Lecture 1

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- What is an Object ?
- Graphical View of an Object
- Object Examples
- What is a Class ?
- Object vs Class ?
- Class Examples

What is Object ?

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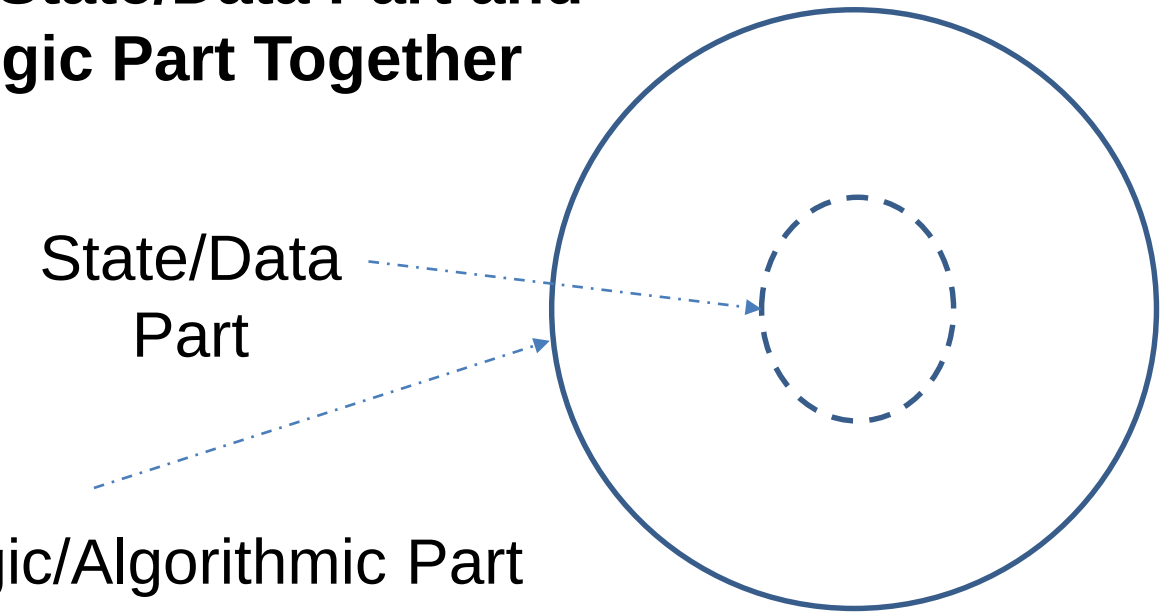
- Object Means Combination of Data (Attributes) and Logic (Algorithm, Behavior, Functions, Operations) of some real world entity. For example Student, Box, Account, Time
- Every real-world object has two characteristics :
  - Data-Part/State [Also known as attributes or properties]
  - Behavior [Also known as operations / Algorithmic / Logic Part]
- Software Object is conceptually similar to a every real-world object.

Object: Graphical View

Object Keeps State/Data Part and Behavior/Logic Part Together



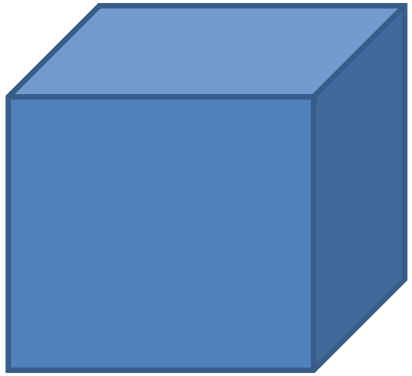
A Software Object

Object Examples

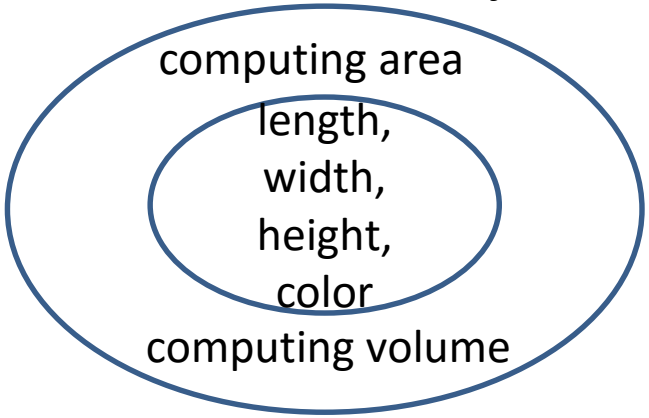
- **Box Object :**
  - State/Data Part : length, width, height, Color [Attributes/Instance Fields]
  - Behavior Part: computing area, computing volume [Operations, Methods]
- **Dog Object :**
  - State/Data Part : name, breed, color [Attributes / Instance Fields]
  - Behavior Part : barking, fetching, wagging [Operations, Methods]
- **Account Object :**
  - State/Data Part : account number, account holder name, balance, type of account [Attributes/ Instance Fields]
  - withdrawing an amount, depositing an amount, checking balance of a account [Behavior, Operations, Methods]

Object Examples

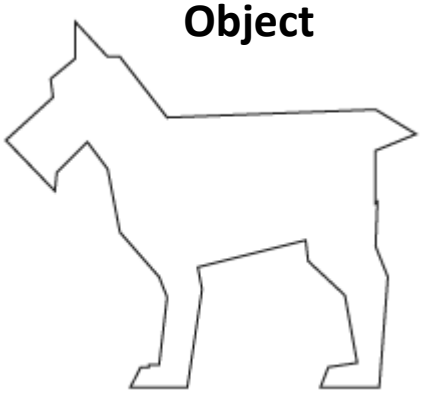
Box as a Real World Object



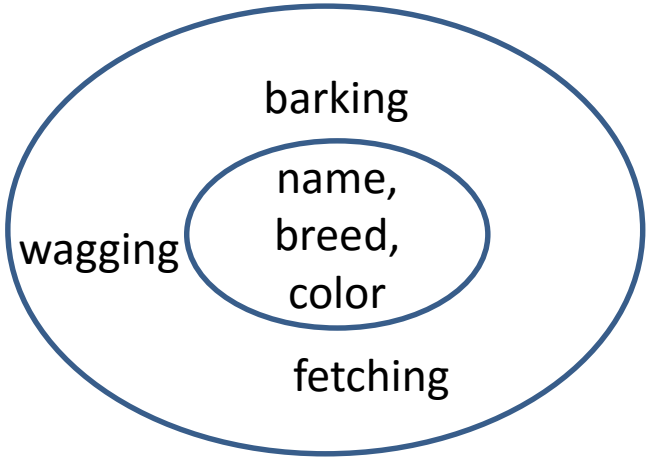
Box as a Software Object



Dog as a Real World Object



Dog as a Software Object



What is Class ?

- Objects are grouped in classes
- A class is a collections of objects having similar behavior and attributes
- An object is simply a single instance of class.
- Objects can not be instantiated (or created) without defining a class
- Classes are defined whereas objects are created.
- In order to create an object, you have to first define the class of that object

Class Example : Box Class

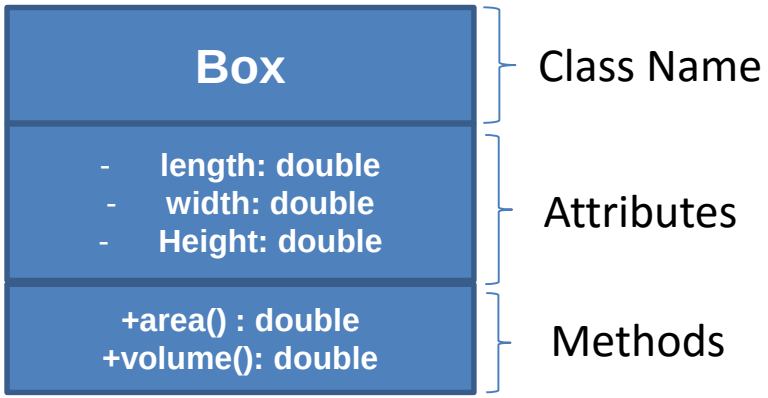

```
class Box
{
    private          double    length;
    private          double    width;
    private          double    height;
    public           double    area()
    {
            return 2* (length * width + width * height + height * length);
    }
    public           double    volume()
    {
            return length * width * height;
    }
}// End of class
```

Instance Fields

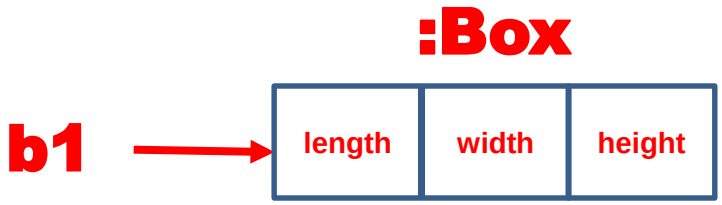
Methods

Class Example : Box Class

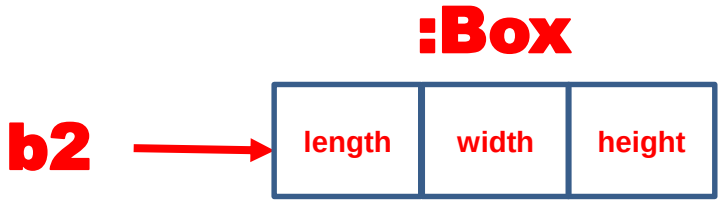
```
class Box
{
        private  double         length;
        private  double         width;
        private  double         height;
        public   double         area()
        {
                return 2* (length * width + width * height + height * length);
        }
        public   double         volume()
        {
                return length * width * height;
        }
}// End of class
```



Box b1 = new Box();



Box b2 = new Box();

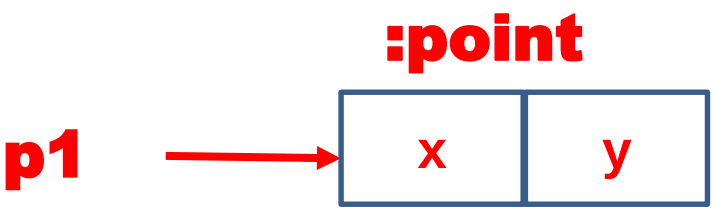


Class Example : Point

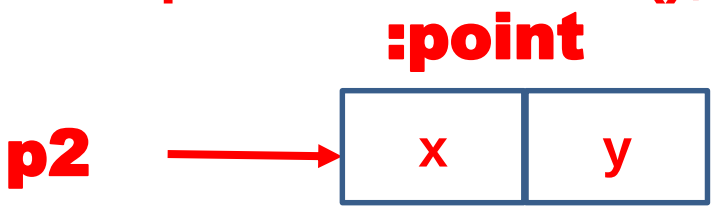
```
class Point
{
        private  double         x;
        private  double         y;
        public   double         getX()
        {
                 return         x;
        }
        public   double         getY()
        {
                 return         y;
        }
        public   void           setX(double value)
        {
                 x = value;
        }
        public   void           setY(double value)
        {
                 y = value;
        }
}// End of class
```

Point
- x: double - y: double
+getX() : double +getY(): double +setX(value:double):void +setY(value:double):void

Point p1 = new Point();



Point p2 = new Point();



Exercise

- Think about the class named ‘Student’. Define its state and operations
- Define the instance fields (attributes) and methods of class named ‘Line’.