CS1555 Recitation 2

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 each of the relations?

Def: |R| Arity or Degree of a relation r(R) is defined as …

Def: |r(R)| Cardinality of a relation r(R) is defined as …

Student

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

Arity = _____

Cardinality = _____

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 = _____

Cardinality = _____

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 = _____
Cardinality = _____

Course_taken

Course_No	Term	SID	Grade
CS1520	Fall 18	123	3.75
CS1520	Fall 18	124	4
CS1520	Fall 18	126	3
CS1555	Fall 18	123	4
CS1555	Fall 18	124	NULL

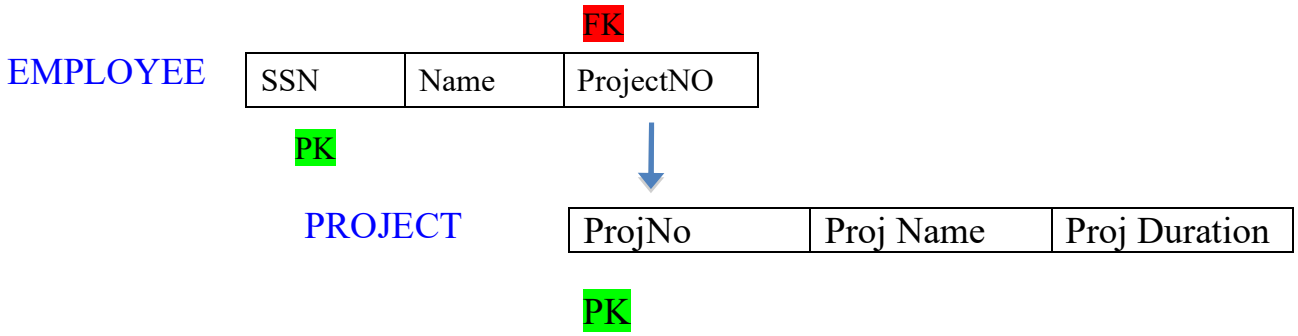
Arity = _____
Cardinality = _____

CS1550	Spring 19	123	NULL
CS1550	Spring 19	124	NULL
CS1550	Spring 19	126	NULL
CS1550	Spring 19	129	NULL
CS2550	Spring 19	124	NULL
CS1520	Spring 19	126	NULL

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

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?

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



Def: A foreign key (FK) in a relation R_2 is a set of attributes of R_2 that forms a primary key (PK) of another relation R_1

- Attributes in FK and PK have the **same domain**

Def: Structural Integrity Constraints

- **key** constraints: uniqueness of keys
- **entity integrity** constraints: no PK value can be NULL
- **referential integrity** constraints: a tuple in one relation, that refers to another relation, must refer to an existing tuple in that relation or should be NULL.

5. Use CREATE TABLE statements to create tables for each of the relations above. You need to define the primary keys, foreign keys and any other constraints. The first two tables without foreign key constraints are given.

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

create table  student_Dir (
        sid     varchar(5) not null,
        address    varchar(100),
        phone   varchar(20),
        constraint pk_student_Dir primary key(sid),
        constraint fk_student_Dir _____ );
```

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

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

a. Add a tuple <CS1550, Spring 19, 130, NULL> to course_taken

b. Delete the tuple <CS1520, Spring 19, 126, NULL> from course_taken

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

d. 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

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

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

g. In the table Course, update the course_no of the course CS1520 to CS6666

h. 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