# Introduction to C Programming

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Introduction

- C is a general-purpose programming language developed in the early 1970s by Dennis Ritchie at Bell Labs.
- Renowned for its efficiency and versatility, C is foundational to many modern programming languages.
- Nearly 50 years after its inception, C continues to play a critical role in software development.

Applications of C

- Development of operating systems (e.g., UNIX, Windows, Linux).
- Programming language interpreters and compilers (e.g., Python interpreter, GCC).
- Databases (e.g., Oracle Database, MySQL).
- System-level software and embedded systems.
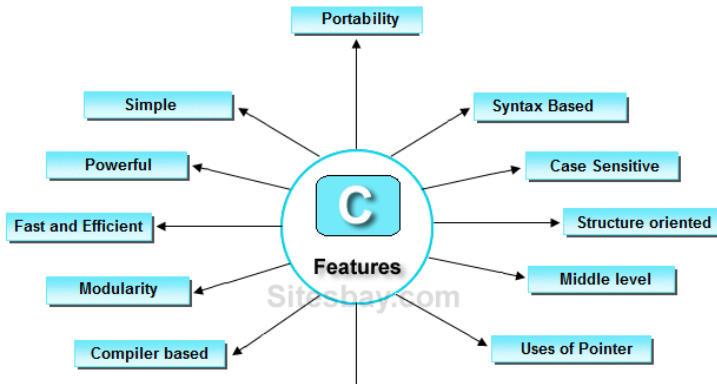
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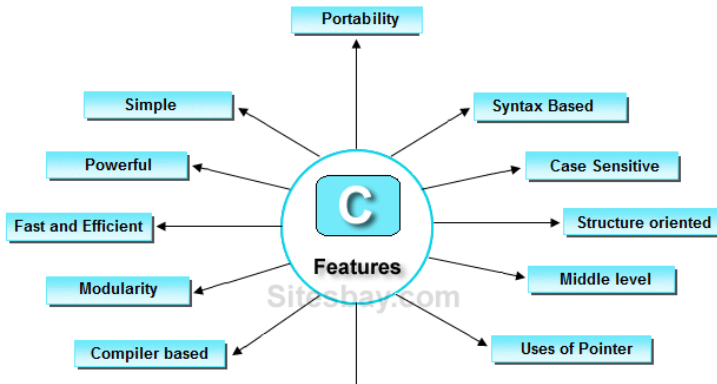
Key Features of C

- **Procedural Language:** Focuses on functions and procedure calls.
- **Low-Level Access:** Allows direct interaction with hardware.
- **Portability:** Code written in C can be compiled on various platforms.
- **Efficiency:** Generates optimized machine code.

Basic Structure of a C Program

Below is an example of a simple C program:

```c
#include <stdio.h>   // Include standard input-output hea

int main() {
    // Print a message to the console
    printf("Hello, World!\n");
    return 0; // Return 0 to indicate successful executi
}
```
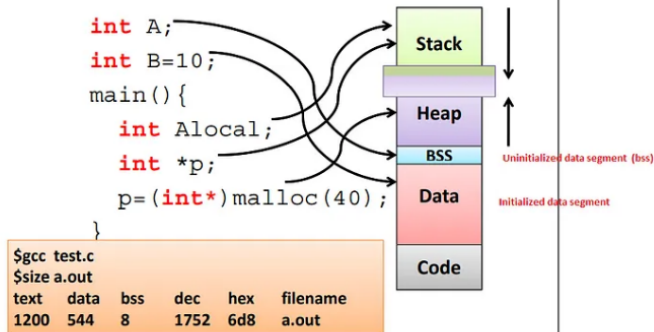
Visualization: C Program Flow

Start

Write Code

Compile Code

Execute Program

Output
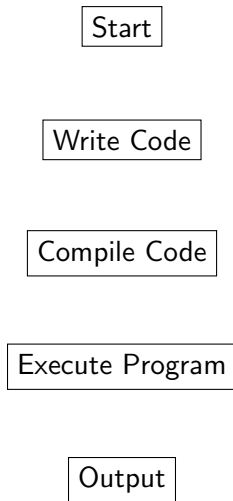
Flow of a C Program

Memory Management in C

- C provides manual control over memory using pointers and functions such as `malloc`, `calloc`, and `free`.
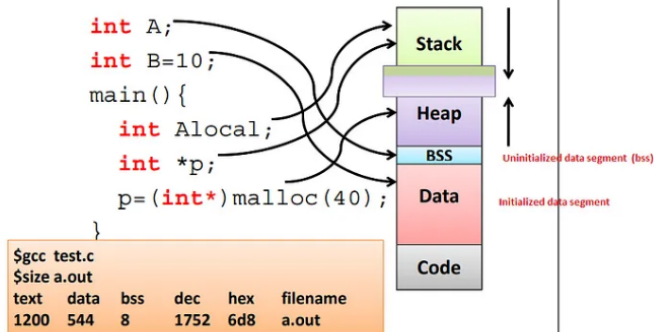- The following image illustrates the memory layout of a typical C program.
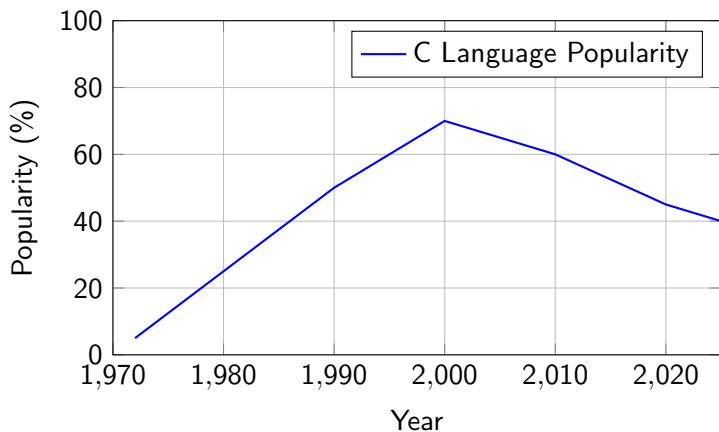
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- The following image illustrates the memory layout of a typical C program.

Graph: Popularity of C Over Time

Popularity of C Language Over Time

Conclusion

- C remains a powerful language that continues to influence the development of modern programming languages and systems.
- Its efficiency, portability, and low-level capabilities make it a vital tool for computer scientists and engineers.
- Understanding C provides a strong foundation for exploring advanced programming concepts.