Course Performance Information System

DBSL mini project

Team members:

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1 ABSTRACT:

This project involves design and implementation of a system to record course performance information. The system will enable teachers to input and update marks for each subject for a student. It will also enable them to modify, insert and delete student records, update the cut-off for subjects as well as view information about a given subject or student. The project has been implemented using Python, Tkinter (GUI) and Oracle SQL.

Problem Statement: Design and implementation of course performance management system for updation of cut-offs, grade display and modification of student records.

Data Requirements:

- Student Information: Name, ID, Contact details, Address, Enrolment details
- Course Information: Course name, Course code, Branch
- Instructor Information: Name, ID, Subjects taught
- Grade Information: Subject-wise cut-offs

Functional Requirements:

- Computation of sum of marks to get the total course marks
- Insertion, updation and deletion of student records
- Provision for the number of assignments/exams to not be predefined
- Appropriate grading for subjects
- Provision for cut-offs to be specified for various grades

2 ER DIAGRAM AND RELATIONAL SCHEMA

Relational Schema:

student = (studentid, firstname, lastname, address, dob, mobile, email)

instructor = (instructorid, fullname, course, branch)

subject = (subjectid, subjectname, course, branch, cutoff, semester, numofassignments)
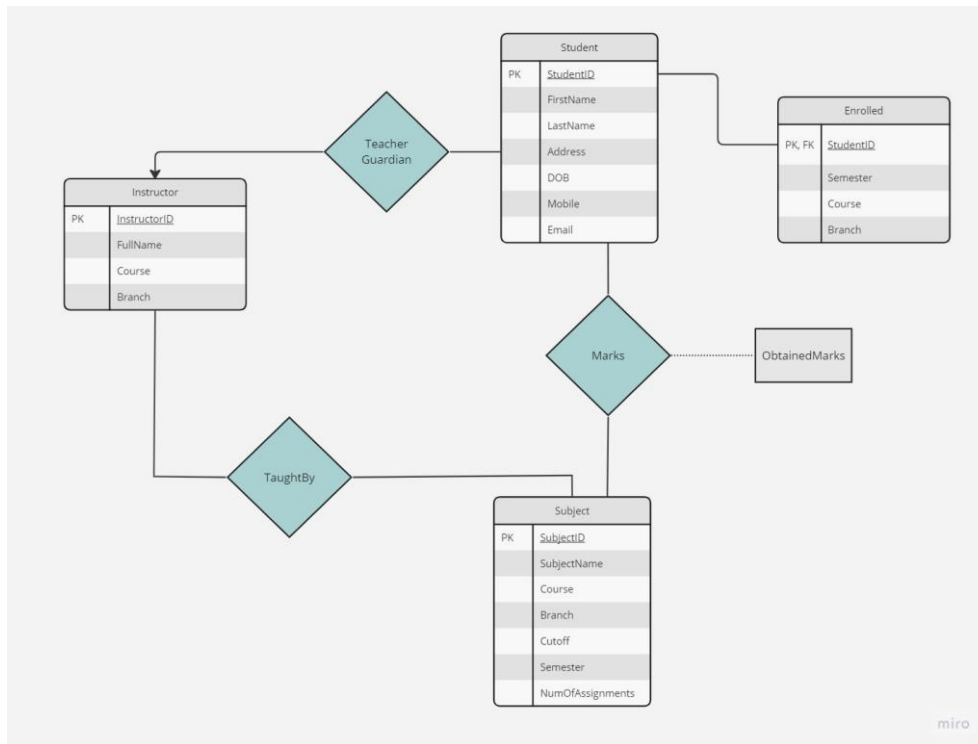
enrolled = (studentid, semester, course, branch)

taughtby = (subjectid, instructorid)

marks = (studentid, subjectid, obtainedmarks)

teacherguardian = (studentid, instructorid)

ER Diagram:

3 DDL COMMANDS TO CREATE TABLES

```sql
CREATE TABLE Student (
    StudentID VARCHAR2(10) PRIMARY KEY,
    FirstName VARCHAR2(30),
    LastName VARCHAR2(30),
    Address VARCHAR2(100),
    DOB DATE,
    Mobile VARCHAR2(20),
    Email VARCHAR2(50)
);
CREATE TABLE Enrolled (
    StudentID VARCHAR2(10) PRIMARY KEY,
    Semester VARCHAR2(10),
    Course VARCHAR2(20),
    Branch VARCHAR2(30),
    CONSTRAINT fk_enrolled
        FOREIGN KEY (StudentID)
        REFERENCES Student(StudentID)
        ON DELETE CASCADE
);
CREATE TABLE Instructor (
```

```sql
    InstructorID VARCHAR2(10) PRIMARY KEY,

    FullName VARCHAR2(50),

    Course VARCHAR2(20),

    Branch VARCHAR2(30)

);

CREATE TABLE TaughtBy (

    SubjectID VARCHAR2(30),

    InstructorID VARCHAR2(10),

    CONSTRAINT fk_taughtby

        FOREIGN KEY (SubjectID)

        REFERENCES Subject(SubjectID)

        ON DELETE CASCADE

);

CREATE TABLE TeacherGuardian (

    StudentID VARCHAR2(10),

    InstructorID VARCHAR2(10),

    CONSTRAINT fk_teachergrd

        FOREIGN KEY (StudentID)

        REFERENCES Student(StudentID)

        ON DELETE CASCADE

);

CREATE TABLE Subject (

    SubjectID VARCHAR2(10) PRIMARY KEY,

    SubjectName VARCHAR2(30),

    Course VARCHAR2(20),

    Branch VARCHAR2(30),

    Cutoff NUMBER,

    Semester NUMBER,

    NumOfAssignments NUMBER

);

CREATE TABLE Marks (

    StudentID VARCHAR2(10),

    SubjectID VARCHAR2(10),

    ObtainedMarks NUMBER(10),

    CONSTRAINT fk_marks

        FOREIGN KEY (StudentID)

        REFERENCES Student(StudentID)

        ON DELETE CASCADE);
```

4 SQL QUERIES

A number of select, insert, update and delete queries have been utilised in the program to modify, insert, delete and display student and subject entries along with other information. Some of them are listed below:

- `SELECT * FROM Subject WHERE SubjectID = '{sub_id}' ORDER BY SubjectID`

- `SELECT * FROM Subject WHERE Branch='{branch}' AND Semester={sem} ORDER BY SubjectID`

- `SELECT FullName FROM Instructor WHERE InstructorID = (SELECT InstructorID FROM`

- `SELECT COUNT(*) FROM Enrolled WHERE Branch = '{branch}' AND Semester = '{sem}'`

- `DELETE FROM Student WHERE StudentID='{stu_id}'`

- `UPDATE Student SET {attr[i]}=TO_DATE('{val}', 'DD-MM-YYYY') WHERE StudentID='{stu_id}'`

- `UPDATE Subject SET NumOfAssignments={int(numA)} WHERE SubjectID='{sub_id}'`

- `INSERT INTO  Student VALUES ('{stu_id}', '{f_name}', '{l_name}', '{addr}', TO_DATE('{dob}', 'DD-MM-YYYY'), '{mob}', '{email}')`

5 UI DESIGN

Screen 1: Grade Sheet display and Student selection

Screen 2: Student details viewing, updation, insertion and deletion

Student ID:	ST0010
First Name:	Tracy
Last Name:	Jones
Address:	333 Church St, Anytown USA
DOB:	17-03-1999
Mobile:	535-5668
Email:	tracy.jones@example.com
Semester:	2
Course:	B.Tech
Branch:	Mechanical
Teacher Guardian:	Emily Rodriguez

Marks Scored

1.	Thermodynamics	58
2.	Solid Mechanics	40
3.	Fluid Mechanics	33
4.	Engineering Materials	61
5.	Manufacturing Technology	87

Insert   Update   Delete   Reset   Exit

Screen 3: Subject details viewing, updation of cut-off

Subject ID:	EE406
Subject Name:	Control Systems
Semester:	4
Course:	B.Tech
Branch:	Electronics
Students Enrolled:	6

Cutoff:	39
No. of assignments:	2

Update

ID	Subject	Branch	Sem
EE202	Signal Processing	Electronics	2
EE204	Circuit Design	Electronics	2
EE206	Microcontrollers	Electronics	2
EE208	Field Theory	Electronics	2
EE210	Communication Systems	Electronics	2
EE402	Digital Communications	Electronics	4
EE404	Instrumentation	Electronics	4
EE406	Control Systems	Electronics	4
EE408	Electromagnetic Waves	Electronics	4
EE410	Electronic Materials	Electronics	4
EE602	Power Electronics	Electronics	6
EE604	VLSI Design	Electronics	6
EE606	Digital Systems	Electronics	6
EE608	Antenna Theory	Electronics	6
EE610	Wireless Systems	Electronics	6
ME202	Thermodynamics	Mechanical	2
ME204	Solid Mechanics	Mechanical	2
ME206	Fluid Mechanics	Mechanical	2
ME208	Engineering Materials	Mechanical	2
ME210	Manufacturing Technology	Mechanical	2

Subject Avg. Marks: 55

6 PL/SQL

6.1 TRIGGERS

Trigger on Student Table:

```sql
CREATE OR REPLACE TRIGGER logStudent
BEFORE INSERT OR UPDATE OR DELETE ON Student
FOR EACH ROW
BEGIN
CASE
WHEN INSERTING THEN
    INSERT INTO LogStudentChange
    VALUES(SYSDATE,:NEW.StudentID, :NEW.FirstName, :NEW.LastName, :NEW.Address, :NEW.DOB,
:NEW.Mobile, :NEW.Email);
WHEN UPDATING OR DELETING THEN
    INSERT INTO LogStudentChange
    VALUES(SYSDATE,:OLD.StudentID, :OLD.FirstName, :OLD.LastName, :OLD.Address, :OLD.DOB,
:OLD.Mobile, :OLD.Email);
END CASE;
END;
/
```

Trigger on Subject Table:

```sql
CREATE OR REPLACE TRIGGER logSubject
BEFORE UPDATE OF Cutoff, NumOfAssignments ON Subject
FOR EACH ROW
BEGIN
CASE
WHEN UPDATING THEN
    INSERT INTO LogSubjectChange
    VALUES(SYSDATE,:OLD.SubjectID, :OLD.Cutoff, :OLD.NumOfAssignments);
END CASE;
END;
/
```

6.2 FUNCTIONS

Function to calculate total marks:

```sql
CREATE OR REPLACE FUNCTION calcTotMarks(p_student_id IN VARCHAR2) RETURN NUMBER IS
  v_marks NUMBER(10);
  v_tot_marks NUMBER(10) := 0;

  CURSOR c_marks IS
    SELECT ObtainedMarks FROM Marks WHERE StudentID = p_student_id;
BEGIN
  FOR c IN c_marks LOOP
    v_marks := c.ObtainedMarks;
    v_tot_marks := v_tot_marks + v_marks;
  END LOOP;
  RETURN v_tot_marks;
END;
/
```

Function to calculate pass or fail:

```sql
CREATE OR REPLACE FUNCTION calcStatus(p_student_id IN VARCHAR2) RETURN NUMBER IS
    v_marks NUMBER(10);
    v_cutoff NUMBER(10) := 0;
    v_sub_id VARCHAR2(10);
    res NUMBER := 1;
    CURSOR c_marks IS
    SELECT * FROM Marks WHERE StudentID = p_student_id;
BEGIN
    FOR c IN c_marks LOOP
        v_marks := c.ObtainedMarks;
        v_sub_id := c.SubjectID;
        SELECT Cutoff INTO v_cutoff FROM Subject WHERE SubjectID = v_sub_id;
        IF v_marks < v_cutoff THEN
            res := 0;
        END IF;
    END LOOP;
    RETURN res;
END;
/
```

7 DB CONNECTIVITY

Database connection through cx_Oracle:

```python
import cx_Oracle
cx_Oracle.init_oracle_client(lib_dir=r"path\to\oracle\21c\binaries")
dsn_tns = cx_Oracle.makedsn('localhost', '1521', service_name='xe')
conn = cx_Oracle.connect(user=r'system', password='<redacted>', dsn=dsn_tns)
cursor = conn.cursor()

cursor.execute(<query statement>)
```

PL/SQL calls through cx_Oracle:

```python
var = cursor.callfunc("function_name", return-type, ["param1", "param2"])
```

Data access through cx_Oracle:

```python
cursor.execute(f"SELECT col1, col2 FROM table WHERE col3='{value}'")
rows=cursor.fetchall()
```

8 REFERENCES

https://cx-oracle.readthedocs.io/en/latest/

https://docs.python.org/3/library/tk.html