

Programming Fundamentals I

COSC1436

Lab 7. Arrays

Objectives:

1. to learn to use arrays with integer indexes.
2. to learn to use arrays with enum indexes.
3. to learn to multi-dimensional arrays.

Make sure to demo your work to your instructor for each task to get credit.

Task 1: One-dimensional arrays with integer indexes

Exercise 1. Create a new C++ project in Visual Studio, add a new C++ file and copy the following code into it:

```
// Program Reverse reads numbers into an array
// and prints them out in reverse order.
```

```
#include <iostream>
#include <fstream>
using namespace std;
```

```
const int MAX = 10;
```

```
int main ()
{
```

```
    int numbers[MAX];
    ifstream inData;
    int value;
    int index;
```

```
    inData.open("reverse.txt");
    for (index = 0; index < MAX; index++)
    {
```

```
        // FILL IN Code to read value from file inData
        // and store it in array numbers at position indicated by variable index
```

```
    }
```

```
    for (index = MAX - 1; index >= 0; index--)
        // FILL IN Code to write numbers on the screen
```

```
    system("pause");
    return 0;
}
```

reverse.txt

12
34
76
82
10
55
76
88
33
65

Exercise 2. Complete the missing code under the highlighted lines and run the program with the sample data above.

Exercise 3. Extend the program to compute and display the sum of the values store in array numbers. What was displayed by the program for the above sample data?

Demo program to your instructor.

Task 2: One-dimensional arrays with enum indexes

Exercise 1. Create a new C++ project in Visual Studio, add a new C++ file and copy the following code into it:

```
// Program Favorit surveys users to determine the favorite soft drink.
#include <iostream>
using namespace std;

enum Drinks {COKE, PEPSI, SPRITE, DR_PEPPER};
void Prompt();

int main ()
{
    int favorites[4]; //holds sum of users who favor each drink
    int number;
    Drinks index;

    for (index = COKE; index <= DR_PEPPER; index = Drinks(index+1))
        // FILL IN Code to initialize array favorites to all zeros

    Prompt();
    cin >> number;
    while (number != 4)
    {
        // FILL IN Code to increment the proper drink favorites based on user selections
        // e.g. if user enter 0 increment favorites[COKE] etc.

        Prompt();
        cin >> number;
    }

    // FILL IN THE Code to write out the totals in the format:
    //      Drink      Number of favorites

    system("pause");
    return 0;
}

/*****/

void Prompt()
{
    cout << "Enter a 0 if your favorite is a Coke." << endl;
    cout << "Enter a 1 if your favorite is a Pepsi." << endl;
    cout << "Enter a 2 if your favorite is a Sprite." << endl;
    cout << "Enter a 3 if your favorite is a DrPepper." << endl;
    cout << "Enter a 4 if you wish to quit the survey." << endl;
}
```

Exercise 2. Complete the missing code under the highlighted lines. Run you program and demo it to your instructor.

Exercise 3. Add a function to take the array favorites as a parameter and display the percentage of responses each drink received. Run your program with sample data set and show the results.

Demo program to your instructor.

Task 3: Two-dimensional arrays

Exercise 1. Create a new C++ project in Visual Studio, add a new C++ file and copy the following code into it:

```
// Program TwoDim manipulates a two-dimensional array variable.

#include <iostream>
#include <fstream>
using namespace std;

const int ROW_MAX = 8;
const int COL_MAX = 10;

typedef int ItemType;

typedef ItemType Table[ROW_MAX][COL_MAX];

void  getData(ifstream&, Table, int&, int&);
// Reads values and stores them in the table.

void  printTable(ofstream&, const Table, int, int);
// Write values in the table to a file.

int  main ()
{
    Table table;
    int  rowsUsed;
    int  colsUsed;
    ifstream  dataIn;
    ofstream  dataOut;

    dataIn.open("twod.txt");
    dataOut.open("twod.out");
    getData(dataIn, table, rowsUsed, colsUsed);
    printTable(dataOut, table, rowsUsed, colsUsed);
    return 0;
}

//*****

void  getData(ifstream& data, Table table, int& rowsUsed, int& colsUsed)
// Pre:  rowsUsed and colsUsed are on the first line of
//       file data; values are one row per line
//       beginning with the second line.
// Post: Values have been read and stored in the table.
```

```

{
    ItemType item;
    data >> rowsUsed >> colsUsed;

    for (int row = 0; row < rowsUsed; row++)
        for (int col = 0; col < colsUsed; col++)

            // FILL IN Code to read the next value from input file and store it in array table.
}

//*****

void printTable(ofstream& data, const Table table,
               int rowsUsed, int colsUsed)
// Pre: table contains valid data.
// Post: Values in array table have been sent to a file by row,
//        one row per line.
{
    // FILL IN Code to write values in array table in output file stream data one row per line.
}

```

Exercise 2. Read the documentation carefully and predict the output for the following input data in file twod.txt:

4 5	
3 1 4 1 5	3 1 4 1 5 2 3 6 7 1 7 8 8 8 8 9 8 7 6 5
2 3 6 7 1	
7 8 8 8 8	
9 8 7 6 5	

Exercise 3. Complete the missing code under the highlighted lines. Run completed program and show your results.

Exercise 4. Add a function that computes and returns the largest value in array table. Add a statement in function main() to call function and display the largest value in array table.

Exercise 5. Add a function that computes and returns the smallest value in array table. Add a statement in function main() to call function and display the smallest value in array table.

Exercise 6. Add a function that takes a one dimensional array as a parameter and its size and returns the sum of values. Use this function to display the sum of values in each column in array table.

Demo program to your instructor.