The aim of this lab is to get a hands-on experience using SQL on:

1. Creating tables
2. Dropping tables
3. Specifying constraints (setting PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, CHECK)
4. Inserting values into the tables
5. Updating values in a table
6. Deleting values in a table

You can use MySQL, MS SQL Server, or Oracle APEX for completing this lab. You can find instructions for using Oracle Apex in Appendix 1.

Basic SQL – DDL

Activity 1. Creating Tables and Constraints

Create the following tables using SQL commands. Save your SQL statements for creating tables and also for inserting data into tables in a script file (script files hve .sql extension).

Note:

1. Write SQL Keywords in All Capital Letters. Write table names and column names like you see in the table below.
2. Use appropriate data types. Look at the sample data entered to the tables (see page 8) to get a better insight about columns data types.
3. Use the most efficient data size. For example, Customer_State is always 2 characters long. Choose CHAR(2)

Table Name	Attributes	Constraints
Customer	Customer_ID Customer_Name Customer_Address Customer_State Customer_Zip	✦ Customer_ID is a Primary key ✦ Customer_Name cannot be NULL. Its size is variable, maximum 35 characters. ✦ The size of Customer_Address is variable but maximum 100 characters. It can be NULL. ✦ Customer_State is always fixed 2 characters. It cannot be NULL. ✦ Customer_Zip is 5 or 6 digit numeric (integer) value (hint: use CHECK for restricting values which are 5 or 6 digits)
Products	Product_ID Product_Name Product_Price Product_Line_ID	✦ Product_ID is a Primary key ✦ Product_Name is unique. It is maximum 30 characters. ✦ Product_Price is a floating-point number ✦ Product_Line_ID is always greater than or equal to 10 and less than or equal to 100 (Use SMALLINT data type and CHECK constraint)
Sales_Order	Order_ID Order_Date Customer_ID	✦ Order_ID is a Primary key ✦ For Order_Date, use DATE datatype. ✦ Customer_ID is a foreign key. Use ON DELETE CASCADE constraint.

Order_Line	Order_ID Product_ID Ordered_Quantity	✦ {Order_ID, Product_ID} is a composite Primary key ✦ Order_ID is a foreign key. Set ON DELETE CASCADE constraint. ✦ Product_ID is a foreign key. It cannot be NULL.

Activity 2. Insert Data into the Tables

You do not need to submit a report for this section (Activity 2). It is just for your learning about error messages when you insert data into tables. Run the following statements and check if the result (errors) would happen for you.

#	SQL Statement	Result	If an error happened, how do you resolve it?
1	INSERT INTO Customer VALUES (1, 'Simon Li', '1392 Moonset Apt', 'NT', 180059);	1 row(s) inserted.	
2	INSERT INTO Customer VALUES (1, 'Goldberg Smith', '6870 Nelson St.', 'CA', 56032);	Primary key constraint violated	Customer_ID =1 is already inserted. We must change Customer_ID to 2 or any other value that is not already inserted.
3	INSERT INTO Customer VALUES (NULL, 'Richard Andrew', '2040 Riverbend Rd.', 'CA', 96710);	cannot insert NULL into CUSTOMER_ID	Customer_ID cannot contain NULL value. Instead of NULL, we can enter 3 (according to the data shown in next pages)
4	INSERT INTO Customer VALUES (4, NULL, 'Belview St.', 'AZ', 857987);	cannot insert NULL into CUSTOMER_NAME	When we created the table Customer, we set NOT NULL constraint on Csustomer_Name. That's why we cannot enter NULL value for it. We must enter a value for Customer_Name. According to the data, we enter 'Catherine Wong'
5	INSERT INTO Customer VALUES (5, ' Marie', '7869 Gabriel Road', 'AZS', 857987);	value too large for column "CUSTOMER_STATE"	Customer_State must be maximum 2 characters. We insert the value 'AZ' instead of 'AZS'
6	INSERT INTO Customer VALUES (6, 'Saeed', 'Mountain Hights', 'WS', 8579879);	value larger than specified precision allowed for this column	Customer_Zip can be maximum 6 digits. '8579879' is 7 digits and not allowed.
7	INSERT INTO Sales_Order VALUES (200, '01/01/2016', 10);	integrity constraint violated - parent key not found	There is no Customer_ID = 10 in the customer table. This is referential integrity constrainst violation. Instead of 10 we insert 1, because there is a customer with Customer_ID=1 in the customer table.
8	INSERT INTO Sales_Order VALUES (200, '01/01/2016', 2);	unique constraint violated	There is already Order_ID=200 in the Sales_Order table. Primary

			Key (Order_ID must be unique). We insert 201 instead of 200
9	INSERT INTO Products VALUES (1000, 'Office Desk', 105.00, 500);	check constraint violated	We we created the table, we set a CHECK constraint for Product_Line_ID. It must be between 10 and 100 inclusive. It cannot be 500
10	INSERT INTO Order_Line VALUES (200, 4000, 1);	integrity constraint violated - parent key not found	Referential integrity constraint violation. There is not a product in the product table with Product_ID=4000. We must first insert a product with Product_ID=4000 in the product table, then insert these values to the Order_Line table.
11	INSERT INTO Order_Line VALUES (206, 4000, 1);	integrity constraint violated - parent key not found	There is no Order-ID = 206 in the Sales_Order table. We must first insert an order with Order_ID=206 in the Sales_order table.
12	INSERT INTO Order_Line VALUES (206, 3000, 1);	integrity constraint violated - parent key not found	Referential integrity constraint violation. There is not a product in the product table with Product_ID=3000. We must first insert a product with Product_ID=3000 in the product table, then insert these values to the Order_Line table.
13	INSERT INTO Order_Line VALUES (200, 4000, 1);	unique constraint violated	The table Order_Line has a composite key of (Order_ID, Product_ID). We have already inserted the pair (200,4000), that's why by executing this insert statement Unique Constraint Violation is displayed.
14	DROP TABLE Customer;	unique/primary keys in table referenced by foreign keys	Because Customer_ID is referenced as a foreign key in other tables, i.e. Sales_order table, when we want to drop the customer table, it does not drop the customer table and the error message is shown. We must use CASCADE CONSTRAINT .
15	DROP TABLE Customer CASCADE;	Table dropped.	This works only in MySQL. CASCADE is not recognized in MS SQL Server

After practicing these statements, write SQL Statements to insert the data shown in the following tables into the corresponding tables of your database.

CUSTOMER

CUSTOMER_ID	CUSTOMER_NAME	CUSTOMER_ADDRESS	CUSTOMER_STATE	CUSTOMER_ZIP
1	Simon Li	1392 Moonset Apt	NT	180059
2	Goldberg Smith	6870 Nelson St	CA	56032
3	Richard Andrew	2040 Riverbend Rd.	CA	96710
4	Catherine Wong		AZ	857987
5	Marie	7869 Gabriel Road	AZ	857987
6	Saeed	Mountain Heights	WS	857987

SALES_ORDER

ORDER_ID	ORDER_DATE	CUSTOMER_ID
200	01/01/2016	1
201	01/01/2016	2
202	02/01/2016	3
203	03/01/2017	2
204	10/01/2017	1
205	10/01/2017	4
206	10/01/2017	2
207	10/01/2017	1
208	10/02/2017	5

PRODUCTS

PRODUCT_ID	PRODUCT_NAME	PRODUCT_PRICE	PRODUCT_LINE_ID
1000	Office Desk	105	10
1001	Managers Desk	209.1	10
2000	Office Chair	89	20
2001	Students Desk	229.5	20
3000	Book Shelf	95	30
3001	Duplex Book Shelf	180.25	30
4000	Table Lamp	85	40
4001	Duplex Table Lamp	90	40

ORDER_LINE

ORDER_ID	PRODUCT_ID	ORDERED_QUANTITY
200	4000	1
201	1000	2
201	2000	2
202	3000	1
202	2000	1
203	4001	1
204	2000	1
205	3001	2
206	3000	1
206	4000	1
207	4001	1

Activity 3. Learning Update Commands

You do not need to submit a report on this Activity. Just practice for learning.

After inserting all values to the tables, run first:

```
SELECT *
FROM Order_Line;
```

And take note of the values of Ordered_Quantity for Order_ID= 201 (Ordered_Quantity must be 2) Then run:

```
UPDATE Order_Line
SET Ordered_Quantity=5
WHERE Order_ID = 201;
```

Now run again:

```
SELECT *
FROM Order_Line;
```

Make sure that ordered_Quantity for all Order_ID=201 is 5.

Now run:

```
UPDATE Order_Line
SET Order_ID = 210
WHERE Order_ID = 201;
```

What error message is displayed? Why?

Activity 4. Delete Effect on Other Tables

This activity is also for your learning. No report is needed to submit. Answer the following questions:

a) What would happen when you delete a customer with id =5? Will it affect any other table? If yes, which one?

b) What would happen when you delete a customer with id =1? Will it affect any other table? If yes, which one?

c) What would happen when you delete order with id =200? Explain.

Submission

Submit a SQL script file, (text file with .sql extension) containing the following SQL statements. respect the order of statements.

1. SQL commands used to drop all tables (first children tables, then parents). **[20 Marks]**
2. SQL commands used to create above four tables **[46 Marks]**
3. SQL commands used to insert the above tuples in the tables. **[34 Marks]**

Appendix 1 – Oracle Apex

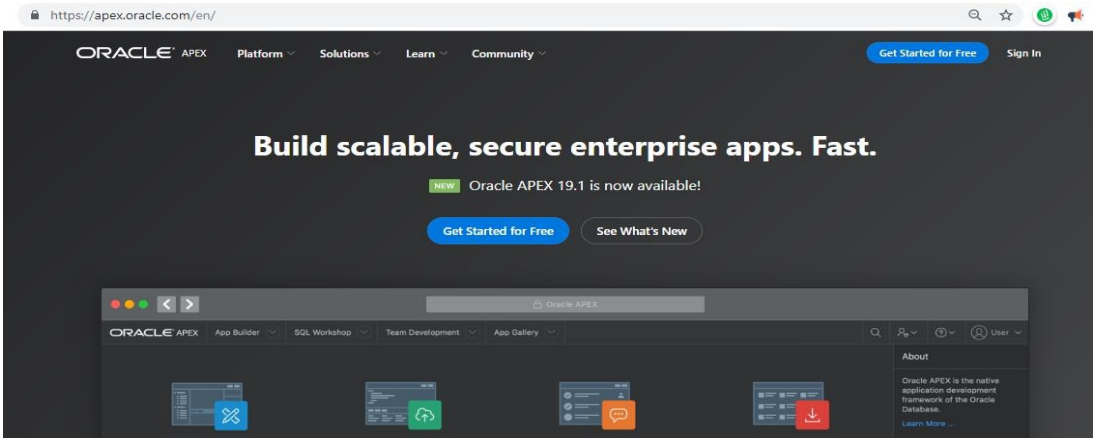
Before starting, you need to create an account in Oracle APEX. The lab is divided into 2 parts:

1. Introduction to Oracle APEX and step by step instructions to create an account.
2. Introduction to SQL DDL (Data Definition Language) to create, drop, alter tables with constraints and insert, update, delete, or truncate values in a table.

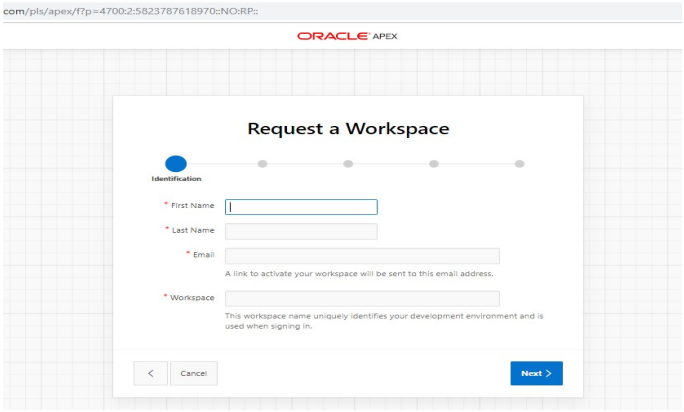
Oracle Application Express (Oracle APEX) is Oracle's primary tool for developing Web applications with SQL and PL/SQL. Using only a web browser, you can develop and deploy professional Web-based applications for desktops and mobile devices.

Please follow the steps to create an Oracle APEX account and workspace:

1. **Create an account:** go to https://apex.oracle.com site and Click on **Get Started for Free-> Request a Free Workspace**. (Warning: Do not use Internet Explorer browser)



2. Fill up the form with your name and email address. Choose a name for the Workspace that you can remember. Click NEXT.

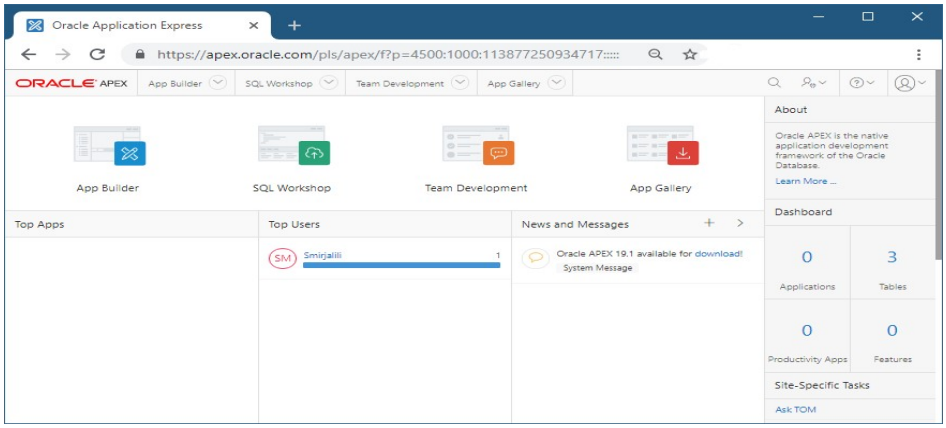


3. Answer the survey questions and accept the term and conditions and finally **Submit Request**.

4. You will receive a confirmation email (to the email account whose address you provided in the 3rd step), open the email, and click on the link **Create Workspace** to complete the approval process.

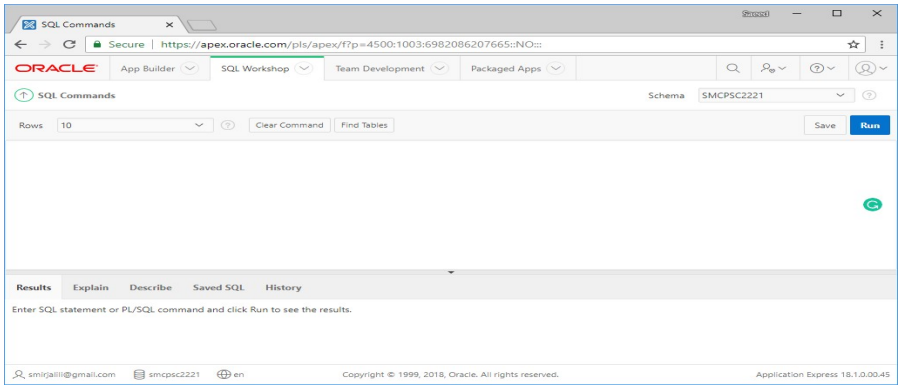
5. Follow the instruction to get your username and password.

6. Go to https://apex.oracle.com page and click Sign In. Your username is the email address you provided.



You will be using the **SQL Workshop** to do most of this lab. Click on **SQL Workshop**.

Click on "**SQL Commands**". You will be using the "SQL Commands" application to practice SQL commands.



To create SQL Scripts in Oracle Apex, click on the downward arrow beside SQL Workshop (on top menu), then click on SQL Scripts, click on Create, give your script a name. For example, type "Creating Tables" in the box in front of Script Name. Then paste your SQL Statement in the script editor then click on Create button. Make sure your SQL Statement is error free before pasting it into the script.)