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  Arity = \_\_\_\_\_\_\_\_\_  Cardinality = \_\_\_\_\_\_\_\_\_ |
| 123 | John | 3 | CS |
| 124 | Mary | 3 | CS |
| 126 | Sam | 2 | CS |
| 129 | Julie | 2 | Math |

**Student\_Dir**

Arity = \_\_\_\_\_\_\_\_\_

Cardinality = \_\_\_\_\_\_\_\_\_

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

**Course**

|  |  |  |
| --- | --- | --- |
| Course\_No | Name | Course\_level |
| CS1520 | Web Programming | UGrad  Arity = \_\_\_\_\_\_\_\_\_  Cardinality = \_\_\_\_\_\_\_\_\_ |
| CS1555 | Database Management Systems | UGrad |
| CS1550 | Operating Systems | UGrad |
| CS 1655 | Secure Data Management and Web Applications | UGrad |
| CS2550 | Database Management Systems | Grad |

**Course\_taken**

|  |  |  |  |
| --- | --- | --- | --- |
| Course\_No | Term | SID | Grade  Arity = \_\_\_\_\_\_\_\_\_  Cardinality = \_\_\_\_\_\_\_\_\_ |
| 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 |
| 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?

FK

|  |  |  |
| --- | --- | --- |
| SSN | Name | ProjectNO |

EMPLOYEE

PK

|  |  |  |
| --- | --- | --- |
| ProjNo | Proj Name | Proj Duration |

PROJECT

PK

**Def:** A foreign key (FK) in a relation R2 is a set of attributes of R2 that forms a primary key (PK) of another relation R1

* 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?

1. Add a tuple <CS1550, Spring 19, 130, NULL> to course\_taken
2. Delete the tuple <CS1520, Spring 19, 126, NULL> from course\_taken
3. Delete the tuple <123, John, 3, CS> from Student
4. 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
5. Delete the tuple <123, 333 Library St, 555-535-5263> from Student\_Dir
6. In the table Course, update the name of the course CS1520 to Java Programming
7. In the table Course, update the course\_no of the course CS1520 to CS6666
8. 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