Object Oriented Programming using Python (I)

Lecture(1)

Programming Paradigm

Prepared by: ***Dr. Rula Amjed Hamid***

University of Information Technology and Communications

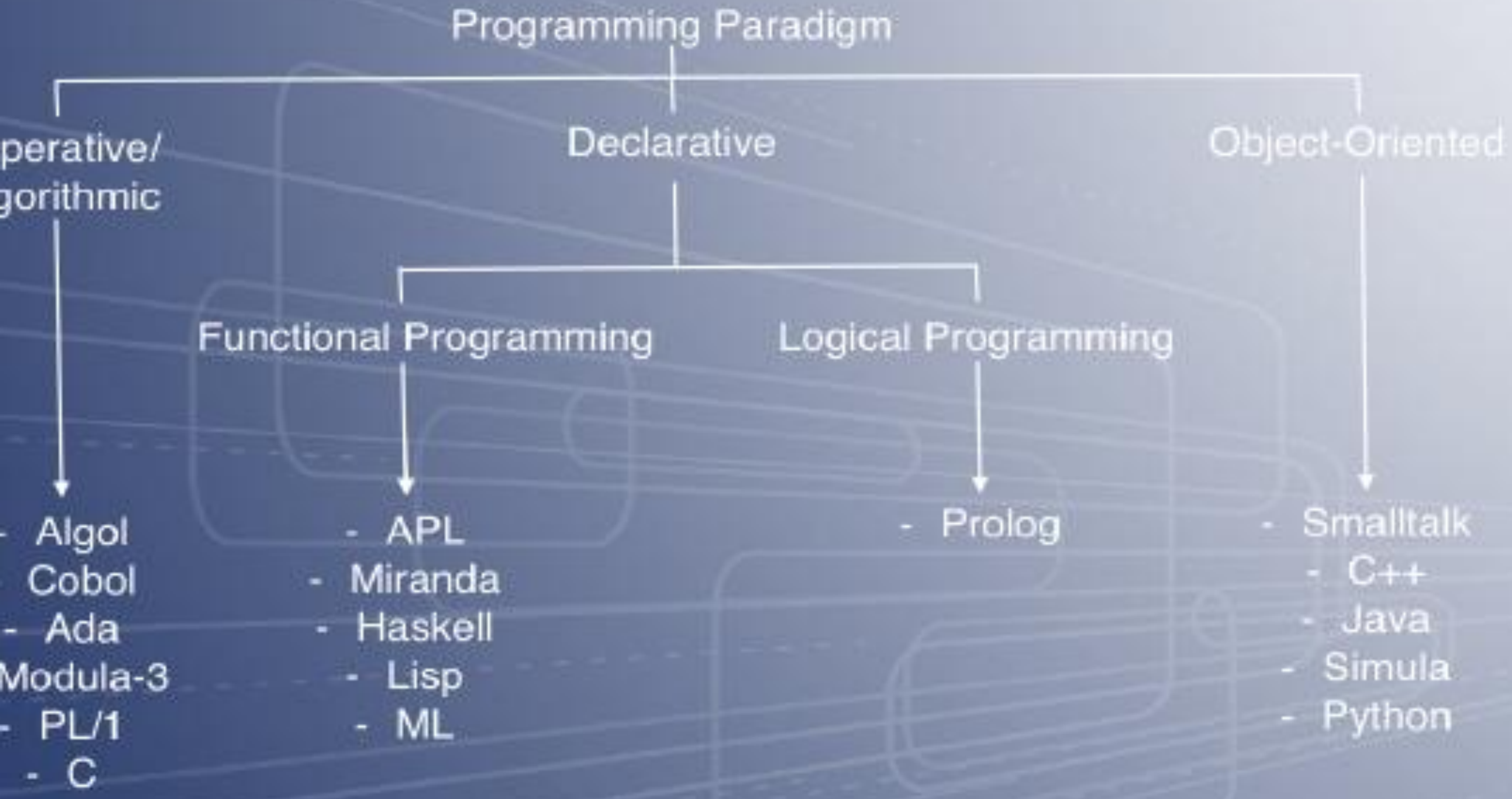
College of Business Informatics

- ***Paradigm*** A pattern or model, a group of ideas about how something should be done,, or thought about.
- Programming is **the process of creating a set of instructions that tell a computer how to perform a task**

Programming Paradigm النمط البرمجي

- 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 .
- some languages fall into only one paradigm, while others fall into multiple paradigms.

TYPES



Programming Paradigm

perative/
gorithmic

- Algol
Cobol
- Ada
Modula-3
- PL/1
- C

Declarative

Functional Programming

- APL
- Miranda
- Haskell
- Lisp
- ML

Logical Programming

- Prolog

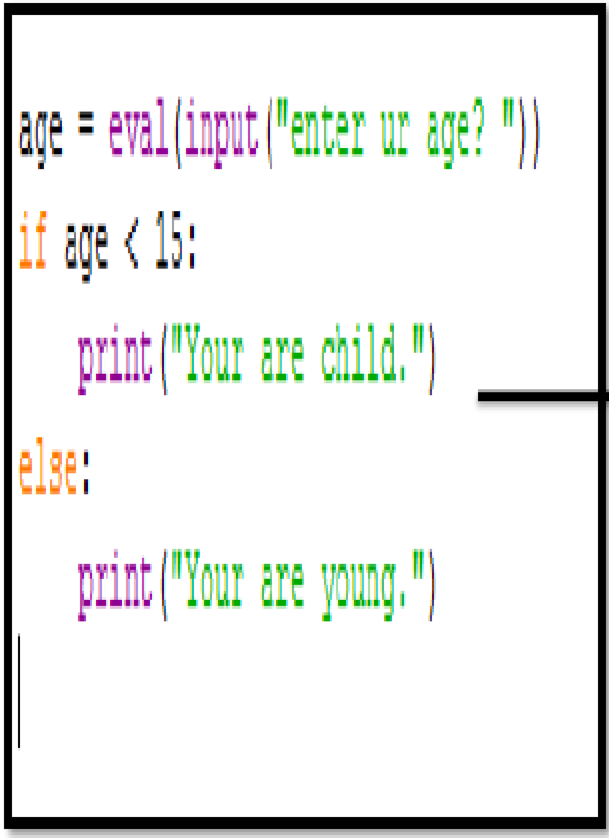
Object-Oriented

- Smalltalk
- C++
- Java
- Simula
- Python

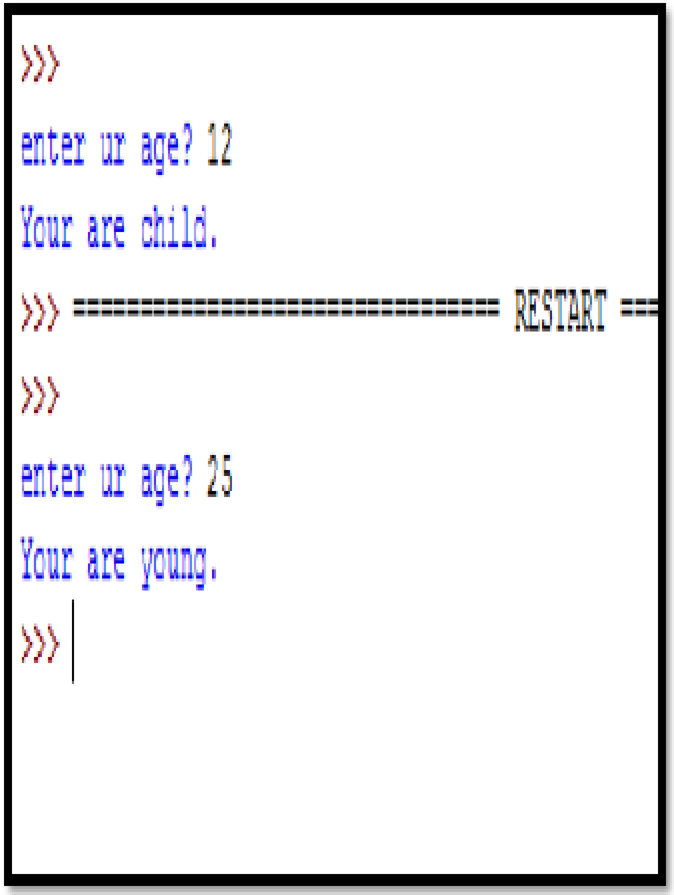
Imperative Programming

- Control flow in imperative programming is *explicit صريح :*
- commands show *how the computation takes place, step by* step. Each step affects the global **state of the computation.**
- 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.

C,COBOL are imperative programming languages



```
age = eval(input("enter ur age? "))
if age < 15:
    print("Your are child.")
else:
    print("Your are young.")
```



```
>>>
enter ur age? 12
Your are child.
>>> ================================ RESTART ===
>>>
enter ur age? 25
Your are young.
>>>
```

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

  - SELECT * FROM Customers

DECLARATIVE PROGRAMMING PARADIGM

1-FUNCTIONAL or procedural PROGRAMMING PARADIGM

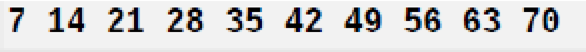
- Functional programming is a subset of declarative programming.
- Programs written using this paradigm use functions, blocks of code intended to behave like mathematical functions.
- In functional programming control flow is expressed by combining function calls, rather than by assigning values to variables.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

```
def table7():
    n = 1
    while n <11 :
            print(n * 7, end =' ')
            n = n +1
```

Function definition

```
table7()
```

Function invocation



```
7 14 21 28 35 42 49 56 63 70
```

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.

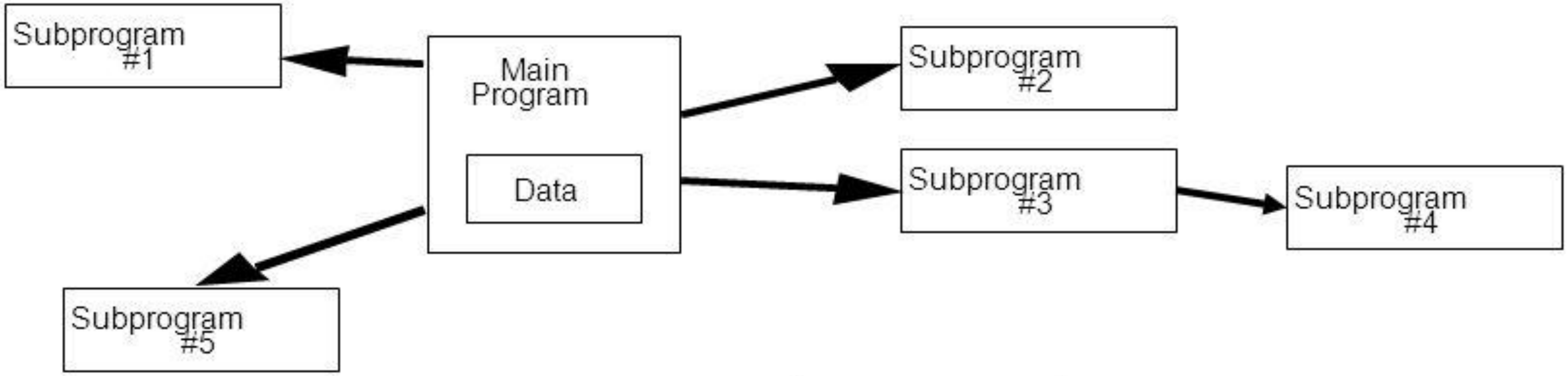
OBJECT ORIENTED PROGRAMMING PARADIGM

- In object oriented programming, we can imagine a program as a collection of classes and *interacting objects*. Objects have data and functions.

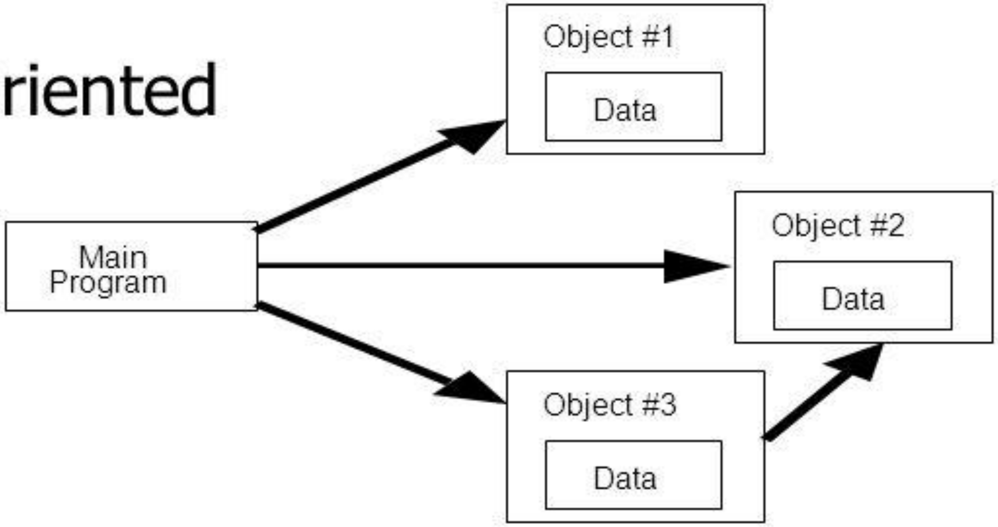
- Data and code are encapsulated in objects. The objects can send messages to each other (parameters passing).

Procedural vs. O-O

Procedural

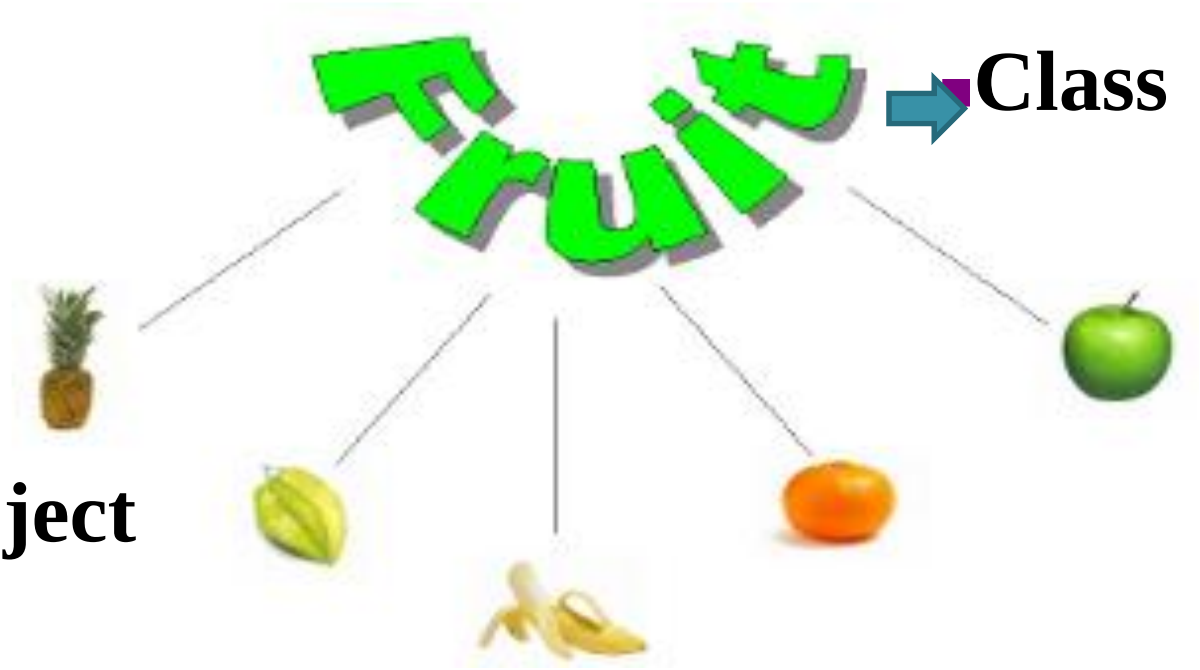


Object Oriented



Class example

- A class is a (template) of an object

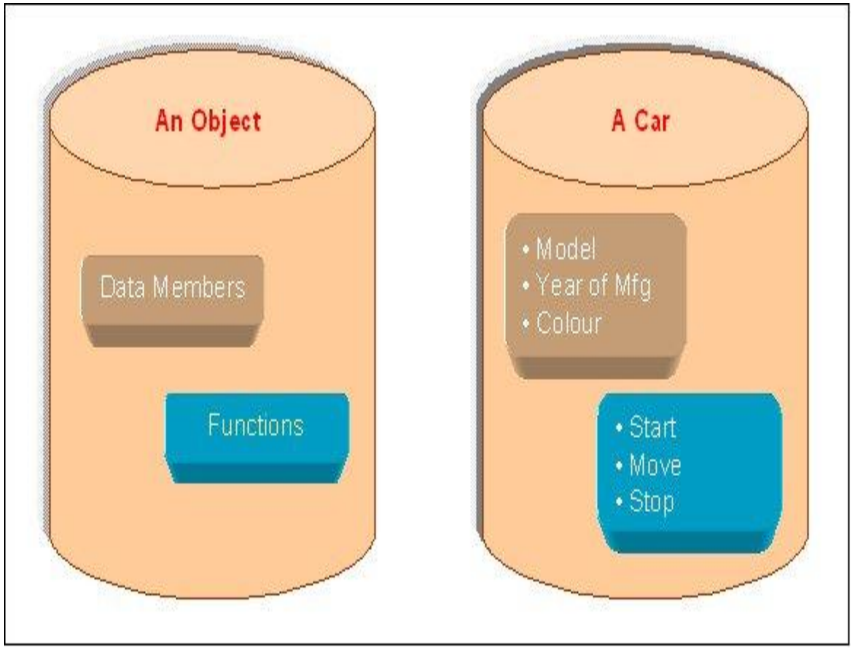


- Class

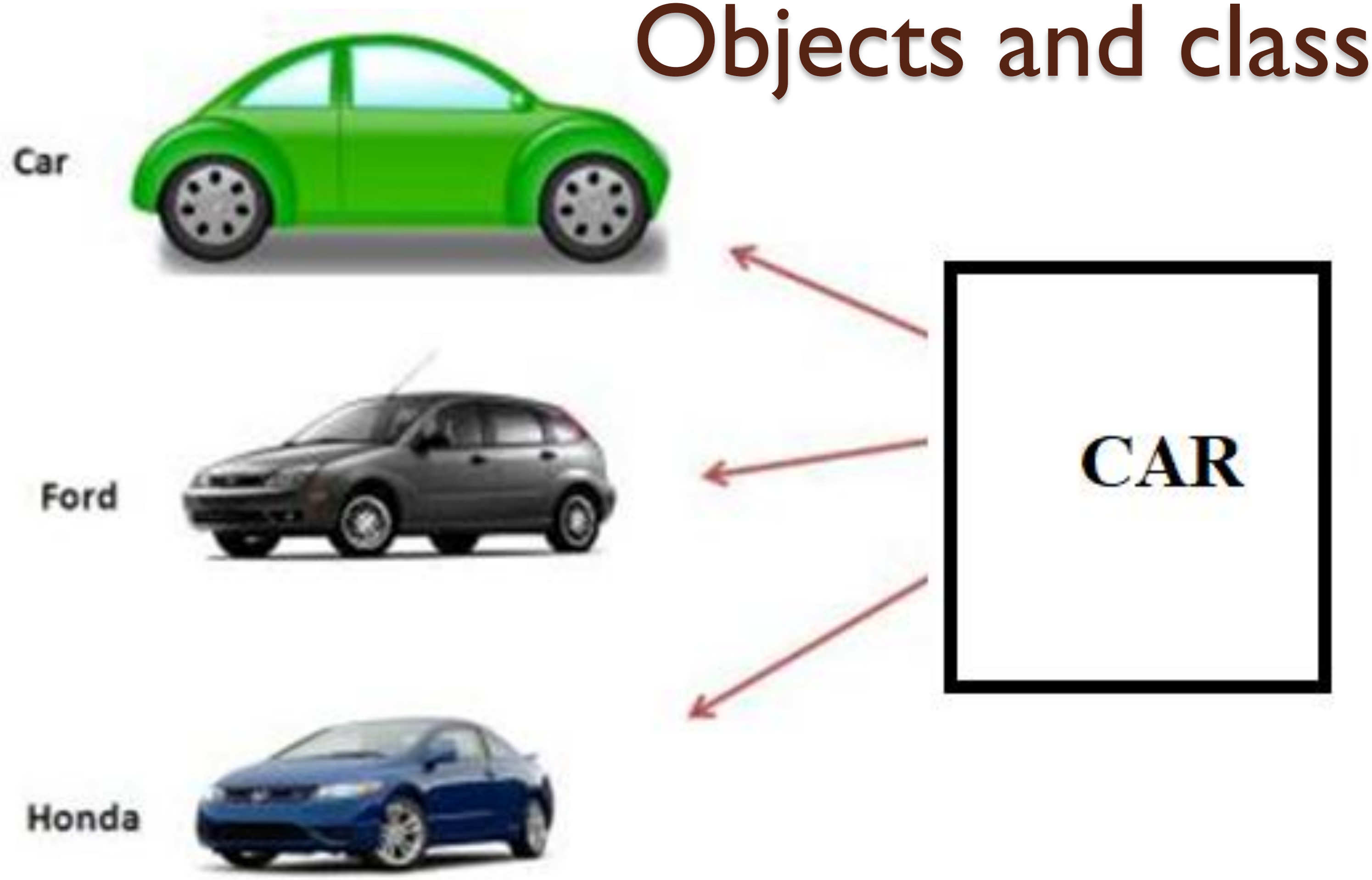
- Object

Objects

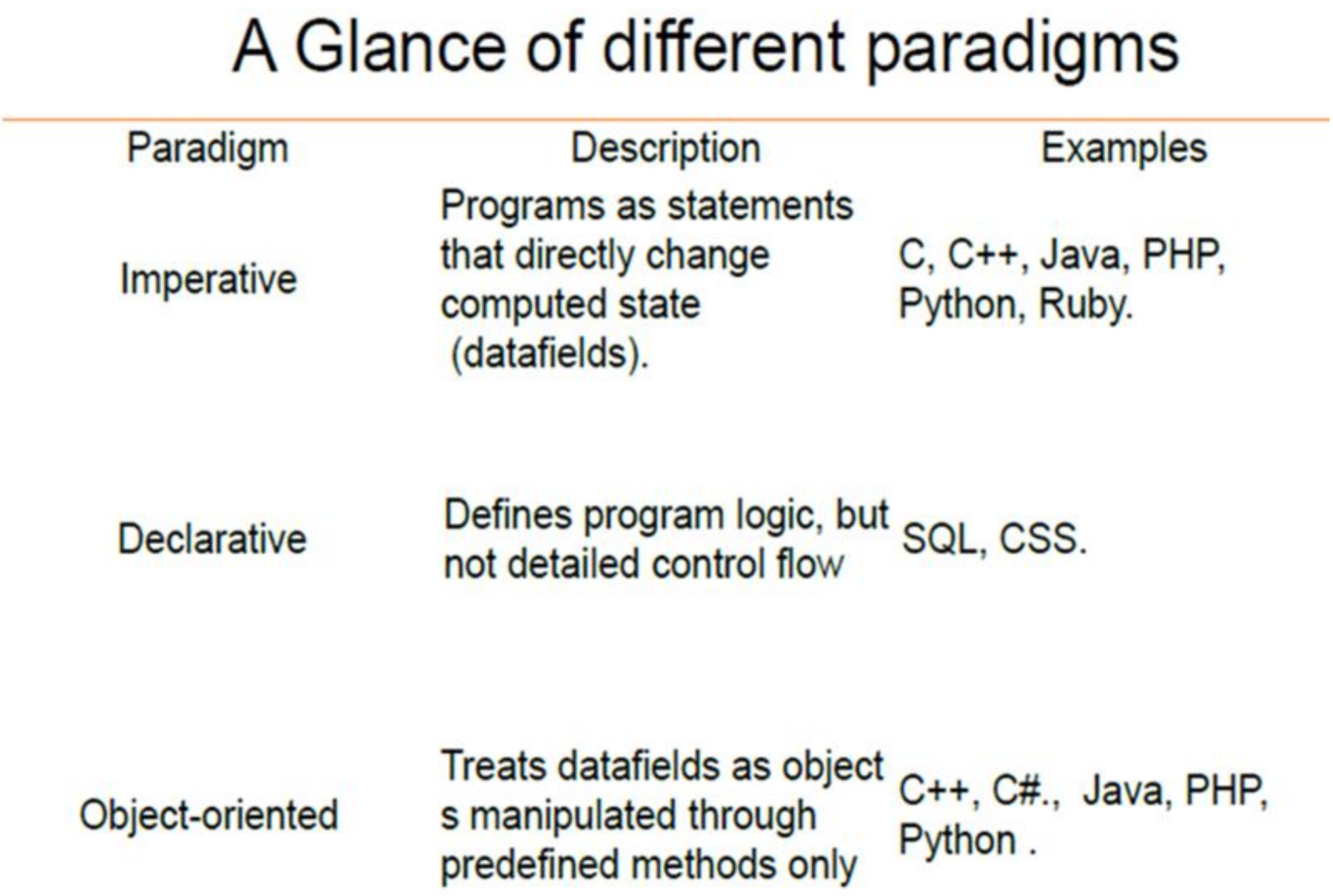
- This is the basic unit of object oriented programming that is both data and function that operate on data are bundled as a unit called as object



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.
Declarative	Defines program logic, but not detailed control flow	SQL, CSS.
Object-oriented	Treats datafields as object s manipulated through predefined methods only	C++, C#., Java, PHP, Python .

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