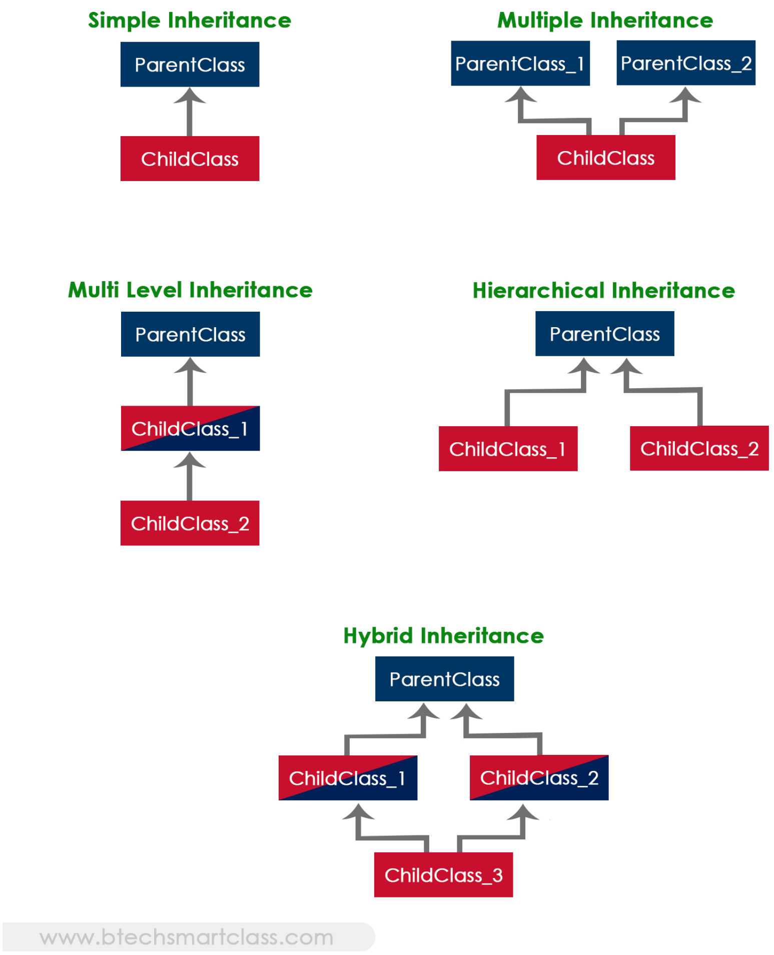
Multiple & Hierarchical Inheritance

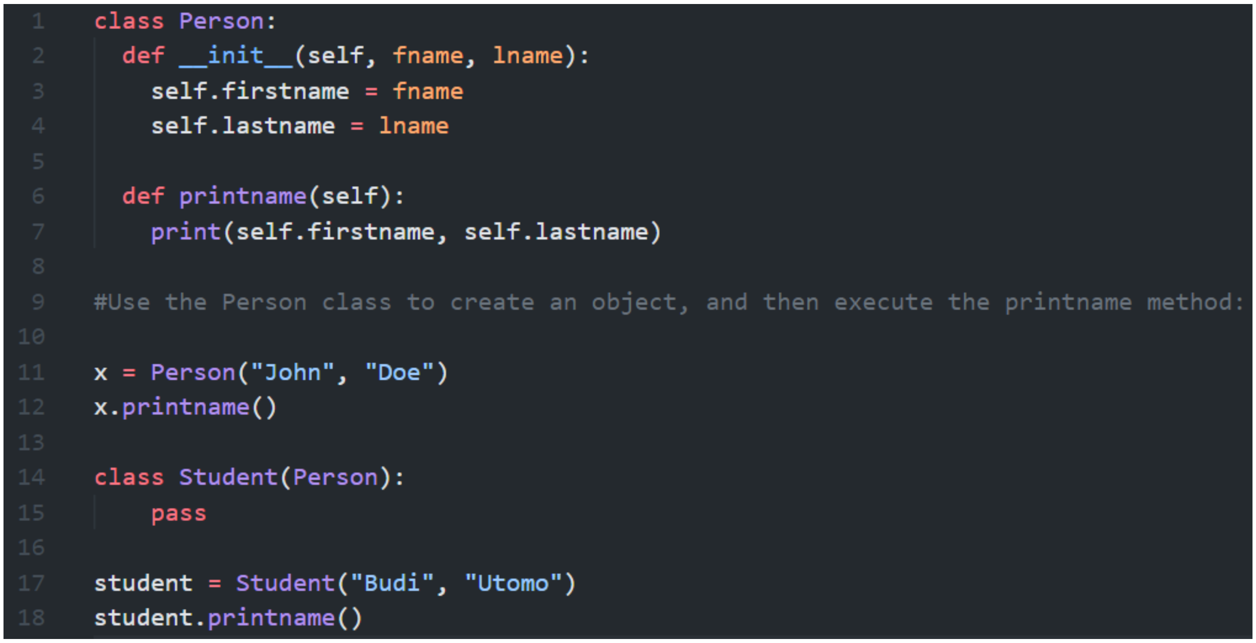
Inheritance

Inheritance is the procedure in which one class inherits the attributes and methods of another class. The class whose properties and methods are inherited is known as the Parent class. And the class that inherits the properties from the parent class is the Child class.

Type of inheritance :



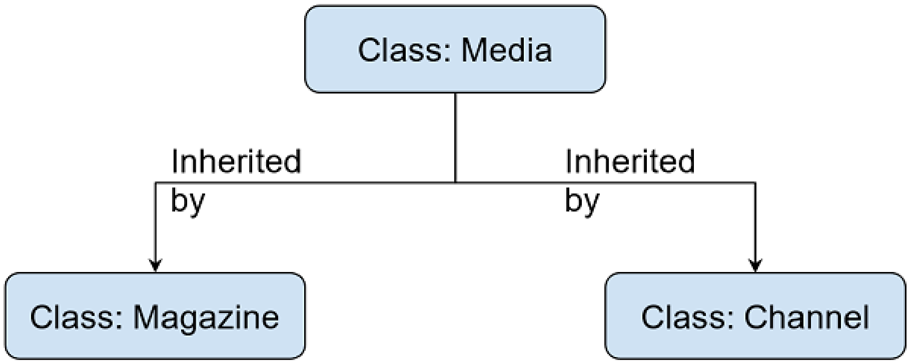
Contoh Simple Inheritance di Python:

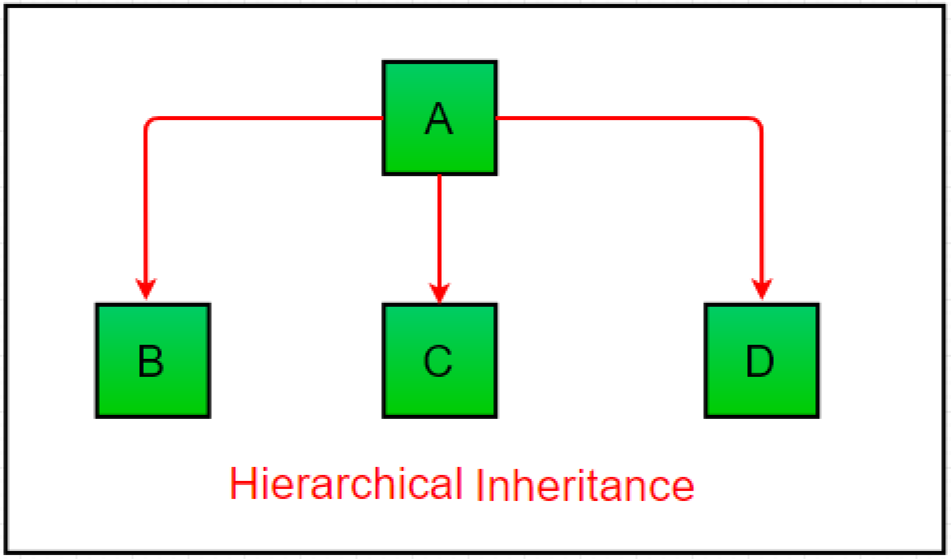


```python
class Person:
  def __init__(self, fname, lname):
    self.firstname = fname
    self.lastname = lname

  def printname(self):
    print(self.firstname, self.lastname)

#Use the Person class to create an object, and then execute the printname method:

x = Person("John", "Doe")
x.printname()

class Student(Person):
    pass

student = Student("Budi", "Utomo")
student.printname()
```

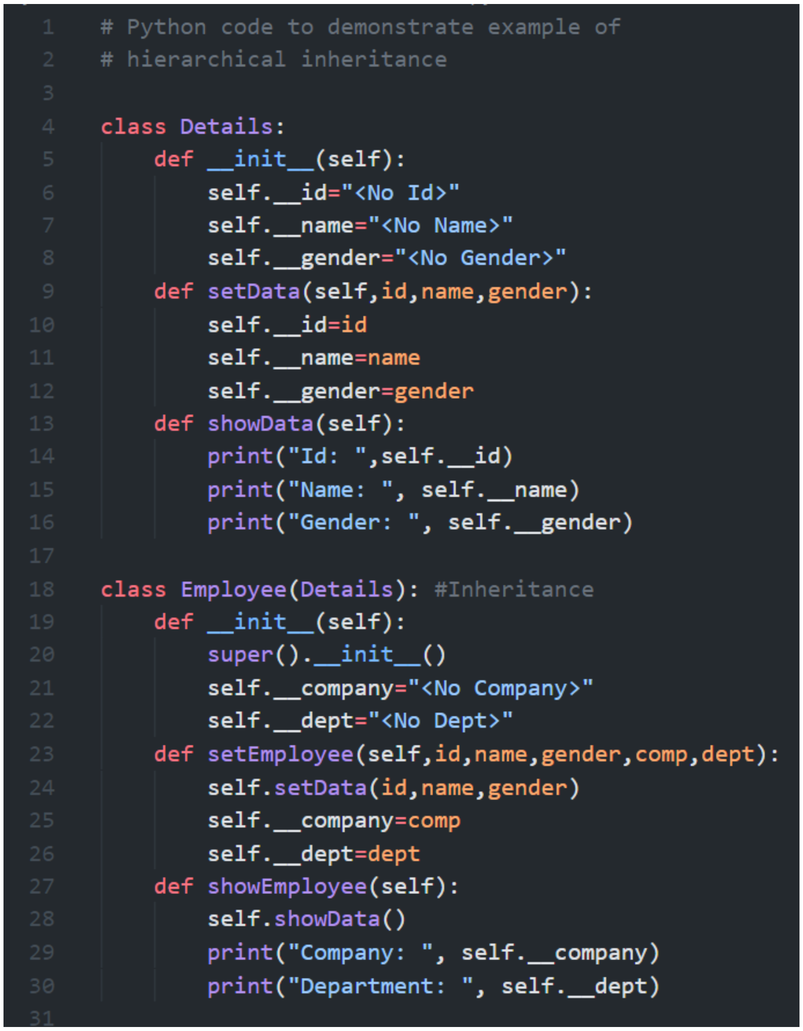
Hierarchical Inheritance

When more than one derived classes are created from a single base this type of inheritance is called hierarchical inheritance. In this program, we have a parent (base) class and two child (derived) classes.

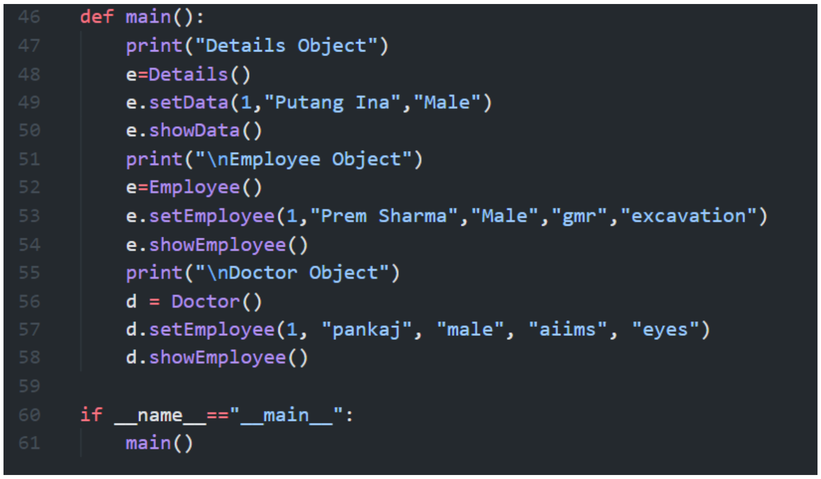




Example of Hierarchical Inheritance:

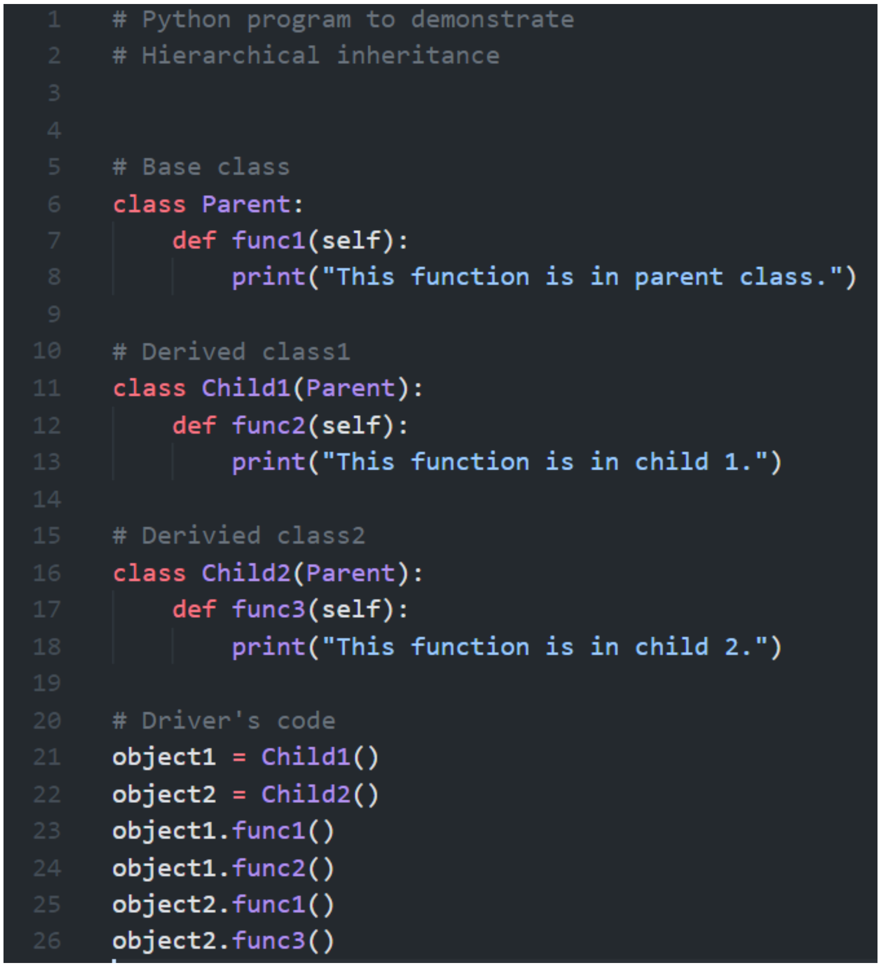


```python
# Python code to demonstrate example of
# hierarchical inheritance

class Details:
    def __init__(self):
        self.__id="<No Id>"
        self.__name="<No Name>"
        self.__gender="<No Gender>"
    def setData(self,id,name,gender):
        self.__id=id
        self.__name=name
        self.__gender=gender
    def showData(self):
        print("Id: ",self.__id)
        print("Name: ", self.__name)
        print("Gender: ", self.__gender)

class Employee(Details): #Inheritance
    def __init__(self):
        super().__init__()
        self.__company="<No Company>"
        self.__dept="<No Dept>"
    def setEmployee(self,id,name,gender,comp,dept):
        self.setData(id,name,gender)
        self.__company=comp
        self.__dept=dept
    def showEmployee(self):
        self.showData()
        print("Company: ", self.__company)
        print("Department: ", self.__dept)

```



```python
def main():
    print("Details Object")
    e=Details()
    e.setData(1,"Putang Ina","Male")
    e.showData()
    print("\nEmployee Object")
    e=Employee()
    e.setEmployee(1,"Prem Sharma","Male","gmr","excavation")
    e.showEmployee()
    print("\nDoctor Object")
    d = Doctor()
    d.setEmployee(1, "pankaj", "male", "aiims", "eyes")
    d.showEmployee()

if __name__=="__main__":
    main()
```

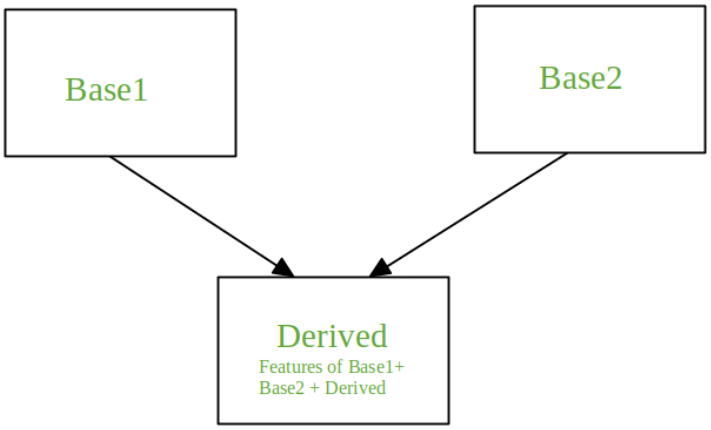
Example (2):



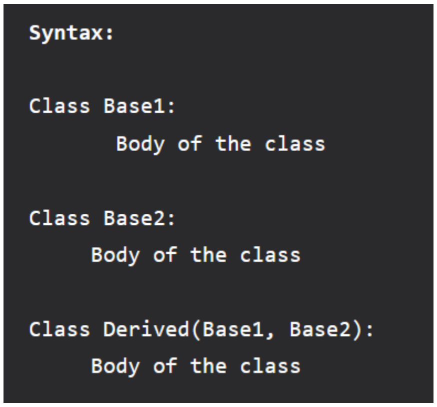
```python
# Python program to demonstrate
# Hierarchical inheritance


# Base class
class Parent:
    def func1(self):
        print("This function is in parent class.")

# Derived class1
class Child1(Parent):
    def func2(self):
        print("This function is in child 1.")

# Derivied class2
class Child2(Parent):
    def func3(self):
        print("This function is in child 2.")

# Driver's code
object1 = Child1()
object2 = Child2()
object1.func1()
object1.func2()
object2.func1()
object2.func3()
```

Multiple Inheritance

Multiple inheritance is a feature of some object-oriented computer programming languages in which an object or class can inherit features from more than one parent object or parent class. It is distinct from single inheritance, where an object or class may only inherit from one particular object or class.

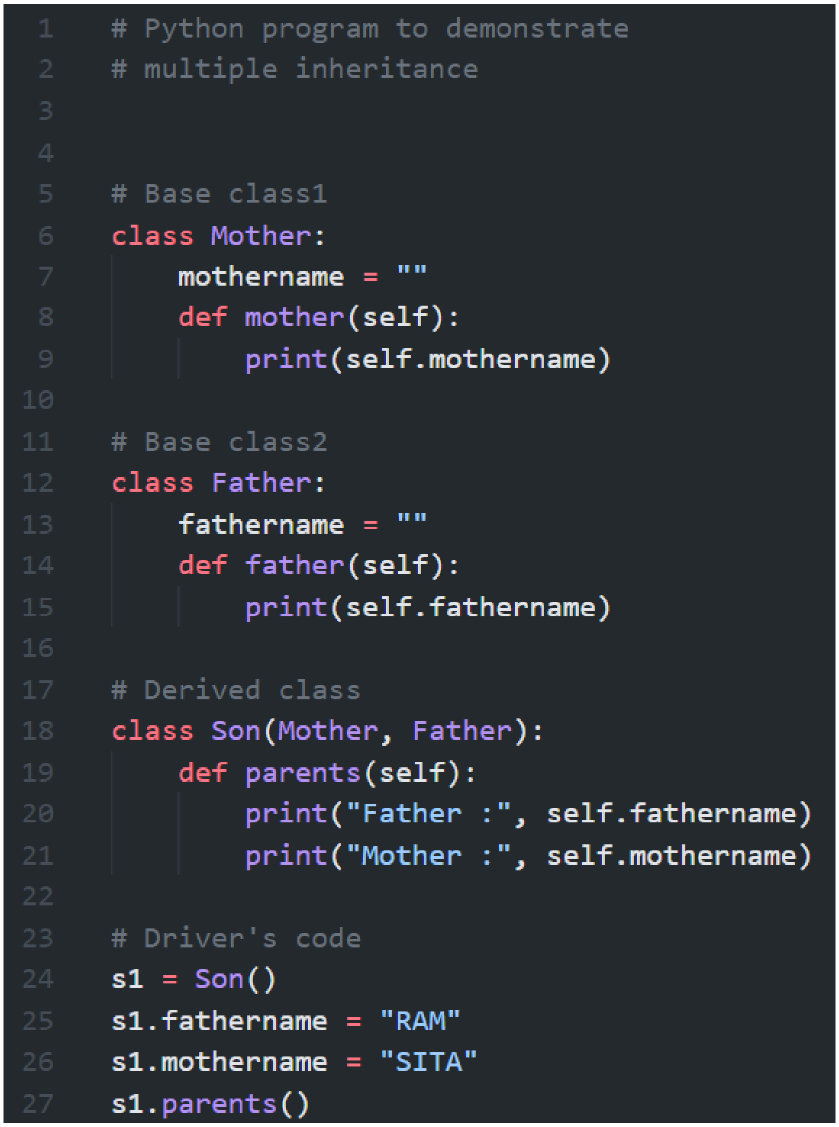


Base Structure:



```
Syntax:

Class Base1:
       Body of the class

Class Base2:
     Body of the class

Class Derived(Base1, Base2):
     Body of the class
```

Example of Multiple Inheritance :



```python
# Python program to demonstrate
# multiple inheritance


# Base class1
class Mother:
    mothername = ""
    def mother(self):
        print(self.mothername)

# Base class2
class Father:
    fathername = ""
    def father(self):
        print(self.fathername)

# Derived class
class Son(Mother, Father):
    def parents(self):
        print("Father :", self.fathername)
        print("Mother :", self.mothername)

# Driver's code
s1 = Son()
s1.fathername = "RAM"
s1.mothername = "SITA"
s1.parents()
```

Exercise

Make a program with **Python** implementing **Multiple Inheritance/ Hierarchical Inheritance** and using getter, setter, make dummy data and print the content of the class.

The classes are :

Animal

- hasTail : Bool
- skinType : String (ex: Feather, Hair, Scale)
- foodType : String (ex: Herbivore, Carnivore , Omnivore)
- eat() : print(“{name} is eating”)
- sleep() : print(“{name} is eating”)

Cat

- color : String

Snake

- length : Float

You can add additional features, either method or additional attributes.

Task

Make a design and the program for this assignment : Formatted as PNG / JPEG / JPG (ex : Link) and put the link of the design in the description on the README on your GitHub project, and add the explanation of the design (Why do you use this design over another?).

Make a program with **Python** implementing **Multiple Inheritance/ Hierarchical Inheritance** and using getter, setter, make dummy data (Min : 5 data per class & print the data) and print the content of the class.

The classes are :
Vehicle : fuelType, maxPassengers, Move()
Ship : age, type, countryOfManufacture
Airplane : type, age, wingsLength

Person : NIK, Name, Gender, sleep()
Job : NIP, companyName, position
Driver : lisenceID, activeUntil, vehicleType

Example of assignment : https://github.com/iqbalzain99/TP4PBO2021/tree/master

Note :

- You can add additional features, either method or additional attributes.
- Make a README file to explain your program and the design.
- Screenshot the result of the program and show the result in the README file.
- Due date : Sunday, 6th March 2022 (23:59)
- Submission link : link

Other Resource

Method in python

Reference

1. https://www.w3schools.com/python/python_inheritance.asp
2. https://www.analyticsvidhya.com/blog/2020/10/inheritance-object-oriented-programming/
3. https://r4dn.com/what-is-hierarchical-inheritance-in-python/#:~:text=Hierarchical%20inheritance%20is%20a%20kind%20of%20inheritance%20where,the%20base%20class.%20Does%20Python%20have%20hierarchical%20inheritance%3F
4. https://www.includehelp.com/python/hierarchical-inheritance-example.aspx
5. https://www.includehelp.com/python/example-of-hierarchical-inheritance-in-python.aspx
6. http://en.wikipedia.org/wiki/Multiple_inheritance
7. https://www.geeksforgeeks.org/multiple-inheritance-in-python/
8. https://www.geeksforgeeks.org/types-of-inheritance-python/