**COSC344**
**Lab for Week 2**

## Overview

At the RED level, all labs will be demonstrated online using MS Teams. If you can't access the COSC344 team channel, please contact the paper coordinator (Haibo Zhang).

The purpose of this lab is to get you familiar with Oracle and its use in our environment. Even though the material is not very challenging, please do the lab because it will prepare you for the subsequent labs as well as the assignments.

**Important Note:** Please read each **bold headed** section **completely** before doing anything in that section. You may encounter problems if you do not strictly follow the given instructions.

## One Time Setup

### On a lab computer:

If you are using a computer in the lab, the computer **MUST** be running **Fedora** for this course. If the computer is running MacOS, reboot it to run Fedora.

The following process will set up your environment so that you can access Oracle from a lab computer. It sets up some environmental variables, and also a command alias.
You need to do this ***ONCE ONLY*** before you can use Oracle.

Type the following exactly as written, or cut & paste the commands from the web page http://www.cs.otago.ac.nz/cosc344/OneTimeSetUp.php

```
cp -p ~/.bashrc ~/.bashrc-saved
cat /coursework/344/pickup/bashrc >> ~/.bashrc
source ~/.bashrc
```

The first command saves a copy of the environment setup file. Since setup files are fragile things, you may not be able to log in if you edit yours and make a mistake. That is why we save a copy before altering it. If you are interested in the environment setup for Oracle, you can read the command lines in the `bashrc` file in the `/coursework/344/pickup/` folder.

### On your own computer:

If you are using your own computer, open a terminal and execute the following command to log into the `hextreme` server

```
ssh   uni_username@hextreme.otago.ac.nz
```

where uni`_username` should be replaced with your university username – the one you used to access Blackboard. For example, if your university email account is jame345@student.otago.ac.nz, your username is jame345. The password is the same as the one you used to log into Blackboard.

**Note:** If you have entered the wrong username/password for three times. You'll be temporarily banned from connecting to hextreme. You'll have to re-try in the next hour

Once you have logged into `hextreme`, type the following exactly as written.
You need to do this ***ONCE ONLY*** before you can use Oracle.

```
cp -p ~/.bashrc ~/.bashrc-saved
cat /home/coursework/344/pickup/bashrc >> ~/.bashrc
source ~/.bashrc
```

The first command saves a copy of the environment setup file. Since setup files are fragile things, you may not be able to log in if you edit yours and make a mistake. That is why we save a copy before altering it. If you are interested in the environment setup for Oracle, you can read the command lines in the `bashrc` file in the `/home/coursework/344/pickup/` folder.

The above sets up your environment so that you can access Oracle from your computer. After that, execute the following command to log into the `titanium` server

```
ssh  cs_username@titanium.otago.ac.nz
```

where `cs_username` should be replaced with your **Computer Science** username, and the password is initially set to your student ID. The **Computer Science** username is the one you used to log into a machine in Computer Science laboratories **before 2022**. If you don't have one, you need to contact our technician Dave Robertson via email dave@cs.otago.ac.nz

**Starting Oracle**

Type `rlsql` to start an Oracle client. ("`rlsql`" is a command alias set up for you in the One Time Setup process - it is the equivalent of typing "`rlwrap sqlplus`" on the command line.) Oracle will prompt for your username and password. Your username is the same as your **Computer Science** username. Your password is initially set to cs followed by your student ID number. You will change your Oracle password soon. You should have the following prompt:

```
sql>
```

[**Caution**]**:** Oracle lets you provide your Oracle username and password on the same line as a parameter to a command. Please resist doing so since the information can be seen by anyone doing a *ps* command. Let Oracle prompt you the username and password; it is much safer.

**Changing Your Oracle Password**

The password must start with a letter - subsequent characters may be letters, numbers, or the symbols # (pound sign), $ (dollar sign) or _ (underscore).

**Important:** read the caution below before using the following command to change password. To change your Oracle password, type:

```
ALTER USER username IDENTIFIED BY new_password;
```

**[Caution]:**

1. Remember to put the semicolon immediately after the new password. Don't forget it!!
2. Oracle does not ask for a confirmation so type carefully and note what you type.

**To Exit Oracle**

To quit Oracle, type `quit` or `exit`.

**Entering Oracle Commands**

At the SQL prompt, type the following:

```
SELECT table_name FROM all_tables;
```

This will give a long list of tables including many which are owned by the system accounts and are not really of any interest. To see a more manageable list type

```
SELECT table_name FROM all_tables WHERE owner NOT LIKE '%SYS%';
```

This will show fewer tables, including some tables owned by SCOTT.
These tables must be accessed as `owner.table_name`
i.e. `select * from scott.emp;`

SQL is not case sensitive. The only situation where character case matters is when you enter text strings or make comparisons between text strings.

In general, we will suggest to use uppercase characters for SQL keywords and lowercase for everything else. However, you can type in whatever case you wish.

In SQL, a semicolon (`;`) terminates a command. Pressing `<return>` takes you to a new line, but does not execute a command. This allows you to format long commands in a sensible manner. If you accidentally press <return> when you wanted to execute a command, simply enter a semicolon and a `<return>`.

**A Suggested Terminal and Application Setup**

For many of our labs and your work, you will find it convenient to have two terminal windows open. You can use one of the windows for interactive work in Linux and use the other window to stay in SQL. This saves having to constantly type in your Oracle username and password.
[**Important**] You need to make sure both terminals are set to the same working directory.

**Create a Directory to Work In**

Create a directory to do your lab work in. You may want to create a directory in your home directory for all COSC344 work, and then create subdirectories under it for each of the labs. Remember that you will also have assignments to work on in the near future.

If you created a (sub) directory, then **`cd`** your terminal window(s) to it before continuing.

**Executing SQL Statements in a File**

Oracle will allow you to put SQL commands into a file and then execute them.

Bring up your favorite editor (e.g. emacs or vim) and create a file with the following:
**Note:** if you connect to Oracle remotely from titanium, you should save the file on titanium.

```
DROP TABLE x;

CREATE TABLE x
   (i INT,
    r NUMBER(6,2) );

INSERT INTO x VALUES (1, 1.1);
INSERT INTO x VALUES (2, 2.2);
INSERT INTO x VALUES (3, 3.3);

COMMIT;

SELECT * FROM x;
```

Save the file as `test.sql`

Now at the `sql>` prompt, type `@test`
It is better to start the Oracle client from the directory in which you save the `test.sql` file. For example, if you save `test.sql` in the `cosc344/lab1` directory, you need to change (using the **cd** command) to that directory first and then type `rlsql` to start the Oracle client; otherwise you need to give the full path of that file, i.e. type `@path/test` where `path` should be replaced by the full path of the directory in which you save `test.sql.`

Your SQL commands will be executed. You may get an error message from the first command. The reason is that there most likely is not a table called *x* in the database. If you execute the script again, you will not see an error.

When executing from a script, Oracle will attempt all commands in spite of errors. That is, it does not stop at an error.

You will find scripts a convenient way to load data into Oracle and to restore your tables to a known state. To create a table and load it, the usual sequence is *drop table, create table,* followed by a series of *insert into* commands. Oracle automatically commits a script, but it is best to commit after you finish inserting into a table. More on that later.

**Getting Information About Your Database**

Oracle keeps meta-data about your database in some system tables. A handy table is called USER_TABLES, which tracks the tables in your database. You can get the names of your tables by typing:

```
SELECT table_name FROM user_tables;
```

You should see at least table *x* is listed. This command is handy if you forget what you called your tables later on.

To get information about a particular table, you can use the DESCRIBE command. Try typing:

```
DESCRIBE x;
```

This command is handy if you forget the attributes and their types.

**Recording an Oracle Session**

When you connect to Oracle, an Oracle session starts. You can use the SQL `spool` command to record an Oracle session into a file.

To use the SQL `spool` command, type `spool filename;` at the sql> prompt. A file with an extension .lst is created and all further SQL commands and responses are recorded into the file. To stop recording, type `spool off;` Recording also stops if you exit from SQL.

**Clean Up**

Before you quit this lab, type `drop table x;` at the `sql>` prompt. That gets rid of the table we experimented with -- just a little housekeeping.

**Practice drawing an ER diagram**

Dia is a software that can help you draw the ER diagram. It has been installed on the computers in Lab E. To run the software, open a terminal and type `dia` and return. As it is an open-source software, you can download it from http://dia-installer.de and install it on your computer.

There are three videos in the following folder:

```
/home/cshome/coursework/344/pickup/00-ERD_videos
```

You can watch these three videos and learn how to create an ERD for a miniworld.
You can copy these videos from hextreme to your local machine using the following command:

```
scp -r
uni_username@hextreme.otago.ac.nz:/home/coursework/344/pickup/00-
ERD_videos /local_path
```

where `uni_username` should be replaced with your own username and /`local_path` should be replaced with the full path on your local machine where you want to save the videos.

You can also draw an ER diagram using the following online drawing tool

https://app.diagrams.net

Practice drawing an ER diagram using one of the above two tools, as this will get you prepared for the first assignment.

**Assessment**

There is no assessment for this lab.