Module 14 - Example of a UNIVERSITY database

Let us take an example of UNIVERSITY database and formulate SQL queries to solve few questions related to the UNIVERSITY database.We shall try to use most of the concepts covered in this course to write SQL queries and analyze the results.But first, let us try to understand the UNIVERSITY schema –

Student*(Sid*, Sname,GPA)

MajorsIn(Sid,Major)

Book(BookNo, Title, Price)

Cites(BookNo,CitedBookNo)

Buys(Sid,BookNo)

The relation ***MajorsIn*** stores students and their majors. A student can have multiple majors, but we also allow that a student can have no major. A record (b,c) in the relation ***Cites*** indicates that the book with book number b cites the book with book number c. Note that a book may cite multiple other books and also, a book does not have to cited. The keys of the relations are the underlined attributes. Let us take a look at the text files that contain the data to be stored in the respective tables.

Student

Sid	Sname	GPA
1001	Jean	3.96
1002	Maria	4.00
1003	Anna	3.49
1004	Chin	4.00
1005	John	3.99
1006	Ryan	4.00
1007	Catherine	3.97
1008	Emma	4.00
1009	Jan	4.00

MajorsIN

Sid	Major
1001	Physics
1001	Math
1002	CS
1002	Math
1003	Math
1004	CS
1006	CS
1007	Physics
1007	CS
1008	Physics
1009	CS

Book

BookNo	Title	Price
2001	Theory of Computation	200
2002	Deductive Logic	75
2003	Discrete Math	120
2004	Linear Algebra	19
2005	Quantum Mechanics	30
2006	Analysis of Algorithms	15
2007	Graph Theory	40
2008	Compilers	150
2009	Particle Phyics	130
2010	Complexity Theory	150

Cites

BookNo	CitedBookNo
2001	2002
2001	2007
2003	2001
2003	2004
2003	2002

Now let us create a database with the name UNIVERSITY and create tables in UNIVERSITY according to the above defined schema.While creating the tables, we need to define data types for the various attributes as well as primary and foreign key constraints. Where appropriate, let us add “ON DELETE CASCADE” statements with the foreign key constraints.And then let us use MySQL’s LOAD statement to load data from the five .txt files.

QUERY

R

```
CREATE DATABASE UNIVERSITY;
```

```
Query OK,
```

```
USE UNIVERSITY;
```

```
Data
```

QUERY	RI
CREATE TABLE Student(Sid INTEGER, Sname CHAR(20), GPA FLOAT, PRIMARY KEY (Sid));	Query OK,
CREATE TABLE MajorsIn(Sid INTEGER, Major CHAR(20), PRIMARY KEY (Sid, Major), FOREIGN KEY (Sid) REFERENCES Student (Sid) ON DELETE CASCADE);	Query OK,
CREATE TABLE Book(BookNo INTEGER, Title CHAR(64), Price FLOAT, PRIMARY KEY (BookNo));	Query OI

QUERY	R

`CREATE TABLE Cites(`
`BookNo INTEGER,`
`CitedBookNo INTEGER,`
`PRIMARY KEY (BookNo, CitedBookNo),`
`FOREIGN KEY (BookNo) REFERENCES Book (BookNo)`
`ON DELETE CASCADE,`
`FOREIGN KEY (CitedBookNo) REFERENCES Book (BookNo));`
	Query OK

`CREATE TABLE Buys(`
`Sid INTEGER,`
`BookNo INTEGER,`
`PRIMARY KEY (Sid, BookNo),`
`FOREIGN KEY (Sid) REFERENCES Student (Sid) ON DELETE CASCADE,`
`FOREIGN KEY (BookNo) REFERENCES Book (BookNo));`
	Query OK

`LOAD DATA INFILE '/path/student.txt'` `INTO TABLE Student FIELDS TERMINATED BY ',';`	Query OK, Records: 9
`LOAD DATA INFILE '/path/major.txt'` `INTO TABLE MajorsIn FIELDS TERMINATED BY ',';`	Records: 11

QUERY	RI
`LOAD DATA INFILE '/path/book.txt'` `INTO TABLE Book FIELDS TERMINATED BY ',';`	Query OK, 10 Records: 10
`LOAD DATA INFILE '/path/cites.txt'` `INTO TABLE Cites FIELDS TERMINATED BY ',';`	Records: 5
`LOAD DATA INFILE '/path/buys.txt'` `INTO TABLE Buys FIELDS TERMINATED BY ',';`	Records: 16

Once all the files are loaded into the database, we can do a “SELECT * FROM table_name” to validate the data.

Now, let us answer a few queries about the UNIVERSITY database using SQL and try to analyze the results.