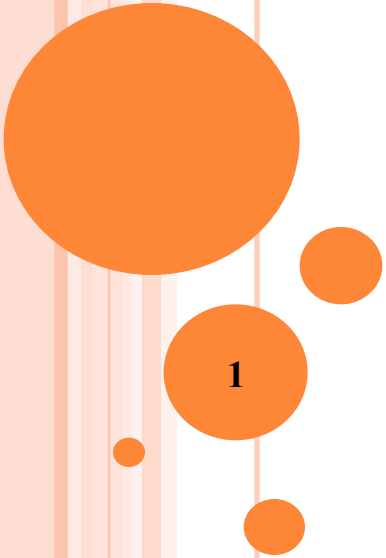


SQL and Oracle

SIT103 Lecture 7

Joining Tables

- Any operation involving more than one table, such as querying on two tables involves a JOIN operation.
- SQL specifies links between tables in the query itself. MS Access allows pre-defined relationships.
- To use fields from two tables in one query, specify both tables in the FROM clause, separated by a comma.

Joins – Sample Tables

STUDENT

STUD_NO	PROG_CODE
8901234Z	165000
9004567A	163000
9103876R	165000

PROGRAMME

PROG_CODE	PROG_NAME
165000	Caf Studies
163000	Master of None

Unbounded Join

- An unbounded join is the combination of every row in one table with every row in the other table, regardless of their values.
- Every join will be an unbounded join unless it is constrained in some way (eg: by specifying common fields).
- Number of resultant rows is the product (multiplication) of the number of rows in each table.
  - Eg: 2 tables of 1000 rows each produce 1,000,000 rows

UNBOUNDED JOIN

- SELECT * FROM STUDENT, PROGRAMME;

STUD_NO	PROG_CODE	PROG_CODE	PROG_NAME
8901234Z	165000	165000	Caf Studies
8901234Z	165000	163000	Master of None
9004567A	163000	165000	Caf Studies
9004567A	163000	163000	Master of None
9103876R	165000	165000	Caf Studies
9103876R	165000	163000	Master of None

Natural Join(most Common)

- A natural join is made by specifying two fields (one in each table) that contain common values (eg keys), using the WHERE clause.
- Assuming an unbounded join occurs, only the combinations where the two fields are the same are selected.
- In reality, the query processor does not need to produce every unbounded combination, only those that match the linking criteria.

NATURAL JOIN EXAMPLE

```
SELECT STUDENT_NO, STUDENT.PROGRAMME_CODE,
   PROGRAMME_NAME
FROM STUDENT, PROGRAMME
WHERE
   STUDENT.PROGRAMME_CODE=PROGRAMME.PROGRAMME_C
   ODE;
```

STUDENT_NO	PROGRAMME_CODE	PROGRAMME_NAME
8901234Z	165000	Caf Studies
9004567A	163000	Master of None
9103876R	165000	Caf Studies

Linking Criteria

- We name each common field pair defined in the WHERE clause as a Linking Criteria.
- The minimum number of linking criteria required per query is one less than the number of tables. Otherwise an unbounded join will occur.
  - Eg: If joining 4 tables, there should be at least 3 linking criteria involving all 4 tables.
- Criteria are combined using AND clauses in the WHERE clause. There is only one WHERE.

Example of multiple tables

```
SELECT STUDENT_NO, PROGRAMME_NAME,
        DEPT_NAME, FACULTY_NAME
FROM STUDENT, PROGRAMME, DEPT, FACULTY
WHERE STUDENT.PGMCODE =
PROGRAMME.PGMCODE
AND PROGRAMME.DEPTNO = DEPT.DEPTNO
AND DEPT.FACULTYNO = FACULTY.FACULTYNO;
```

Qualifying fields and using Aliases

- Any field name common to both tables must be qualified by the table name (or an abbreviation) within the query.
- A shorthand alias can be used by declaring it just after the table name in the FROM clause.

```
SELECT SURNAME, ST.PROGRAMME_CODE,
PROGRAMME_NAME
FROM STUDENT ST, PROGRAMME PGM
WHERE ST.PROGRAMME_CODE = PGM.PROGRAMME_CODE
```

```
   SURNAME      PROGRA    PROGRAMME_NAME
-------------- ------    --------------------------------
RAJOO          167402    GRAD DIP IN PURCHASING AND MATERIALS MANAGEMENT
PHONGWATCHAR   161005    BACHELOR OF BUSINESS IN ACCOUNTANCY
CHOW           165000    BACHELOR OF BUSINESS IN BUSINESS INFORMATION SYSTE
```

JOINS WITH OTHER SELECTION CRITERIA

- There is only one WHERE clause, even when there are linking criteria.
- Other selection/search criteria are added on using AND or OR.

```
SELECT SURNAME, ST.PROGRAMME_CODE,
PROGRAMME_NAME
FROM STUDENT ST, PROGRAMME PGM
WHERE ST.PROGRAMME_CODE = PGM.PROGRAMME_CODE
AND ST.PROGRAMME_CODE = 165000;
```

Grouping Query Revisited

- The Query

```
SELECT PROGRAMME_CODE, COUNT(*)

FROM STUDENT
GROUP BY PROGRAMME_CODE ;
```

GROUP BY – Extra fields

- When GROUP BY is used, the only fields that can be displayed are the grouping field and statistical functions.
- Values for individual rows cannot be displayed.
- If you want to display other fields, a trick is to include the extra field as a secondary grouping field in the GROUP BY clause.

Grouping and Join

- Revised Query to Display Programme Name

```
select S.programme_code, PROGRAMME_NAME, count(*)
from student S, PROGRAMME P
WHERE S.PROGRAMME_CODE =
P.PROGRAMME_CODE
group by S.programme_code, PROGRAMME_NAME;
```

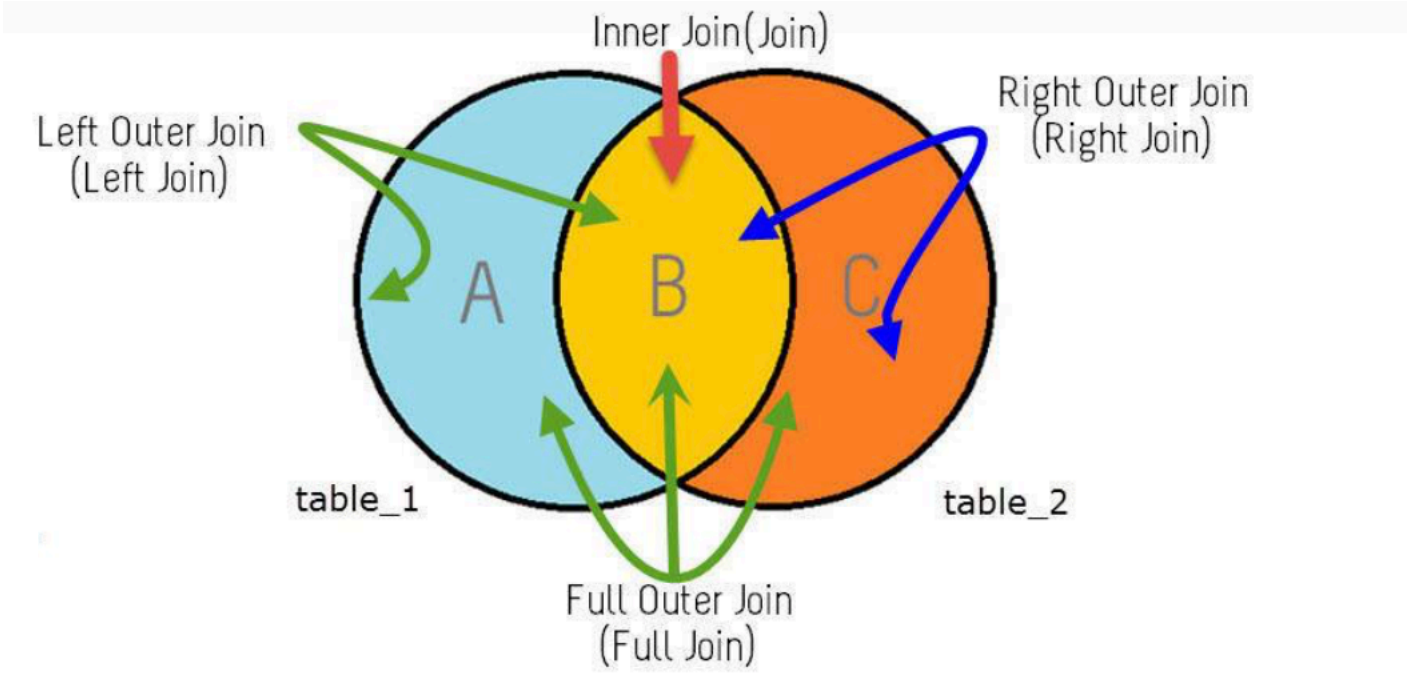
Self Join

- A Self Join is a join of a table to itself.
- The table name appears twice in the FROM clause.
- Acts as if there are two copies of the same table.
- Aliases are used to identify each table's fields.

```
SELECT S1.SURNAME || ' works for ' ||
S2.SURNAME
FROM STAFF S1, STAFF S2
WHERE S1.SUPERVISOR = S2.STAFFNO;
```

Outer Join

- An outer join specifies that all rows from one table should be displayed, even if they have no match in the other table.



Outer Join

- Display all students with their programme names, even those without a programme code.

```
SELECT SURNAME, ST.PROGRAMME_CODE,
   PROGRAMME_NAME
FROM STUDENT ST LEFT OUTER JOIN  PROGRAMME PG
ON ST.PRG_CODE = PG.PRG_CODE ;
```

```
   SURNAME      PROGRA    PROGRAMME_NAME
-------------- ------    --------------------------------
RAJOO          167402    GRAD DIP IN PURCHASING AND MATERIALS MANAGEMENT
PHONGWATCHAR   161005    BACHELOR OF BUSINESS IN ACCOUNTANCY
CHOW           165000    BACHELOR OF BUSINESS IN BUSINESS INFORMATION SYSTE
.....
SMITH
```