DDL Exercises: Solutions

Schema

Student(sID, surName, firstName, campus, email, cgpa)  Offering(dept, cNum) ⊆ Course[dept, cNum]
Course(dept, cNum, name, breadth)  Took[sID] ⊆ Student[sID]
Offering(oID, dept, cNum, term, instructor)  Took[oID] ⊆ Offering[oID]
Took(sID, oID, grade)

Questions

1. Write a query to create the table Student. Make the sID be a Primary Key.
   Solution:
   ```
   CREATE TABLE Student ( 
     sID INTEGER PRIMARY KEY, 
     surName VARCHAR(20), 
     firstName VARCHAR(20), 
     campus CHAR(4), 
     email VARCHAR(30), 
     cgpa REAL
   );
   ```

2. Adjust your previous query to add the following constraints:
   - each pair (surName, firstName) must be Unique.
   - firstName and surName cannot be null.
   - campus should be only ‘StG’, ‘UTM’, or ‘UTSC’.
   - cgpa should be between 0 and 4.0.
   - email must contain a ‘@’ character (remember the LIKE operator).

   Solution:
   ```
   CREATE TABLE Student ( 
     sID INTEGER PRIMARY KEY, 
     surName VARCHAR(20) NOT NULL, 
     firstName VARCHAR(20) NOT NULL, 
     campus CHAR(3), 
     email VARCHAR(30), 
     cgpa REAL, 
     UNIQUE (firstName, surName), 
     CHECK (campus IN ('StG', 'UTM', 'UTSC')),
     CHECK (cgpa > 0 AND cgpa <= 4.0),
   );
   ```
check (email LIKE '%@%'),

3. Suppose $R = \text{Took}$ and $S = \text{Student}$. What type of actions on these relations must be simply rejected, based on the definitions from the schema?

**Solution:**

Insert or update to $R$ that introduces an item that’s not in $S$.
But, a Deletion or Update with an $sID$ that occurs in Took could be allowed.
Other possible things to reject:
Insert an item that has the same value for the primary key, etc.

4. What should happen in these situations?
   a) csc343 changes number to be 543
   b) student 99132 is deleted
   c) student 99132’s grade in csc148 is raised to 85.
   d) csc148 is deleted

**Solution:**
a) If we want the Offering table to match, declare in Offering "foreign key (cNum, dept) references Course on update cascade. If we don’t do that, the update is disallowed.
b) If we want all her course takings to be deleted also, declare in Took "foreign key (sID) references Student on delete cascade”. If we don’t do that, the deletion is disallowed, because other fields in other tables may reference this sID.
c) Must make sure cgpa gets updated too.
d) If we have declared in Offering “foreign key (cNum, dept) references Course on delete cascade”, and in Took “foreign key (oID) references Offering on delete cascade”, it will cascade back through Offerings (deleting every offering of csc148) and Took (deleting every taking/grade of csc148). This is perhaps not such a good idea: the delete of csc148 could be done by mistake. :-)
If we don’t have these constraints, then the deletion is disallowed. So, in some cases, not having these constraints could actually protect us from mistakes.