C Programming

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Computer and Program

- What is a computer ?
  - It is an electronic device for storing and processing data, typically in binary form, according to instructions given to it in a program.

- What is a Program ?
  - It is a set of instructions given to the machine to perform certain task.

Classification of Programming Languages :

- **The low-level language** is a programming language that provides no abstraction from the hardware, and it is represented in 0 or 1 forms, which are the machine instructions.

- **The high-level language** is a programming language that allows a programmer to write the programs which are independent of a particular type of computer. The high-level languages are considered as high-level because they are closer to human languages than machine-level languages.

Introduction To C :

- C is a programming Language developed in 1972 at AT & T Bell Labs by Dennis Ritchie.
- This language was first standardized by ANSI – American National Standards Institute in 1989. therefore it's also referred as C89.
- C is a High Level Language.
  - High Level Languages are user friendly languages which can be easily understood by humans.
  - They are machine independent, portable.
  - It requires the compiler to translate the high level code into machine understandable language.
- It has extensive Library Functions.

Features :

- Data types
- Operators
- Control structures
- Functions
- Storage classes
- Pointers
- Arrays
- Strings
- Dynamic memory allocation
- Structures
- Unions
- Enum
- File IO
- Preprocessor directives

Hello World :

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

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

- Commands
  - cmd> gcc hello.c
  - cmd> ./a.exe

- stdio.h – header file
- printf() – library function
- main() – entry point user defined function
  - void main() { … }
  - int main() { … }
  - int main(void) { … }
- return 0 –exit status

Compilation and execution of a C program :

- **Pre-processor** :-
  - A pre-processor accepts the inputs in source language and produces output source program that is acceptable to the compiler.
  - Main task of pre-processor is to remove the comments and handle all the statements starting with #
- **Linker** :-
  - Single programmer can write small program and store it in single source code file , However Large size software consist of several thousands and several millions of code , to take care of this approach software developers generally follow the modular approach.
  - In modular approach software consist of multiple source file , In this case we use the software called as linker to combine all object programs and to convert into final executable.
  - Linker is a software that takes multiple object files and fits them together to assemble into final executable.

Toolchain and IDE :

- Toolchain is set of tools to convert high level language program to machine level code.
  - Preprocessor
  - Compiler
  - Assembler
  - Linker
  - Debugger
  - Utilities
- Popular compiler (toolchains)
  - GCC
  - Visual Studio
- •IDE – Integrated development environment
  - Visual Studio
  - Eclipse
  - VS Code (+ gcc)
  - Turbo C etc.

Software Installations :

- Installations
  - GCC (MinGW)
  - VS Code(IDE)

Thank You