COMP 2714 – RELATIONAL DATABASE SYSTEMS

Lab03 Exercise – Introduction to Oracle PL/SQLpair
(Stored Procedures, Functions, Triggers)

This lab exercise provides a brief introduction to using Oracle PL/SQL in stored procedures, functions and triggers. You need to work individually.

Read the complete lab exercise description before starting, especially the last section on what to submit !! Also, submit a version 1 of your Word Doc before the end of today's lab !!

Note: Since we are not doing the DBXETutorial.zip tutorial from the very beginning, there are a couple of situations that you will encounter during the course of this lab, that you have to think about what you can do to overcome these (minor) challenges!

1. Preparation

a. Unlocking the hr Schema in the Oracle database

1. If necessary, start the database: Start ->O (section) -> Oracle Database 11g Express -> Start Database.

2. Start up the SQL*Plus command prompt:
    a. Start -> O (section) -> Oracle Database 11g Express -> Run SQL Command Line; at > prompt, type Connect
    b. Enter user-name: prompt, type in   system
    c. Enter password: prompt, type in   oracle1

3. Unlock the hr schema with the following statement:
    ALTER USER hr IDENTIFIED BY hr ACCOUNT UNLOCK;

4. For this lab exercise, login with user id **hr** and with password **hr** (as set by ALTER USER in 3 above).

b. For Oracle 11gXE - Additional Steps to Create the HR APEX (Application Express) Workspace

1. Start -> O (section) -> Oracle Database 11g Express Edition -> Oracle XE 11g Get Started.
   In the lab, IE has problems; use Firefox or Chrome: http://127.0.0.1:8080/apex/f?p=4950

2. Click Application Express (**either** the tab along the top of the page, **or** the red button)

3. In the Login screen, login with Username: system and Password: oracle1 (or the one you set during installation)

4. Create a new workspace HR:
    a. Database User: click button   Use Existing
    b. Database Username: HR
    c. Application Express Username: HR
    d. Password / Confirm Password: hr   (note: it is case sensitive)
    e. Click red button: Create Workspace

5. In the message box (just below the tabs Home / Storage / ...) showing Successfully created workspace HR, click **click here** to login to workspace.

6. In the Application Express Login page, enter Password: hr and click Login button. To Logout, click **Logout** upper right corner).

7. To log back into the HR workspace:
    a. Open a web browser and Enter url: http://127.0.0.1:8080/apex/ **or** http://127.0.0.1:8080/apex/f?p=4550
       OR
       = Start -> O (section) -> Oracle Database 11g Express Edition -> Oracle XE 11g Get Started
       = Click Application Express, and login as system / oracle1
       = Click button on right of page: Already have an account? Login Here
    b. Enter Password: hr and click Login button

2. Using Oracle 10g Express Tutorial

1. Download file **DBXETutorial.zip** into folder D:\work\Downloads.

2. Double click file DBXETutorial.zip, and drag the folder DBXETutorial from within the zip file onto D:\work .

3. Navigate into folder D:\work\DBXETutorial and double click **index.htm** to start the Tutorial. If necessary, click on the warning message and **Allow Blocked Content…**

4. Note these differences between Oracle 10g Express Tutorial and the new Oracle 11g XE Application Express:

10gXE	**11gXE**
a. SQL icon	SQL Workshop icon
b. Object Browser arrow	SQL Workshop -> Object Browser -> then button Create drop-down arrow

3. For this Lab Exercise

1. For this lab exercise, complete the following required sections of the Tutorial (the last section "Using Packages" is **optional** - complete it if you are interested):

   ☐ 📖 Adding PL/SQL Functionality into an Application
       📄 Creating a PL/SQL Block
       📄 Creating an Anonymous Block
     ☐ 📖 Using Triggers
         📄 Creating DML Triggers
         📄 Managing Triggers
         📄 Auditing by Using a Trigger
     ☐ 📖 Using Procedures and Functions
         📄 Creating Procedures
         📄 Using Parameters
         📄 Creating Functions
         📄 Handling Exceptions

2. Click on "Adding PL/SQL Functionality into an Application" in the left navigation pane to start this part of the Tutorial. Tutorial content will be displayed in the right pane. Click on the + to the left of "Adding PL/SQL Functionality into an Application" to see all the sections of this part of the tutorial.

3. Read the page content to gain an understanding of the subject matter as you progress through the tutorial. Click "next" and "previous" to page through. Perform the hands-on practices described in "**Show Me and Try It**".

4. **In addition to the given instructions, in a number of places, you need to think and apply your SQL skills to problem-solve the situations and make the tutorial parts work.**

5. Whenever you see "Show Me and Try It", you can click on it to step through the video clip demo and explanation. Then perform the same task(s) with the Oracle Express database directly.
   (In section "Creating Functions", SKIP the 2nd part related to "build an Application Express report".)

6. Altogether you will have created the following in your Oracle Express database:

SECURE_EMP (trigger)	in Creating DML Triggers: Part 2
AUDIT_EMPSAL_VALUES (trigger)	in Auditing by Using a Trigger: Part 2
RAISE_AMOUNT (procedure)	in Creating Procedures
GET_SAL (function)	in Creating Functions (1st Show Me and Try It)
	(**SKIP** 2nd Show Me and Try It on Application Express report)
GET_SAL (modified function)	in Handling Exceptions

4. For Submission

1. Create a Word document and named it Lab03<Lastname><Initial>.docx.

2. Start up the SQL*Plus command prompt:
   a. Start -> O (section) -> Oracle Database 11g Express -> Run SQL Command Line; at > prompt, type Connect
   b. Enter user-name: prompt, type in   hr
   c. Enter password: prompt, type in   hr

3. Type in the following command to show the structure of the USER_SOURCE view: (can do this using a script)
   DESCRIBE USER_SOURCE

   Use the following statement to list the stored procedures, functions and triggers you have in your hr schema:
   ```
   SELECT  DISTINCT  name, type
   FROM    user_source
   ORDER BY name, type;
   ```

4. Use the following statement to display the trigger code, then copy and paste it into your Word document.
   ```
   SELECT text
   FROM   user_source
   WHERE  type = 'TRIGGER' AND name = 'SECURE_EMP'
   ORDER BY line;

   SELECT text
   FROM   user_source
   WHERE  type = 'TRIGGER' AND name = 'AUDIT_EMPSAL_VALUES'
   ORDER BY line;
   ```

5. Use the following statement to display the procedure code, then copy and paste it into your Word document:
   ```
   SELECT text
   FROM   user_source
   WHERE  type = 'PROCEDURE' AND name = 'RAISE_AMOUNT'
   ORDER BY line;
   ```

6. Use the following statement to display the function code, then copy and paste it into your Word document.
   ```
   SELECT  text
   FROM   user_source
   WHERE  type = 'FUNCTION' AND name = 'GET_SAL'
   ORDER BY line;
   ```

7. **Before the end of lab period**, submit a version 1 copy of the Word document. This should include at least the code from your created triggers SECURE_EMP and AUDIT_EMPSAL_VALUES.

8. **When all steps are completed**, submit a version 2 updated copy of the same Word document, before the next lab, or as instructed by your lab instructor.