DWDM Assignment

```
mysql> CREATE DATABASE UNIVERSITY;
Query OK, 1 row affected (0.01 sec)
mysql> USE University;
Database changed
mysql> CREATE TABLE Students (
           StudentID INT PRIMARY KEY,
    ->
            Name VARCHAR(50),
    ->
           Age INT
           Major VARCHAR(50)
    ->
    -> );
Query OK, 0 rows affected (0.04 sec)
mysql> CREATE TABLE Courses (
    ->
           CourseID INT PRIMARY KEY,
            CourseName VARCHAR(50),
    ->
            Credits INT
    ->
-> );
Query OK, 0 rows affected (0.03 sec)
mysql> CREATE TABLE Enrollments (
            EnrollmentID INT PRIMARY KEY,
            StudentID INT,
    ->
           CourseID INT,
    ->
           Grade CHAR(2),
            FOREIGN KEY (StudentID) REFERENCES Students(StudentID), FOREIGN KEY (CourseID) REFERENCES Courses(CourseID)
    ->
    ->
    -> );
```

```
Query OK, 0 rows affected (0.04 sec)
mysql> INSERT INTO Students (StudentID, Name, Age, Major) VALUES

-> (1, 'Alice', 20, 'Computer Science'),
-> (2, 'Bob', 22, 'Data Science'),
-> (3, 'Charlie', 21, 'Computer Science'),
-> (4, 'Diana', 23, 'Data Science'),
-> (5, 'Ethan', 19, 'Mathematics'),
-> (6, 'Fiona', 20, 'Computer Science'),
-> (7, 'George', 24, 'Data Science'),
-> (8, 'Hannah', 22, 'Computer Science'),
-> (9, 'Ian', 21, 'Data Science'),
-> (10, 'Julia', 23, 'Computer Science'),
-> (11, 'Kevin', 25, 'Data Science'),
-> (12, 'Liam', 22, 'Computer Science'),
-> (13, 'Mona', 24, 'Data Science'),
-> (14, 'Nate', 17, 'Undeclared'),
-> (15, 'Olivia', 23, 'Physics');
Query OK, 15 rows affected (0.01 sec)
Records: 15 Duplicates: 0 Warnings: 0
 mysql> SELECT * FROM Students;
                                                                   | Age | Major
     StudentID | Name
                                                                                 20 | Computer Science
22 | Data Science
21 | Computer Science
                                            Alice
                                            Bob
                                             Charlie
                                                                                  21
23
19
                                                                                                 Data Science
Mathematics
                                            Diana
                                            Ethan
                                5
                                6
7
8
                                            Fiona
                                                                                   20
                                                                                                  Computer Science
                                            George
                                                                                  24
                                                                                                 Data Science
                                                                                  22
21
                                                                                                 Computer Science
Data Science
                                            Hannah
                                9
                                            Ian
Julia
                                                                                  23
25
22
                                                                                                 Computer Science
Data Science
Computer Science
                             10
                                            Kevin
Liam
                             11
                             12
                                            Mona
                                                                                  24
17
23
                                                                                                  Data Science
Undeclared
                                            Nate
Olivia
                             14
                                                                                                 Physics
```

```
-> (101, 'Database Systems', 4),

-> (102, 'Algorithms', 4),

-> (103, 'Machine Learning', 3),

-> (104, 'Web Development', 3);
Query OK, 4 rows affected (0.00 sec)
Records: 4 Duplicates: 0 Warnings: 0
mysql>
mysql> SELECT * FROM Courses;
    CourseID | CourseName
                                                               Credits
              101
                          Database Systems
                                                                            4
                                                                            4
              102
                          Algorithms
              103
                          Machine Learning
                                                                            3
                          Web Development
              104
                                                                            3
4 rows in set (0.00 sec)
mysql> INSERT INTO Enrollments (EnrollmentID, StudentID, CourseID, Grade) VALUES
       -> (1, 1, 101, 'A'),

-> (2, 2, 103, 'B'),

-> (3, 3, 102, 'A'),

-> (4, 4, 103, 'C'),

-> (5, 1, 102, 'B'),

-> (6, 6, 101, 'A-')
                            101,
        -> (7, 7, 103, 'B+'),
        -> (8, 8, 102, 'C+'),
        -> (9, 9, 103, 'A'),
-> (10, 2, 101, 'B');
Query OK, 10 rows affected (0.01 sec)
Records: 10 Duplicates: 0 Warnings: 0
 mysql> SELECT * FROM Courses;
    CourseID | CourseName
                                                               Credits
                          Database Systems
                                                                            4
                                                                            4
              102
                          Algorithms
                          Machine Learning
Web Development
              103
                                                                            3
                                                                            3
              104
 4 rows in set (0.00 sec)
mysql> INSERT INTO Enrollme
-> (1, 1, 101, 'A'),
-> (2, 2, 103, 'B'),
-> (3, 3, 102, 'A'),
-> (4, 4, 103, 'C'),
-> (5, 1, 102, 'B'),
-> (6, 6, 101, 'A-'),
-> (7, 7, 103, 'B+'),
-> (8, 8, 102, 'C+'),
-> (9, 9, 103, 'A'),
-> (10, 2, 101, 'B');
Query Ok, 10 rows affected
Records: 10 Duplicates: 0
                           INTO Enrollments (EnrollmentID, StudentID, CourseID, Grade) VALUES
101, 'A'),
103, 'B'),
102, 'A'),
103, 'C'),
101, 'A-'),
103, 'B+'),
102, 'C+'),
103, 'A'),
101, 'A'),
101, 'B');
rows affected (0.01 sec)
                         102,

101, 'A-,

103, 'B+'),

102, 'C+'),

103, 'A'),

2, 101, 'B');

cows affected (0.01 sec)

cows affected (Warnings: 0
 mysql> SELECT * FROM Enrollments;
 | EnrollmentID | StudentID | CourseID | Grade
                                                                    101
                                                  1
2
3
                                                                               A
B
A
C
B
A-
B+
                          1
2
3
4
                                                                    103
102
103
                                                  4
                          5
                                                                    102
                                                  1
6
7
8
                                                                    101
103
                          6
7
8
                                                                    102
                                                                     103
                        10
                                                                    101
```

mysql> INSERT INTO Courses (CourseID, CourseName, Credits) VALUES

```
mysql> CREATE TABLE Departments (
              DeptID INT PRIMARY KEY,
              DeptName VARCHAR(50)
     -> );
Query OK, 0 rows affected (0.03 sec)
mysql> ALTER TABLE Students ADD Email VARCHAR(100);
Query OK, 0 rows affected (0.15 sec)
Records: 0 Duplicates: 0 Warnings: 0
mysql> SELECT * FROM Students;
                                      | Major
| StudentID | Name
                               Age
                                                                 Email |
                  Alice
                                  20
                                        Computer Science
                                                                 NULL
             1
             2
3
                                  22
                  Bob
                                        Data Science
                                                                 NIIII
                                  21
                  Charlie
                                        Computer Science
                                                                 NULL
             4
                  Diana
                                  23
                                        Data Science
                                                                 NULL
             5
                                  19
                                                                 NULL
                  Ethan
                                        Mathematics
                  Fiona
                                  20
                                        Computer Science
                                                                 NULL
             7
                                  24
                  George
                                        Data Science
                                                                 NULL
             8
                                  22
                  Hannah
                                        Computer Science
                                                                 NULL
             9
                                  21
                  Ian
                                        Data Science
                                                                 NULL
                  Julia
                                                                 NULL
            10
                                  23
                                        Computer Science
            11
                  Kevin
                                  25
                                        Data Science
                                                                 NULL
            12
                  Liam
                                  22
                                        Computer Science
                                                                 NULL
            13
                  Mona
                                  24
                                        Data Science
                                                                 NULL
            1 Д
                                  17
                                        Undeclared
                  Nate
                                                                 MIII I
                  Olivia
            15
                                  23
                                        Physics
                                                                 NULL
15 rows in set (0.00 sec)
mysql> DROP TABLE Departments;
Query OK, 0 rows affected (0.01 sec)
mysql> ALTER TABLE Students ADD CONSTRAINT AgeCheck CHECK (Age >= 17);
Query OK, 15 rows affected (0.07 sec)
Records: 15 Duplicates: 0 Warnings: 0
```

```
mysql> ALTER TABLE Students DROP CONSTRAINT AgeCheck;
Query OK, 0 rows affected (0.02 sec)
Records: 0 Duplicates: 0 Warnings: 0
mysql> UPDATE Students SET Major = 'Data Science' WHERE StudentID = 1;
Query OK, 1 row affected (0.01 sec)
Rows matched: 1 Changed: 1 Warnings: 0
mvsal>
mysql> SELECT * FROM Students;
                              Age
                                                              Email
  StudentID | Name
                                     | Major
                                       Data Science
Data Science
                                                               NULL
                 Alice
                                 20
                                 22
21
                 Bob
                                                               NULL
                 Charlie
            3
                                       Computer Science
                                                               NULL
            4
                 Diana
                                 23
                                       Data Science
                                                               NULL
                                 19
            5
                 Ethan
                                       Mathematics
                                                               NULL
            6
7
                 Fiona
                                 20
                                       Computer Science
                                                               NULL
                                 24
                                       Data Science
                                                               NULL
                 George
            8
                                 22
                                                               NULL
                 Hannah
                                       Computer Science
            9
                                                               NULL
                                 21
                                       Data Science
                 Ian
                 Julia
                                 23
           10
                                       Computer Science
                                                               NULL
           11
                 Kevin
                                 25
                                       Data Science
                                                               NULL
           12
                 Liam
                                 22
                                       Computer Science
                                                               NULL
                                 24
                                       Data Science
Undeclared
           13
                 Mona
                                                               NULL
           14
                                 17
                                                               NULL
                 Nate
           15
                 Olivia
                                       Physics
                                 23
                                                               NULL
15 rows in set (0.00 sec)
mysql> DELETE FROM Students WHERE Age < 18;
Query OK, 1 row affected (0.01 sec)
```

```
mysql> SELECT * FROM Students;
  StudentID
                          Age
                                                        Email
               Name
                                  Major
                                  Data Science
Data Science
               Alice
           1
                             20
                                                        NULL
           2
               Bob
                             22
                                                        NULL
           3
               Charlie
                             21
                                   Computer Science
                                                        NULL
           4
               Diana
                             23
                                  Data Science
                                                        NULL
           5
               Ethan
                             19
                                  Mathematics
                                                        NULL
               Fiona
           6
                             20
                                  Computer Science
                                                        NULL
               George
           7
                             24
                                  Data Science
                                                        NULL
                                   Computer Science
           8
                             22
                                                        NULL
               Hannah
           9
               Ian
                             21
                                  Data Science
                                                        NULL
          10
               Julia
                             23
                                  Computer Science
                                                        NULL
                                  Data Science
               Kevin
          11
                             25
                                                        NULL
          12
               Liam
                             22
                                   Computer Science
                                                        NULL
          13
                             24
                                   Data Science
                                                        NULL
               Mona
                                  Physics
          15
               Olivia
                             23
                                                        NULL
14 rows in set (0.00 sec)
mysql> SELECT Name, Major FROM Students WHERE Age > 19;
Name
           | Major
             Data Science
Data Science
 Alice
  Bob
             Computer Science
  Charlie
  Diana
             Data Science
             Computer Science
  Fiona
  George
             Data Science
             Computer Science
  Hannah
             Data Science
  Ian
             Computer Science
  Julia
  Kevin
             Data Science
  Liam
             Computer Science
  Mona
             Data Science
  Olivia
             Physics
13 rows in set (0.00 sec)
```

```
mysql> DROP TABLE Departments;
Query OK, 0 rows affected (0.01 sec)
mysql> ALTER TABLE Students ADD CONSTRAINT AgeCheck CHECK (Age >= 17);
Query OK, 15 rows affected (0.07 sec)
Records: 15 Duplicates: 0 Warnings: 0
mysql> ALTER TABLE Students DROP CONSTRAINT AgeCheck;
Query OK, 0 rows affected (0.02 sec)
Records: 0 Duplicates: 0 Warnings: 0
mysql> UPDATE Students SET Major = 'Data Science' WHERE StudentID = 1;
Query OK, 1 row affected (0.01 sec)
Rows matched: 1 Changed: 1 Warnings: 0
mysql> SELECT * FROM Students;
  StudentID | Name
                                    Age
                                                | Major
                                                                                  Email
                                                   Data Science
Data Science
                       Alice
                                           20
                                                                                  NULL
                1 2
                       Bob
                                           22
21
                                                                                  NULL
                       Charlie
                 3
                                                   Computer Science
Data Science
                                                                                  NULL
                       Diana
                                           23
                                                                                  NULL
                5
                       Ethan
Fiona
                                           19
                                                   Mathematics
                                                                                  NULL
                                           20
                                                   Computer Science
Data Science
                6
7
                                                                                  NULL
                                           24
                       George
                                                                                  NULL
                8
9
                                           22
21
                                                   Computer Science
                                                                                  NULL
                       Ian
Julia
                                                   Data Science
                                                                                  NULL
                                           23
               10
                                                   Computer Science
                                                                                  NULL
               11
12
13
                                           25
22
24
                       Kevin
                                                   Data Science
                                                                                  NULL
                                                   Computer Science
Data Science
Undeclared
                       Liam
                                                                                  NULL
                                                                                  NULL
                       Mona
               14
                                           17
23
                                                                                  NULL
                       Olivia
               15
                                                   Physics
                                                                                  NIII I
15 rows in set (0.00 sec)
```

```
mysql> DELETE FROM Students WHERE Age < 18;
Query OK, 1 row affected (0.01 sec)
mysql>
mysql> SELECT * FROM Students;
  StudentID
                                        Age
                                                                                     Email
                                                    Data Science
Data Science
Computer Science
Data Science
                       Alice
                                                                                     NULL
                                            20
                1
2
                                            22
21
23
19
                                                                                     NULL
NULL
NULL
                       Bob
Charlie
                 3
                       Diana
                4
                                                    Mathematics
Computer Science
                       Ethan
Fiona
                                                                                     NULL
NULL
                5
6
7
8
9
                                            24
22
                                                    Data Science
                                                                                     NULL
                                                    Computer Sc.
Data Science
Computer Science
Data Science
Computer Science
                                                    Computer Science
                       Hannah
                       Ian
Julia
                                                                                     NULL
                                            23
25
                                                                                     NULL
               10
                       Kevin
Liam
               11
12
                                                                                     NULL
                                            22
24
                                                                                     NULL
                                                    Data Science
Physics
                       Mona
Olivia
                                                                                     NULL
               13
               15
                                                                                     NULL
14 rows in set (0.00 sec)
mysql> SELECT Name, Major FROM Students WHERE Age > 19;
                    Major
l Name
                    Data Science
Data Science
Computer Science
   Alice
   Bob
   Charlie
                    .
Data Science
Computer Science
   Diana
Fiona
   George
                    Data Science
Computer Science
   Hannah
                            Science
   Ian
Julia
                    Data
                    Computer Science
Data Science
   Kevin
                    Computer Science
Data Science
   Liam
   Mona
```

```
mysql> SELECT AVG(Age) AS AvgAge FROM Students;
 AvgAge
22.0714
1 row in set (0.00 sec)
mysql> SELECT Major, COUNT(*) AS StudentCount
    -> FROM Students
    -> GROUP BY Major
    -> HAVING COUNT(*) > 5;
 Major
                 StudentCount
 Data Science
                            7
1 row in set (0.00 sec)
mysql> SELECT * FROM Students WHERE Age > 20 AND Major = 'Computer Science';
 StudentID
              Name
                        Age
                              Major
                                                   Email
          3
              Charlie
                          21
                               Computer Science
          8
              Hannah
                          22
                               Computer Science
                                                   NULL
                          23
         10
              Julia
                               Computer Science
                                                   NULL
         12
              Liam
                          22
                               Computer Science
                                                   NULL
4 rows in set (0.00 sec)
```

```
mysql> SELECT s.Name, e.Grade,
-> RANK() OVER (ORDER BY Grade ASC) AS RankInClass
-> FROM Enrollments e JOIN Students s ON e.StudentID = s.StudentID;
                Grade | RankInClass |
Name
  Alice
  Charlie
                                          1
                Α
                                          1
                Α
  Ian
                                         4
  Fiona
                Α-
  Alice
                                         5
5
                В
  Bob
                В
  Bob
                В
                                          5
                B+
  George
                                         8
  Diana
                c
                                          9
  Hannah
                C+
                                        10
10 rows in set (0.01 sec)
mysql> SELECT s.Name, c.CourseName
-> FROM Students s
     -> INNER JOIN Enrollments e ON s.StudentID = e.StudentID
-> INNER JOIN Courses c ON e.CourseID = c.CourseID;
                CourseName
  Alice
                Database Systems
                Machine Learning
  Bob
  Charlie
                Algorithms
  Diana
                Machine Learning
  Alice
                Algorithms
                Database Systems
Machine Learning
  Fiona
  George
                Algorithms
  Hannah
                Machine Learning
  Ian
  Bob
                Database Systems
10 rows in set (0.00 sec)
```

```
mysql> SELECT s.Name, c.CourseName
    -> FROM Students s
    -> LEFT JOIN Enrollments e ON s.StudentID = e.StudentID
    -> LEFT JOIN Courses c ON e.CourseID = c.CourseID;
 Name
          CourseName
 Alice
            Database Systems
            Algorithms
  Alice
 Bob
            Machine Learning
            Database Systems
  Bob
  Charlie
            Algorithms
 Diana
            Machine Learning
 Ethan
            NULL
  Fiona
            Database Systems
            Machine Learning
  George
  Hannah
            Algorithms
            Machine Learning
  Ian
  Julia
            NULL
            NULL
  Kevin
  Liam
            NULL
            NULL
  Mona
  Olivia
            NULL
16 rows in set (0.00 sec)
```

```
mysql> SELECT s.Name, c.CourseName
    -> FROM Students s
    -> LEFT JOIN Enrollments e ON s.StudentID = e.StudentID
-> LEFT JOIN Courses c ON e.CourseID = c.CourseID;
 Name
           CourseName
  Alice
            Database Systems
  Alice
             Algorithms
 Bob
             Machine Learning
 Bob
             Database Systems
  Charlie
             Algorithms
             Machine Learning
  Diana
 Ethan
             NULL
 Fiona
             Database Systems
 George
             Machine Learning
  Hannah
             Algorithms
  Ian
             Machine Learning
             NULL
  Julia
             NULL
  Kevin
             NULL
  Liam
  Mona
             NULL
  Olivia
             NULL
16 rows in set (0.00 sec)
```

mysql> SELECT s.Name, c.CourseName -> FROM Students s CROSS JOIN Courses c; Name CourseName Alice Web Development Alice Machine Learning Alice Algorithms Alice Database Systems Bob Web Development Bob Machine Learning Bob **Algorithms** Bob Database Systems Charlie Web Development Charlie Machine Learning Charlie Algorithms Charlie Database Systems Diana Web Development Diana Machine Learning Diana Algorithms Diana Database Systems Ethan Web Development Ethan Machine Learning Ethan Algorithms Ethan Database Systems Fiona Web Development Machine Learning Fiona **Algorithms** Fiona Database Systems Fiona George Web Development Machine Learning George Algorithms George George Database Systems Web Development Hannah Hannah Machine Learning Hannah Algorithms Hannah Database Systems Web Development Ian Machine Learning Ian Ian Algorithms Ian Database Systems

mysql> SELECT s1.Name AS Student1, s2.Name AS Student2 -> FROM Students s1

-> JOIN	Students s2	ON	s1.Major	=	s2.Major	AND	s1.StudentID	<>	s2.StudentID
Student1	Student2								
Mona	Alice								
Kevin	Alice								
Ian	Alice								
George	Alice								
Diana	Alice								
Bob	Alice								
Mona	Bob								
Kevin	Bob								
Ian	Bob								
George	Bob								
Diana	Bob								
Alice	Bob								
Liam	Charlie								
Julia	Charlie								
Hannah	Charlie								
Fiona	Charlie								
Mona	Diana								
Kevin	Diana								
Ian	Diana								
George	Diana								
Bob	Diana								
Alice	Diana								
Liam	Fiona								
Julia	Fiona								
Hannah	Fiona								
Charlie	Fiona								
Mona	George								
Kevin	George								
Ian	George								
Diana	George								
Bob	George								
Alice	George								
Liam	Hannah								

```
mysql> SELECT Major, STRING_AGG(Name, ', ') AS Students
     -> FROM Students
-> GROUP BY Major;
ERROR 1305 (42000): FUNCTION university.STRING_AGG does not exist
mysql> SELECT Major, STRING_AGG(Name, ', ') AS Students
     -> FROM Students
-> GROUP BY Major;
ERROR 1305 (42000): FUNCTION university.STRING_AGG does not exist mysql> SELECT Name FROM Students
-> WHERE Age > (SELECT AVG(Age) FROM Students);
  Name
  Diana
  George
  Julia
  Kevin
  Mona
  Olivia
6 rows in set (0.01 sec)
mysql> SELECT Name FROM Students s
-> WHERE EXISTS (
-> SELECT 1 FROM Enrollments e
               WHERE e.StudentID = s.StudentID AND e.Grade = 'A'
     -> );
  Name
  Alice
  Charlie
  Ian
  rows in set (0.00 sec)
```

```
mysql> SELECT Major, AvgAge
-> FROM (SELECT Major, AVG(Age) AS AvgAge FROM Students GROUP BY Major) AS t;
  Major
                          AvgAge
  Data Science
                          22.7143
  Computer Science
                          21.6000
  Mathematics
                          19.0000
  Physics
                          23.0000
4 rows in set (0.00 sec)
mysql> DROP INDEX idx_student_major ON Students;
ERROR 1091 (42000): Can't DROP 'idx_student_major'; check that column/key exists
mysql> SELECT Name, Age
-> FROM Students
     -> ORDER BY Age DESC;
             | Age
  Name
                 25
24
  Kevin
  George
                  24
  Mona
  Diana
                  23
                  23
  Julia
  Olivia
                  23
                 22
22
  Bob
  Hannah
                 22
21
  Liam
  Charlie
                 21
20
  Ian
  Alice
  Fiona
                  20
  Ethan
                  19
14 rows in set (0.00 sec)
```

```
mysql> SELECT TOP 5 Name, Age
   -> FROM Students
   -> ORDER BY Age DESC;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '5
 Name, Age
FROM Students
ORDER BY Age DESC' at line 1
mysql> WITH AvgAgeCTE AS (
   -> SELECT AVG(Age) AS AgeValue FROM Students
   -> )
   -> SELECT Name, Age
   -> FROM Students, AvgAgeCTE
   -> WHERE Students.Age > AvgAgeCTE.AgeValue;
 Name | Age |
 Diana
            23 |
 George
           24
  Julia
           23
 Kevin
           25
  Mona
           24 |
 Olivia | 23 |
6 rows in set (0.00 sec)
```