



Lecture 05

Constructor & Instance Variables

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Previous Lectures

- **Information Hiding**
- **Encapsulation**
- **Class Structure & Objects**

Outline

- **Constructor**
- **Constructor with Arguments**
- **Programming Practice with Constructor**
- **Types of Variables**
- **Instance Variables**
- **Class Variables or Static Variables**

Constructor

- Constructor is used to **initialize** the objects of a class. Constructor is used to ensure that object is in well defined state at the time of creation.
- Constructor is automatically called when the object is created. Constructors are not usually called explicitly by us.
- A constructor is called only once at the time of creating an instance.
- If two instances are created for a class, the constructor will be called once for each instance.

```
main.py x constructor.py x
1  #Constructor
2  class Student:
3      def __init__(self): #constructor
4          self.rollno=0
5          self.name=""
6      def show_student(self):
7          print("The Rollno of", self.name, "is:", self.rollno)
8
9  st1=Student() #object/instance creation
10 st1.show_student()
```

```
constructor x
↑ "C:\Users\Mubashir Ali\PycharmProjects\Practice\venv\Scripts\python.exe"
↓ The Rollno of is: 0
```

```
2 class Student:
3     def __init__(self,n): #constructor with argument
4         self.rollno=0
5         self.name=n
6     def show_student(self,grade):
7         print("The Rollno of", self.name, "is:", self.rollno)
8         print("The Grade of", self.name, "is:", grade)
9     st1=Student('Ali') #object/instance creation with argument
10    st1.show_student('A') #function call with argument
```

```
"C:\Users\Mubashir Ali\PycharmProjects\Practice\venv\Scripts\python.exe"
The Rollno of Ali is: 0
The Grade of Ali is: A
```

Type of Variable

We have 2 types of variables

- Instance Variable
- Class Variable / Static Variable

Instance Variable

- Instance variables are the variables whose separate copy is created in every object.
- Instance variables are defined and initialized using a constructor with self parameter.
- Instance Method
- We can access instance variable by outside the class using `object_name.variable_name`


```

1  #Instance Variables
2  class Student:
3      def __init__(self,n):  #constructor with argument
4          self.name=n      #instance variable
5      def show_student(self): #instance method
6          print("A student object/instance is created whose name is:", self.name)
7          #accessing instance variable within instance method
8  st1=Student('Adil')      #object/instance creation with argument
9  st1.show_student()      #accessing instance variable outside the class
10 st1=Student('Vaneeza')  #object/instance creation with argument
11 st1.show_student()      #accessing instance variable outside the class

```

```

"C:\Users\Mubashir Ali\PycharmProjects\Practice\venv\Scripts\python.exe" "C:/Users/M
A student object/instance is created whose name is: Adil
A student object/instance is created whose name is: Vaneeza

```

Instance Variable

- Instance variables are the variables whose separate copy is created in every object.
- If we modify the copy of Instance variable in an instance, it will not effect all the copies in the other instance.

```
main.py x constructor.py x constructor_with_arguments.py x instance_variable.py x
5 def show_student(self): #instance method
6     print("A student object/instance is created whose name is:", self.name)
7     #accessing instance variable within instance method
8 st1=Student('Adil') #object/instance creation with argument
9 st1.show_student() #accessing instance variable outside the class
10 st1=Student('Vaneeza') #object/instance creation with argument
11 st1.show_student() #accessing instance variable outside the class
12 st1=Student('Zoha') #object/instance creation with argument
13 st1.show_student() #accessing instance variable outside the class
14 st1=Student('Junaid') #object/instance creation with argument
```

```
instance_variable x
"C:\Users\Mubashir Ali\PycharmProjects\Practice\venv\Scripts\python.exe" "C:/Users/M
A student object/instance is created whose name is: Adil
A student object/instance is created whose name is: Vaneeza
A student object/instance is created whose name is: Zoha
A student object/instance is created whose name is: Junaid
```

Summary

- ✓ **Constructor**
- ✓ **Constructor with Arguments**
- ✓ **Programming Practice with Constructor**
- ✓ **Types of Variables**
- ✓ **Instance Variables**
- ✓ **Class Variables or Static Variables**

References

- Topic 2.3, Data Structures and Algorithms in Python by Michael T. Goodrich et al.
- https://en.wikipedia.org/wiki/Object-oriented_programming
- <https://www.geeksforgeeks.org/python-classes-and-objects/>