Introduction to C

BU Summer Challenge

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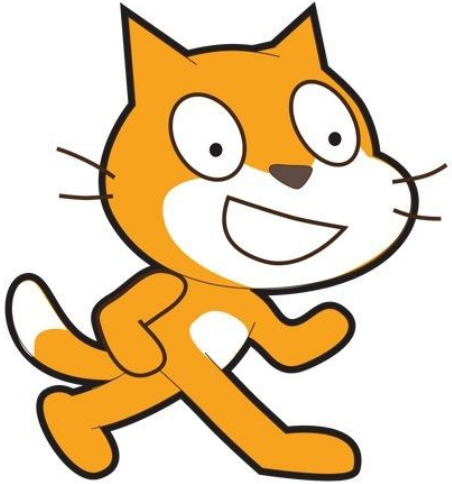
What have we done last time?

- Introduction to Scratch.
- Basic algorithms.
- Programming concepts.

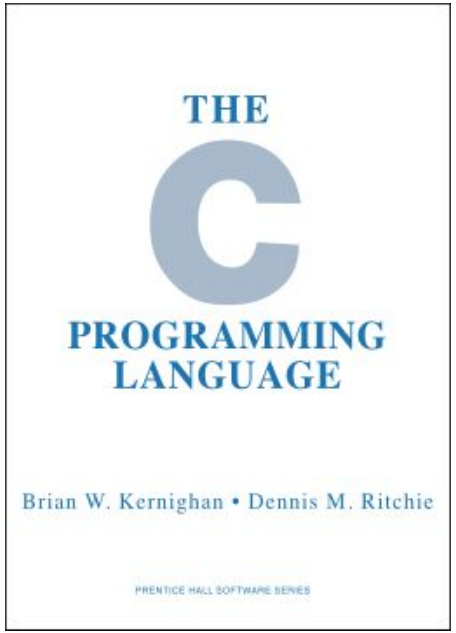


History of C

- Developed in the early 1970s.
- Its development is closely tied to development of UNIX.
- Its predecessor was interestingly named **B.**

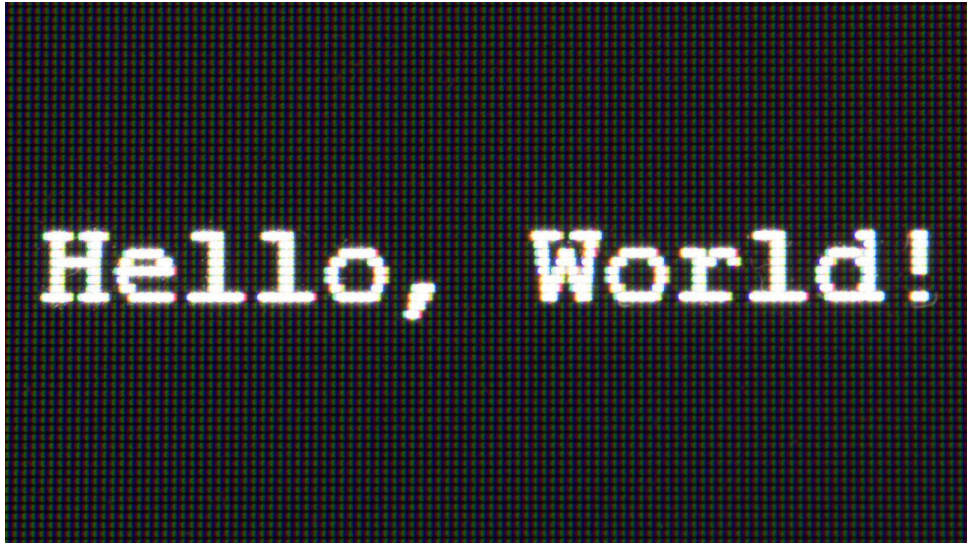
Significance of C

- Allowed us to think above **assembly language.**
- Makes systems more portable.
- Crucial in the development of modern software infrastructure.
- Still dominant and omnipresent.



Setting up the Environment

- We will use online GDB environment:
  - **https://www.onlinegdb.com/online_c_compiler**


Hello, World!

Syntax and Structure of a C Program

- Headers: **#include <stdio.h>**
- **main()** function
- Statements ending with **;**
- Comments: // or /* ... */
- Escape sequences: **\n, \t, \\, \”**

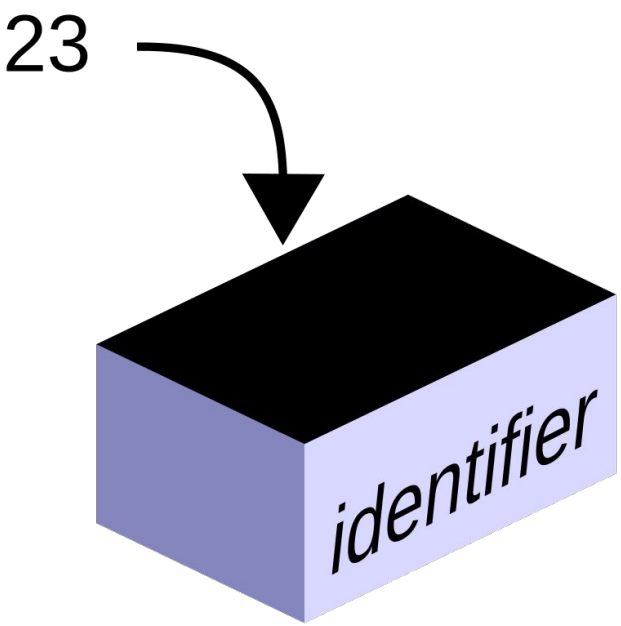
Compilation Pipeline

1. Preprocessing:
    a. Handles directives such as **include, define, macro**
    b. Produces **expanded source file**.
2. Compilation:
    a. Converts source to **assembly**.
3. Assembly:
    a. Converts assembly to **machine code**.
    b. Results in **object file.**
4. Linking:
    a. Combines **object files** and **libraries** into **executable files.**

- Important to understand for debugging and optimization.

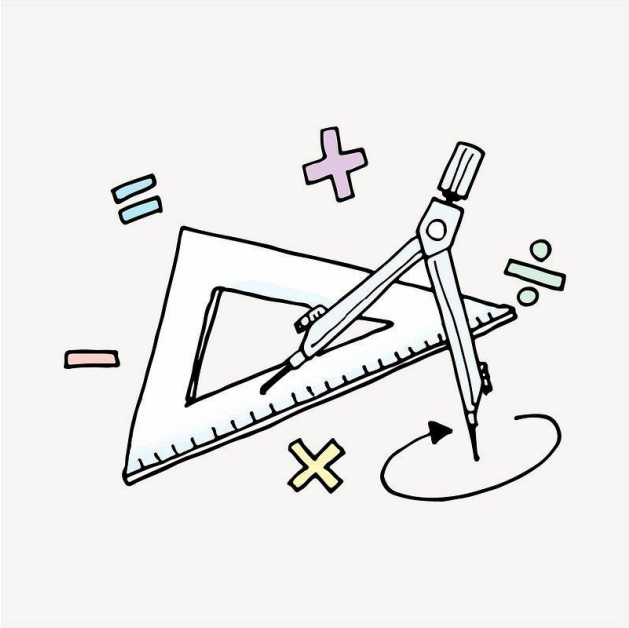
Data Types and Variables

- **int**: Integer type, typically 4 bytes.
- **float**: Single-precision floating-point, typically 4 bytes.
- **double**: Double-precision floating-point, typically 8 bytes.
- **char**: Character type, typically 1 byte.
- **Void** data type, used for functions that do not return value. (Example?)



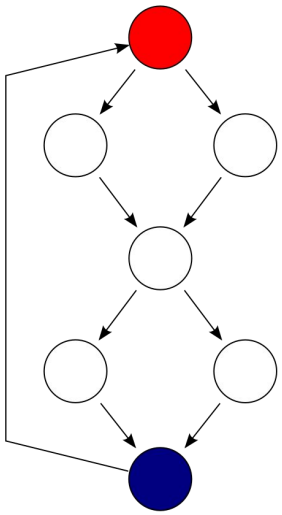
Operators

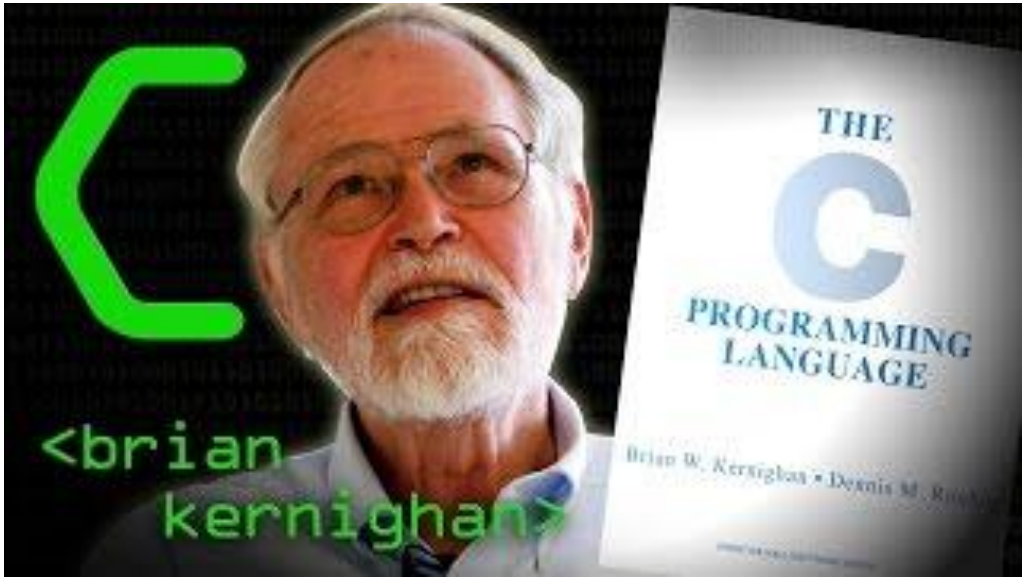
- Arithmetic operators.
- Relational operators.
- Logical operators.
- Bitwise operators.
- Assignment operators.



Control Flow Statements

- Conditional statements:
  - If, if-else, nested, switch-case.
- Loops:
  - for loop, while loop, do while loop.
- Break and continue.

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