

Implementation:

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MySQL 8.0 Command Line Cli x + v

mysql> create database u;
ERROR 1007 (HY000): Can't create database 'u'; database exists
mysql> use u;
Database changed
mysql> CREATE TABLE Student1NF (
  ->   StudentID INT,
  ->   Name VARCHAR(100),
  ->   Course VARCHAR(100),
  ->   Instructor VARCHAR(100),
  ->   InstructorDepartment VARCHAR(100)
  -> );
Query OK, 0 rows affected (0.31 sec)

mysql>
mysql> INSERT INTO Student1NF VALUES
  -> (101, 'Alice', 'Math', 'John', 'Science'),
  -> (101, 'Alice', 'Physics', 'Smith', 'Science'),
  -> (102, 'Bob', 'Math', 'John', 'Science'),
  -> (102, 'Bob', 'Chemistry', 'Lee', 'Chemistry'),
  -> (103, 'Charlie', 'Biology', 'Clark', 'Biology');
Query OK, 5 rows affected (0.04 sec)
Records: 5 Duplicates: 0 Warnings: 0

mysql>
mysql> SELECT * FROM Student1NF;
+-----+-----+-----+-----+-----+
| StudentID | Name | Course | Instructor | InstructorDepartment |
+-----+-----+-----+-----+-----+
| 101 | Alice | Math | John | Science |
| 101 | Alice | Physics | Smith | Science |
| 102 | Bob | Math | John | Science |
| 102 | Bob | Chemistry | Lee | Chemistry |
| 103 | Charlie | Biology | Clark | Biology |
+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> CREATE TABLE Student (
  ->   StudentID INT PRIMARY KEY,
  ->   Name VARCHAR(100)
  -> );
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  ->   Name VARCHAR(100)
  -> );
Query OK, 0 rows affected (0.04 sec)

mysql>
mysql> INSERT INTO Student VALUES
  -> (101, 'Alice'),
  -> (102, 'Bob'),
  -> (103, 'Charlie');
Query OK, 3 rows affected (0.01 sec)
Records: 3 Duplicates: 0 Warnings: 0

mysql> select * from Student;
+-----+-----+
| StudentID | Name |
+-----+-----+
| 101 | Alice |
| 102 | Bob |
| 103 | Charlie |
+-----+-----+
3 rows in set (0.00 sec)

mysql> CREATE TABLE InstructorInfo (
  ->   Instructor VARCHAR(100) PRIMARY KEY,
  ->   Department VARCHAR(100)
  -> );
Query OK, 0 rows affected (0.04 sec)

mysql>
mysql> INSERT INTO InstructorInfo VALUES
  -> ('John', 'Science'),
  -> ('Smith', 'Science'),
  -> ('Lee', 'Chemistry'),
  -> ('Clark', 'Biology');
Query OK, 4 rows affected (0.01 sec)
Records: 4 Duplicates: 0 Warnings: 0
```

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mysql> select * from InstructorInfo;
+-----+-----+
| Instructor | Department |
+-----+-----+
| Clark      | Biology    |
| John       | Science    |
| Lee        | Chemistry  |
| Smith      | Science    |
+-----+-----+
4 rows in set (0.00 sec)

mysql> CREATE TABLE Enrollment (
  -> StudentID INT,
  -> Course VARCHAR(100),
  -> Instructor VARCHAR(100),
  -> PRIMARY KEY (StudentID, Course),
  -> FOREIGN KEY (StudentID) REFERENCES Student(StudentID),
  -> FOREIGN KEY (Instructor) REFERENCES InstructorInfo(Instructor)
  -> );
Query OK, 0 rows affected (0.07 sec)

mysql>
mysql> INSERT INTO Enrollment VALUES
  -> (101, 'Math', 'John'),
  -> (101, 'Physics', 'Smith'),
  -> (102, 'Math', 'John'),
  -> (102, 'Chemistry', 'Lee'),
  -> (103, 'Biology', 'Clark');
Query OK, 5 rows affected (0.01 sec)
Records: 5 Duplicates: 0 Warnings: 0

mysql> select * from Enrollment;
+-----+-----+-----+
| StudentID | Course | Instructor |
+-----+-----+-----+
| 103       | Biology | Clark      |
| 101       | Math   | John       |
| 102       | Math   | John       |
| 102       | Chemistry | Lee        |
| 101       | Physics | Smith      |
+-----+-----+-----+
```

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mysql> CREATE TABLE CourseInstructor (
  -> Course VARCHAR(100) PRIMARY KEY,
  -> Instructor VARCHAR(100),
  -> FOREIGN KEY (Instructor) REFERENCES InstructorInfo(Instructor)
  -> );
Query OK, 0 rows affected (0.07 sec)

mysql>
mysql> INSERT INTO CourseInstructor VALUES
  -> ('Math', 'John'),
  -> ('Physics', 'Smith'),
  -> ('Chemistry', 'Lee'),
  -> ('Biology', 'Clark');
Query OK, 4 rows affected (0.01 sec)
Records: 4 Duplicates: 0 Warnings: 0

mysql> select * from CourseInstructor;
+-----+-----+
| Course | Instructor |
+-----+-----+
| Biology | Clark      |
| Math    | John       |
| Chemistry | Lee        |
| Physics | Smith      |
+-----+-----+
4 rows in set (0.00 sec)

mysql> CREATE TABLE EnrollmentBCNF (
  -> StudentID INT,
  -> Course VARCHAR(100),
  -> PRIMARY KEY (StudentID, Course),
  -> FOREIGN KEY (StudentID) REFERENCES Student(StudentID),
  -> FOREIGN KEY (Course) REFERENCES CourseInstructor(Course)
  -> );
Query OK, 0 rows affected (0.06 sec)
```

```
+-----+-----+
4 rows in set (0.00 sec)
```

```
mysql> CREATE TABLE EnrollmentBCNF (
->     StudentID INT,
->     Course VARCHAR(100),
->     PRIMARY KEY (StudentID, Course),
->     FOREIGN KEY (StudentID) REFERENCES Student(StudentID),
->     FOREIGN KEY (Course) REFERENCES CourseInstructor(Course)
-> );
```

Query OK, 0 rows affected (0.06 sec)

```
mysql>
mysql> INSERT INTO EnrollmentBCNF VALUES
-> (101, 'Math'),
-> (101, 'Physics'),
-> (102, 'Math'),
-> (102, 'Chemistry'),
-> (103, 'Biology');
```

Query OK, 5 rows affected (0.01 sec)

Records: 5 Duplicates: 0 Warnings: 0

```
mysql> select * from EnrollmentBCNF;
```

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+-----+-----+
| StudentID | Course |
+-----+-----+
|         103 | Biology |
|         102 | Chemistry |
|         101 | Math |
|         102 | Math |
|         101 | Physics |
+-----+-----+
```

5 rows in set (0.00 sec)