Package:-

1. A package is a **collection of related modules** stored inside a **folder (directory)**.
2. **Creating a Package:-**

Folder Structure:

```
mypackage/
│
├── __init__.py
├── add.py
└── mul.py
```

add.py

```python
def add(a, b):
    return a + b
```

mul.py

```python
def mul(a, b):
    return a * b
```

Using Package Modules

```python
from mypackage import add, mul
print(add.add(10, 20))
print(mul.mul(5, 4))
```

__init__.py File

Purpose:

- Marks a directory as a **package**
- Executes when package is imported

Scope of a Variables:-

1. Global Variables

Global variables are variables that are created **outside any function** (in the main program).

Key Points:

- Created **outside** the function
- Can be **accessed (read)** inside a function
- **Cannot be modified** inside a function directly
- To modify them inside a function, we must use the **global keyword**

Example 1: Accessing a Global Variable

```
x = 10   # global variable
def show_value():
    print("Inside function:", x)   # can read global variable

show_value()
print("Outside function:", x)
```

Output:

```
Inside function: 10
Outside function: 10
```

- **Global variable x is accessible inside and outside the function.**

Modifying a Global Variable

1. By default, if you **assign** a value inside a function, Python thinks it is a **local variable**.
2. To modify a global variable, use **global keyword**.

Example 2: Modifying Global Variable

```
count = 0   # global variable
def increment():
    global count
    count += 1
```

Example 2: Modifying Global Variable

```
count = 0   # global variable
def increment():
    global count
    count += 1

increment()
print(count)
```

Output:	1

- global count tells Python to use the global variable.

Example 3: Modifying Without global

```
count = 0
def increment():
    count += 1   # Error: UnboundLocalError
increment()
print(count)
```

2. Local Variables

Local variables are variables created **inside a function**.

Key Points:

- Created **inside a function**
- Can be accessed and modified **only inside that function**
- Cannot be accessed outside the function

Example: Local Variable

```
def demo():
    a = 5   # local variable
    print(a)
```

2. Local Variables

Local variables are variables created **inside a function**.

Key Points:

- Created **inside a function**
- Can be accessed and modified **only inside that function**
- Cannot be accessed outside the function

Example: Local Variable

```
def demo():
    a = 5   # local variable
    print(a)

demo()
# print(a)  # Error
```

HERE, a works inside the function but a does not work outside the function

Local Variable in Nested Function

If you want to modify a variable of the **outer function** inside an **inner function**, use **nonlocal keyword**.

Example: nonlocal Keyword

```
def outer():
    x = 10
    def inner():
        nonlocal x
        x += 5
    inner()
    print(x)
outer()
```

Output:	15

Class and Object:

In programming:

- This **blueprint** is called a **Class**
- The real phones created from it are called **Objects**

Class:-

Class is a blueprint or template

- It stores **data (properties)**
- It defines **functionality (behavior)**

OR

Class is a container that holds properties and functions of real-time entities.

Example: Laptop

- **Laptop** → real-world entity → **Object**
- Laptop has:
  - Properties → brand, color, RAM, price
  - Functions → start(), shutdown(), charge()

All these properties and functions are **defined inside a class**.

Object:-

Object is an instance of a class

- From **one class**, we can create **many objects**

Example:

- Class → Mobile
- Objects → Samsung phone, iPhone, Redmi phone

Class Creation (Syntax):-

```
class ClassName:
   properties   # variables
   functions    # methods
```

Example:

```
class Mobile:
    brand = "Samsung"
    price = 20000
```

Object Creation:-

```
object_name = ClassName(arguments)
```

Example:

```
m1 = Mobile()
m2 = Mobile()
```

Here:

- Mobile → Class
- m1, m2 → Objects

Accessing Class Properties:-

Syntax:	object_name.property_name

Example:

```
print(m1.brand)
print(m2.brand)
print(m1.price)
```

Output:

```
Samsung
Samsung
20000
```

- Both objects access the **same class properties**.

Modifying / Updating Properties:-

You can update properties in **two ways**:

1. Using Class Name

ClassName.property_name = new_value

2. Using Object Name

object_name.property_name = new_value

⚠️ But the effect is **different.**

Example: Bank Class

```
class Bank:
   bname = "SBI"
   loc = "Hyderabad"
c1 = Bank()
c2 = Bank()
# Accessing Properties
print(Bank.bname, Bank.loc)
print(c1.bname, c1.loc)
print(c2.bname, c2.loc)
```

Output:

```
SBI Hyderabad
SBI Hyderabad
SBI Hyderabad
```

Modification Using Class Name

```
Bank.loc = "Bengaluru"
# After Modification:
print(Bank.bname, Bank.loc)
print(c1.bname, c1.loc)
print(c2.bname, c2.loc)
```

Output:

```
SBI Bengaluru
SBI Bengaluru
SBI Bengaluru
```

***Note: Modification in class affects all objects of that class.**

Modification Using Object Name

```
c1.loc = "Delhi"
# After Object Update:
print(c1.bname, c1.loc)
print(c2.bname, c2.loc)
print(Bank.bname, Bank.loc)
```

Output:

```
SBI Delhi
SBI Bengaluru
SBI Bengaluru
```

⚠️ **Modification in an object does NOT affect the class or other objects.**

Types of States / Properties:-

There are **two types of properties** in a class:

1. **Static / Generic / Class Members**
2. **Specific / Object Members**

1. Static / Generic / Class Members

Static members are properties that are **common for all objects** of a class.

Example (School):

- School name
- Location
- Website
- Timing
- Contact number
- Uniform

*These values are **same for every student**, so they are called **Static Members**.

Code Example: Static Members

```
class School:
    sname = "ABC School"
    loc = "Prayagraj"
    website = "www.abcschool.com"
    timing = "9 AM - 3 PM"
```

2. Specific / Object Members

Specific members are properties that are **different for each object**.

Example (Student):

- Student name
- Roll number
- Student ID
- Age
- Class
- Phone number
- Blood group

* These values change **from student to student**, so they are called **Specific Members**.

Code Example: Specific Members

```
st1 = School()
st1.name = "Aditya"
st1.sid = 1
st1.age = 14
st1.cls = 5
st2 = School()
st2.name = "Adil"
st2.sid = 2
st2.age = 15
st2.cls = 6
```

Accessing Static vs Specific Members

```
print(st1.sname)   # Static member
print(st1.name)    # Specific member
```

Question:

Create a **Bank class**

- It should have **4 static (class) members**
- Create **5 objects**
- Each object should have **5 object (specific) members**

Step 1:

```
class Bank:
    bank_name = "SBI"
    branch = "Prayagraj"
    ifsc = "SBIN000123"
    country = "India"

c1 = Bank()
c1.name = "Aditya"
c1.age = 22
c1.phone = 9876543210
c1.pan = "ABCDE1234F"
c1.balance = 50000

c2 = Bank()
c2.name = "Rahul"
c2.age = 23
c2.phone = 9123456780
c2.pan = "BCDEF2345G"
c2.balance = 60000

c3 = Bank()
```

```
c3 = Bank()
c3.name = "Amit"
c3.age = 24
c3.phone = 9988776655
c3.pan = "CDEFG3456H"
c3.balance = 45000

c4 = Bank()
c4.name = "Neha"
c4.age = 21
c4.phone = 9090909090
c4.pan = "DEFGH4567I"
c4.balance = 70000

c5 = Bank()
c5.name = "Priya"
c5.age = 22
c5.phone = 9012345678
c5.pan = "EFGHI5678J"
c5.balance = 80000
```

***this is NOT a good approach,**

- Too many lines
- Code becomes lengthy
- Not industry oriented
- Repeated work for every object

Step 2: Solution → Use a Function inside the Class

To reduce lines and repetition, we use a **function inside the class** so that:

- Same function can be used for all objects
- Code becomes clean and reusable

Code:-

```
class Bank:
    bank_name = "SBI"
    branch = "Prayagraj"
    ifsc = "SBIN000123"
    country = "India"
    def set_details(obj, name, age, phone, pan, balance):
        obj.name = name
        obj.age = age
        obj.phone = phone
        obj.pan = pan
        obj.balance = balance

# Creating 5 Objects
c1 = Bank()
c1.set_details("Aditya", 22, 9876543210, "ABCDE1234F", 50000)

c2 = Bank()
c2.set_details("Rahul", 23, 9123456780, "BCDEF2345G", 60000)

c3 = Bank()
c3.set_details("Amit", 24, 9988776655, "CDEFG3456H", 45000)

c4 = Bank()
c4.set_details("Neha", 21, 9090909090, "DEFGH4567I", 70000)

c5 = Bank()
c5.set_details("Priya", 22, 9012345678, "EFGHI5678J", 80000)
```

Why this is still NOT the best approach

- Object is created **first**

Step-3:→ __init__() Method

1. __init__() is a **special function (constructor)**
2. It is called **automatically** when object is created
3. It allows us to **pass values during object creation**
4. No need to pass object again and again

Code:-

```python
class Bank:
    # Static / Class Members
    bname = "SBI"
    branch = "Hyderabad"
    ifsc = "SBIN000123"
    helpline = "1800-11-2211"

    # Constructor to initialize object members
    def __init__(self, name, age, phone, pan, balance):
        self.name = name
        self.age = age
        self.phone = phone
        self.pan = pan
        self.balance = balance

# Creating Objects (5 Objects with 5 Object Members)
c1 = Bank("Aditya", 22, 9876543210, "ABCDE1234F", 50000)
c2 = Bank("Adil", 23, 9123456789, "PQRSX5678K", 60000)
c3 = Bank("Rahul", 24, 9988776655, "LMNOP4321Z", 45000)
c4 = Bank("Aman", 21, 9090909090, "QWERT9876Y", 70000)
c5 = Bank("Ravi", 25, 8888888888, "ZXCVB1111A", 55000)

# Accessing Object Data
print(c1.name, c1.phone, c1.balance)
print(c2.name, c2.phone, c2.balance)
```

Methods:-

The function which are written inside the class are called as Methods.

There are 3 types of methods:-

1. Object / Instance Method
2. Class Method
3. Static Method

1. Object Method:-

1. Methods that **work on object data**
2. They **must use self**
3. Used to **access or modify object members**

Example:-

```python
class Bank:
    # Static / Class Members
    bname = "SBI"
    branch = "Hyderabad"
    ifsc = "SBIN000123"
    helpline = "1800-11-2211"

    # Constructor (Object members)
    def __init__(self, name, age, phone, pan, balance):
        self.name = name
        self.age = age
        self.phone = phone
        self.pan = pan
        self.balance = balance

    # Object Method
    def display(self):
        print(self.name, self.phone, self.balance)

    def change_phone(self, new_phone):
        def change_phone(self, new_phone):
            self.phone = new_phone

        # Withdraw Money




    # Object creation
    obj1 = Bank("Aditya", 22, "9876543210", "ABCDE1234F", 50000)

    # Output
    obj1.display()
    obj1.withdraw(10000)
    obj1.display()
    obj1.change_phone("9999999999")
    obj1.display()
```

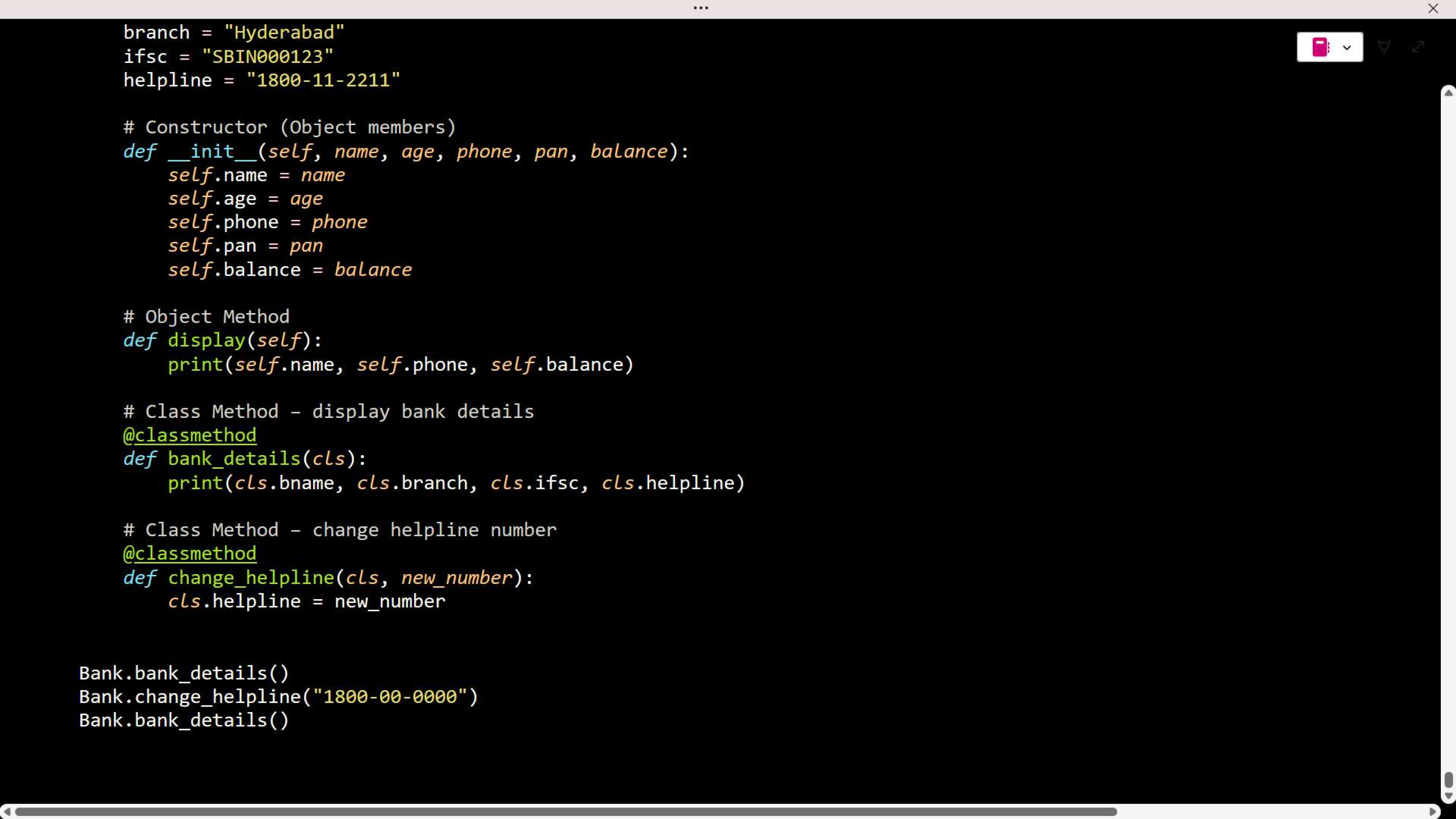
Note*: Object methods are used to access or modify object-specific data and use self.

2. Class Method:-

1. Used to **work with class (static) members**
2. Uses **@classmethod decorator**
3. Uses **cls** instead of self

Example:-

```
    class Bank:
        # Static / Class Members
        bname = "SBI"
```



```python
    branch = "Hyderabad"
    ifsc = "SBIN000123"
    helpline = "1800-11-2211"

    # Constructor (Object members)
    def __init__(self, name, age, phone, pan, balance):
        self.name = name
        self.age = age
        self.phone = phone
        self.pan = pan
        self.balance = balance

    # Object Method
    def display(self):
        print(self.name, self.phone, self.balance)

    # Class Method - display bank details
    @classmethod
    def bank_details(cls):
        print(cls.bname, cls.branch, cls.ifsc, cls.helpline)

    # Class Method - change helpline number
    @classmethod
    def change_helpline(cls, new_number):
        cls.helpline = new_number


Bank.bank_details()
Bank.change_helpline("1800-00-0000")
Bank.bank_details()
```