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

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.

```
[68] 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 = []

     print(f"Items in the Array:")
     for arritem in list_numbers:
       if arritem == len(list_numbers):
         print(arritem, end = " ")
       else:
         print(arritem, 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: First Problem Source Code

The problem asked me to write a program that creates an array of 10 integers, displays it and accesses individual elements to compute the sum. I imported the array module and named it as arr for less confusion and I used the typecode “i” for the array of variable numbers. I looped the array to get the sum and created a new variable that stores the array so that I could access each item to display it.

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]

```
[88] 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)

     print(f"Original Array: {numbers.tolist()}")
     print(f"\nNew Array: {new_num.tolist()}")
```

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

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

Figure 2: Second Problem Source Code

The problem asked me to write a program that appends new items at the end of the array. I imported array as ar for less confusion and also imported copy module so that I could create a new array and copy the original to show the difference on the output. I used the append function to add a new item at the end of the array.

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]

```
[89] 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(1,100)

     print(f"Original Array: {numbers.tolist()}")
     print(f"\nNew Array: {new_num.tolist()}")
```

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

New Array: [1, 100, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

Figure 3: Third Problem Source Code

The problem asked me to write a program that instead of appending at the end of the list, I would insert a new item before the second element in the existing array. I did the same approach as the previous problem but instead of the append function I used insert function and named the index 1 and the new item 100.

Write a Python program to reverse the order of the items in the array. Original array: numbers = [5, 4, 3, 2, 1]

```
[90] 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(f"\nNew Array: {new_num.tolist()}")
```

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

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

Figure 4: Fourth Problem Source Code

The problem asked me to write a program to reverse the order of the items in the array. The numbers in the array are all in descending order so when I use the reverse function on the array I get the output in ascending order.

Write a Python program to get the length of the array. Original array: numbers = [5, 4, 3, 2, 1]

```
[95] 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: Fifth Problem Source Code

The problem asked me to write a program that gets the length of the array. I used the len function to get the length of the array and as intended it shows that the array has 5 elements.

IV. Conclusion

This laboratory activity gives me an insight about arrays. I specifically used an array module and named it as arr so that I could avoid the confusion of array.array. I learned how to set up an array and the typecodes. In finding the length of the array I saw the itemsize function on the array module and I implemented it first but I saw that it gave me that the length of the array is 4 instead of 5. I then knew that the itemsize function returns the size of the array in bytes based on the typecodes which in this case is “i”. I also learned to append, insert, reverse and increment to get the sum of the integers in the array. To display the output, on the first problem I converted it to a list using the tolist() function in the array module so that I could loop it smoothly and I used a separator so that when I do the for loop it will be on the same line.

References

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

[2] GeeksforGeeks. (2025, July 23). *Python Access Array item*. GeeksforGeeks. https://www.geeksforgeeks.org/python/python-access-array-item/

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