

A job ready bootcamp in C++, DSA and IOT

## Introduction to C++



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# Agenda

- ① History of C++
- ② Version history of C++
- ③ Comparison with C
- ④ Introduction to OOP
- ⑤ Key Principles of OOP
- ⑥ Software development using C++

## History of C++

- C++ is a general programming language
- Created by Danish Computer scientist Bjarne Stroustrup as an extension of the C programming language.
- Developed at AT&T's Bell Labs, USA
- C++ ranked 4<sup>th</sup> on TIOBE index



Bjarne Stroustrup

During Stroustrup's PHD thesis work, he found Simula had features that were very helpful for large software development but the language was too slow for practical use, while BCPL was fast but too low level to be suitable for large software development.

When Stroustrup started working in AT & T's bell labs, he had the problem of analyzing the UNIX Kernel with respect to distributed computing.

Stroustrup decided to enhance the C language with simula like features.

C was chosen because it was

- general purpose
- fast
- portable
- widely used

initially it was called C with classes

C++ name was given by Rick Mascitti

and was first used in December 1983.

Before this name, it was known as C with classes or new C

## Version History of C++

- C with classes (1979) - First implementation.  
classes, member functions, derived classes,  
public and private access control, friend,  
type checking of function arguments,  
inline functions, overloaded assignment  
operator, constructor, destructors,  
 $f()$  is same as  $f(void)$
- First C with classes reference manual  
published (1982)
- CFront was a compiler written by Stroustrup  
which converts C++ program to C program (1985)

## C++ Language (1985)

virtual function, function overloading,  
operator overloading, references,  
new and delete operators, const  
keyword, scope resolution operator,  
I/O stream

- First book "The C++ programming Language" was published, written by Bjarne Stroustrup (1985)
- C++ support in GCC (1987)

- CFront 2.0 (1989)

multiple inheritance, pointers to members,  
protected access control, type-safe linkage,  
abstract class, static, const qualified  
member functions, endl.

- 1990

namespaces, exception handling.  
nested class, templates

- ANSI C++ Committee founded (1990)

- ISO C++ Committee founded (1991)

- CFront 3.0 (1991)

- STL implemented in C++ (1992)

- C++ 98 (1998)  
bool, algorithms in STL, iterators,  
function objects
- C++ 03 (2003)  
major bug fixes
- C++ 11 (2011)
- C++ 14 (2014)
- C++ 17 (2017)
- C++ 20 (2020)

## Comparison with C

C++ is a superset of C language

C is procedure oriented programming language

C++ is Object Oriented as well as procedure oriented.

(Supports polymorphism, inheritance, encapsulation)

No concept of exception handling

C++ supports exception handling

no type safe linking

type safe linking

Top down approach

Bottom up approach

## Procedure Oriented Programming

- Emphasis is on the procedures.
- Any software project can be seen as a list of tasks.
- Some procedure (Sequence of instructions) is required to accomplish a given task

Example – Banking System.

## Introduction to OOP

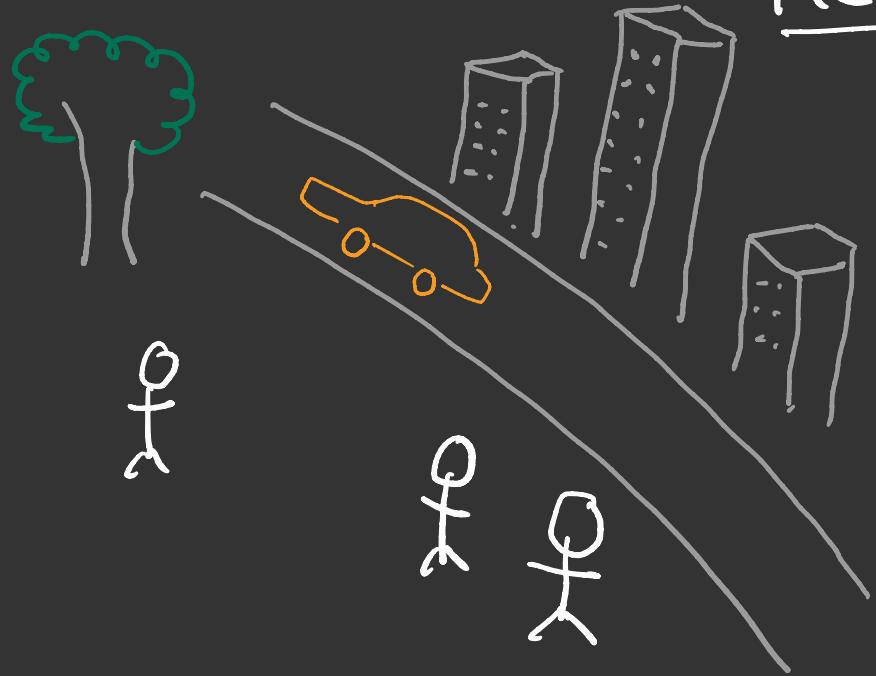
Object Oriented Programming is a popular programming paradigm based on the concept of Objects.

Object is something which can contain data and code

data in the form of fields (or attributes, or properties)

code in the form of procedures (or methods)

## Real world Analogy



Real world entities are called objects.

Class is a description of an object

Class = Category

running(): ← verb

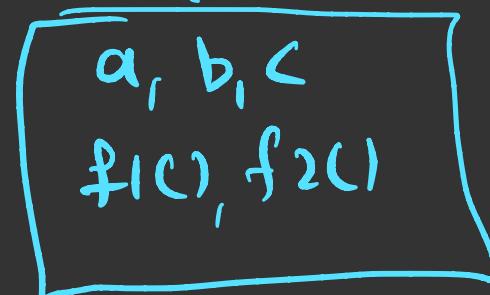
Ramesh . running()  
↑  
noun              ↑  
                  verb

Person → Common noun Class

Ramesh  
Mahesh  
Nilesh } → Proper noun Objects

Class is a description of an object.

class is group of variables and functions



Object is an instance of a class.

X obj;

obj.a

obj.b

obj.c

| obj.f1();  
| obj.f2();

## History of OOP

The term object oriented programming made its first appearance at MIT in the late 1950s and early 1960s.

LISP is the second oldest high level programming language (after FORTRAN) which uses term Object with properties

Simula introduced important concepts that are today an essential part of Object oriented programming, such as class and object, inheritance, and dynamic binding

Alan Kay who also developed Smalltalk implemented Object Oriented features has received the major credit on development of OOP.

"OOP to me means only messaging,  
local retention and protection  
and hiding of state-process, and  
extreme late binding of all things."

- Alan Kay

In Simple words, essential ingredients  
of OOP are

- Message Passing
- Encapsulation
- Dynamic Binding

# What are Programming Paradigms?

Paradigm = model

Programming Paradigms are specific code organization with particular techniques to implement programming solutions.

Different programming paradigms are guidance on approach to solve a programming problem.

# Different Programming Paradigms

- Procedural Programming
  - Object Oriented Programming
  - Imperative Programming
  - Declarative Programming
  - Parallel Processing Approach
- many more ...

Which of the following is the first Object Oriented Programming language?

- (a) Java
- (b) C++
- (c) Simula
- (d) Smalltalk

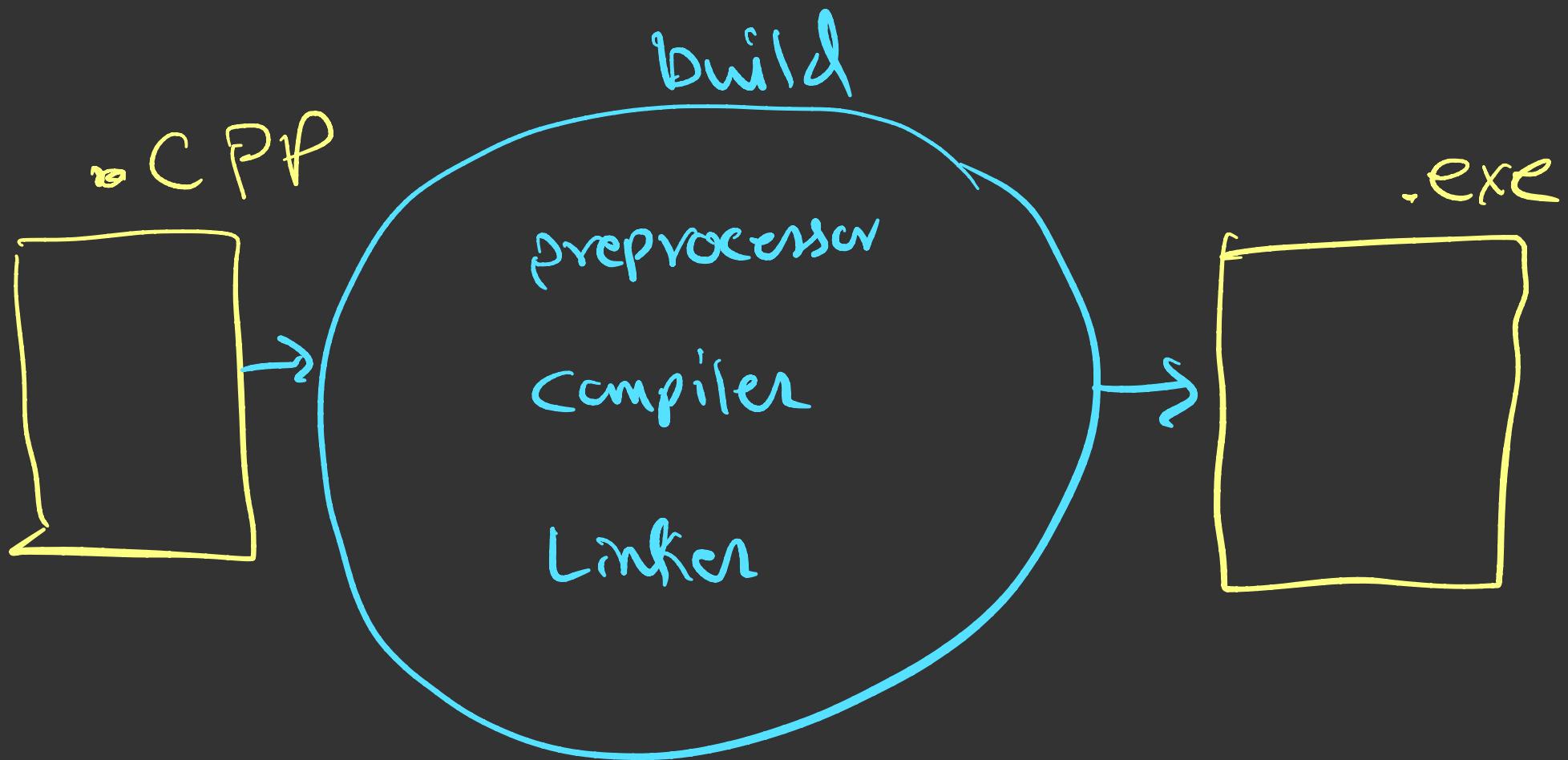
Which of the following is the first purely object oriented programming language?

- (a) Java
- (b) C++
- (c) Simula
- (d) Smalltalk

## Key Principles of OOP

- Encapsulation
- Data Hiding
- Abstraction
- Inheritance
- Polymorphism

# Software Development using C++



Compiler in C → gcc

Compiler in C++ → g++