Hacker Devils Easy Section

February 12th, 2025

Meeting Agenda

- Announcements
- Introduction
- Problems

Attendance:



Announcements

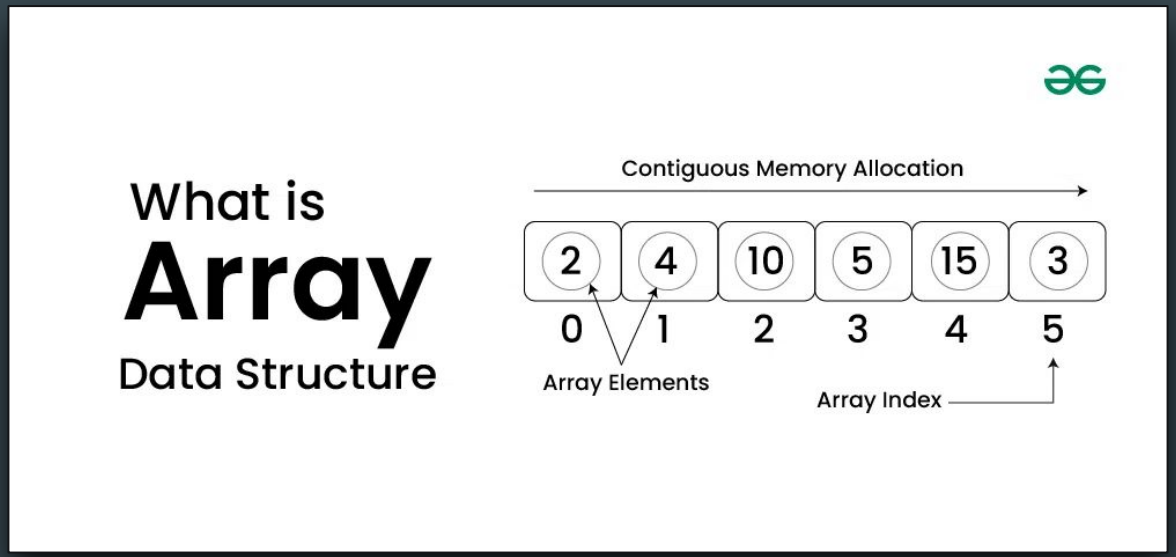
- SODA Code-A-Thon on **March 1st**
- March Code-A-Thon on March 22nd
- Leetcode Premium - Resources Tab
- Join the discord!



Arrays

What is an array?

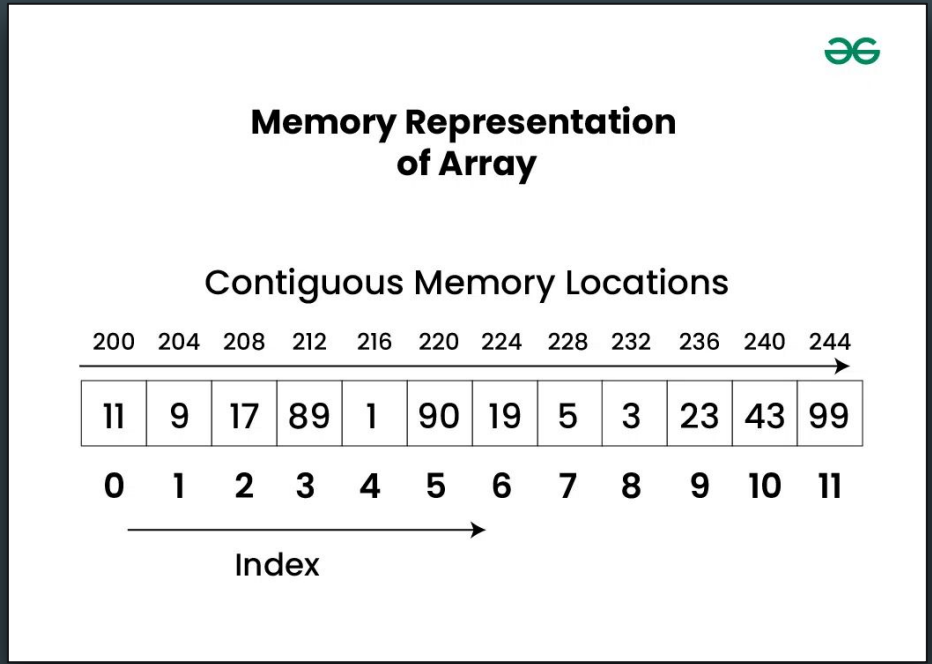
An array is a linear data structure where all elements are arranged sequentially. It is a collection of elements of same data type stored at contiguous memory locations.



Arrays

An array can consist of anything, not just ints - doubles, floats, booleans, Strings, Objects, burgers, etc.

[🍔, 🍔, 🍔, 🍔, 🍔]



Array Implementation in Java

```java
class Main {
    public static void main(String[] args) {
        int[] arr = {1,2,3,4,5}; // Curly Braces
        int n = arr.length;
        // Normal "dumb" for loop
        for (int i = 0; i < n; i++) {
            System.out.print(arr[i]);
        }
        // Enhanced "awesome" For Loop
        for (int i: arr) {
            System.out.print(i);
        }
    }
}
```

ArrayLists in Java

In Java, ArrayList can change in size. Arrays cannot.

```java
import java.util.ArrayList;
class Main {
    public static void main(String[] args) {
        ArrayList<Integer> arr = new ArrayList<>();
        arr.add(1);
        arr.add(2);
        arr.add(3);
        arr.add(4);
        arr.add(5);
        int n = arr.size();
        // Normal "dumb" for loop
        for (int i = 0; i < n; i++) {
            System.out.print(arr.get(i));
        }
        // Enhanced "awesome" For Loop
        for (int i: arr) {
            System.out.print(i);
        }
    }
}
```

Array Implementation in Python

```
arr = [1,2,3,4,5]

# Silly normal for loop
for i in range(0, len(arr)):
    print(arr[i])

# Silly for loop is useful tho
for i in range(0, len(arr), 2):
    print(arr[i])

# Awesome for loop
for i in arr: # <- Pretty awesome
    print(i)
```

There are times when you want to use the “silly” for loop, for example if you want to print out every other element.

Warm-Up Example

Given an array of integers, find the sum of its elements.

For example, if the array $ar = [1, 2, 3]$, $1 + 2 + 3 = 6$, so return 6.

Function Description

Complete the $simpleArraySum$ function with the following parameter(s):

- $ar[n]$: an array of integers

Returns

- int: the sum of the array elements

Input Format

The first line contains an integer, n, denoting the size of the array.

The second line contains n space-separated integers representing the array's elements.

Constraints

$0 < n, ar[i] \leq 1000$

Simple Array Sum | HackerRank

Warm-Up Solution (Java)

```java
public static int simpleArraySum(List<Integer> ar) {
    int sum = 0;
    for (int i = 0; i < ar.size(); i++) {
        sum += ar.get(i);
    }
    return sum;
}
```

```java
public static int simpleArraySum(List<Integer> ar) {
    int sum = 0;
    for (int i: ar) sum += i;
    return sum;
}
```

Warm-Up Solution (Python)

```python
def simpleArraySum(ar):
    sum = 0
    for i in range(0, len(ar)):
        sum += ar[i]
    return sum
```

```python
def simpleArraySum(ar):
    sum = 0
    for i in ar:
        sum += i
    return sum
```

```python
def simpleArraySum(ar):
    return sum(ar)
```

Problem 1

Birthday Cake Candles | HackerRank

You are in charge of the cake for a child's birthday. It will have one candle for each year of their total age. They will only be able to blow out the tallest of the candles. Your task is to count how many candles are the tallest.

Example

$candles = [4, 4, 1, 3]$

The tallest candles are `4` units high. There are `2` candles with this height, so the function should return `2`.

Function Description

Complete the function $birthdayCakeCandles$ with the following parameter(s):

- $int\ candles[n]$: the candle heights

Returns

- int: the number of candles that are tallest

Input Format

The first line contains a single integer, n, the size of $candles[]$.

The second line contains n space-separated integers, where each integer i describes the height of $candles[i]$.

3 Test Cases

[5, 1, 3, 5, 4, 5]
[2, 3, 1, 4, 3, 2]
[1, 4, 5, 3, 2, 6]

Problem 1 Solution (Java)

```java
public static int birthdayCakeCandles(List<Integer> candles) {
    int max = 1;
    for (int i: candles) {
        max = Math.max(max, i);
    }
    int countMax = 0;
    for (int i: candles) {
        if (i == max) countMax++;
    }
    return countMax;

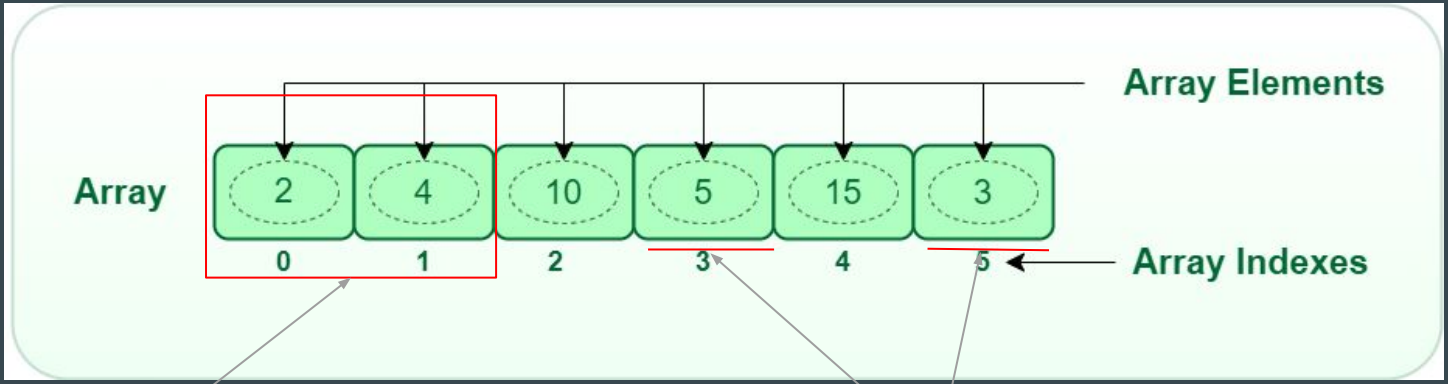
}
```

Problem 1 Solution (Python)

```python
def birthdayCakeCandles(candles):
    tallest = 1
    count = 0;
    for i in candles:
        tallest = max(i, tallest)
    for i in candles:
        if tallest == i:
            count+=1
    return count
```

```python
def birthdayCakeCandles(candles):
    return candles.count(max(candles))
```

Problem 2 Explanation: What is a sub-array



This is a sub-array

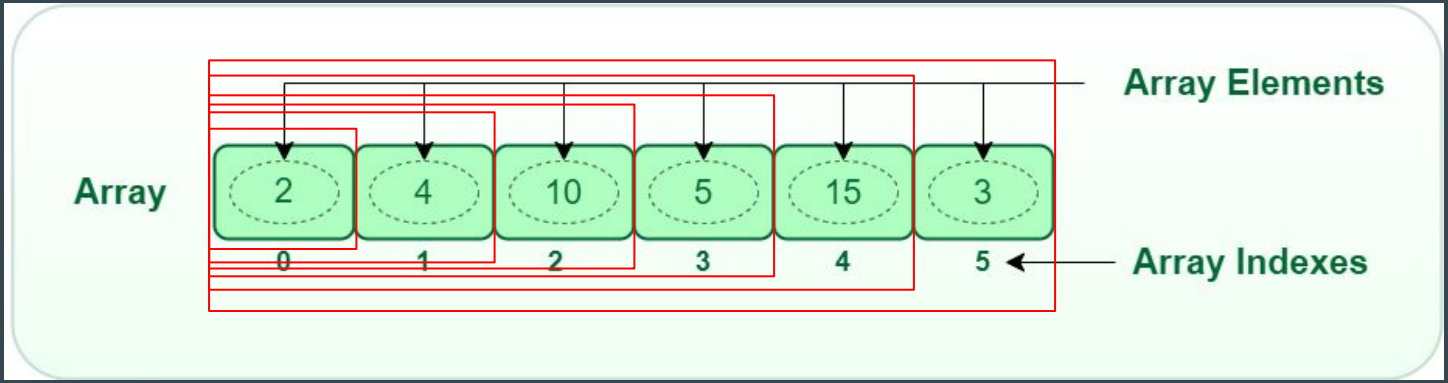
This is NOT a sub-array

Bear in mind that a sub-array has to be a **contiguous** part of a larger array

Problem 2 Explanation: Setting up the program

- First, we need to get the inputs:
- Declare a variable for the array <length>, then initialize it using input from the console.
- Using a simple for loop, iterate for <length> times, and populate the array using inputs from the console.
- Since we need to obtain a sum and check if it is negative, we have to declare and initialize a variable <sum> = 0.
- And since we need to obtain the **count** of negative-sum sub-arrays, we need to declare and initialize a variable <count> = 0.

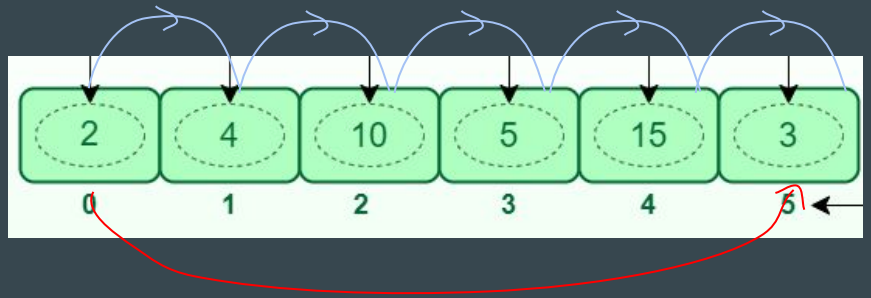
Problem 2 Solution Explanation: Let's focus on obtaining the sum first



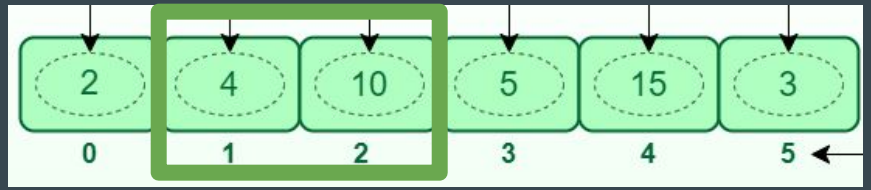
What if we declared several separate arrays for each sub-array and obtained their sums?

It is too inefficient and unnecessary. There are countless combinations.

Problem 2 Explanation



What if we iterated over all the elements with an outer loop, then for each element we got the sum for the sub-array starting at that element with an inner loop?



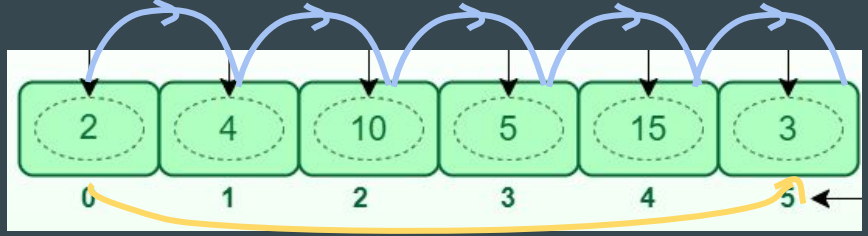
But what about the sub-arrays in the middle?

Problem 2 Explanation

We need a way to check the sum of all the combinations of contiguous elements in the array.

Ps. We don’t need to declare new arrays, we just need to get the sums.. Any ideas?

Problem 2 Explanation: The Algorithm



An outer loop will be used to iterate over the array:

For each element in the array (let the current index be <i>):

Set <sum> to be zero

Start an inner loop with the index starting at <i> (let this index be <j>):

Add each element to the <sum>

After adding each element to <sum> , check if <sum> is less than 0:

If it's less than 0, increment <count>

Increment <j> to go to the next element in the inner loop

Increment <i> to go to the next element in the outer loop

Display the count

Problem 2

Java Subarray | HackerRank

This problem requires knowledge of arrays and algorithms. It might be challenging at first, but think about it. Do not limit yourself, and think outside the box!

The problem requires a function that returns the number of sub-arrays, whose sum is a negative number, in a given array.

Problem 2: Program Code

```java
public class Solution {

    public static void main(String[] args) {
        Scanner in = new Scanner(System.in);
        int length = in.nextInt();
        int sum;
        int count = 0;
        int[] arr = new int[length];
        for (int i = 0; i < length; i++){
            arr[i] = in.nextInt();
        }

        int i = 0;
        int j;
        for (i = 0; i < arr.length; i++){
            sum = 0;
            for (j = i; j < arr.length; j++){
                sum += arr[j];
                if (sum < 0){
                    count++;
                }
            }
        }


        in.close();
        System.out.println(count);
    }
}
```

```python
def solution():
    arr = []
    count = 0
    sum = 0
    length = int(input("Enter the length of the array: "))
    for i in range(length):
        arr.append(int(input("Enter a number: ")))

    for i in range(length):
        sum = 0
        for j in range(i, length):
            sum += arr[j]
            if sum < 0:
                count += 1
    print(count)

solution()
```

Problem-Solving

- How many ways can you solve a coding problem?
- Some solutions are simpler than others
  - They might also be harder to discover
- Think about how every problem works before writing out your solution