UNIVERSITY OF CALOOCAN CITY
COMPUTER ENGINEERING DEPARTMENT

Data Structure and Algorithm

Laboratory Activity No. 4

Arrays

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I. Objectives

Introduction

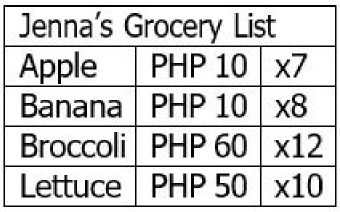
Array, in general, refers to an orderly arrangement of data elements. Array is a type of data structure that stores data elements in adjacent locations. Array is considered as linear data structure that stores elements of same data types. Hence, it is also called as a linear homogenous data structure.

This laboratory activity aims to implement the principles and techniques in:

- Writing algorithms using Array data structure
- Solve programming problems using dynamic memory allocation, arrays and pointers

II. Methods

Jenna's Grocery



Jenna's Grocery List		
Apple	PHP 10	x7
Banana	PHP 10	x8
Broccoli	PHP 60	x12
Lettuce	PHP 50	x10

Jenna wants to buy the following fruits and vegetables for her daily consumption. However, she needs to distinguish between fruit and vegetable, as well as calculate the sum of prices that she has to pay in total.

Problem 1: Create a class for the fruit and the vegetable classes. Each class must have a constructor, deconstructor, copy constructor and copy assignment operator. They must also have all relevant attributes (such as name, price and quantity) and functions (such as calculate sum) as presented in the problem description above.

Problem 2: Create an array GroceryList in the driver code that will contain all items in Jenna's Grocery List. You must then access each saved instance and display all details about the items.

Problem 3: Create a function TotalSum that will calculate the sum of all objects listed in Jenna's Grocery List.

Problem 4: Delete the Lettuce from Jenna's GroceryList list and de-allocate the memory assigned.

III. Results

ALGORITHM

1. Start the program.

2. Create a class “Groceryitems” with: name, price, quantity also the functions to calculate sum and show the display.

3. Create two sub classes for fruits and vegetables inherited from the grocery list.

4. Create an array list for grocery list.

5. Display all the items in grocery list.

6. Compute and display the sum total of all items.

7. Remove lettuce from the grocery list.

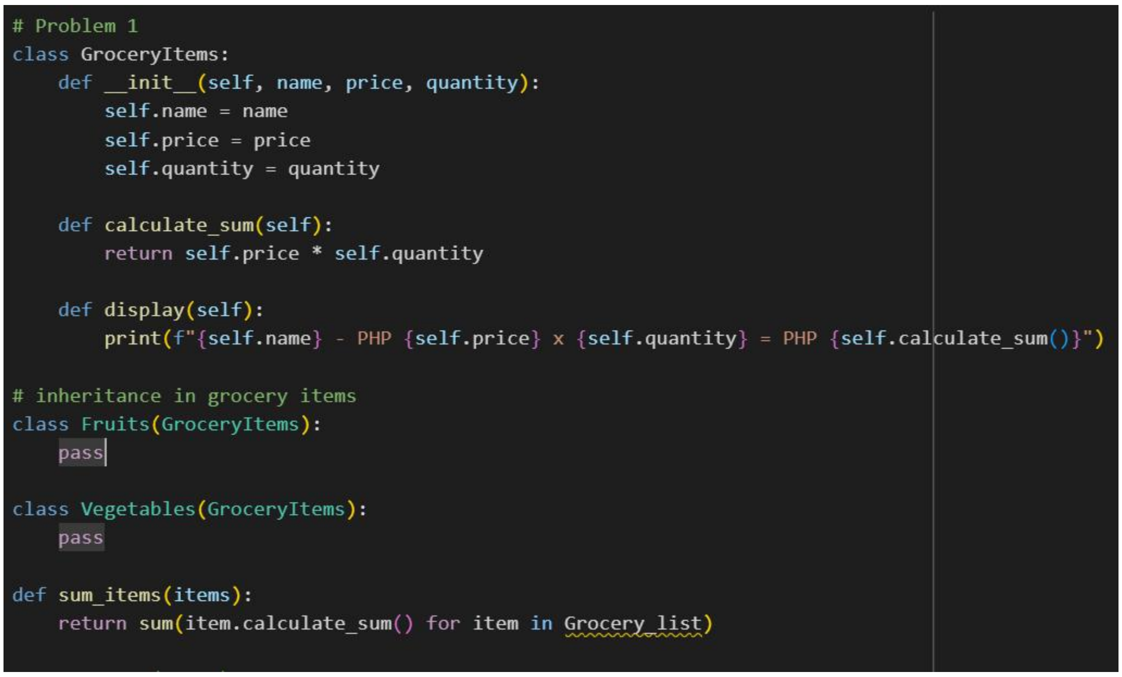
8. Display the updated list.

9. Compute and print the updated total sum.

10. End the program

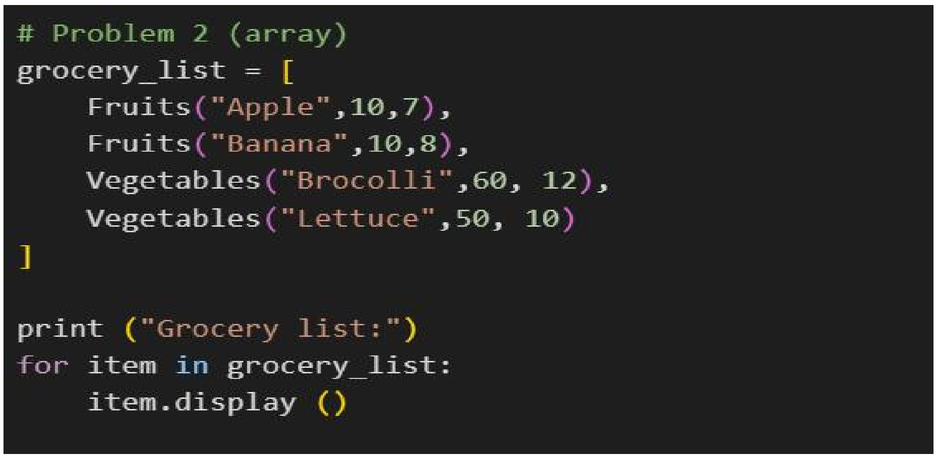
PROGRAM

Problem 1 (Creating a class)



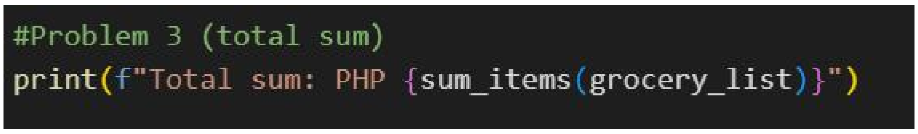
```
# Problem 1
class GroceryItems:
    def __init__(self, name, price, quantity):
        self.name = name
        self.price = price
        self.quantity = quantity

    def calculate_sum(self):
        return self.price * self.quantity

    def display(self):
        print(f"{self.name} - PHP {self.price} x {self.quantity} = PHP {self.calculate_sum()}")

# inheritance in grocery items
class Fruits(GroceryItems):
    pass

class Vegetables(GroceryItems):
    pass

def sum_items(items):
    return sum(item.calculate_sum() for item in Grocery_list)
```

Problem 2 (array)



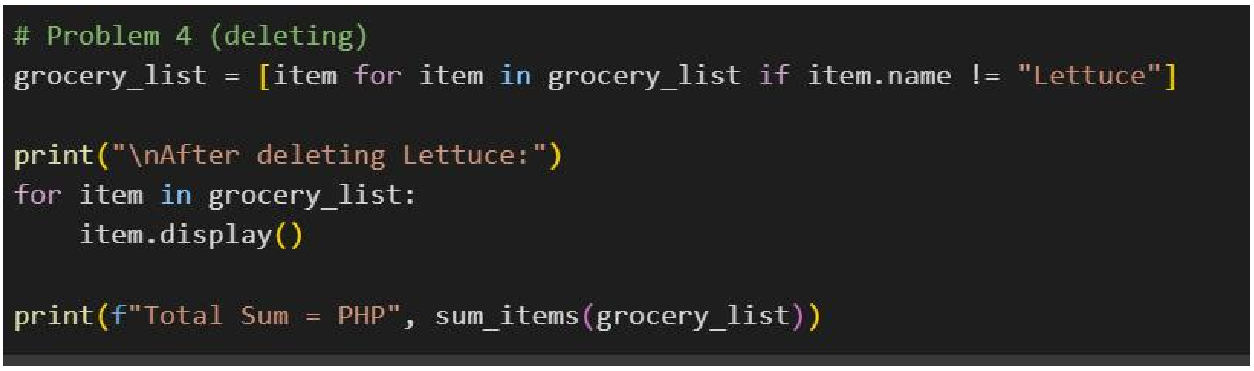
```
# Problem 2 (array)
grocery_list = [
    Fruits("Apple",10,7),
    Fruits("Banana",10,8),
    Vegetables("Brocolli",60, 12),
    Vegetables("Lettuce",50, 10)
]

print ("Grocery list:")
for item in grocery_list:
    item.display ()
```

Problem 3 (Total sum)



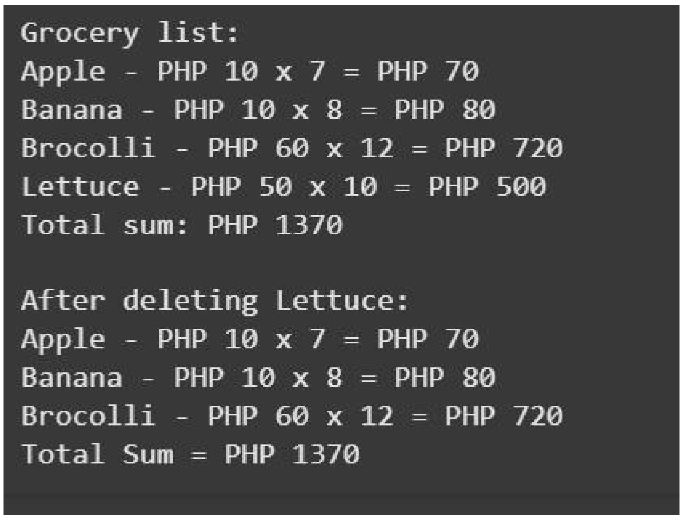
```
#Problem 3 (total sum)
print(f"Total sum: PHP {sum_items(grocery_list)}")
```

Problem 4 (de-allocate)



```
# Problem 4 (deleting)
grocery_list = [item for item in grocery_list if item.name != "Lettuce"]

print("\nAfter deleting Lettuce:")
for item in grocery_list:
    item.display()

print(f"Total Sum = PHP", sum_items(grocery_list))
```

PROGRAM OUTPUT



```
Grocery list:
Apple - PHP 10 x 7 = PHP 70
Banana - PHP 10 x 8 = PHP 80
Brocolli - PHP 60 x 12 = PHP 720
Lettuce - PHP 50 x 10 = PHP 500
Total sum: PHP 1370

After deleting Lettuce:
Apple - PHP 10 x 7 = PHP 70
Banana - PHP 10 x 8 = PHP 80
Brocolli - PHP 60 x 12 = PHP 720
Total Sum = PHP 1370
```

IV. Conclusion

In conclusion this program shows the functions of constructing, deconstructing, inheritance, copy assignment, creating an array and etc. This shows how Object Oriented Programing concepts make it easier to use and manage data in real world applications like the grocery list problem.

References

[1] Co Arthur O.. “University of Caloocan City Computer Engineering Department Honor Code,” UCC-CpE Departmental Policies, 2020.