

## Database Build Task (using MySQL)

### Creating the Database

```
CREATE DATABASE college_data;  
USE college_data;
```

### Creating the Tables

```
CREATE TABLE students(  
  -> StudentID mediumint NOT NULL UNIQUE,  
  -> StudentName char(100) NOT NULL,  
  -> ExamScore tinyint,  
  -> Support char(3) NOT NULL,  
  -> DOB date NOT NULL,  
  -> PRIMARY KEY (StudentID));
```

```
CREATE TABLE teachers(  
  -> TeacherID mediumint NOT NULL UNIQUE,  
  -> TeacherName char(100) NOT NULL,  
  -> PRIMARY KEY (TeacherID));
```

```
CREATE TABLE exam_boards(  
  -> ExamBoardID mediumint NOT NULL UNIQUE,  
  -> ExamBoardName char(100) NOT NULL,  
  -> PRIMARY KEY (ExamBoardID));
```

```
CREATE TABLE courses(  
  -> CourseID mediumint NOT NULL UNIQUE,  
  -> CourseName char(100) NOT NULL,  
  -> TeacherID mediumint NOT NULL,  
  -> PRIMARY KEY (CourseID),  
  -> FOREIGN KEY (TeacherID) REFERENCES teachers(TeacherID));
```

```
CREATE TABLE student_records(  
  -> StudentID mediumint NOT NULL,  
  -> CourseID mediumint NOT NULL,  
  -> ExamBoardID mediumint NOT NULL,  
  -> CONSTRAINT Student_PK PRIMARY KEY (StudentID, CourseID, ExamBoardID),  
  -> FOREIGN KEY (StudentID) REFERENCES students(StudentID),  
  -> FOREIGN KEY (CourseID) REFERENCES courses(CourseID),  
  -> FOREIGN KEY (ExamBoardID) REFERENCES exam_boards(ExamBoardID));
```

### Inserting Data Into Tables

```
INSERT INTO students (StudentID, StudentName, ExamScore, Support, DOB)
VALUES (1002, 'Sally Davies', 55, 'yes', '1999-10-02'),
(1003, 'Mark Hanmill', 90, 'no', '1995-06-05'),
(1004, 'Anas Ali', 70, 'no', '1980-08-03'),
(1005, 'Cheuk Yin', 45, 'yes', '2002-05-01');
INSERT INTO teachers (TeacherID, TeacherName)
VALUES (1, 'Mr Jones'),
(2, 'Ms Parker'),
(3, 'Mr Peters'),
(4, 'Mrs Patel'),
(5, 'Mr Daniels');
```

```
INSERT INTO courses (CourseID, CourseName, TeacherID)
VALUES (101, 'Computer Science', 1),
(102, 'Maths', 2),
(103, 'Physics', 3),
(104, 'Biology', 4),
(105, 'Music', 5);
```

```
INSERT INTO exam_boards (ExamBoardID, ExamBoardName)
VALUES (1, 'BCS'),
(2, 'EdExcel'),
(3, 'AQA'),
(4, 'OCR'),
(5, 'WJEC');
```

```
INSERT INTO student_records (StudentID, CourseID, ExamBoardID)
VALUES (1001, 101, 1),
(1001, 102, 2),
(1001, 103, 4),
(1002, 102, 3),
(1002, 104, 5),
(1002, 105, 3),
(1003, 101, 1),
(1003, 102, 2),
(1003, 103, 4),
(1004, 102, 3),
(1004, 103, 4),
(1004, 104, 5),
(1005, 101, 1),
(1005, 102, 2),
(1005, 105, 3);
```

*Alternatively, this code also worked (exported from excel into a csv file, loaded into MySQL):*

```
LOAD DATA INFILE '/home/codio/workspace/student-records.csv'  
INTO TABLE student_records  
FIELDS TERMINATED BY ','  
LINES TERMINATED BY '\n'  
IGNORE 1 LINES;
```

### Testing the referential integrity

*Starting with the Teacher ID reference in the courses table – a query was successfully carried out to pull the teacher names through with the CourseID and CourseName:*

```
SELECT courses.CourseID, courses.CourseName, teachers.TeacherName  
FROM courses  
INNER JOIN teachers ON courses.TeacherID = teachers.TeacherID;
```

CourseID	CourseName	TeacherName
101	Computer Science	Mr Jones
102	Maths	Ms Parker
103	Physics	Mr Peters
104	Biology	Mrs Patel
105	Music	Mr Daniels

*Joining all data referenced by IDs in the student\_records table:*

```
SELECT student_records.StudentID, students.StudentName, courses.CourseName,  
exam_boards.ExamBoardName  
FROM student_records  
INNER JOIN students ON student_records.StudentID = students.StudentID  
INNER JOIN courses ON student_records.CourseID = courses.CourseID  
INNER JOIN exam_boards ON student_records.ExamBoardID = exam_boards.ExamBoardID;
```

StudentID	CourseID	ExamBoardID
1001	101	1
1001	102	2
1001	103	4
1002	102	3
1002	104	5
1002	105	3
1003	101	1
1003	102	2
1003	103	4
1004	102	3
1004	103	4
1004	104	5
1005	101	1
1005	102	2
1005	105	3

Performing multiple joins, with reference to the student\_records table to create a view that replicates the original (un-normalized) data:

```
SELECT student_records.StudentID, students.StudentName, courses.CourseName,
teachers.TeacherName, exam_boards.ExamBoardName
FROM student_records
INNER JOIN students ON student_records.StudentID = students.StudentID
INNER JOIN courses ON student_records.CourseID = courses.CourseID
INNER JOIN exam_boards ON student_records.ExamBoardID = exam_boards.ExamBoardID
INNER JOIN teachers ON courses.TeacherID = teachers.TeacherID;
```

StudentID	StudentName	CourseName	TeacherName	ExamBoardName
1001	Bob Baker	Computer Science	Mr Jones	BCS
1001	Bob Baker	Maths	Ms Parker	EdExcel
1001	Bob Baker	Physics	Mr Peters	OCR
1002	Sally Davies	Maths	Ms Parker	AQA
1002	Sally Davies	Biology	Mrs Patel	WJEC
1002	Sally Davies	Music	Mr Daniels	AQA
1003	Mark Hanmill	Computer Science	Mr Jones	BCS
1003	Mark Hanmill	Maths	Ms Parker	EdExcel
1003	Mark Hanmill	Physics	Mr Peters	OCR
1004	Anas Ali	Maths	Ms Parker	AQA
1004	Anas Ali	Physics	Mr Peters	OCR
1004	Anas Ali	Biology	Mrs Patel	WJEC
1005	Cheuk Yin	Computer Science	Mr Jones	BCS
1005	Cheuk Yin	Maths	Ms Parker	EdExcel
1005	Cheuk Yin	Music	Mr Daniels	AQA

```
SELECT student_records.StudentID, students.StudentName, students.ExamScore,
students.Support, students.DOB, courses.CourseName, teachers.TeacherName,
exam_boards.ExamBoardName
FROM student_records
INNER JOIN students ON student_records.StudentID = students.StudentID
INNER JOIN courses ON student_records.CourseID = courses.CourseID
INNER JOIN exam_boards ON student_records.ExamBoardID = exam_boards.ExamBoardID
INNER JOIN teachers ON courses.TeacherID = teachers.TeacherID;
```

StudentID	StudentName	ExamScore	Support	DOB	CourseName	TeacherName	ExamBoardName
1001	Bob Baker	78	no	2001-08-25	Computer Science	Mr Jones	BCS
1001	Bob Baker	78	no	2001-08-25	Maths	Ms Parker	EdExcel
1001	Bob Baker	78	no	2001-08-25	Physics	Mr Peters	OCR
1002	Sally Davies	55	yes	1999-10-02	Maths	Ms Parker	AQA
1002	Sally Davies	55	yes	1999-10-02	Biology	Mrs Patel	WJEC
1002	Sally Davies	55	yes	1999-10-02	Music	Mr Daniels	AQA
1003	Mark Hanmill	90	no	1995-06-05	Computer Science	Mr Jones	BCS
1003	Mark Hanmill	90	no	1995-06-05	Maths	Ms Parker	EdExcel
1003	Mark Hanmill	90	no	1995-06-05	Physics	Mr Peters	OCR
1004	Anas Ali	70	no	1980-08-03	Maths	Ms Parker	AQA
1004	Anas Ali	70	no	1980-08-03	Physics	Mr Peters	OCR
1004	Anas Ali	70	no	1980-08-03	Biology	Mrs Patel	WJEC
1005	Cheuk Yin	45	yes	2002-05-01	Computer Science	Mr Jones	BCS
1005	Cheuk Yin	45	yes	2002-05-01	Maths	Ms Parker	EdExcel
1005	Cheuk Yin	45	yes	2002-05-01	Music	Mr Daniels	AQA

```
SELECT * FROM student_records;
```

StudentID	CourseID	ExamBoardID
1001	101	1
1001	102	2
1001	103	4
1002	102	3
1002	104	5
1002	105	3
1003	101	1
1003	102	2
1003	103	4
1004	102	3
1004	103	4
1004	104	5
1005	101	1
1005	102	2
1005	105	3