CC – 112L

Programming Fundamentals

Lab – 04

Introduction to Selection Statements and Iteration Statements in C

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Contents

Learning Objective

- **Selection Statements in C (if, if-else, switch)**
- **Iteration Statements in C (while, for, do-while)**

Required Resources

- Desktop Computer or Laptop
- Microsoft VS Code

General Instructions

- In this Lab, you are NOT allowed to discuss your solution with your colleagues, even not allowed to ask how he/she is doing, this may result in negative marking. You can **ONLY** discuss with your Teaching Assistants (TAs) or Lab Instructor.
- This lab contains both **in-lab** and **post-lab** tasks. The **in-lab** tasks are to be **completed and evaluated during the lab timings**. The **post-lab** tasks are to be submitted at **bcsf19m002@pucit.edu.pk. The submission deadline is Sunday, 11: 59 pm, 15-10-2023.**
- For the post-lab submissions, **you must use your pucit email ids.** You should zip all of your work (**.c files only**) into a folder named with your Roll No. and Lab No. e.g., **BITF22M001_L04**. The subject of the email should be '**Lab 04 Submission**'. All of your code must be **properly indented.** You must strictly follow the instructions. You will be penalized for not following the instructions.

Selection Statements in C

1. If Selection Statement or Single Selection Statement:

The if selection statement either selects (performs) an action if a condition is true or skips the action if the condition is false. The if statement is called a **single-selection statement** because it selects or ignores a single action.

```c
//C Program to demonstrate the syntax of if statement
#include<stdio.h>

int main()
{
    int num = 9;

    // if statement with true condition
    if (num < 10) {
        printf("%d is less than 10", num);
    }

    // if statement with false condition
    if (num > 20) {
        printf("%d is greater than 20", num);
    }

    return 0;
}
```

Output: 9 is less than 10

2. If … else Selection Statement or Double Selection Statement:

The if…else selection statement performs an action if a condition is true and performs a different action if the condition is false. The if…else statement is called **a double-selection statement** because it selects between two different actions.

```c
// C Program to demonstrate the use of if-else statement
#include <stdio.h>

int main()
{

    // if block with condition at the start
    if (5 < 10) {

        // will be executed if the condition is true
        printf("5 is less than 10.");
    }

    // else block after the if block
    else {

        // will be executed if the condition is false
        printf("5 is greater that 10.");
    }

    return 0;
}
```

Output: 5 is less than 10.

3. Switch Selection Statement or Multi Selection Statement:

The switch selection statement performs one of many different actions, depending on the value of an expression. The switch statement is called a **multiple-selection statement** because it selects among many different actions.

```c
// C program to print the day using switch
#include <stdio.h>

// Driver Code
int main()
{
    int day = 2;

    printf("The day with number %d is ", day);
    switch (day) {
    case 1:
        printf("Monday");
        break;
    case 2:
        printf("Tuesday");
        break;
    case 3:
        printf("Wednesday");
        break;
    case 4:
        printf("Thursday");
        break;
    case 5:
        printf("Thursday");
        break;
    case 6:
        printf("Thursday");
        break;
    case 7:
        printf("Thursday");
        break;
    default:
        printf("Invalid Input");
        break;
    }
    return 0;
}
```

Output: The day with number 2 is Tuesday

Iteration Statements in C

1. While Loop

An iteration statement (also called a repetition statement or loop) allows you to specify that an action is to be repeated while some condition remains true.

i. Counter-Controlled Iterations

In a counter-controlled loop the number of iterations is known before the loop begins executing.

```c
// C program to demonstrate while loop
#include <stdio.h>

int main()
{
    // Initialization of loop variable
    int i = 0;

    // setting test expression as (i < 5), means the loop
    // will execute till i is less than 5
    while (i < 5) {

        // loop statements
        printf("Learning Programming Fundamentals\n");

        // updating the loop variable
        i++;
    }
    return 0;
}
```

Output:
Learning Programming Fundamentals
Learning Programming Fundamentals
Learning Programming Fundamentals
Learning Programming Fundamentals
Learning Programming Fundamentals

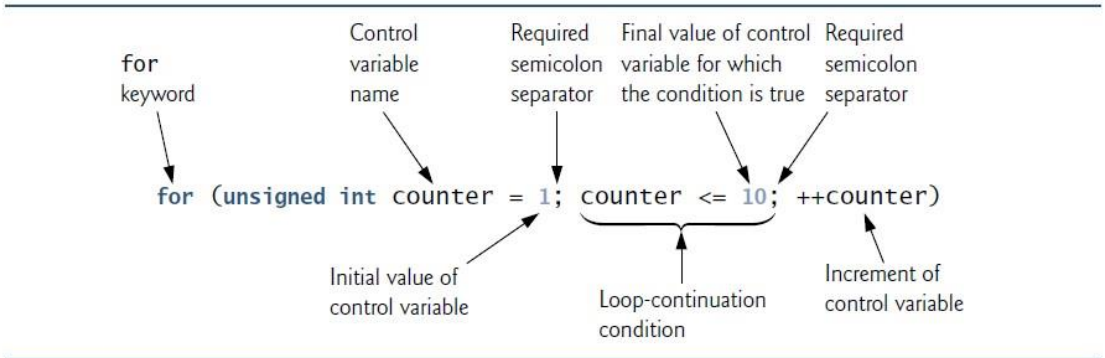
ii. Sentinel-Controlled loop

Sentinel value (also called a signal value, a dummy value, or a flag value) is used to indicate “end of data entry.” Sentinel-controlled iteration is often called **indefinite iteration** because the number of iterations isn’t known before the loop begins executing.

```c
// C Program to Demonstrate Sentinel Controlled While
#include<stdio.h>

int main()
{
    int userInput;

    // Prompt the user to enter a number
    printf("Enter a number (0 to quit): ");

    // Read the user's input
    scanf("%d", &userInput);

    while (userInput != 0) {
        // Perform some action with the user's input
        printf("You entered: %d\n", userInput);

        // Prompt the user to enter another number
        printf("Enter a number (0 to quit): ");

        // Read the user's input again
        scanf("%d", &userInput);
    }

    printf("Goodbye! You entered 0 to quit.\n");

    return 0;
}
```

Output:
Enter a number (0 to quit): 5
You entered: 5
Enter a number (0 to quit): 6
You entered: 6
Enter a number (0 to quit): 0

2. For Loop



```c
// C program to demonstrate for loop
#include <stdio.h>

int main()
{
    // i is the control variable with the initial value 1
    // i <= 5 is the loop continuation condition
    //i is being incremented by 1

    // conditional statement
    for (int i = 1; i <= 5; i++)
    {
        // statement will be printed
        printf("Learning Programming Fundamentals\n");
    }

    return 0;
}
```

Output:
Learning Programming Fundamentals
Learning Programming Fundamentals
Learning Programming Fundamentals
Learning Programming Fundamentals
Learning Programming Fundamentals

3. Do … while Loop

The do…while in C is a loop statement used to repeat some part of the code till the given condition is fulfilled. It is a form of an **exit-controlled** or **post-tested loop** where the test condition is checked after executing the body of the loop. Due to this, the statements in the do…while loop will always be executed at least once no matter what the condition is.

```c
// C Program to demonstrate the use of do...while loop
#include <stdio.h>

int main()
{

    // loop variable declaration and initialization
    int i = 0;
    // do while loop
    do {
        printf("Learning Programming Fundamentals\n");
        i++;
    } while (i < 3);

    return 0;
}
```

Now, we are done studying the concepts. You can attempt the in-lab tasks now. Happy Coding!

In-Lab Tasks:

Time Duration: 1.5 hour Total Marks: 60

1. Write a C program to check whether the triangle is equilateral (all 3 sides are equal), isosceles (2 of the sides are equal) or scalene (none of the sides are equal) triangle. (10 marks).
2. Create a program that takes an integer (1-12) as input and uses a switch statement to display the name of the corresponding month (e.g., 1 for January, 2 for February, and so on). (10 marks)
3. Write a C program that takes test scores in a PF quiz for 10 students and display the average by using a while loop. (10 marks)
4. Modify your program in from Q3 so that instead of inputting scores for only 10 students, it now keeps taking input until the teacher (user) presses -1. (Use sentinel-controlled while loop). (10 marks)
5. Now, implement the same logic from Q4 using do … while loop. (10 marks)
6. Write a C program to find the sum of all **even** numbers between 2 and 100 (both inclusive) by using a for loop. You are not allowed to use an if statement in this question. (10 marks)

Post-Lab Tasks:

Note: Will be posted after the lab.