BSc (Hons) in Information Technology
Year 1

Lab Sheet 09

IT1010 – Introduction to Programming — Semester 1, 2021

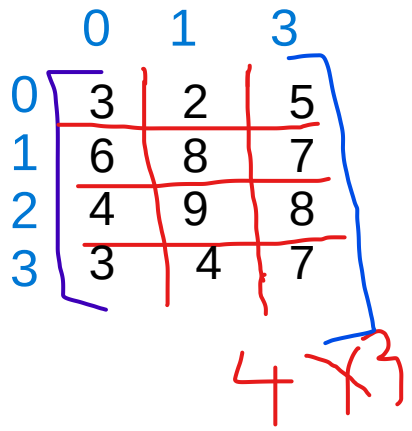
Objectives:
At the end of the class the students should be able to:

- Use 2D arrays in C programs.

Exercise 1

Following is a sample C program that reads a series of integer numbers from the keyboard and store them within a 2D array called ***numbers***. Next, the array elements are displayed in a tabular format.

```
#include <stdio.h>
int main(void)
{
	int numbers[4][3] = {0};
	int i, j;

	for(i = 0; i < 4; i++) //Store integer values
	{
		for(j = 0; j < 3; j++)
		{
			printf("Enter integer value : ");
			scanf("%d", &numbers[i][j]);
		}
	}

	printf("\nArray Elements : ");

	for(i = 0; i < 4; i++) //Display array element
	{
		for(j = 0; j < 3; j++)
		{
			printf("%d\t", numbers[i][j]);
		}
	}

	return 0;
}
```



i) Type the given C program in Dev C++.
ii) Compile and run the C program.
iii) Set a break point at the second statement in the main program.
iv) Using debugging option, add watches to the array and the variable.
v) Using next line button, execute remaining statements and check how the array elements are changed while taking user inputs.

Exercise 2

units [3][4]

Following is a sample C program that has a 2D array called ***units*** which stores the number of electricity units used for four months by three customers. The following details need to be stored within the 2D array as user inputs.

	Month 01	Month 02	Month 03	Month 04
Customer ID **01**	110	120	105	145
Customer ID **02**	85	100	140	75
Customer ID **03**	180	150	160	155

The program needs to display the maximum number of electricity units used with the customer id and the month.

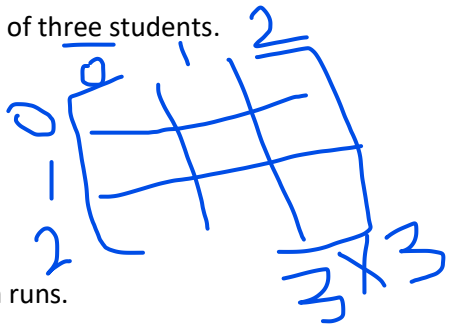
```
#include <stdio.h>
int main(void)
{
	int units[3][4] = {0};
	int i, j, max, cusId, month;

	for(i = 0; i < 3; i++) //Store user input
	{
		printf("Details of Cutomer ID %d\n", i + 1);
		for(j = 0; j < 4; j++)
		{
			printf("Enter no. of units for month %d : ", j + 1);
			scanf("%d", &units[i][j]);
		}
		printf("\n");
	}

	max = units[0][0];

	for(i = 0; i < 3; i++) //Find maximum value
	{
		for(j = 0; j < 4; j++)
		{
			if(units[i][j] >=max)
			{
				max = units[i][j];
				cusId = i + 1;
				month = j + 1;
			}
		}
	}

	printf("For month %d, Customer ID %d has ", month, cusId);
	printf("maximum units : %d\n", max);

	return 0;
}
```

missed

i) Type the given C program in Dev C++.
ii) Compile and run the C program.
iii) Set a break point at the second statement in the main program.
iv) Using debugging option, add watches to the array and the variables.
v) Using next line button execute remaining statements, check how the array elements and variable values are changed.

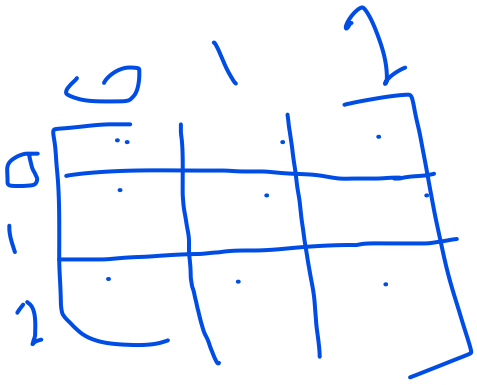
Exercise 3

i) Write a C program to do the following.
   a) Create a 2D array called ***mark*** to store the exam marks for three modules of three students.
   b) Input the exam marks from the keyboard and store them in the array.
   c) Calculate and display average mark of each student.



ii) Compile and run the program.
iii) Set a break point at a suitable statement of the main program.
iv) Using debugging option, add watches to the declared variables and arrays.
v) Using next line button, execute remaining statements see how the C program runs.

Sample output



Student no : 1
Score 1 : 45
Score 2 : 80
Score 3 : 80

Student no : 2
Score 1 : 60
Score 2 : 50
Score 3 : 70

Student no : 3
Score 1 : 56

Score 2 : 85
Score 3 : 90

Student No	Exam Scores			Average
1	45	80	80	68.33
2	60	50	70	60.00
3	56	84	90	76.67