Tribhuwan University
Institute of Engineering
Purbanchal Campus, Dharan

C Lab Report

Submitted By:

Name: Tilak Thapa

Roll No: PUR079BCT094

Submitted To:

Department of Electronic and Computer Engineering

Lab Date:

Submission Date:

Signature:

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Lab Sheet 1

1. WAP to display Hello, World!.

➢ Objective

The objective of this program is to write a code that displays the message "Hello, World!" on the console.

➢ Code

```
#include <stdio.h>

int main( ) {
   printf("Hello, World!\n");
   return 0;
}
```

➢ Output

```
Hello, World!
```

2. WAP to display your name, roll number and address

Objective

The objective of this program is to write a code that displays your name, roll number, and address on the console.

Code

```c
#include <stdio.h>

int main( )
{
   printf("Name: Tilak Thapa\n");
   printf("Roll Number: PUR079BCT094\n");
   printf("Address: Tulsipur - 4, Dang\n");
   return 0;
}
```

Output

```
Name: Tilak Thapa
Roll Number: PUR079BCT094
Address: Tulsipur - 4, Dang
```

3. WAP to add two integer variables and print sum

➢ Objective

The objective of this program is to write a code that adds two predefined integer variables and prints their sum.

➢ Code

```
#include <stdio.h>

int main( )
{
   int num1 = 10;
   int num2 = 20;
   int sum = num1 + num2;
   printf("Sum: %d\n", sum);
   return 0;
}
```

➢ Output

```
Sum: 30
```

4. WAP to multiply two integer variables and print product

➢ Objective

The objective of this program is to write a code that multiplies two integer variables and prints their product.

➢ Code

```
#include <stdio.h>

int main()
{
   int num1 = 5;
   int num2 = 6;
   int product = num1 * num2;
   printf("Product: %d\n", product);
   return 0;
}
```

➢ Output

```
Product: 30
```

5. WAP to calculate and display the simple interest.

Objective

The objective of this program is to write a code that calculates and displays the simple interest based on predefined values for principal amount, rate, and time.

Code

```
#include <stdio.h>

int main()
{
   float principal = 1000;
   float rate = 5.5;
   float time = 2.5;
   float interest = (principal * rate * time) / 100;
   printf("Simple Interest: Rs %f\n", interest);
   return 0;
}
```

Output

```
Interest: Rs 137.500000
```

6. WAP to calculate the area of the circle

➢ Objective

The objective of this program is to write a code that calculates the area of a circle based on a predefined radius.

➢ Code

```
#include <stdio.h>

int main( )
{
   const float PI = 3.14159;
   float radius = 2.5;
   float area = PI * radius * radius;
   printf("Area of the circle: %.2f sq unit.\n", area);
   return 0;
}
```

➢ Output

```
Area of the circle: 19.63 sq unit.
```

Lab Sheet 2

1. WAP to declare integer, float and character variable. Initialize them with certain value and print those values. Also display the size of variables.

➢ Objective

The objective of this program is to write a code that declares integer, float, and character variables, initializes them with certain values, and prints the values. Additionally, the program will display the size of each variable.

➢ Code

```
#include <stdio.h>

int main( )
{
   int integerVariable = 10;
   float floatVariable = 3.14;
   char charVariable = 'A';

   printf("Integer Variable: %d\n", integerVariable);
   printf("Float Variable: %f\n", floatVariable);
   printf("Character Variable: %c\n\n", charVariable);

   printf("Size of Integer Variable: %d bytes\n", sizeof(integerVariable));
   printf("Size of Float Variable: %d bytes\n", sizeof(floatVariable));
   printf("Size of Character Variable: %d bytes\n", sizeof(charVariable));

   return 0;
}
```

➢ Output

```
Integer Variable: 10
Float Variable: 3.140000
Character Variable: A

Size of Integer Variable: 4 bytes
Size of Float Variable: 4 bytes
Size of Character Variable: 1 bytes
```

2. WAP to swap the values of the variable with and without using third variable.

➢ Objective

The objective of this program is to write a code that swaps the values of two variables, both with and without using a third variable.

I. Approach 1 (Using third variable)

➢ Code

```
#include <stdio.h>

int main( )
{
   int num1 = 10;
   int num2 = 20;
   int temp;

   printf("Before swapping:\n");
   printf("num1 = %d\n", num1);
   printf("num2 = %d\n", num2);

   temp = num1;
   num1 = num2;
   num2 = temp;

   printf("After swapping (using third variable):\n");
   printf("num1 = %d\n", num1);
   printf("num2 = %d\n", num2);

   return 0;
}
```

➢ Output

```
Before swapping:
num1 = 10
num2 = 20
After swapping (using third variable):
num1 = 20
num2 = 10
```

II. Approach 2 (Without Using Third Variable)

➢ Code

```
#include <stdio.h>

int main()
{
   int num1 = 10;
   int num2 = 20;

   printf("Before swapping:\n");
   printf("num1 = %d\n", num1);
   printf("num2 = %d\n", num2);

   num1 = num1 + num2;
   num2 = num1 - num2;
   num1 = num1 - num2;

   printf("After swapping (without using third variable):\n");
   printf("num1 = %d\n", num1);
   printf("num2 = %d\n", num2);

   return 0;
}
```

➢ Output

```
Before swapping:
num1 = 10
num2 = 20
After swapping (without using third variable):
num1 = 20
num2 = 10
```

3. WAP to calculate the area and volume of a cylinder using pre-processor directive for value of PI.

Objective

The objective of this program is to write a code that calculates the area and volume of a cylinder using a preprocessor directive for the value of pi.

Code

```
#include <stdio.h>

#define PI 3.14159

int main( )
{
   float radius = 2.5;
   float height = 5.0;
   float area, volume;

   area = 2 * PI * radius * (radius + height);
   volume = PI * radius * radius * height;

   printf("Area of the cylinder: %.2f\n", area);
   printf("Volume of the cylinder: %.2f\n", volume);

   return 0;
}
```

Output

```
Area of the cylinder: 117.81
Volume of the cylinder: 98.17
```

4. WAP to input two numbers from user and display the minimum using conditional operator.

➢ Objective

The objective of this program is to write a code that takes two numbers as input from the user and displays the minimum of the two numbers using the conditional operator.

➢ Code

```
#include <stdio.h>

int main( )
{
   int num1, num2, minimum;

   printf("Enter the first number: ");
   scanf("%d", &num1);

   printf("Enter the second number: ");
   scanf("%d", &num2);

   minimum = (num1 < num2) ? num1 : num2;

   printf("The minimum number is: %d\n", minimum);

   return 0;
}
```

➢ Output

```
Enter the first number: 4
Enter the second number: 5
The minimum number is: 4
```

5. WAP to display whether a number is even or odd using conditional operator

➢ Objective

The objective of this program is to write a code that takes a number as input from the user and displays whether the number is even or odd using the conditional operator.

➢ Code

```
#include <stdio.h>

int main( )
{
   int number;
   char *result;
   printf("Enter a number: ");
   scanf("%d", &number);
   result = (number % 2 == 0) ? "even" : "odd";
   printf("The number is %s.\n", result);
   return 0;
}
```

➢ Output

```
Enter a number: 6
The number is even.
```

6. What are the output of the following programs:

➢ Objective

The objective is to find the input of given code.

➢ Code

```
#include <stdio.h>
int main()
{
   int a = 5, b = 9;
   printf("a = %d, b = %d\n", a, b);
   printf("a&b = %d\n", a & b);
   printf("a|b = %d\n", a | b);
   printf("a^b = %d\n", a ^ b);
   printf("(a<<b) = %d\n", (a << 2));
   printf("(b<<a) = %d\n", (b << 2));
   printf("(a>>b) = %d\n", (a >> 2));
   printf("(b>>a) = %d\n", (b >> 2));
   return 0;
}
```

➢ Output

```
a = 5, b = 9
a&b = 1
a|b = 13
a^b = 12
(a<<b) = 20
(b<<a) = 36
(a>>b) = 1
(b>>a) = 2
```

Lab Sheet 3

1. Write a C program to check whether a number is negative, positive, or zero.

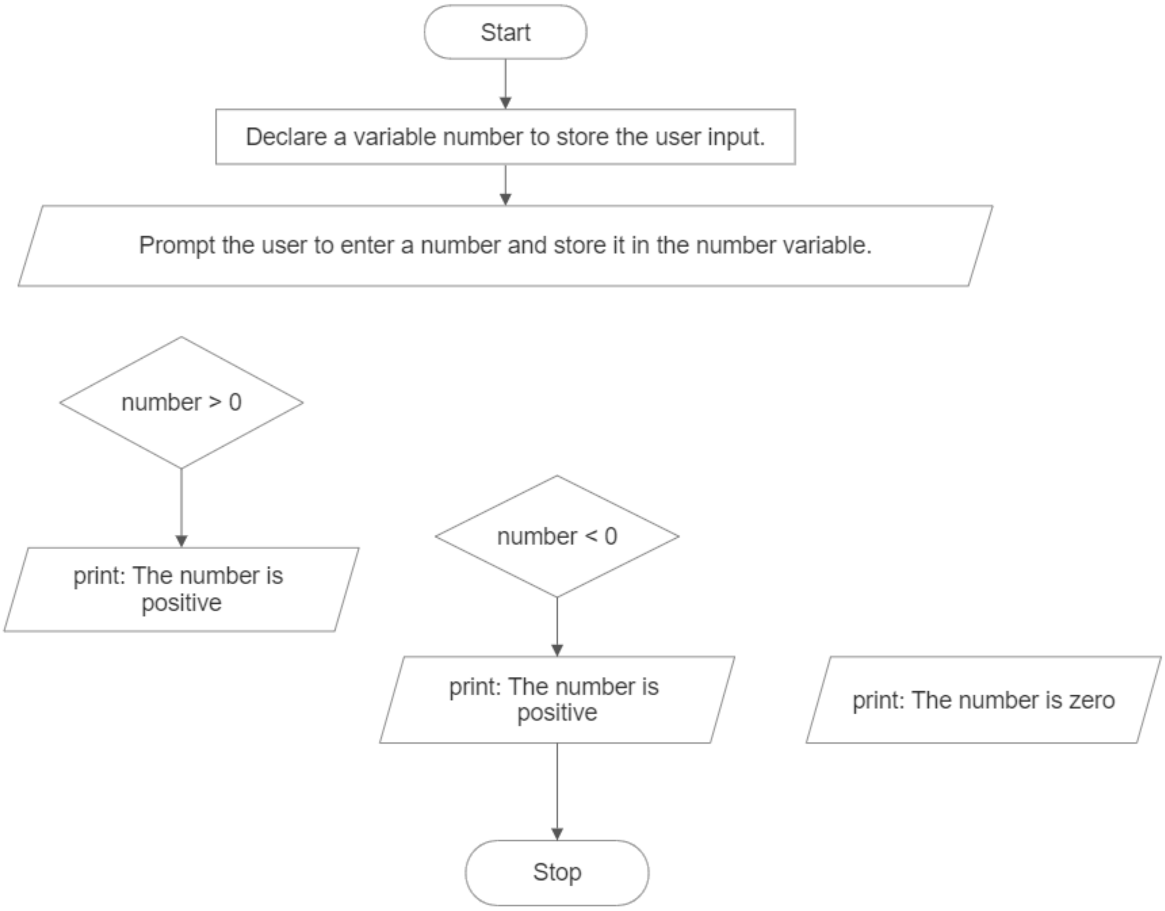
➢ Objective

The objective of this program is to write a code that takes a number as input from the user and determines whether the number is negative, positive, or zero. The program will use conditional statements to check the value of the number and display the appropriate message indicating its classification.

➢ Algorithm

```
i. Start.
ii. Declare a variable number to store the user input.
iii. Prompt the user to enter a number and store it in the number variable.
iv. Use conditional statements to check the value of the number:
v. If number is greater than 0, print "The number is positive."
vi. If number is less than 0, print "The number is negative."
vii. If number is equal to 0, print "The number is zero."
viii. Stop.
```

➢ Flowchart


Start
Declare a variable number to store the user input.
Prompt the user to enter a number and store it in the number variable.
number > 0
print: The number is positive
number < 0
print: The number is positive
print: The number is zero
Stop

➢ Code

```
#include <stdio.h>

int main( )
{
   int number;

   printf("Enter a number: ");
   scanf("%d", &number);

   if (number > 0)
      printf("The number is positive.\n");
   else if (number < 0)
      printf("The number is negative.\n");
   else
      printf("The number is zero.\n");

   return 0;
}
```

➢ Output

```
Enter a number: 5
The number is positive.
```

➢ Discussion and Conclusion

This program takes a number as input from the user and determines whether the number is negative, positive, or zero using conditional statements. The user is prompted to enter a number, which is stored in the number variable. The program checks the value of the number using conditional statements (if, else if, and else) and prints the appropriate message indicating whether the number is positive, negative, or zero. The program was implemented using the VS Code IDE and compiled using GCC to generate an executable file. By using conditional statements, the program accurately classifies the input number based on its value.

2. WAP to find maximum between three numbers entered by the user.

➢ Objective

The objective of this program is to write a code that takes three numbers as input from the user and determines the maximum among them. The program will use conditional statements to compare the values of the three numbers and display the maximum value.

➢ Algorithm

i. Start.

ii. Declare three variables num1, num2, and num3 to store the user input and another variable called max to store maximum number.

iii. Prompt the user to enter three numbers and store them in the respective variables.

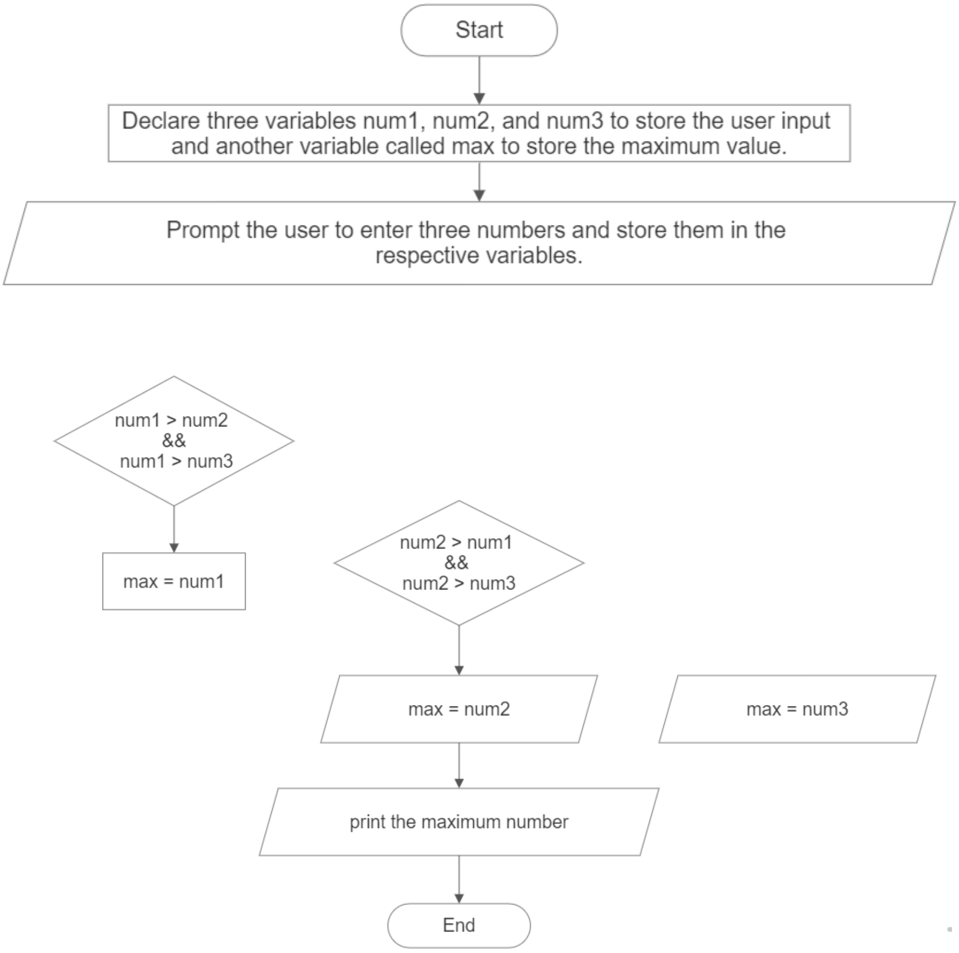
iv. Use conditional statements to compare the values of the three numbers:

- If num1 is greater than both num2 and num3, it is the maximum.
- If num2 is greater than both num1 and num3, it is the maximum.
- If num3 is greater than both num1 and num2, it is the maximum.

v. Print the maximum value.

vi. End the program.

➢ Flowchart


Start
Declare three variables num1, num2, and num3 to store the user input and another variable called max to store the maximum value.
Prompt the user to enter three numbers and store them in the respective variables.
num1 > num2 && num1 > num3
max = num1
num2 > num1 && num2 > num3
max = num2
max = num3
print the maximum number
End

Code

```
#include <stdio.h>

int main()
{
   int num1, num2, num3, max;

   printf("Enter three numbers: ");
   scanf("%d %d %d", &num1, &num2, &num3);

   if (num1 > num2 && num1 > num3)
      max = num1;
   else if (num2 > num1 && num2 > num3)
      max = num2;
   else
      max = num3;

   printf("The maximum number is: %d\n", max);

   return 0;
}
```

Output

```
Enter three numbers: 1 2 2
The maximum number is: 2
```

Discussion and Conclusion

This program takes three numbers as input from the user and determines the maximum among them using conditional statements. The user is prompted to enter three numbers, which are stored in the variables num1, num2, and num3. The program compares the values of these numbers using conditional statements (if and else if) and assigns the maximum value to the variable max. Finally, the program prints the maximum number. The program was implemented using the VS Code IDE and compiled using GCC to generate an executable file. By comparing the values of the three numbers, the program accurately determines the maximum value.

3. WAP to input a character from the user and check whether the character is vowel or consonant.

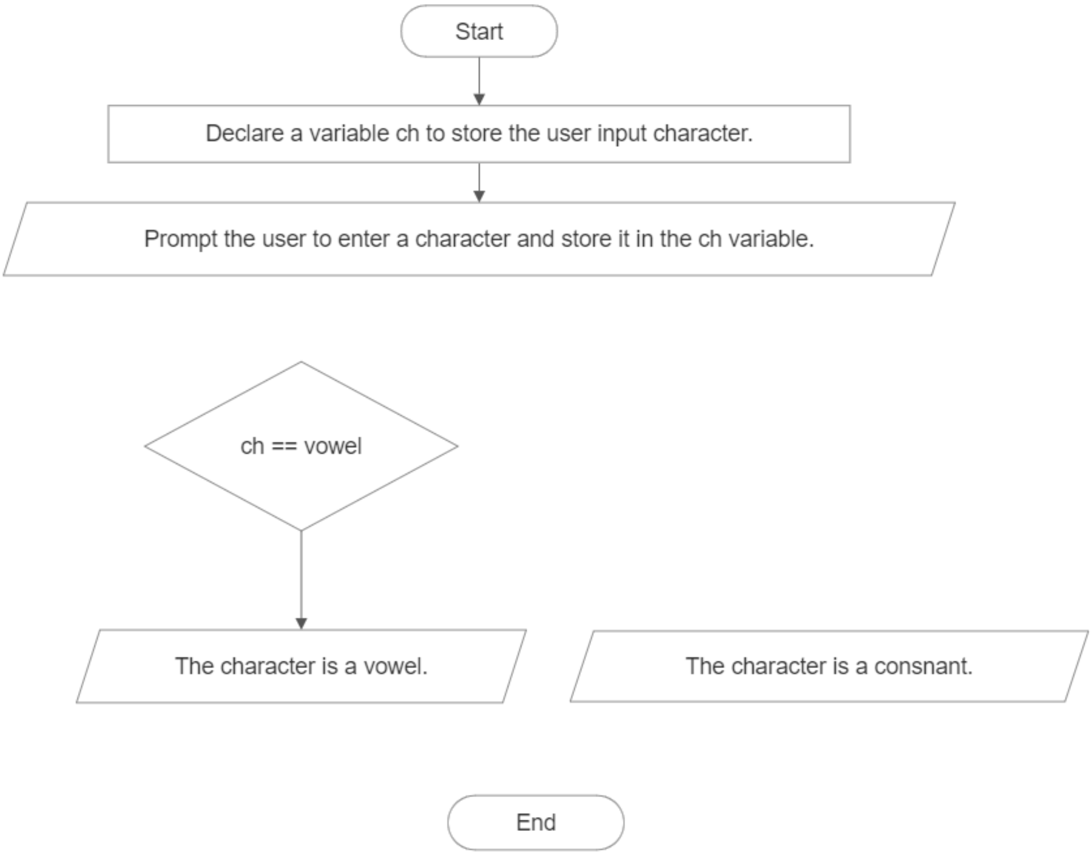
➢ Objective

The objective of this program is to write a code that takes a character as input from the user and determines whether the character is a vowel or a consonant.

➢ Algorithm

```
i. Start.
ii. Declare a variable ch to store the user input character.
iii. Prompt the user to enter a character and store it in the ch variable.
iv. Use conditional statements to check if the character is a vowel or a consonant:
    • If ch is equal to 'a', 'e', 'i', 'o', or 'u', it is a vowel.
v. If the character is a vowel, print a message indicating that it is a vowel.
vi. If the character is not a vowel, print a message indicating that it is a consonant.
vii. Stop.
```

➢ Flowchart


Start
Declare a variable ch to store the user input character.
Prompt the user to enter a character and store it in the ch variable.
ch == vowel
The character is a vowel.
The character is a consnant.
End

Code

```
#include <stdio.h>

int main( )
{
   char ch;

   printf("Enter a character: ");
   scanf(" %c", &ch);

   if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u' ||
      ch == 'A' || ch == 'E' || ch == 'I' || ch == 'O' || ch == 'U')
   {
      printf("The character is a vowel.\n");
   }
   else
   {
      printf("The character is a consonant.\n");
   }

   return 0;
}
```

Output

```
Enter a character: r
The character is a consonant.
```

Discussion

This program takes a character as input from the user and checks whether the character is a vowel or a consonant using conditional statements. The user is prompted to enter a character, which is stored in the variable ch. The program compares the value of ch with the vowels ('a', 'e', 'i', 'o', 'u') in both lowercase and uppercase forms to determine whether it is a vowel. If it is a vowel, the program prints a message indicating that it is a vowel. If it is not a vowel, the program considers it a consonant and prints a corresponding message. The program was implemented using the VS Code IDE and compiled using GCC to generate an executable file. By comparing the value of the character with the predefined vowels, the program accurately determines whether it is a vowel or a consonant.

4. WAP to input a character from the user and check whether the character is Alphabet or not. If the character is alphabet then show whether it is uppercase or lowercase

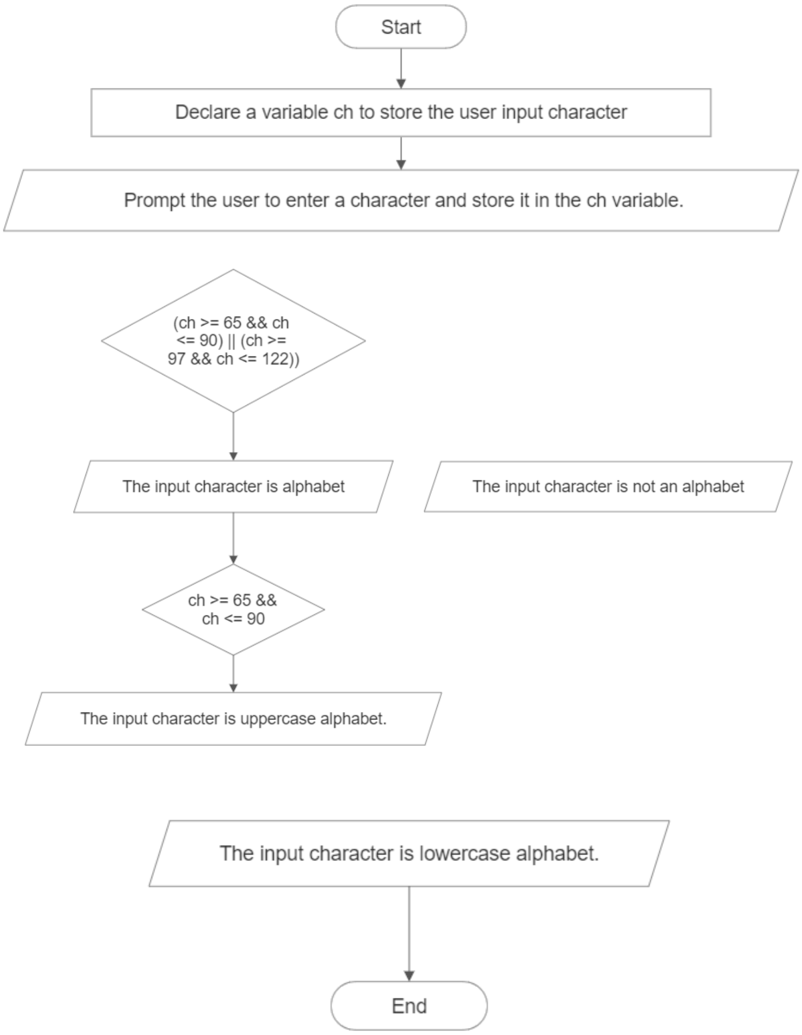
Objective

The objective of this program is to write a code that takes a character as input from the user and determines whether the character is an alphabet or not. If the character is an alphabet, the program will further identify whether it is in uppercase or lowercase.

Algorithm

```
i. . Start.
ii. Declare a variable ch to store the user input character.
iii. Prompt the user to enter a character and store it in the ch variable.
iv. Use conditional statements to check if the character is an alphabet:
v. If the ASCII value of ch is within the range of uppercase letters (65 to 90) or lowercase letters
      (97 to 122), it is an alphabet.
vi. If the character is an alphabet, further check whether it is in uppercase or lowercase:
vii. If the ASCII value of ch is within the range of uppercase letters (65 to 90), it is an uppercase
      letter and if the ASCII value of ch is within the range of lowercase letters (97 to 122), it is a
      lowercase letter.
viii. Print the appropriate message indicating the result.
ix. Stop.
```

Flowchart


Start
Declare a variable ch to store the user input character
Prompt the user to enter a character and store it in the ch variable.
(ch >= 65 && ch <= 90) || (ch >= 97 && ch <= 122))
The input character is alphabet
The input character is not an alphabet
ch >= 65 && ch <= 90
The input character is uppercase alphabet.
The input character is lowercase alphabet.
End

Code

```
#include <stdio.h>

int main()
{
   char ch;

   printf("Enter a character: ");
   scanf(" %c", &ch);

   if ((ch >= 65 && ch <= 90) || (ch >= 97 && ch <= 122))
   {
      printf("The character is an alphabet.\n");

      if (ch >= 65 && ch <= 90)
         printf("It is in uppercase.\n");
      else
         printf("It is in lowercase.\n");
   }
   else
   {
      printf("The character is not an alphabet.\n");
   }

   return 0;
}
```

Output

```
Enter a character: e
The character is an alphabet.
It is in lowercase.
```

Discussion and Conclusion

This program takes a character as input from the user and checks whether the character is an alphabet or not using conditional statements. The user is prompted to enter a character, which is stored in the variable ch. The program compares the ASCII value of the character to determine if it falls within the range of uppercase or lowercase letters. If it is an alphabet, the program prints the appropriate messages indicating that it is an alphabet and whether it is in uppercase or lowercase. If it is not an alphabet, the program notifies the user accordingly. The program was implemented using the VS Code IDE and compiled using GCC to generate an executable file. By checking the ASCII value of the character, the program accurately determines whether it is an alphabet and its case.

5. WAP to check whether the year entered by the user is leap year or not

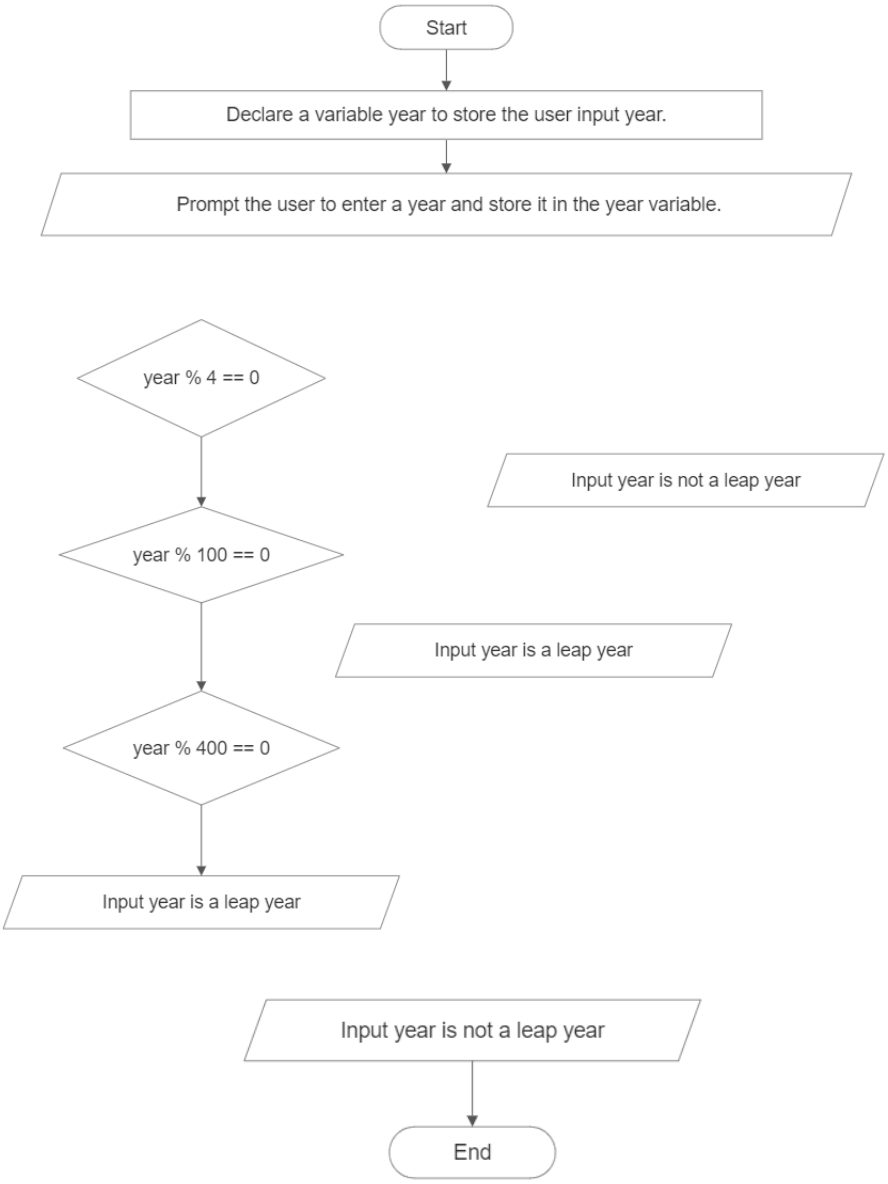
➢ Objective

The objective of this program is to write a code that takes a year as input from the user and determines whether the year is a leap year or not.

➢ Algorithm

```
i. . Start.
ii. Declare a variable year to store the user input year.
iii. Prompt the user to enter a year and store it in the year variable.
iv. Use conditional statements to check if the year is a leap year:
        • If the year is evenly divisible by 4, it is a potential leap year.
        • If the year is also divisible by 100, it must be divisible by 400 to be considered a leap year.
v. If the year satisfies the leap year conditions, print a message indicating that it is a leap year.
vi. If the year does not satisfy the leap year conditions, print a message indicating that it is not a
        leap year.
vii. Stop.
```

➢ Flowchart


Start
Declare a variable year to store the user input year.
Prompt the user to enter a year and store it in the year variable.
year % 4 == 0
Input year is not a leap year
year % 100 == 0
Input year is a leap year
year % 400 == 0
Input year is a leap year
Input year is not a leap year
End

➢ Code

```
#include <stdio.h>

int main( ) {
   int year;

   printf("Enter a year: ");
   scanf("%d", &year);

   if (year % 4 == 0) {
      if (year % 100 == 0){
         if (year % 400 == 0){
            printf("%d is a leap year.\n", year);
         } else {
            printf("%d is not a leap year.\n", year);
         }
      } else {
         printf("%d is a leap year.\n", year);
      }
   } else {
      printf("%d is not a leap year.\n", year);
   }

   return 0;
}
```

➢ Output

```
Enter a year: 2022
2022 is not a leap year.
```

➢ Discussion and Conclusion

The program checks whether a year entered by the user is a leap year or not. It uses nested if statements to evaluate the leap year conditions. First, it checks if the year is divisible by 4. If it is, it further checks if the year is divisible by 100. If it is divisible by 100, it checks if it is also divisible by 400. If it satisfies all these conditions, it is considered a leap year. Otherwise, it is not a leap year. The program then displays the result accordingly. The program successfully determines whether a given year is a leap year or not using nested if statements. It prompts the user for a year and applies the leap year conditions to determine the result. The program was implemented using the VS Code IDE and compiled with GCC. By using the nested if statements, the program accurately identifies leap years based on the defined rules.

6. WAP to check whether the number entered by the user is divisible by 5 and 11 or not.

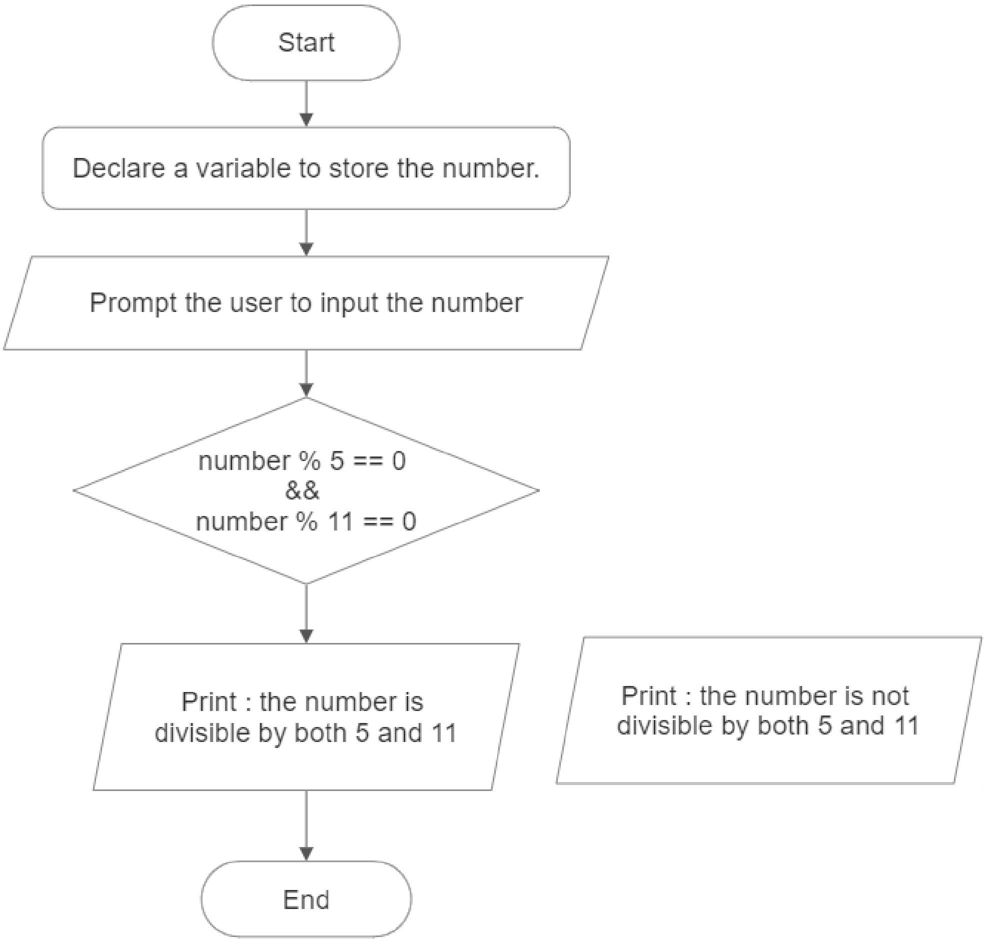
➢ Objective

The objective of this program is to write a code that takes a number as input from the user and determines whether the number is divisible by both 5 and 11 or not.

➢ Algorithm

```
i. Start.
ii. Declare a variable number to store the user input number.
iii. Prompt the user to enter a number and store it in the number variable.
iv. Use the modulus operator to check if the number is divisible by both 5 and 11:
v. If the number % 5 is equal to 0 and the number % 11 is equal to 0, it is divisible by both 5 and
      11.
vi. If the number is divisible by both 5 and 11, print a message indicating that it is divisible by 5
      and 11.
vii. If the number is not divisible by both 5 and 11, print a message indicating that it is not
      divisible by 5 and 11.
viii. Stop.
```

➢ Flowchart


Start
Declare a variable to store the number.
Prompt the user to input the number
number % 5 == 0
&&
number % 11 == 0
Print : the number is divisible by both 5 and 11
Print : the number is not divisible by both 5 and 11
End

➢ Code

```
#include <stdio.h>

int main()
{
   int number;

   printf("Enter a number: ");
   scanf("%d", &number);

   if (number % 5 == 0 && number % 11 == 0)
   {
      printf("%d is divisible by 5 and 11.\n", number);
   }
   else
   {
      printf("%d is not divisible by 5 and 11.\n", number);
   }

   return 0;
}
```

➢ Output

```
Enter a number: 55
55 is divisible by 5 and 11.
```

➢ Discussion and Conclusion

This program takes a number as input from the user and checks whether the number is divisible by both 5 and 11 using the modulus operator. If the number satisfies the conditions (number % 5 == 0 and number % 11 == 0), it is considered divisible by 5 and 11, and a corresponding message is displayed. Otherwise, a different message is printed. The program was implemented using the VS Code IDE and compiled using GCC. By applying the modulus operator, the program accurately determines the divisibility of the entered number by 5 and 11.