CS1555 Recitation 2- Solution

Objective: To practice the relational model and SQL DDL

Consider the following relation schemas and states:

Student (SID, Name, Class, Major)
Student_Dir (SID, Address, Phone)
Courses_taken (Course_No, Term, SID, Grade)
Course(Course_No, Name, Level)

1. What are the arities and cardinalities of the relations?

Student

SID	Name	Class	Major
123	John	3	CS
124	Mary	3	CS
126	Sam	2	CS
129	Julie	2	Math

Arity = **4**
Cardinality = **4**

Student_Dir

SID	Address	Phone
123	333 Library St	555-535-5263
124	219 Library St	555-963-9635
129	555 Library St	555-123-4567

Arity = **3**
Cardinality = **3**

Course

Course_No	Name	Course_level
CS1520	Web Programming	UGrad
CS1555	Database Management Systems	UGrad
CS1550	Operating Systems	UGrad
CS 1655	Secure Data Management and Web Applications	Ugrad
CS2550	Database Management Systems	Grad

Arity = **3**
Cardinality = **5**

Course_taken

Course_No	Term	SID	Grade
CS1520	Fall 11	123	3.75
CS1520	Fall 11	124	4
CS1520	Fall 11	126	3
CS1555	Fall 11	123	4
CS1555	Fall 11	124	NULL
CS1550	Spring 12	123	NULL
CS1550	Spring 12	124	NULL
CS1550	Spring 12	126	NULL

Arity = **4**
Cardinality = **11**

CS1550	Spring 12	129	NULL
CS2550	Spring 12	124	NULL
CS1520	Spring 12	126	NULL

2. Find the primary key of each relation, assuming that a student is allowed to take each course only once.

Student: (SID)

Student_Dir: (SID)

Course: (Course_no)

Course_taken: (Course_no, SID)

3. Now given that a student may re-take a course if she or he fails to obtain a proper grade for that course, what is the primary key of the Course-taken relation?

(Course_no, SID, term)

4. Find the foreign key(s) of each relation, if any. Where does each foreign key reference to?

FK1: Student_Dir(SID) references Student (SID)

FK2: Course_Taken(SID) references Student (SID)

FK3: Course_Taken(Course_No) references Courses (Course_No)

5. Use CREATE TABLE statement to create tables for each of the relations above. You need to define the primary keys, foreign keys and any other constraints.

```
create table  student (
      sid     varchar2(5) not null,
      name    varchar2(15) not null,
      class   number(2),
      major   varchar2(10),
      constraint pk_student primary key(sid));

create table  student_Dir (
      sid     varchar2(5) not null,
      address   varchar2(100),
      phone   varchar2 (20),
      constraint pk_student_Dir primary key(sid),
      constraint fk_student_Dir foreign key(sid) references student(sid)
            on delete cascade on update no action);

create table  course (
      course_no    varchar2(10) not null,
```

```
        name    varchar2(100),
        course_level    varchar2 (10),
        constraint pk_Course primary key(course_no));


create table  course_taken (
        course_no    varchar2(10) not null,
        tarm    varchar2(15) not null,
        sid    varchar2 (5) not null,
        grade number(3,2),
        constraint pk_ course_taken primary key(course_no, sid, term),
        constraint fk_1_course _ taken foreign key(sid) references student(sid)
            on delete cascade on update no action,
        constraint fk_2_course _ taken foreign key(course_no)
            references Course(course_no) on delete cascade on update no action);
```

6. What will happen if the first two CREATE TABLE statements are switched. Will the statements run smoothly without a problem?

No. An error will be thrown saying that the STUDENT table does not exist.

7. Would the following actions be valid given the current data? If not, why?

- Add a tuple <CS1550, Spring 12, 130, NULL> to course_taken

  No. FK2 would be violated since there is no student of SID 130 in Student.

- Delete the tuple <CS1520, Spring 12, 126, NULL> from course_taken

  Yes.

- Delete the tuple <123, John, 3, CS> from Student

  No. FK2 and FK1 would be violated because there are tuples in Course_taken and in Student_Dir having SID = 123.

- Delete the tuple <123, John, 3, CS> from Student, with foreign keys referring to SID in the Student table are declared with the "on delete cascade" option

  Yes. It would be valid if the foreign keys FK1 and FK2 are declared with the "on delete cascade" option.

- Delete the tuple <123, 333 Library St, 555-535-5263> from Student_Dir

  Yes.

- In the table Course, update the name of the course CS1520 to Java Programming

Yes.

- In the table Course, update the course_no of the course CS1520 to CS6666
  No. FK3 would be violated.

- In the table Course, update the course_no of the course CS1520 to CS6666, with foreign keys referring to Course_No in Course table are declared with the "on update cascade" option
  Not in Oracle. Oracle does not support "ON UPDATE" option as defined by the standard and supported by other DBMS verndors.