**UNITY UNIVERSITY, ADAMA CAMPUS**

**DEPARTMENT OF COMPUTER SCIENCE**

**ACTIVITES ON ARRAYS IN C++ WITH**

***Part One: Read the following questions carefully and attempt all the question accordingly.***

1. Define the term array and list some of the reasons that we need arrays in programming
2. Explain the term, element, index and dimension that uses in arrays in C++ programming
3. Write the difference between one-dimensional and two dimensional arrays and when two use these two types of array by giving examples
4. Write the **syntax** to declare one-dimensional and two dimensional arrays by giving examples
5. List down the attributes or properties that differentiate arrays in C++ and explain what each attributes determines
6. We use for----loop to manipulate (process) one-dimensional arrays in C++. Write separate for----loop statement to read and print six integers when arrays are initialized with some value at the time of declaration and when the user inputs some values of array as an input respectively.
7. Write a syntax to declare and define a function to pass arguments to a function both in one-dimensional and two-dimensional arrays by giving examples
8. Write a syntax to call a function in one-dimensional and two-dimensional arrays by giving examples
9. Write C++ code to assign (values) element in rows and columns of two dimensional array
10. Write C++ code to access and print the contents of array in rows and columns of two-dimensional array
11. Write C++ code to declare 3x5 two-dimensional arrays by the name list and initialized with some values you want
12. Write C++ code to declare one dimensional array by the name SomeArray with array size of 6 elements and initialized with some value you need.

***Part Two: - Coding or Programming. Read the following question carefully and attempt all the questions accordingly***

1. Write C++ program to demonstrate one dimensional array. Suppose the program is expected to accept each values of the array and print the values of each element.

#include<iostream>

using namespace std;

int main() {

int myArray[5];

int i;

cout<<"User assign the value of each array element:"<<endl;

cout<<endl;

for ( i=0; i<5; i++) { // 0-4

cout<<“Enter the values of myArray ["<<i<< "]: ";

***//Users input the value of each elements of the array***

cin >>myArray[i];

}

***//Print two blank lines***

cout<<endl<<endl;

cout<<"The Output of the program is as follows:"<<endl<<endl;

***//For loop to print each value of the array***

for (i = 0; i<5; i++) {

cout<<“Values of the Array ["<<i<<"]:"<<myArray[i] <<endl;

}

return 0;

}

1. Write C++ program to illustrate to store arrays of five elements and display the values of each element stored. The program is expected to accept values of each elements of array from the user and display values of each elements of the array starting from index [1] and also displays the reverse of the contents of array.

#include<iostream>

using namespace std;

int main () {

int array[5];

//Declaration of index variable

int i;

cout<<"Users Enter the value of an array:"<<endl<<endl;

//For loop to count elements of the array

for(i=0; i<5; i++) {

//Input the five integers in to array "array“

cout<<"Enter any integer number ["<<i+1<<"]:" ;

cin>>array[i];

}

cout<<endl<<endl;

cout<<"Output of the Program is as follows:"<<endl<<endl;

//For loop to Print out the integers stored in array

for(i=0; i<5; i++)

cout<<"The value of an array["<<i+1 <<"]:"<<array[i]<<endl;

cout<<endl<<endl;

cout<<"Output of the the Reverse of Array is as follows:"<<endl<<endl;

//For loop to Print out the integers stored in array

for(i=4; i>=0; i--)

cout<<"The value of reverse of the array["<<i+1 <<"]:"<<array[i]<<endl;

return 0;

}

1. Write C++ program to illustrate to store global arrays of 6 elements with some initial value (array initialization). The program displays both the contents of each elements of the array and the contents of the reverse of array.

//C++ Program to declare and initialize global array

//If Array is initialized we use only one for loop

//To print all the values stored in the variable

#include<iostream>

using namespace std;

//Declaration of global array with some initialized value

int array [6]= {5,6,8,9,2,0};

//Main function

int main () {

//Declaration of index variable

int i;

cout<<"Output of the program"<<endl<<endl;

//print out the integers stored in array

for(i =0; i <6; i++) {

cout<<"The value of an array["<<i<<"]: "<<array[i]<<endl;

}

cout<<"Output of the Reverse of the arrary is:"<<endl<<endl;

//print out the reverse of integers stored in array

for(i=5; i>=0; i--) {

cout<<"The value of an array["<<i<<"]: "<<array[i]<<endl;

}

return 0;

}

1. Write C++ program to calculate the sum of the values of 5 elements of array initialized with some value globally and the program is expected to display the values of each elements of array and its sum of all elements of array.

#include<iostream>

using namespace std;

int array []={16, 2, 77, 40, 12,23};

//Main Function

int main(){

//Declaration of local Variables to store the values of

//sum of each elements of array

int result=0;

//Declaration of index variables

int n;

//For Loop To display each valuues of the elements of array

cout<<"The Values of Each element of Array:"<<endl<<endl;

for(n=0; n<6; n++){

cout<<"Each Values of the Array["<<n<<"]:"<<array[n]<<endl;

}//End of For Loop

cout<<endl<<endl<<"Sum of the values are a follows:"<<endl;

//For Loop to count n number

cout<<endl;

for(n=0; n<6; n++){

//Add the values of each array to the variable result

//And assign the result at each atteration to the variable result

result=(result+array[n]);

}//End of for Loop

//Display the sum of the values of each element

cout<<"Sum="<<result;

return 0;

}//End of main ()

1. Refer Question No. 4 above and write the for loop statement used to display the values of each elements of array in a reverse order (revere of the array) and add to your previous program, compile and test the program.

//For Loop to display the reverse of each elements of array

cout<<endl<<endl<<"The Values of the Reverse of Array:"<<endl<<endl;

for(n=5; n>=0; n--){

cout<<"Reverse of the Array["<<n<<"]:"<<array[n]<<endl;

}//End of For Loop

1. Use #define ARRAY\_SIZE from C++ library with array size of 5 elements and write C++ program to accept actual values of each elements of array from the user. The program displays the actual values of the array, its reverse of the contents of the array and calculate and display the contents of the array.

#include<iostream>

using namespace std;

//Determine the size of the array

#define ARRAY\_SIZE 5

//Declaration of global variables to store

//the sum of the contents of the array

int result=0;

//Main Function

int main () {

//Declaration of Array and use the ARRAY\_SIZE as a size

int array[ARRAY\_SIZE]; //An array

//Declaration of index variable

int i;

//For Loop to Read the actual values of the array and

//Store in appropriate memory locations

cout<<"Users input the actual Value of Array:"<<endl<<endl;

for (i=0; i<ARRAY\_SIZE; i++){

cout<<"Enter the Values of ["<<i<<"]:";

cin>>array[i];

}//End of for loop ()

//Print the actual values of array inputted by the user

cout<<endl<<endl<<"Values of inputed array is as follows:"<<endl<<endl;

for(i=0; i<ARRAY\_SIZE; i++){

//Access the values of the Array

cout<<"Actual Values of the Array["<<i<<"]:"<<array[i]<<endl;

} //End of for loop

//Print the array in reverse order

cout<<endl<<endl<<"Values of the reversed array is as follows:"<<endl<<endl;

//Index goes from the highest to the lowest

for(i=ARRAY\_SIZE-1; i>=0; i--){

cout<<"Reversed Values["<<i<<"]:"<<array[i]<<endl;

}//End of for loop

cout<<endl<<endl<<"Sum of the values are a follows:"<<endl;

//For Loop to count n number

cout<<endl;

for(i=0; i<ARRAY\_SIZE; i++){

//Add the values of each array to the variable result

//And assign the result at each atteration to the variable result

result=(result+array[i]);

}//End of for Loop

//Display the sum of the values of each element

cout<<"Sum="<<result;

return 0;

} //End of main ()

1. Write C++ program to ***demonstrate passing arrays as argument*** to the ***function*** and the ***function*** ***print()-***to print the content of the array, ***Reverse()***-to print the reverse of the contents of the array, ***Sum()***-to calculate the sum of the contents of the array and ***Clear( ) –to modiﬁes the contents of any array sent to it*** or ***making all the elements zero***. Use the following information to write the program:

* Declare a function as follows:
  + void Print(int a[], int n);
  + void Reverse(int a[], int n);
  + int Sum(int a[], int n);
  + void Clear(int a[], int n);
* Define a function based on this function declaration to perform its required operation when it is called.
* Declare global Array of 4 element with some initial value and global index variables as follows:
  + int list[]={12,16,24,38};//Global Array
  + int i;//Index Variables
* The program perform its required operation when it is called from the main program and the Sum() returns the sum of the contents of the array to the caller but the remaining function does not return any value, simply displays the content.

#include <iostream>

#include <iomanip>

using namespace std;

//Declaration of Functions

void Print(int a[ ], int n);

void Reverse( int a[], int n);

int Sum(int a[ ], int n);

void Clear(int a[], int n);

//Declaration of global Array with some initial value

int list[ ] = { 12, 14, 16, 28 };

//Declare the index variable i globally that can be

//accessed by all of the functions defined anywhere

int i;

//Main Function

int main() {

//Declaration of variables local to main ()

int sum;

// Call a Function to print the contents of the array

Print(list, 4);

// Call a Function to Reversse() to print the reverse of array

Reverse(list, 4);

// Call the function Sum()

sum=Sum(list, 4);

//Display Sum

cout<<"Sum of the contents of array="<<sum<<endl;

//Call Clear() function

Clear(list, 4);

return 0;

}//End of main ()

//Define a Function to print the contents of array

void Print(int a[ ], int n) {

//For loop to print the content of array

cout<<"Contents of the Array is as follows:"<<endl<<endl;

for(i = 0; i < n; i++ ) {

//Display the contents of array

cout<<setw(4)<<a[i] << " ";

}//End of for loop

cout<<endl;

} //End of print ()

//Define a Function to print the contents of array

void Reverse(int a[ ], int n) {

//For loop to print the content of array

cout<<endl<<"Reverse of Contents of Array is:"<<endl<<endl;

for(i=3; i>=0; i--) {

//Display the contents of reverse of array

cout<<setw(4)<<a[i]<< " ";

}//End of for loop

cout<<endl<<endl;

} //End of Reverse ()

//Define a function to sum the contents of the array

int Sum(int a[ ], int n) {

int result = 0;

//For Loop to calculate the sum of each elements of array

for (i = 0; i <n; i++ ){

//Calculate some at aeach atteration and store

//the values on the variable result

result=(result + a[i]);

}//End of for Loop

return (result);

}//End of Sum()

//Define a Function to Clear the content sof array

void Clear(int a[ ], int n) {

cout<<endl<<endl<<"Clear the Contents of the Array:"<<endl<<endl;

//For loop to clear the content of array

for(i = 0; i < n; i++ ) {

//Clear the contents of each element of array

//at each atteration by assigning 0 to each elements of array

a[i]=0;

//Display the clear contents of array

cout<<setw(4)<<a[i] << " ";

}//End of for loop

cout<<endl;

} //End of Clear ()

1. Write C++ program to prevent a particular function does not modify the contents of array by adding ***const*** specifier to accept array parameters as const on each of the function you declared and defined below. Follow the following additional information to write a program:

* Declare a function that accept array contents should be const as follows:
* void Print(const int a[], int n);
* void Reverse(const int a[], int n);
* int Sum(const int a[], int n);
* void Clear(const int a[], int n);
* Define a function that accept array parameters as const based on this declaration to perform its required operation when it is called.
* Declare global Array of 4 element with some initial value and global index variable as follows:
  + int list[]={12,16,24,38};//Global Array
  + int i;//Index Variables
* All the function we define to perform its required operation does not modify any contents of the array.
* The program perform its required operation when it is called from the main program and the Sum() returns the sum of the contents of the array to the caller but the remaining function does not return any value, simply displays the content.

#include <iostream>

#include <iomanip>

using namespace std;

//Declaration of Functions

void Print(const int a[ ], int n);

void Reverse( const int a[], int n);

void Clear(const int a[], int n);

int Sum(const int a[ ], int n);

//Declaration of global Array with some initial value

int list[ ] = { 12, 14, 16, 28 };

//Declare the index variable i globally that can be

//accessed by all of the functions defined anywhere

int i;

//Main Function

int main() {

//Declaration of variables local to main ()

int sum;

// Call a Function to print the contents of the array

Print(list, 4);

// Call a Function to Reversse() to print the reverse of array

Reverse(list, 4);

// Call the function Sum()

sum=Sum(list, 4);

//Display Sum

cout<<"Sum of the contents of array="<<sum<<endl;

//Call Clear() function

Clear(list, 4);

return 0;

}//End of main ()

//Define a Function to print the array

void Print(const int a[ ], int n) {

//For loop to print the content of array

cout<<"Contents of the Array is as follows:"<<endl;

for(i = 0; i < n; i++ ) {

//Display the contents of array

cout<<setw(4)<<a[i] << " ";

}//End of for loop

cout<<endl;

} //End of print ()

//Define a Function to print the contents of array

void Reverse(const int a[ ], int n) {

//For loop to print the content of array

cout<<endl<<"Reverse of Contents of Array is:"<<endl<<endl;

for(i=3; i>=0; i--) {

//Display the contents of reverse of array

cout<<setw(4)<<a[i]<< " ";

}//End of for loop

cout<<endl<<endl;

} //End of Reverse ()

//Define a function to sum the contents of the array

int Sum(const int a[ ], int n) {

int result = 0;

//For Loop to calculate the sum of each elements of array

for (i = 0; i <n; i++ ){

//Calculate some at aeach atteration and store

//the values on the variable result

result=(result + a[i]);

}//End of for Loop

return (result);

}//End of Sum()

//Define const Function to not to Clear the content sof array

void Clear(const int a[ ], int n) {

//For loop to that does not modify the content of array

cout<<endl<<endl<<"Clear the Contents of the Array:"<<endl<<endl;

for(i = 0; i < n; i++ ) {

//Clear the contents of each element of array

//at each atteration by assigning 0 to each elements of array

//But if you comment this statement the contents of array is not modified

//a[i]=0;//

//Display the contents of array that doe not modified

cout<<setw(4)<<a[i] << " ";

}//End of for loop

cout<<endl;

} //End of print ()

1. Write C++ program to calculate sum and average of 6 scores of subjects that students obtained in a semester by declaring and defining the necessary functions and arrays. The program accepts score or marks of the student from the user as an input and displays the scores of each subject, sum of the marks and average marks that the student obtained in a semester.

#include <iostream>

#include <iomanip>

using namespace std;

//Declaration of Functions

void Print(const int marks[ ], int num);

int Sum(const int marks[], int num);

int Average(const int marks[], int num);

//Declaration of global Array

int course[6];

//Declare the index variable i globally that can be

//accessed by all of the functions defined anywhere

int i;

//Main Function

int main() {

//Declaration of variables local to main ()

int sum,average;

cout<<"User Input the score of a student:"<<endl<<endl;

cout<<endl;

for (i=0; i<6; i++) { // 0-5

cout<<"Scores of a Subject["<<i<< "]: ";

//Users input the value of each elements of the array

cin >>course[i];

}//End of for loop

cout<<endl<<endl;

//Call print() to print the scores

Print(course, 6);

//Call Sum() and display the sum

sum=Sum(course, 6);

cout<<setw(4)<<"Total="<<sum<<endl<<endl;

//Call Average() and display the result

average=Average(course, 6);

//Display average

cout<<setw(4)<<"Average Marks in 6 course="<<average<<endl;

return 0;

}//End of main()

//Define a function to print scores of 6 subjects

void Print(const int marks[ ], int num){

//For llop to print the scores of the subject

cout<<"The scores of 6 subjects are as follows:"<<endl<<endl;

for(i=0; i<num; i++) {

cout<<setw(4)<<marks[i];

}//End of for loop

cout<<endl<<endl;

}//End of print()

//Define a function by the name Sum() to calculate

//the scores of 6 subject and returns the sum to the caller

int Sum(const int marks[], int num){

//Define local variables to store the sum at each atteration

int sum=0;

//For loop to count and calculate the sum of scores of 6 ubjects

for(i=0; i<num; i++){

//Calculate sum and

sum=(sum+marks[i]);

}//End of for loop()

return (sum);

}//End of Sum()

//Define Average function to calculat average of scores of

//6 subjects and return the values to the caller

int Average( const int marks[], int num){

//Declaration of Variables local to this function

int sum=0;

int av;

//For loop to count and calculate average

for(i=0; i<num;i++){

//Calculate average

sum=(sum+marks[i]);

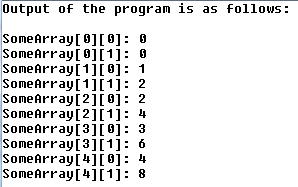
}//End of for loop

av=(sum/num);

return(av);

}//End of Average()

1. Write C++ program ***to illustrate two dimensional array.*** Declare 5x2 two-dimensional array by the name SomeArray with some initialized value. The program displays the contents of array as it is inputted by the user as follows instead of as tables in rows and columns.



#include <iostream>

#include<iomanip>

using namespace std;

//Declaration of index variable globally

int i, j;

int main() {

//Declaration of two dimensional Array and initialize them

int SomeArray[5][2]={{0,0},{1,2},{2,4},{3,6},{4,8}};

//Nested For loop to display the contents of Array

cout<<"Output of the program is as follows:"<<endl<<endl;

//Outer For Loop to count number of rows

for(i=0;i<5;i++){

//Inner For loop to count number of columns

for(j=0;j<2;j++){

//Display the content of array in row 5 and column 2

cout<<"SomeArray["<<i<<"]["<<j<<"]:"<<SomeArray[i][j]<<endl;

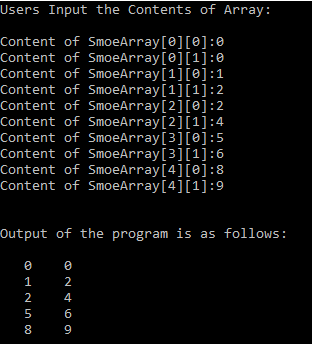
} //End of inner for loop

}//End of outer for loop

return 0;

} //End of main ()

1. Declare 5x2 two-dimensional array by the name SomeArray and write C++ program to accept the values or contents of array inputted by the user and displays the contents of array in rows and columns as follows:



#include <iostream>

#include<iomanip>

using namespace std;

//Declaration of index variable globally

int i,j;

int main() {

//Declaration of two dimensional Array and initialize them

int SomeArray[5][2];

//Nested for Loop to accept the contents of the array

//from the user and stores the content

cout<<"Users Input the Contents of Array:"<<endl<<endl;

//Outer For Loop to count number of rows

for(i=0;i<5;i++){

//Inner For loop to count number of columns

for(j=0;j<2;j++){

//Users input the contents of the Array

cout<<"Content of SmoeArray["<<i<<"]["<<j<<"]:";

cin>>SomeArray[i][j];

}//End of outer for loop

}//End of Inner For Loop

cout<<endl<<endl<<"Output of the program is as follows:"<<endl<<endl;

//Outer For Loop to count number of rows

for(i=0;i<5;i++){

//Inner For loop to count number of columns

for(j=0;j<2;j++){

//Display the content of array in tabular form

cout<<setw(4)<<SomeArray[i][j]<<" ";

} //End of inner for loop

cout<<endl;

}//end of outer for loop

return 0;

} //End of main ()

1. Write C++ program to demonstrate two-dimensional array. The program is expected to accept the values of each elements of array in rows and columns from the user and displays the contents of array and its reverse of the contents of array in rows and columns or matrix. Suppose the two-dimensional array you declare for this program is 3 x 4 array.

#include <iostream>

#include<iomanip>

using namespace std;

//Declaration of index variable globally

int i,j;

int main() {

//Declaration of two dimensional Array and initialize them

int array[3][4];

//Nested for Loop to accept the contents of the array

//from the user and stores the content

cout<<"Users Input the Contents of Array:"<<endl<<endl;

//Outer For Loop to count number of rows

for(i=0;i<3;i++){

//Inner For loop to count number of columns

for(j=0;j<4;j++){

//Users input the contents of the Array

cout<<"Input Contents of Array["<<i<<"]["<<j<<"]:";

cin>>array[i][j];

}//End of outer for loop

}//End of Inner For Loop

cout<<endl<<endl<<"Output of the program is as follows:"<<endl<<endl;

//Outer For Loop to count number of rows

for(i=0;i<3;i++){

//Inner For loop to count number of columns

for(j=0;j<4;j++){

//Display the content of array in tabular form

cout<<setw(4)<<array[i][j]<<" ";

} //End of inner for loop

cout<<endl;

}//end of outer for loop

cout<<endl<<endl<<"Reverse of the Content of Array:"<<endl<<endl;

//Outer For Loop to count number of rows

for(i=2;i>=0;i--){

//Inner For loop to count number of columns

for(j=3;j>=0;j--){

//Display the content of array in tabular form

cout<<setw(4)<<array[i][j]<<" ";

} //End of inner for loop

cout<<endl;

}//end of outer for loop

return 0;

} //End of main ()

1. Write C++ program to accept number of rows and columns and its contents of array from the user and declare const global variables used to determine the maximum row and column dimensions for array declaration. The program provides a hint to limit the contents of array that stores in rows and columns while inputting the contents as the maximum rows and columns are specified in const variable declaration. The program display the contents and its reverse of array in a matrix form. Use the following additional information as a hint to write the program:

* Declare const global variables to determine row and column dimensions as
* const int MAX1=10;//Use as to determine row dimension
* const int MAX2=10;//Use as to determine column dimension
* Declare index variables globally or locally by the name i and j to count the number of rows and columns respectively used in nested for----loop to read the contents of array inputted by the user, display the contents and its reverse of the contents of array.
* Declare Arrays of integers by the name M local to main function
* Declare variables local to main by the name NbRows and NbCols to read the number of rows and columns that the programmer needs to determine how many contents of array need to input in rows and columns.

#include<iostream>

#include<iomanip>

using namespace std;

//Declaration of constant Global Variables

const int MAX1=10;//Use MAX1 variable as a row dimension

const int MAX2=10;// Use MAX2 variable as a column dimension

//Declaration of Index Variables globally

int i, j;

//Main Function

int main (){

//Declare 2D Array locally by the name M and use MAX1 and MAX2

//As dimensions of rows and columns

int M[MAX1][MAX2];

//Declaration of local Variables local to main ()

//To Store the no of rows and columns the users need

int NbRows, NbColumns;

//User Assign the number of Rows and columns

cout<<"Users Input the no of Rows and Columns as follows:"<<endl<<endl;

cout<<"Enter number of Rows:";

cin>>NbRows;

cout<<"Enter number of Columns:";

cin>>NbColumns;

//Display Blank Line

cout<<endl<<endl;

//Outer for Loop to count number of rows

cout<<"Users Input the Contents of Array as follows:"<<endl<<endl;

for(i=0; i<NbRows; i++){

//Inner for loop to count number of columns

for(j=0; j<NbColumns; j++){

//Users input the contents of the Array

cout<<"Enter Contents of Array["<<i<<"]["<<j<<"]:";

cin>>M[i][j];

}//End of inner for loop

} //End of outer for loop

//Diplay Blank Line

cout<<endl<<endl;

//Print the matrix you entered using for loop

cout<<"The Content of Array displayed in Matrix form as follows:"<<endl<<endl;

//Outer for loop to count number of rows

for(i=0; i<NbRows; i++){

//Inner for loop to count number of columns

for(j=0; j<NbColumns; j++){

//Display all values in each elements of array

cout<<setw(6)<<M[i][j]<<" "<<" ";

}//End of Inner for loop

//Print Blank Line

cout<<endl;

}//End of Outer for loop

//Print the matrix you entered in the Reverse order

cout<<endl<<endl<<"Content of Matrix displayed in Reverse Order as:"<<endl<<endl;

//Outer for loop to count number of rows

for(i=NbRows-1; i>=0; i--){

//Inner for loop to count number of columns

for(j=NbColumns-1; j>=0; j--){

//Display the Matrix in reverse order

cout<<setw(6)<<M[i][j]<<" "<<" ";

}//End of Inner for loop

//Print Blank Line

cout<<endl;

}//End of Outer for loop

return 0;

}//End of main ()

1. Write C++ nested for-----loop statement to read contents of array inputted by the user and nested for---loop statement to display contents and reverse of contents of array separately visualized in rows and columns or matrix form. The 2D array used to write this for---loop statement is 2x4 array.
2. Write C++ program to demonstrate passing two-dimensional array as an argument or parameter to a function, The main task of the program is to read the contents of array in rows and columns, print contents of array in matrix form. Use the following additional information to write the program:

* Declare a const variables as follows to determine the no of dimensions of rows and columns used when 2D array is declared globally or locally.
* const int ROWS=10, COLUMNS= 10;
* Declare a function by the name Read\_Matrix() and Print\_Matrix()as follows:
* void Read\_Matrix(int M[ROWS][COLUMNS], int, int);
* void Print\_Matrix(int M[ROWS][COLUMNS], int, int);
* Declare Global integer Array by the name M with a size of const variables(ROWS and COLUMNS) declared before function declaration above as a dimension of rows and columns respectively.
* Declare global index variable by the name row and col to count the number of rows and columns when a function read, display the content of array in the nested for---loop.
* Declare local variables to main function by the name NbRows and NbColumns to indicate how many number of rows and columns that a user input while the program run.
* Define a function to read the contents of array inputted by the user and to print the contents of array based on the function declaration provided as a hint above.

#include<iostream>

#include<iomanip>

using namespace std;

//Declaration of Constant Variables to determine the

//size of dimensions of rows and columns when array is declared

const int ROWS = 10, COLUMNS = 10;

//Declaration of functions or prototype

void Read\_Matrix(int M[ROWS][COLUMNS], int, int);

void Print\_Matrix(int M[ROWS][COLUMNS], int, int);

void Reverse\_Matrix(int M[ROWS][COLUMNS], int, int);

//Declaration of Global Array with const ROWS and COLUMNS

//used as dimensions of rows and columns respectively

int M[ROWS][COLUMNS];

//Declaration of index variables globally by the

//name row and col to count rows and columns respectively

int row, col;

//Main Function

int main() {

// Declaration of Variables local to main () used

//to store the number of rows and columns used as a hint

//to determine how many contents needs to store in rows and columns

cout<<"Users input the no. of rows and columns as follows:"<<endl<<endl;

int NbRows, NbColumns;

cout<<"Enter Number of Rows:";

cin>>NbRows;

cout<<"Enter Number of Columns:";

cin>>NbColumns;

// call Read\_Matrix() to read contents inputed by the

//User in rows and columns as input

Read\_Matrix(M,NbRows, NbColumns);

// Call Print\_Matrix() to Print the contents of array

//in rows and columns or matrix form

Print\_Matrix(M, NbRows,NbColumns);

//Call Reverse\_Matrix() to print the reverse of the matrix

Reverse\_Matrix(M, NbRows,NbColumns);

return 0;

}//End of main ()

// Define a function to enter the elements of a matrix

void Read\_Matrix(int M[ROWS][COLUMNS], int NbRows, int NbColumns) {

cout<<endl<<endl<<"Users Input Contents of Array as follow:"<<endl<<endl;

//Inner for loop to read no of rows a user inputted

for (row=0;row<NbRows;row++) {

//Outer for---loop to count values in columns as user inputted

for(col=0;col<NbColumns;col++){

cout<<"Enter Values in Row["<<row<<"]["<<col<<"]:";

cin>>M[row][col];

} //End of inner loop

cout<<endl;

} //End of outer loop

cout<<endl<<endl;

} //End of Read\_Matrix()

//Define a function to print the contents of Array or

//The matrix inputted by the user

void Print\_Matrix(int M[ROWS][COLUMNS], int NbRows, int NbColumns) {

cout<<"The Matrix you entered is as follows:"<<endl<<endl;

//Outer for--loop to count the no of rows

for(row=0;row<NbRows;row++) {

//Inner for---loop to count the no of columns

for(col=0;col<NbColumns;col++ ){

//Print the contents of Array in Matrix form

cout<<setw(5)<<M[row][col];

} //End of inner loop

cout<<endl;

} //End of outer loop

} //End of Print\_Matrix()

1. Refer the C++ code you write in Q15 and Define a function by the name Reverse\_Matrix() used to print the reverse of the contents of array in matrix form.

//Define a Reverse\_Matrix() to print the reverse of matrix

void Reverse\_Matrix(int M[ROWS][COLUMNS], int NbRows, int NbColumns){

cout<<endl<<endl<<endl<<"The Reverse of a Matrix is as follows:"<<endl<<endl;

//Outer for--loop to cunt the no of rows

for(row=NbRows-1;row>=0;row--) {

//Inner for---loop to count the no of columns

for(col=NbColumns-1;col>=0;col--){

//Print the reverse of contents of Array

cout<<setw(5)<<M[row][col];

} //End of inner loop

cout<<endl;

} //End of outer loop

}//End of Reverse\_Matrix()

1. Refer the C++ code you write in question no. 15 and modify the program to print the contents of array and its reverse of the contents of Array. The program does not read the contents of array rather the 2D array you declare as with some initialized value. Do not for get to declare the necessary variables such as index variables, const variables to determine the dimensions of rows and columns, variables used to accept number of rows and columns from the user and function declaration and definitions to perform its required operation when it is called.
2. Write C++ program to calculate addition of two matrix declared as 3x3 array and displays the contents of the 1st, 2nd matrix, sum of the two matrix and reverse of contents of sum of the two matrix. Use the following additional information to write the program:

* Declare two 2D Array of 3 by 3 matrix globally
* Declare global array to store addition of the two matrix.
* Declare index variable globally to control the loop while counting rows and columns to read contents from the user and displays the contents as output
* Declare local variables to limit the number of rows and columns while users are inputting the contents.
* The program performs the following operations:
* Read the contents of the first and second matrix separately.
* Display the contents the first and 2nd matrix separately
* Calculate addition of the two matrix and displays the contents of the sum and its reverse of the contents of the sum of the two matrix.

#include<iostream>

#include<iomanip>

using namespace std;

//Declaration of 3 x3 two 2D array globally

int a[3][3],b[3][3];

//Declaration of global array to store addition of two matrix

int sum[3][3];

//Declaration of index variables globally to control loop

int i, j;

//Main Function

int main (){

//Declaration of local variables to accept no of rows & cols from the user

int r, c;

//User assign no of rows and columns

cout<<"User Input the number of rows and columns as follows:"<<endl<<endl;

cout<<"Enter number of Rows:";

cin>>r;

cout<<"Enter number of columns:";

cin>>c;

//Nested for Loop to store contents of the 1st matrix

cout<<endl<<endl<<"User Input Contents of the 1st Matrix as follows:"<<endl<<endl;

//Outer for loop to read the no of rows of the 1st Matrix

for(i=0; i<r; i++){

//Outer for loop to read the no of cols of the 1st Matrix

for(j=0;j<c;j++){

cout<<"Enter Contents of 1st Matrix["<<i<<"]["<<j<<"]:";

cin>>a[i][j];

}//End of inner for Loop

cout<<endl;

}//End of outer for Loop

cout<<"User Input Contents of the 2nd Matrix as follows:"<<endl<<endl;

//Outer for loop to read the no of rows of the 2nd Matrix

for(i=0; i<r; i++){

//Inner for loop to read the no of cols of the 2nd Matrix

for(j=0;j<c;j++){

cout<<"Enter Contents of 2nd Matrix["<<i<<"]["<<j<<"]:";

cin>>b[i][j];

}//End of inner for Loop

cout<<endl;

}//End of outer for Loop

//Nested for Loop to display the contents of the first Matrix

cout<<"Contents of the first Matrix:"<<endl<<endl;

//Outer for---loop to count no of rows in 1st matrix

for(i=0;i<r;i++){

//Inner for---loop to count no of cols in 1st matrix

for(j=0;j<c;j++){

//Display Contents of the 1st Matrix

cout<<setw(5)<<a[i][j]<<" ";

}//End of outer For Loop

cout<<endl;

}//End of outer For Loop

//Nested for Loop to display the contents of the first Matrix

cout<<endl<<endl<<"Contents of the 2nd Matrix:"<<endl<<endl;

//Outer for---loop to count no of rows in 2nd matrix

for(i=0;i<r;i++){

//Inner for---loop to count no of cols in 2nd matrix

for(j=0;j<c;j++){

//Display Contents of the 2nd Matrix

cout<<setw(5)<<b[i][j]<<" ";

}//End of outer For Loop

cout<<endl;

}//End of outer For Loop

//Nested for----loop used to calculate addition of two matrix

//And store the contents on the array of sum

cout<<endl<<endl<<"Addition of 2 Matrix is as follows:"<<endl<<endl;

//Outer for---loop to count no of rows

for(i=0;i<r;i++){

//Inner for----loop to count no of cols

for(j=0;j<c;j++){

//Calculate the sum of the two Matrix and stores on sum

sum[i][j]=a[i][j]+b[i][j];

//Display the contents of addition of two matrix

cout<<setw(5)<<sum[i][j]<<" ";

}//End of inner for Loop

cout<<endl;

}//End of outer For Loop

//Nested for----loop to display the reverse of contents of Array

cout<<endl<<endl<<"Reverse of Sum of two Matrix is:"<<endl<<endl;

//Outr for loop to count the number of cols

for(i=r-1;i>=0;i--){

//Inner for----loop to count the no of colmns

for(j=c-1;j>=0;j--){

cout<<setw(5)<<sum[i][j]<<" ";

}//End of inner For loop()

cout<<endl;

}//End of Outer for---loop

return 0;

}//End of main

1. Refer the C++ code in Q 18 and modify the source code to calculate addition of the two 2D array or matrix by adding function declaration and definition by the name Read\_Matrix1()-to read the contents of the first matrix from the user, Read\_Matrix2()-to print the contents of the 2nd matrix from the user, Print\_Matrix1()-to print the contents of the first matrix, Read\_Matrix2()-to print the contents of the 2nd matrix, Sum\_Matrix()-to calculate addition of two matrix and display its contents and Reverse\_Sm\_Matrix()-to display the contents of the reverse of addition of the two matrix. All the functions perform its required operation when it is called. And also add the following additional information to your program declared globally in order to be used as the dimensions of rows and columns as array is declared

const int r=10;

const int c=10;

#include<iostream>

#include<iomanip>

using namespace std;

//Declaration of const global variables to indicates

//the dimensions of rows and columns as follows respectively

const int r=10;

const int c=10;

//Declaration of functions or prototype

void Read\_Matrix1(int m[r][c], int, int);

void Read\_Matrix2(int n[r][c], int, int);

void Print\_Matrix1(int m[r][c], int, int);

void Print\_Matrix2(int n[r][c], int, int);

void Sum\_Matrix(int s[r][c], int, int);

void Reverse\_Sum\_Matrix(int sr[r][c], int, int);

//Declaration of two 2D array globally and use the const

//Variables as row and col dimenshions

int a[r][c];

int b[r][c];

//Declaration of global array to store addition of two matrix

int sum[r][c];

//Declaration of global index variables to control loop

int i, j;

//Main Function

int main(){

// Declaration of Variables local to main () used

//to store the number of rows and columns used as a hint

//to determine how many contents users input in rows and cols

int NbRows, NbColumns;

cout<<"\*\*\*\*\*\*\*\*\*\*\*\* Users Input Number of rows and columns \*\*\*\*\*\*\*\*\*:"<<endl<<endl;

cout<<"Enter Number of Rows:";

cin>>NbRows;

cout<<"Enter Number of Columns:";

cin>>NbColumns;

// call Read\_Matrix1() to read contents the 1st Matrix inputted by the user

Read\_Matrix1(a,NbRows, NbColumns);

// call Read\_Matrix1() to read contents the 1st Matrix inputted by the user

Read\_Matrix2(b,NbRows, NbColumns);

//Call Print\_Matrix1() to displays the contents of the 1st Matrix

Print\_Matrix1(a, NbRows,NbColumns);

//Call Print\_Matrix1() to displays the contents of the 1st Matrix

Print\_Matrix2(b, NbRows,NbColumns);

//Call Sum\_Matrix() to calculate and display the contents of addtion of the two matrix

Sum\_Matrix(sum, NbRows, NbColumns);

//Call Reverse\_Sum\_Matrix() to print the reverse of the contents of sum matrix

Reverse\_Sum\_Matrix(sum, NbRows,NbColumns);

return 0;

}//End of main ()

//Define Read\_Matrix1() to read the contents of the 1st Matrix

void Read\_Matrix1(int m[r][c], int NbRows, int NbColumns){

//Nested for Loop to store contents of the 1st matrix

cout<<endl<<endl<<"Input Contents of the 1st Matrix as follows:"<<endl<<endl;

//Outer for loop to read the no of rows of the 1st Matrix

for(i=0; i<NbRows; i++){

//Outer for loop to read the no of cols of the 1st Matrix

for(j=0;j<NbColumns;j++){

cout<<"Enter Contents of 1st Matrix["<<i<<"]["<<j<<"]:";

cin>>m[i][j];

}//End of inner for Loop

cout<<endl;

}//End of outer for Loop

}//End of Read\_Matrix1()

//Define Read\_Matrix2() to read the contents of the 2nd Matrix

void Read\_Matrix2(int n[r][c],int NbRows,int NbColumns){

//Nested for Loop to store contents of the 1st matrix

cout<<endl<<endl<<"\*\*\*\*\*\*\*\*Input Contents of the 2nd Matrix\*\*\*\*\*\*\*\*\*\*:"<<endl<<endl;

//Outer for loop to read the no of rows of the 2nd Matrix

for(i=0; i<NbRows; i++){

//Outer for loop to read the no of cols of the 2nd Matrix

for(j=0;j<NbColumns;j++){

cout<<"\*\*\*\*\*\*\*Enter Contents of 1st Matrix\*\*\*\*\*\*\*\*["<<i<<"]["<<j<<"]:";

cin>>n[i][j];

}//End of inner for Loop

cout<<endl;

}//End of outer for Loop

}//End of Read\_Matrix2()

//Define Print\_Matrix1() to print the contents of the 1st Matrix

void Print\_Matrix1(int m[r][c],int NbRows,int NbColumns){

cout<<endl<<endl<<"\*\*\*\*\*\*\*\*\*Contents of the 1st Matrix as follows\*\*\*\*\*\*\*\*:"<<endl<<endl;

//Outer for loop to print the no of rows of the 1st Matrix

for(i=0; i<NbRows; i++){

//Outer for loop to print the no of cols of the 1st Matrix

for(j=0;j<NbColumns;j++){

//Display the Contents of the first Array

cout<<setw(5)<<m[i][j]<<" ";

}//End of inner for Loop

cout<<endl;

}//End of outer for Loop

}//End of Print\_Matrix1()

//Define Print\_Matrix2() to print the contents of the 2nd Matrix

void Print\_Matrix2(int n[r][c],int NbRows,int NbColumns){

cout<<endl<<endl<<"\*\*\*\*\*\*\*\*\*Contents of 2nd Matrix is as follows \*\*\*\*\*\*\*\*\*\*:"<<endl<<endl;

//Outer for loop to print the no of rows of the 2nd Matrix

for(i=0; i<NbRows; i++){

//Outer for loop to print the contents of cols of the 2nd Matrix

for(j=0;j<NbColumns;j++){

//Display the Contents of the first Array

cout<<setw(5)<<n[i][j]<<" ";

}//End of inner for Loop

cout<<endl;

}//End of outer for Loop

}//End of Print\_Matrix2()

//Define Sum\_Matrix() to calculate and print the contents of the two Matrix

void Sum\_Matrix(int s[r][c],int NbRows,int NbColumns){

cout<<endl<<endl<<"\*\*\*\*\*\*Addition of 2 Matrix is as follows\*\*\*\*\*\*\*:"<<endl<<endl;

//Outer for---loop to count no of rows and print the contents

for(i=0;i<NbRows;i++){

//Inner for----loop to count no of cols and print the contents

for(j=0;j<NbColumns;j++){

//Calculate sum of the two Matrix and stores the contents on array sum

sum[i][j]=a[i][j]+b[i][j];

//Display the contents of addition of the two matrix

cout<<setw(5)<<sum[i][j]<<" ";

}//End of inner for Loop

cout<<endl;

}//End of outer For Loop

}//End of Sum\_Matrix()

//Define Reverse\_Sum\_Matrix() print the reverse of contents of the sum Matrix

void Reverse\_Sum\_Matrix(int ss[r][c],int NbRows,int NbColumns){

cout<<endl<<endl<<"\*\*\*\*\*\* Reverse of Addition of 2 Matrix \*\*\*\*\*\*\*:"<<endl<<endl;

//Outer for---loop to count no of rows and print the contents

//of Array in reverse order

for(i=NbRows-1;i>=0;i--){

//Inner for----loop to count no of cols and print the contents

//of Array in the Reverse order

for(j=NbColumns-1;j>=0;j--){

//Calculate sum of the two Matrix and stores the contents on array sum

sum[i][j]=a[i][j]+b[i][j];

//Display the contents of addition of the two matrix

cout<<setw(5)<<sum[i][j]<<" ";

}//End of inner for Loop

cout<<endl;

}//End of outer For Loop

}//End of Reverse\_Sum\_Matrix ()

1. Declare two 2D global array and write C++ program to find or calculate the product of two matrix based on the following additional information.

* Declare const global variable to be used as dimensions of rows and columns for the two matrix.
* Declare two 2D global array that represents array of two matrix and another global array to store the product of the two matrix.
* Declare global or local index variables to control and count the nested for ---loop when it reads the contents of the two matrix, print the contents of the two matrix, calculate the product of the two matrix and displays its contents of the product and its reverse of the contents of the product of the two matrix .
* Declare local variables to determine how many number of rows and columns of contents of array needs to input.
* Declare and define a function by the name:
* Read\_Matrix1()- to read the contents of the first matrix while the users input its content
* Read\_Matrix2()- to read the contents of the 2nd matrix while the users input its content
* Print\_Matrix1()- to print or displays the contents of the first matrix.
* Print\_Matrix2()- to print or displays the contents of the 2nd matrix.
* Pro\_Matrix()- to calculate product of the two matrix and displays the contents the product.
* Reverse\_Pro\_Matrix()-to display the contents of the reverse of the product of the two matrix.
* All the functions perform its required operation when it is called by passing arrays as an argument or a parameter to a function