

Lecture 6: Inheritance in Object-Oriented Programming

1. Introduction

Inheritance is a fundamental concept in OOP that allows a class (called child or subclass) to inherit properties and methods from another class (called parent or superclass). This mechanism promotes code reuse and establishes hierarchical relationships between classes.

2. Basic Inheritance Syntax in Python

```
class Parent:
    def __init__(self, name):
        self.name = name

    def greet(self):
        print(f"Hello from {self.name}")

class Child(Parent):
    pass

c = Child("ChildClass")
c.greet() # Output: Hello from ChildClass
```

3. Overriding Methods

Child classes can override methods from the parent class to provide specialized behavior.

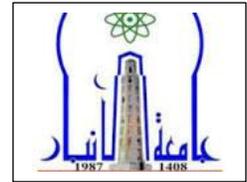
```
class Parent:
    def greet(self):
        print("Hello from Parent")

class Child(Parent):
    def greet(self):
        print("Hello from Child")

c = Child()
c.greet() # Output: Hello from Child
```

4. Using `super()` to Access Parent Methods

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The `super()` function allows child classes to call methods from the parent class.

```
class Parent:
    def greet(self):
        print("Hello from Parent")

class Child(Parent):
    def greet(self):
        super().greet()
        print("Hello from Child")

c = Child()
c.greet()
```

Output:

```
Hello from Parent
Hello from Child
```

5. Multi-Level Inheritance

Inheritance can extend through multiple levels.

```
class Grandparent:
    def greet(self):
        print("Hello from Grandparent")

class Parent(Grandparent):
    def greet(self):
        print("Hello from Parent")

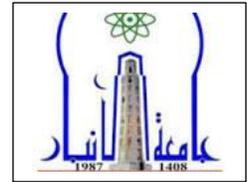
class Child(Parent):
    def greet(self):
        print("Hello from Child")

c = Child()
c.greet() # Output: Hello from Child
```

6. Exercises

1. Create a base class `Animal` with method `speak()`.
 2. Derive classes `Dog` and `Cat` from `Animal`, override `speak()` method with appropriate sounds.
 3. Instantiate objects and call their `speak()` methods.
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7. Summary

Inheritance promotes reusability and extensibility of code. It allows new classes to reuse and modify behaviors from existing classes efficiently.

8. References

1. Python Docs - Inheritance
2. Real Python - Inheritance in Python