Department of ICT
Faculty of Technology
University of Ruhuna

Programming Practicum – ICT1142 **Level 1- Semester 1**

Lab Sheet 10 – Part 02 **| 2022**

Objective:

The purpose of this lab session is to study on Array of pointers, Command line arguments, Dynamic memory allocation and static variables.

Exercise 1

Type the following code and understand how an array of pointer can be initialized and processed.

```
#include <stdio.h>
int main( )
{
        int *arr[4];
        int a=5, b=25, c=12,d=76;
        arr[0]=&a; arr[1]=&b; arr[2]=&c; arr[3]=&d;
        for (int i=0; i<4; i++)
                printf("the value is %d=%d, address is %p\t\n", i, (*arr[i]), arr[i]);
 return 0;
}
```

Modify the same program by adding following codes. Then compile, execute and observe the output.

```
        int arr1[3]={45,15,89};
        int *ptr1;
        ptr1= arr1;
        printf("the value is %d\n",*ptr1) ;
        ptr1++;
        printf("the value is %d\n",*ptr1) ;
        ptr1++;
        printf("the value is %d\n",*ptr1) ;
```

Exercise 2

Following C program accept command line arguments. Type and save the program as C_agru.c and then compile and run the program as follows.

Compile:

$> gcc C_agru.c –o output

Run:

$> ./output **4 6 C_argu.c**

Observe output…..

```
#include <stdio.h>
#include <stdlib.h> /* for atoi() */
   int main(int argc,char *argv[]) {
      int m,n;
      if (argc != 4) {
         printf("Format must be: %s m n filename\n",argv[0]);
         return 1;
      }
      m = atoi(argv[1]); /* convert strings to integers */
      n = atoi(argv[2]);
      printf("%s received m=%i n=%i filename=%s\n",argv[0],m,n,argv[3]);
      return 0;

  }
```

Exercise 3

Write a C program to input marks of three subjects and name of the exam as command line arguments and then calculate the average of marks. Finally display all the information to the screen.

Exercise 4

Type and run the following program to get understanding about static variable.

```
#include <stdio.h>
void display();
int main(){
        display();
        display();
}
void display(){
        static int c = 0;
        printf("%d  ",c);
        c += 5;
}
```

Exercise 5

Type and execute the program and get an idea on dynamic memory allocation in C

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

int main() {

   char name[25];
   char *description;

   strcpy(name, "Faculty of Technology");

   /* allocate memory dynamically */
   description = malloc( 200 * sizeof(char) );

   if( description == NULL ) {
      printf("Error - unable to allocate required memory\n");
   }
   else {
      strcpy( description, "I am a student of University of Ruhuna");
   }
   printf("Description: %s\n", description );
   printf("Name = %s\n", name );

/* release memory using free() function */
   free(description);

   return 0;
}
```

Exercise 6

Write a C program to get command line arguments in the below format.

integer1 integer2 operation

Ex: 45 23 add

12 10 subtract

The “operation” can be, add, multiply, subtract and divide. After taking the inputs your program should perform the necessary action on the two integers according to the “operation”. You should create separate functions to perform different operations. Prototype of one function is given below.

void sum(int x, int y);

Hint: use string comparisons to identify the operation you entered.

Your program should give necessary error messages to the user when required.