Experiment - 7

Set up a C programming environment in Ubuntu and write a simple C program to demonstrate compilation and execution using gcc.

Installing GCC Compiler On Ubuntu

- GCC, or the “GNU Compiler Collection,” is a suite of powerful compilers used by developers to write and compile code in various programming languages.
- Installation steps:

  Step 1: Open the Terminal

  Press Ctrl+Alt+T on your keyboard to open the Ubuntu terminal. This is where we’ll run the installation commands.

Step 2: Update Package Lists

Before we install GCC, let's ensure that our package lists are up to date. Enter the following command and press Enter:

sudo apt update

Step 3: Install GCC

Now, it's time to install GCC. Enter the following command and press Enter:

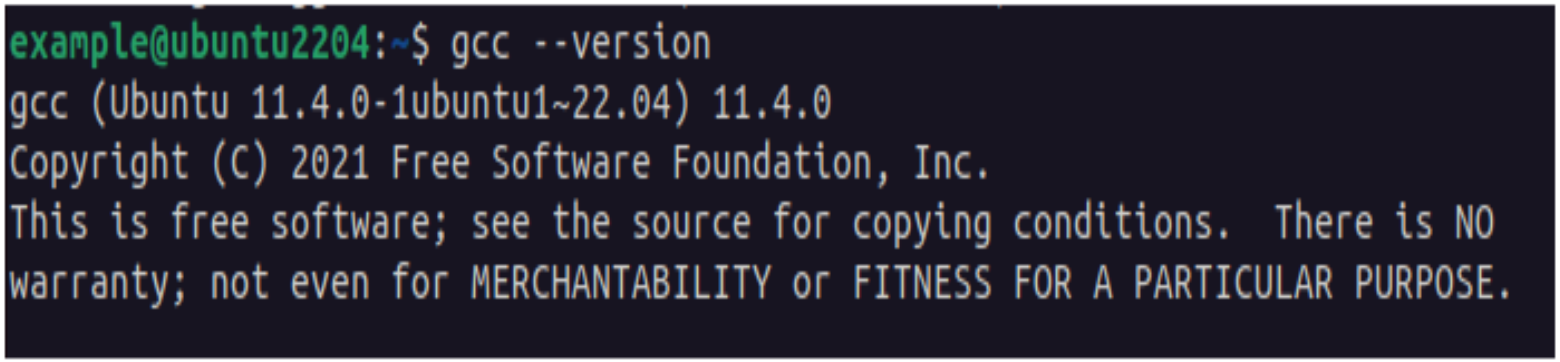
sudo apt install gcc

- Ubuntu will ask you to confirm the installation. Type 'Y' and press Enter to proceed.
- This will install GCC from the Ubuntu repositories.

Step 4: Verify the Installation

To make sure GCC is installed correctly, you can check the compiler version by running the following command:

gcc --version



- Problem: Write a C program that allows the user to perform basic operations on an array of integers. The program should allow the user to input an array of integers and then calculate and display the following:

  1. The **average** of the array elements.
  2. The **maximum** element in the array.

Algorithm

1. **Start**
2. **Input the Size of the Array**
   - Prompt the user to enter the number of elements, n, they want in the array.
   - Store this value in variable n.
3. **Declare the Array**
   - Declare an integer array arr of size n to hold the user's input.
4. **Input the Array Elements**
   - Call the function input_array(arr, n) to prompt the user to input n integer values, storing each value in the array arr.

input_array Function:

- Loop through the array indices from 0 to n-1
- For each index, prompt the user to input the element and store it in the respective array position.

5. **Calculate the Average**

- Call the function calculate_average(arr, n) to compute the average of the array elements.

calculate_average Function:

- Initialize a variable sum to 0.
- Loop through the array indices from 0 to n-1, adding each element of the array to sum.
- After the loop ends, calculate the average by dividing sum by n.
- Return the calculated average.

6. **Find the Maximum Element**

   - Call the function find_maximum(arr, n) to find the largest value in the array.

   find_maximum Function:

   - Initialize a variable max to the first element of the array (arr[0]).
   - Loop through the array from index 1 to n-1.
   - If any element is greater than max, update max to that element.
   - Return the value of max.

7. **Display the Results**

   - Print the calculated average (formatted to 2 decimal places).
   - Print the maximum element found in the array.

8. **End**

```c
#include <stdio.h>

// Function to calculate the average of an array
float calculate_average(int arr[], int n) {
    int sum = 0;
    for (int i = 0; i < n; i++) {
        sum += arr[i];
    }
    return (float)sum / n;
}

// Function to find the maximum element in the array
int find_maximum(int arr[], int n) {
    int max = arr[0];
    for (int i = 1; i < n; i++) {
        if (arr[i] > max) {
            max = arr[i];
        }
    }
    return max;
}
```

```c
// Function to input array from the user
void input_array(int arr[], int n) {
    for (int i = 0; i < n; i++) {
        printf("Element %d: ", i + 1);
        scanf("%d", &arr[i]);
    }
}
```

```c
int main() {
    int n;

    // Asking user for the number of elements in the array
    printf("Enter the number of elements in the array: ");
    scanf("%d", &n);

    int arr[n];  // Declare array of size n

    // Input the array elements from the user
    printf("Enter %d elements:\n", n);
    input_array(arr, n);

    // Calculate average and find maximum
    float avg = calculate_average(arr, n);
    int max = find_maximum(arr, n);

    // Print the results
    printf("\nAverage of the array: %.2f\n", avg);
    printf("Maximum element in the array: %d\n", max);

    return 0;
}
```

```
Enter the number of elements in the array: 5
Enter 5 elements:
Element 1: 12
Element 2: 45
Element 3: 23
Element 4: 78
Element 5: 34

Average of the array: 38.40
Maximum element in the array: 78
```