UNIVERSITY OF CALOOCAN CITY
COMPUTER ENGINEERING DEPARTMENT

Data Structure and Algorithm

Laboratory Activity No. 5

Implementation of Arrays

Submitted by:
Adoracion, Jerick Dave D.

Instructor:
Engr. Maria Rizette H. Sayo

August 22, 2025

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.

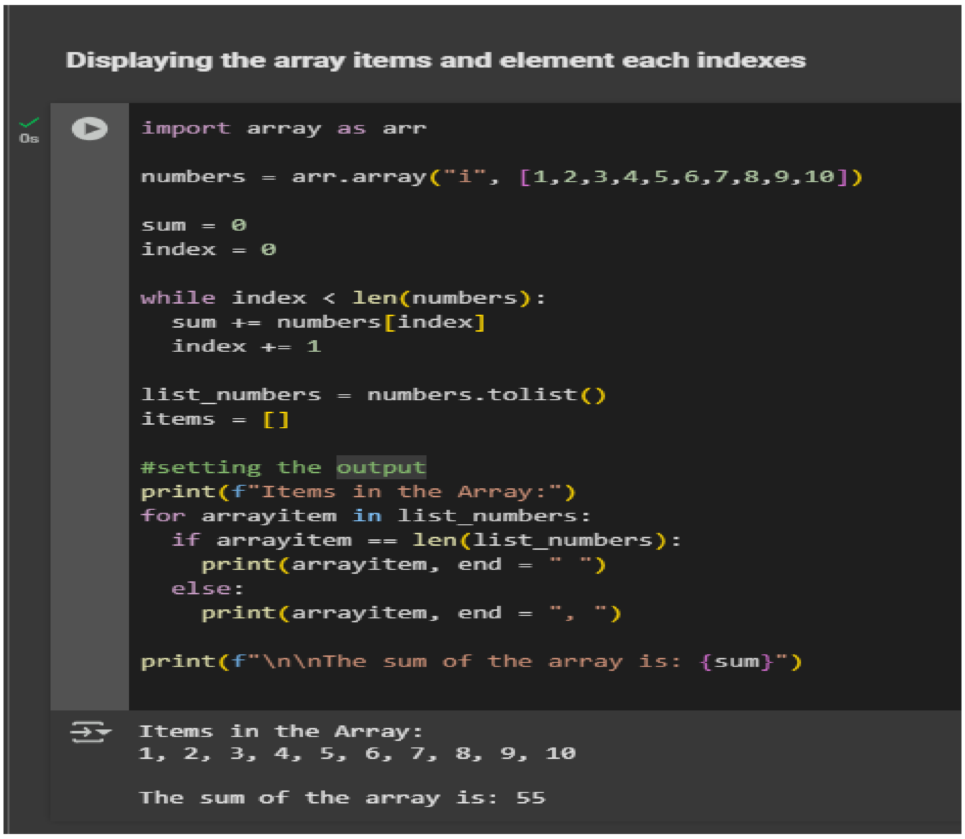
This laboratory activity aims to implement the principles and techniques in:

- Writing algorithms using Array data structure
- Writing a python program that can implement Array data structure

II. Methods

- Write a Python program to create an array of 10 integers and display the array items. Access individual elements through indexes and compute for the sum.
- Write a Python program to append a new item to the end of the array. Original array: numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
- Write a Python program to insert a new item before the second element in an existing array. Original array: numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
- Write a Python program to reverse the order of the items in the array. Original array: numbers = [5, 4, 3, 2, 1]
- Write a Python program to get the length of the array. Original array: numbers = [5, 4, 3, 2, 1]

III. Results



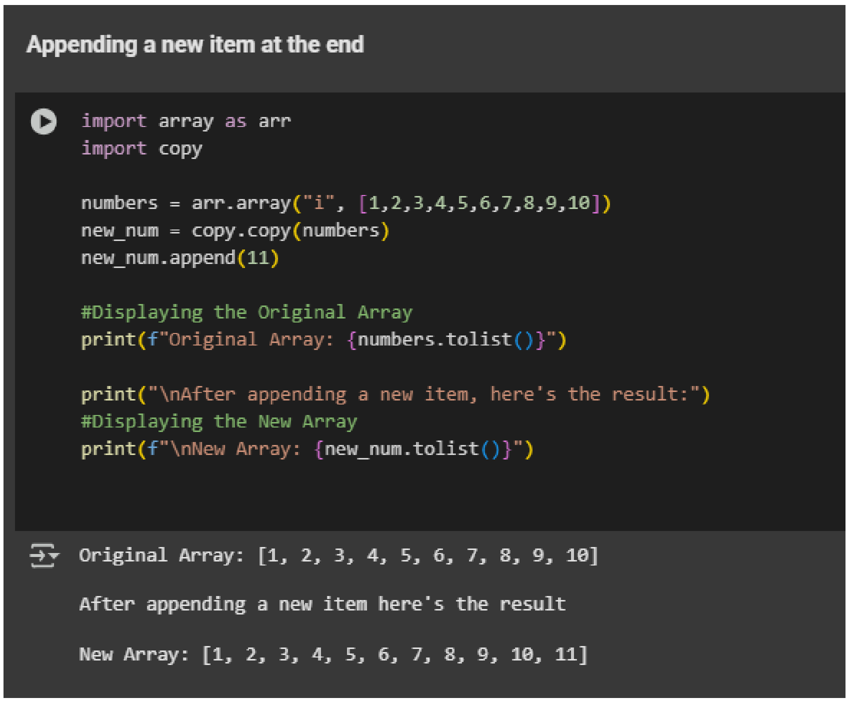
Displaying the array items and element each indexes

```
import array as arr

numbers = arr.array("i", [1,2,3,4,5,6,7,8,9,10])

sum = 0
index = 0

while index < len(numbers):
  sum += numbers[index]
  index += 1

list_numbers = numbers.tolist()
items = []

#setting the output
print(f"Items in the Array:")
for arrayitem in list_numbers:
  if arrayitem == len(list_numbers):
    print(arrayitem, end = " ")
  else:
    print(arrayitem, end = ", ")

print(f"\n\nThe sum of the array is: {sum}")
```

```
Items in the Array:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10

The sum of the array is: 55
```

Figure 1: 1st problem Source Code

I solved this problem by displaying it and accessing individual elements to compute the sum through looping the array to get the sum and get a new variable that stores the array so we can access each item and display.



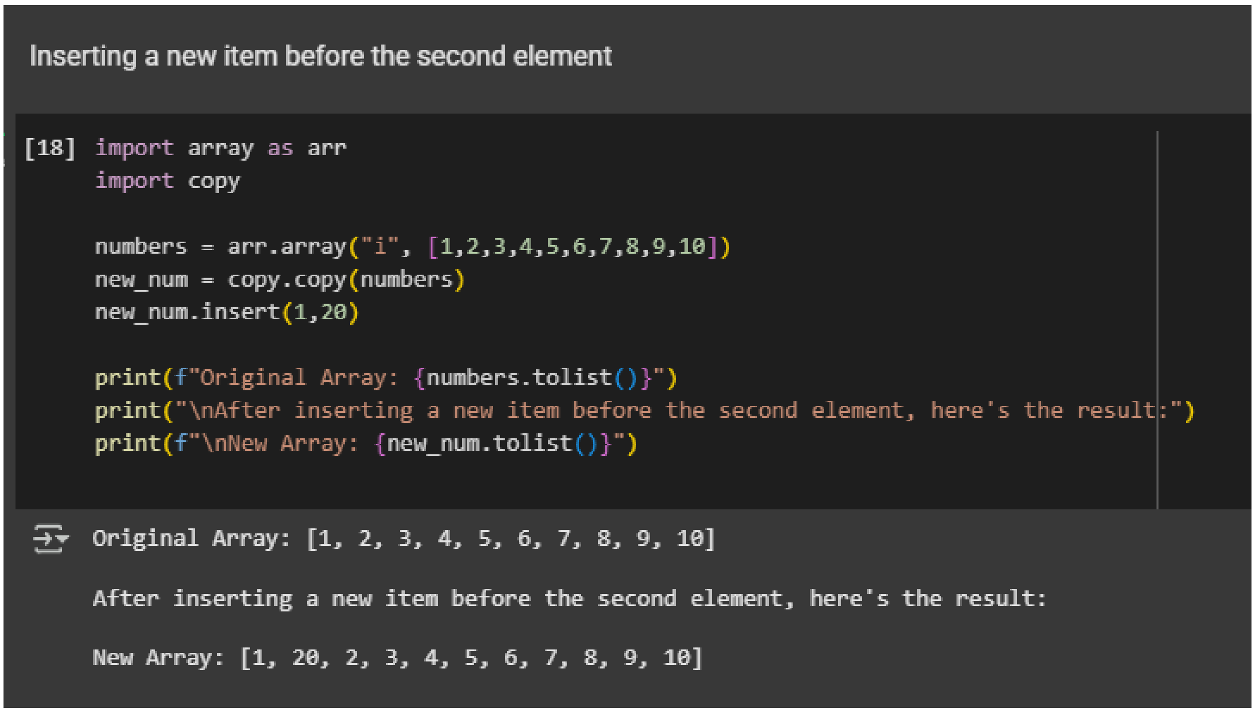
Appending a new item at the end

```
import array as arr
import copy

numbers = arr.array("i", [1,2,3,4,5,6,7,8,9,10])
new_num = copy.copy(numbers)
new_num.append(11)

#Displaying the Original Array
print(f"Original Array: {numbers.tolist()}")

print("\nAfter appending a new item, here's the result:")
#Displaying the New Array
print(f"\nNew Array: {new_num.tolist()}")
```

```
Original Array: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

After appending a new item here's the result

New Array: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
```

Figure 2: 2nd Problem Source Code

I solved this problem by adding an append function which is to add a new item at the end of the array, displaying the Original Array, and New Array now containing the appended item.



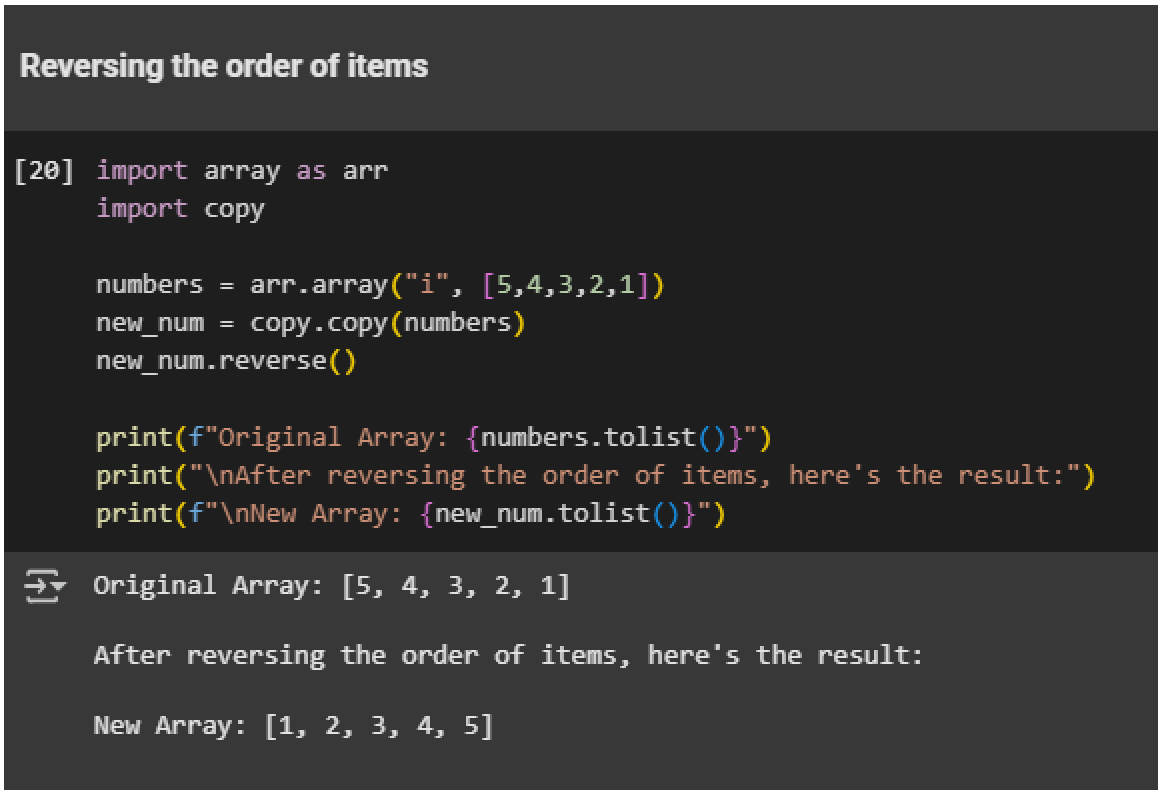
Inserting a new item before the second element

```
[18] import array as arr
     import copy

     numbers = arr.array("i", [1,2,3,4,5,6,7,8,9,10])
     new_num = copy.copy(numbers)
     new_num.insert(1,20)

     print(f"Original Array: {numbers.tolist()}")
     print("\nAfter inserting a new item before the second element, here's the result:")
     print(f"\nNew Array: {new_num.tolist()}")
```

```
Original Array: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

After inserting a new item before the second element, here's the result:

New Array: [1, 20, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

Figure 3: 3rd Problem Source Code

I solved this problem by inserting a new item (20) before the second element. Same ass the other function displaying the Original Array, and New Array now containing the inserted item.



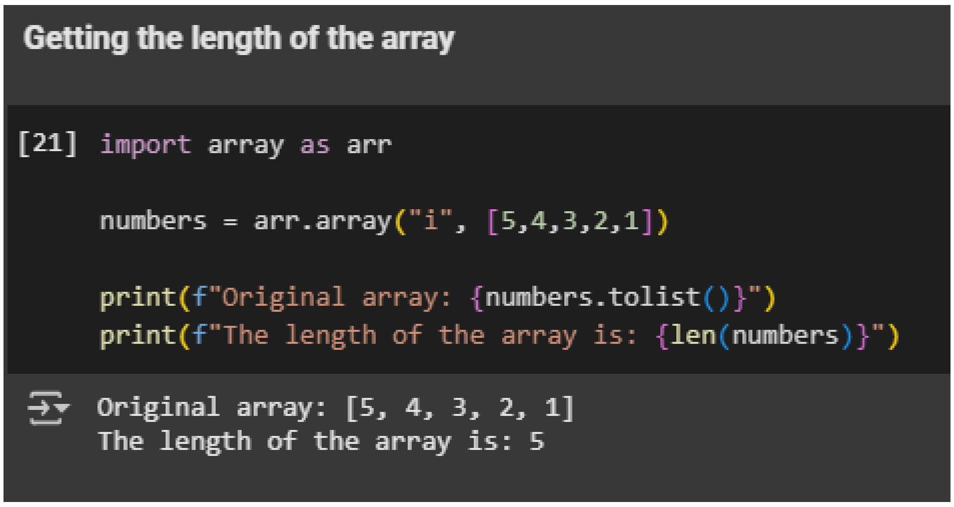
Reversing the order of items

```
[20] import array as arr
     import copy

     numbers = arr.array("i", [5,4,3,2,1])
     new_num = copy.copy(numbers)
     new_num.reverse()

     print(f"Original Array: {numbers.tolist()}")
     print("\nAfter reversing the order of items, here's the result:")
     print(f"\nNew Array: {new_num.tolist()}")
```

```
Original Array: [5, 4, 3, 2, 1]

After reversing the order of items, here's the result:

New Array: [1, 2, 3, 4, 5]
```

Figure 4: 4th Problem Source Code

This problem's item must be in an ascending order. So, to do that, I used a reverse function displaying the functions in an ascending order.



Getting the length of the array

```
[21] import array as arr

     numbers = arr.array("i", [5,4,3,2,1])

     print(f"Original array: {numbers.tolist()}")
     print(f"The length of the array is: {len(numbers)}")
```

```
Original array: [5, 4, 3, 2, 1]
The length of the array is: 5
```

Figure 5: 5th Problem Source Code

In this problem, we are tasked to get the length of the array. So, to do that, I used a len function displaying that the array: [5, 4, 3, 2, 1] has 5 elements.

IV. Conclusion

As a student, this laboratory activity allowed me to clearly understand the importance of arrays in programming. Through hands-on implementation in Python, I was able to practice fundamental operations such as accessing elements, appending, inserting, reversing, and finding the length of arrays. These exercises not only strengthened my logical thinking but also improved my coding efficiency. Overall, this activity enhanced my knowledge of data structures, which is essential for solving more complex problems in computer engineering.

References

[1] A. O. Co, "University of Caloocan City Computer Engineering Department Honor Code," *UCC-CpE Departmental Policies*, 2020.

[2] T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, *Introduction to Algorithms*, 3rd ed. Cambridge, MA: MIT Press, 2009.

[3] G. Brassard and P. Bratley, *Fundamentals of Algorithmics*. Englewood Cliffs, NJ: Prentice Hall, 1996.

[4] J. Zelle, *Python Programming: An Introduction to Computer Science*, 3rd ed. Franklin, Beedle & Associates Inc., 2016.

[5] M. Lutz, *Learning Python*, 5th ed. Sebastopol, CA: O'Reilly Media, 2013.