

ASSIGNMENT 6

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Batch - 04 (DS)

Task Description #1:

- Start a Python class named Student with attributes name, roll_number, and marks. Prompt GitHub Copilot to complete methods for displaying details and checking if marks are above average

PROMPT: Create a Student class having attributes name, rollnumber, marks and display the results using a function named display_details(), and create another function named is_passed() to check whether the student is passed using their average and call the class

CODE:

```
class Student:  
    def __init__(self, name, roll_number, marks):  
        self.name = name  
        self.roll_number = roll_number  
        self.marks = marks  
  
    def display_details(self):  
        print(f"Name: {self.name}")  
        print(f"Roll Number: {self.roll_number}")  
        print(f"Marks: {self.marks}")  
  
    def is_passed(self, average_marks):  
        return self.marks > average_marks  
  
    def display_pass_status(self, average_marks):  
        if self.is_passed(average_marks):  
            print(f"{self.name} passed.")  
        else:  
            print(f"{self.name} did not pass.")  
  
# Example of how to call the Student class  
student1 = Student("Alice", "A001", 85)  
student2 = Student("Bob", "A002", 65)  
  
# Display details for each student  
print("Details for Student 1:")  
student1.display_details()  
print("\nDetails for Student 2:")  
student2.display_details()  
  
# Check if the student passed based on an average  
average_marks = 70  
  
print(f"\nChecking pass status against average marks ({average_marks}):")  
student1.display_pass_status(average_marks)  
student2.display_pass_status(average_marks)
```

OUTPUT:

```
Details for Student 1:
```

```
Name: Alice
```

```
Roll Number: A001
```

```
Marks: 85
```

```
Details for Student 2:
```

```
Name: Bob
```

```
Roll Number: A002
```

```
Marks: 65
```

```
Checking pass status against average marks (70):
```

```
Alice passed.
```

```
Bob did not pass.
```

EXPLANATION:

This code defines a Python class called `Student`.

Here's a breakdown of the code:

- **class Student::** This line starts the definition of the `Student` class.
- **__init__(self, name, roll_number, marks)::** This is the constructor method. It's called when you create a new `Student` object. `self` refers to the instance of the class, and `name`, `roll_number`, and `marks` are the attributes you provide when creating a student. Inside the constructor, these attributes are assigned to the object using `self.attribute_name`.
- **display_details(self)::** This method prints the `name`, `roll_number`, and `marks` of the student object.
- **is_passed(self, average_marks)::** This method checks if the student's marks are greater than the `average_marks` provided as an argument. It returns `True` if the student's marks are higher and `False` otherwise.
- **display_pass_status(self, average_marks)::** This method uses the `is_passed()` method to determine if the student passed and then prints a message indicating whether the student passed or did not pass.
- **student1 = Student("Alice", "A001", 85) and student2 = Student("Bob", "A002", 65):** These lines create two instances

(objects) of the Student class, named student1 and student2, with different details.

- **The print statements and method calls:** These lines demonstrate how to use the methods of the Student objects to display their details and check their pass status based on an average_marks of 70.

Task Description #2:

- Write the first two lines of a for loop to iterate through a list of numbers. Use a comment prompt to let Copilot suggest how to calculate and print the square of even numbers only.

PROMPT: write a python program to calculate and print the square of even numbers from a list of numbers, write program using for loop to iterate

CODE:

```
# Sample list of numbers
numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

print("Square of even numbers:")
# Iterate through the list
for number in numbers:
    # Check if the number is even
    if number % 2 == 0:
        # Calculate the square
        square = number ** 2
        # Print the square
        print(f"The square of {number} is {square}")
```

OUTPUT:

```
Square of even numbers:  
The square of 2 is 4  
The square of 4 is 16  
The square of 6 is 36  
The square of 8 is 64  
The square of 10 is 100
```

EXPLANATION:

This code snippet calculates and prints the square of even numbers from a given list.

Here's a breakdown of the code:

- **numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]**: This line creates a list named numbers containing integers from 1 to 10.
- **print("Square of even numbers:")**: This line simply prints a descriptive header to the console.
- **for number in numbers**:: This is a for loop that iterates through each element in the numbers list. In each iteration, the current element is assigned to the variable number.
- **if number % 2 == 0**:: This is an if statement that checks if the current number is even. The modulo operator (%) returns the remainder of a division. If a number divided by 2 has a remainder of 0, it's an even number.
- **square = number ** 2**: If the if condition is true (the number is even), this line calculates the square of the number using the exponentiation operator (**) and stores the result in the square variable.
- **print(f"The square of {number} is {square}")**: This line prints the original even number and its calculated square in a formatted string. This line only executes for even numbers.

Task Description #3:

- Create a class called BankAccount with attributes account_holder and balance. Use Copilot to

complete methods for deposit(), withdraw(), and check for insufficient balance.

PROMPT: Create a class named BanckAccount with attributes account_holder and balance and self attributes. Complete methods for deposit() using if conditions , withdraw(), and check for insufficient balance. And,call the class

CODE:

```
class BankAccount:
    def __init__(self, account_holder, balance=0.0):
        self.account_holder = account_holder
        self.balance = balance

    def deposit(self, amount):
        if amount > 0:
            self.balance += amount
            print(f"Deposited: ${amount:.2f}")
            print(f"New balance: ${self.balance:.2f}")
        else:
            print("Deposit amount must be positive.")

    def withdraw(self, amount):
        if amount > 0:
            if self.balance >= amount:
                self.balance -= amount
                print(f"Withdrew: ${amount:.2f}")
                print(f"New balance: ${self.balance:.2f}")
            else:
                print(f"Insufficient balance.\nAvailable balance: ${self.balance:.2f}")
        else:
            print("Withdrawal amount must be positive.")

    def display_balance(self):
        print(f"Account holder: {self.account_holder}")
        print(f"Current balance: ${self.balance:.2f}")
```

```
# Example of how to call the BankAccount class
account1 = BankAccount("Alice Smith", 1000.0)

# Display initial balance
account1.display_balance()

# Deposit some money
account1.deposit(500.0)

# Withdraw some money
account1.withdraw(200.0)

# Try to withdraw more than the balance
account1.withdraw(1500.0)

# Display final balance
account1.display_balance()
```

OUTPUT:

```
Account holder: Alice Smith
Current balance: $1000.00
Deposited: $500.00
New balance: $1500.00
Withdrew: $200.00
New balance: $1300.00
Insufficient balance.
Available balance: $1300.00
Account holder: Alice Smith
Current balance: $1300.00
```

EXPLANATION:

This code defines a Python class called `BankAccount` and provides an example of how to use it.

Here's a breakdown:

- **class BankAccount::** This line starts the definition of the `BankAccount` class.
- **__init__(self, account_holder, balance=0.0)::** This is the constructor. It's called when you create a new `BankAccount` object. `self` refers to the object

itself. `account_holder` is the name of the account holder, and `balance` is the initial balance (defaulting to 0.0 if not provided). These values are stored as attributes of the object.

- **deposit(self, amount):** This method handles deposits. It checks if the amount is positive, adds it to the balance, and prints a confirmation message with the new balance.
- **withdraw(self, amount):** This method handles withdrawals. It checks if the amount is positive and if there is enough balance. If both conditions are met, it subtracts the amount from the balance and prints a confirmation. Otherwise, it prints an error message for insufficient balance or a non-positive withdrawal amount.
- **display_balance(self):** This method simply prints the `account_holder` and the current balance of the account.
- **The code after the class definition:** This part demonstrates how to create an instance of the `BankAccount` class (`account1`), display its initial balance, perform a deposit, perform a withdrawal, attempt an invalid withdrawal (more than the balance), and finally display the balance after these operations.

Task Description #4:

- Define a list of student dictionaries with keys `name` and `score`. Ask Copilot to write a while loop to print the names of students who scored more than 75

PROMPT: write a python program which has dictionary named `student` and generate a list of key(`name`)-value(`score`) pairs and should print the names of student who scores more than 75

CODE:

```

# Dictionary named student with names and scores
student = {
    "Alice": 88,
    "Bob": 65,
    "Charlie": 92,
    "David": 70,
    "Eve": 78,
    "Frank": 55
}

# Generate a list of key-value pairs (name-score)
student_list = list(student.items())

print("List of student name-score pairs:", student_list)

# Print names of students who scored more than 75
print("\nStudents who scored more than 75:")
for name, score in student_list:
    if score > 75:
        print(name)

```

OUTPUT:

```

List of student name-score pairs: [('Alice', 88), ('Bob', 65), ('Charlie', 92), ('David', 70), ('Eve', 78), ('Frank', 55)]

Students who scored more than 75:
Alice
Charlie
Eve

```

EXPLANATION:

This code snippet works with a dictionary of student names and their scores to identify and print the names of students who scored more than 75.

Here's a breakdown:

- **student = { ... }:** This line creates a dictionary named student. The keys of the dictionary are student names (strings), and the values are their corresponding scores (integers).

- **student_list = list(student.items()):** The .items() method of a dictionary returns a view object that displays a list of a dictionary's key-value tuple pairs. This line converts that view object into a list of tuples, where each tuple contains a student's name and their score.
- **print("List of student name-score pairs:", student_list):** This line prints the generated list of name-score pairs.
- **print("\nStudents who scored more than 75:":** This line prints a header before listing the names of students who meet the criteria.
- **for name, score in student_list:** This is a for loop that iterates through each tuple (name, score) in the student_list. In each iteration, the first element of the tuple is assigned to the variable name, and the second element is assigned to the variable score.
- **if score > 75:** This is an if statement that checks if the current score is greater than 75.
- **print(name):** If the if condition is true (the score is greater than 75), this line prints the name of the student. This line only executes for students who scored more than 75.

Task Description #5:

- Begin writing a class ShoppingCart with an empty items list. Prompt Copilot to generate methods to add_item, remove_item, and use a loop to calculate the total bill using conditional discounts

PROMPT: write a program in python. Create a class named ShopingCart having empty list items. Add methods like add_item, remove_item and uses a loop to calculate the total bill using conditional(if-else) discounts. And call the class.

CODE:

```
class ShoppingCart:
    def __init__(self):
        self.items = [] # Initialize an empty list for items

    def add_item(self, item_name, price, quantity=1):
        """Adds an item to the shopping cart."""
        self.items.append({"name": item_name, "price": price, "quantity": quantity})
        print(f"Added {quantity} x {item_name} to the cart.")

    def remove_item(self, item_name):
        """Removes an item from the shopping cart by name."""
        initial_item_count = len(self.items)
        self.items = [item for item in self.items if item["name"] != item_name]
        if len(self.items) < initial_item_count:
            print(f"Removed {item_name} from the cart.")
        else:
            print(f"{item_name} not found in the cart.")
```

```

def calculate_total_bill(self):
    """Calculates the total bill with conditional discounts."""
    total_price = 0
    print("\nCalculating total bill:")
    for item in self.items:
        item_total = item["price"] * item["quantity"]
        total_price += item_total
        print(f"- {item['name']}: ${item_total:.2f}")

    # Apply discounts based on total price
    discount = 0
    if total_price > 100:
        discount = total_price * 0.10 # 10% discount for total over $100
        print("Applied 10% discount for total over $100.")
    elif total_price > 50:
        discount = total_price * 0.05 # 5% discount for total over $50
        print("Applied 5% discount for total over $50.")

    final_bill = total_price - discount
    print(f"Subtotal: ${total_price:.2f}")
    print(f"Discount: -$ {discount:.2f}")
    print(f"Final Bill: ${final_bill:.2f}")
    return final_bill

# Example usage:
cart = ShoppingCart()
cart.add_item("Laptop", 1200, 1)
cart.add_item("Mouse", 25, 2)
cart.add_item("Keyboard", 75, 1)
cart.calculate_total_bill()

cart.remove_item("Mouse")
cart.calculate_total_bill()

```

OUTPUT:

```
Added 1 x Laptop to the cart.  
Added 2 x Mouse to the cart.  
Added 1 x Keyboard to the cart.
```

Calculating total bill:

- Laptop: \$1200.00
- Mouse: \$50.00
- Keyboard: \$75.00

Applied 10% discount for total over \$100.

Subtotal: \$1325.00

Discount: -\$132.50

Final Bill: \$1192.50

Removed Mouse from the cart.

Calculating total bill:

- Laptop: \$1200.00
- Keyboard: \$75.00

Applied 10% discount for total over \$100.

Subtotal: \$1275.00

Discount: -\$127.50

Final Bill: \$1147.50

1147.5

EXPLANATION:

This code defines a Python class named `ShoppingCart` to simulate a basic shopping cart functionality and provides an example of how to use it.

Here's a breakdown:

- **class ShoppingCart::** This line begins the definition of the `ShoppingCart` class.
- **__init__(self)::** This is the constructor method. It's called when you create a new `ShoppingCart` object. It initializes an empty list called `self.items` which will store the items added to the cart.
- **add_item(self, item_name, price, quantity=1)::** This method adds an item to the `items` list. It takes the `item_name`, `price`, and optional `quantity` (defaulting to 1) as arguments. Each item is stored as a dictionary within the `items` list.

- **remove_item(self, item_name):** This method removes an item from the cart based on its item_name. It uses a list comprehension to create a new list containing only the items whose names do not match the item_name to be removed. It also provides feedback on whether the item was found and removed.
- **calculate_total_bill(self):** This method calculates the total cost of the items in the cart and applies conditional discounts.
 - It initializes total_price to 0.
 - It iterates through each item in the self.items list.
 - For each item, it calculates the item_total (price multiplied by quantity) and adds it to the total_price.
 - It then checks the total_price to apply discounts: 10% for totals over \$100, and 5% for totals over \$\$100, and 5% for totals over \$50.
 - Finally, it calculates the final_bill by subtracting the discount from the total_price and prints a summary of the calculation, including the subtotal, discount, and final bill.
- **The code after the class definition:** This section demonstrates how to create a ShoppingCart object, add several items, calculate the initial bill, remove an item, and then calculate the bill again to show the effect of the removal and potential change in discount.