

C++ in depth

Introduction to OOP



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Agenda

- ① Introduction of OOP
- ② History of OOP
- ③ Key principles of OOP
- ④ Software development using C++

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

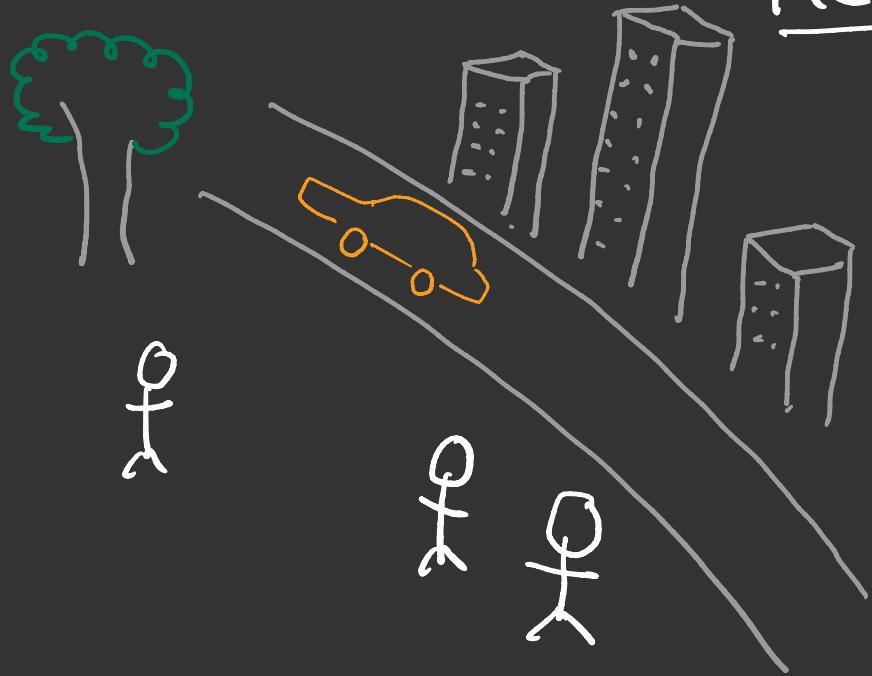
Object Oriented Programming is a popular programming paradigm based on the concept of Objects.

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



running();

Ramesh.running();

Mathesh.running();

↑
noun

↑
verb

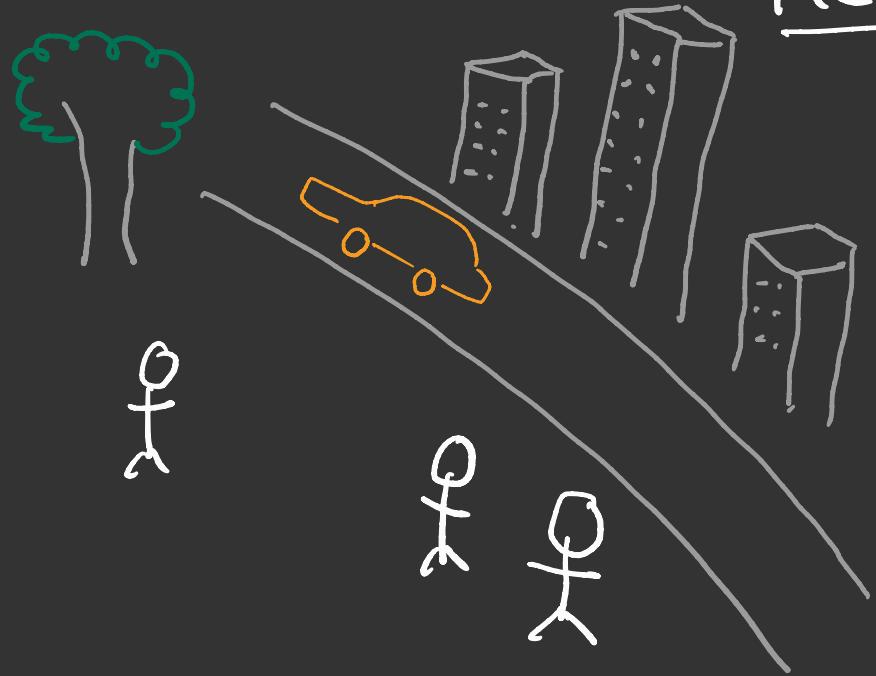
noun = Object
verb = method/function

properties = member variables of object

Class Person

Object Ramesh
Mathesh
Harish

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

person



common noun



Object is an instance of a class.

yamesh



mahesh Hanish



proper noun

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?

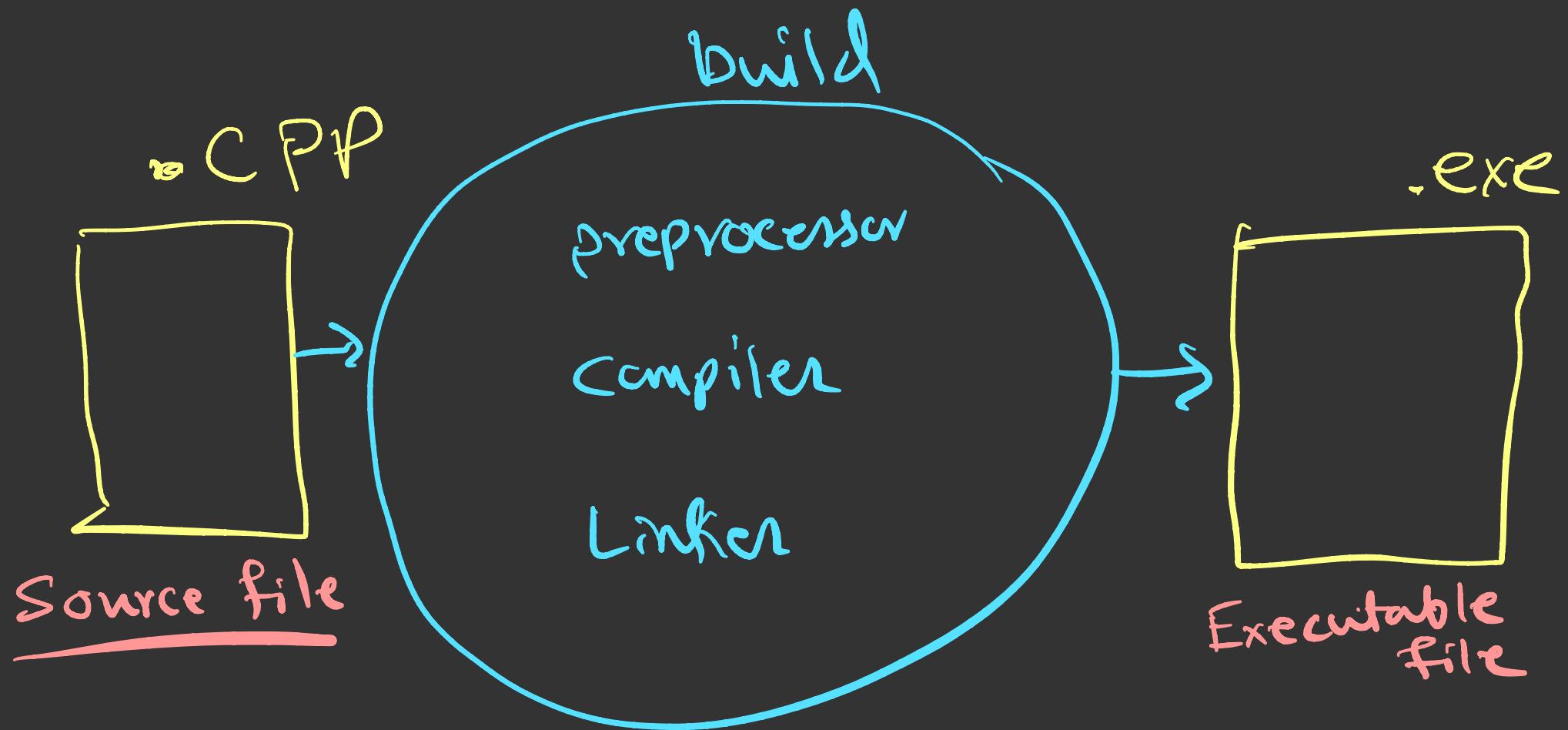
- (a) Java
- (b) C++
- (c) Simula
- (d) Smalltalk



Key Principles of OOP

- Encapsulation
- Data Hiding
- Abstraction
- Inheritance
- Polymorphism

Software Development using C++



Compiler in C → gcc

Compiler in C++ → g++

S - Rent sim

- printf scanf
 - functions
 - arguments (formal, actual)
 - return, void
 - call by value, call by reference
 - pointer
 - size, type
 - structure pointer.
 - Structure
 - DMA