Lab Week - 1
Writing basic SQL statements

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Writing basic SQL statements

- In this session:
  - Objectives of SQL
  - Capabilities of SQL SELECT statements
  - Writing SQL statements
  - Execution of a basic SELECT statement
  - Arithmetic Operator precedence
  - Nulls and Aliases
  - Concatenation
  - Literal strings
  - Limiting outputs

Objectives of SQL

- Ideally, database language should allow user to:
  - create the database and relation structures;
  - perform insertion, modification, deletion of data from relations;
  - perform simple and complex queries.

- Must perform these tasks with minimal user effort and command structure/syntax must be easy to learn.

- It must be portable.

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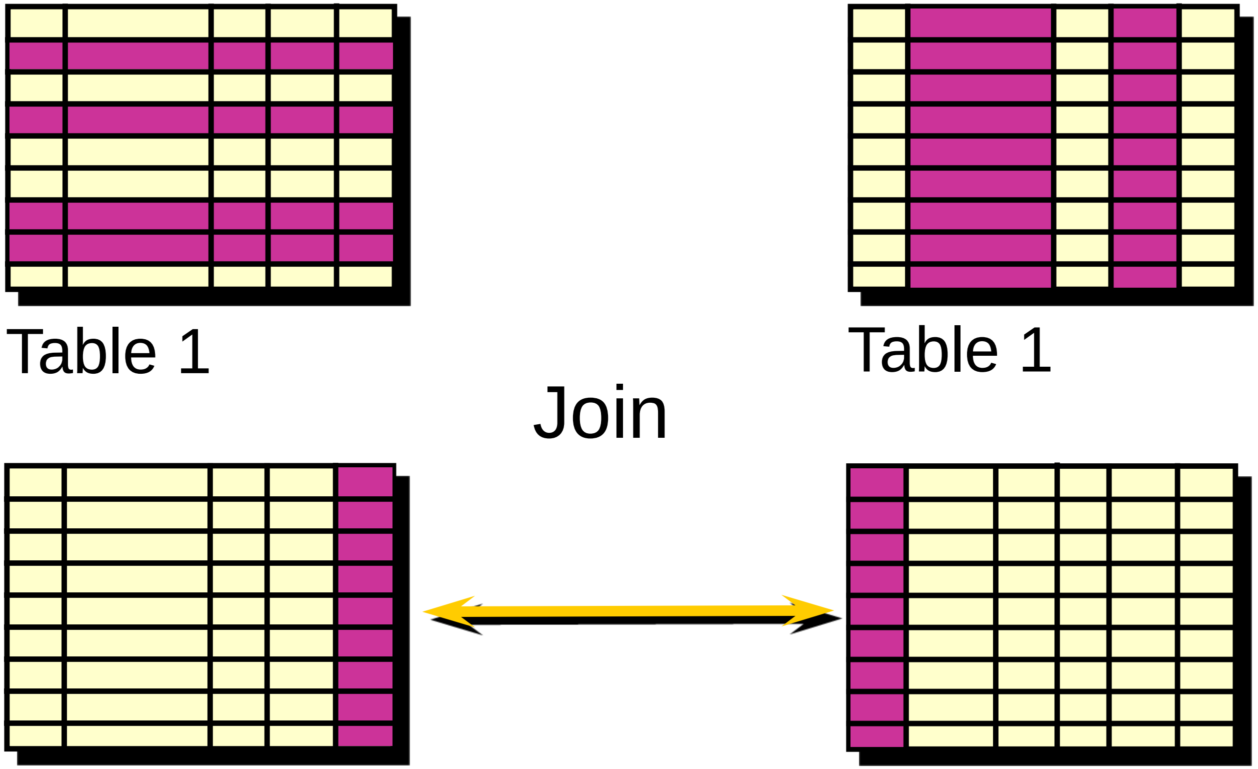
Objectives of SQL

- SQL is relatively easy to learn:
  - it is non-procedural - you specify *what* information you require, rather than *how* to get it;
  - it is essentially free-format.

Capabilities of SQL SELECT Statements



Selection

Projection

Table 1

Table 1

Join

Table 1

Table 2

Basic SELECT Statement

- SELECT identifies what columns.
- FROM identifies which table.

```
SELECT   [DISTINCT] {*, column [alias],...}
FROM     table;
```

Writing SQL Statements

- SQL statement consists of *reserved words* and *user-defined words*.
  - Reserved words are a fixed part of SQL and must be spelt exactly as required and cannot be split across lines.
  - User-defined words are made up by user and represent names of various database objects such as relations, columns, views.

Writing SQL Statements

- Most components of an SQL statement are *case insensitive*, except for literal character data.
- More readable with indentation and lineation:
  - Each clause should begin on a new line.
  - Start of a clause should line up with start of other clauses.
  - If clause has several parts, should each appear on a separate line and be indented under start of clause.

Selecting All Columns

```
SELECT * FROM dept;
```

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

Selecting Specific Columns

```
SELECT deptno, loc
FROM   dept;
```

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

Arithmetic Expressions

- Create expressions on NUMBER and DATE data by using arithmetic operators.

Operator	Description
+	Add
-	Subtract
*	Multiply
/	Divide

Using Arithmetic Operators

```
SELECT ename, sal,  sal+300
FROM emp;
```

```
ENAME            SAL   SAL+300
---------- --------- ---------
KING            5000      5300
BLAKE           2850      3150
CLARK           2450      2750
JONES           2975      3275
MARTIN          1250      1550
ALLEN           1600      1900
...
14 rows selected.
```

Operator Precedence

- Multiplication and division take priority over addition and subtraction.
- Operators of the same priority are evaluated from left to right.
- Parentheses are used to force prioritised evaluation and to clarify statements.

*   /   +   –

Operator Precedence

```
SELECT ename, sal, 12*sal+100
FROM emp;
```

```
ENAME             SAL 12*SAL+100
---------- ---------- ----------
KING             5000      60100
BLAKE            2850      34300
CLARK            2450      29500
JONES            2975      35800
MARTIN           1250      15100
ALLEN            1600      19300
...
14 rows selected.
```

Using Parentheses

```
SELECT ename, sal, 12*(sal+100)
  FROM   emp;
```

```
ENAME             SAL 12*(SAL+100)
---------- ---------- -----------
KING             5000       61200
BLAKE            2850       35400
CLARK            2450       30600
JONES            2975       36900
MARTIN           1250       16200
...
14 rows selected.
```

Defining a Null

- A null is a value that is unavailable, unassigned, unknown, or inapplicable.
- A null is not the same as zero or a blank space.

```
SELECT      ename, job, comm
FROM        emp;
```

```
ENAME      JOB             COMM
---------- --------- ---------
KING       PRESIDENT
BLAKE      MANAGER
...
TURNER     SALESMAN           0
...
14 rows selected.
```

Nulls in Arithmetic Expressions

- Arithmetic expressions containing a null value evaluate to null.

```
SELECT ename, 12*sal+comm
FROM   emp
WHERE  ename='KING';
```

```
ENAME       12*SAL+COMM
----------- -----------
KING
```

Defining a Column Alias

- Renames a column heading
- Is useful with calculations
- Immediately follows column name; **optional** AS keyword between column name and alias
- Requires double quotation marks if it contains spaces or special characters or is case sensitive.

Using Column Aliases

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

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

```
SELECT ename "Name",sal*12 "Annual Salary"
FROM   emp;
```

```
Name          Annual Salary
------------- -------------
...
```

Concatenation Operator

- Concatenates columns or character strings to other columns
- Is represented by two vertical bars (||)
- Creates a resultant column that is a character expression

Using the Concatenation Operator

```
SELECT    ename||job AS "Employees"
FROM      emp;
```

```
Employees
-------------------
KINGPRESIDENT
BLAKEMANAGER
CLARKMANAGER
JONESMANAGER
MARTINSALESMAN
ALLENSALESMAN
...
14 rows selected.
```

Literal Character Strings

- A literal is a character, expression, or number included in the SELECT list.
- Date and character literal values must be enclosed within single quotation marks.
- Each character string is output once for each row returned.

Using Literal Character Strings

```
SELECT    ename    ||' '||'is a'||' '||job
             AS "Employee Details"
FROM    emp;
```

```
Employee Details
-------------------------
KING is a PRESIDENT
BLAKE is a MANAGER
CLARK is a MANAGER
JONES is a MANAGER
MARTIN is a SALESMAN
...
14 rows selected.
```

Duplicate Rows

- The default display of queries is all rows, including duplicate rows.

```
SELECT deptno
FROM   emp;
```

```
   DEPTNO
---------
       10
       30
       10
       20
...
14 rows selected.
```

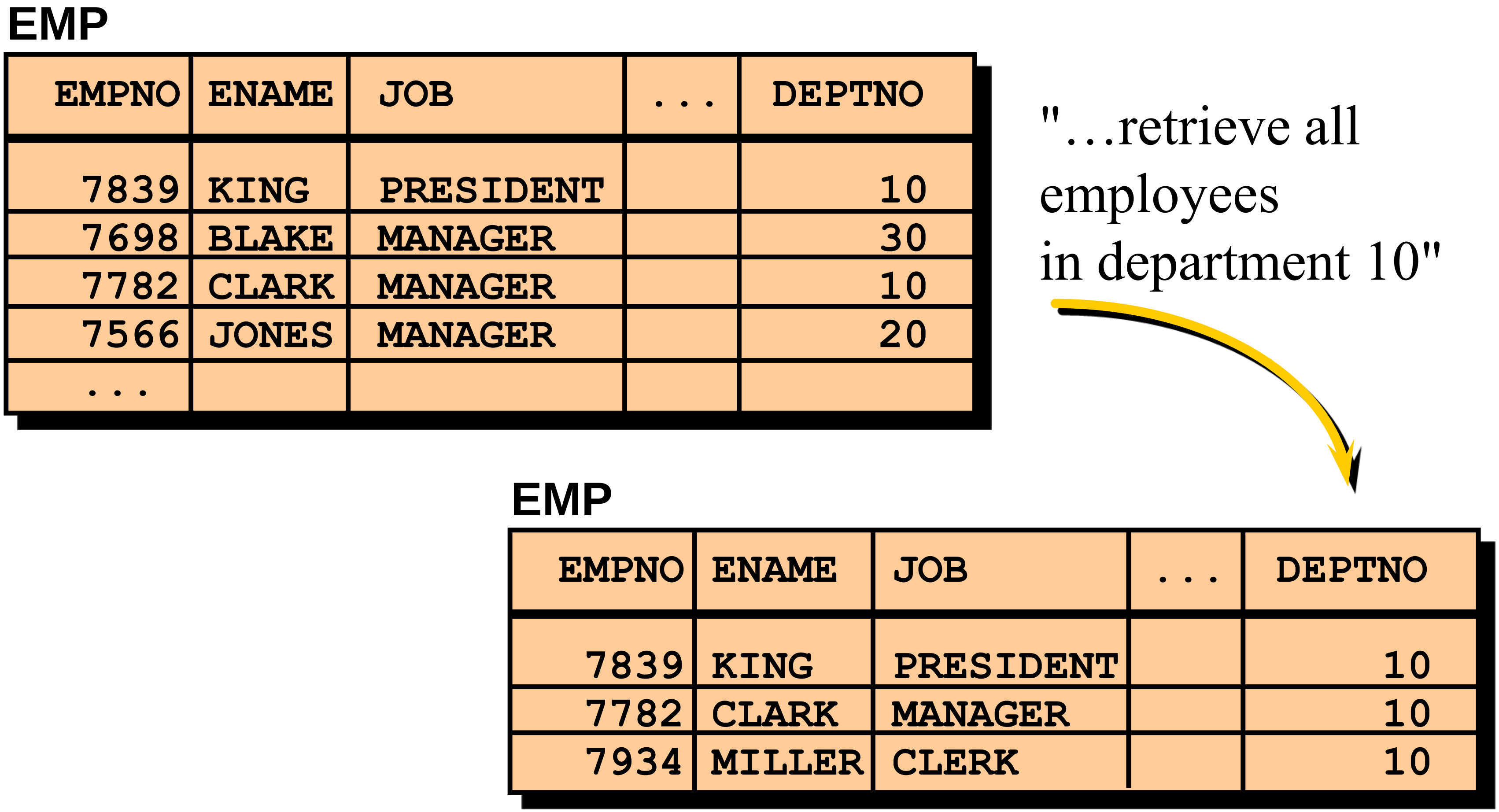
Eliminating Duplicate Rows

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

```
SELECT DISTINCT deptno
FROM   emp;
```

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

Limiting Rows Using a Selection



EMP

EMPNO	ENAME	JOB	. . .	DEPTNO
7839	KING	PRESIDENT		10
7698	BLAKE	MANAGER		30
7782	CLARK	MANAGER		10
7566	JONES	MANAGER		20
. . .				

"…retrieve all employees
in department 10"

EMP

EMPNO	ENAME	JOB	. . .	DEPTNO
7839	KING	PRESIDENT		10
7782	CLARK	MANAGER		10
7934	MILLER	CLERK		10

Limiting Rows Selected

- Restrict the rows returned by using the WHERE clause.
- The WHERE clause follows the FROM clause.

```
SELECT        [DISTINCT] {*| column [alias], ...}
FROM          table
[WHERE        condition(s)];
```

Using the WHERE Clause

```
SELECT ename, job, deptno
FROM   emp
WHERE  deptno=10;
```

```
EMPNO ENAME       JOB          DEPTNO
----- -------    --------    ---------
7782   CLARK     MANAGER           10
7839   KING      PRESIDENT        10
7934   MILLER    CLERK            10
```

Using the WHERE Clause - Another example

```
SELECT ename, job, deptno
FROM   emp
WHERE job =‘CLERK’;
```

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

SQL and SQL Plus

- SQL
  - A command language for communication with the database server from any tool or application
- SQL Plus
  - Is an Oracle tool that recognizes and submits SQL statements to the Oracle server for execution and contains its own command language

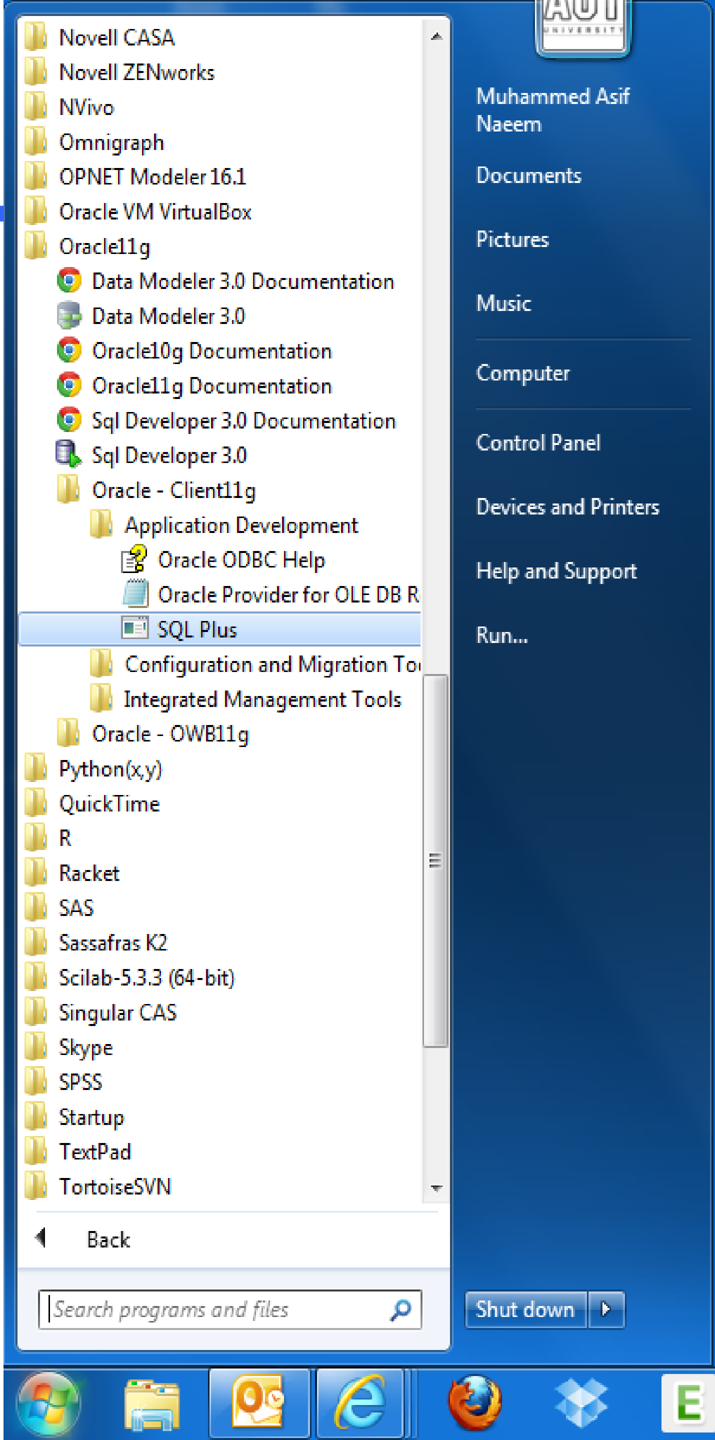
Accessing SQL Plus at campus

Follow the given steps to access SQL Plus at campus:

1. Go to start button of your windows
2. Click All Programs.
3. Click on Oracle11g from All Programs menu.
4. Click on Oracle–Client11g under Oracle11g.
5. Click Application Development under Oracle-Client11g.
6. Finally you will find SQL Plus under Application Development.
7. Click SQL Plus and here you go.

For future you can also create shortcut of SQL Plus on your desktop to get rid from all above steps.

For graphical representation please see the snapshot on the right side.



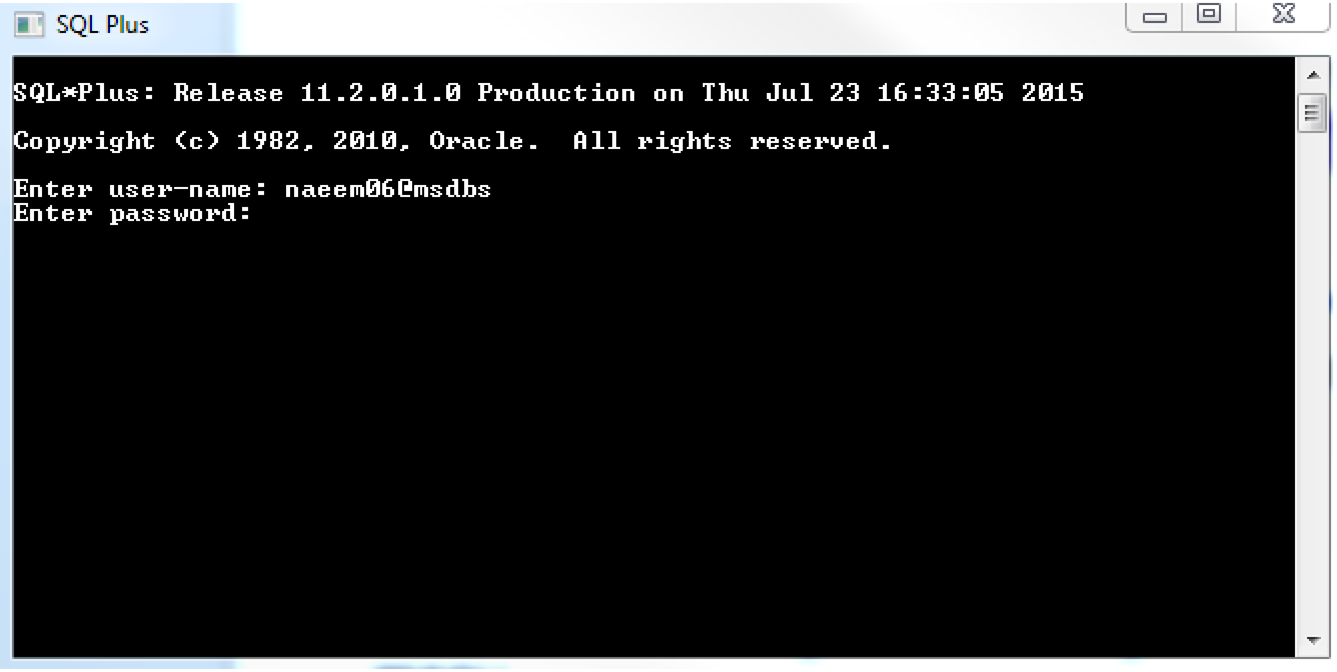
Logging in to SQL Plus

Once you open SQL Plus, please provide your user-name and password as shown in snapshot below.

User-name: yourAUTLoginID@msdbs

Password: warehouse

You are free to change your password whenever you want.



```
SQL*Plus: Release 11.2.0.1.0 Production on Thu Jul 23 16:33:05 2015

Copyright (c) 1982, 2010, Oracle.  All rights reserved.

Enter user-name: naeem06@msdbs
Enter password:
```

Accessing SQL Plus off campus

You can access SQL Plus off campus through CMSRDP.

Details about CMSRDP are available on course page at autonline.

Lab Activities

- Complete SQL exercise
- Using the script provided on AUTOnline create the Hotel schema, using Oracle.