COMP 3311 Database Management Systems

Lab 1. Introduction to Oracle and Oracle SQL Developer

Objectives of the Lab

- After this lab you should be able to
  - Know more about the Oracle DBMS.
  - Know how using SQL Developer to connect to the Oracle DBMS.
  - Run script files on the Oracle DBMS through the SQL Developer.
  - Issue simple SQL commands to the Oracle DBMS through SQL Developer.

Why Oracle?

- Oracle database system is the one of the most widely used commercial **D**ata**B**ase **M**anagement **S**ystems (DBMS) – you are likely to use it at some point in the future.
- Other DBMSs are similar to the Oracle database system - you should be able to program with other DBMSs, if you are familiar with the Oracle system.

Why Oracle?

- If you mastered Oracle it will be easy for you to switch to any other database products, e.g. SQL server, MySQL.
- But if you only know how to use MySQL, it will still take some time for you to swap to Oracle.
- Oracle has the most sophisticated functions

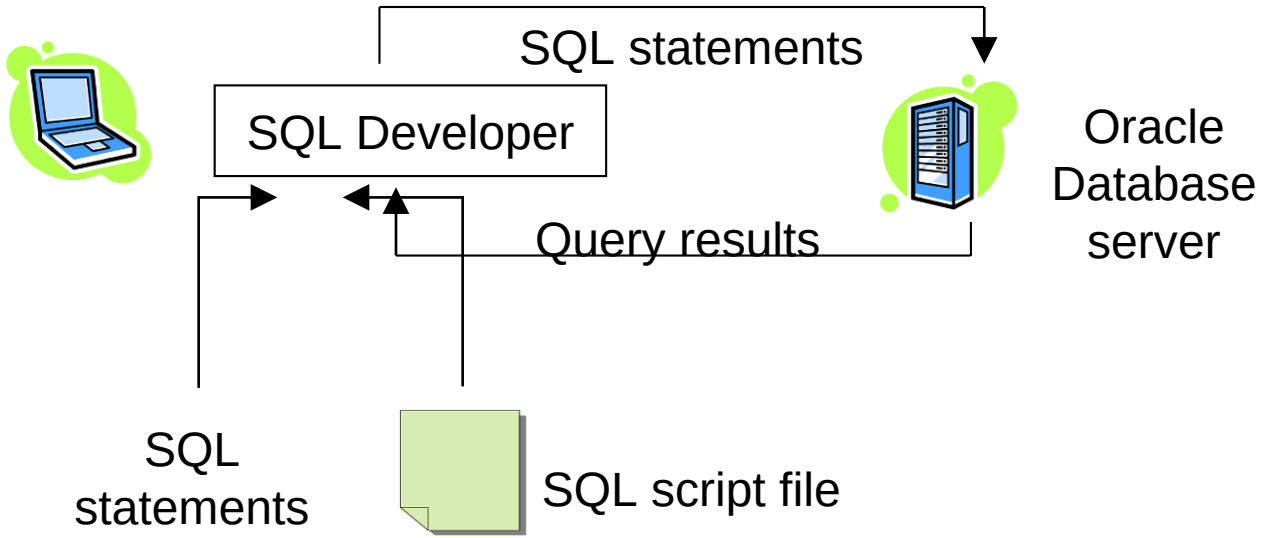
Getting the Oracle

- We recommend you to use the Oracle server provided by the department
- It could be tricky to install and uninstall Oracle on your laptop
- You can connect to Oracle server provided by CSE through Oracle Developer

A bit more about Oracle database

- Based on the relational model introduced by E.F Codd.
- The first commercially available SQL based database.
- Having supported the Client-Server model (will discuss) since version 5.
- The latest stable version is Oracle Database 19c (c for cloud).

The Oracle Client/Server model



SQL Developer

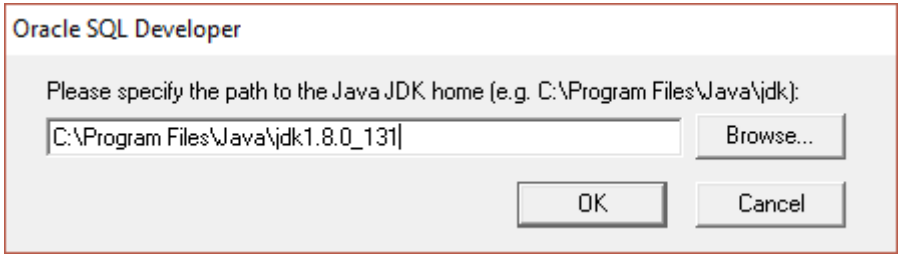
- A free integrated development environment that simplifies the development and management of Oracle Database in both traditional and Cloud deployments.
- SQL Developer offers
  - complete end-to-end development of your PL/SQL applications,
  - a worksheet for running queries and scripts,
  - a DBA console for managing the database,
  - a reports interface,
  - a complete data modeling solution, and
  - a migration platform for moving your 3rd party databases to Oracle.

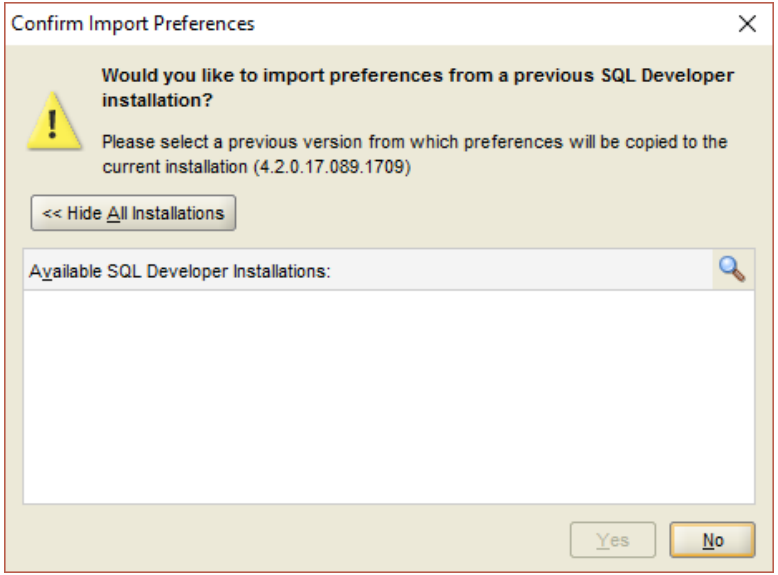
Appendix 1: Installing SQL Developer 1

- Download SQL Developer from Oracle:
- http://www.oracle.com/technetwork/developer-tools/sql-developer/downloads/index.html
- Accept License Agreement
- Download suitable SQL Developer
- (Optional) Download JDK if it is not installed
- http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html

Appendix 1: Installing SQL Developer 2

- Unzip SQL Developer folder
- Run sqldeveloper.exe (on windows) or sh sqldeveloper.sh (on Linux and Mac OS X)
- Select the path of java JDK home
- Select No for Confirm Import Preferences





Appendix 2: Connecting to UST network 1

- Only computer connected to the UST network can access the CSE Oracle server.
- To connect to UST network, you can use VPN
- Install Secure Remote Access (SSL VPN Service) client provided by ITSC
  https://itsc.ust.hk/apps/vpn/client.html
- Connection Establishment
  https://itsc.ust.hk/apps/vpn/conn_win.html

Appendix 2: Connecting to UST network 2

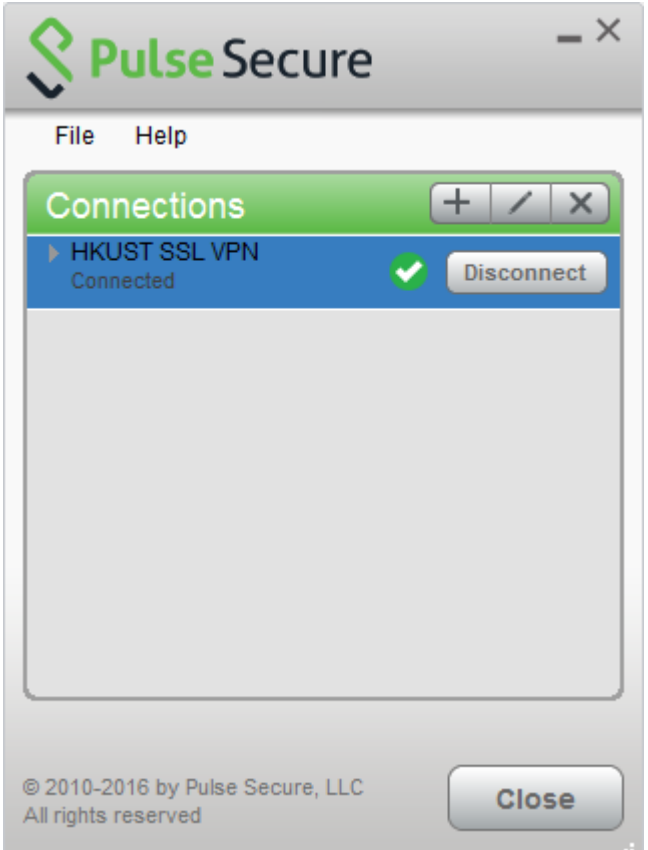
1. Double-click Pulse icon in the notification area to launch the SSL VPN client

2. Click Connect to connect to the SSL VPN gateway

3. Enter your ITSC Network Account information
   User Name: ITSC Network Account
   Password: ITSC Network Account Password

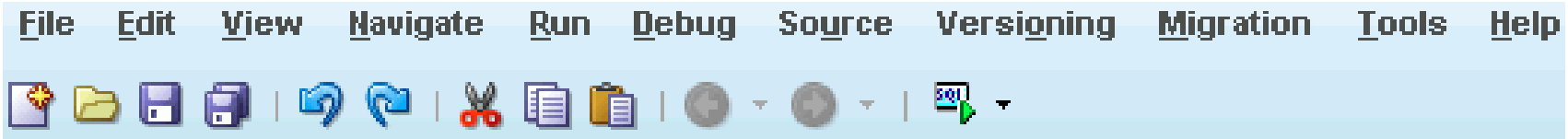
4. Press Connect to connect
   (Press Approve on your phone if you have enrolled in Two-Factor Authentication (2FA))

5. You can press Disconnect to end your connection



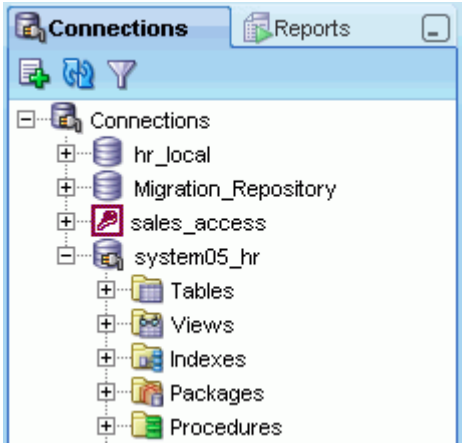
SQL Developer User Interface 1

- Icons under the menus perform various actions, including the following:
  - **New** creates a new a new database object.
  - **Open** opens a file.
  - **Save** saves any changes to the currently selected object.
  - **Save All** saves any changes to all open objects.
  - **Back** moves to the pane that you most recently visited.
  - **Forward** moves to the pane after the current one in the list of visited panes. (Or use the drop-down arrow to specify a tab view.)
  - **Open SQL Worksheet** opens the SQL Worksheet. If you do not use the drop-down arrow to specify the database connection to use, you are asked to select a connection.



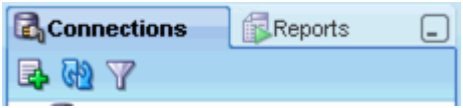
SQL Developer User Interface 2

- The **Connections navigator** lists database connections that have been created.
- The **Files navigator** displays your local file system using a standard hierarchy of folders and files. You can double-click or drag and drop files to open them, and you can edit and save the files.



SQL Developer User Interface 3

- Icons under the Connections tab perform the following actions on the currently selected object:
  - **Refresh** queries the database for the current details about the selected object (for example, a connection or just a table).
  - **Apply Filter** restricts the display of objects using a filter that you specify. To remove the effects of applying a filter, right-click the node and select **Clear Filter**



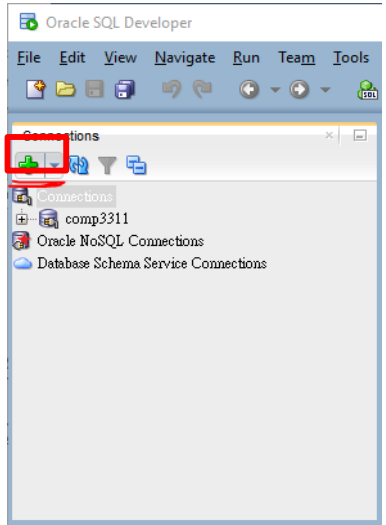
- The right side of the SQL Developer window has tabs and panes for objects that you select or open.

Connecting to Oracle database server 1

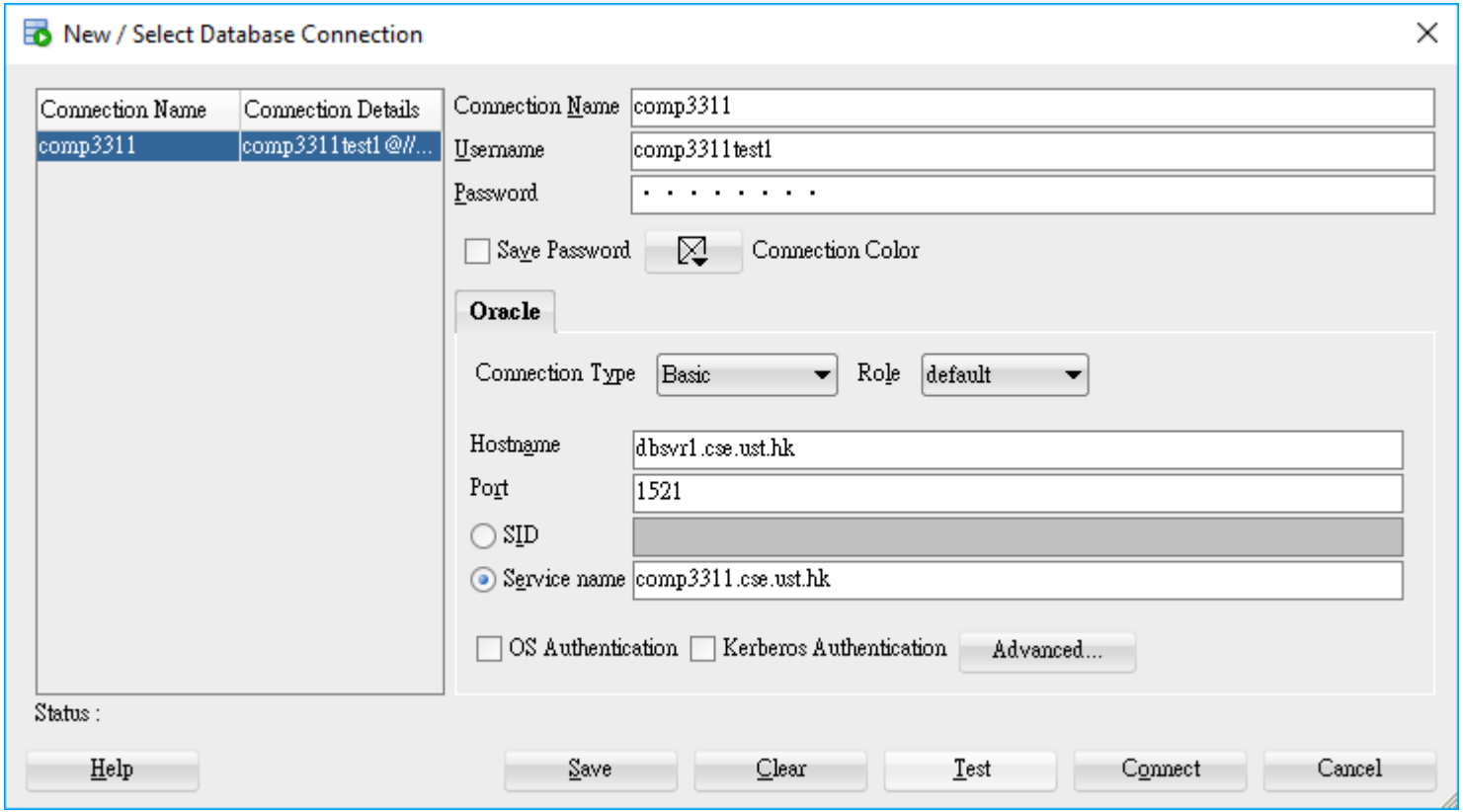
- Create new database connection
- Get your Oracle username and password from the following URL

- https://course.cse.ust.hk/comp3311/labs/account2020.pdf

Connection type	Basic
Hostname	dbsvr1.cse.ust.hk
Port	1521
Service name	comp3311.cse.ust.hk



Connecting to Oracle database server 2



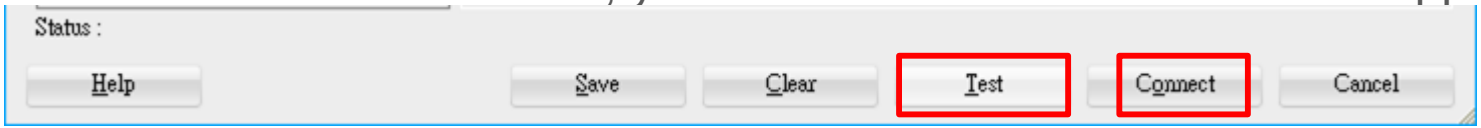
Appendix: Connecting to Oracle database server 3

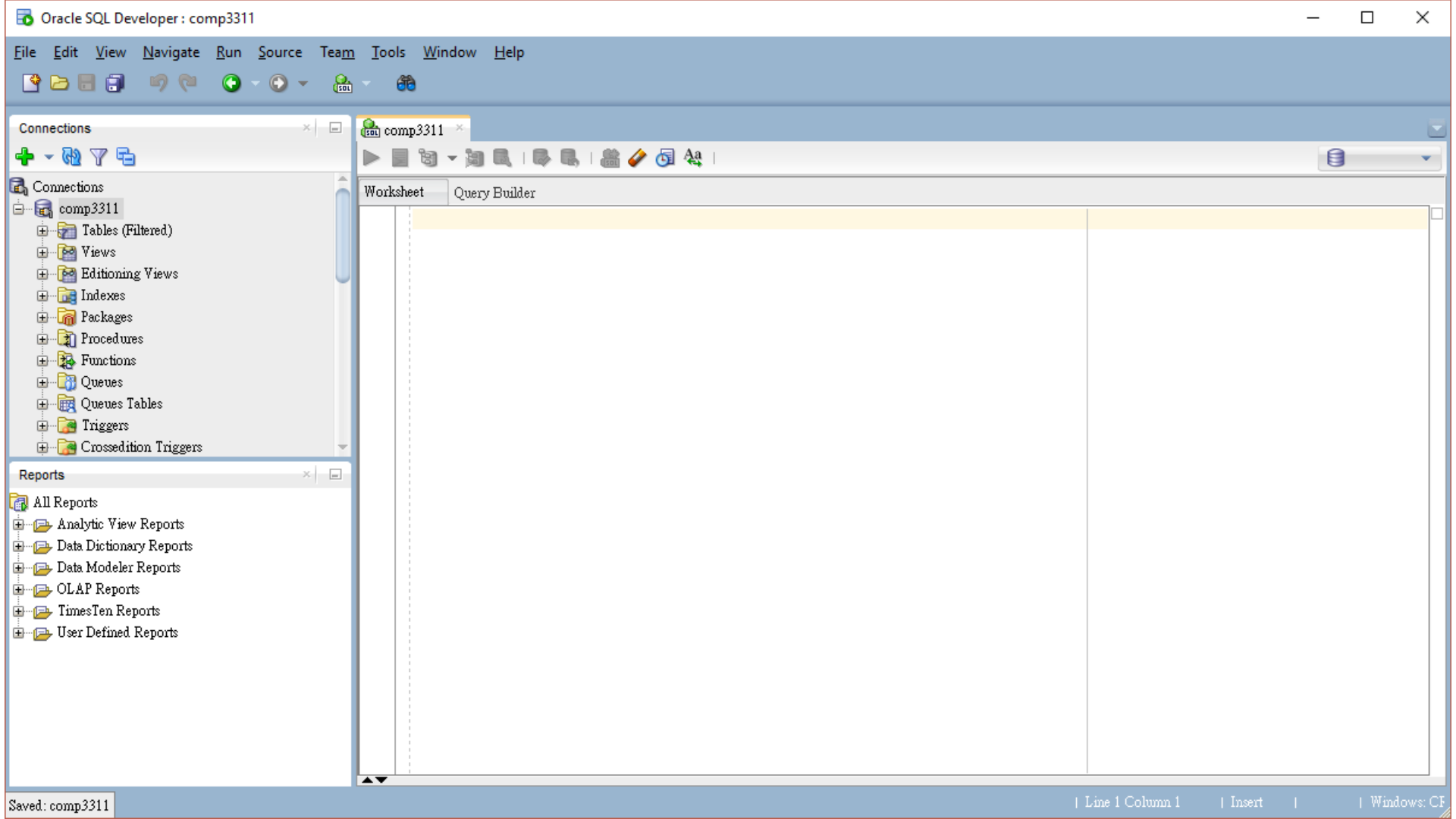
- Role: This is the set of privileges to be associated with the connection. Accept default for this connection.
- OS Authentication: Leave this unchecked for this connection.
- Proxy Connection: Leave this unchecked for this connection.
- Hostname: This is the host system for the Oracle Database instance. Enter an IP address, a machine name, or localhost (when connecting to a database on the same machine as Oracle SQL Developer). The default is localhost .
- Port: This is the listener port for the database. The default port for Oracle Database is 1521.
- SID: This is the system identifier, such as orcl (the default for Oracle Database 10g and Oracle Database 11g) or xe (the default for Oracle Database 10g Express Edition).
- Service name: This is the network service name of the database. Select either SID or Service name.

For database 12c, we use service name (comp3311.cse.ust.hk)

Connecting to Oracle database server 4

- test connection
- if status: Sucess, click Connect.
- if status: Failure - Test failed: ORA-01017: invalid username/password; login denied, check your username and password. Make sure use the username provided in this lab.
- if status: Status: Failure - Test failed: IO Error: The Network Adapter could not establish the connection, check if the computer connect to UST network. To connect to UST network, you can use the VPN mentioned in Appendix 2.



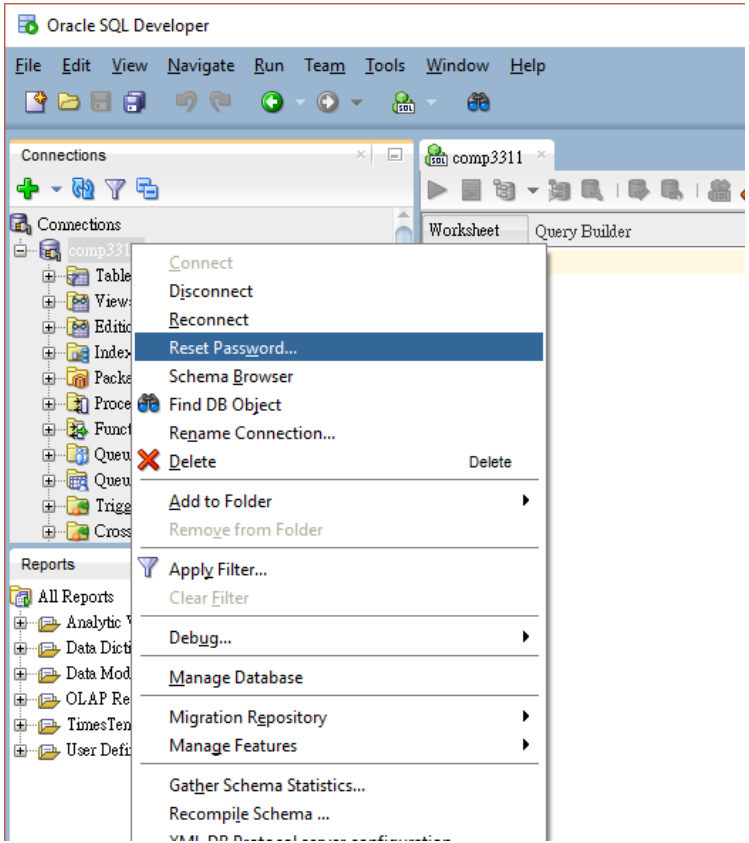

Oracle SQL Developer : comp3311
File Edit View Navigate Run Source Team Tools Window Help
Connections
Connections
comp3311
Tables (Filtered)
Views
Editioning Views
Indexes
Packages
Procedures
Functions
Queues
Queues Tables
Triggers
Crossedition Triggers
Reports
All Reports
Analytic View Reports
Data Dictionary Reports
Data Modeler Reports
OLAP Reports
TimesTen Reports
User Defined Reports
comp3311
Worksheet
Query Builder
Saved: comp3311
Line 1 Column 1
Insert
Windows: CF

Changing your password 1

- You are using the passwords from account2020.pdf, so you know one another’s passwords!
- But you **don’t** want others to alter your database!
- Please do not use others’ accounts and try to change others’ passwords.

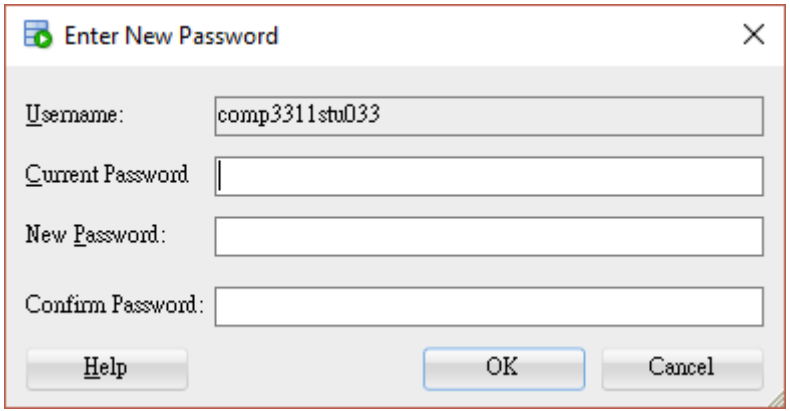
Changing your password 2

- Right click connection
- click Reset Password



Changing your password 3

- Enter current password
- Enter new password twice
- Click OK



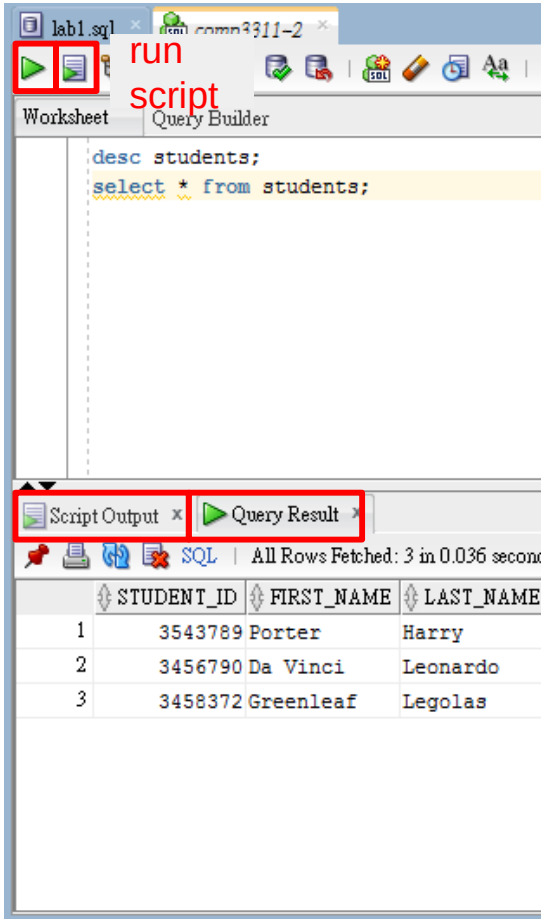
- Please remember the new password!

Changing your password: SQL statement

- alter user <*Oracle account*> identified by <*new_password*>;
  - replace <*Oracle account*> and <*new_password*> with your Oracle account name and the new password.
  - Remember adding a “ ; ” at the end of the SQL statement, because all SQL statement ends in a “ ; ”.
  - Here is an example:
    alter user comp3311ta2 identified by “123456” ;

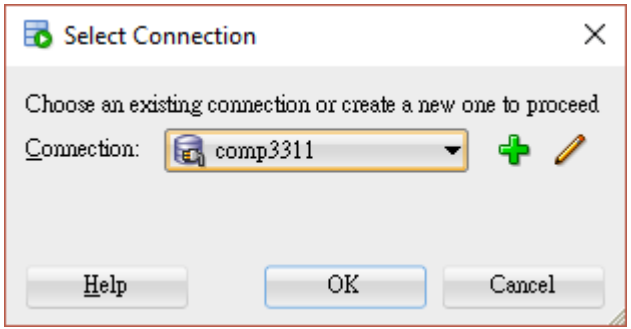
Script vs Query

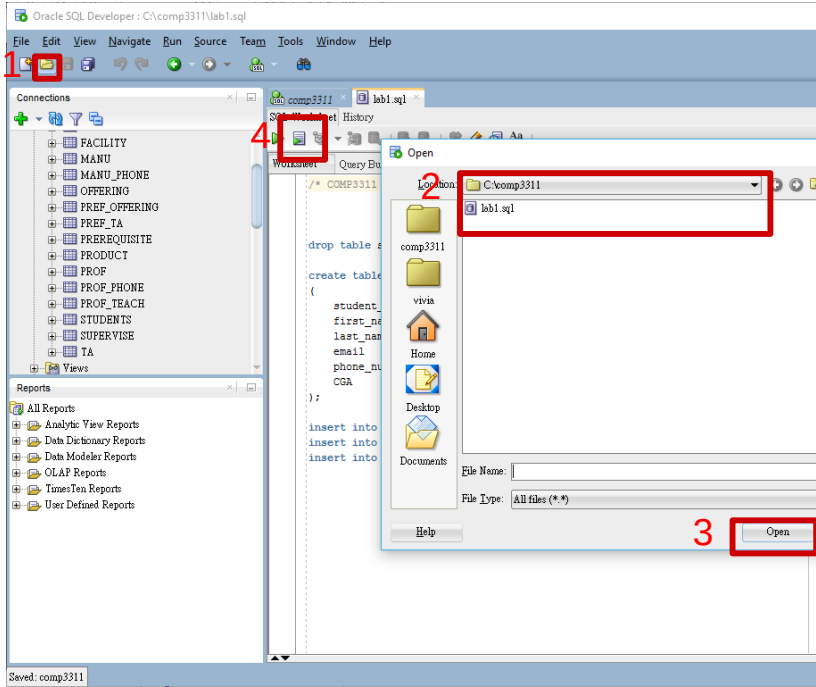
- Run Statement will give you a list of all the results in a sortable table. It will also only run the statement under the cursor (or highlighted).
- Run Script will execute all statements in the worksheet, and give a text readout of the results.
- The result will be shown in Query Result or Script Output.



Running a SQL script file 1

- Download (save) the lab1.sql file to local file system
  - http://course.cs.ust.hk/comp3311/labs/lab1.sql
- Open file
- Run script
- Choose connection





Running a SQL script file 2

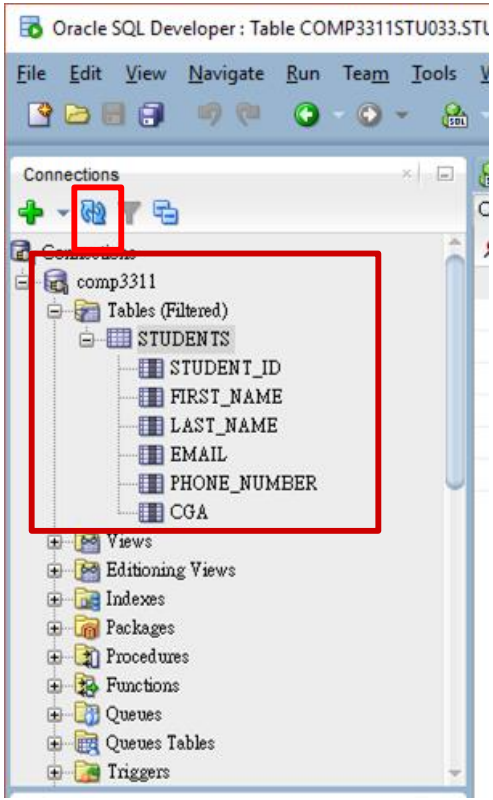
- Basically lab1.sql creates a table called ‘students’ with 6 attributes.
- And lab1.sql inserts 3 different instances of students into the table.
- Don’t worry if you do not understand the SQL statements for the time being. We shall cover them in details in the future labs.

Running a SQL script file 3

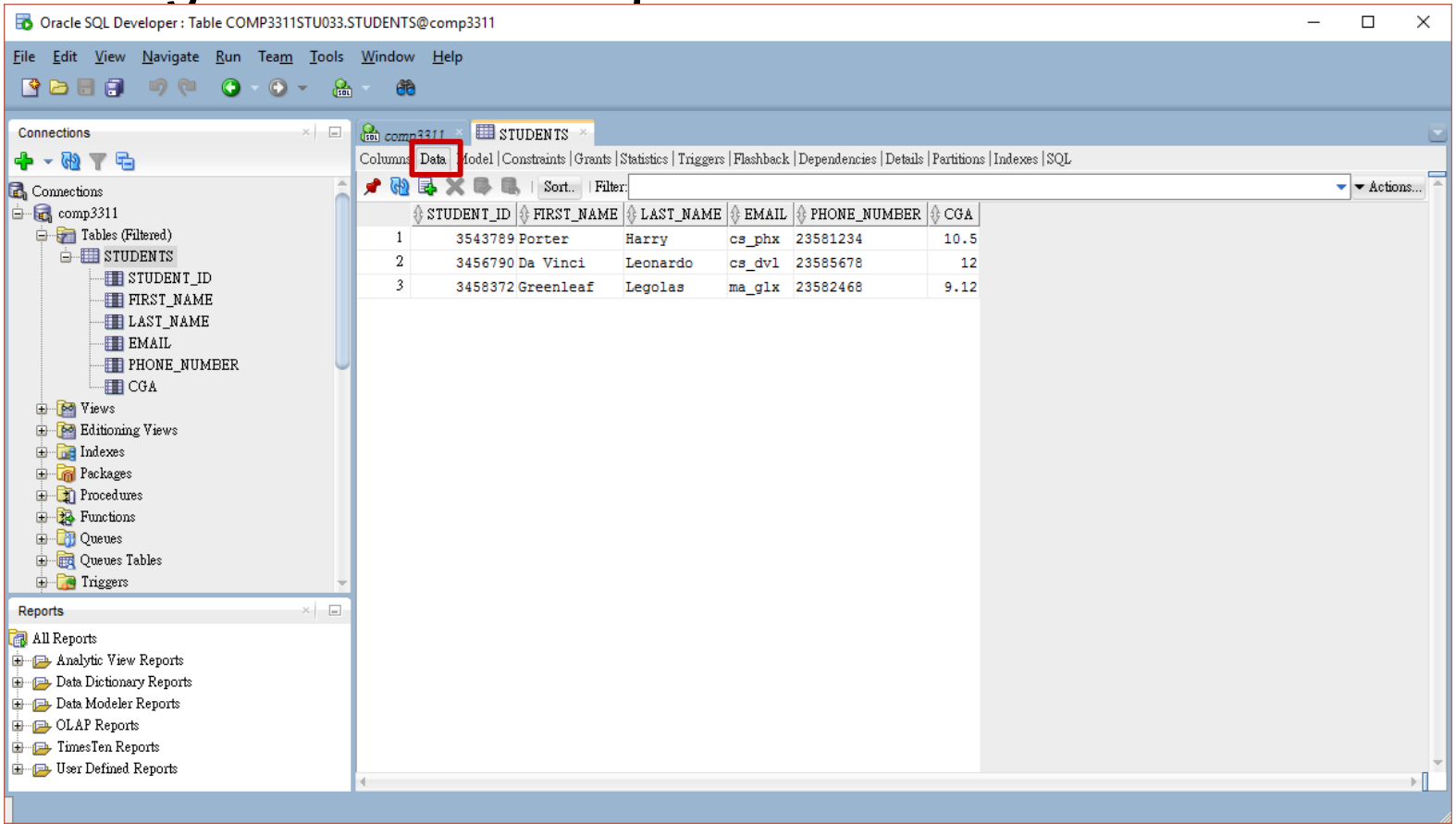
- You should get below result in Script Output after successfully run lab1.sql
  - Table STUDENTS dropped.
  - Table STUDENTS created.
  - 1 row inserted.
  - 1 row inserted.
  - 1 row inserted.

Browsing Database Objects 1

- Expand the connection objects under current connection in connection navigator
- Expand “Tables”
- Refresh if no table is shown
- Select “STUDENTS”
- the table structure is shown



Browsing Database Objects 2



SQL Worksheet

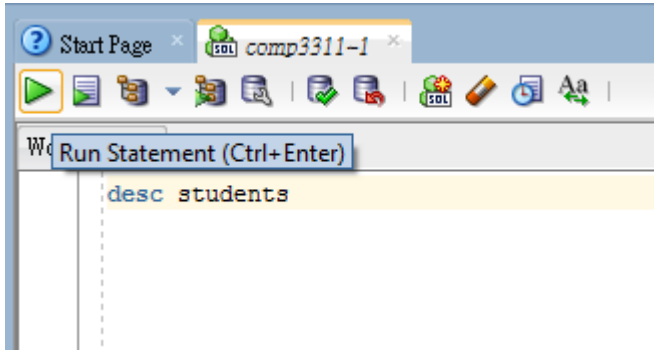
- You can use the SQL Worksheet to enter and execute
  - SQL
  - PL/SQL
  - SQL*Plus statements

Using the SQL Worksheet

- You can display a SQL Worksheet by
  - right-clicking a connection in the Connections navigator and selecting Open SQL Worksheet
  - by selecting Tools and then SQL Worksheet, or
  - by clicking the Use SQL Worksheet icon under the menu bar.

Displaying the table structure with SQL statement

- Command: DESC[RIBE] *<tablename>*
- example: desc students
  - switch to worksheet
  - type desc students in worksheet
  - keep the cursor on this line
  - run statement
  - result will be shown in Script Output



- What you see?
  - Null? – Means whether a column must contain data
  - Type – The data type of the column
  - NUMBER(p, s) – A number of p digits, s decimal points
  - VARCHAR(s) – Variable characters of max. length s

About notations in this Lab

- Command: DESC[RIBE] *<tablename>*
- *<tablename>* represents the name of the table, no need to type <>
- DESC[RIBE] indicates that you can either type describe or desc for short. You can omit the characters in the []

Conclusions

- We covered the following topics in this lab:
  - Introduction to the Oracle DBMS
  - Introduction to the SQL Developer
  - Connecting to the Oracle DBMS through the SQL Developer
  - Running simple SQL scripts
  - Editing SQL statements in SQL Developer