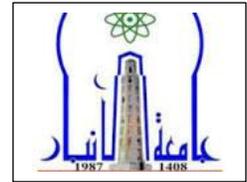


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Lecture 5: Constructors and Destructors in OOP

1. Introduction

Constructors and destructors are special methods in object-oriented programming that manage the lifecycle of objects. The constructor initializes an object when it is created, while the destructor cleans up before an object is destroyed.

2. Constructors in Python

In Python, the constructor method is named `__init__`. It is called automatically when an object is instantiated.

Example:

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

p1 = Person("Alice", 30)
print(p1.name) # Output: Alice
print(p1.age) # Output: 30
```

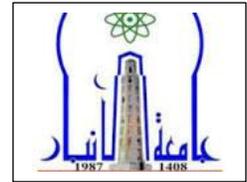
3. Parameterized Constructors

Constructors can take parameters to initialize object attributes with specific values during creation.

```
class Car:
    def __init__(self, brand, model):
        self.brand = brand
        self.model = model

my_car = Car("Toyota", "Corolla")
print(my_car.brand) # Output: Toyota
print(my_car.model) # Output: Corolla
```

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4. Destructors in Python

Python has a destructor method named `__del__` which is called when an object is about to be destroyed. However, the exact timing of destructor calls depends on Python's garbage collection and reference counting.

Example:

```
class Person:
    def __init__(self, name):
        self.name = name
        print(f"{self.name} created")

    def __del__(self):
        print(f"{self.name} destroyed")

p1 = Person("Alice")
del p1
```

5. Use Cases for Destructors

- Freeing external resources such as files or network connections.
- Performing cleanup tasks before an object is removed from memory.

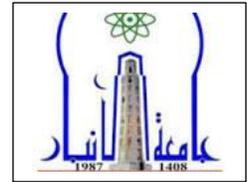
6. Exercises

1. Create a class `FileHandler` that opens a file in the constructor and closes it in the destructor.
2. Test the class by writing data to the file and ensuring it closes properly.

7. Summary

- Constructors initialize new objects.
- Destructors clean up before objects are destroyed.
- Python's `__init__` and `__del__` methods are special lifecycle methods.
- Destructors depend on Python's garbage collection and may not always run immediately.

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8. References

1. Python Docs - Object Initialization and Destruction
2. Real Python - Python Constructors and Destructors