Object Oriented Programming using Python (I)

Lecture(1)

Programming Paradigm

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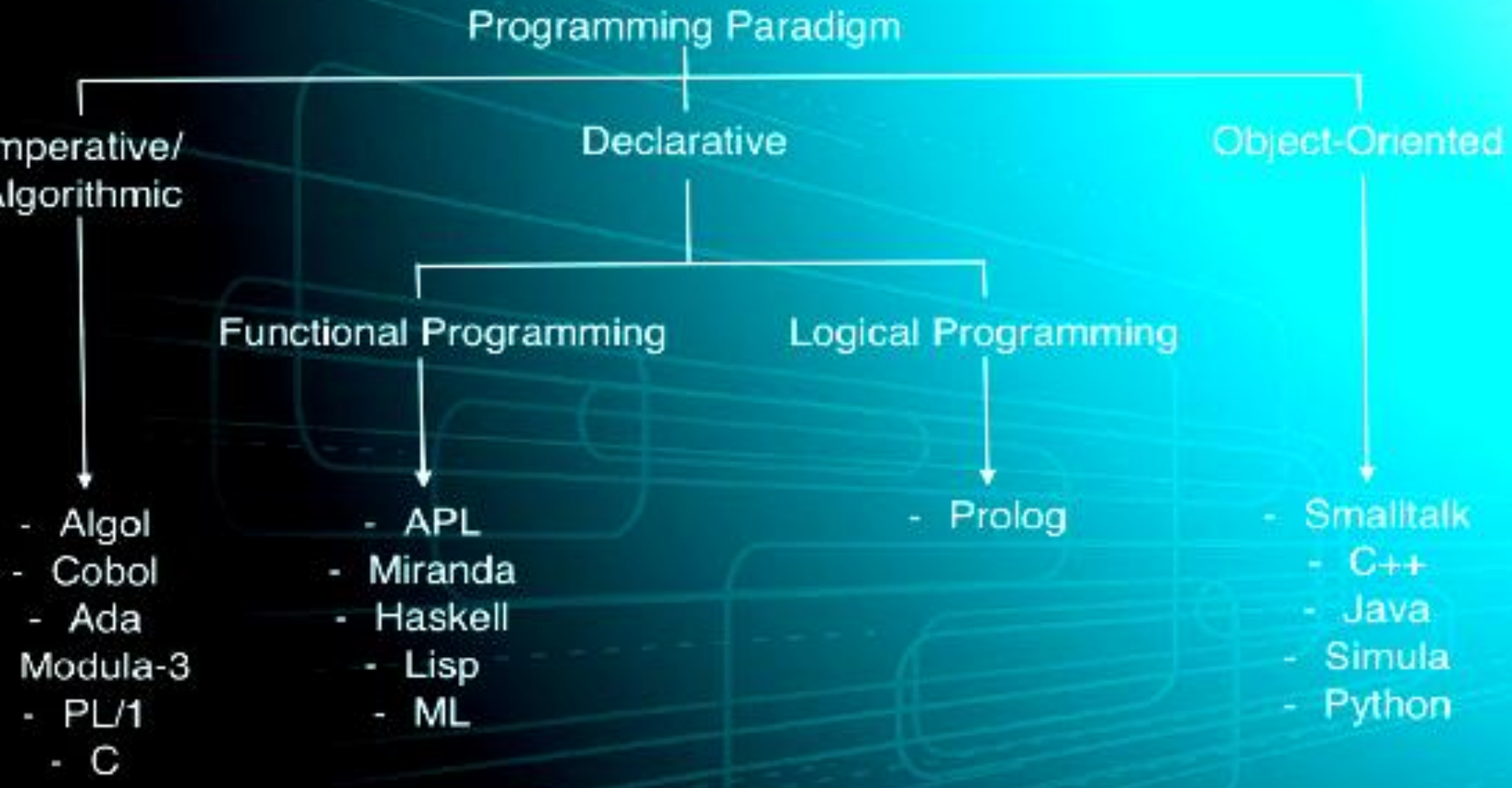
Paradigm

- A theory or a pattern or model, a group of ideas about how something should be done, made, or thought about.

Programming Paradigm

- A programming paradigm is a fundamental style of computer programming. This style shows the way of building the structure and elements of programs. according to the style of computer programming .
- Features of various programming languages determine which programming paradigms they belong to
- some languages fall into only one paradigm, while others fall into multiple paradigms.

TYPES


Programming Paradigm
mperative/
lgorithmic
Declarative
Object-Oriented
Functional Programming
Logical Programming
- Algol
- Cobol
- Ada
Modula-3
- PL/1
- C
- APL
- Miranda
- Haskell
- Lisp
- ML
- Prolog
- Smalltalk
- C++
- Java
- Simula
- Python

Imperative Programming

- Control flow in imperative programming is *explicit:*
- commands show *how the computation takes place, step by* step. Each step affects the global **state of the computation.**
- C,COBOL are imperative programming languages
- Imperative programs describe the details of *HOW* the results are to be obtained.
- HOW means describing the Inputs and describing how the Outputs are produced.

```
result=[]
val=0
while val>=0:
    val=eval(input("enter on"))
    result=result+[val]
print(result)
```

DECLARATIVE PROGRAMMING PARADIGM

- Declarative programming is a programming paradigm—a style of building the structure and elements of computer programs—that expresses the logic of a computation without describing its control flow.
- Declarative programming focuses on *what the* program should accomplish.
- Examples are: SQL, XSQL (XMLSQL) etc.

FUNCTIONAL PROGRAMMING PARADIGM

- Functional programming is a subset of declarative programming.
- Programs written using this paradigm use functions, blocks of code intended to behave like mathematical functions.
- In functional programming control flow is expressed by combining function calls, rather than by assigning values to variables.
- With functional programming ,Code is much shorter, less error, and much easier to prove correct

```
from random import randrange
def fun1():
    s=0
    l=[]
    for i in range(0,20):
        x=randrange(1,100)
        s+=x
        l=l+[x]
    print("the  list of random numbers",l)
    print("the average",s/20)
    return(s)

print("the sum is",fun1())
print("the sum is",fun1())
print("the sum is",fun1())
```

OBJECT ORIENTED PROGRAMMING PARADIGM

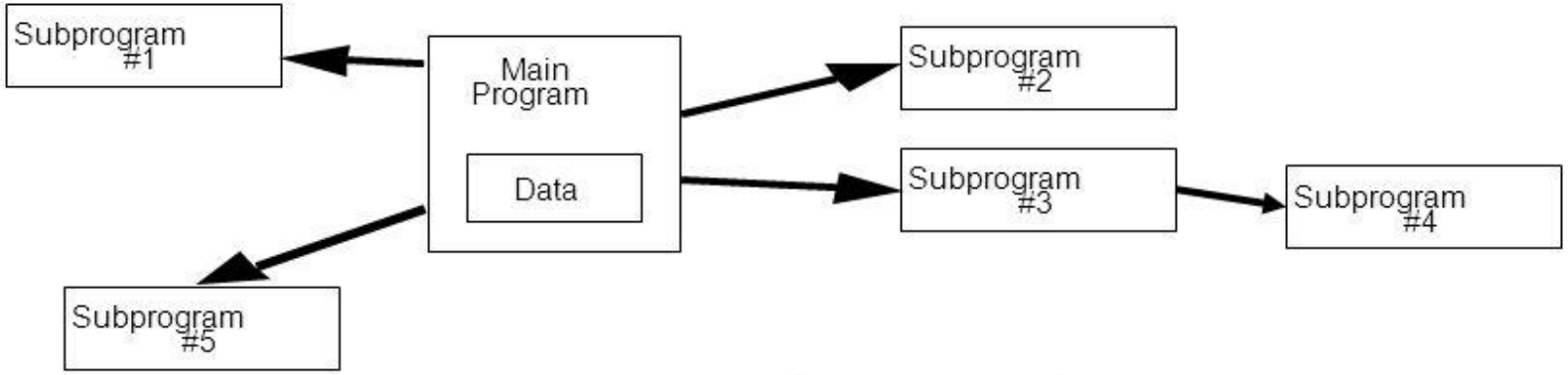
- Object-oriented programming (OOP) is a programming paradigm based on the concept of "objects", which may contain data often known as attributes; and code, often known as methods
- In OOP, computer programs are designed by making them out of objects.
- Examples are: C++, C#, Java, PHP, Python.

OBJECT ORIENTED PROGRAMMING PARADIGM

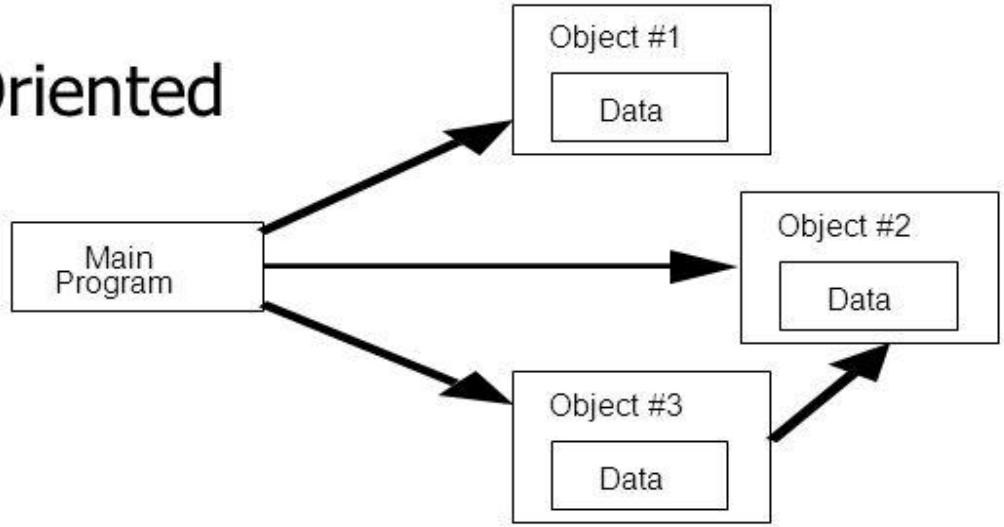
In object oriented programming, we can imagine a program as a collection of *interacting objects*. Objects have state, behavior and identity. Data and code are encapsulated in objects. The objects can send messages to each other (message passing). Everything an object can do is represented by its message interface. So you don't have to know anything about what is in the object in order to use it.

Procedural vs. O-O

Procedural

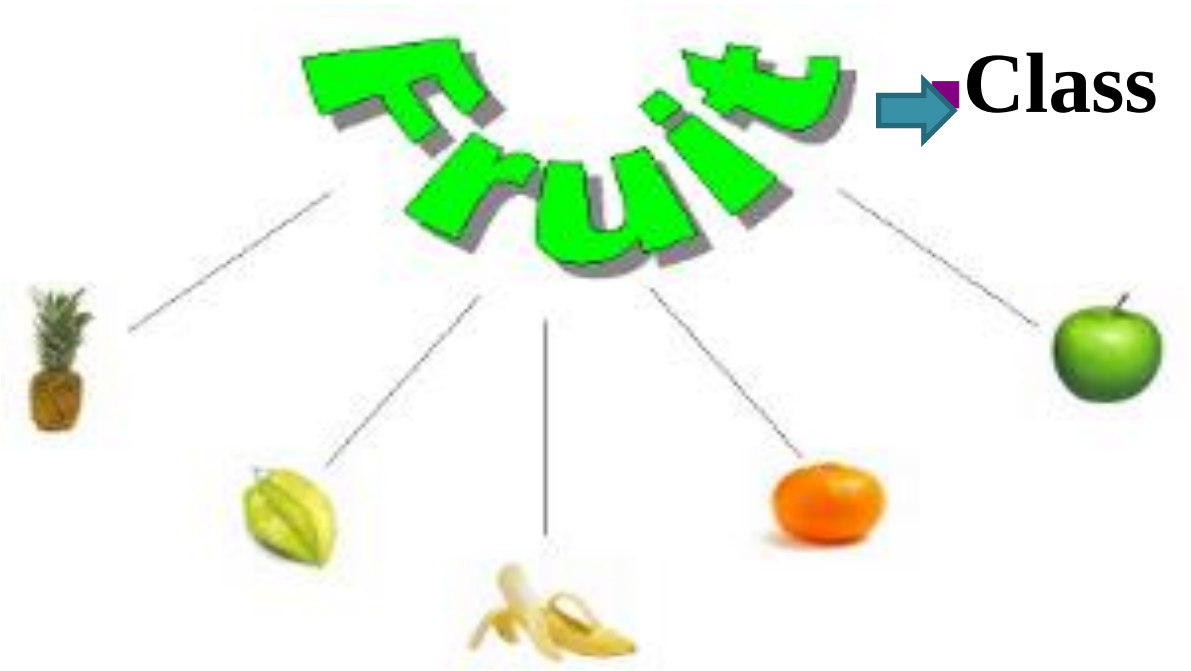


Object Oriented



Class example

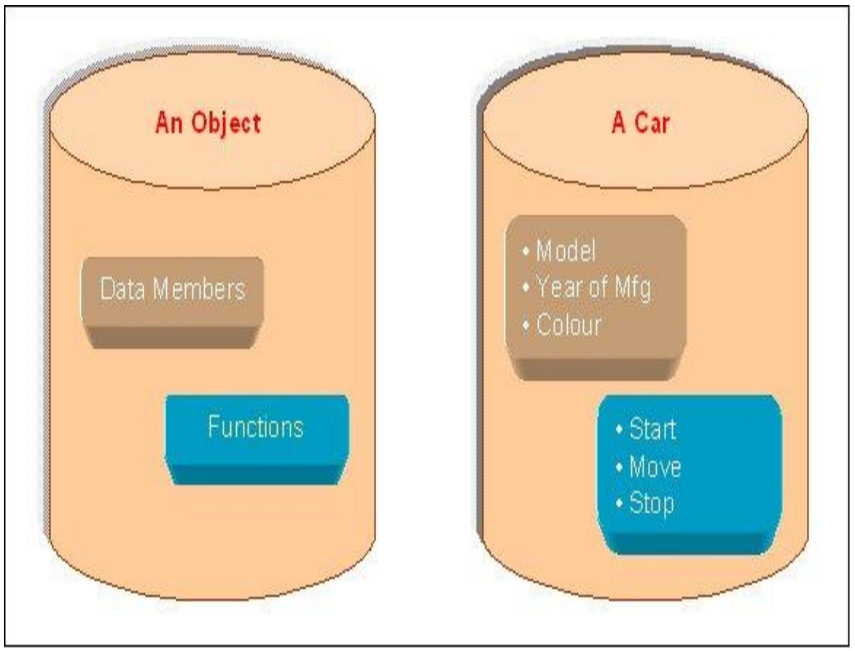
- A class is a (template) of an object



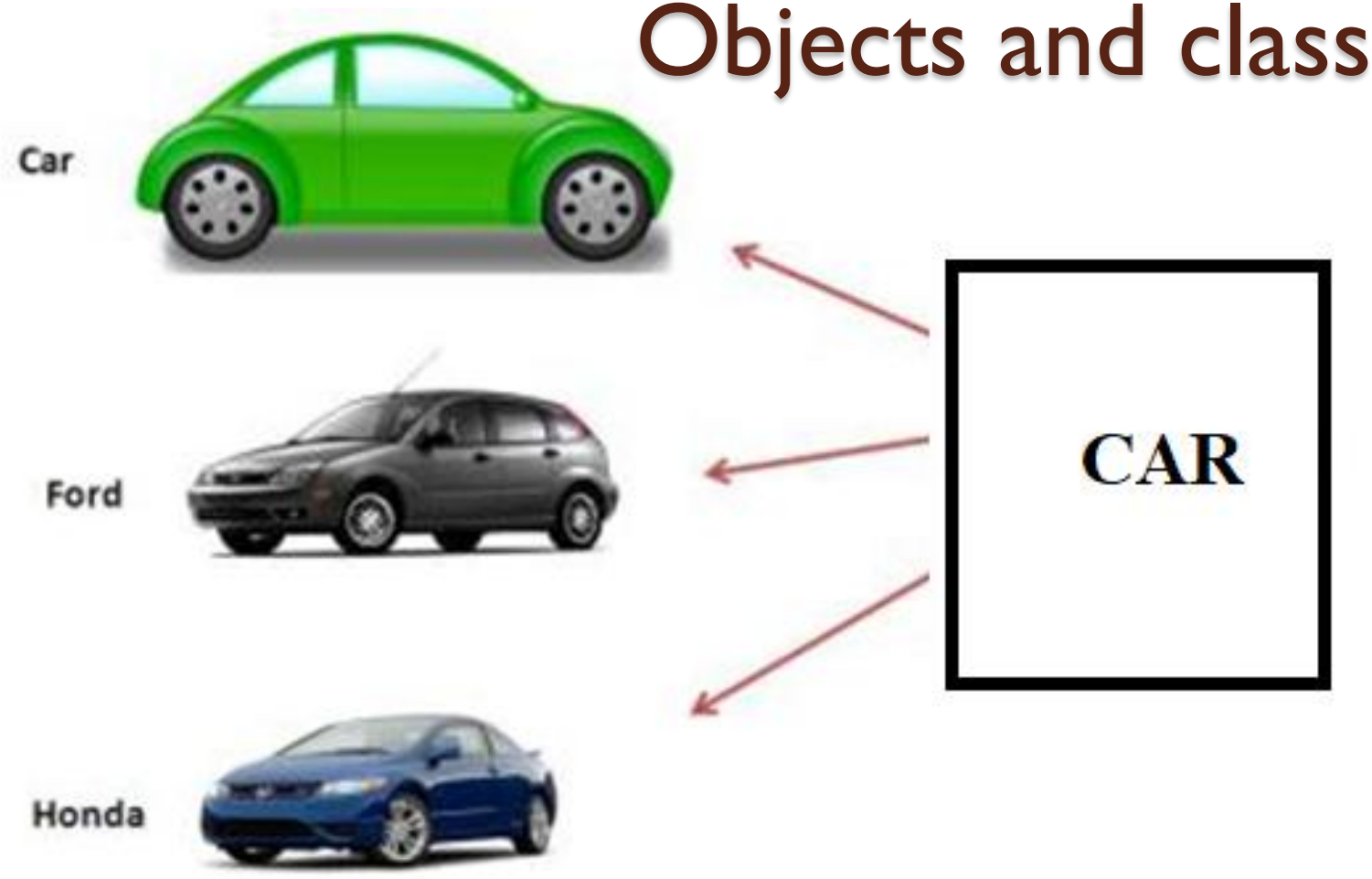
- **Class**
- **Object**

Objects

- This is the basic unit of object oriented programming that is both data and function that operate on data are bundled as a unit called as object



Objects and class



Each car has different attributes , functions and methods

A Glance of different paradigms

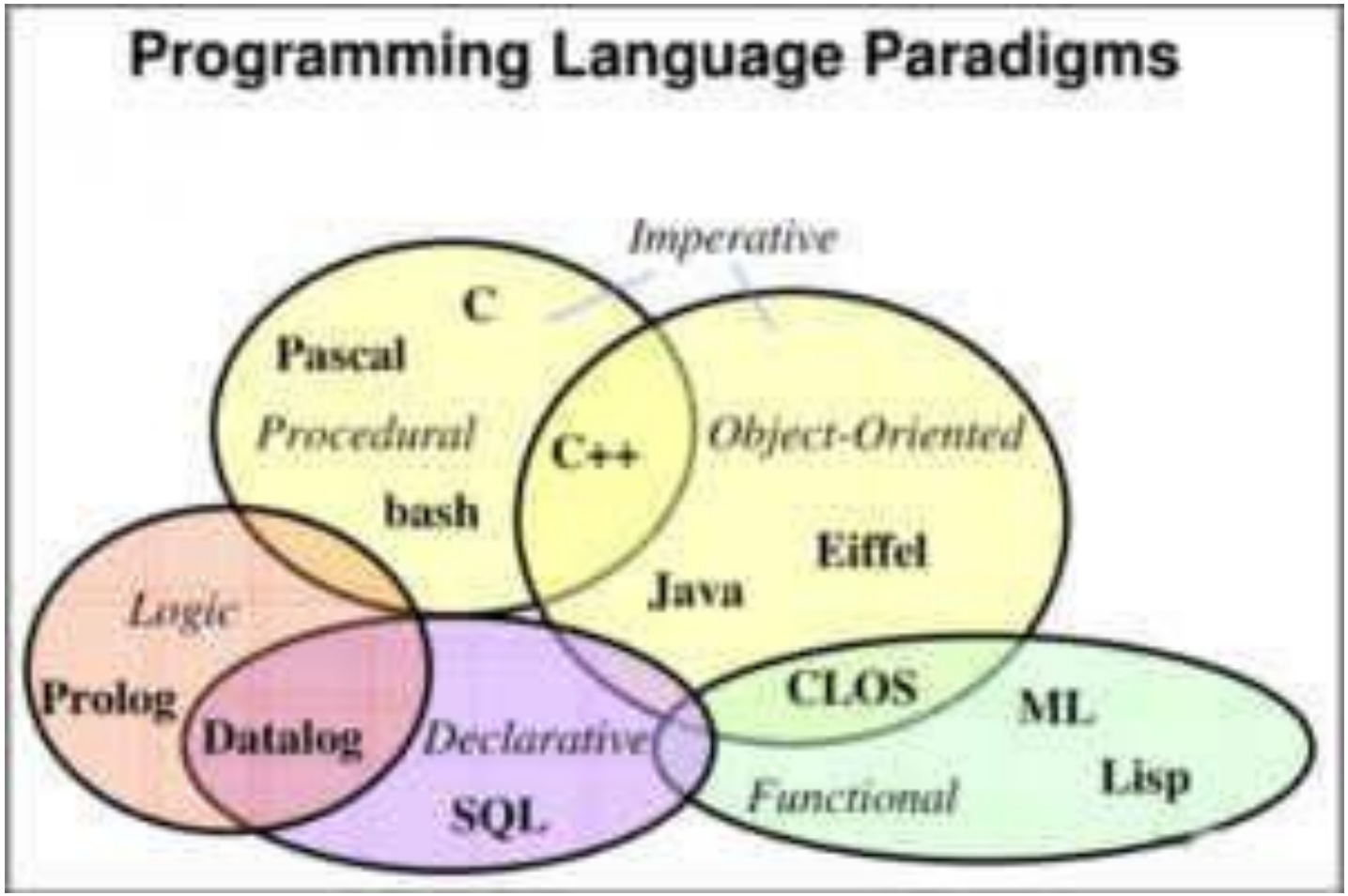
Paradigm	Description	Examples
Imperative	Programs as statements that directly change computed state (datafields).	C, C++, Java, PHP, Python, Ruby.
Functional	Treats computation as the evaluation of mathematical functions avoiding state.	C++, Lisp, Python, JavaScript
Object-oriented	Treats datafields as objects manipulated through predefined methods only	C++, C#., Java, PHP, Python .
Declarative	Defines program logic, but not detailed control flow	SQL, CSS.

WHY OBJECT ORIENTED PROGRAMMING

- One of the main principle of object oriented programming language is that everything an object will need must be inside of the object this will provide privacy. This language also emphasizes reusability and the ability of implementations without having to change a great deal of code

MULTI PARADIGM

- A multi-paradigm programming language is a programming language that supports more than one programming paradigm.
- The design goal of such languages is to allow programmers to use the most suitable programming style and associated language constructs for a given job.
- Languages such as C++, Java, Python are multi-paradigm programming languages that support object-oriented programming to a greater or lesser degree, typically in combination with imperative, procedural programming.


Programming Language Paradigms
Imperative
C
Pascal
Procedural
C++
Object-Oriented
bash
Eiffel
Java
Logic
Prolog
Datalog
Declarative
SQL
CLOS
ML
Lisp
Functional