

SQL Server Integrity Constraints

Consider the following database schema

- Professor(ProfNo, Name, Laboratory)
- PhDStudent(StudentNo, Name, Laboratory, Supervisor)
Supervisor references Professor(ProfNo)
- Course(CourseNo, Title, ProfNo)
ProfNo references Professor(ProfNo)
- CourseTaken(StudentNo, CourseNo)
StudentNo references PhDStudent(StudentNo)
CourseNo references Course(CourseNo)

Define in SQL Server a set of triggers that ensure the following constraints.

- (1) A PhD student must work in the same laboratory as his/her supervisor.
- (2) A PhD student must take at least one course.
- (3) A PhD student must take all courses taught by his/her supervisor.

Database creation

```
create table Professor (  
  ProfNo char(5) not null,  
  Name varchar(25) not null,  
  Laboratory varchar(25) not null,  
  constraint PK_Professor primary key (ProfNo)  
)  
create table PhDStudent (  
  StudentNo char(9) not null,  
  Name varchar(25) not null,  
  Laboratory varchar(25),  
  Supervisor char(5),  
  constraint PK_PhDStudent primary key (StudentNo),  
  constraint FK_PhDStudent_Professor  
    foreign key (Supervisor) references Professor(ProfNo)  
)  
create table Course (  
  CourseNo char(7) not null,  
  Title varchar(30) not null,  
  ProfNo char(5),  
  constraint PK_Course primary key (CourseNo),  
  constraint FK_Course_Professor  
    foreign key (ProfNo) references Professor(ProfNo)  
)  
create table CourseTaken (  
  StudentNo char(9) not null,  
  CourseNo char(7) not null,  
  constraint PK_CourseTaken primary key (StudentNo,CourseNo),  
  constraint FK_CourseTaken_Student  
    foreign key (StudentNo) references PhDStudent(StudentNo),  
  constraint FK_CourseTaken_Course  
    foreign key (CourseNo) references Course(CourseNo)  
)
```

Database loading

Professor

<u>ProfNo</u>	Name	Laboratory
12345	John B. Smith	Databases
33344	Franklin T. Wong	Databases
99988	Alicia J. Zelaya	Networks
98765	Jennifer S. Wallace	Web Technologies
66688	Ramesh K. Narayan	Web Technologies

PhDStudent

<u>StudentNo</u>	Name	Laboratory	Supervisor
453453453	Joyce A. English	Databases	12345
987987987	Ahmad V. Jabbar	Databases	33344
888665555	James A. Borg	Web Technologies	66688

Course

<u>CourseNo</u>	Title	ProfNo
INFO364	Introduction to Databases	12345
INFO365	Advanced Databases	33344
INFO378	XML	66688
INFO379	Web Services	66688

CourseTaken

<u>StudentNo</u>	<u>CourseNo</u>
453453453	INFO364
453453453	INFO365
987987987	INFO364
987987987	INFO365
888665555	INFO378