Lab Manual – 00

Course Title : Algorithm Lab

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Topic : Revise C programming

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❖C Programming

➢ Introduction:

C is a general-purpose, procedural computer programming language supporting structured programming, lexical variable scope, and recursion, while a static type system prevents unintended operations. It was developed by Dennis Ritchie in 1972-73.

❖ Outcome:

- Learn how to run a simple code
- Uses of for loop
- Define a structure
- Define Array, String
- Define function
- Define Recursion function

❖ Simple Code

❖ First C Program:

```
#include <stdio.h>
int main()
{
   printf("Hello World!\n");
   return 0;
}
```

Output
Hello world!

Problem: Write a program that print the sum of two integers value.

```
#include<stdio.h>

int main()

{

   int num1,num2;

   int sum;

   printf("Enter Number 1: ");

   scanf("%d",&num1);

   printf("Enter Number 2: ");

   scanf("%d",&num2);

   sum = num1+num2;
```

```
    printf("\nThe Sum is : %d",sum);
    return 0;
}
```

Input	Output
Number 1: 5 Number 2: 6	Sum is : 6
Number 1: 10 Number 2: 25	Sum is : 35

❖ Loop (For)

In programming, a loop is a sequence of instructions that is continuously repeated until a certain condition is reached. Using loop, it is possible to short the largest code.

Syntax: for (i = 0; i<n; i++)

initialize; condition; increment/decrement

Problem: Write a program that print 'C Programming' how many times user want.

```
#include<stdio.h>
int main()
{
   int times,i;
   printf("Enter How Many Times : ");
   scanf("%d",&times);
   for(i=0;i<times;i++)
   {
      printf("C Programming\n");
   }
   return 0;
}
```

Input	Output
How Many Times : 3	C Programming C Programming C Programming
How Many Times : 2	C Programming C Programming

❖ Structure

A struct in the C programming language is a composite data type declaration that defines a physically grouped list of variables under one name in a block of memory, allowing the different variables to be accessed via a single pointer or by the struct declared name which returns the same address.

Problem: Write a program that read a person's information and display these info using structure.

```
#include <stdio.h>
#include <string.h>
struct Person
{
    char name[30];
    int age;
    char home[30];
    char university[20];
} p1;
int main()
{
    printf("Enter Person Information :\n");
    printf("Name: ");
    scanf("%s", p1.name);
    printf("Age: ");
    scanf("%d", &p1.age);
    printf("Home: ");
    scanf("%s", p1.home);
    printf("University: ");
    scanf("%s", p1.university);
    printf("\nPerson Information :\n");
    printf("Name: ");
    printf("%s\n", p1.name);
    printf("Age: ");
```

```
    printf("%d\n", p1.age);
    printf("Home: ");
    printf("%s\n", p1.home);
    printf("University: ");
    printf("%s\n", p1.university);
    return 0;
}
```

Input	Output
Enter Person Information : Name : Bijoy Age : 20 Home : Tangail University : DIU	Person Information : Name : Bijoy Age : 20 Home : Tangail University : DIU

❖ Array

Array is most important term in programming. Array is a variable that can store multiple values. We can also say that array is a one kind of data structure that can store fixed size of sequential collection of elements or collection of variables which is same type. Declaration of an array is [datatype array Name [arraySize];]. Suppose you need to store 100 integer type data, you should use an array and the declaration of this int arr[100]. By solving following problems, it will be to clear how it's woks.

Problem: Write a program that can declare the array and store the value of 1 to 100. You should also print these number.

```
#include <stdio.h>
int main()
{
int i, arr[100];
int j = 0;
for(i=1; i<=100; i++)
{
arr[j] = i;
j++;
}
for(i=0; i<100; i++)
```

```
{
printf("%d ", arr[i]);
}
printf("\n");
return 0;
}
```

Input	Output
No Input	1 2 3 4 ……..100

❖ String

"Basically, String in C is a one type of character Array. There is no direct string in C. Declaration of string is ' char string_name[size]. In given example we will try to clear your knowledge about String".

Problem: Write a program that declare a string and print the string.

```
#include <stdio.h>
int main()
{
char str[] = "Farjana";
printf("1st Way: %s\n", str);
char str1[10] = "Farjana";
printf("Second way: %s\n", str);
char str2[] = {'F', 'a', 'r', 'z', 'a','n','a', '\0'};
///add null character in end cause every string has null character
at end
printf("Third way: %s\n", str2);
char str3[20] = {'F', 'a', 'r', 'z', 'a','n','a', '\0'};
printf("Fourth way: %s\n", str3);
return 0;
}
```

Input	Output
No Input	1st way : Farjana 2nd way : Farjana 3rd way : Farzana 4th way : Farzana

Problem: Write a program that read a string and display the given string.

```
#include <stdio.h>

int main()

{

char str[50];

///read string

scanf("%s", str);

/// do not need to use ampercent(&) due to %s

printf("The given string is: %s\n", str);

return 0;

}
```

Input	Output
Bijoy	The given string is : Bijoy
Sadi	The given string is : Sadi

❖ Function

A function is a block of code that perform specific task. The idea is to put some commonly or repeatedly done task together and make a function so that instead of writing the same code again and again for different inputs, we can call the function. Functions help us to reduce code redundancy. Let's look an example, suppose you need to calculate sum of multiple values 5 times with three values for every time. What we will do? Generally, we have to write code for 5 times for calculating this. But if we write function for this, we need to pass the values to function and it is possible to get the result. There are two types of function, one is build-in function(printf(), scanf(), gets(), etc) and user define function. In this chapter we will discuss about user define function.

Problem: Write a program that create a function and print from user define function.

```
#include <stdio.h>

int funny() /// int = return type of your function

{

printf("This is user define function\n");

}
```

```
int main()
{
printf("This is a main function\n");
printf("Enter 1 for printing from another function: ");
int n;
scanf("%d", &n);
if(n==1) funny();
else printf("Wrong Input\n");
return 0;
}
```

Input	Output
Input :1	This is a main function This is user define function

❖ Recursion Function

Recursion is a programming technique that allows the programmer to express operations in terms of themselves. In C, this takes the form of a function that calls itself. A useful way to think of recursive functions is to imagine them as a process being performed where one of the instructions is to "repeat the process".

Problem: Write a code to find Sum of Natural Numbers Using Recursion.

```
#include <stdio.h>
int addNumbers(int n);
int main() {
   int num;
   printf("Enter a positive integer: ");
   scanf("%d", &num);
   printf("Sum is= %d",addNumbers(num));
   return 0;
}
int addNumbers(int n) {
   if(n != 0)
```

```
    {
        return n + addNumbers(n - 1);
    }
    else
    {
        return n;
    }
}
```

Input	Output
Enter a Positive Number : 4	Sum is = 10
Enter a Positive Number : 20	Sum is = 210

“Happy Coding”

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