



SNS COLLEGE OF TECHNOLOGY

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An Autonomous Institution

COURSE NAME : 19CST101 PROGRAMMING FOR PROBLEM SOLVING

I YEAR/ I SEMESTER

UNIT-II C PROGRAMMING BASICS

Topic: Introduction to 'C' Programming

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Introduction to 'C' Programming

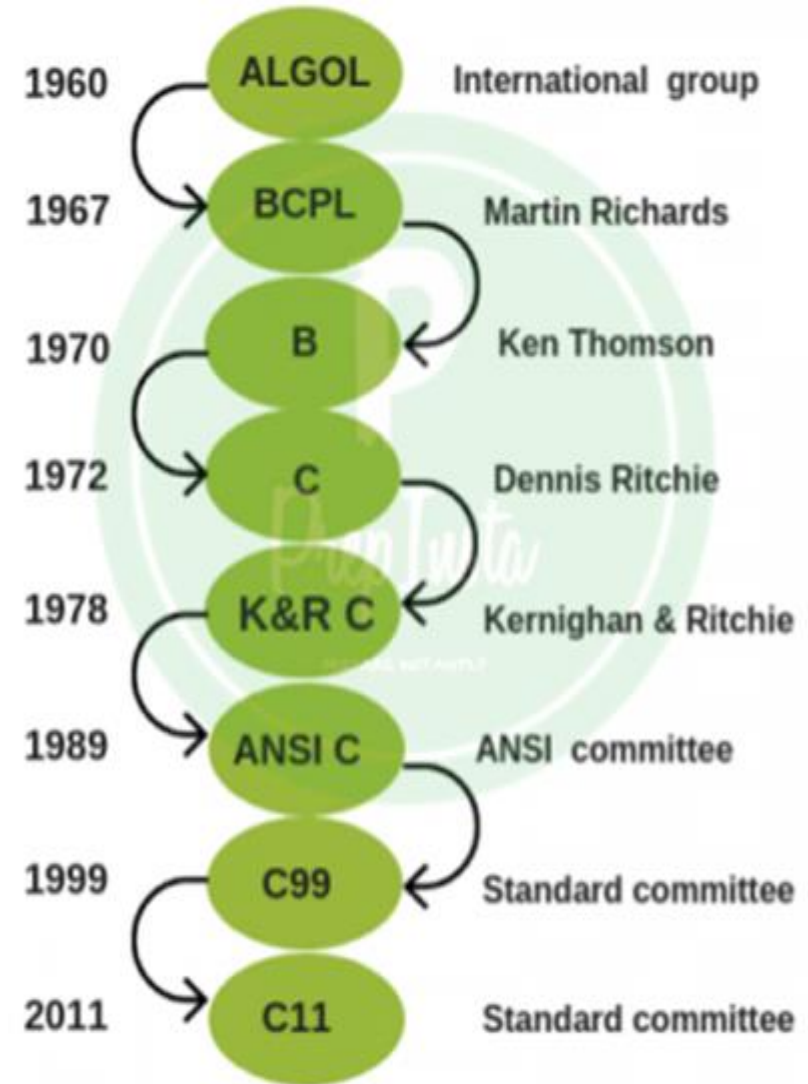
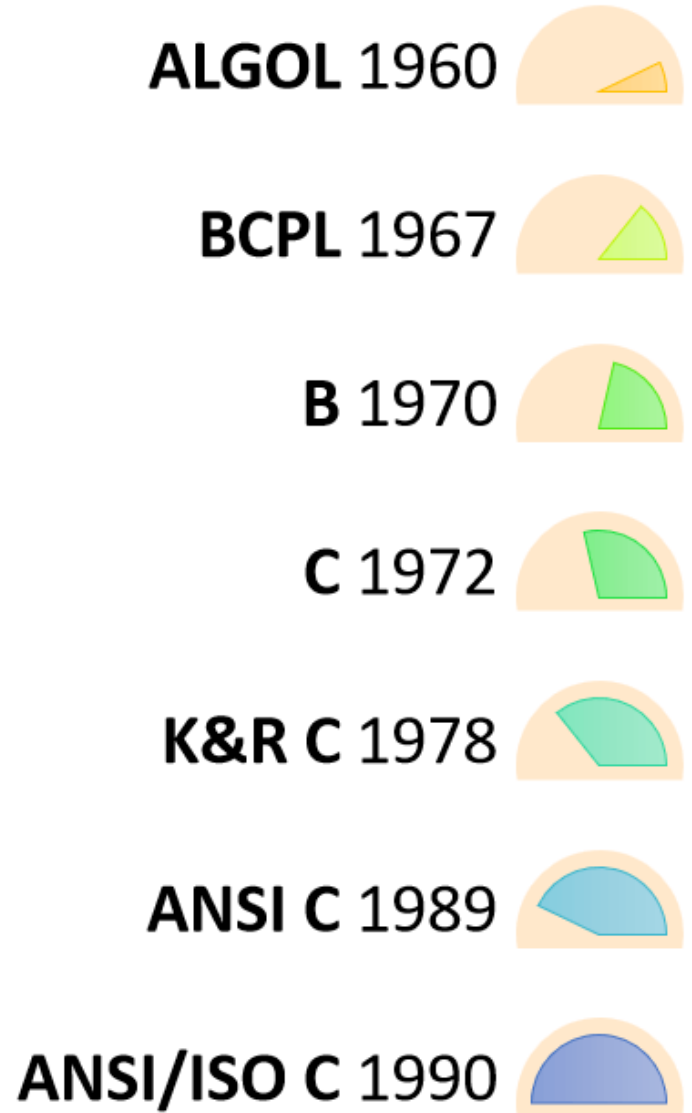


What is C programming?

- General-purpose programming language - extremely popular, simple and flexible.
- Machine-independent, structured programming language - used extensively in various applications.
- 'C' is a god's programming language.
- C is a base for the programming.
- If you know 'C,' - can easily grasp the knowledge of the other programming languages that uses the concept of 'C'



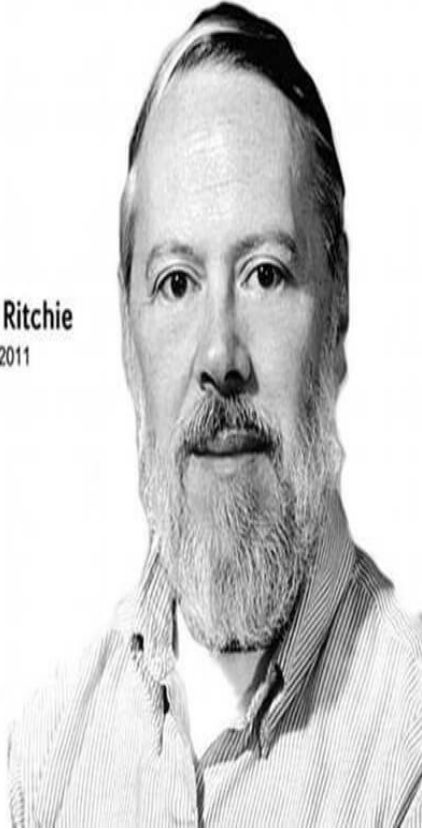
History of C language





History of C language

Dennis Ritchie
1941-2011



- In 1972, a great computer scientist Dennis Ritchie created a new programming language called 'C' at the Bell Laboratories.
- It was created from 'ALGOL', 'BCPL' and 'B' programming languages.
- 'C' programming language contains all the features of these languages and many more additional concepts that make it unique from other languages.
- 'C' is a powerful programming language which is strongly associated with the UNIX operating system.
- Today 'C' runs under a variety of operating systems and hardware platforms.
- To assure that 'C' language will remain standard, American National Standards Institute (ANSI) defined a commercial standard for 'C' language in 1989.
- Later, it was approved by the International Standards Organization (ISO) in 1990. 'C' programming language is also called as 'ANSI C'.
- Languages such as C++/Java are developed from 'C'.
- These languages are widely used in various technologies.
- Thus, 'C' forms a base for many other languages that are currently in use.



Key Applications



Where is C used?

- Widely used in embedded systems.
- Used for developing system applications.
- Widely used for developing desktop applications.
- Most of the applications by Adobe.
- Used for developing browsers and their extensions.
- Google's Chromium.
- Used to develop databases – MySQL
- Used in developing an operating system - Apple's OS X, Microsoft's Windows, and Symbian
- Used for compiler production.
- Widely used in IOT applications.



Real-World Applications





Real-World Applications



1. Operating Systems

- The first operating system to be developed using a high-level programming language was UNIX. Later on, Microsoft Windows and various Android applications were scripted in C.

2. Embedded Systems

- The C programming language is considered an optimum choice when it comes to scripting applications and drivers of embedded systems, as it is closely related to machine hardware.

3. GUI

- GUI stands for Graphical User Interface. Adobe Photoshop, Adobe Premiere and Illustrator were created using C.

4. New Programming Platforms

- C++, the concept of object-oriented programming, various other programming languages like MATLAB and Mathematica.
- It facilitates the faster computation of programs.

5. Google

- Google file system and Google chromium browser were developed using C/C++.
- The Google Open Source community has a large number of projects being handled using C/C++.

6. Mozilla Firefox and Thunderbird

- Mozilla Firefox and Thunderbird were open-source email client projects, they were written in C/C++.



Real-World Applications

7. MySQL

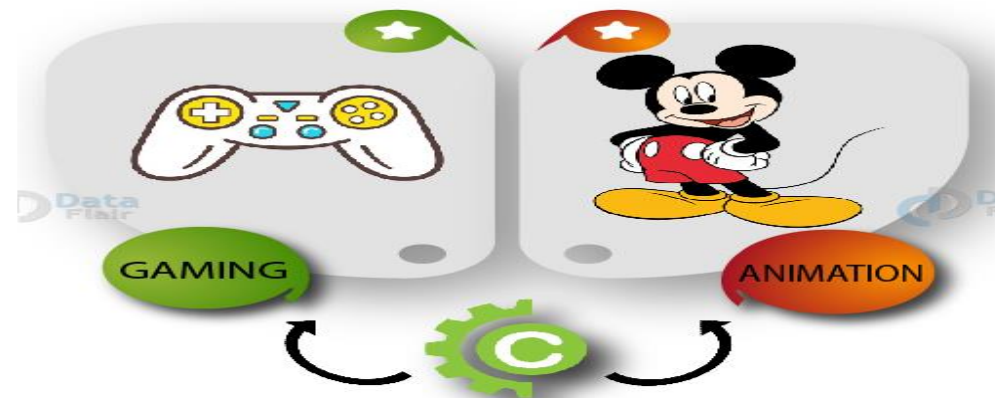
- MySQL, again being an open-source project, used in Database Management Systems was written in C/C++.

8. Compiler Design

- One of the most popular uses of the C language was the creation of compilers.
- The association of C with low-level languages, making it easier to be comprehensible by the machine.
- Several popular compilers were Bloodshed Dev-C, Clang C, MINGW, and Apple C.

9. Gaming and Animation

- Since the C programming language is relatively faster than Java or Python, as it is compiler-based, it finds several applications in the gaming sector.
- Some of the most simple games are coded in C such as Tic-Tac-Toe, The Dino game, The Snake game and many more.
- Increasing advanced versions of graphics and functions, Doom3 a first-person horror shooter game was designed by id Software for Microsoft Windows using C in 2004.





Why learn 'C'?



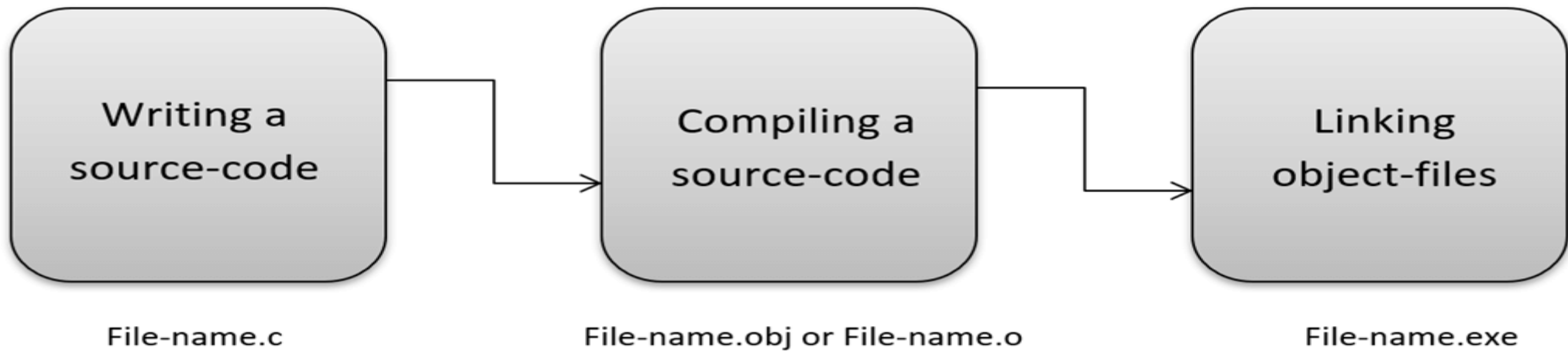
- Base language for many programming languages.
- It shares the same concepts such as data types, operators, control statements and many more.
- Used widely in various applications.
- Simple language and provides faster execution.
- Structured programming language in which program is divided into various modules - easy for testing, maintaining and debugging processes.
- 32 keywords, various data types and a set of powerful built-in functions - make programming very efficient.
- Can extend itself.
- Contains various functions which are part of a library - can add our features and functions to the library.
- Can access and use functions anytime we want in our program - makes it simple while working with complex programming.
- Highly portable language which means programs written in 'C' language can run on other machines.



How 'C' Works?



- C is a compiled language.
- A compiler is a special tool that compiles the program and converts it into the object file which is machine readable.
- After the compilation process, the linker will combine different object files and creates a single executable file to run the program.
- The following diagram shows the execution of a 'C' program





How 'C' Works?



- Nowadays, various compilers are available online, and you can use any of those compilers.
- The functionality will never differ and most of the compilers will provide the features required to execute both 'C' and 'C++' programs.
- Following is the list of popular compilers available online:
 - Clang compiler
 - MinGW compiler (Minimalist GNU for Windows)
 - Portable 'C' compiler
 - Turbo C



Summary



- 'C' was developed by Dennis Ritchie in 1972.
- It is a robust language.
- It is a low programming level language close to machine language.
- It is widely used in the software development field.
- It is a procedure and structure oriented language.
- It has the full support of various operating systems and hardware platforms.
- Many compilers are available for executing programs written in 'C'.
- A compiler compiles the source file and generates an object file.
- A linker links all the object files together and creates one executable file.
- It is highly portable.



Fundamental rules



- C is a case sensitive language so all C instructions must be written in lower case letter. (printf vs. PRINTF)
- All C statement must end with a semicolon. (;)
- Whitespace is used in C to describe blanks and tabs and improve the readability
- Whitespace is required between keywords and identifiers.
- All C statements can be written in one line or it can split into multiple lines
- Braces must always match upon pairs i.e., every opening brace must have a matching closing brace ({...})
- Every C program must contain a Main() function
- Comments cant be nested.
- The variables must be declared in the declaration section before they are used



Fundamental rules



- The rule specify how the character sequence will be grouped together, to form **tokens**.
- A smallest individual unit in C program is known as **C Token**.
- Tokens are either keywords, identifiers, constants, variables or any symbol which has some meaning in C language.
- A C program can also be called as a collection of various tokens.
- In the following program,
- if we take any one statement:

```
printf("Hello,World");
```

```
#include  
int main()  
{  
    printf("Hello,World");  
    return 0;  
}
```

