Introduction to C-Language

Lecture 2

Introduction to C-Language

- Created by Dennis Ritchie at Bell Labs in 1972, while working to develop Unix Operating System.

- It came from Ken Thompson’s B-Language written in 1970.

Levels of Programming Languages

There are 3 levels of programming languages

i) **High-Level Language**

ii) **Middle-Level Language**

iii) **Low-Level Language**

Uses of C/C++ Programming Language

Areas where C-Language can be used are

- Operating Systems
- Network Drivers
- Communication Packages
- Data Bases
- Language Interpreters
- Utilities
- Language Compilers
- Spreadsheets
- Text Editors
- etc etc

C/C++ Character Set

C/C++ character set comprises of following characters

- **A,B,C,....Z**
- **a,b,c,......z**
- **0,1,2,......9**
- **, . ; : ? ! “ / ` \ | ~**
- **( ) [ ] { } < >**
- **+ - # % _ ^ = & ***

White Space Characters

- The character that produces blank space when printed is called a white space character, e.g.
  - Spaces
  - Tabs
  - New Lines

Constants & Variables

- Constants
  - 1,56,1.89,’a’,’Z’,”BSCS”

- Variables

  X=5,

  X=20

Data types and Sizes

- There are three main data types in C/C++

i) Character char

ii) Integer int

iii) Floating Point float

Character data type

- represented by **char**
- used for storing a character, digit or special character.
- A character constant must be enclosed in single quotations i.e. ‘A’, ‘1’ or ‘*’ etc.
- uses/occupies one byte of memory.
- character constant can be signed or unsigned.

Character data type

- The range of binary numbers in **signed char** is from -128 to +127
- The range for binary numbers in **unsigned char** is from 0 to 255
- So, there are 3 types of character data type, i.e. **char**, **signed char** and **unsigned char**. e.g.
- ***char age*** means signed char
- ***signed char code*** means signed char
- ***unsigned char value*** means unsigned char

Integer data type

- Integer data type is represented by **int**
- used for storing Integers, i.e. numeric values without decimal portions.
- Integer variable can store a value ranging from -32,768 to + 32,767
- Integer data type uses 2 bytes of memory
- Integer data type is also represented as **short**
- Another integer type to store larger values is **long** that can store a value
- ranging from -2,147,483,648 to 2,147,483,647
- **long** takes 4 bytes of memory

Integer data type

- Another **int** type is **signed int** which is used to store sign too along with the numeric value.
- Another int type is unsigned int which is used to store values without sign
- So, there are 9 types of Integer data types, i.e. **int**, **short**, **signed int**, **unsigned int**, **signed short**, **unsigned short**, **long**, **signed long** and **unsigned long** e.g.

Integer data type

- **int a** means signed int
- **signed int b** means signed int
- **unsigned int c** means unsigned int
- **short d** means signed short
- **signed short e** means signed short
- **unsigned short f** means unsigned short
- **long g** means signed long
- **signed long h** means signed long
- **unsigned long i** means unsigned long

Float data type

- Float data type is represented by **float** and is used for storing numeric values
- along with fraction or decimal portion. Float data type takes 4 bytes of memory.
- A floating point number is expressed in scientific notation. The reason of storing float values in scientific notation is that they can be very large or extremely small

Float data type

- **2000000000000000 = 2e+15**
- **0.00000000000023 = 2.3e-13**
- A value written as 47e3 means 47 x 10^3
- Exponent value ranges from -38 to +38, i.e. 47x10^-38 to 47x10^+38
- Another float type is **double** that takes 8 bytes of memory.
- Exponent values in double ranges from -308 to + 308, i.e. 47x10-308 to 47x10+308

Name	Description	Size*	Range*
char	Character or small integer.	1byte	signed: -128 to 127 unsigned: 0 to 255
short int (short)	Short Integer.	2bytes	signed: -32768 to 32767 unsigned: 0 to 65535
int	Integer.	4bytes	signed: -2147483648 to 2147483647 unsigned: 0 to 4294967295
long int (long)	Long integer.	4bytes	signed: -2147483648 to 2147483647 unsigned: 0 to 4294967295
bool	Boolean value. It can take one of two values: true or false.	1byte	true or false
float	Floating point number.	4bytes	+/- 3.4e +/- 38 (~7 digits)
double	Double precision floating point number.	8bytes	+/- 1.7e +/- 308 (~15 digits)
long double	Long double precision floating point number.	8bytes	+/- 1.7e +/- 308 (~15 digits)

Naming Rules in C/C++

Following are the naming rules in C/C++

- Can contain letters, digits and underscores.
- Digit can not be the first character.
- Spaces are not allowed.
- May not be same as keyword or function name etc.
- First 40 characters are significant, i.e. Length can be of max. 40 characters, but varies from compiler to compiler.
- Can not consist of an underscore alone.

Types of C/C++ Instructions

There are 4 types of C/C++ Instructions.

i) Type declaration Instructions

Variable types and definitions etc.

ii) Input/Output Instructions

Data Input, Data Display, Data Write etc

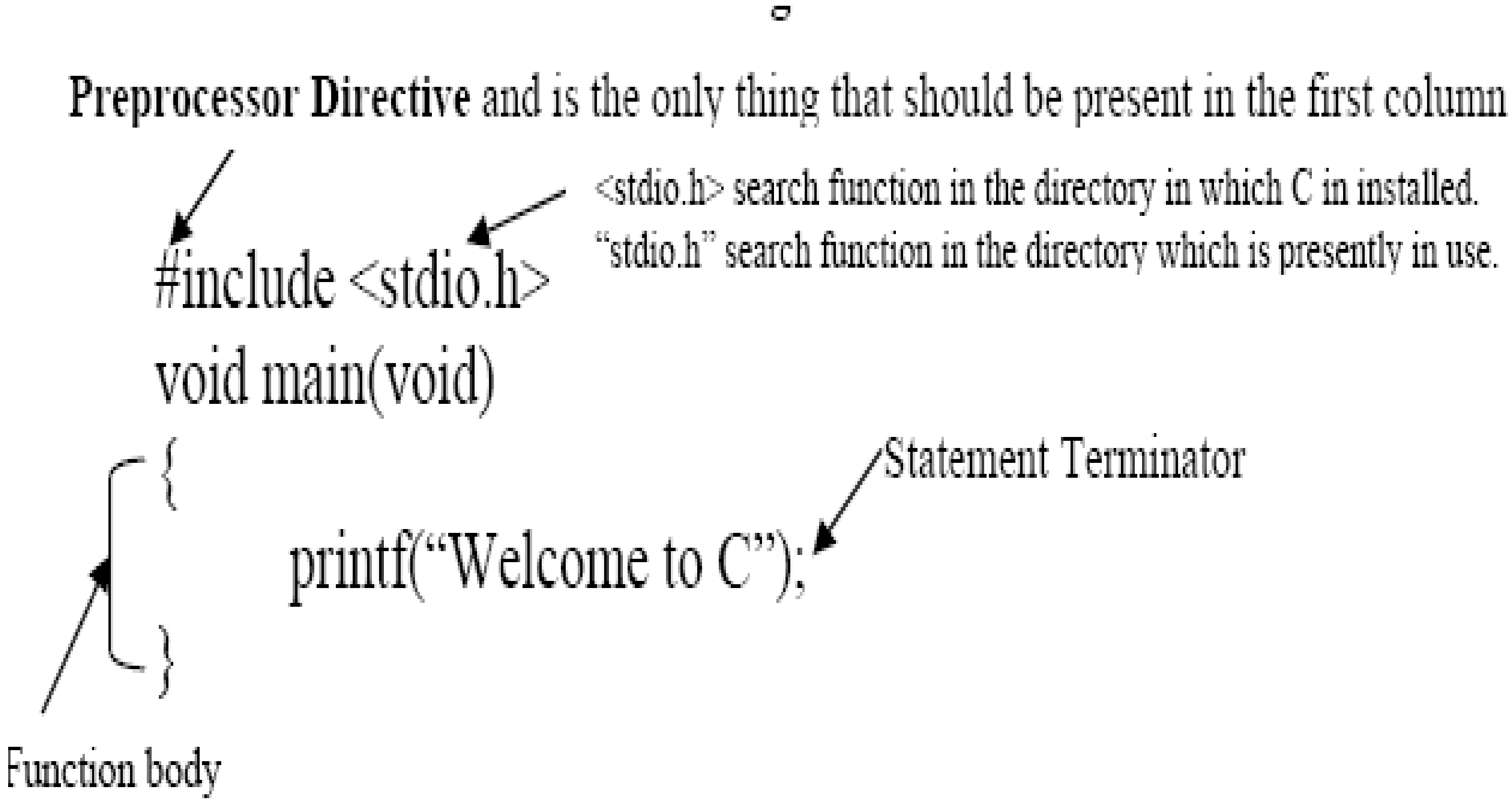
iii) Control Instructions

Controls the sequence of execution of the program instructions.

iv) Arithmetic Instructions

Arithmetic Operations etc

First Program in C



Preprocessor Directive and is the only thing that should be present in the first column

<stdio.h> search function in the directory in which C in installed.

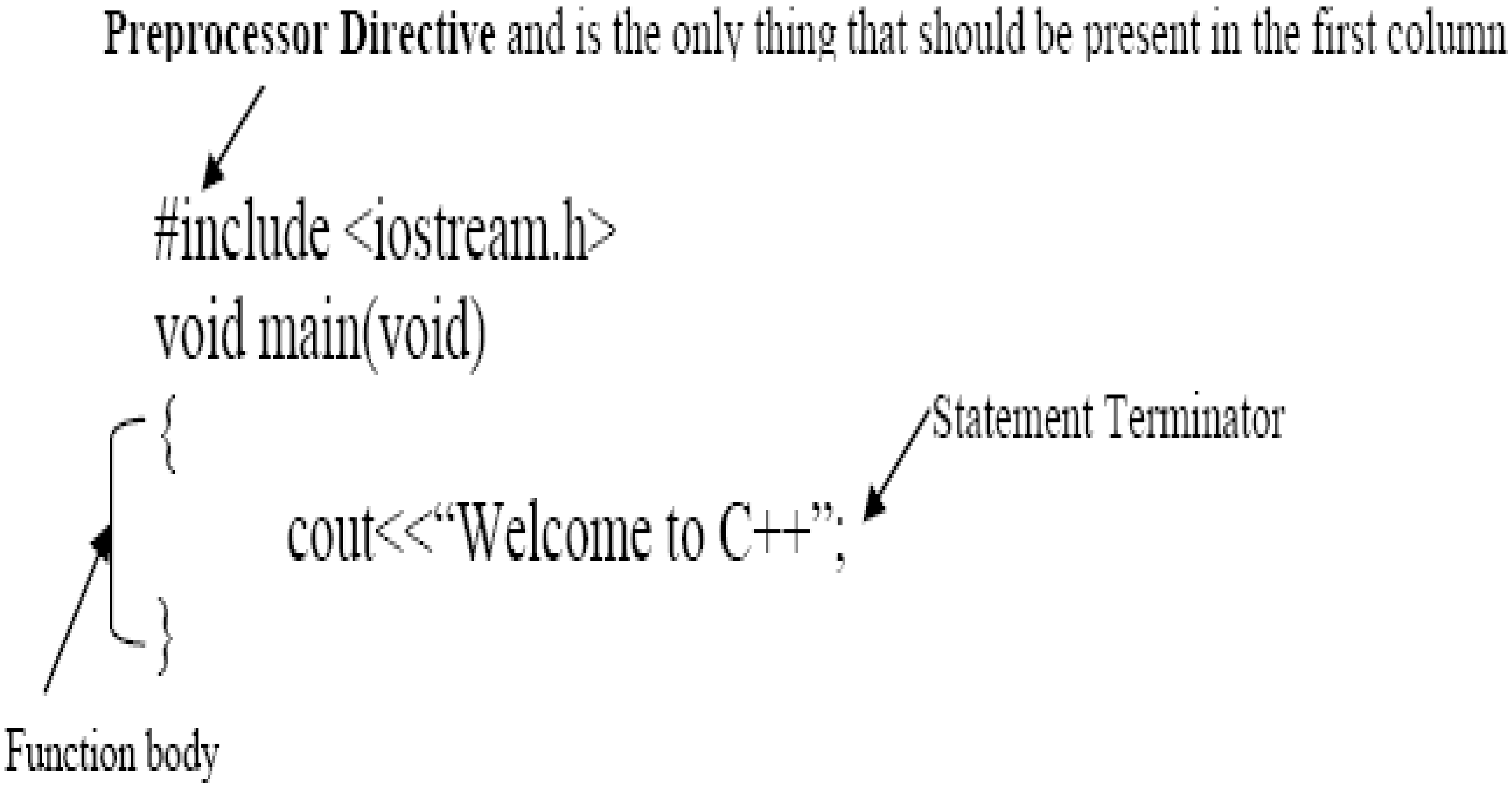
"stdio.h" search function in the directory which is presently in use.

```
#include <stdio.h>
void main(void)
{
        printf("Welcome to C");
}
```

Statement Terminator

Function body

First Program in C++



Preprocessor Directive and is the only thing that should be present in the first column

```
#include <iostream.h>
void main(void)
{
        cout<<"Welcome to C++";
}
```

Statement Terminator

Function body