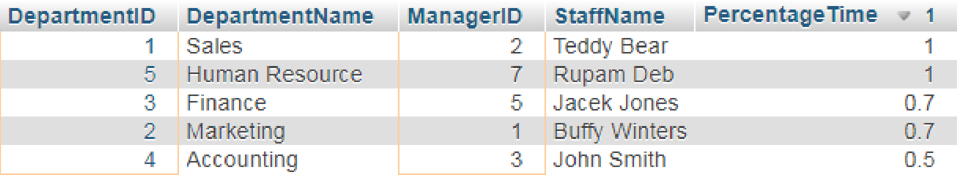
```
SELECT D.DepartmentID, D.DepartmentName, D.ManagerID, S.StaffName, WA.PercentageTime
FROM department AS D, staff AS S, workallocation AS WA
WHERE D.ManagerID = S.StaffID
          AND S.StaffID = WA.StaffID
          AND D.DepartmentID = WA.DepartmentID;
```



DepartmentID	DepartmentName	ManagerID	StaffName	PercentageTime
1	Sales	2	Teddy Bear	1
2	Marketing	1	Buffy Winters	0.7
3	Finance	5	Jacek Jones	0.7
4	Accounting	3	John Smith	0.5
5	Human Resource	7	Rupam Deb	1

- Now, show the output table above in descending order of the time fraction.

```
SELECT D.DepartmentID, D.DepartmentName, D.ManagerID, S.StaffName, WA.PercentageTime
FROM department AS D, staff AS S, workallocation AS WA
WHERE D.ManagerID = S.StaffID
          AND S.StaffID = WA.StaffID
          AND D.DepartmentID = WA.DepartmentID
ORDER BY PercentageTime DESC;
```

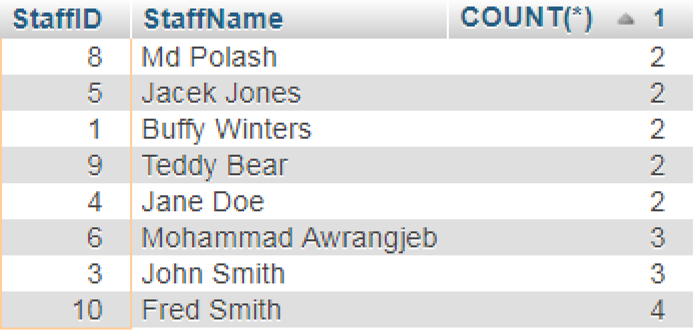


DepartmentID	DepartmentName	ManagerID	StaffName	PercentageTime ▼ 1
1	Sales	2	Teddy Bear	1
5	Human Resource	7	Rupam Deb	1
3	Finance	5	Jacek Jones	0.7
2	Marketing	1	Buffy Winters	0.7
4	Accounting	3	John Smith	0.5

Join: GROUP BY and ORDER BY

- Find the staff who works in at least 2 departments. Show your output in ascending order of number of departments each staff work in. Include staff IDs and names in your output.

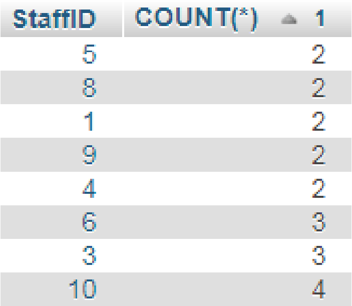
```
SELECT S.StaffID, S.StaffName, COUNT(*)
FROM Staff AS S, Department AS D, Workallocation AS W
WHERE S.StaffID = W.StaffID
          AND D.DepartmentID = W.DepartmentID
GROUP BY W.StaffID
HAVING COUNT(*) > 1
ORDER BY COUNT(*) ASC;
```



StaffID	StaffName	COUNT(*) ▲ 1
8	Md Polash	2
5	Jacek Jones	2
1	Buffy Winters	2
9	Teddy Bear	2
4	Jane Doe	2
6	Mohammad Awrangjeb	3
3	John Smith	3
10	Fred Smith	4

- Earlier we had the following query and output!

```
SELECT StaffID, COUNT(*)
FROM workallocation
GROUP BY StaffID
HAVING COUNT(*) > 1
ORDER BY COUNT(*) ASC;
```



StaffID	COUNT(*) ▲ 1
5	2
8	2
1	2
9	2
4	2
6	3
3	3
10	4

- **What is the difference between these two outcomes! Why?**

Thank you