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Module 2

[Q_1] Research and provide three real-world applications where C programming is extensively used, such as in embedded systems, operating systems, or game development.

- Embedded System
  - Embedded System, It allow Low-Level access to memory and hardware.
  - It's found in devices like Microcontrollers, automobiles, medical devices, consumer electronics etc.

  Example:

  - Smart Home Application
- Operating System
  - C is backbone of many operating system because it offers a good balance between low-level system access and portability.
  - Its include kernel development, system libraries and utilities.

  Example:

  - Linux Kernel
  - Window System Component
- Game Development
  - C is still a critical language in game development. Especially in creation of game engines and in performance critical component.

  Example:

  - Game Engines
  - Graphics & Rendering

[Q_2] Install a C compiler on your system and configure the IDE. Write your first program to print "Hello, World!" and run it.

```
#include<stdio.h>

int main()

{
```

```
    printf("Hello World");
    return 0;
}
```

OUTPUT :---

Hello World

[Q_3] Write a C program that includes variables, constants, and comments. Declare and use different data types (int, char, float) and display their values.

```
#include<stdio.h>
int main()
{
    int n1;
    float n2;
    char c = 'a';
    printf("Enter Intger The Numerical Value Of N1:");
    scanf("%d", &n1);
    printf("The Intger Numerical Value Of N1 Is: %d", n1);
    printf("\nEnter Float The Numerical Value Of N2:");
    scanf("%f", &n2);
    printf("The Float Numerical Value Of N2 Is: %.2f", n2);
    printf("\nThe Character  Of c Is: %c", c);

    return 0;
}
```

OUTPUT:-

Enter Intger The Numerical Value Of N1:10

The Intger Numerical Value Of N1 Is: 10

Enter Float The Numerical Value Of N2:20.25

The Float Numerical Value Of N2 Is: 20.25

The Character Of c Is: a

[Q_4] Write a C program that accepts two integers from the user and performs arithmetic, relational, and logical operations on them. Display the results.

```
#include <stdio.h>
int main()
{
   int n1, n2;
   printf("Enter The Numerical Value Of N1:");
   scanf("%d", &n1);
   printf("Enter The Numerical Value Of N2:");
   scanf("%d", &n2);
   // Arethmatic Operaters
   printf("\nArithmeric Operaters");
   printf("\nThe Addition Of  %d and  %d is : %d", n1, n2, n1 + n2);
   printf("\nThe Subtraction Of  %d and  %d is : %d", n1, n2, n1 - n2);
   printf("\nThe Multiplication Of  %d and  %d is : %d", n1, n2, n1 * n2);
   printf("\nThe Division Of  %d and  %d is : %d", n1, n2, n1 / n2);
   printf("\nThe Modulo Of  %d and  %d is : %d", n1, n2, n1 % n2);
   // Relational Operaters
   printf("\nRelational Operaters");
   printf("\nThe Eqale Relational Operaters Of  %d ==  %d : %s ", n1, n2, (n1
== n2) ? "True" : "False");
   printf("\nThe Not Eqale Relational Operaters Of Of  %d !=  %d : %s ", n1,
n2, (n1 != n2) ? "True" : "False");
```

```
    printf("\nThe Greater Than Relational Operaters Of Of  %d >  %d: %s ", n1, n2, (n1 > n2) ? "True" : "False");

    printf("\nThe Less Than Relational Operaters Of Of  %d <  %d : %s ", n1, n2, (n1 < n2) ? "True" : "False");

    // Logical Operaters

    printf("\nLogical Operaters");

    printf("\nThe && Logical Operaters Of  %d > 0 &&  %d> 0 : %s ", n1, n2, (n1 > 0 && n2 > 0) ? "True" : "False");

    printf("\nThe || Eqale Logical Operaters Of Of  %d > 0 ||  %d > 0 : %s", n1, n2, (n1 > 0 || n2 > 0) ? "True" : "False");

    // printf("\nThe ! Logical Operaters Of Of  %d > 0 ! %d > 0 %s ", n1, n2, (n1>0 ! n2>0) ? "True" : "False");


    return 0;

}
```

OUTPUT :

```
Enter The Numerical Value Of N1:20

Enter The Numerical Value Of N2:3


Arithmeric Operaters

The Addition Of  20 and  3 is : 23

The Subtraction Of  20 and  3 is : 17

The Multiplication Of  20 and  3 is : 60

The Division Of  20 and  3 is : 6

The Modulo Of  20 and  3 is : 2

Relational Operaters

The Eqale Relational Operaters Of  20 ==  3 : False

The Not Eqale Relational Operaters Of Of  20 !=  3 : True

The Greater Than Relational Operaters Of Of  20 >  3: True
```

The Less Than Relational Operaters Of Of 20 < 3 : False

Logical Operaters

The && Logical Operaters Of 20 > 0 && 3> 0 : True

The || Eqale Logical Operaters Of Of 20 > 0 || 3 > 0 : True

[Q_5] Write a C program to check if a number is even or odd using an if-else statement. Extend the program using a switch statement to display the month name based on the user's input (1 for January, 2 for February, etc.).

```
#include <stdio.h>
int main()
{
   int n1,ch;

   printf("\nEnter The Numerical Value Of N1:");
   scanf("%d", &n1);
   if (n1 % 2 == 0)
   {
      printf("\n%d Is Even Number.", n1);
   }
   else
   {
      printf("\n%d Is Odd Number.", n1);
   }

   printf("\n\n 1  ---------> January");
```

```
printf("\n 2  ---------> February");
printf("\n 3  ---------> March");
printf("\n 4 ---------> April");
printf("\n 5  ---------> May");
printf("\n 6  ---------> June");
printf("\n 7  ---------> July");
printf("\n 8  ---------> August");
printf("\n 9  ---------> September");
printf("\n 10 ---------> October");
printf("\n 11  ---------> November");
printf("\n 12  ---------> December");
printf("\n\n");
printf("Enter Your Choice:");
scanf("%d",&ch);

switch (ch)
{
case 1:
   printf("January");
   break;

case 2:
   printf("ebruary");
   break;
case 3:
```

```
    printf("March");
    break;
case 4:
    printf("April");
    break;
case 5:
    printf("May");
    break;
case 6:
    printf("June");
    break;
case 7:
    printf("July");
    break;
case 8:
    printf("August");
    break;
case 9:
    printf("September");
    break;
case 10:
    printf("October");
    break;
case 11:
    printf("November");
```

```
        break;
    case 12:
        printf("December");
        break;

    default:
    printf("Invaliud Operation...!");
        break;
    }
    return 0;
}OUTPUT :
```

Enter The Numerical Value Of N1:11

11 Is Odd Number.

1 ---------> January
2 ---------> February
3 ---------> March
4 ---------> April
5 ---------> May
6 ---------> June
7 ---------> July
8 ---------> August
9 ---------> September
10 ---------> October
11 ---------> November

12 ---------> December

Enter Your Choice:10

October

[Q_6] Write a C program to print numbers from 1 to 10 using all three types of loops (while, for, do-while).

```
#include <stdio.h>
int main()
{
   int i;
   printf("Using For Loop Print The 1 - 10 Numerical Value:");
   for (i = 1; i <= 10; i++)
   {
      printf("\n%d", i);
   }

   printf("\nUsing While Loop Print The 1 - 10 Numerical Value:");
   i = 1;
   while (i <= 10)
   {
      printf("\n%d", i);
      i++;
   }

   printf("\nUsing Do-While Loop Print The 1 - 10 Numerical Value:");
   i = 1;
```

```
    do
    {
        printf("\n%d", i);
        i++;
    } while (i <= 10);

    return 0;
}
```

OUTPUT :

Using For Loop Print The 1 - 10 Numerical Value:

1

2

3

4

5

6

7

8

9

10

Using While Loop Print The 1 - 10 Numerical Value:

1

2

3

4

5

6

7

8

9

10

Using Do-While Loop Print The 1 - 10 Numerical Value:

1

2

3

4

5

6

7

8

9

10

[Q_7] Write a C program that uses the break statement to stop printing numbers when it reaches 5. Modify the program to skip printing the number 3 using the continue statement.

```
#include <stdio.h>
int main()
{
   int n1, i;
   printf("Enter The Numerical Value Of N1:");
   scanf("%d", &n1);

   for (i = 1; i <= n1; i++)
   {
```

```
        if (i == 3)
        {
            continue;
        }
        printf("\n%d", i);
        if (i == 5)
        {
            break;
        }
    }

    return 0;
}
```

OUTPUT :

Enter The Numerical Value Of N1:15

1

2

4

5

[Q_8] Write a C program that calculates the factorial of a number using a function. Include function declaration, definition, and call.

```
#include <stdio.h>
int fact(int n1)
{
    int i, fact = 1;
```

```
    for (i = 1; i <= n1; i++)
    {
        fact = fact * i;
    }

    return fact;
}
int main()
{
    int n1, result;
    printf("Enter Your Numerical Value For N1:");
    scanf("%d", &n1);

    result = fact(n1);
    printf("\n %d Factorial Number Is: %d", n1, result);
    return 0;
}
```

OUTPUT :

```
Enter Your Numerical Value For N1:4

 4 Factorial Number Is: 24
```

[Q_9] Write a C program that stores 5 integers in a one-dimensional array and prints them. Extend this to handle a two-dimensional array (3x3 matrix) and calculate the sum of all elements.

```
#include <stdio.h>
int main()
```

```
{
    // One Dimentional Array
    int a[100], i,b[100][100], c[100][100], size, sum[100][100], j, h, v;
    for (i = 0; i < 5; i++)
    {
        printf("Enter The Array Of An Elements a[%d]:", i);
        scanf("%d", &a[i]);
    }
    printf("\n\nElements An Array of a is:");
    for (i = 0; i < 5; i++)
    {
        printf("\n%d", a[i]);
    }

    // Two Dimentional Array
    printf("Enter Row Number:");
    scanf("%d", &v);
    printf("Enter Col Number:");
    scanf("%d", &h);
    printf("Enter The Size Of Array :");
    scanf("%d", &size);
    printf("\n");
    for (i = 0; i < size; i++)
    {
        for (j = 0; j < size; j++)
        {
            printf("\nEnter The Array Of An Elements b[%d][%d]:", i, j);
```

```
            scanf("%d", &b[i][j]);
        }
    }
    printf("\n");
    for (i = 0; i < size; i++)
    {
        for (j = 0; j < size; j++)
        {
            printf("\nEnter The Array Of An Elements c[%d][%d]:", i, j);
            scanf("%d", &c[i][j]);
        }
    }
   printf("\nElements Of An Array   B:");
    for (i = 0; i < size; i++)
    {
        for (j = 0; j < size; j++)
        {
            printf(" %d ", b[i][j]);
        }
        printf("\n");
    }
    printf("\nElements Of An Array   C:");
    for (i = 0; i < size; i++)
    {
        for (j = 0; j < size; j++)
        {
            printf(" %d ", c[i][j]);
```

```
        }
        printf("\n");
    }
    printf("\nThe Sum Of Array Elements B & C Is:");
    for (i = 0; i < size; i++)
    {
        for (j = 0; j < size; j++)
        {
            sum[i][j] = b[i][j] + b[i][j];
            printf(" %d ", sum[i][j]);
        }
        printf("\n");
    }

    return 0;
}
```

OUTPUT :

```
Enter The Array Of An Elements a[0]:2
Enter The Array Of An Elements a[1]:1
Enter The Array Of An Elements a[2]:4
Enter The Array Of An Elements a[3]:3
Enter The Array Of An Elements a[4]:6


Elements An Array of a is:
2
1
```

4

3

6Enter Row Number:3

Enter Col Number:3

Enter The Size Of Array :3

Enter The Array Of An Elements b[0][0]:1

Enter The Array Of An Elements b[0][1]:4

Enter The Array Of An Elements b[0][2]:2

Enter The Array Of An Elements b[1][0]:5

Enter The Array Of An Elements b[1][1]:6

Enter The Array Of An Elements b[1][2]:2

Enter The Array Of An Elements b[2][0]:7

Enter The Array Of An Elements b[2][1]:4

Enter The Array Of An Elements b[2][2]:8

Enter The Array Of An Elements c[0][0]:3

Enter The Array Of An Elements c[0][1]:4

Enter The Array Of An Elements c[0][2]:5

Enter The Array Of An Elements c[1][0]:8

Enter The Array Of An Elements c[1][1]:1

Enter The Array Of An Elements c[1][2]:4

Enter The Array Of An Elements c[2][0]:9

Enter The Array Of An Elements c[2][1]:5

Enter The Array Of An Elements c[2][2]:7

Elements Of An Array B: 1 4 2

5 6 2

7 4 8

Elements Of An Array C: 3 4 5

8 1 4

9 5 7

The Sum Of Array Elements B & C Is: 2 8 4

10 12 4

14 8 16

[Q_10] Write a C program to demonstrate pointer usage. Use a pointer to modify the value of a variable and print the result.

[Q_11] Write a C program that takes two strings from the user and concatenates them using strcat(). Display the concatenated string and its length using strlen().

```
#include <stdio.h>
#include <string.h>
int main()
{
   char str1[100], str2[100];
   printf("Enter First String Name:");
   gets(str1);
   printf("Enter Second String Name:");
   gets(str2);

   strcat(str1, str2);
   printf("\nThe String After Using strcat() is : %s ",str1);

   int len = strlen(str1);
   printf("\nThe Length Of strcat() String is %d ",len);
   return 0;
}
```

OUTPUT :

```
Enter First String Name:hello
Enter Second String Name:Bye
```

The String After Using strcat() is : helloBye

The Length Of strcat() String is 8

[Q_12] Write a C program that defines a structure to store a student's details (name, roll number, and marks). Use an array of structures to store details of 3 students and print them.

[Q_13] Write a C program to create a file, write a string into it, close the file, then open the file again to read and display its contents.