

Short-term Hands-on Supplementary Course on C programming

Session 1: C programming Basics

Agenda

- Why Programming is necessary?
- Why C?
- Program Structure in C
- Variables, Data types
- Output using printf, Input using scanf
- Arithmetic operations
- Tutorial : Expression Evaluation

Why programming is necessary?

- Programming is using a language that a machine can understand in order to get it to perform various tasks.
- Computer programming is how we communicate with machines in a way that makes them function how we need.
- Examples of programming languages- C, C++, Python, Java, etc.



Why C?

- 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
- It can be paired with LINUX OS.



Application of C

C programming is widely used in-

- Operating Systems
- Language Compilers
- Networks
- Modern Programs



Basic HelloWorld program in C

```
#include <stdio.h> //Importing C library for printf

int main() {
    /* my first program
    in C */
    printf("Hello, World! \n"); //This is a comment

    return 0;
}
```

Most of the statements are ended with a **semicolon(;**)



Program structure in C - Comments

```
#include <stdio.h> // Importing C library for printf

int main() {
    /* my first program
    in C */
    printf("Hello, World! \n"); // This is a comment

    return 0;
}
```

// is used to represent single line comment

/* */ is used to represent multi-line comments.

Program structure in C - Comments

```
#include <stdio.h> //Importing C library for printf

int main() {
    /* my first program
    in C */
    printf("Hello, World! \n"); //This is a comment

    return 0;
}
```

- **Comments** are like helping text in your C program
- **Comments** are ignored by the compiler
- **Comments** are optional

Importing libraries

```
#include <stdio.h> //Importing C library for printf

int main() {
    /* my first program
    in C */
    printf("Hello, World! \n"); //This is a comment

    return 0;
}
```

Importing C
libraries

- < > are used to import C libraries.
- “ ” are used to import local libraries.

Main Program

```
#include <stdio.h> //Importing C library for printf

int main() {
    /* my first program
    in C */
    printf("Hello, World! \n"); //This is a comment

    return 0;
}
```

- The main program/function serves as the starting point for program execution.
- It always returns an integer 0, which means the program was executed successfully

Main Program - Command line argument

```
#include <stdio.h> //Importing C library for printf

int main(int argc, char *argv[]) {
    /* my first program
    in C */
    printf("Hello, World! \n"); //This is a comment

    return 0;
}
```

The arguments mentioned inside the parenthesis() are passed during command line execution.

argc is the number of arguments in argv

argv is an array of arguments

Variables

A **variable** is nothing but a name given to a storage area that our programs can manipulate.

- The name of a variable can be composed of letters, digits, and the underscore character.
- It must begin with either a letter or an underscore.
- Upper and lowercase letters are distinct because C is case-sensitive.

```
int a;  
int b=5;  
  
char c;  
char d='y';  
char e[255];  
char f[255]="Hello World!";  
  
float g;  
float h=10.365;  
  
double i;  
double j=1045.83663;
```



Data Types

char

Typically a single octet(one byte). It is an integer type.

int

The most natural size of integer for the machine.

float

A single-precision floating point value.

double

A double-precision floating point value.

void

Represents the absence of type.

```
int a;  
int b=5;  
  
char c;  
char d='y';  
char e[255];  
char f[255]="Hello World!";  
  
float g;  
float h=10.365;  
  
double i;  
double j=1045.83663;
```



Output using 'printf()'

printf statement prints the output on the screen

%d - used to print 'int' type.

%c - used to print 'char' type.

%s - used to print strings.

%f - used to print 'float' type.

%lf - used to print 'double' type.

```
printf("Int - %d\n",b);  
printf("Char - %c\n",d);  
printf("String - %s\n",f);  
printf("Float - %f\n",h);  
printf("Double - %lf\n",j);
```

```
Int - 5  
Char - y  
String - Hello World!  
Float - 10.365000  
Double - 1045.836630
```

These are called as format specifiers, and used in printf and scanf statements.



Input using 'scanf()'

scanf statement gets input from user and stores it in a variable

%d - used to print 'int' type.

%c - used to print 'char' type.

%s - used to print strings.

%f - used to print 'float' type.

%lf - used to print 'double' type.

```
scanf("%d",&a);  
scanf("%c",&c);  
scanf("%s",e);  
scanf("%f",&g);  
scanf("%lf",&i);
```

& is used to access the location of the variables.



Arithmetic operations

| Operator | Description | Example |
|----------|--|---------------|
| + | Adds two operands. | $A + B = 30$ |
| - | Subtracts second operand from the first. | $A - B = -10$ |
| * | Multiplies both operands. | $A * B = 200$ |
| / | Divides numerator by de-numerator. | $B / A = 2$ |
| % | Modulus Operator and remainder of after an integer division. | $B \% A = 0$ |
| ++ | Increment operator increases the integer value by one. | $A++ = 11$ |
| -- | Decrement operator decreases the integer value by one. | $A-- = 9$ |



Arithmetic operations

| Operator | Description | Example |
|----------|--|--------------------|
| && | Called Logical AND operator. If both the operands are non-zero, then the condition becomes true. | (A && B) is false. |
| | Called Logical OR Operator. If any of the two operands is non-zero, then the condition becomes true. | (A B) is true. |
| ! | Called Logical NOT Operator. It is used to reverse the logical state of its operand. If a condition is true, then Logical NOT operator will make it false. | !(A && B) is true. |

Tutorial

1) Which variable name is/are invalid

- `_arg12$`
- `arg1&2`
- `Arg_1_2`
- `123_arg`
- `args123_`

2) Compute fahrenheit given celsius=32 [Formula- $^{\circ}F = ^{\circ}C \times (9/5) + 32$] and compute celsius give fahrenheit=108[Formula- $^{\circ}C = (^{\circ}F - 32) \times 5/9$]



Thank You for attending!

Contact us regarding any questions through email

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