Department of IT and Computer Science
Pak-Austria Fachhochschule: Institute of Applied Sciences
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COMP-201L Data Structures and Algorithms Lab

Lab Report: 01

Class: Computer Science

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Semester: Third

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Instructor Signature

Lab No. 1

C++ Review

Objectives:

- To Review the basic concepts of C++.
- To Review Arrays, how to declare, initialize and access 2D and 3D arrays Implement Arrays in C++.

Tools/Software Required:

C++ Compiler

Introduction:

Basic concepts of C++, Arrays, declaration, initialize and access 2D and 3D arrays.

Lab Tasks:

Lab Task 01:

You're given with marks of 10 students in Mathematics, write a program to determine the grade of each student.
80, 72, 93, 87, 90, 55, 66, 74, 69, 56

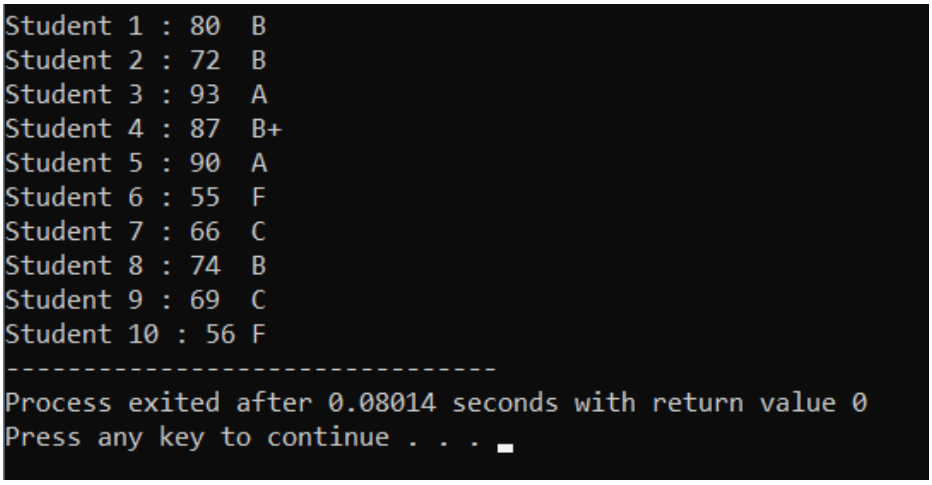
Assume:
Grade is A if score is equal and greater than 90
Grade is B+ if score is less than 90 and greater than 81
Grade is B if score is less than 82 and greater than 71
Grade is C if score is less than 72 and greater than 66
Grade is D if score is less than 66 and greater than 59
Grade is F if score is less than 60.

Code:

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

void Marks(int*);

int main()
{
	int a[10] = {80, 72, 93, 87, 90, 55, 66, 74, 69, 56};
	Marks(a);
	delete[] a;
}

void Marks(int a[])
{
		for(int i=0;i<10;i++)
	{
		cout<<"\nStudent "<<i+1<<" : "<<a[i]<<"\t";
		if(a[i]>=90)
		cout<<'A';

		else if(a[i]<90 && a[i]>=81)
		cout<<"B+";
```

```
            else if(a[i]<82 && a[i]>=71)
            cout<<'B';
            else if(a[i]<72 && a[i]>=66)
            cout<<'C';

            else if(a[i]<66 && a[i]>=60)
            cout<<'D';

            else if(a[i]<60)
            cout<<'F';

        }
}
```

Output:



Lab Task 02:

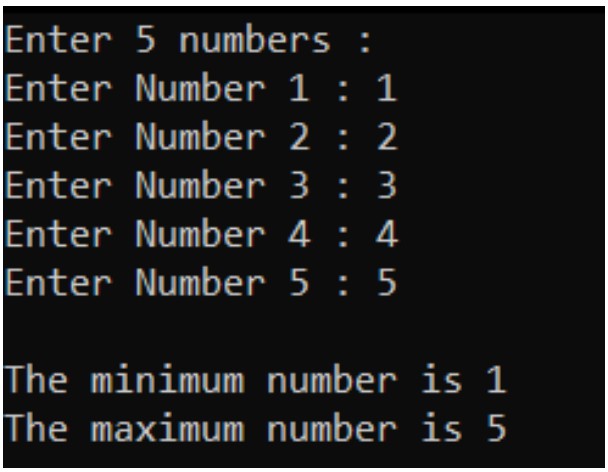
Write a program to ask user to enter 5 floating numbers and find the maximum and minimum of all by calling min() and max() functions

Code:

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


float min(float a[],int size)
{
	float min=a[0];

	for(int i=0;i<size;i++)
	{
		if(min>a[i])
		min=a[i];
	}

	return min;
}

float max(float a[],int size)
{
	float max=a[0];

	for(int i=0;i<size;i++)
	{
		if(max<a[i])
		max=a[i];
	}

	return max;
}
```

```
int main()
{
	float a[5];

	cout<<"Enter 5 numbers :\n";

	for(int i=0;i<5;i++)
	{
		cout<<"Enter Number "<<i+1<<" : ";
		cin>>a[i];
	}

	cout<<"\nThe minimum number is "<<min(a,5);
	cout<<"\nThe maximum number is "<<max(a,5);
	delete[] a;
}
```

Output:



Lab Task 03:

Write a program that shows following output

Code:

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

void PrintHistogram(int a[],int size)
{
	int temp;
	cout<<"\nElement\tValue\tHistogram\n";

	for(int i=0;i<10;i++)
	{
		cout<<i<<"\t"<<a[i]<<"\t";
		temp=a[i];

		for(int i=1;i<=temp;i++)
		cout<<"*";

		cout<<endl;
	}
}

int main()
{
	int size=10;
	int a[size];
	cout<<"Please enter 10 integers :\n";

	for(int i=0;i<size;i++)
	{
		cout<<"Enter Number "<<i+1<<" : ";
		cin>>a[i];
	}

	PrintHistogram(a,size);
	delete[] a;
}
```

Output:

```
Please enter 10 integers :
Enter Number 1 : 1
Enter Number 2 : 2
Enter Number 3 : 3
Enter Number 4 : 4
Enter Number 5 : 5
Enter Number 6 : 6
Enter Number 7 : 7
Enter Number 8 : 8
Enter Number 9 : 9
Enter Number 10 : 10

Element Value   Histogram
0       1       *
1       2       **
2       3       ***
3       4       ****
4       5       *****
5       6       ******
6       7       *******
7       8       ********
8       9       *********
9       10      **********
```

Lab Task 04:

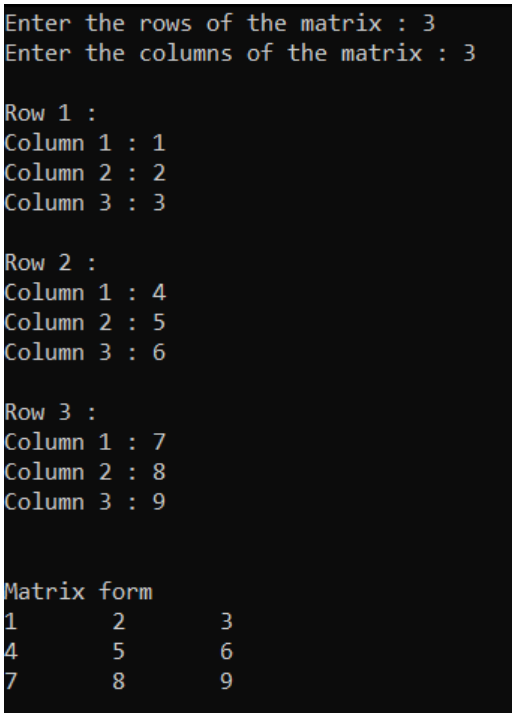
Write a program that will print multi-subscripted array as shown below using function printArray().

Code:

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

void PrintArray(int *a,int rows,int col)
{
	cout<<"\n\nMatrix form\n";

	for(int i=0;i<rows;i++)
	{
		for(int j=0;j<col;j++)
		{
			cout<<*((a+i*col)+j)<<"\t";
		}
		cout<<endl;
	}
}


int main()
{
	int rows,col;

	cout<<"Enter the rows of the matrix : ";
	cin>>rows;

	cout<<"Enter the columns of the matrix : ";
	cin>>col;

	int a[rows][col];

	for(int i=0;i<rows;i++)
	{
		cout<<"\nRow "<<i+1<<" :\n";
```

```
            for(int j=0;j<col;j++)
            {
                cout<<"Column "<<j+1<<" : ";
                cin>>a[i][j];
            }
        }

        PrintArray(*a,rows,col);

        delete[] a;
}
```

Output:



Results & Observations:

In this lab, we have learnt the basics of arrays and multi-dimensional arrays. We can use arrays to hold values of the same data type. We can modify values and use these values for different purposes as well.