E-Content for SEMESTER-1

Programming Fundamentals(CMS-A-CC-1-2-TH)

and Programming in C (CMS-A-CC-1-2-P)

by

Mitra Tithi Dey,

Assistant Professor, Department of Computer Science,

Netaji Nagar Day College

C is a general-purpose, high-level language that was originally developed by Dennis M. Ritchie to develop the UNIX operating system at Bell Labs. C was originally first implemented on the DEC PDP-11 computer in 1972.

In 1978, Brian Kernighan and Dennis Ritchie produced the first publicly available description of C, now known as the K&R standard.

The UNIX operating system, the C compiler, and essentially all UNIX application programs have been written in C. C has now become a widely used professional language for various reasons –

- Easy to learn
- Structured language
- It produces efficient programs
- It can handle low-level activities
- It can be compiled on a variety of computer platforms

➢ **Why use C?**

C was initially used for system development work, particularly the programs that make-up the operating system. C was adopted as a system development language because it produces code that runs nearly as fast as the code written in assembly language.

- ➤ Some examples of the use of C might be –
- Operating Systems
- Language Compilers
- Assemblers
- Text Editors
- Print Spoolers
- Network Drivers
- Modern Programs
- Databases
- Language Interpreters

➤ C Compilers

When we write any program in C language then to run that program we need to compile that program using a C Compiler which converts the program into a language understandable by a computer. This is called machine language (i.e. binary format). So before proceeding, it is to make sure that we have C Compiler available at our computer. Some examples of C compilers are Turbo C and Borland C.

➤ C - Program Structure

A C program basically has the following form:
- Preprocessor Commands
- Functions
- Variables
- Statements & Expressions
- Comments

➢ **Some C Program Examples**

1) **C Program to swap between two values**

```c
#include<stdio.h>
#include<conio.h>
void main() {
  int first, second, temp;
  printf("Enter first number: ");
  scanf("%d", &first);
  printf("Enter second number: ");
  scanf("%d", &second);

  // value of first is assigned to temp
  temp = first;

  // value of second is assigned to first
  first = second;

  // value of temp (initial value of first) is assigned to second
  second = temp;

  //Display
  printf("\nAfter swapping, first number = %d", first);
  printf("After swapping, second number = %d", second);
  getch();
}
```

2) **C Program to Check Whether a Character is an Alphabet or not**

```c
#include<stdio.h>
#include<conio.h>
void main() {
    char c;
    printf("Enter a character: ");
    scanf("%c", &c);
```

```c
if ((c >= 'a' && c <= 'z') || (c >= 'A' && c <= 'Z'))
    printf("%c is an alphabet.", c);
else
    printf("%c is not an alphabet.", c);
getch();
}
```

3) Program to Check Even or Odd

```c
#include <stdio.h>
#include<conio.h>
void main() {
    int num;
    printf("Enter an integer: ");
    scanf("%d", &num);

    // true if num is perfectly divisible by 2
    if(num % 2 == 0)
        printf("%d is even.", num);
    else
        printf("%d is odd.", num);

    getch();
}
```

4) C Program to Find the Largest Number Among Three Numbers

```c
#include <stdio.h>
int main() {
  int n1, n2, n3;
  printf("Enter three numbers: ");
  scanf("%d %d %d", &n1, &n2, &n3);
  // outer if statement
  if (n1 >= n2) {
```

```c
  // inner if...else
  if (n1 >= n3)
    printf("%d is the largest number.", n1);
  else
    printf("%d is the largest number.", n3);
}
// outer else statement
  else {

    // inner if...else
    if (n2 >= n3)
      printf("%d is the largest number.", n2);
    else
      printf("%d is the largest number.", n3);
  }
getch();
}
```

5) C Program to print the sum and product of digits of an integer.

```c
#include<stdio.h>
#include<conio.h>
void main()
{
    int n,r,sum=0,product=1; /*variable declaration*/
    clrscr();
    printf("enter an integer");
    scanf("%d",&n);
    while(n!=0)
    {
        r=n%10;
        sum=sum+r;
        product=product*r;
        n=n/10;
```

```
      }
      printf("\n sum = %d, product= %d",sum,product);
      getch();
}
```

6) C Program to reverse a number

```
#include<stdio.h>
#include<conio.h>
void main()
{
      int n,r;
      clrscr();
      printf("enter an integer");
      scanf("%d",&n);
      printf("\n entered number = %d",n);
      printf("\n reversed number= ");
      while(n!=0)
      {
          r=n%10;
          printf("%d",r);
          n=n/10;
      }
      getch();
}
```

7) C Program to compute the sum of the first n terms of the following series, S =1-2+3-4+5................

```
#include<stdio.h>
#include<conio.h>
void main()
{
      int n,sum=0,i;
      clrscr();
```

```c
        printf("enter an integer");
        scanf(" %d",&n);
        for(i=1;i<=n;i++)
        {
            if(i%2==0)
            {
                sum=sum+(-i);
            }
            else
            {
                sum=sum+i;
            }
        }
        printf("\n sum = %d",sum);
        getch();
}
```

8) C Program to find the average of n numbers using Arrays

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

  int marks[10], i, n, sum = 0, average;

  printf("Enter number of elements: ");
  scanf("%d", &n);

  for(i=0; i < n; ++i) {
    printf("Enter number%d: ",i+1);
    scanf("%d", &marks[i]);

    // adding integers entered by the user to the sum variable
    sum += marks[i];
```

```
    }

    average = sum / n;
    printf("Average = %d", average);

    return 0;
}
```

9) C Program to swap two numbers using pointers

```c
#include <stdio.h>
int main()
{
    int x, y, *a, *b, temp;

    printf("Enter the value of x and y\n");
    scanf("%d%d", &x, &y);

    printf("Before Swapping\nx = %d\ny = %d\n", x, y);

    a = &x;
    b = &y;

    temp = *b;
    *b = *a;
    *a = temp;

    printf("After Swapping\nx = %d\ny = %d\n", x, y);

    return 0;
}
```

10) C programming to read the strings from a file

```c
#include <stdio.h>
int main(){
  FILE *fpr;
  /*Char array to store string */
  char str[100];
  /*Opening the file in "r" mode*/
  fpr = fopen("C:\\mynewtextfile.txt", "r");

  /*Error handling for file open*/
  if (fpr == NULL)
  {
    puts("Issue in opening the input file");
  }

  /*Loop for reading the file till end*/
  while(1)
  {
    if(fgets(str, 10, fpr) ==NULL)
        break;
    else
        printf("%s", str);
  }
  /*Closing the input file after reading*/
  fclose(fpr);
  return 0;
  }
```

11) C Program to count the number of vowels in a string

```c
#include<stdio.h>
void main ()
{
    char s[11] = "javatpoint";
    int i = 0;
    int count = 0;
    while(i<11)
    {
        if(s[i]=='a' || s[i] == 'e' || s[i] == 'i' || s[i] == 'u' || s[i] == 'o')
        {
            count ++;
        }
        i++;
    }
    printf("The number of vowels %d",count);
}
```

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