Python OOP Starter Guide:

"Why OOP When Procedural Works?" + Basics of Class and Object

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💭 Why OOP When Procedural Works in Python?

- ✅ Procedural works well for **small programs**
- ❌ But for **large, real-world apps**, procedural gets:
  - Hard to **maintain**
  - Difficult to **reuse code**
  - Messy when handling **multiple data types**
- ✅ OOP helps you:
  - **Model real-world objects** (like `Student`, `Order`, `Vehicle`)
  - Combine **data + logic** into one structure
  - **Reuse** code using inheritance and **organize** it better

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🏗️ What is a Class?

A **class** is a **blueprint or template** to create objects.

Example: A class called `Car` defines what all cars have (like model, brand) and do (like drive, brake).

🧱 What is an Object?

An **object** is a **real instance** created using a class.

Example: `"Toyota Innova"` is an object created using the `Car` class.

❓ Why Object Creation is Required?

- Objects allow you to **store real data** using a class structure.
- You can create **multiple versions** (objects) from the same class — each with its own values.
- Without creating an object, the class is just a design — you can't use its functions or variables.

⚡ Function vs Method – One-liner

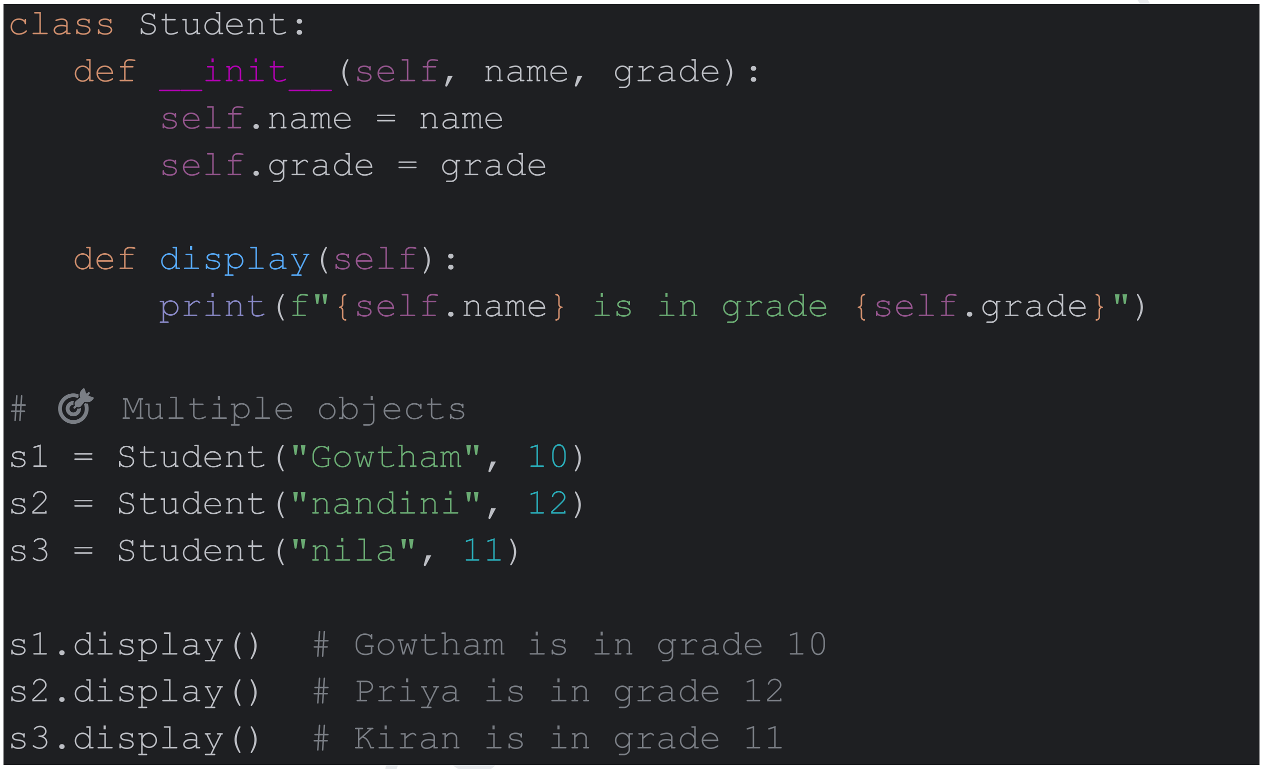
Function is defined outside class.
Method is a function **inside a class** that works with an object.

🧪 Simple Example: Class & Object

```
class Student:
   def say_hello(self):
       print("Hi, I'm a student!")

s1 = Student()   #
s1.say_hello() #s1.say_hello(s1)
```

Multiple Object for single class



```python
class Student:
   def __init__(self, name, grade):
       self.name = name
       self.grade = grade

   def display(self):
       print(f"{self.name} is in grade {self.grade}")

# 🎯 Multiple objects
s1 = Student("Gowtham", 10)
s2 = Student("nandini", 12)
s3 = Student("nila", 11)

s1.display()  # Gowtham is in grade 10
s2.display()  # Priya is in grade 12
s3.display()  # Kiran is in grade 11
```

✅ When is Multiple Object Creation Needed?

Use Case	Example
Modeling multiple real things	Students, Cars, Products, Employees
Storing different user data	Login sessions, users, profiles
Game development	Each character, enemy, or item as an object

Data analysis tools	Each dataset or row becomes an object
Chatbots / messages	Each message/user interaction as an object

❌ What if you don’t use multiple objects?

- You'd overwrite the data every time
- Code becomes rigid, non-scalable
- Can’t maintain individual records

✅ Q2: *“Does object creation mean memory is allocated?”*

Yes, absolutely!
When you write something like:

```
u1 = User("Gowtham", 33)
```

- Python creates a **new memory space** for this object
- Stores variables like `name`, `age` inside that memory
- You can check this with `id(u1)`

```
u1 = User("Gowtham", 33)
u2 = User("Priya", 28)

print(id(u1))  # 👉 Unique memory address
print(id(u2))  # 👉 Different address
```

Each object = separate space in memory
So you can store, change, and track them **independently**

About the Author

Gowtham SB is a **Data Engineering expert, educator, and content creator** with a passion for **big data technologies, as well as cloud and Gen AI** . With years of experience in the field, he has worked extensively with **cloud platforms, distributed systems, and data pipelines**, helping professionals and aspiring engineers master the art of data engineering.

Beyond his technical expertise, Gowtham is a **renowned mentor and speaker**, sharing his insights through engaging content on **YouTube and LinkedIn**. He has built one of the **largest Tamil Data Engineering communities**, guiding thousands of learners to excel in their careers.

Through his deep industry knowledge and hands-on approach, Gowtham continues to **bridge the gap between learning and real-world implementation**, empowering individuals to build **scalable, high-performance data solutions**.

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