DATA BASE MANAGEMENT SYSTEM LAB

Laboratory Instructor's Manual

Last Revised

February, 2022

Dept. of CSE
Techno Main, Salt Lake

GENERAL INSTRUCTIONS FOR STUDENTS

1. Do not enter the Laboratory without prior permission.
2. Switch off your mobile phones during Lab class and maintain silence.
3. Save your files only on the specific destination folders as instructed.
4. Do not play games, watch movies, chat or listen to music during the class.
5. Do not change desktop setting, screen saver or any other system settings.
6. Do not use any external storage device without prior permission.
7. Do not install any software without prior permission.
8. Do not browse any restricted, illegal or spam sites.

GENERAL ADDRESS FOR LABORATORY TEACHERS

1. Submission of documented lab reports related to completed lab assignments should be done during the following lab session.
2. The promptness of submission should be encouraged by way of marking and evaluation patterns as reflected in the lab rubric which eventually will benefit the students.

Program Outcomes (POs)

PO1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis:** Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural and engineering sciences.

PO3. **Design/Development of solutions:** Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety and the cultural societal and environmental considerations.

PO4. **Conduct investigations of complex problems:** Use research based knowledge including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to access societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work:** Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.

PO10. **Communications:** Communicate effectively with the engineering community and with the society at large. Be able to comprehend and write effective reports documentation. Make effective presentations and give and receive clear instructions.

PO11. **Project management and finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO1: Ability to develop the solutions for scientific, analytical and research-oriented problems in the area of Computer Science and Engineering.

PSO2: Ability to apply suitable programming skills integrated with professional competence to develop applications catering to the industrial and societal needs in the field of Computer Science and Engineering and its allied areas.

NAME OF THE PROGRAM: *CSE*	DEGREE: *B.Tech*
COURSE NAME: *DATA BASE MANAGEMENT SYSTEM LAB*	SEMESTER: *6TH*
COURSE CODE: *PCC-CS691*	COURSE CREDIT: *2*
COURSE TYPE: *PRACTICAL*	CONTACT HOURS: *4L*

SYLLABUS

Code: **PCC-CS691**
Contact: **4P**
Credits: **2**
Structured Query Language
   1. Creating Database
- Creating Database
- Creating a Table
- Specifying Relational Data Types
- Specifying Constraints
- Creating Indexes

  2. Table and Record Handling
- INSERT statement
- Using SELECT and INSERT together
- DELETE, UPDATE, TRUNCATE statements
- DROP, ALTER statements

  3. Retrieving Data from a Database
- The SELECT statement
- Using the WHERE clause
- Using Logical Operators in the WHERE clause
- Using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING

Clause
- Using Aggregate Functions
- Combining Tables Using JOINS
- Subqueries

  4. Database Management
- Creating Views
- Creating Column Aliases
- Creating Database Users
- Using GRANT and REVOKE

Cursors in Oracle PL / SQL
Writing Oracle PL / SQL Stored Procedures

Course Outcome (CO)

After this course student will be able to

CO1	Construct an ER and a relational model for a given problem domain by identifying functional requirements and constraints, using DIA diagram editor.
CO2	Write queries by applying suitable SQL commands to retrieve information using a state-of-art RDBMS e.g. Oracle 10g.
CO3	Develop PL/SQL constructs like procedures, blocks and cursors for computing problems and real life applications.
CO4	Design a database solution for an industrial and/or an IT application addressing cultural/social/health/safety issues working effectively either as an individual or as a team.
CO5	Compose well-drafted documents to present the design and solutions conclusively.

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COURSE TYPE: *PRACTICAL*	**CONTACT HOURS:** *4L*
SESSION: *2021-2022*	

List of Experiments

Exp. No.	List of Experiments	Week No.
1.	Design an ER diagram for a Motor Vehicle Branch that administers driving tests and issues driver's licenses. Analyze the requirements by identifying the entities, attributes, relationships, keys, constraints etc. Apply extended entity-relationship features to the design. Defend your design with proper assumptions and justifications. Map the ER model into a relational model.	**Week1**
2.	Design an ER diagram for an application that models soccer teams, the games they play, and the players in each team. Analyze the requirements by identifying the entities, attributes, relationships, keys, constraints etc. Apply extended entity-relationship features to the design. Defend your design with proper assumptions and justifications. Map the ER model into a relational model.	**Week2**
3.	Design an ER diagram for an application that models an educational institute having several departments, faculty, students, projects, student hostels etc. Analyze the requirements by identifying the entities, attributes, relationships, keys, constraints etc. Apply extended entity-relationship features to the design. Defend your design with proper assumptions and justifications. Map the ER model into a relational model.	**Week3**
4.	i. Create tables for Client, Product, and Salesman with the attributes given, implementing DDL commands for specifying prime attributes, non-prime attributes, foreign keys, cardinalities, null values, constraints etc. and the data types. Implement DDL commands for drop, alter on the tables created. ii. Implement DML commands like populating the tables with data using insert command and retrieving data using simple queries in SQL. (Application of select, update, delete etc.)	**Week4**
5.	i. Create tables for Client, Product, Salesman, Sales_Order, and Sales_Order_Details and populate them. Retrieve data by writing queries in SQL using logical operators, aggregate operators, group by, having, order by clauses etc. ii. Create tables for Employee, Company and works and populate them. Retrieve data by writing nested queries in SQL using JOIN to combine tables and other operators like IN, BETWEEN, LIKE etc.	**Week5**
6.	i. Design an ER diagram for an application that models a car-insurance company whose customers own one or more cars each. Analyze the requirements by identifying the entities, attributes, relationships, keys, constraints etc. Apply extended entity-relationship features to the design. Defend your design with proper assumptions and justifications. Map the ER model into a relational model. ii. Create tables, populate with data and construct queries (advanced) in SQL to extract information from the car insurance company's database.	**Week6**

Exp. No.	List of Experiments	Week No.
7.	i. Design an ER diagram for an application that models a hospital doctors treat patients, prescribe tests, monitor progress etc. Analyze the requirements by identifying the entities, attributes, relationships, keys, constraints etc. Apply extended entity-relationship features to the design. Defend your design with proper assumptions and justifications. Map the ER model into a relational model. ii. Create tables, populate with data and construct queries (advanced) in SQL to extract information from the car insurance company's database.	**Week7**

8.	i. Implement a PL/SQL block that will accept student id number from the user, and check is student attendance is less than 80% then display message that student cannot appear in exam. [Table: STUDENT (STUD_ID, primary key, STUD_NAME, STUD_ATT)].
	
	ii. Implement a PL/SQL code block that will accept an account number from the user. Check if the user's balance is less than the minimum balance, only then deduct Rs.100 from the balance. The process is fired on the ACCT_MSTR table. [Table: ACCT_MSTR (ACCT_NO, ACCT_HOLDR_NAME, CURBAL].
	
	iii. Implement a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table named AREAS, consisting of two columns Radius and Area. [Table: AREAS (RADIUS, AREA)].
	
	iv. Implement a PL/SQL procedure that takes weight of an apple box as input from the user.
	    ● If the weight is >= 10 kg, rate =Rs. 5/kg.
	    ● If the weight is < 10 kg, rate = Rs. 7/kg.
	Calculate the cost of the apple box. Display the output on the screen.
	
	v. Implement a PL/SQL procedure to calculate the difference between highest salaried and lowest salaried employee. Store the information in a table.
	
	vi. Implement a PL/SQL block using cursor that will display the name, department and the salary of the first 3 employees getting lowest salary. [Table: Employee (ename, dept, salary)]
	
	vii. Implement a PL/SQL cursor that will update salary of all employees, such that, it allows an increment of 20% if the salary is less than 2000 otherwise increment of Rs.1000. It should print old and new salary for all employees. [Table: Employee (ename, dept, salary)]
		Week8

9.	Consider the following relations and Draw the ER, EER Diagram, Relational Model and write the SQL statement for the following queries: Create the tables and insert 5 sets of records into each. employee (personname, street, city) works (personname, companyname, salary) company (companyname, city) manages (personname, managername)	**Week9**

Exp. No.	List of Experiments	Week No.
	a) Find the names of all employees who work for Axis Bank.	
	b) Find the names and cities of residence of all employees who work for Axis Bank.	
	c) Find the names, street addresses, and cities of residence of all employees who work for Axis Bank and earn more than Rs.30000 per annum.	
	d) Find all employees who live in the same city as the company for which they work is located.	
	e) Find all employees who live in the same city and on the same street as their managers.	
	f) Find all employees in the database who do not work for Axis Bank.	
	g) Find all employees who earn more than every employee of Axis Bank. h) Assume that the companies may be located in several cities. Find all companies located in every city in which Axis Bank is located.	
	i) Find all employees who earn more than the average salary of all employees of their company.	
	j) Find the company that has the most employees.	
	k) Find the company that has the smallest payroll.	
	l) Find those companies whose employees earn a higher salary, on average, than the average salary at Axis Bank.	
	m) Modify the database so that ABC now lives in Kolkata.	
	n) Give all employees of Axis Bank a 10 percent raise.	
	o) Give all managers in the database a 10 percent raise.	
	P) Give all managers in the database a 10 percent raise, unless the salary would be greater than Rs.300000.In such cases, give only a 3 percent raise.	
	q) Delete all tuples in the works relation for employees of Axis Bank.	
10.	Consider the following tables: MATCH (match_id, team1, team2, ground, mdate, winner) PLAYER (p_id, lname, fname, country, yborn, bplace, ftest) BATTING (match_id, p_id, mts, order, out_type, fow, nruns, nballs, fours, sixes) BOWLING (match_id, p_id, novers, maidens, nruns, nwickets) 1. Draw the appropriate ER, EER and Relational model for the given data. 2. Write SQL expressions for the following: i) Find match ids of those matches in which player 27001 bats and makes more runs than he made at every match he played at Sydney.	**Week10**

Exp. No.	List of Experiments	Week No.
	ii) Find player ids of players who have scored more than 30 in every ODI match that they have batted. iii) Find the ids of players that had a higher average score than the average score for all players when they played in Sri Lanka.	
11.	A record company wishes to use a computer database to help with its operations regarding its performers, recordings and song catalogue. A requirements analysis has elicited the following information: • Songs have a unique song number, a non-unique title and a composition date. • A song can be written by a number of composers; the composer's full name is required. • Songs are recorded by recording artists (bands or solo performers). • A song is recorded as a track of a CD. A CD has many songs on it, called tracks. CDs have a unique record catalogue number, • A title and must have a producer (the full name of the producer is required). • Each track must have the recording date and the track number of the CD. • A song can appear on many (or no) CDs, and be recorded by many different recording artists. The same recording artist might re-record the same song on different CDs. • A CD must have only 1 recording artist appearing on it. • CDs can be released a number of times, and each time the release date and associated number of sales is required. 1. Use this information to design an appropriate ER and relational model. 2. Compile DDL and DML commands on the database created. SQL:- i>Update number of recorded album to 4 for those artist who has recorded only 3. ii>Find all artists who have recorded at least two albums. iii>Find all writers who have only written one song. 3. PL/SQL i>Write Procedure to insert a new Contract into the Contract relation.	**Week11**
12.	1> Create the following tables. Hotel (Hotel_No, Name, Address) Room (Room_No, Hotel_No, Type, Price) Booking (Hotel_No, Guest_No, Date_From, Date_To, Room_No) Guest (Guest_No, Name, Address) A. Populate the tables and answer the following query using SQL.	**Week12**

Exp. No.	List of Experiments	Week No.
	1. List the names and addresses of all guests in London, alphabetically ordered by name. 2. List all double or family rooms with a price below £40.00 per night, in ascending order of price. 3. List the bookings for which no date_to has been specified. 4. How many hotels are there? 5. What is the average price of a room? 6. What is the total revenue per night from all double rooms? 7. How many different guests have made bookings for August? 8. List the details of all rooms at the Grosvenor Hotel, including the name of the guest staying in the room, if the room is occupied. 9. What is the total income from bookings for the Grosvenor Hotel today? 10. List the rooms that are currently unoccupied at the Grosvenor Hotel. B. Design an ER Model for an application where hotels are booked by guests wanting to go on a holiday in India or abroad. Your design should meet all requirements. Map into a relational model.	
	2> Consider the schema for Company Database: EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo,DLoc) PROJECT (PNo, PName, PLocation, DNo) WORKS_ON (SSN, PNo, Hours) A. Write SQL queries to ………… 1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project. 2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise. 3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.	

Exp. No.	List of Experiments	Week No.
	4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator). 5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000. B. Write a program in PL/SQL to create a procedure to displays the GCD of nos. C. Write a program in PL/SQL to create a cursor displays the name and salary of each employee in the EMPLOYEES table whose salary is less than that specified by a passed-in parameter value.	

Rubrics for Lab

Criteria Score	Excellent (10-8)	Good (7-6)	Average (5-4)	Poor (3-1)	CO Mapping	PO/PSO Mapping
Lab Participation (Following Procedure +Lab Techniques+ Subject Knowledge + Contribution)	Student demonstrates an accurate understanding of the lab assignments. The student can correctly answer questions and if required, can explain concepts to fellow classmates. Student is eager to develop new ideas and assists when needed.	Student arrives on time to lab, but may be underprepared. Answers to questions are basic and superficial suggesting that concepts are not fully grasped. Able to follow the instruction and somehow manage to execute the program.	Student's unpreparedness makes it impossible to fully participate. If able to participate, student has difficulty explaining key lab concepts.	There was no attempt to make prior arrangements to make up the lab. Attendance is not regular. Not able to run the program even after getting help from the peers.	**CO1/CO2/CO3**	**PO1/ PO2/ PO3, PSO1/ PSO2**
Interaction with Group (Team work)	Very good participation with a good leadership quality; is respectful of others and their point of view; makes sure that everyone gets a turn; conscious of time	Good participation; appears interested; enthusiastic but talks over teammates; try to help group complete tasks; somewhat conscious of time	Minimal participation; shows little interest; doesn't pay attention to other group members; may argue to get point across; helps group only when asked; little emphasis on time	No participation; sits on the sidelines with no interaction; disinterested; no stake in time management	**CO4**	**PO9**
ERD & Relational Model	Correctly construct ERD and Relational Model without errors	Provide optimal solution	Provide partial solution with minor errors	Incorrect solution with major errors	**CO1/CO2/CO4**	**PO5/ PSO1**
Queries (SQL/PLSQL)	Correctly write effective queries without errors	Provide optimal solution	Provide partial solution with minor errors	Incorrect solution with major errors	**CO2/CO3/CO4**	**PO5/ PSO2**

Criteria Score	Excellent (10-8)	Good (7-6)	Average (5-4)	Poor (3-1)	CO Mapping	PO/PSO Mapping
Lab Report	Student demonstrates an accurate understanding of the lab concepts. Questions are answered completely and correctly. Output of each program is neat, creative and includes complete titles. Errors, if any are minimal	Student has a basic knowledge of content, but may lack some understanding of some concepts. Questions are answered fairly well and/or output could have been done more neatly, accurately or with more complete information	Student has problems with both the output and the answers. Student appears to have not fully grasped the lab content and the code possess multiple errors	Student turns in lab report late or the report is so incomplete and/or so inaccurate that it is unacceptable.	**CO5**	**PO10**

<u>Operational Instructions for using related software and/or tools, (Subject specific)</u>

Usage Instruction for DBMS (CS691) Lab in UBUNTU

<u>For Login to the Remote Oracle server::</u>

Step 1: To login to the remote (college) Oracle server, open Terminal and type:

`$ . oremote_env.sh`

Step 2: To start Oracle SQLPlus type (refer to Figure-1),
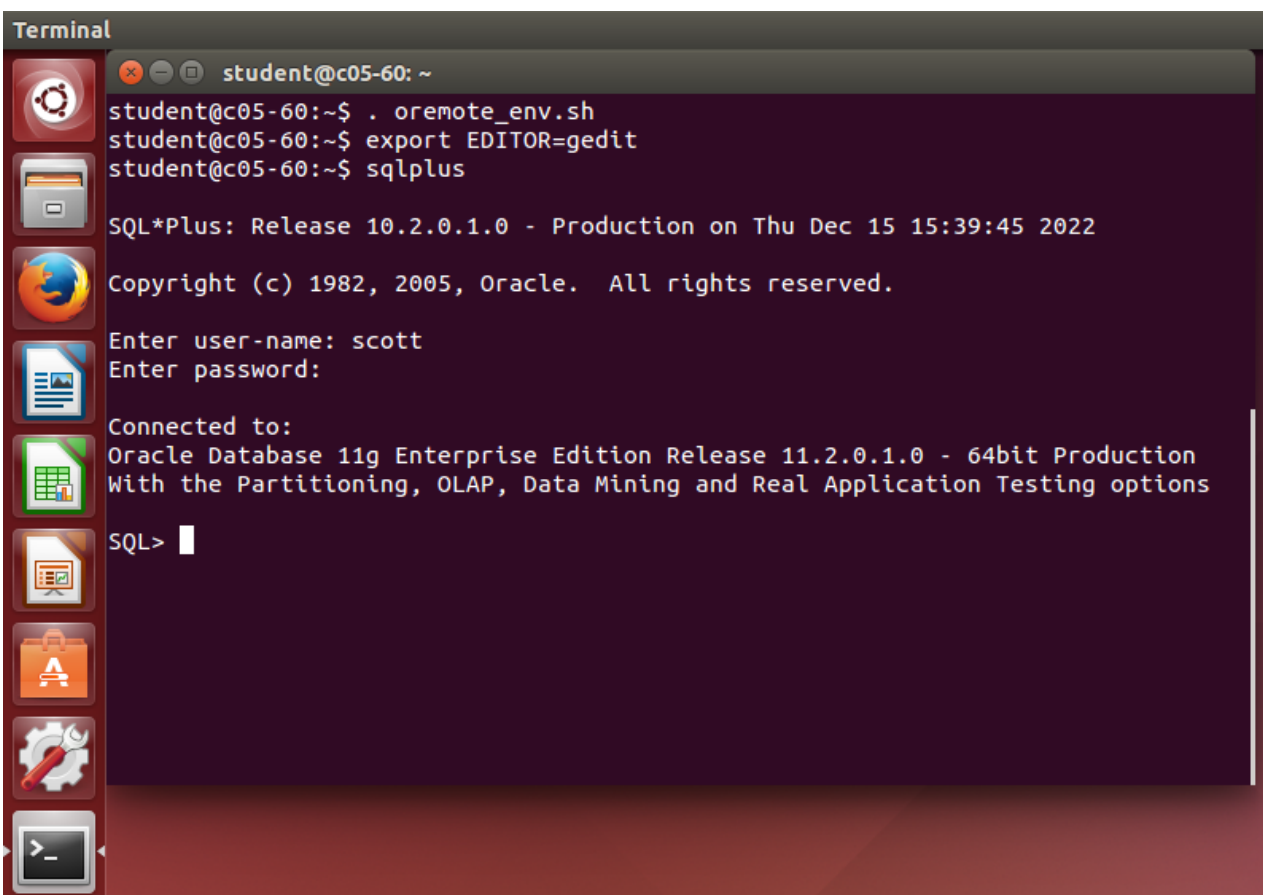
`$ export EDITOR=gedit`
`$ sqlplus`

Figure-1

Step 3: Enter the username and password as per the given format to login (e.g. *cse6th13000120001*).

For Login to the Local Oracle server::

Step 1: To create username and password for the first time, open Terminal and type:

```
$ sh $ORACLE_HOME/orauser.sh
```

Now, enter 11digit University roll no. (e.g. 12345678910) and re-enter the same University roll number for confirmation (refer to Figure-2 below). It will create a new user with the username as *st12345678910* and password *st12345678910.*
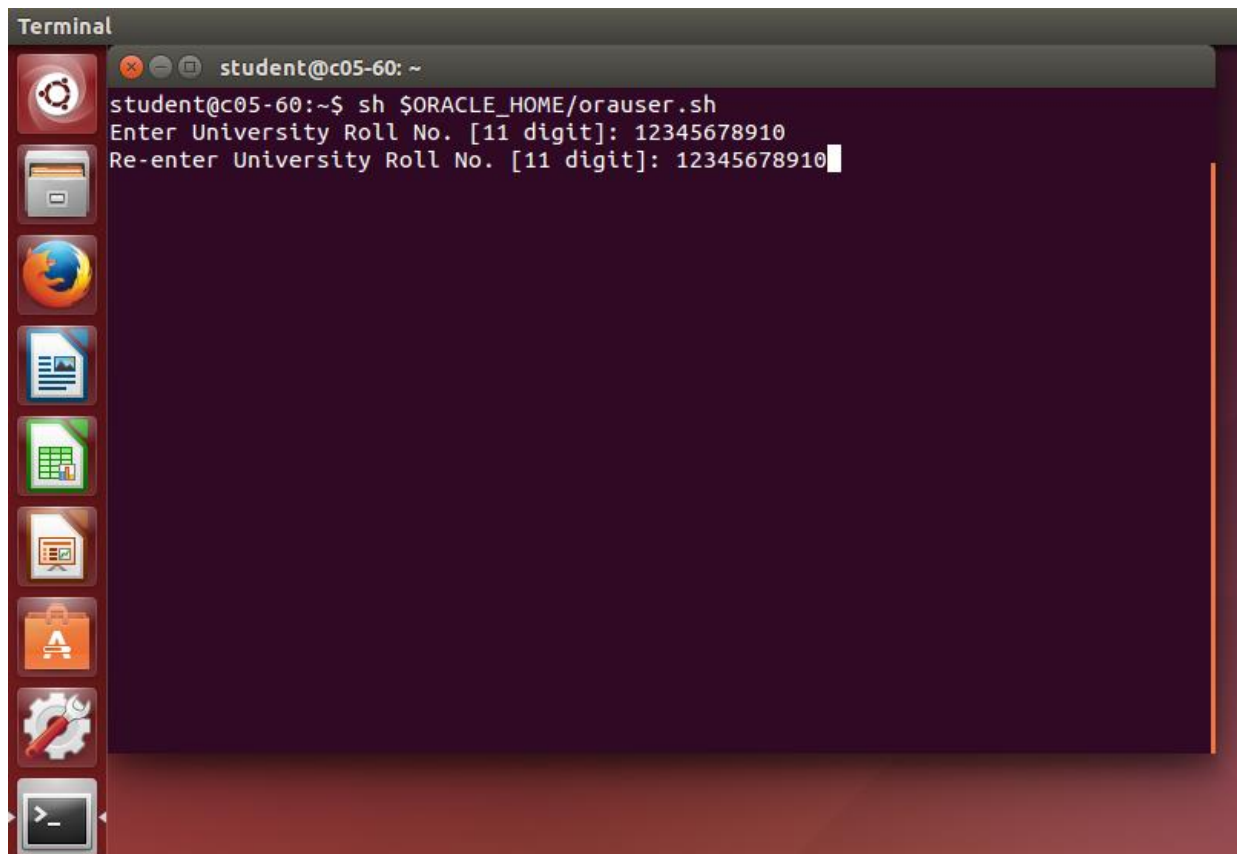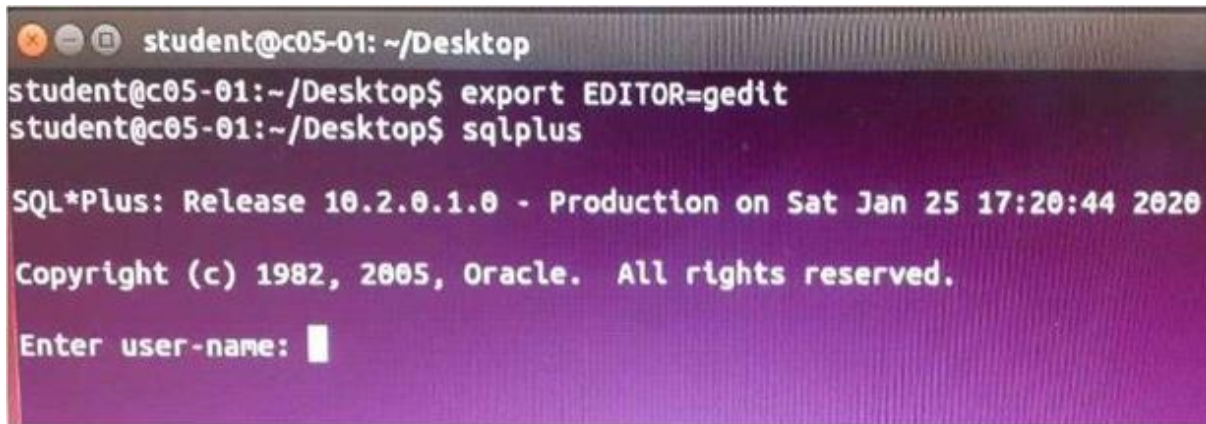

Figure-2

Step 2: To start Oracle SQLPlus type (refer to Figure-3),

```
$ export EDITOR=gedit
$ sqlplus
```

Figure-3

Instructions for PL/SQL::

Note 1: Write the below line before start any PL/SQL program statements
SET SERVEROUTPUT ON;

Note 2: Write **/** to run your PL/SQL program.