Laboratory Activity No. 1	
Introduction to Object-Oriented Programming	
Course Code: CPE009B	**Program:** BSCPE
Course Title: Object-Oriented Programming	**Date Performed: Sept 15, 2024**
Section: CPE21S4	**Date Submitted: Sept 15,2024**
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1. Objective(s):	
This activity aims to familiarize students with the concepts of Object-Oriented Programming	
2. Intended Learning Outcomes (ILOs):	
The students should be able to: 2.1 Identify the possible attributes and methods of a given object 2.2 Create a class using the Python language 2.3 Create and modify the instances and the attributes in the instance.	
3. Discussion:	

Desktop Computer with Anaconda
Python Windows Operating System

5. Procedure:

Creating Classes

1. Create a folder named **OOPIntro_LastName**
2. Create a Python file inside the **OOPIntro_LastName** folder named **Accounts.py** and copy the code shown below:

Object-Oriented Programming (OOP) is an approach to programming that views the world and systems as consisting of objects that relate and interact with each other. This involves identifying the characteristics that describe the object which are known as the Attributes of the object. Furthermore, it also deals with identifying the possible capabilities or actions that an object is able to do which are called Methods.

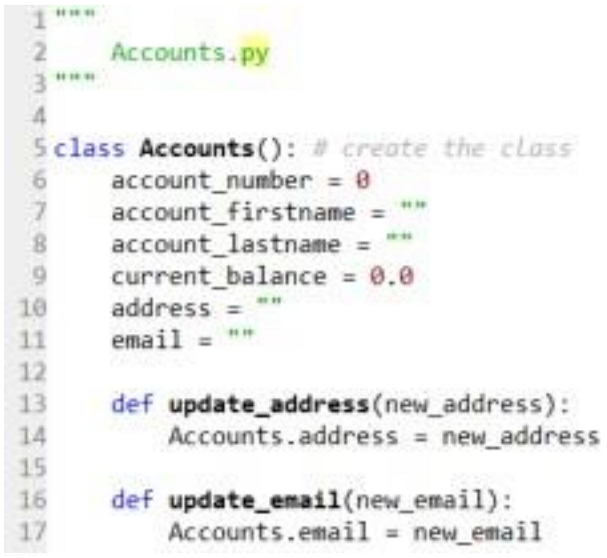
An object is simply composed of Attributes and Methods wherein Attributes are variables that hold the information describing the object and Methods are functions which allow the object to perform its defined capabilities/actions. A UML Class Diagram is used to formally represent the collection of Attributes and Methods.

An example is given below considering a simple banking system.

Accounts ATM

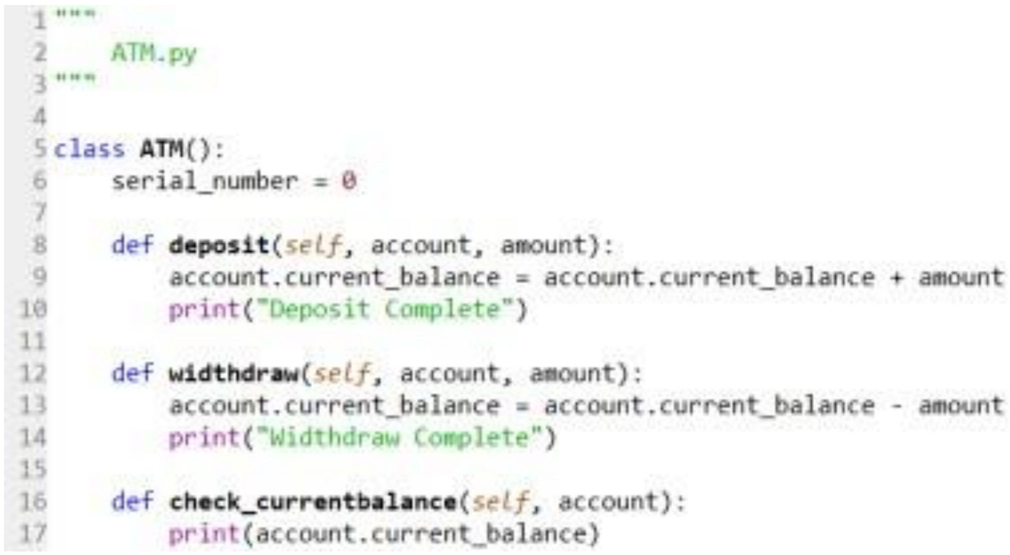
+ account_number: int + serial_number: int
+ account_firstname: string
+ account_lastname: string
+ current_balance: float
+ address: string + deposit(account: Accounts, amount: int) + email: string + widthdraw(account: Accounts, amount: int) + update_address(new_address: string) + check_currentbalance(account: Accounts) + update_email(new_email: string) + view_transactionsummary()

4. Materials and Equipment:



```python
"""
    Accounts.py
"""

class Accounts(): # create the class
    account_number = 0
    account_firstname = ""
    account_lastname = ""
    current_balance = 0.0
    address = ""
    email = ""

    def update_address(new_address):
        Accounts.address = new_address

    def update_email(new_email):
        Accounts.email = new_email
```

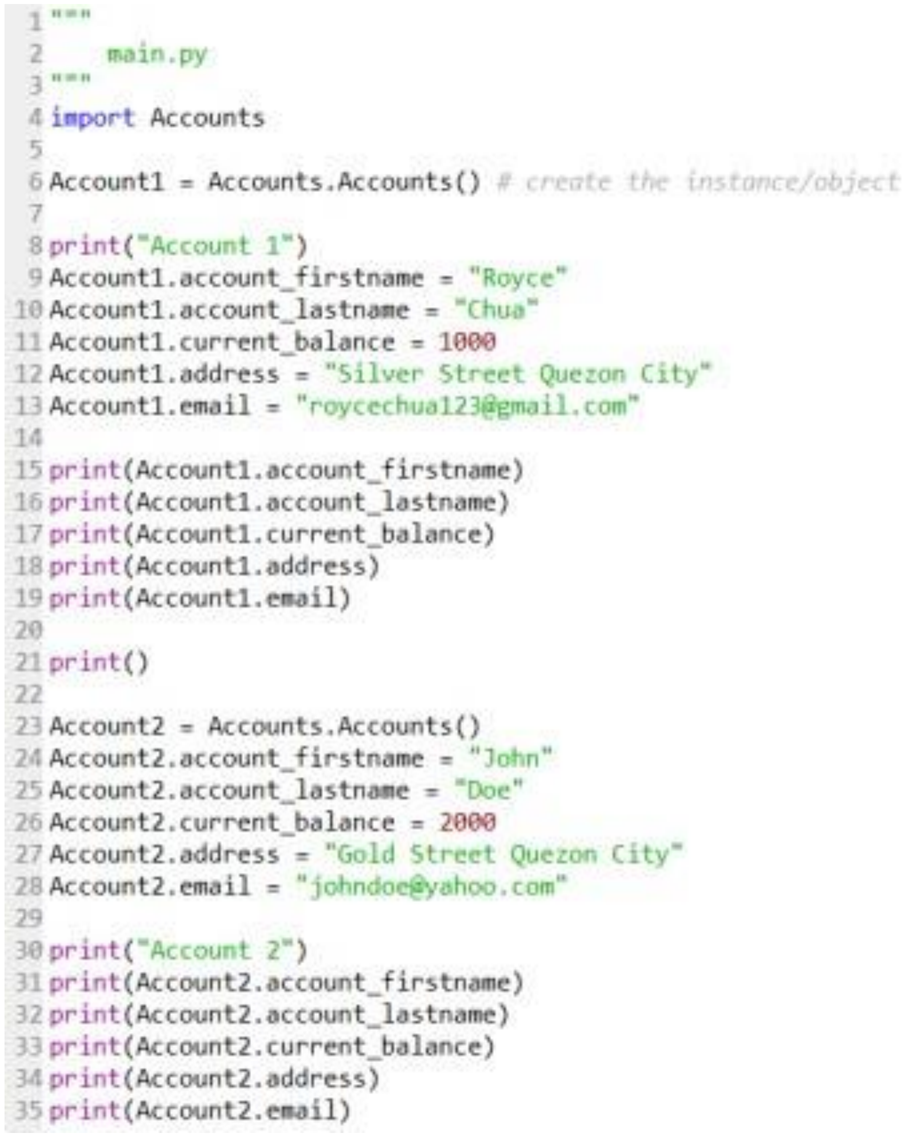
3. Modify the Accounts.py and add `self,` before the new_address and new_email.
4. Create a new file named ATM.py and copy the code shown below:



```python
"""
    ATM.py
"""

class ATM():
    serial_number = 0

    def deposit(self, account, amount):
        account.current_balance = account.current_balance + amount
        print("Deposit Complete")

    def widthdraw(self, account, amount):
        account.current_balance = account.current_balance - amount
        print("Widthdraw Complete")

    def check_currentbalance(self, account):
        print(account.current_balance)
```

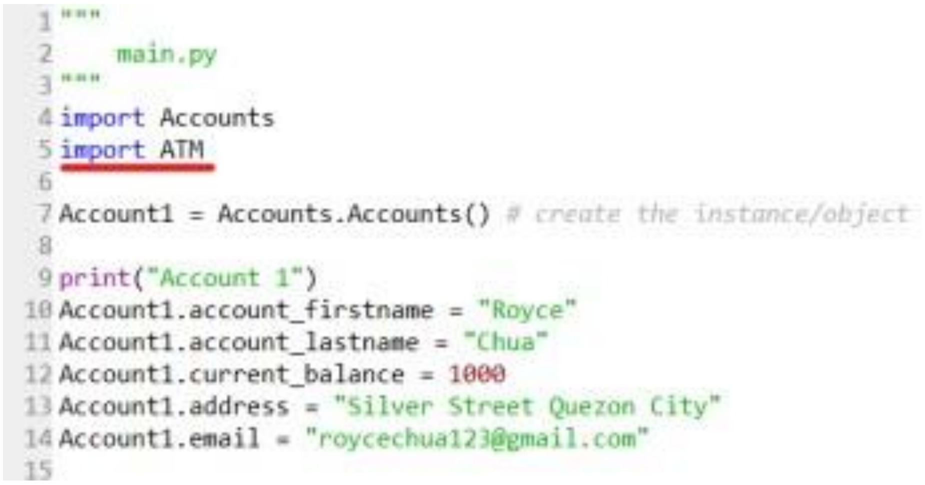
Creating Instances of Classes

5. Create a new file named main.py and copy the code shown below:



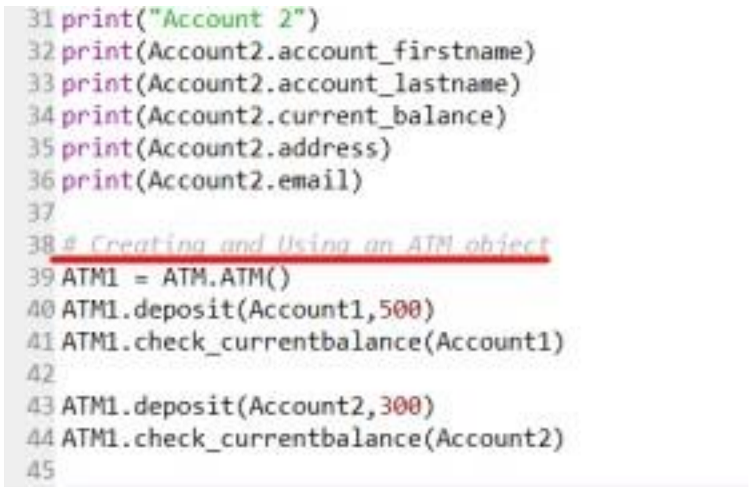
```python
"""
    main.py
"""
import Accounts

Account1 = Accounts.Accounts() # create the instance/object

print("Account 1")
Account1.account_firstname = "Royce"
Account1.account_lastname = "Chua"
Account1.current_balance = 1000
Account1.address = "Silver Street Quezon City"
Account1.email = "roycechua123@gmail.com"

print(Account1.account_firstname)
print(Account1.account_lastname)
print(Account1.current_balance)
print(Account1.address)
print(Account1.email)

print()

Account2 = Accounts.Accounts()
Account2.account_firstname = "John"
Account2.account_lastname = "Doe"
Account2.current_balance = 2000
Account2.address = "Gold Street Quezon City"
Account2.email = "johndoe@yahoo.com"

print("Account 2")
print(Account2.account_firstname)
print(Account2.account_lastname)
print(Account2.current_balance)
print(Account2.address)
print(Account2.email)
```

6. Run the main.py program and observe the output. Observe the variables names account_firstname, account_lastname as well as other variables being used in the Account1 and Account2. 7. Modify the main.py program and add the code underlined in red.



```python
"""
    main.py
"""
import Accounts
import ATM

Account1 = Accounts.Accounts() # create the instance/object

print("Account 1")
Account1.account_firstname = "Royce"
Account1.account_lastname = "Chua"
Account1.current_balance = 1000
Account1.address = "Silver Street Quezon City"
Account1.email = "roycechua123@gmail.com"

```

8. Modify the main.py program and add the code below line 38.

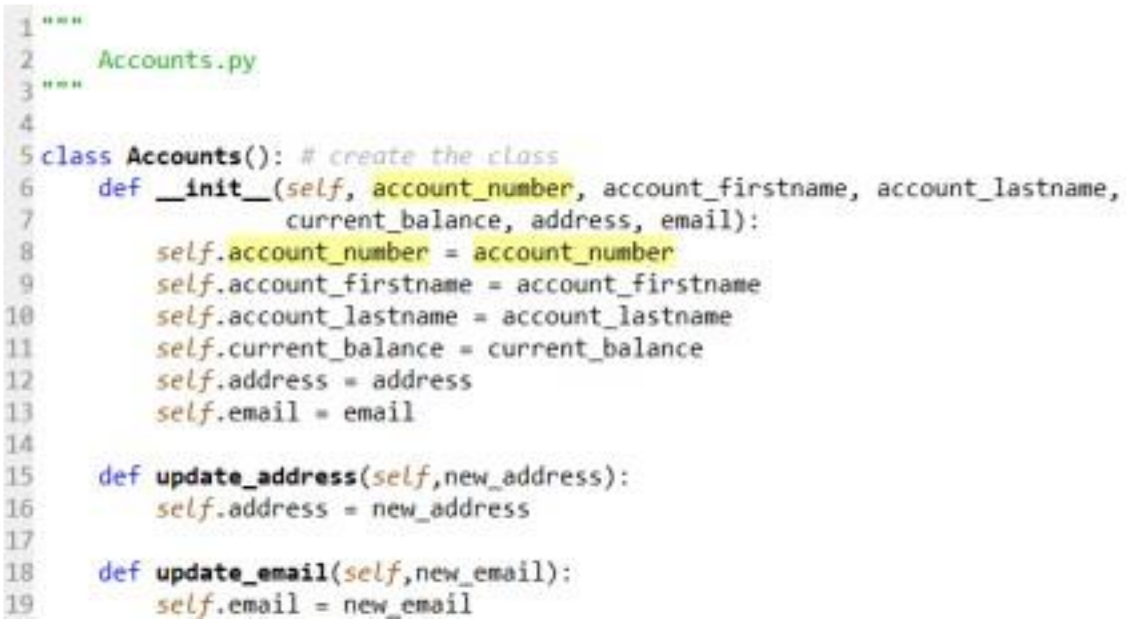


```python
print("Account 2")
print(Account2.account_firstname)
print(Account2.account_lastname)
print(Account2.current_balance)
print(Account2.address)
print(Account2.email)

# Creating and Using an ATM object
ATM1 = ATM.ATM()
ATM1.deposit(Account1,500)
ATM1.check_currentbalance(Account1)

ATM1.deposit(Account2,300)
ATM1.check_currentbalance(Account2)

```

9. Run the main.py program.

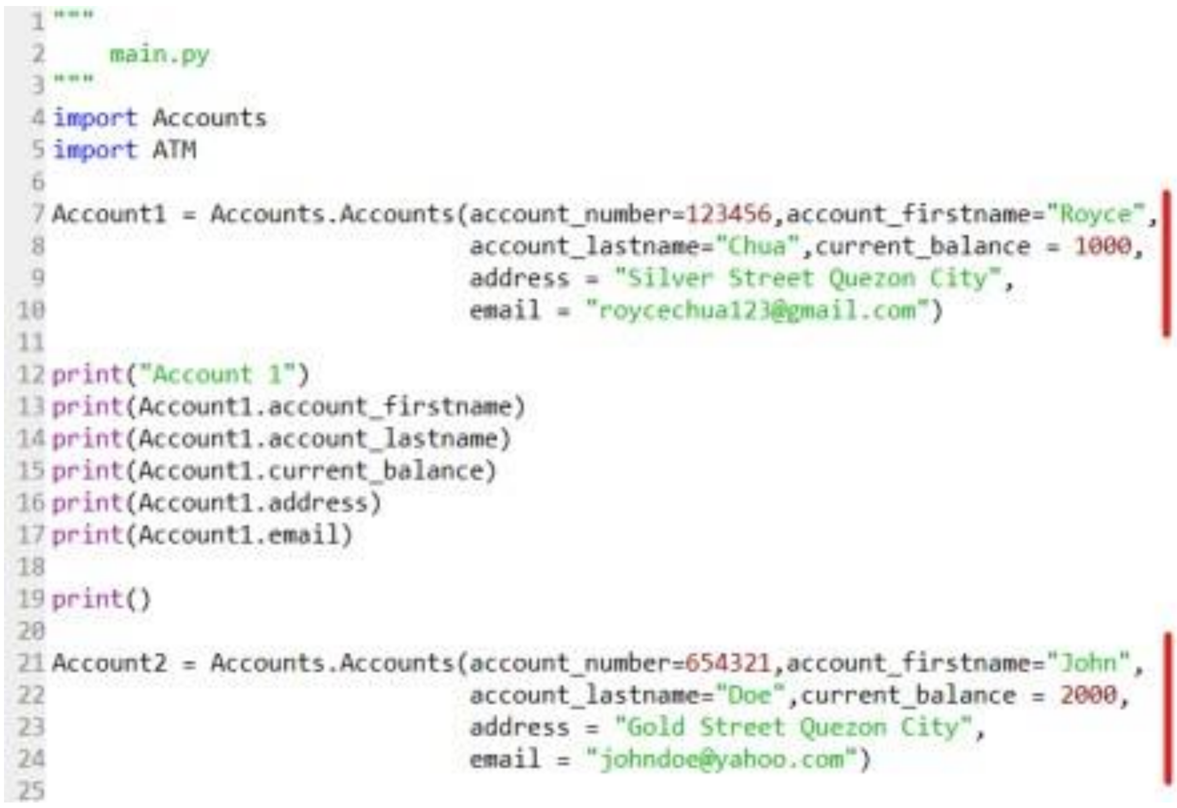
Create the Constructor in each Class

1. Modify the Accounts.py with the following code:
   Reminder: def __init__() is also known as the constructor class



```python
"""
    Accounts.py
"""

class Accounts(): # create the class
    def __init__(self, account_number, account_firstname, account_lastname,
                 current_balance, address, email):
        self.account_number = account_number
        self.account_firstname = account_firstname
        self.account_lastname = account_lastname
        self.current_balance = current_balance
        self.address = address
        self.email = email

    def update_address(self,new_address):
        self.address = new_address

    def update_email(self,new_email):
        self.email = new_email
```

2. Modify the main.py and change the following codes with the red line. Do not remove the other codes in the program.



```python
"""
    main.py
"""
import Accounts
import ATM

Account1 = Accounts.Accounts(account_number=123456,account_firstname="Royce",
                             account_lastname="Chua",current_balance = 1000,
                             address = "Silver Street Quezon City",
                             email = "roycechua123@gmail.com")

print("Account 1")
print(Account1.account_firstname)
print(Account1.account_lastname)
print(Account1.current_balance)
print(Account1.address)
print(Account1.email)

print()

Account2 = Accounts.Accounts(account_number=654321,account_firstname="John",
                             account_lastname="Doe",current_balance = 2000,
                             address = "Gold Street Quezon City",
                             email = "johndoe@yahoo.com")

```

3. Run the main.py program again and run the output.

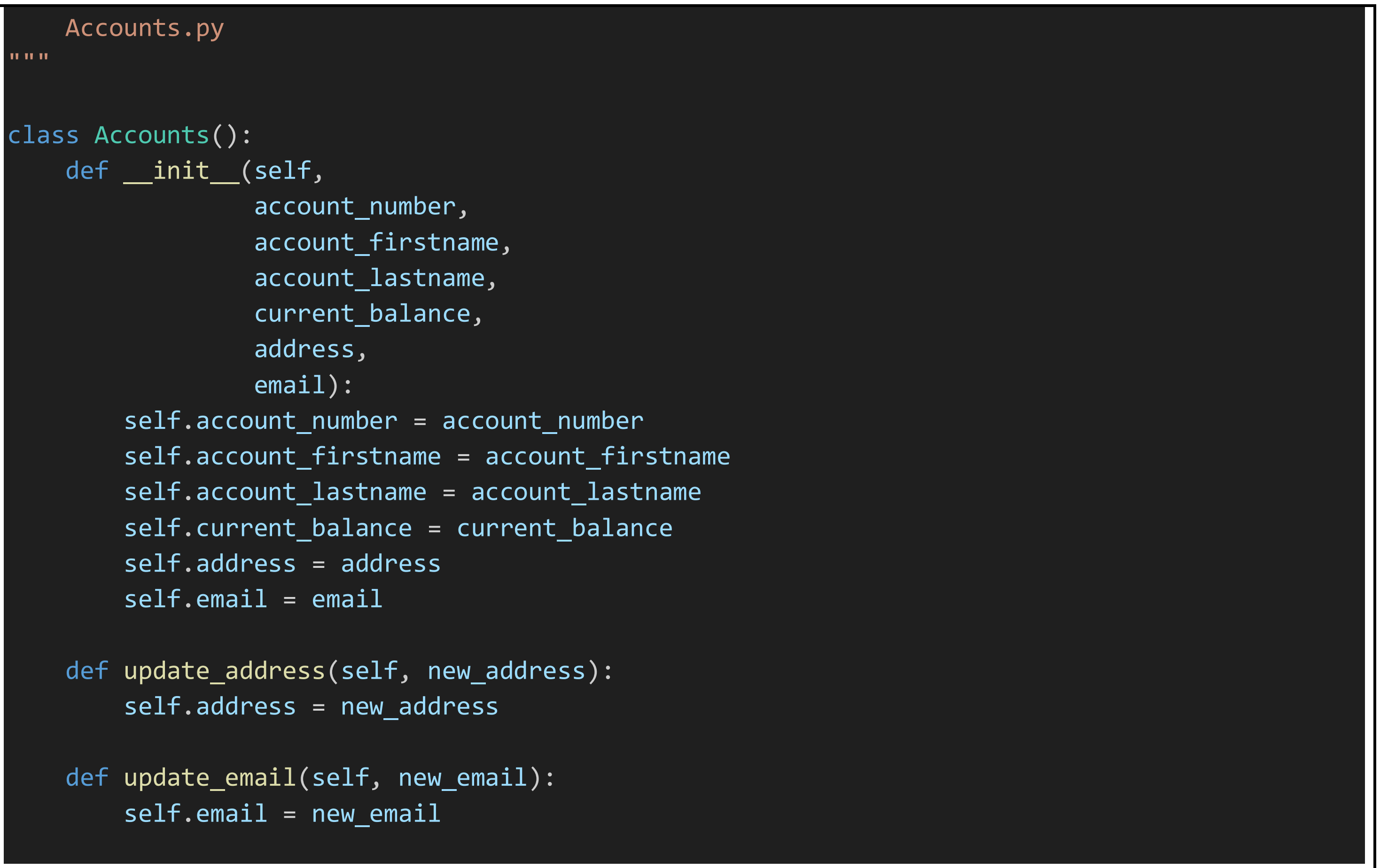
6. Supplementary Activity:

Tasks

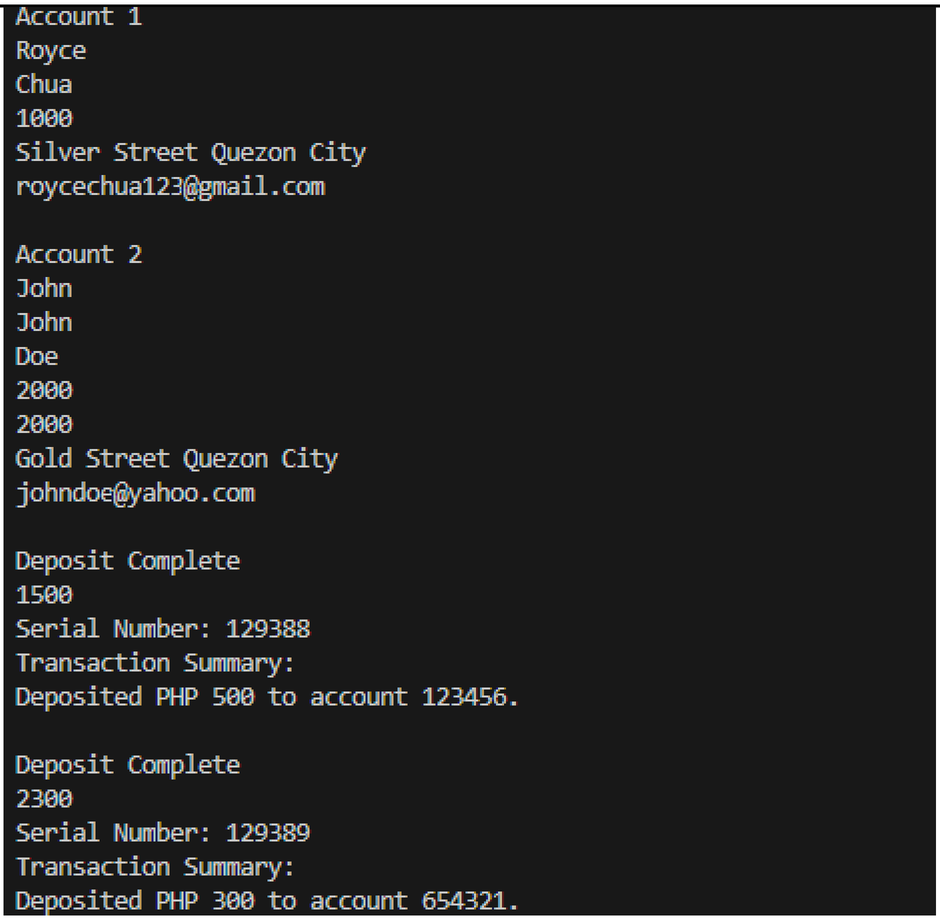
1. Modify the ATM.py program and add the constructor function.
2. Modify the main.py program and initialize the ATM machine with any integer serial number combination and display the serial number at the end of the program.
3. Modify the ATM.py program and add the **view_transactionsummary()** method. The method should display all the transaction made in the ATM object.

```python
"""
    ATM.py
"""

class ATM:
    def __init__(self, account, serial_number):
        self.account = account
        self.serial_number = serial_number
        self.transaction_history = []

    def deposit(self, account, amount):
        account.current_balance += amount
        transaction = f"Deposited PHP {amount} to account {account.account_number}."
        self.transaction_history.append(transaction)
        print("Deposit Complete")

    def withdraw(self, account, amount):
        account.current_balance -= amount
        transaction = f"Withdrew PHP {amount} from account {account.account_number}."
        self.transaction_history.append(transaction)
        print("Withdraw Complete")

    def check_current_balance(self, account):
        data = account.current_balance
        print(data)

    def view_transaction_summary(self):
        if not self.transaction_history:
            print("No Transactions.")
        else:
            print("Transaction Summary:")
            for transaction in self.transaction_history:
                print(transaction)

"""
    Main.py
"""

import Accounts
import ATM
```

```python
Account1 = Accounts.Accounts(account_number=123456,
                             account_firstname="Royce",
                             account_lastname="Chua",
                             current_balance=1000,
                             address="Silver Street Quezon City",
                             email="roycechua123@gmail.com")

print("Account 1")
print(Account1.account_firstname)
print(Account1.account_lastname)
print(Account1.current_balance)
print(Account1.address)
print(Account1.email)

print()

Account2 = Accounts.Accounts(account_number=654321,
                             account_firstname="John",
                             account_lastname="Doe",
                             current_balance=2000,
                             address="Gold Street Quezon City",
                             email="johndoe@yahoo.com")

print("Account 2")
print(Account2.account_firstname)
print(Account2.account_lastname)
print(Account2.current_balance)
print(Account2.address)
print(Account2.email)

print()

# Creating and Using an ATM object
ATM1 = ATM.ATM(Account1, serial_number=975310)
ATM1.deposit(Account1, 500)
ATM1.check_current_balance(Account1)
print("Serial Number:", ATM1.serial_number)
ATM1.view_transaction_summary()

print()

ATM1 = ATM.ATM(Account2, serial_number=864200)
ATM1.deposit(Account2, 300)
ATM1.check_current_balance(Account2)
print("Serial Number:", ATM1.serial_number)
ATM1.view_transaction_summary()

"""
```



```python
    Accounts.py
"""

class Accounts():
    def __init__(self,
                 account_number,
                 account_firstname,
                 account_lastname,
                 current_balance,
                 address,
                 email):
        self.account_number = account_number
        self.account_firstname = account_firstname
        self.account_lastname = account_lastname
        self.current_balance = current_balance
        self.address = address
        self.email = email

    def update_address(self, new_address):
        self.address = new_address

    def update_email(self, new_email):
        self.email = new_email
```



```
Account 1
Royce
Chua
1000
Silver Street Quezon City
roycechua123@gmail.com

Account 2
John
John
Doe
2000
2000
Gold Street Quezon City
johndoe@yahoo.com

Deposit Complete
1500
Serial Number: 129388
Transaction Summary:
Deposited PHP 500 to account 123456.

Deposit Complete
2300
Serial Number: 129389
Transaction Summary:
Deposited PHP 300 to account 654321.
```

Questions

1. What is a class in Object-Oriented Programming?

   A class is a user-defined data type that encapsulates data and methods. It defines a set of attributes (data) and methods (functions) that will be common to all instances (objects) of that class.__

2. Why do you think classes are being implemented in certain programs while some are sequential(line-by-line)?

   classes are implemented in OOP, such as modularity, encapsulation, and reuse are needed to manage complexity and represent in real world concepts. Sequential programming is suitable for simpler, more linear tasks where the overhead of OOP is not necessary.

3. How is it that there are variables of the same name such account_firstname and account_lastname that exist but have different values?

   instance of a class can have its own set of attributes, and local variables can shadow instance variables. account_firstname = "Name" # Local variable
   print(self.account_firstname) # Instance variable

____
__

4. Explain the constructor functions role in initializing the attributes of the class? When does the Constructor function execute or when is the constructor function called?
It helps to reduce messy codes and it allows to modify it easily inside.__

5. Explain the benefits of using Constructors over initializing the variables one by one in the main program?
It reduces complexity of the code and to be cleaner, more organized code and enhances maintainability.

7. Conclusion:

In conclusion, Constructors defined by the __init__ method are essential for initializing class attributes ensuring that objects are created with a valid and consistent state. They simplify object creation by initialization logic within the class, reducing the need for manual setup and minimize the errors. This leads to cleaner, more organized and maintainable code.

8. Assessment Rubric: