



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

Present the visualized procedures done. Also present the results with corresponding data visualizations such as graphs, charts, tables, or image. Please provide insights, commentaries, or explanations regarding the data. If an explanation requires the support of literature such as academic journals, books, magazines, reports, or web articles please cite and reference them using the IEEE format.

Please take note of the styles on the style ribbon as these would serve as the style format of this laboratory report. The body style is Times New Roman size 12, line spacing: 1.5. Body text should be in Justified alignment, while captions should be center-aligned. Images should be readable and include captions. Please refer to the sample below:

```
class GroceryItem:
    def __init__(self, name, price, quantity):
        self.name = name
        self.price = price
        self.quantity = quantity

    def __del__(self):
        print(f"Deleting {self.name} from memory")

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

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

    def copy(self):
        return GroceryItem(self.name, self.price, self.quantity)

class Fruit(GroceryItem):
    def __init__(self, name, price, quantity):
        super().__init__(name, price, quantity)
        self.type = "Fruit"

class Vegetable(GroceryItem):
    def __init__(self, name, price, quantity):
        super().__init__(name, price, quantity)
        self.type = "Vegetable"

def calculate_total_sum(grocery_list):
    return sum(item.calculate_total() for item in grocery_list)

def remove_item(grocery_list, name):
    for i, item in enumerate(grocery_list):
        if item.name == name:
            # Simulate manual memory deallocation
            del grocery_list[i]
            return True
    return False

def main():
    # Problem 2: Create grocery list array
    grocery_list = [
        Fruit("Apple", 10, 7),
        Fruit("Banana", 10, 8),
        Vegetable("Broccoli", 60, 12),
        Vegetable("Lettuce", 50, 10)
    ]
```

```
# Display all items
print("Jenna's Grocery List:")
print("-----")
for item in grocery_list:
    item.display()

# Problem 3: Calculate total sum
total = calculate_total_sum(grocery_list)
print(f"\nTotal sum of all items: PHP {total}")

# Problem 4: Delete Lettuce
print("\nRemoving Lettuce from the list...")
if remove_item(grocery_list, "Lettuce"):
    print("Lettuce removed successfully")
else:
    print("Lettuce not found in the list")

# Display updated list
print("\nUpdated Grocery List:")
print("-----")
for item in grocery_list:
    item.display()

# Calculate new total
new_total = calculate_total_sum(grocery_list)
print(f"\nNew total sum after removal: PHP {new_total}")

# Explicit cleanup (normally automatic in Python)
print("\nCleaning up memory...")
for item in grocery_list:
    item.__del__()

if __name__ == "__main__":
    main()
```

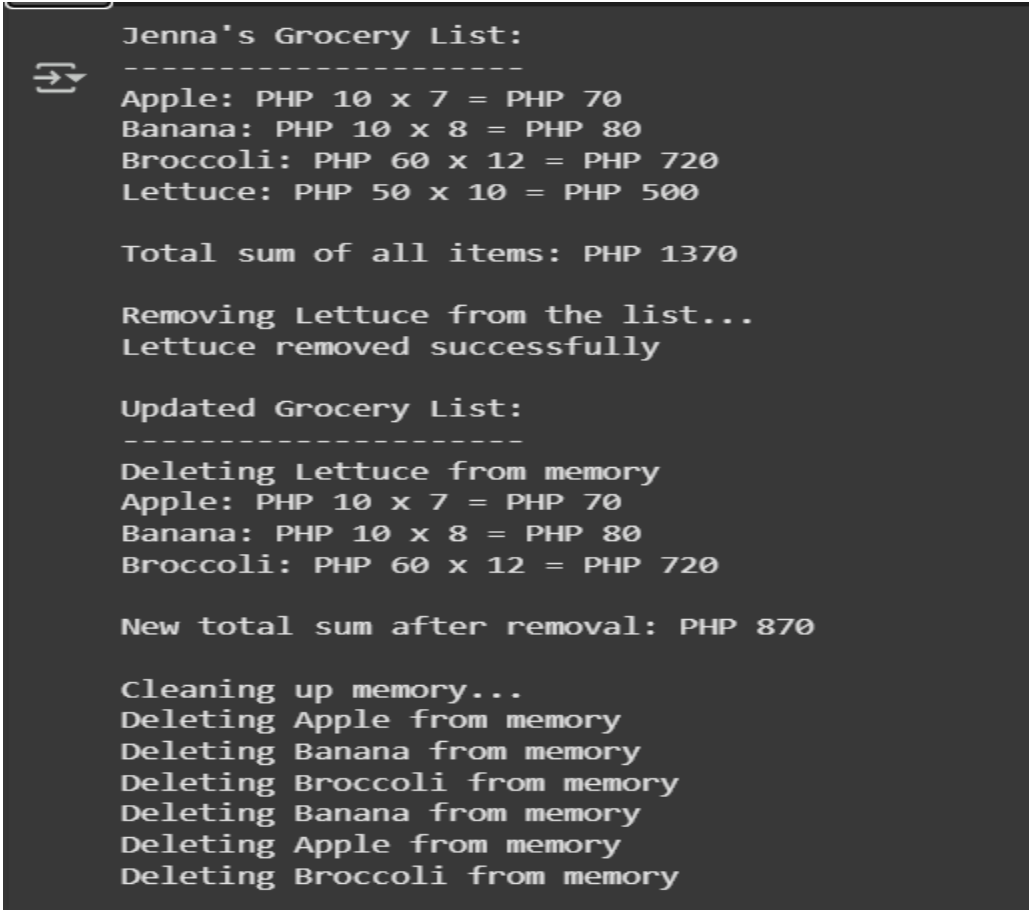


Figure 1 Screenshot of program

If an image is taken from another literature or intellectual property, please cite them accordingly in the caption. Always keep in mind the Honor Code [1] of our course to prevent failure due to academic dishonesty.

IV. Conclusion

This Python program successfully manages Jenna's grocery list using arrays (lists) and object-oriented principles. It calculates totals, removes items, and demonstrates basic memory management concepts. The solution is simple, efficient, and easy to understand, making it ideal for learning data structures and algorithms in Python.

References

- [1] Co Arthur O.. “University of Caloocan City Computer Engineering Department Honor Code,” UCC-CpE Departmental Policies, 2020.’
- [2] Busbee, K. L., & Braunschweig, D. (2018, December 15). *Arrays and lists*. Programming Fundamentals. <https://press.rebus.community/programmingfundamentals/chapter/arrays-and-lists/>