1. Demonstrate you successfully followed the steps in this lab by preparing screen captures of you running the lab as specified in the Instructions above.

C Code:

```
/* Final.cpp
*Date: May 5, 2020
*Dev: Attiqa Sheikh
*Purpose: program that calculates ticket sales and sorts them appropriately
*/
#include <stdio.h>
#define MAXN 100 // max characters in a group/concert name
#define MAXG 50 // max concerts/groups
#define MAXC 3 // max categories
char group [MAXG][MAXN];
int fans [MAXG][MAXC];
float prices [MAXC];
float sales [MAXG];
int count = 0;
void printArray () {
 printf ("%15s%5s%5s%5s%10s\n",
 "Concert", "s1", "s2", "s3", "Sales");
 for (int i = 0; i < count; i++) {
  printf ("%15s", group [i]);
  for (int j = 0; j < MAXC; j++) {
   printf ("%5d", fans[i][j]);
  } // end for each category
  printf ("%10.2f\n", sales [i]);
 } // end for each group
} // end function printArray
void computeSales () {
 for (int i = 0; i < count; i++) {
  sales [i] = 0;
  for (int j = 0; j < MAXC; j++) {
   sales [i] += prices [j] * fans [i][j];
  } // end for each category
 } // end for each group
} // end function computeSales
```

```
void switchRows (int m, int n) {
 char tc;
 int ti;
 float v;
 // printf ("Switching %d with %d\n", m, n);
 for (int i = 0; i < MAXN; i++) {
  tc = group[m][i];
  group[m][i] = group[n][i];
  group [n][i] = tc;
 } // end for each character in a group name
 for (int i = 0; i < MAXC; i++) {
  ti = fans [m][i];
  fans [m][i] = fans [n][i];
  fans [n][i] = ti;
 } // end for each fan category
 v = sales [m];
 sales [m] = sales [n];
 sales [n] = v;
} // end switch
int findMinSales (int m) {
 float min = sales [m];
 int target = m;
 for (int i = m+1; i < count; i++)
  if (sales [i] < min) {
   min = sales [i];
   target = i;
  } // end new max found
 return target;
} // end function findMinSales
void sortBySales () {
 int target;
 for (int i = 0; i < count; i++) {
  target = findMinSales (i);
  if (target > i)
   switchRows (i, target);
 } // for each concert
} // end function sortBySales
void getData () {
// for (int i = 0; i < MAXG; i++) sales [i] = 0;
 printf ("Enter ticket prices in each of %d categories: ", MAXC);
 for (int i = 0; i < MAXC; i++)
```

```
scanf ("%f", &prices [i]);
 printf ("-- Enter group and fans in %d categories\n", MAXC);
 printf (" . to finish entries:\n");
 for (int i = 0; i < MAXG; i++) {
  scanf ("%s", group[i]);
  if (\text{group } [i][0] == '.')
   break;
  count++;
  for (int j = 0; j < MAXC; j++)
   scanf ("%d", &fans[i][j]);
 } // end for each group
} // end function getData
int main(void) {
        getData ();
       computeSales ();
       printArray ();
       printf ("\n --- Sorted ---\n");
       sortBySales ();
       printArray ();
       printf("... bye ...\n");
       return 0;
```

Screen Capture

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Enter ticket prices in each of 3 cateogories: 1 2 3
 Enter group and fans in 3 categories
  . to finish entries:
  1 2 3
 3 3 5
 4 5 6
        Concert
                                     Sales
                                     14.00
                                     12.00
                                     14.00
                                     24.00
                                     9.00
                                     32.00
                                     32.00
    Sorted ---
        Concert
                                     Sales
                                     9.00
                                     12.00
                                     14.00
                                     14.00
                                     24.00
                                     32.00
                                     32.00
 .. bye ...
Process exited after 55.45 seconds with return value 0
Press any key to continue . . .
```

a. Add a function to print welcome information, including your name and an introduction to the project, and, of course, call this function as the first instruction in main.

Welcome

```
void welcome(){
    printf("Welcome to the ticket sales calculator.\n");
    printf("The purpose of this program is to help calculate sales on tickets.\n");
    printf("Developer: Attiqa Sheikh\n");
    printf("Date: May 5, 2020 \n\n\n\n"); }
```

Main function

```
int main(void) {
    welcome();
    getData ();
    computeSales ();
    printArray ();
    printf ("\n --- Sorted ---\n");
    sortBySales ();
    printArray ();
    printf("... bye ...\n");
    return 0; }
```

Screen Capture

■ C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe

```
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 3 cateogories: 2 6 5

    Enter group and fans in 3 categories

   . to finish entries:
a 2 6 8
b 2 6 5
        Concert
                  51
                       52
                             53
                                    Sales
                        6
                             8
                                    80.00
              a
                   2
              b
                   2
                        6
                             5
                                    65.00
 --- Sorted ---
        Concert
                  51
                       52
                            53
                                    Sales
              b
                   2
                       6
                             5
                                    65.00
              а
                   2
                        6
                              8
                                    80.00
... bye ...
Process exited after 21.21 seconds with return value 0
Press any key to continue . . .
```

2. Modify the program to add a function to compute and display the total sales for all the concerts. Support your experimentation with screen captures of executing the new code.

totalSales function

```
//calculates total
        void totalSales(){
               //total
                float total =0;
                int saleSize = sizeof(sales);
                //loop for the size
                for(int i = 0; i<saleSize; i++){
                        total += sales[i];
                }
                printf("Total Sales: %.2f \n\n", total);
        }//end function
Main function
        int main(void) {
                welcome();
                getData ();
                computeSales ();
                printArray ();
                printf ("\n --- Sorted ---\n");
                sortBySales ();
                printArray ();
                totalSales();
                printf("... bye ...\n");
                return 0; }
```

Screen Capture

Select C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102

```
Date: May 5, 2020
Enter ticket prices in each of 3 cateogories: 1 2 3
 - Enter group and fans in 3 categories
. to finish entries:
 2 6 5
b 4 8 9
 6 9 8
d 1 6 5
        Concert
                                      Sales
                                       29.00
                          8
                                      47.00
                                      48.00
                                      28.00
  -- Sorted
        Concert
                                      Sales
                                       28.00
                          6
                                      29.00
                    4
                                      47.00
                                8
                                      48.00
Total Sales: 152.00
 .. bye ...
```

3. Enhance the program to allow the user to enter 4 categories. Explain the changes you made to the code, and create appropriate test data files. Support your experimentation with screen captures of executing the new code.

I first changed the value of MAXC from 3 to 4 so that it could support the total number of categories. The printf statement was changed to have a fourth category with a definition of the data type.

Max categories

```
#define MAXN 100 // max characters in a group/concert name #define MAXG 50 // max concerts/groups #define MAXC 4 // max categories
```

printArray function

```
void printArray () {
    printf ("%15s%5s%5s%5s%5s%5s%10s\n",
        "Concert", "s1", "s2", "s3","s4", "Sales");
    for (int i = 0; i < count; i++) {
            printf ("%15s", group [i]);
        for (int j = 0; j < MAXC; j++) {
                printf ("%5d", fans[i][j]);
        } // end for each category
        printf ("%10.2f\n", sales [i]);
        } // end for each group</pre>
```

} // end function printArray

Test#	Input	Expected Output	Notes
#1	1 2 3 4 a 1 2 3 4 b 2 4 6 8 c 3 4 5 6 d 8 9 7 2 e 6 4 8 9	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020	Simple test case with whole numbers.
		Enter ticket prices in each of 4 categories: 1 2 3 4 Enter group and fans in 4 categories . to finish entries: a 1 2 3 4 b 2 4 6 8 c 3 4 5 6 d 8 9 7 2 e 6 4 8 9 . Concert s1 s2 s3 s4 Sales	
		a 1 2 3 4 30.00 b 2 4 6 8 60.00 c 3 4 5 6 50.00 d 8 9 7 2 55.00	

```
e 6 4 8 9
                        74.00
--- Sorted ---
    Concert s1 s2 s3 s4 Sales
              2
                 3
                        30.00
          1
                    4
                 5
          3
       c
              4
                    6
                        50.00
       d
          8
              9
                 7
                     2
                        55.00
          2
              4
                6
                    8
                        60.00
         6
              4
                 8
                    9
                        74.00
       e
Total Sales: 269.00
... bye ...
```

Screen Captures

```
■ C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 1 2 3 4
-- Enter group and fans in 4 categories
  . to finish entries:
a 1 2 3 4
b 2 4 6 8
c 10 12 14 16
        Concert
                                         Sales
                                  54
                                         30.00
                                  4
              a
              b
                             6
                                 8
                                         60.00
                            14
                                        140.00
                  10
 --- Sorted ---
        Concert
                  51
                       52
                                  54
                                         Sales
                                         30.00
                        4
                             6
                                 8
                                         60.00
              b
                  10
                       12
                            14
                                  16
                                        140.00
Total Sales: 230.00
... bye ...
Process exited after 21.91 seconds with return value 0
Press any key to continue . . .
```

4. Prepare a new test table with at least 2 more test cases listing input and expected output for the new code you created, supporting 4 categories.

Test #	Input	Expected Output	Notes
#1	2 5.2 6 9 a 1 2 8 7 b 5 6 8 6 c 2 6 3 7 d 1 2 3 4 e 2 6 5 3	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020	Decimal in categories
		Enter ticket prices in each of 4 categories: 2 5.2 6 9 Enter group and fans in 4 categories . to finish entries: a 1 2 8 7 b 5 6 8 6 c 2 6 3 7 d 1 2 3 4 e 2 6 5 3	
		Concert s1 s2 s3 s4 Sales a 1 2 8 7 123.40 b 5 6 8 6 143.20 c 2 6 3 7 116.20 d 1 2 3 4 66.40 e 2 6 5 3 92.20	
		Sorted Concert s1 s2 s3 s4 Sales d 1 2 3 4 66.40 e 2 6 5 3 92.20 c 2 6 3 7 116.20 a 1 2 8 7 123.40 b 5 6 8 6 143.20 Total Sales: 541.40 bye	
#2	1.2 3 5.5 6 a 1 2 3 6 b 2.3 5 6 7	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 1.2 3 5.5 6 Enter group and fans in 4 categories	Cannot have decimals within sales categories. Prints the rest of the entries out as 0. Since the entries are invalid, the program ends it automatically without requiring a ""

```
. to finish entries:
a 1 2 3 6
b 2.3 5 6 7
     Concert s1 s2 s3 s4
                               Sales
                   3
                           59.70
               2
                      6
           1
                            2.40
                   0
                       0
--- Sorted ---
     Concert s1 s2 s3 s4
                               Sales
                            2.40
        b
               0
                   0
                      0
               2
                   3
                           59.70
        a
           1
                      6
Total Sales: 62.10
... bye ...
```

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
```

```
Welcome to the ticket sales calculator
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 2 5.2 6 9
- Enter group and fans in 4 categories
  . to finish entries:
 1 2 8 7
b 5 6 8 6
c 2 6 3 7
 1 2 3 4
 2653
       Concert
                                         Sales
                                        123.40
              a
                             8
                                        143.20
                                        116.20
                                        66.40
92.20
  -- Sorted ---
       Concert
                                         Sales
                                         66.40
                                         92.20
                                        116.20
                                        123.40
                                        143.20
Total Sales: 541.40
.. bye ...
Process exited after 94.25 seconds with return value 0
Press any key to continue . . .
```

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiga Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 1.2 3 5.5 6
-- Enter group and fans in 4 categories
  . to finish entries:
a 1 2 3 6
b 2.3 5 6 7
        Concert
                                         Sales
                                         59.70
                        0
                             0
                                  0
                                          2.40
--- Sorted ---
        Concert
                  51
                       52
                                  54
                                         Sales
                        0
                             0
                                  0
                                          2.40
                                         59.70
Total Sales: 62.10
... bye ...
Process exited after 23.09 seconds with return value 0
Press any key to continue . . .
```

5. Create a variety of test cases focusing on the sorting algorithm, such as the final element is the smallest, the entire set is already sorted, etc. Explain the purpose of each test case, and check your code against each of those cases.

Test #	Input	Expected Output	Notes
#1	2 4 6 8 a 2 2 2 3 b -11 1 2 3 c 1 2 3 4	Expected Output The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020 Enter ticket prices in each of 4 categories: 2 4 6 8 Enter group and fans in 4 categories . to finish entries: a 2 2 2 3 b -11 1 2 3 c 1 2 3 4 . Concert s1 s2 s3 s4 Sales a 2 2 2 3 48.00 b -11 1 2 3 18.00 c 1 2 3 4 60.00 Sorted Concert s1 s2 s3 s4 Sales b -11 1 2 3 18.00	Values include a negative number.
		a 2 2 2 3 48.00 c 1 2 3 4 60.00 Total Sales: 126.00	
#2	1 2 3 4 a 1 2 3 4 b 1 2 3 4 c 1 2 3 4	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020	Values are all the same.
		Enter ticket prices in each of 4 categories: 1 2 3 4 Enter group and fans in 4 categories . to finish entries: a 1 2 3 4 b 1 2 3 4 c 1 2 3 4 . Concert s1 s2 s3 s4 Sales	

		a 1 2 3 4 30.00 b 1 2 3 4 30.00 c 1 2 3 4 30.00	
		Sorted Concert s1 s2 s3 s4 Sales a 1 2 3 4 30.00 b 1 2 3 4 30.00 c 1 2 3 4 30.00 Total Sales: 90.00	
		bye	
#3	1 2 3 .2 a 1 2 3 4 b 1 2 3 6 c 1 2 3 8	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020	Difference between sales is a fraction.
		Enter ticket prices in each of 4 categories: 1 2 3 .2 Enter group and fans in 4 categories . to finish entries: a 1 2 3 4 b 1 2 3 6 c 1 2 3 8	
		Concert s1 s2 s3 s4 Sales a 1 2 3 4 14.80 b 1 2 3 6 15.20 c 1 2 3 8 15.60	
		Sorted Concert s1 s2 s3 s4 Sales a 1 2 3 4 14.80 b 1 2 3 6 15.20 c 1 2 3 8 15.60 Total Sales: 45.60	
		bye	
#4	1 1 1 1 a 1 2 3 4 b 3 1 1 3 c 1 1 1 1	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020	Largest number first, smallest number last.
		Enter ticket prices in each of 4 categories: 1 1 1 1	

```
-- Enter group and fans in 4 categories
 . to finish entries:
a 1 2 3 4
b 3 1 1 3
c 1 1 1 1
    Concert s1 s2 s3 s4 Sales
       a 1 2
               3 4
                       10.00
       b 3 1 1 3
                        8.00
         1 1 1 1
                        4.00
--- Sorted ---
    Concert s1 s2 s3 s4 Sales
       c 1 1 1 1
                        4.00
       b 3 1
                1
                    3
                        8.00
         1 2 3 4
                       10.00
       a
Total Sales: 22.00
... bye ...
```

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 2 4 6 8
-- Enter group and fans in 4 categories
  . to finish entries:
a 2 2 2 3
b -11 1 2 3
c 1 2 3 4
        Concert
                  51
                        52
                             53
                                  54
                                          Sales
                                          48.00
                              2
              b
                 -11
                         1
                                   3
                                          18.00
                   1
                              3
                                   4
                                          60.00
 --- Sorted ---
        Concert
                                  54
                                          Sales
                  51
                        52
                 -11
                             2
                                          18.00
              b
                        1
                   2
                         2
                              2
                                   3
                                          48.00
              a
                         2
                              3
                   1
                                   4
                                          60.00
Total Sales: 126.00
... bye ...
```

C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe

```
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 1 2 3 4
 - Enter group and fans in 4 categories
   . to finish entries:
 1 2 3 4
b 1 2 3 4
1 2 3 4
                             54
                                      Sales
       Concert
                51
                    52 53
                                      30.00
             a
                     2
                          3 4
             b
                 1
                                      30.00
                 1
                      2
                               4
                                      30.00
 --- Sorted ---
                             54
       Concert
                51
                     52
                          53
                                      Sales
                                      30.00
             a
                     2
                          3 4
             b
                1
                                      30.00
                      2
                           3
                               4
                                     30.00
                 1
Total Sales: 90.00
.. bye ...
```

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 1 2 3 .2
-- Enter group and fans in 4 categories
   . to finish entries:
a 1 2 3 4
b 1 2 3 6
c 1 2 3 8
        Concert
                      52
                           53
                                 54
                                        Sales
                 51
                                        14.80
                       2
                                 4
              a
                   1
                        2
             b
                   1
                             3
                                6
                                        15.20
                   1
                        2
                             3 8
                                        15.60
 --- Sorted ---
        Concert
                  51
                       52
                           53 54
                                        Sales
                            3 4
                                        14.80
                       2
             a
                            3 6
                   1
                       2
                                        15.20
              b
                        2
                             3
                                 8
                                        15.60
              C
                   1
Total Sales: 45.60
 .. bye ...
```

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 1 1 1 1
-- Enter group and fans in 4 categories
 . to finish entries:
a 1 2 3 4
b 3 1 1 3
c 1 1 1 1
       Concert s1 s2 s3 s4
                                      Sales
                1 2 3
3 1 1
                                4
                                      10.00
             а
             b
                               3
                                      8.00
                 1
                     1
                          1
                               1
                                      4.00
 --- Sorted ---
                                      Sales
       Concert
               s1 s2 s3 s4
                                      4.00
             C
                 1
                          1 3 4
                 3
                      1
             b
                                      8.00
                      2
             a
                  1
                                      10.00
Total Sales: 22.00
... bye ...
```

- 6. Try using different inputs:
 - a. What changes would you suggest to handle larger, more realistic numbers?

The data type of float should be changed to handle much larger numbers. Since the total calculation can be a bit off for larger numbers, it is more practical to make the data type a double. Doubles have a larger precision of 8 bytes rather than floats that have 4 bytes.

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiga Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 25000 65000 85000 95000
-- Enter group and fans in 4 categories
   . to finish entries:
a 25000 65400 65800 12000
b 12000 25600 25400 23300
c 12500 12500 12500 1234567
       Concert s1
                       52
                          53
                                 54
                                        Sales
              a2500065400658001200011608999936.00
              b120002560025400233006336499712.00
              c1250012500125001234567119471366144.00
 --- Sorted ---
       Concert s1 s2 s3 s4
                                        Sales
             b120002560025400233006336499712.00
              a2500065400658001200011608999936.00
             c1250012500125001234567119471366144.00
Total Sales: 137416867840.00
 .. bye ...
```

b. What happens if any of the numbers, such as the ticket prices, are negative?

Mathematically, the ticket prices can be negative and the final result will also be negative for it to be interpreted in the same manner. Even if the sales are able to be negative in the program, realistically it doesn't make sense for it to be a negative number.

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: -1 -2 -3 -4
- Enter group and fans in 4 categories
  . to finish entries:
 2 4 6 8
b 2 6 5 8
 8 9 6 2
        Concert
                                 54
                                         Sales
                        4
                                        -60.00
                             6
                                  8
                        6
                                        -61.00
                   8
                             6
                                        -52.00
 --- Sorted ---
        Concert
                                        Sales
              b
                        6
                                  8
                                        -61.00
                        4
                             6
                                  8
                                        -60.00
                                        -52.00
Total Sales: -173.00
 .. bye ...
```

- c. What are your recommendations concerning negative input values?
 - We can create a statement within our ticket price and total sales functions that doesn't allow the user to input a negative value, and instead put the user in a loop where if a negative input value is entered, they are prompted to try again an unlimited number of times until the user inputs an appropriate value.
- 7. What changes should be made to the code if the customer wished to sort on the number of fans in category 1, the first of the three (or four) categories?

Make those changes, test your code and confirm that it is working correctly.

findMinSales

Test #	Input	Expected Output	Notes
#1	1 2 3 4 a 1 2 3 4 b 1 2 3 4 c 1 2 3 4	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020	Simple numbers inputted.
		Enter ticket prices in each of 4 categories: 1 2 3 4 Enter group and fans in 4 categories . to finish entries: a 1 2 3 4 b 1 2 3 4 c 1 2 3 4	
		Concert s1 s2 s3 s4 Sales a 1 2 3 4 30.00 b 1 2 3 4 30.00 c 1 2 3 4 30.00 Sorted Concert s1 s2 s3 s4 Sales	

		a 1 2 3 4 30.00 b 1 2 3 4 30.00 c 1 2 3 4 30.00 Total Sales: 90.00	
#2	1 1 1 1 a 5 5 5 5 b 6 4 5 5 c 6 3 6 5	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020	The data that is entered is opposite from the order it is sorted.
		Enter ticket prices in each of 4 categories: 1 1 1 1 Enter group and fans in 4 categories . to finish entries: a 5 5 5 5 b 6 4 5 5 c 6 3 6 5	
		Concert s1 s2 s3 s4 Sales a 5 5 5 5 20.00 b 6 4 5 5 20.00 c 6 3 6 5 20.00	
		Sorted Concert s1 s2 s3 s4 Sales a 5 5 5 5 20.00 b 6 4 5 5 20.00 c 6 3 6 5 20.00 Total Sales: 60.00 bye	
#3	1 2 3 4 a 6 3 6 5 b 10 10 3 5 c 1 120 100 300	Welcome to the ticket sales calculator. The purpose of this program is to help calculate sales on tickets. Developer: Attiqa Sheikh Date: May 5, 2020	The total sales is the opposite of the first category.
		Enter ticket prices in each of 4 categories: 1 2 3 4 Enter group and fans in 4 categories . to finish entries: a 6 3 6 5 b 10 10 3 5 c 1 120 100 300	

```
Concert s1 s2 s3 s4 Sales
    a 6 3 6 5 50.00
    b 10 10 3 5 59.00
    c 1 120 100 300 1741.00

--- Sorted ---

Concert s1 s2 s3 s4 Sales
    c 1 120 100 300 1741.00
    a 6 3 6 5 50.00
    b 10 10 3 5 59.00

Total Sales: 1850.00

... bye ...
```

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
```

```
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 1 2 3 4
-- Enter group and fans in 4 categories
  . to finish entries:
a 1 2 3 4
b 1 2 3 4
c 1 2 3 4
        Concert
                  51
                       52
                                  54
                                         Sales
                                         30.00
              a
                   1
                        2
                                  4
                        2
                             3
                   1
                                         30.00
              b
                   1
                        2
                                         30.00
                                   4
 --- Sorted ---
        Concert
                                         Sales
                  51
                       52
                             53
                                  54
                   1
                             3
                                  4
                                         30.00
              b
                        2
                                         30.00
                   1
                                  4
                              3
                                  4
                                         30.00
Total Sales: 90.00
... bye ...
```

C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe

```
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 1 1 1 1
- Enter group and fans in 4 categories
   . to finish entries:
 5 5 5 5
b 6 4 5 5
 6 3 6 5
        Concert
                  51
                       52
                             53
                                  54
                                         Sales
              a
                                         20.00
                              5
              b
                   6
                                         20.00
                              6
                   6
                                   5
                                         20.00
 --- Sorted ---
        Concert
                  51
                             53
                                  54
                                         Sales
                       52
                                         20.00
              а
              b
                   6
                        4
                                         20.00
                              6
                                         20.00
                   6
Total Sales: 60.00
 .. bye ...
```

```
C:\Users\sheik\OneDrive\Desktop\Courses\Class Assignments\CMIS102\Final.exe
Welcome to the ticket sales calculator.
The purpose of this program is to help calculate sales on tickets.
Developer: Attiqa Sheikh
Date: May 5, 2020
Enter ticket prices in each of 4 cateogories: 1 2 3 4
-- Enter group and fans in 4 categories
   . to finish entries:
a 6 3 6 5
b 10 10 3 5
c 1 120 100 300
        Concert
                             53
                                          Sales
                   51
                                   54
                                          50.00
                   6
                              6
              a
                        10
                                          59.00
              b
                   10
                       120
                            100
                                  300
                                        1741.00
 --- Sorted ---
        Concert
                             53
                                          Sales
                        52
                                   54
                   51
                   1
                       120
                            100
                                  300
                                        1741.00
                    6
                              6
                                          50.00
               a
              b
                   10
                        10
                                          59.00
Total Sales: 1850.00
... bye ...
```

C Code with Completed Exercises

```
/* Final.cpp
*Date: May 5, 2020
*Dev: Attiqa Sheikh
*Purpose: program that calculates ticket sales and sorts them appropriately
*/
#include <stdio.h>
#define MAXN 100 // max characters in a group/concert name
#define MAXG 50 // max concerts/groups
#define MAXC 4 // max categories
char group [MAXG][MAXN];
int fans [MAXG][MAXC];
float prices [MAXC];
float sales [MAXG];
int count = 0;
void welcome(){
       printf("Welcome to the ticket sales calculator.\n");
       printf("The purpose of this program is to help calculate sales on tickets.\n");
       printf("Developer: Attiqa Sheikh\n");
       printf("Date: May 5, 2020 \ln \ln \ln');
void printArray () {
 printf ("%15s%5s%5s%5s%5s%10s\n",
 "Concert", "s1", "s2", "s3", "s4", "Sales");
 for (int i = 0; i < count; i++) {
  printf ("%15s", group [i]);
  for (int j = 0; j < MAXC; j++) {
   printf ("%5d", fans[i][j]);
  } // end for each category
  printf ("%10.2f\n", sales [i]);
 } // end for each group
} // end function printArray
void computeSales () {
 for (int i = 0; i < count; i++) {
  sales [i] = 0;
  for (int j = 0; j < MAXC; j++) {
   sales [i] += prices [j] * fans [i][j];
  } // end for each category
 } // end for each group
```

```
} // end function computeSales
void switchRows (int m, int n) {
 char tc;
 int ti;
 float v;
 // printf ("Switching %d with %d\n", m, n);
 for (int i = 0; i < MAXN; i++) {
  tc = group[m][i];
  group [m][i] = group [n][i];
  group [n][i] = tc;
 } // end for each character in a group name
 for (int i = 0; i < MAXC; i++) {
  ti = fans [m][i];
  fans [m][i] = fans [n][i];
  fans [n][i] = ti;
 } // end for each fan category
 v = sales [m];
 sales [m] = sales [n];
 sales [n] = v;
} // end switch
int findMinSales (int m) {
 float min = fans [m][0];
 int target = m;
 for (int i = m+1; i < count; i++)
  if (fans [i][0] < min) {
   min = fans [i][0];
   target = i;
  } // end new max found
 return target;
} // end function findMinSales
void sortBySales () {
 int target;
 for (int i = 0; i < count; i++) {
  target = findMinSales (i);
  if (target > i)
    switchRows (i, target);
 } // for each concert
} // end function sortBySales
//calculates total
void totalSales(){
```

```
//total
       float total =0;
       int saleSize = sizeof(sales);
       //loop for the size
       for(int i = 0; i \le saleSize; i + + ){
               total += sales[i];
       }
       printf("Total Sales: %.2f \n\n", total);
}//end function
void getData () {
// for (int i = 0; i < MAXG; i++) sales [i] = 0;
 printf ("Enter ticket prices in each of %d cateogories: ", MAXC);
 for (int i = 0; i < MAXC; i++)
  scanf ("%f", &prices [i]);
 printf ("-- Enter group and fans in %d categories\n", MAXC);
 printf(" . to finish entries:\n");
 for (int i = 0; i < MAXG; i++) {
  scanf ("%s", group[i]);
  if (group [i][0] == '.')
   break;
  count++;
  for (int j = 0; j < MAXC; j++)
   scanf ("%d", &fans[i][j]);
 } // end for each group
} // end function getData
int main(void) {
welcome();
 getData ();
 computeSales ();
 printArray ();
 printf ("\n --- Sorted ---\n");
 sortBySales ();
 printArray ();
 totalSales();
printf("... bye ...\n");
 return 0;
```