

# Notes on Chapter 8 - Classes and Object Oriented Programming

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A curated list of important points for my reference.

1. Objects are the core things that Python programs manipulate. Every object has a type that defines the kinds of things that programs can do with that object.
2. An **Abstract Data type** is a set of objects and the operations on those objects.
3. The two powerful mechanisms for managing the complexity of programming are
  - Decomposition → Creates the structure of the program
  - Abstraction → Suppresses the detail
4. One implements data abstractions using **classes**.  
: is a slice syntax for every element in the array.
5. When a function definition occurs within a class definition, the defined function is called as **method** and is associated with the class. These methods are sometimes referred to as **method attributes** of the class.
6. **OBJECTS**
  - They have individuality and multiple names can be bound to the same object.
  - Known as Aliasing in other languages.
  - A *Namespace* is a mapping from names to objects.
  - In the expression, *z.real*, *real* is an attribute of the object *z*.
7. Class supports 2 kinds of operations
  - **Instantiation** is used to create instances of the class.  
For ex., the statement `s = IntSet()` creates a new object of type `IntSet`. This object is called an Instance of `IntSet`.

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- **Attribute References** use dot notations to access attributes associated with the class. For ex., `s.member` refers to the method `member` associated with the instance `s` of type `IntSet`.
8. Whenever a class is instantiated, a call is made to the `__init__` method defined in that class.
  9. The `__init__` method lets the class initialize the object's attributes and serves no other purpose.

```
s=IntSet()
s.insert(3)
print(s.member(3))
```

creates a new instance of `IntSet`, inserts the integer 3 into that `IntSet`, and then prints `true`.

10. When data attributes are associated with a class we call them **Class variables**. When they are associated with an instance we call them **instance variables**.
11. All instances of user-defined classes are hashable, and therefore can be used as dictionary keys.
12. What actually **Hashable** means in python? Ref: Geeks for Geeks
  - hashable is a feature of Python objects that tells if the object has a hash value or not.
  - If the object has a hash value then it can be used as a key for a dictionary or as an element in a set.
  - An object is hashable if it has a hash value that does not change during its entire lifetime.
  - Python has a built-in hash method ( `__hash__()` ) that can be compared to other objects.
  - if the hashable objects are equal then they have the same hash value.
  - All immutable built-in objects in Python are hashable like tuples while the mutable containers like lists and dictionaries are not hashable. An example below

```
t1 = (1, 5, 6)
t2 = (1, 5, 6)
# show the id of object
print(id(t1))
print(id(t2))
##### output #####
```

1954294958784  
1954294958784

### 13. Abstract Data Types

- An abstract data type is a type with associated operations, but whose representation is hidden.
- They lead to a different way of thinking about organising large programs.
- Data Objects → A data object is a region of storage that contains a value or group of values.
- writing expressions that directly access instance variables is considered poor form and should be avoided.

### 14. Inheritance

- It provides a convenient mechanism for building groups of related abstractions.

15. You can use `*args` and `**kwargs` as arguments of a function when you are unsure about the number of arguments to pass in the functions.

### 16. **\*\*kwargs(Keyword Arguments)**

- allows us to pass a variable number of keyword arguments to a python function. In the function, we use the double asterisk(`**`) before the parameter name to denote this type of argument.