```cpp
/*
Daniel Avila    January 29th 2020   Section 19
Lab 1: Arrays
Description: In this lab, we use the concept of 2-D arrays to make a gradebook that can be tuned
*/
#include <iostream>
using namespace std;

int main()
{
    const int NUM_STUDENTS = 3, NUM_SCORES = 3; //Number of students and number of exams that each student has
    int row, col, x, y;
    double sum, newScore, average, array[4][4];            //The accumulator in sum; The new score that is fixed in newScore;
                                                           //Calculates:
                    sum / 3 in average;Array made of 3x3 elements in exams and students
    char response;                                         //The user input needed in from updating a score in form of a character

    //This nested for loop is "drawing" out the table and attaining user input for the student's exam score and putting it into its cell
      for (row = 1; row <= NUM_STUDENTS; row++)      //This creates the row as only one student with each of their 3 exams
      {
          for (col = 1; col <= NUM_SCORES; col++)    //This creates the columns as only one exam with each of their 3 students
          {
              cout << "Enter Student " << row << "'s Exam " << col << " score.\n";
              cin >> array[row][col];                        //Each cell receives input from the user and inserts it into it as R[]C[]
          }
      }
      cout << endl;
    //This nested for loop creates the block of output where each student has their 3 exams displayed together
      for (row = 1; row <= NUM_STUDENTS; row++)      //This creates the student block with 3 lines each
      {
          for (col = 1; col <= NUM_SCORES; col++)    //This puts the exam scores for each student at the end of the line
          {
              cout << "Student " << row << "'s Exam " << col << " score is: " << array[row][col] << endl;
          }
          cout << endl;
      }
    //This nested for loop displays the average score for each student
          for (row = 1; row <= NUM_STUDENTS; row++)
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38          {
39              sum = 0;                                            //The accumulator
                  starts at 0 because of the average calculation
40              for (col = 1; col <= NUM_SCORES; col++)
41              {
42                  sum += array[row][col];                     //Each cell is added
                      together by the row because it's added by student's exams
43              }
44              average = sum / NUM_SCORES;                 //The calculation of all 3
                   exams added and then divided by 3(the number of exams each student
                   has)
45              cout << "The average score for Student " << row << " is " << average
                  << endl;
46          }
47          cout << endl;
48      //This block of code is a while loop that asks the user if they need to
          update a score for a student's exam
49          cout << "Would you like to update an exam score Y/N? \n";
50          cin >> response;
51          cout << endl;
52          while ((response != 'y' && response != 'Y') || (response != 'n' &&
              response != 'N'))
53          {
54              if (response == 'y' || response == 'Y')        //This section of code
                   is done for data validation to ensure the user input a legal
                  option
55              {
56                  cout << "Enter a student's number (1-3): \n";//Which student to
                      update in terms of rows
57                  cin >> x;
58                  if (x < 1 || x > 3)                            //This nested if
                      statement makes data validation for the student option to
                      update
59                  {
60                      cout << "Please enter a valid student option!\n";
61                      cin >> x;
62                  }
63                  cout << "Enter an exam number (1-3): \n";   //Which exam to
                      update in terms of columns
64                  cin >> y;
65                  if (y < 1 || y > 3)                            //This nested if
                      statement makes data validation for the exam option to update
66                  {
67                      cout << "Please enter a valid exam option!\n";
68                      cin >> y;
69                  }
70                  cout << "Enter a new score for Student " << x << "'s Exam " << y
                      << ": \n";
71                  cin >> newScore;                               //The new score is
                       inputted into this variable for better tracking
72                  cout << "Student " << x << "'s Exam " << y << " score is: " <<
                      newScore << endl << endl;
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73                  array[x][y] = newScore;                    //Ensuring that the
                      new score is inputted into the array by setting equal to the
                      array cell the user chose
74                  cout << "Would you like to change the score for another student
                      Y/N?\n";
75                  cin >> response;
76                  cout << endl;
77              }
78              else if (response == 'n' || response == 'N')       //Using an else-if
                   statement to occupy the other option of the question which is the
                  'no'
79              {
80                  for (row = 1; row <= NUM_STUDENTS; row++)
81                  {
82                      sum = 0;
83                      for (col = 1; col <= NUM_SCORES; col++)
84                      {
85                          sum += array[row][col];            //With the updated
                         score, it calculates a new average the same as the loop
                         before
86                      }                                          //In the same
                         block section of code it will display the new average of each
                          student
87                      average = sum / NUM_SCORES;
88                      cout << "The new average score for Student " << row << " is "
                          << average << endl;
89                  }
90                  cout << endl;
91                  cout << "You have stopped updating\n\n";
92                  break;
93              }
94              else                                               //Used with data
                  validation, if an illegal input is inputted, it tells the user to
                  fix it
95                  cout << "Invalid response! Please re-enter a valid response
                      option. \n";
96
97          }
98
99      system("pause>nul");
100     return 0;
101 }
```

```
Enter Student 1's Exam 1 score.
75.9
Enter Student 1's Exam 2 score.
80
Enter Student 1's Exam 3 score.
98.75
Enter Student 2's Exam 1 score.
45
Enter Student 2's Exam 2 score.
69
Enter Student 2's Exam 3 score.
89.65
Enter Student 3's Exam 1 score.
90
Enter Student 3's Exam 2 score.
94.3
Enter Student 3's Exam 3 score.
82.3

Student 1's Exam 1 score is: 75.9
Student 1's Exam 2 score is: 80
Student 1's Exam 3 score is: 98.75

Student 2's Exam 1 score is: 45
Student 2's Exam 2 score is: 69
Student 2's Exam 3 score is: 89.65

Student 3's Exam 1 score is: 90
Student 3's Exam 2 score is: 94.3
Student 3's Exam 3 score is: 82.3

The average score for Student 1 is 84.8833
The average score for Student 2 is 67.8833
The average score for Student 3 is 88.8667

Would you like to update an exam score Y/N?
Y
Enter a student's number (1-3):
2
Enter an exam number (1-3):
1
Enter a new score for Student 2's Exam 1:
70.5
Student 2's Exam 1 score is: 70.5

Would you like to change the score for another student Y/N?
y
Enter a student's number (1-3):
1
Enter an exam number (1-3):
2
Enter a new score for Student 1's Exam 2:
88.8
Student 1's Exam 2 score is: 88.8

Would you like to change the score for another student Y/N?
n
The new average score for Student 1 is 87.8167
The new average score for Student 2 is 76.3833
The new average score for Student 3 is 88.8667

You have stopped updating
```