UNIVERSITY OF CALOOCAN CITY
COMPUTER ENGINEERING DEPARTMENT

Data Structure and Algorithm

Laboratory Activity No. 5

Implementation of 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
- Writing a python program that can implement Array data structure

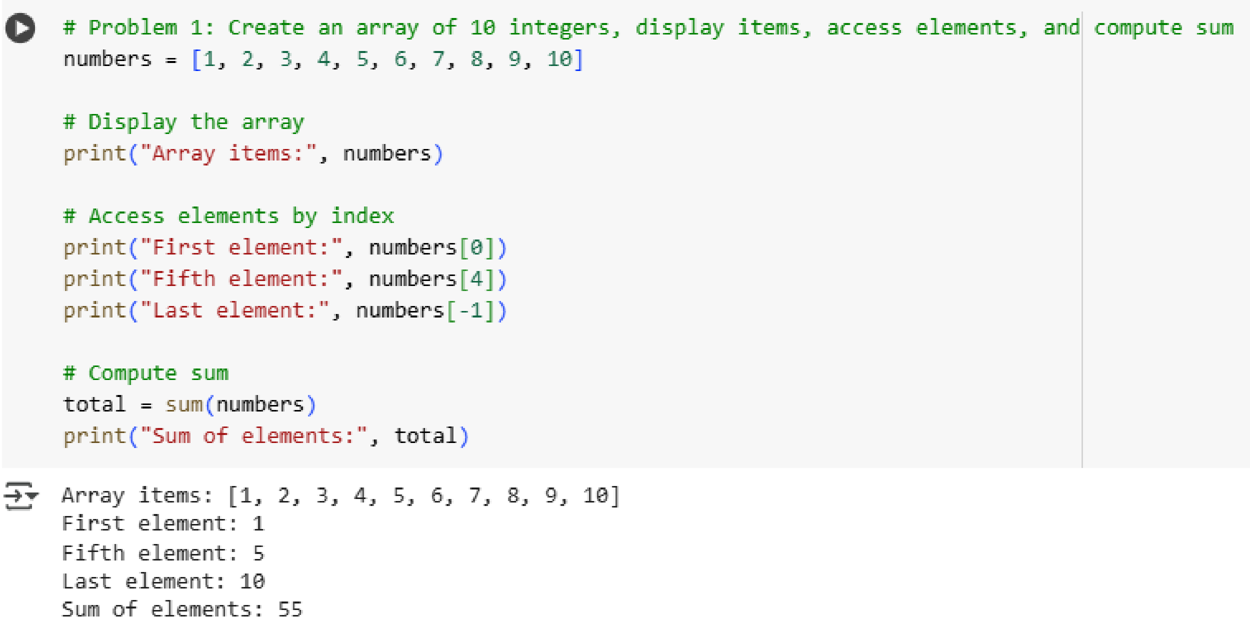
II. Methods

- 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

In this laboratory, several Python programs were created to demonstrate implementing Array data structure. An array is a data structure that stores elements of the same type in a sequence. The elements are kept in continuous memory locations, making it a linear structure. Because of this, an array is also called a linear and homogeneous data structure.S



```
# Problem 1: Create an array of 10 integers, display items, access elements, and compute sum
numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

# Display the array
print("Array items:", numbers)

# Access elements by index
print("First element:", numbers[0])
print("Fifth element:", numbers[4])
print("Last element:", numbers[-1])

# Compute sum
total = sum(numbers)
print("Sum of elements:", total)
```

```
Array items: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
First element: 1
Fifth element: 5
Last element: 10
Sum of elements: 55
```

Figure 1 Screenshot of 1st program

A program that generates an array containing ten integers and shows each of its items is shown in Figure 1. Additionally, it demonstrates how to use each item's index to retrieve it before computing the array's total sum of all the numbers.

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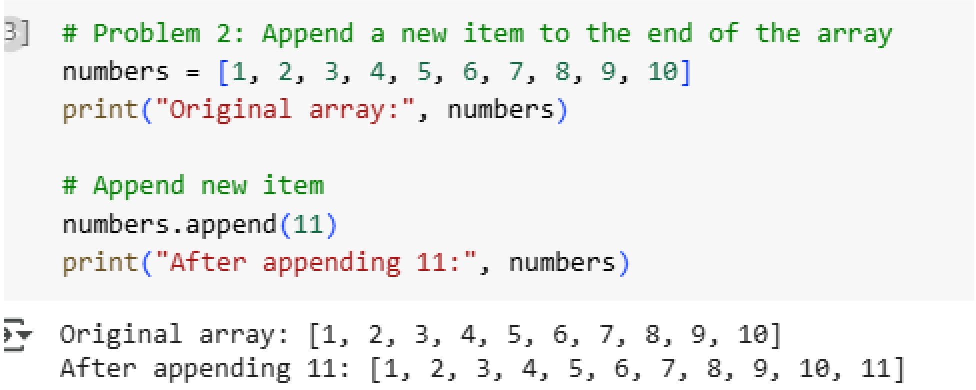

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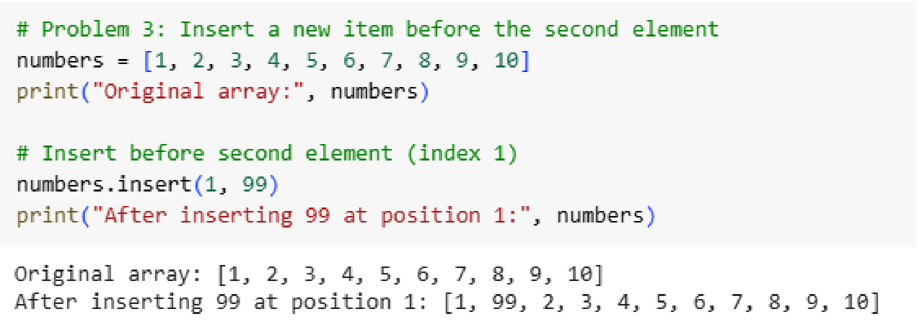
3] # Problem 2: Append a new item to the end of the array
numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
print("Original array:", numbers)

# Append new item
numbers.append(11)
print("After appending 11:", numbers)
```

```
Original array: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
After appending 11: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]
```

Figure 2 Screenshot of 2nd program

A program that appends a new item to the end of the array is depicted in Figure 2. This illustrates how to add more elements to an array using Python's append function.



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# Problem 3: Insert a new item before the second element
numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
print("Original array:", numbers)

# Insert before second element (index 1)
numbers.insert(1, 99)
print("After inserting 99 at position 1:", numbers)
```

```
Original array: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
After inserting 99 at position 1: [1, 99, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

Figure 3 Screenshot of 3rd program

The software adds a new item before the second element in the old array, as seen in Figure 3. This demonstrates how to add elements at a precise location, rather than merely at the end, using array indexing.

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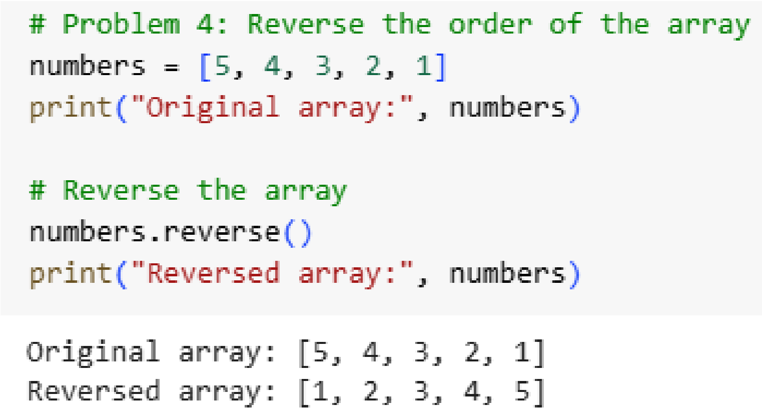


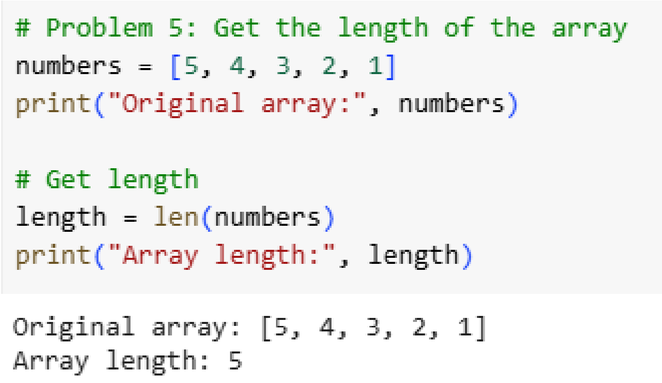
```
# Problem 4: Reverse the order of the array
numbers = [5, 4, 3, 2, 1]
print("Original array:", numbers)

# Reverse the array
numbers.reverse()
print("Reversed array:", numbers)
```

```
Original array: [5, 4, 3, 2, 1]
Reversed array: [1, 2, 3, 4, 5]
```

Figure 4 Screenshot of 4th program

A program that flips the array's item order is depicted in Figure 4. This demonstrates how easy Python can reorder elements so that the last becomes the first and the first becomes the last.



```
# Problem 5: Get the length of the array
numbers = [5, 4, 3, 2, 1]
print("Original array:", numbers)

# Get length
length = len(numbers)
print("Array length:", length)
```

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

Figure 5 Screenshot of 5th program

The program in Figure 5 determines and shows the array's length. This demonstrates how to count the total number of entries in an array using a built-in Python function.

IV. Conclusion

In summary, the exercises demonstrated various approaches to array implementation in Python. Arrays were constructed, elements were accessed, sums were calculated, new items were added, elements were placed at certain locations, the order was reversed, and the array's length was determined. These exercises taught us the fundamental functions that make arrays a crucial data structure for effectively managing and storing data.

References

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