SIT103 – Data and Information Management

Assignment 2   ***Due Date - 11.59 PM on 18 January 2019***

Database for Video Game Centre

Total mark of the assignment: 100 (20% of the final unit assessment).

Late Submission and Extension Policy

- All students MUST submit an assignment on the due date, whether it is completed or not.
- Students who have just cause may email your lecturer and apply for an extension <mark>BEFORE</mark> the due date unless they are hospitalised or there are extenuating circumstances that prevent this. All applications must be accompanied by documentary evidence of the disadvantage causing this request.
- Late Assignments will be penalised by 5% for each day late. After one week, assignments will not be marked.

Unit Learning Outcomes (ULOs)

- Of the three Unit Learning Outcomes (ULOs) of this unit, this assignment will focus on the last two ULOs. These are:
- *ULO 2 - At the end of this unit students will be able to evaluate data models and apply data modelling techniques to capture the data aspects of real-world situations.*
- *ULO 3 - At the end of this unit students will be able to design and develop relational databases by using SQL and a database management system.*
- The assessment of this assignment will indicate whether students can partially attain these unit learning outcomes.

Scenario

University of Vermont need to track of students and their majors, transcripts, and registration as well as of the university's course offerings. The university database also keeps track of the sponsored research projects of faculty and graduate students. The requirements are listed as follows.

For each staff members, the database maintains information on staff's Name, Social Security number, address, and birth date, a rank (e.g. assistant, associate, adjunct, research, visiting, and so on), office, office phone, and salary. All staff members are related to the academic department(s) with which they are affiliated (a staff member can be associated with several departments).

For each student, the database maintains information on student's Name, SID, address, and birth date A student has a class as such as freshman=1, sophomore=2, graduate student=3, etc). Each student is also related to his or her major and minor departments to the course sections he or she is currently attending and registered. And if a student completed a course a transcript should be given. Each transcript instance includes the grade the student received in a section of a course. Graduate student is a subclass of student, with the defining predicate Class = 5. For each graduate student, we keep a list of previous degrees as a multivalued attribute. We also relate the graduate student to a faculty advisor and to a thesis committee, if one exists.

An academic department has the attributes name, telephone and office number and is related to the faculty member who is its chairperson and to the college to which it belongs. Each college has attributes college name, office number, and the name of its dean.

A course has attributes course number, course name, and course description. Several sections of each course are offered, with each section having the attributes section number and the year and quarter in which the year section was offered, and quarter number used to identify the section.

Finally, the entity type grant keeps track of research grants and contracts awarded to the university. Each grant has attributes grant title, grant number, the awarding agency, and the starting date. A grant is related to one principal investigator and to all researchers it supports. Each instance of support has as attributes the starting date of support, the ending date of the support.

Answer following questions.

Provide the following:

1. Identify business rules. Business rules are important to define relevant constraint in the organisations. Some organisations have specific rules only practice by the organisation. (*e.g.* A business rule for a car sales company may be "for each car separate invoice should be issued."). You can make any appropriate assumptions and mention them in your answer.

    (5 marks)

2. ER diagram is based on the business rules, and should clearly label all entities, entity attributes, primary and foreign keys, relationship and connectivity. The cardinality is optional.
    Instruction: Use professional software (e.g., MS Office Visio) to draw the ER diagram. Crow's Foot notation is preferable.

    (40 marks)

3. Develop relational schemas. Relational schemas should be derived using the ERD. You should map cardinalities correctly from ERD to Relational Schema. You should clearly indicate the referential integrity constraints (primary and foreign key relationships) using arrows. Clearly indicate datatype for each attribute.
    e.g.
    Emp(eid: *integer*, ename: *string(50),* address: *string(100),* did: *number*)

    Dept(did: number, dname : string (15))

    (15 marks)

4. SQL commands
    1. Create all tables in Deakin Oracle DBMS (about eight tables including composite tables) and Populate the tables with sample data (10 records in each table is recommended).
    2. Alter the student table and add new field Phone Number for student table. Type for Phone Number should be number.
    3. Increase the annual salary for all staff member by 5%.
    4. List the course numbers, course names a student who is doing computer science major could enrol for.
    5. Find the students with age between 18 and 21. Print their student number, name and the age with the major.

    6. Create your own query. It must include a nested query. Submit the following:
        i   question your query is answering the SQL query
        ii the mark for this question will depend on the complexity of the query.
        iii higher marks will be given for queries that are more complex and/or innovative.

iv if you do not provide a description of what question the query is answering, you will get zero for this query.

(40 marks)

Submission: Submit a copy of your solution – a single document (word or pdf format – 5 marks of penalty will be applied for other format of submissions), electronically on the course portal, on or before the due date.
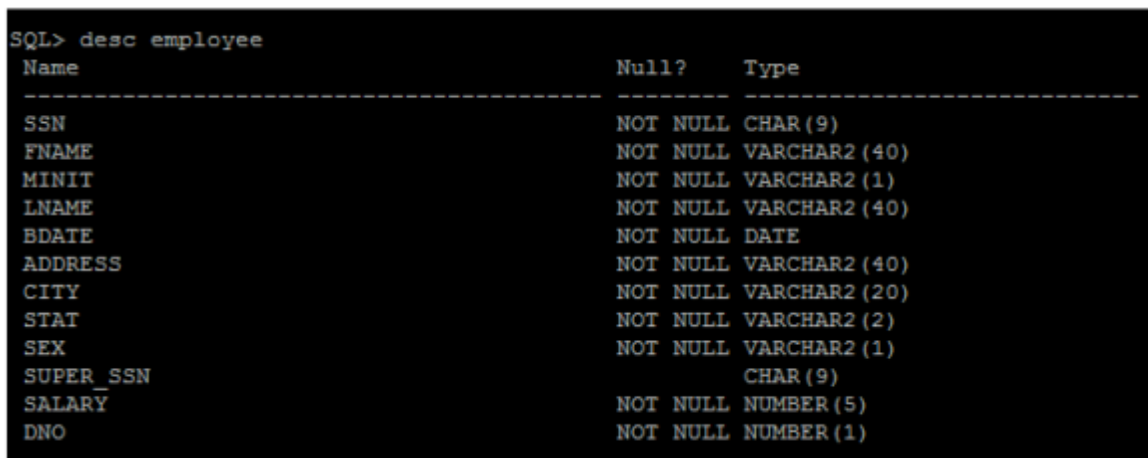
You must submit your Report with a

- Cover page (with student number, name and a signed statement that mentioned all the work is your own work.)- Failing of one of the items will applied for 5 marks of penalty form the final mark.
- Answers for above mentioned questions. The design should be very clearly documented. And answers should be written in the order of the questions. If not 5 marks of penalty will be applied.

Simple Example on how to submit Q4

Screen screenshots (*Please provide clear screen shot showing your work*)

Q1 – Create employee table
```
CREATE TABLE EMPLOYEE(
Ssn char(9) NOT NULL,
Fname varchar(40) NOT NULL,
Minit varchar(1) NOT NULL,
Lname varchar(40) NOT NULL,
Bdate date ,
Address varchar(40) NOT NULL,
City varchar(20) NOT NULL,
Stat varchar(2) NOT NULL,
Sex varchar(1) NOT NULL,
Super_SSN char(9),
DNO char(4) NOT NULL,
CONSTRAINT PK_Person PRIMARY KEY (Ssn),
CONSTRAINT FK_Emp  FOREIGN KEY (DNO) REFERENCES Persons(DNO)
);
```

```
SQL> desc employee
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 SSN                                       NOT NULL CHAR(9)
 FNAME                                     NOT NULL VARCHAR2(40)
 MINIT                                     NOT NULL VARCHAR2(1)
 LNAME                                     NOT NULL VARCHAR2(40)
 BDATE                                     NOT NULL DATE
 ADDRESS                                   NOT NULL VARCHAR2(40)
 CITY                                      NOT NULL VARCHAR2(20)
 STAT                                      NOT NULL VARCHAR2(2)
 SEX                                       NOT NULL VARCHAR2(1)
 SUPER_SSN                                          CHAR(9)
 SALARY                                    NOT NULL NUMBER(5)
 DNO                                       NOT NULL NUMBER(1)
```

Insert values – Emp table

INSERT INTO EMPLOYEE (Ssn, Fname, Minit, Lname, Bdate, Address, City, Stat, Sex, Salary, Super_ssn, Dno)
VALUES ('123456789','John', 'B', 'Smith','09-Jan-1965', '731 Fondren', 'Houston', 'TX', 'M', '30000', '333445555', '5');

```
SQL> INSERT INTO DEPARTMENT (dname, dnumber, mgr_ssn, mgr_start_date)
  2     VALUES ( 'Administration','4','987654321','01/nov/1995');

1 row created.

SQL> INSERT INTO DEPARTMENT (dname, dnumber, mgr_ssn, mgr_start_date)
  2     VALUES ( 'Headquartes','1','888665555','19/jun/1981');

1 row created.
```

```
SQL> SELECT * FROM EMPLOYEE
  2 ;

FNAME        M LNAME          SSN BDATE     ADDRESS                              S     SALARY SUPER_SSN       DNO
------------ - ---------- --------- --------- ------------------------------------- - ---------- ---------- ----------
JOHN         B SMITH     123456789 09-JAN-65 731 FONDREN,HOUSTON,TX               M      30000 333445555         5
ALICIA       J ZELAYA    999887777 10-JAN-68 3321 CASTLE,SPRING,TX               F      25000 987654321         4
JENNIFER     S WALLACE   987654321 20-JUN-41 291 BERRY,BELLAIRE,TX               F      43000 888665555         4
RAMESH       K NARAYAN   666884444 15-SEP-62 975 FIRE OAK,HUMBLE,TX              M      38000 333445555         5
JOYCE        A ENGLISH   453453453 31-JUL-72 5631 RICE,HOUSTON,TX                F      25000 333445555         5
AHMAD        U JABBAR    987987987 29-MAR-69 980 DALLAS,HOUSTON,TX               M      25000 987654321         4
JAMES        E BORG      888665555 10-NOV-37 450 STONE,HOUSTON,TX                M      55000                   1
FRANKLIN     T WONG      333445555 08-DEC-55 638 VOSS,HOUSTON,TX                 M      40000 888665555         5

8 rows selected.
```

Print employee's first name, last name, address, and department number
SELECT Fname, Lname, Address, City, Stat, Dno
FROM EMPLOYEE;

Please see the marking scheme in next page.

Question	Comments	Marks
1. Identify business rules **(5 marks)** You need to list any business rules identified.		/5
2. Entity Relationship Diagram **(40 marks)**		
Identifying Entities		/5
Identifying Attributes for each entity		/5
Identification of relationships		/5
For use of correct symbols and for the clarity		/5
Mapping cardinalities correctly		/10
Identifying and marking Primary and foreign Keys		/10
3. Relational Schemas **(15 marks)**		**/15**
4. Queries **(40 marks)**		**/40**
Query 1		/10
Query 2		/6
Query 3		/6
Query 4		/6
Query 5		/6
Query 6		/6
Total		/100