Institute of Technology Tralee

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Database Concepts

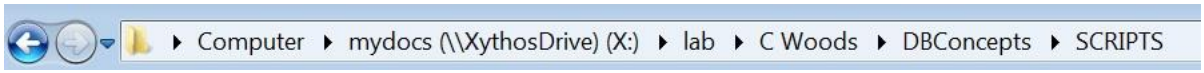
Lab 03 – Oracle SQL*Plus

In this lab you will learn:

- About Oracle SQL*Plus
- How to use interactive SQL
- How to edit SQL statements in the SQL buffer
- How to create an Oracle script
- How to edit an Oracle script
- How to Execute an Oracle script

Before You Start:

During this lab, you will work with a demonstration database. You will need to copy a script which can be run/executed to generate this database in your Oracle tablespace. The script, ***Demo.sql***, can be found on the X: drive in the following location:



Copy this Oracle script ***Demo.sql*** from the student shared drive to your X:\Student drive.
If you are saving this script in sub-folders, familiarise yourself with the path.

You will be able to work faster if you place a copy of this script on the C:\ drive.

Logging On to SQL*Plus

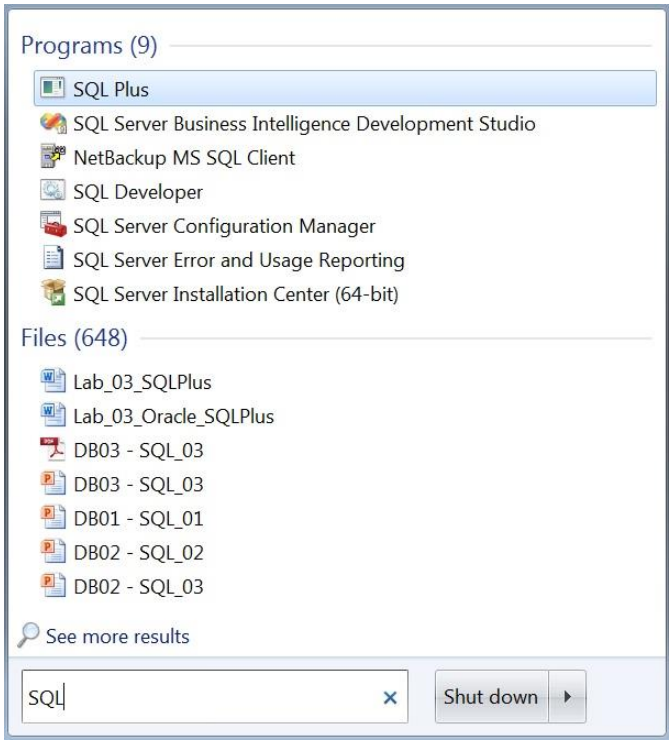
Oracle 11g is the current version of Oracle on the student server.

Oracle SQL*Plus is an Oracle product which allows an end user to interact with the Oracle server using a command line interface.

To log on to the ORACLE SQL*Plus server, select the following:

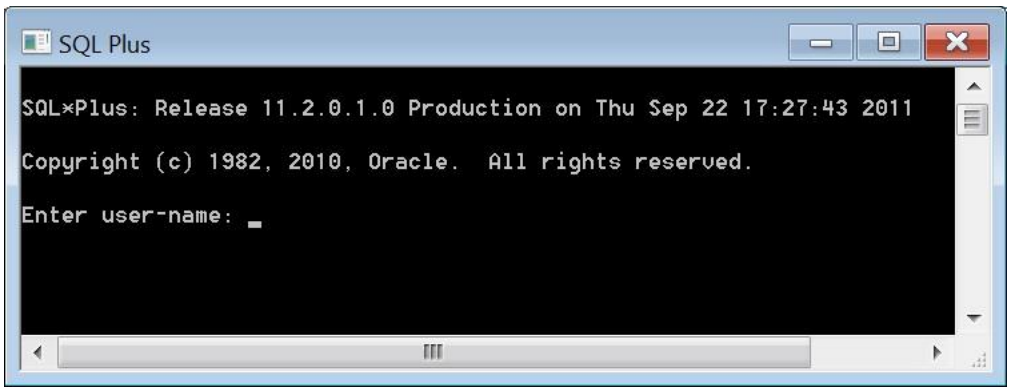
Start → All Programs and enter SQL.

The following screen appears.



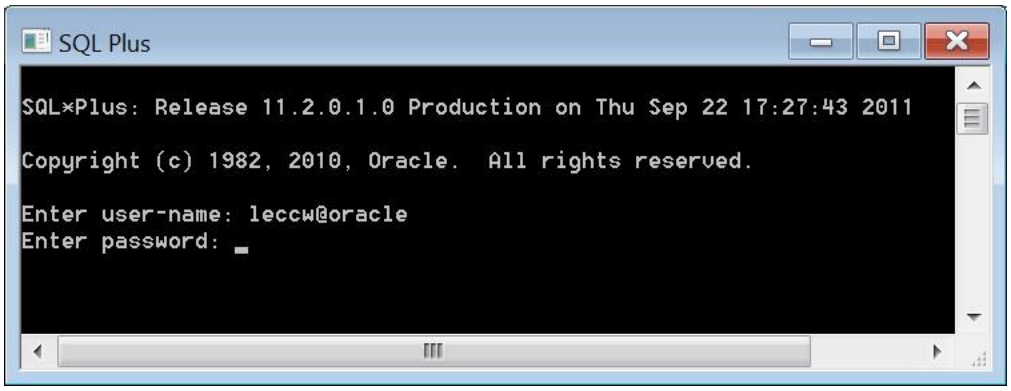
Select **SQL Plus** from the list.

You will then be presented with the following dialogue box:



Enter user-name: **tNumber@oracle** {User name and Host string for the Oracle server}

Enter password: **your usual password**



Once you have logged in successfully, you will be presented with a ***command line interface*** with the **SQL>** prompt (shown below). This is where you will enter your SQL queries.

Create the Demonstration Database:

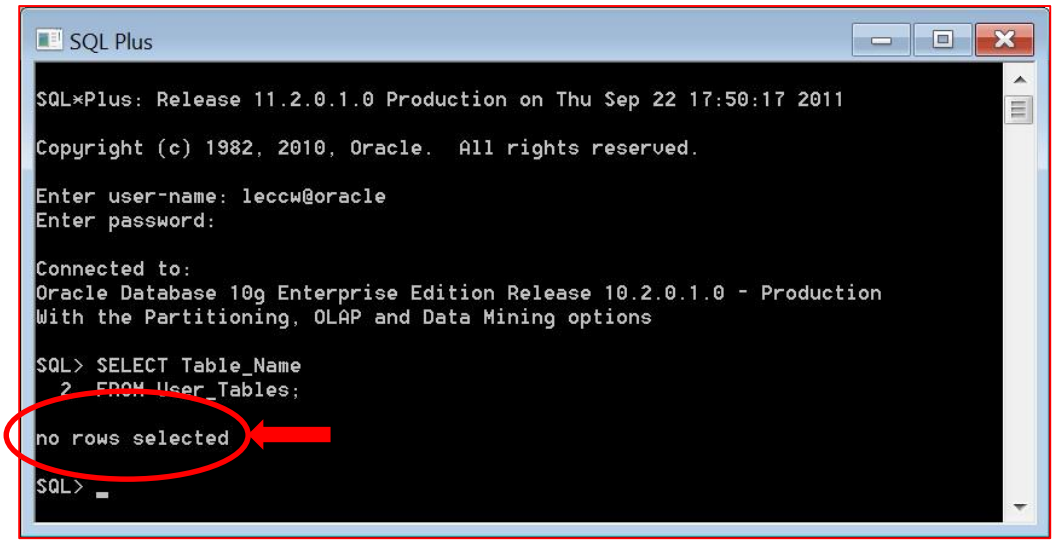
Each student in IT Tralee who has an ORACLE account has his/her own ***tablespace***. You have access only to your own tablespace. Any tables you create are stored in this tablespace.

Initially, your tablespace will not contain any ***user defined*** tables (because you haven't created any yet!).

By default, your tablespace contains several ***system tables***, one of which is called ***User_Tables***. This table contains a record of each user defined table that exists in your table space.

To see a list of user defined tables contained in your *tablespace*, enter the following at the SQL prompt:

```
SQL> SELECT Table_name
     FROM User_Tables;
```



The Oracle script ***Demo.sql*** (which you copied earlier) builds a demonstration database which will be used during this lab. To execute the Oracle script ***Demo.sql***, enter the following command at the SQL prompt:

SQL> @C:\Demo

Note the following:

- The command entered is NOT an SQL command (it is an SQL*Plus command) and therefore no semi-colon is required at the end of the statement.
- **@** is the **SQL*Plus** command used to execute a script.

Now look and see what tables this script has created in your tablespace.

```
SQL> SELECT Table_Name
  2  FROM User_Tables;

TABLE_NAME
------------------------------
STUDENTS
COURSES
LECTURERS
DEPARTMENTS

SQL>
```

The Oracle SQL*Plus application allows you to see the ***definition*** of a table. To see a table definition, use the SQL*Plus ***DESC*** ('Describe') command. Enter the following at the prompt:

SQL> DESC Students

The table definitions is displayed, as shown below:

```
SQL> DESC students
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------

 STUDID                                    NOT NULL NUMBER(4)
 SURNAME                                            VARCHAR2(20)
 FORENAME                                           VARCHAR2(20)
 STREET                                             VARCHAR2(20)
 TOWN                                               VARCHAR2(15)
 COUNTY                                             VARCHAR2(15)
 PHONE                                              VARCHAR2(14)
 MOBILE                                             VARCHAR2(14)
 COURSECODE                                         VARCHAR2(5)

SQL>
```

Note the name of each field, its data type and size.

The **NULL?** Field tells us if NULL values are not allowed in a field.
We would expect to see NOT NULL in the primary key (PK) field.

NOTE: **DESC** (or DESCRIBE) is not an SQL command. It is an *SQL*Plus* command.

Familiarise yourself with the structure of the tables created by ***Demo.sql***.

- Use SQL*Plus *DESC* to look at the structure of the other tables:
    - SQL > DESC Courses
    - SQL > DESC Lecturers
    - SQL > DESC Departments

- Use SQL *SELECT* to see the data in the tables
    - SQL > SELECT *
      FROM Courses;

The SQL*Plus Environment

*SQL*Plus* commands allow you to:

- Interact with an underlying database using SQL statements
- Edit the most recently executed SQL statement in the ***SQL buffer***
- Create Oracle Scripts
- Execute previously saved scripts

Write SQL SELECT queries to do the following:

1. List all lecturers in alphabetical order of surname.

2. List all lecturers in alphabetical order of surname and then forename.

3. List Surname, Forename and Salary for all lecturers earning more than €40000.

What comments might you make in relation to:

- Correcting typing mistakes
- Changing/modifying the query
- Adding clauses to the query

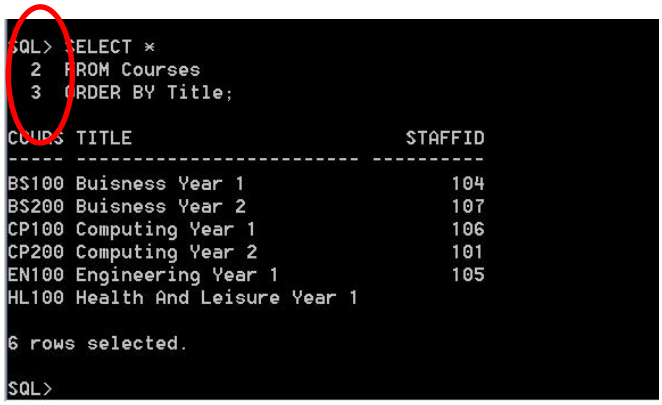
The SQL Buffer

The SQL buffer holds (or stores) the ***most recently*** entered SQL command. The buffer holds ***only one*** SQL command. Each time you enter an SQL command at the SQL prompt, it is stored in the SQL buffer - the previous SQL statement entered is lost.

When entering SQL commands you should follow the conventions discussed in lectures:

- use upper case letters for reserved words
- enter each clause of the SQL command on a separate line
- etc.

Each line entered (in the buffer) is allocated a line number.



```
SQL> SELECT *
  2  FROM Courses
  3  ORDER BY Title;

COURS TITLE                          STAFFID
----- ------------------------- ----------
BS100 Buisness Year 1                   104
BS200 Buisness Year 2                   107
CP100 Computing Year 1                  106
CP200 Computing Year 2                  101
EN100 Engineering Year 1                105
HL100 Health And Leisure Year 1

6 rows selected.

SQL>
```

The SQL command held in the SQL buffer can be edited using a set of ***SQL*Plus buffer editing commands.*** The table below summarises the buffer editing commands provided by Oracle SQL*Plus.

Command	Abbreviation	Purpose
APPEND text	A text	Adds text to the end of the current line
CHANGE	C/old/new/	Changes old text to new in the current line
CHANGE	C/text/	Deletes text from the current line
CLEAR BUFFER	Cl BUFF	Deletes all lines from the SQL buffer
Del		Deletes current line
INPUT	I	Inserts an indefinite number of lines (from current line)
INPUT	I text	Inserts a line consisting of text
LIST	L	Lists all lines in the SQL buffer
LIST n	L n	Lists one line specified by n
LIST m n	L m n	Lists a range of lines (m to n)
RUN	R	Displays and runs the current SQL command in the buffer
/		Runs the SQL command that is currently in the buffer

Try the following:

Enter the SQL statement

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

List the contents of the SQL Buffer

```
SQL> l
  1  SELECT *
  2* FROM Lecturers;

SQL>
```

Replace the * in the SELECT clause with the column names Surname, Forename and salary.

At any given time, only ***one line*** in the SQL buffer may be edited. The editable line is marked with an '*' beside its line number.

To make this change, you must **first** designate line 1 as the editable line.

```
SQL> l1
  1* SELECT *
SQL>
```

Then, change the asterisk to the required column list.

```
SQL> c/*/Surname,Forename, Salary/
  1* SELECT Surname,Forename,Salary
SQL>
```

Finally, list the contents of the buffer to verify the change.

```
SQL> l
  1  SELECT Surname,Forename,Salary
  2* FROM Lecturers
SQL>
```

Now, execute the amended query by entering the **"/"** command at the prompt.
The results are displayed.

```
SQL> SELECT Surname, Forename, Salary
  2  FROM Lecturers;

SURNAME              FORENAME              SALARY
-------------------- -------------------- ----------
Smith                Jim                   50000
Kelly                Mary                  48000
Jones                Michael               42000
Burke                Alice                 45000
Smith                Paul                  51000
Kirwin               James                 47500
Kennedy              Anne                  43750
Ahern                Tim                   41300
Browne               Rose                  44250
Fitzpatrick          Anne                  41000
Brosnan              Alan                  46500

SURNAME              FORENAME              SALARY
-------------------- -------------------- ----------
Kelly                Frank                 31000

12 rows selected.

SQL>
```

Order the output in order of descending salary

To do this, you must include or ***input*** an Order By clause in the appropriate place in the query.

List the contents of the buffer.

```
SQL> l
  1  SELECT Surname,Forename,Salary
  2* FROM Lecturers

SQL>
```

Ensure that the editable line is the last line of the SQL statement (the asterisk should be on line 2).
Type ***i*** (for input) at the prompt.

```
SQL> i
  3  _
```

Enter the ORDER BY clause when prompted.

```
SQL> i
  3  ORDER BY Salary DESC
  4
```

To exit input mode, simply hit return on a blank line.

List the contents of the buffer to verify the change (type ***l*** at the SQL prompt).

Execute the query (type / at the SQL prompt).

Append the Department column to the SELECT clause.

Ensure that line 1 is the editable line of the SQL statements.

Type *A* for append followed by the text you wish to append at the prompt.

```
SQL> l1
  1* SELECT Surname,Forename,Salary

SQL> A , Department
  1* SELECT Surname,Forename,Salary, Department

SQL> l
  1*  SELECT Surname,Forename,Salary, Department
  2* FROM Lecturers
  3* ORDER BY Salary Desc

SQL>
```

Execute the query.

ORACLE Scripts

Using the SQL prompt to execute SQL statements can be tedious:

- Only one statement may be executed at a time
- Easy to make typing errors
- Editing is time consuming

A script is simply a text file which contains one or more SQL commands.
This text file is given a default file extension (**.sql)** by the SQL*Plus processor.
The default application used by ORACLE SQL*Plus to generate a script is ***notepad***.

Unlike the buffer, a script may contain ***several*** SQL statements.

Each SQL statement in the script must be followed by a semi-colon(;) **EXCEPT** the last statement in the script if the execute (run) character is included (/).

Scripts are typically used to:

- Create a database
- Alter a database definition
- Populate a database (if required)
- Save complex queries

The table below summarises the script handling commands provided by Oracle SQL*Plus.

Command	Description
SAVE filename	Saves current contents of SQL buffer to a file (ie. a script)
GET filename	Calls up contents of previously saved script into the buffer
START filename	Runs a previously saved script
ED filename	Invokes the editor to edit contents of a script.
EXIT	Leaves SQL*Plus

The Format of an ORACLE Script

Examine the script ***Demo.sql*** which you have copied from the student shared drive.
To do this, enter the following command at the SQL prompt:

```
SQL> ED C:\Demo
```

Make sure you have specified a valid path/file name.
The script is opened in ***notepad***.
Look at the contents of the script file.

Exercise:

Using the demonstration database created by ***Demo.sql***, write SQL queries to do the following:

1. List all Lecturers in alphabetical order of surname and forename
2. List all lecturers who work in department 20
3. List all students who live in the town of Tralee
4. List all lecturers who earn more than €55,000.
5. Find the average salary for a lecturer.
6. List all lecturers who earn below the average salary.
7. List all course codes which have students registered on them.
   List each course code only once.
8. List the CourseCode and the number of students on that course, for each course.
9. List all Lecturers whose surname is 'SMITH'.
10. List all Lecturers whose surname is 'Smith'.
11. List all lecturers whose Forename begins with the letter 'J'.
12. List all Lecturers whose Forename contains the letters 'im'.
13. List Course Code, title and lecturer details for all courses.