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Lab Series No. 04.

Lab 04 –Class Variables and Data Hiding .

Lab Objectives:

1. Class and Instance Variables
2. Data Hiding
3. Self Parameter
4. Modification to attributes inside the class

1. Class and Instance Variables

In Python, instance variables are variables whose value is assigned inside a constructor or method with self. Class variables are variables whose value is assigned in class.

Program 1: Write a Python program to create variable inside the class with string value and accessing it.

Code:

```
# Python program to show that the variables with a value assigned in
class declaration, are class variables and variables inside methods
and constructors are instance variables.

# Class for Computer Science Student
class CSStudent:

	# Class Variable
	trade = 'Computer Science Software Engineering'

	# The init method or constructor
	def __init__(self, roll):

		# Instance Variable
		self.roll = roll

# Objects of CSStudent class
Faisal = CSStudent(315)
Farhan = CSStudent(316)

print(Faisal.trade)
print(Faisal.roll)
print(Faisal.trade)
print(Farhan.roll)
```

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```
# Class variables can be accessed using class name
also print(CSStudent.trade)
```

Program 2: Write a Python program to create instance variable inside method and accessing it.

Code:

```
# Python program to show that the variables with a value assigned in
class declaration, are class variables and variables inside methods
and constructors are instance variables.

# Class for Computer Science Student
class CSStudent:

      # Class Variable
      trade1 = 'Computer Science'
      trade2 = 'Software Engineering'

      # The init method or constructor
      def __init__(self, roll):

            # Instance Variable
            self.roll = roll

      # Adds an instance variable
      def setAddress(self, address):
         self.address = address

      # Retrieves instance variable
      def getAddress(self):
        return self.address

# Objects of CSStudent class Faisal
= CSStudent(315)
Faisal.setAddress("Gulistan e
Johar") print(Faisal.getAddress())
```

2. Data Hiding

In Python, we use double underscore (Or __) before the attributes name and those attributes will not be directly visible outside.

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Program 3: Write a Python program which can create a hidden variable inside the class. Then try to access it.

Code:

```
class MyClass:

    # Hidden member of MyClass
    __hiddenVariable = 0

    # A member method that changes
    # __hiddenVariable
    def add(self, increment):
        self.__hiddenVariable += increment
        print (self.__hiddenVariable)

# Executing the Code
myObject = MyClass()
myObject.add(2)
myObject.add(5)

# This line causes error
print (myObject.__hiddenVariable)
```

Program 4: Write a Python program which can create a hidden variable inside the class. Then try to access it by using tricky method.

Code:

```
# A Python program to demonstrate that hidden
# members can be accessed outside a class
class MyClass:

    # Hidden member of MyClass
    __hiddenVariable = 10

# Executing code
myObject = MyClass()
print(myObject._MyClass__hiddenVariable)
```

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4. The Self Parameter

The self-parameter is a reference to the current instance of the class, and is used to access variables that belongs to the class.

It does not have to be named self, you can call it whatever you like, but it has to be the first parameter of any function in the class:

Program 5: Write a Python program which use other than self keyword for reference .

Code:

```
class Person:
  def __init__(a, name, age, salary, profession):
    a.name = name
    a.age = age
    a.salary = salary
    a.profession = profession

  def mydetail(a):
    print("Assalam o Alekum, my name is " + a.name +", my age is :" + str(a.age) +". Now a days earning :"+ str(a.salary) + ", its really lovely to be a " + a.profession )

person1 = Person("Syed Faisal Ali", 44, 1234567, "Research Scientist")
person1.mydetail()
```

Program 6: Write a Python program which can modify the attributes inside the class.

Code:

```
class Person:
  def __init__(a, name, age, salary, profession):
    a.name = name
    a.age = age
    a.salary = salary
    a.profession = profession

  def mydetail(a):
    print("Assalam o Alekum, my name is " + a.name +", my age is :" + str(a.age) +". Now a days earning :"+ str(a.salary) + ", its really lovely to be a " + a.profession )

person1 = Person("Syed Faisal Ali", 42, 1234567, "Research Scientist")
person1.mydetail()
```

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```
print("Need to modify the age and salary inside the class")
person1.age = 44
person1.salary = 7654321
person1.mydetail()
```

Program 7: Write a Python program which uses the child class to call its own method and then parent class method.

Code:

```
class Parent:# define parent class
   parentAttr = 100

   def __init__(self):
      print ("Calling parent constructor")

   def parentMethod(self):
      print ('Calling parent method')

   def setAttr(self, attr):
      Parent.parentAttr = attr

   def getAttr(self):
      print ("Parent attribute :", Parent.parentAttr)

class Child(Parent): # define child class
   def __init__(self):
      print ("Calling child constructor")

   def childMethod(self):
      print ('Calling child method')

c1 = Child()          # instance of child
c1.childMethod()      # child calls its method
c1.parentMethod()     # calls parent's method
c1.setAttr(200)       # again call parent's method
c1.getAttr()          # again call parent's method
```

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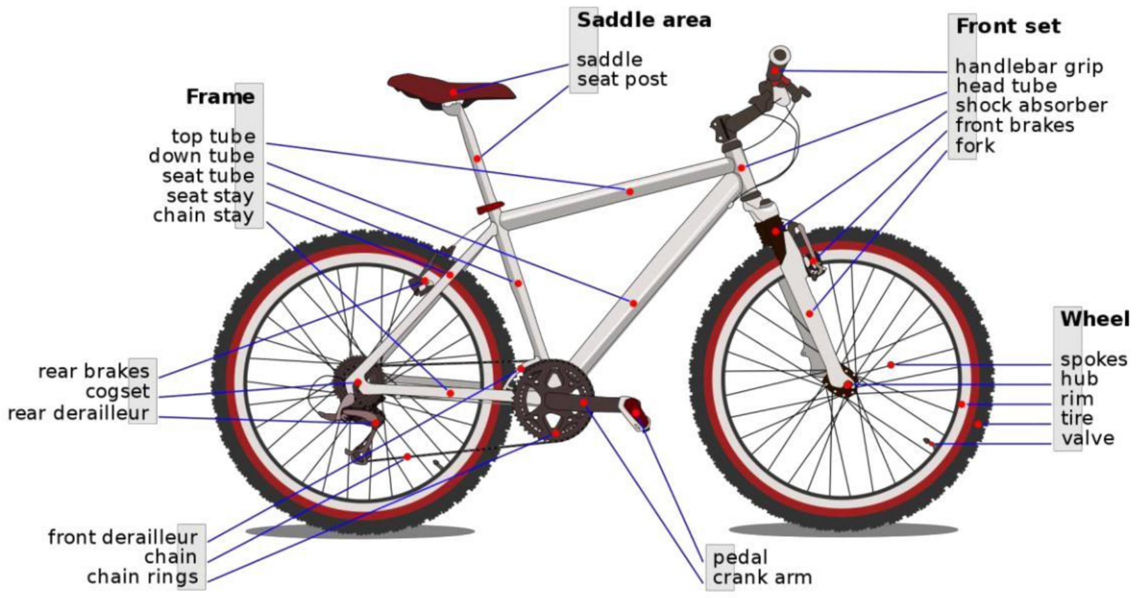
Programming Exercise

Task1: Define what you understand by the classes, objects and functionalities

Task 2: Shape classes and its sub classes and its parameters.

Task 3: Create Courses in CS and SE under the class of CS Program. Make methods that can add courses in semester and return it.

Task 4: Create a bike class and its components in light with the concept of Object Oriented. Later create multiple bikes with different attributes based on customer requirements.



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