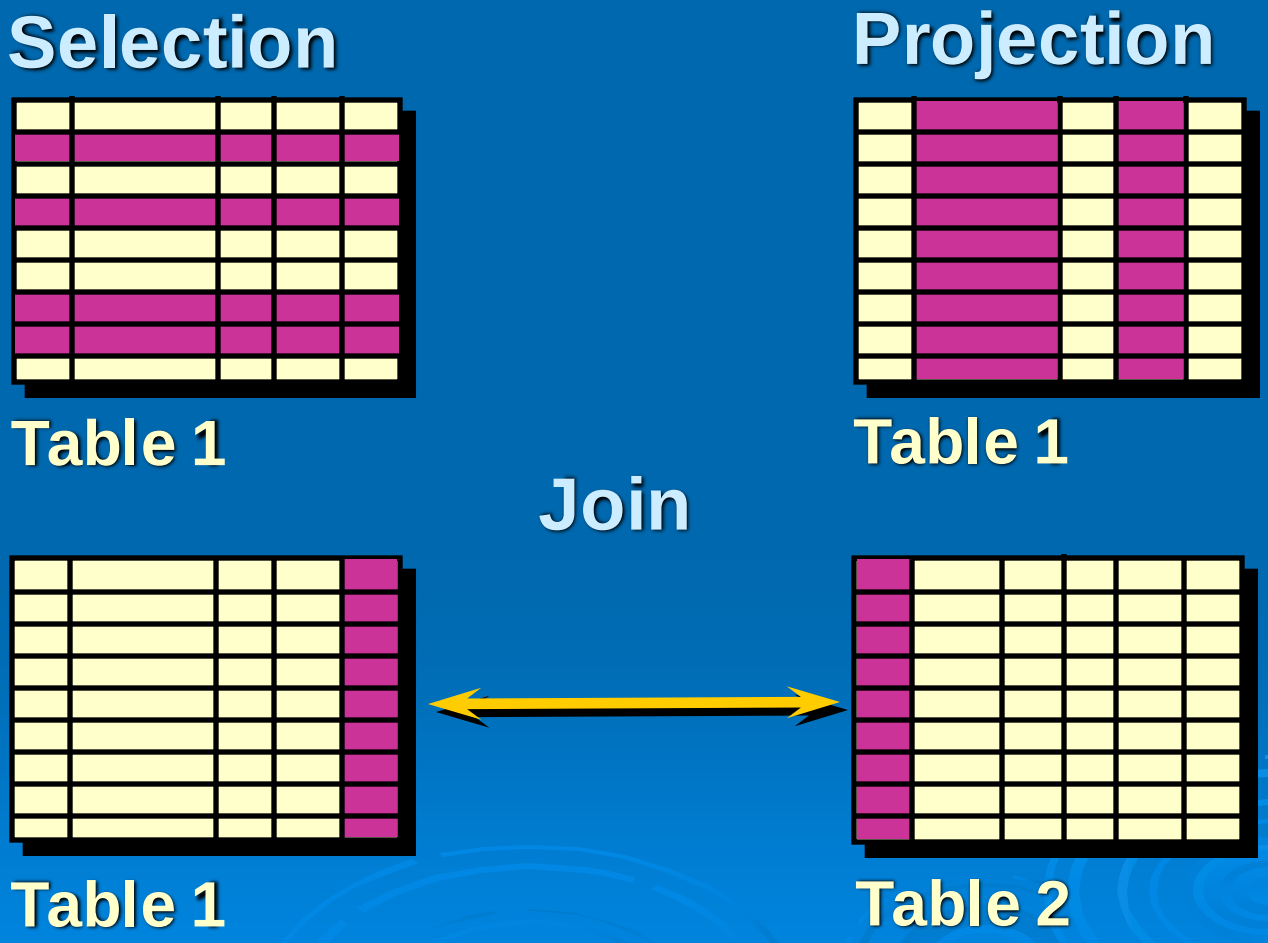
Introduction to SQL

- Stands for Structured Query Language
- Standard interface to relational databases
- SQL is used to create database structure, or to fill it with data, or to remove data or alter data
- User Friendly Non Procedural Very High Level Query Language

SQL Statements

SELECT	**Data retrieval**
INSERT UPDATE DELETE	**Data manipulation language (DML)**
CREATE ALTER DROP RENAME TRUNCATE	**Data definition language (DDL)**
COMMIT ROLLBACK SAVEPOINT	**Transaction control**
GRANT REVOKE	**Data control language (DCL)**

Capabilities of SQL SELECT Statements



Capabilities of SQL SELECT Statements

- A SELECT statement retrieves information from the database. Using a SELECT statement, you can do the following:
  - Selection
  - Projection
  - Join

Writing SQL Statements

- SQL statements are not case sensitive.
- SQL statements can be on one or more lines.
- Keywords cannot be abbreviated or split across lines.
- Tabs and indents are used to enhance readability.

Guidelines are from Oracle Corporation for Oracle DBMS but also valid for other databases (if not all then also most of them are true)

Tables Used in the Lecture

EMP

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7839	KING	PRESIDENT		17-NOV-81	5000		10
7698	BLAKE	MANAGER	7839	01-MAY-81	2850		30
7782	CLARK	MANAGER	7839	09-JUN-81	2450		10
7566	JONES	MANAGER	7839	02-APR-81	2975		20
7654	MARTIN	SALESMAN	7698	28-SEP-81	1250	1400	30
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7844	TURNER	SALESMAN	7698	08-SEP-81	1500	0	30
7900	JAMES	CLERK	7698	03-DEC-81	950		30
			7698	22-FEB-81	1250	500	30
			7566	03-DEC-81	3000		20
			7902	17-DEC-80			
			7566	09-DEC-82			
			7788	12-JAN-83			
			7782	23-JAN-82			

DEPT

DEPTNO	DNAME	LOC
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON

SALGRADE

GRADE	LOSAL	HISAL
1	700	1200
2	1201	1400
3	1401	2000
4	2001	3000
5	3001	9999

Basic SELECT Statement

```
SELECT    <column list>
FROM  table;
```

- SELECT identifies *what* columns(similar to projection operation).
- FROM identifies *which* table.

Selecting All Columns

```
SQL> SELECT *
  2  FROM   dept;
```

```
    DEPTNO DNAME          LOC
---------- -------------- -------------
        10 ACCOUNTING     NEW YORK
        20 RESEARCH       DALLAS
        30 SALES          CHICAGO
        40 OPERATIONS     BOSTON
```

Selecting Specific Columns

```
SQL> SELECT deptno, loc
  2  FROM   dept;
```

```
   DEPTNO LOC
--------- -------------
       10 NEW YORK
       20 DALLAS
       30 CHICAGO
       40 BOSTON
```

Projection

Eliminating Duplicate Rows

Eliminate duplicate rows by using the DISTINCT keyword in the SELECT clause.

```
SQL> SELECT DISTINCT deptno
  2  FROM   emp;
```

```
    DEPTNO
---------
        10
        20
        30
```

Limiting Rows Selected

- Restrict the rows returned by using the WHERE clause.

```
SELECT      column1,column2,….
FROM        table
[WHERE      condition(s)];
```

- The WHERE clause follows the FROM clause.

Using the WHERE Clause

```
SQL> SELECT ename, job, deptno
  2  FROM   emp
  3  WHERE  job='CLERK';
```

```
ENAME      JOB          DEPTNO
---------- --------- ----------
JAMES      CLERK            30
SMITH      CLERK            20
ADAMS      CLERK            20
MILLER     CLERK            10
```

Character Strings and Dates

- Character strings and date values are enclosed in single quotation marks.
- Character values are case sensitive and date values are format sensitive.

```
SQL> SELECT   ename, job, deptno
  2  FROM     emp
  3  WHERE    ename = 'JAMES';
```

Comparison Operators

Operator	Meaning
=	Equal to
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to
<>	Not equal to

Using the Comparison Operators

```
SQL> SELECT ename, sal, comm
  2  FROM   emp
  3  WHERE  sal<=comm;
```

```
ENAME          SAL       COMM
---------- --------- ---------
MARTIN         1250 <--> 1400
```

Other Comparison Operators

Operator	Meaning
BETWEEN ...AND...	Between two values (inclusive)
IN(list)	Match any of a list of values
LIKE	Match a character pattern
IS NULL	Is a null value

Using the BETWEEN Operator

- Use the BETWEEN operator to display rows based on a range of values.

```
SQL> SELECT   ename, sal
  2  FROM     emp
  3  WHERE    sal BETWEEN 1000 AND 1500;
```

ENAME	SAL
MARTIN	1250
TURNER	1500
WARD	1250
ADAMS	1100
MILLER	1300

Lower limit

Higher limit

Using the IN Operator

- Use the IN operator to test for values in a list.

```
SQL> SELECT   empno, ename, sal, mgr
  2  FROM     emp
  3  WHERE    mgr IN (7902, 7566, 7788);
```

```
     EMPNO ENAME                SAL        MGR
---------- ---------- ---------- ----------
      7902 FORD                3000       7566
      7369 SMITH                800       7902
      7788 SCOTT               3000       7566
      7876 ADAMS               1100       7788
```

Defining a Column Alias

- Renames a column heading
- Is useful with calculations
- Immediately follows column name;

  AS keyword between column name and alias

Using Column Aliases

```
SQL> SELECT ename AS name, sal AS salary
     FROM   emp;
```

```
NAME          SALARY
------------ ---------
...
```

```
SQL> SELECT ename Name,
     sal*12 AS AnnualSalary
     FROM   emp;
```

```
Name         AnnualSalary
------------ ------------
...
```

Select-From-Where Statements

- The principal form of a query is:

  SELECT desired attributes
  FROM one or more tables
  WHERE condition about tuples of
      the tables