Learning Programming Concept with C

Online Orientation

Agenda

What to expect from the online classes.

Things to do before and during the classes.

Physical and mental attendance.

Online Classes

We have to work together due to physical absence.

The code segments will be executed by me. You need to repeat the same in whichever device available.

Things to do

Join the class on time.

Keep pen and paper ready to take notes or solve exercises.

Keep your video and mic muted. This will reduce your data consumption.

If you want to ask a question, unmute your mic and ask the question. Once done, you can put your mic back on mute.

You can also message on chat if you are not able to understand anything. We will repeat the explanation.

In-between the class, randomly a question can be asked to anyone of you. Please be ready for it.

Review

Process of Programming: Step 1

Define and model the problem. In real life this is important and complicated.

- Example : consider modelling the Indian Railway reservation system or State Bank of India banking system.

Process of Programming: Step 2

Obtain a logical solution to your problem.

A logical solution is a finite and clear step-by-step procedure to solve your problem.

Methods to model a problem

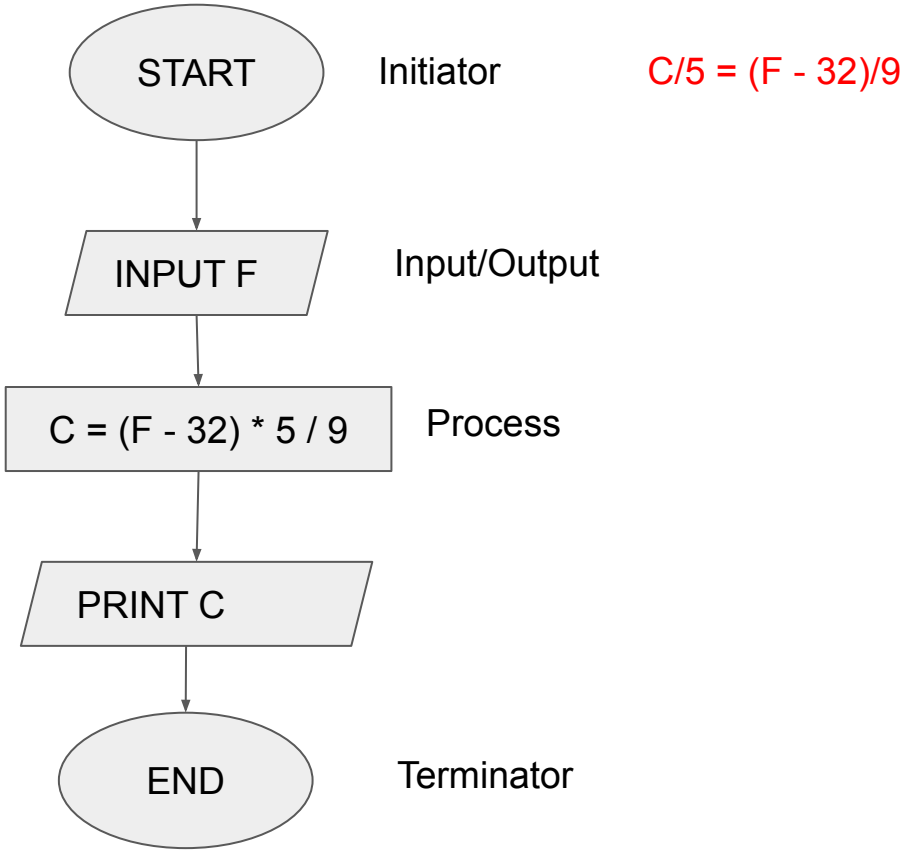
- Flowchart
- Algorithm

Flowchart

- A flowchart is a diagram that depicts a process, system or computer algorithm.
- Pictorial representation of algorithm.

Example

- Temperature Conversion
- Farenheit to Celcius.



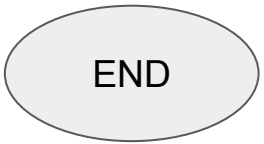
Symbols

Initiator

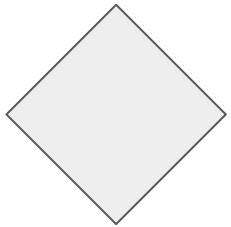
Connector

Input/Output

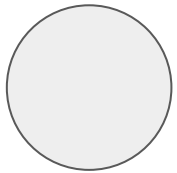
Process



Terminator



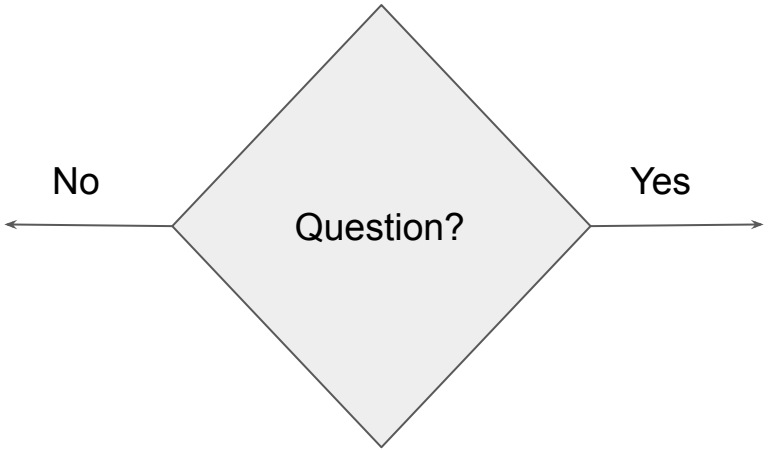
Decision



Connector

Question

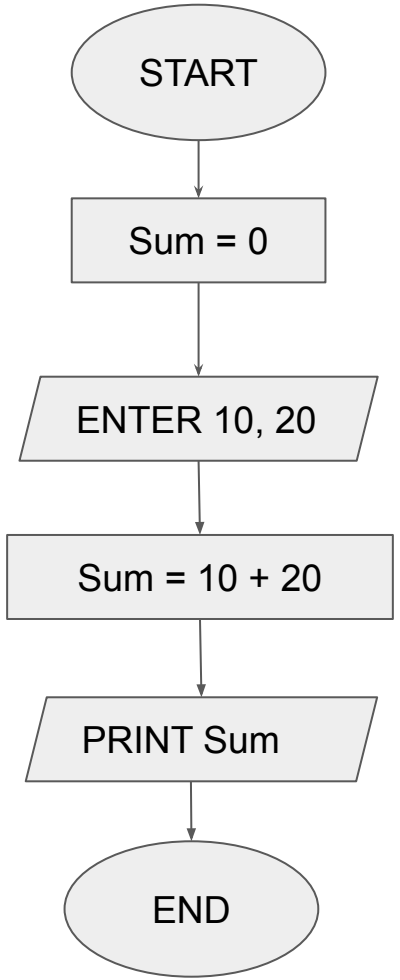
This symbol is for which kind of task?



A. Input/Output
B. Connector
C. Process
D. Decision

Problem

- Add 10 and 20



Algorithm

- An algorithm is a finite and clear step-by-step procedure to solve your problem.
- Three parts
  - Input
  - Process
  - Output

Example

Sum_of_10_and_20:

1. Initialize sum = 0
2. Enter the numbers 10 and 20
3. Add them and store the result in sum
4. Print sum

Real world problem

GCD: Greatest Common Divisor

An algorithm to find the greatest common divisor of two positive integers m and n, m >= n.

An initial solution, described informally as:

Gratest_Common_Divisor:

1. Take the smallest number n.
2. For each number k, n>=k>=1, in descending order do the following
    a. If k divides m and n, then k is the gcd of m and n

Consider the following situation

What if you take two large consecutive numbers? Say 100 and 99.

99 GCD of 100, 99

98 GCD of 100, 99

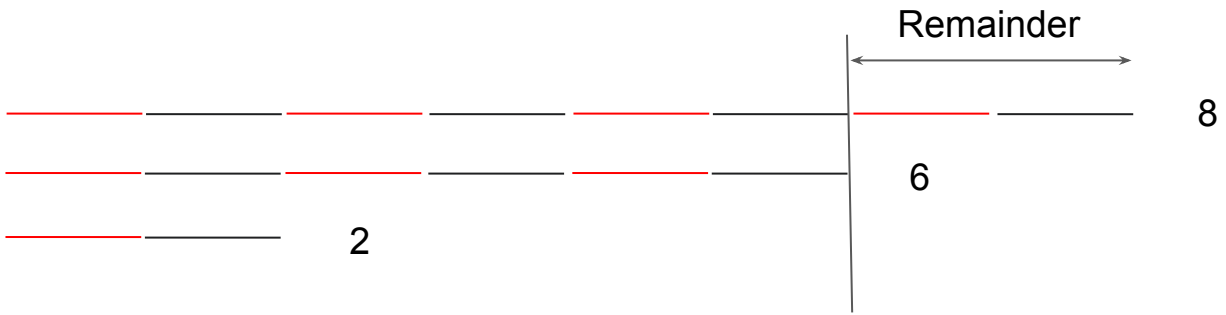
97 GCD of 100, 99

…

1 GCD of 100, 99 Yes!!

This algorithm will compute the GCD correctly, but it is very slow.

Euclid’s Algorithm: Intuition



GCD(8, 6) = 2

Euclid’s Algorithm

Suppose a > b. Then GCD of a and b is the same as the GCD of b and the remainder of a when divided by b.

GCD(a, b) = GCD(a, a % b)

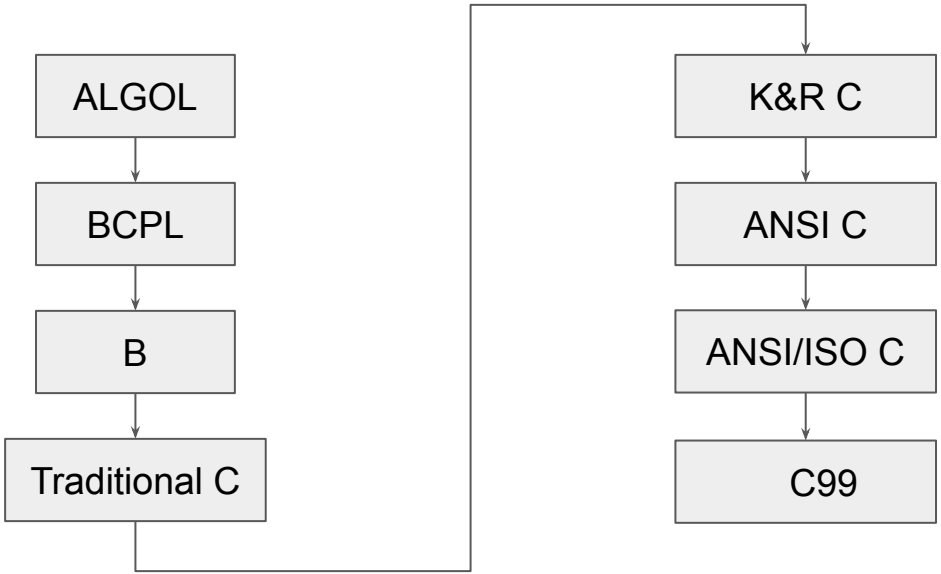
Euclid_Algorithm:
Data: Integers m and n
If n > m, then interchange m and n;
while n≠0 do

- g←m%n;
- m←n;
- n←g;

end
return m;

History of C

C is one of the most popular computer languages today because it is a structured, high-level, machine independent language.



Evolution

- The root of all modern languages is ALGOL, introduced in the early 1960s.
- In 1967, Martin Richards developed a language called BCPL (Basic Combined Programming Language) primarily for writing system software.
- In 1970, Ken Thompson created a language using many features of BCPL and called it simply B.
- Traditional C was evolved from ALGOL, BCPL, and B by Dennis Ritchie at the Bell Laboratories in 1972.
- Brian Kerningham and Dennis Ritchie made C popular and was called K&R C.
- American National Standard Institute (ANSI) defined standard for C 1989.
- Approved by International Standards Organization (ISO) in 1990.
- C99 = C + certain features of C++ and Java.