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Test Name:	**TeamApt Back-End Developer Hiring Test**
Taken On:	29 Sep 2022 05:23:03 CDT
Time Taken:	40 min 32 sec/ 90 min
Work Experience:	> 5 years
Invited by:	Perpetual
Invited on:	27 Sep 2022 11:51:51 CDT
Skills Score:	Problem Solving (Basic) 50/50 REST API (Intermediate) 63/75 SQL (Intermediate) 75/75
Tags Score:	Aggregation 75/75 Algorithms 65/65 Binary Search 5/5 Binary Trees 0/5 C 5/5 C++ 5/5 Core CS 25/30 Data Structures 60/65 Databases 75/75 Dynamic Programming 50/50 Easy 75/80 Interviewer Guidelines 125/125 Java 5/5 Lists 5/5 Medium 138/150 Problem Solving 50/50 REST API 63/75 SQL 75/75 Simple Joins 75/75 Sub-queries 75/75 Trees 5/10

92.6%

213/230

scored in **TeamApt Back-End Developer Hiring Test** in 40 min 32 sec on 29 Sep 2022 05:23:03 CDT

Candidate Feedback: Auto import feature should be added, like if I right URL then it should ask weather to import Java.net or not. It will help us te decrease time

Recruiter/Team Comments:

No Comments.

Plagiarism flagged

We have marked questions with suspected plagiarism below. Please review.

	Question Description	Time Taken	Score	Status
Q1	Balanced Array › Coding	56 sec	50/ 50	
Q2	Goals Scored by Countries › DbRank	16 min 44 sec	75/ 75	
Q3	REST API: Discounted Price › Coding	19 min 4 sec	63/ 75	
Q4	Count Leaves in a 3-ary Tree › Multiple Choice	25 sec	5/ 5	
Q5	XOR Linked List › Multiple Choice	14 sec	5/ 5	
Q6	Nodes in a Binary Tree › Multiple Choice	22 sec	0/ 5	
Q7	Binary Search › Multiple Choice	8 sec	5/ 5	
Q8	Meaning of Space Complexity › Multiple Choice	13 sec	5/ 5	
Q9	How Many Comparisons in a Merge Sort? › Multiple Choice	21 sec	5/ 5	

QUESTION 1

Needs Review

Score 50

Balanced Array › Coding

Easy | Data Structures | Dynamic Programming | Algorithms | Problem Solving | Interviewer Guidelines

QUESTION DESCRIPTION

Given an array of numbers, find the index of the smallest array element (the *pivot*), for which the sums of all elements to the left and to the right are equal. The array may not be reordered.

Example

arr=[1,2,3,4,6]

- the sum of the first three elements, *1+2+3=6*. The value of the last element is *6*.
- Using zero based indexing, *arr[3]=4* is the pivot between the two subarrays.
- The index of the pivot is *3*.

Function Description

Complete the function *balancedSum* in the editor below.

balancedSum has the following parameter(s):

int *arr[n]:* an array of integers

Returns:

int: an integer representing the index of the pivot

Constraints

- $3 \le n \le 10^5$
- $1 \le arr[i] \le 2 \times 10^4$, where $0 \le i < n$
- It is guaranteed that a solution always exists.

▼ Input Format for Custom Testing

Input from stdin will be processed as follows and passed to the function.

The first line contains an integer *n*, the size of the array *arr*.
Each of the next *n* lines contains an integer, *arr[i]*, where $0 \leq i < n$.

▼ Sample Case 0

Sample Input 0

```
STDIN     Function Parameters
-----     -------------------
4      →  arr[] size n = 4
1      →  arr = [1, 2, 3, 3]
2
3
3
```

Sample Output 0

```
2
```

Explanation 0

- The sum of the first two elements, *1+2=3*. The value of the last element is 3.
- Using zero based indexing, *arr[2]=3* is the pivot between the two subarrays.
- The index of the pivot is *2*.

▼ Sample Case 1

Sample Input 1

```
STDIN     Function Parameters
-----     -------------------
3      →  arr[] size n = 3
1      →  arr = [1, 2, 1]
2
1
```

Sample Output 1

```
1
```

Explanation 1

- The first and last elements are equal to 1.
- Using zero based indexing, *arr[1]=2* is the pivot between the two subarrays.
- The index of the pivot is *1*.

INTERVIEWER GUIDELINES

▼ Hint 1

For each index, find the sum to its left and right and check if they are equal. This index which satisfies the condition will be distinct.

▼ Hint 2

Use prefix sum to calculate the sum till each index.

▼ Solution

Concepts Covered: Basic Programming Skills, Loops, Arrays, Problem Solving. The problem tests the candidate's ability to use loops and array handling. It requires the candidate to come up with an algorithm to find the pivot point where the sum of prefix and suffix till that point is equal in a constrained time and space complexity.

constrained time and space complexity.

Optimal Solution: Let's take the prefix sum of the array denoted by pf[ ]. pf[i] denotes the sum of all array elements in the range [0, i].
So for each index i, we just need to check if pf[i - 1] = tot_sum - pf[i], where tot_sum is the sum of all array elements in the array.
Time Complexity: O(N)

```
def balancedSum(arr):
    # Write your code here
    sum = 0
    pf = [0] * len(arr)
    # store the prefix sums for each index
    # while calculating the overall array sum
    for i in range(len(arr)):
        sum += arr[i]
        pf[i] = sum
    # pf[i-1] is the prefix sum up to the current index
    # sum - pf[i] is the sum of elements from the current index to the
end
    for i in range(1, len(arr)):
        if(pf[i - 1] == sum - pf[i]):
            return i
```

Brute Force Approach: For each index i, find the sum of all the element values in the range [1, i - 1] and the sum in the range [i + 1, n]. If both these sums are equal that point is the pivot.
Time Complexity: O(N^2)

Error Handling:
1. It's important to omit the index which is considered as the current pivot in the left sum and right sum. If you consider prefix sum, then pf[i - 1] should only be the left sum and not pf[i]. Similarly, (tot_sum - pf[i]) should be the right sum and not (tot_sum - pf[i - 1]).

▼ Complexity Analysis

Time Complexity - O(n).
Space Complexity - O(n) - The prefix sum array pf[]

▼ Follow up Question

How about if you are asked to optimize the space complexity?

Let pf_sum be the sum of all elements from [0, i] till any index i. Then the condition for any index i to be a pivot :
sum - pf_sum = pf_sum - arr[i]. (sum = total sum of arr)

Psuedo Code -

```
def balancedSum(arr):
    # Write your code here
    sum = 0
    for i in range(len(arr)):
        sum += arr[i]
    pf_sum = 0
    for i in range(0, len(arr)):
        pf_sum += arr[i]
        if(sum - pf_sum == pf_sum - arr[i]):
            return i
```

▼ Follow up Question

Let's suppose we can modify the array to check if each index i is a pivot or not

Let's suppose we can modify the array to check if each index i is a pivot or not.

The array can be modified as:

For an index i to be a pivot:

Increase the value of any element to the right and decrease the value of any element to the right of index i, or

Decrease the value of any element to the right and increase the value of any element to the right of index i.

This can be solved by just checking if (tot_sum - arr[i]) is divisible by 2.

Psuedo Code -

```
def balancedSum(arr):
    # Write your code here
    tot_sum = 0
    for i in range(len(arr)):
        tot_sum += arr[i]
    for i in range(1, len(arr) - 1):
        if((tot_sum - arr[i]) % 2 == 0):
            return i
```

CANDIDATE ANSWER

Language used: **Java 15**

```
class Result {

    /*
     * Complete the 'balancedSum' function below.
     *
     * The function is expected to return an INTEGER.
     * The function accepts INTEGER_ARRAY arr as parameter.
     */

    public static int balancedSum(List<Integer> arr) {
        int leftptr = 0;
        int rightptr = arr.size()-1;
        int left_sum = arr.get(leftptr);
        int right_sum = arr.get(rightptr);
        while(rightptr - leftptr != 2)
        {
           if(left_sum <= right_sum){
               leftptr++;
               left_sum = left_sum + arr.get(leftptr);
           }
           else{
               rightptr--;
               right_sum = right_sum + arr.get(rightptr);
           }
        }
        if(left_sum == right_sum)
           return (leftptr+1);
        else
           return -1;
    }

}


```

TESTCASE	DIFFICULTY	TYPE	STATUS	SCORE	TIME TAKEN	MEMORY USED
TestCase 0	Easy	Sample case	Success	1	0.0895 sec	32.8 KB
TestCase 1	Easy	Sample case	Success	1	0.0924 sec	32.5 KB
TestCase 2	Easy	Sample case	Success	4	0.0865 sec	32.3 KB
TestCase 3	Easy	Sample case	Success	4	0.1459 sec	44.8 KB
TestCase 4	Easy	Hidden case	Success	4	0.1798 sec	49.5 KB
TestCase 5	Easy	Hidden case	Success	3	0.1738 sec	52.1 KB
TestCase 6	Easy	Hidden case	Success	3	0.2321 sec	55.5 KB
TestCase 7	Easy	Hidden case	Success	5	0.2227 sec	55.1 KB
TestCase 8	Easy	Hidden case	Success	5	0.2477 sec	57 KB
TestCase 9	Easy	Hidden case	Success	5	0.249 sec	57.1 KB
TestCase 10	Easy	Hidden case	Success	5	0.2373 sec	62.2 KB
TestCase 11	Easy	Hidden case	Success	5	0.3163 sec	60.3 KB
TestCase 12	Easy	Hidden case	Success	5	0.3516 sec	61.5 KB

No Comments

QUESTION 2

Correct Answer

Score 75

Goals Scored by Countries › DbRank

Databases | Medium | Aggregation | Simple Joins | Sub-queries | Interviewer Guidelines | SQL

QUESTION DESCRIPTION

Given the database of a football tournament, sort the countries by the number of goals scored by that country, descending.

The number of goals scored by a country is the sum of the goals scored by its players.

If two or more countries have the same number of goals scored, order them ascending by *countries.id*.

The output should be in the format of: countries.name, goals scored

▼ Schema

You are provided 3 tables: *Players*, *Countries and Goals*.

Players

Name	Description
	the help

id	NTEGER	rimary key
name	STRING	the name of the player

Countries		
Name	Type	Description
id	INTEGER	the primary key
		the

name	STRING	name of the country

Goals		
Name	Type	Description
player_id	INTEGER	the primary key
cou	IN	the country to wh

player_id	The number of goals scored by the player in the tournament
player_name	The name of the player
position	The position of the player
team_id	The ID of the team the player belongs to
team_name	The name of the team the player belongs to
tournament_id	The ID of the tournament
tournament_name	The name of the tournament

name

▼ **Sample Data Tables**

Players	
id	name
1	Cristiano Ronaldo
2	Lionel Messi
3	Toni Kroos
	An

4	Andre Silva	
5	Kylian Mbappe	
6	Marco Reus	
7	Antoine Griezmann	
8	Paulo Dybala	
	T	

	imoWerner
9	

Countries	
id	name
1	Germany
2	Portugal
3	Argentina
4	France

Goals	
PlayerId	countGoals

player_id
126
236
315
423
547
613
748
834
913

Expected Output

France	15
Germany	11
Argentina	10
Portugal	9

INTERVIEWER GUIDELINES

▼ Solution

Aggregate goals per country as table alias *r.* Join *r* with the *countries* table to get country names.

MySQL solution

```
SELECT c.name,
       r.goals1
FROM (SELECT country_id,
             SUM(goals) AS goals1
      FROM goals
      GROUP BY country_id) AS r
JOIN countries AS c
ON r.country_id = c.id
ORDER BY r.goals1 DESC,
         c.id
```

CANDIDATE ANSWER

Language used: **MySQL**

```
1 /*
2 Enter your query below.
3 Please append a semicolon ";" at the end of the query
4 */
```

```
5 Select c.name as countriesName, sum(g.goals) as goalsScored from Countries c
  inner join Goals g on c.id=g.country_id group by c.name, c.id order by
  goalsScored desc, c.id asc;
```

Time taken: **0.03 sec**

No Comments

QUESTION 3

Correct Answer

Score 63

REST API: Discounted Price › Coding REST API Medium

QUESTION DESCRIPTION

Given a *barcode*, query the API at https://jsonmock.hackerrank.com/api/inventory?barcode=*barcode* and return the item's discounted price.

The response is a JSON object with 5 fields. The essential field is *data*:

- *data*: Either an empty array or an array with a single object that contains the item's record.
- In the *data* array, the item has the following schema:
  - *barcode* - the barcode for the product (String)
  - *price* - the gross selling price (Number)
  - *discount*: the discount percent to apply (Number).
  - Some fields that are not of interest.

page, per_page, total, total_pages, etc. are not required for this task.

If the barcode is found, the *data* array contains exactly 1 element. If not, it is empty and the function should return '*-1*'.

An example of the product record from https://jsonmock.hackerrank.com/api/inventory?barcode=74001755 is:

```
{
 "barcode": "74001755",
 "item": "Ball Gown",
 "category": "Full Body Outfits",
 "price": 785,
 "discount": 7,
 "available": 1
}
```

Use the "discount" and the "price" properties to calculate the discounted price rounded to the nearest integer.

```
discountedPrice = price - ((discount / 100) * price)
```

Function Description

Complete the *getDiscountedPrice* function in the editor.

getDiscountedPrice has the following parameters:

string barcode: the item to query

Returns

int: the discounted price rounded to the nearest integer or *-1*

Constraints

- There will be either 1 or 0 records in *data*.

▼ Input Format For Custom Testing

In the first and only line, there is a barcode.

▼ Sample Case 0

Sample Input For Custom Testing

```
74002314
```

Sample Output

```
2964
```

Explanation

First, a call is made to API https://jsonmock.hackerrank.com/api/inventory?barcode=74002314. The *price = 3705* and *discount = 20*.

▼ Sample Case 1

Sample Input For Custom Testing

```
74005364
```

Sample Output

```
-1
```

Explanation

An API call is made to https://jsonmock.hackerrank.com/api/inventory?barcode=74005364. The *data* field contains an empty array, so the item was not found.

CANDIDATE ANSWER

Language used: **Java 8**

```
import java.net.*;
import com.google.gson.Gson;
import com.google.gson.JsonArray;
import com.google.gson.JsonElement;
import com.google.gson.JsonObject;

class Result {

    private static final String URL =
"https://jsonmock.hackerrank.com/api/inventory?barcode=";

    /*
     * Complete the 'getDiscountedPrice' function below.
     *
     * The function is expected to return an INTEGER.
     * The function accepts INTEGER barcode as parameter.
     * API URL: https://jsonmock.hackerrank.com/api/inventory?barcode=
<barcode>
     */

    public static int getDiscountedPrice(int barcode) throws IOException {
        URL obj = new URL(URL + barcode);

        HttpURLConnection con = (HttpURLConnection) obj.openConnection();
        con.setRequestMethod("GET");
```

```
        BufferedReader in = new BufferedReader(new
InputStreamReader(con.getInputStream()));

        String response;
        while ((response = in.readLine()) != null) {
            JsonObject jsonResponse = new Gson().fromJson(response,
JsonObject.class);

            JsonArray data = jsonResponse.getAsJsonArray("data");

            for (JsonElement e : data) {
                String discount =
e.getAsJsonObject().get("discount").getAsString();
                String price =
e.getAsJsonObject().get("price").getAsString();
                Integer discountP = Math.round((Float.valueOf(price) *
Float.valueOf(discount)) / 100f);
                Integer discountedPrice = Integer.valueOf(price) - discountP;
                return discountedPrice;
            }

        }
        return -1;
    }

}
```

TESTCASE	DIFFICULTY	TYPE	STATUS	SCORE	TIME TAKEN	MEMORY USED
Testcase 0	Easy	Sample case	Success	1	0.8347 sec	56.2 KB
Testcase 1	Easy	Sample case	Success	1	0.8534 sec	56.2 KB
Testcase 2	Easy	Sample case	Success	1	0.7712 sec	57 KB
Testcase 3	Easy	Hidden case	Wrong Answer	0	0.694 sec	57 KB
Testcase 4	Easy	Hidden case	Success	12	0.8632 sec	57.8 KB
Testcase 5	Easy	Hidden case	Success	12	0.7275 sec	57.1 KB
Testcase 6	Easy	Hidden case	Success	18	0.8556 sec	56 KB
Testcase 7	Easy	Hidden case	Success	18	0.9964 sec	57.2 KB

No Comments

QUESTION 4

Correct Answer

Score 5

Count Leaves in a 3-ary Tree › Multiple Choice

Easy | Data Structures | Trees | Core CS

QUESTION DESCRIPTION

A 3-ary tree is a tree in which every internal node has exactly 3 children. How many leaf nodes are there in a 3-ary tree with 6 internal nodes?

CANDIDATE ANSWER

Options: (Expected answer indicated with a tick)

- 10
- 23
- 17
- ✓ 13

No Comments

QUESTION 5

Correct Answer

Score 5

XOR Linked List › Multiple Choice

Data Structures | Lists | Easy | C | C++ | Java | Core CS

QUESTION DESCRIPTION

The functionality provided by a **XOR Linked list** is similar to that of:

CANDIDATE ANSWER

Options: (Expected answer indicated with a tick)

- A Singly Linked List
- ✓ A Doubly Linked List
- A Circular Linked List
- A combined stack-cum-queue data structure

No Comments

QUESTION 6

Wrong Answer

Score 0

Nodes in a Binary Tree › Multiple Choice

Easy | Trees | Binary Trees | Data Structures | Core CS

QUESTION DESCRIPTION

Given a full binary tree with n internal nodes, how many leaf nodes does it have?

CANDIDATE ANSWER

Options: (Expected answer indicated with a tick)

- ✓ n + 1
- 2n + 1
- n -1
- n^2

No Comments

QUESTION 7

Correct Answer

Score 5

Binary Search › Multiple Choice

Binary Search | Easy | Algorithms | Core CS

QUESTION DESCRIPTION

The following code should perform a binary search. Select the true statement about the snippet.

```
1  int binarySearch(int arr[], int l, int r, int x)
2  {
3      if (r >= l) {
4          int mid = l + (r - l) / 2;
5          if (arr[mid] == x)
6              return mid;
7          if (arr[mid] > x)
8              return binarySearch(arr, l, mid + 1, x);
9
10         return binarySearch(arr, mid +1, r, x);
11     }
12     return -1;
13 }
```

INTERVIEWER GUIDELINES

Suppose the size of the array 'arr' is 2 and at the first index 'x' is not present in 'arr'. This is one of the situations in which this code will execute an infinite number of times.

Instead of (mid + 1) in line 8, there should be (mid - 1).

CANDIDATE ANSWER

Options: (Expected answer indicated with a tick)

- ( ) There is an error in line 4.
- (✓) There is an error in line 8.
- ( ) There is an error in line 10.
- ( ) The code is correct.

No Comments

QUESTION 8

Correct Answer

Score 5

Meaning of Space Complexity › Multiple Choice Easy Algorithms Core CS

QUESTION DESCRIPTION

Space complexity refers to

CANDIDATE ANSWER

Options: (Expected answer indicated with a tick)

- [x] Memory required by an algorithm to run to completion
- [ ] Complexities involved in space mission trasmission
- [ ] Complexities of a 3D graphics creation
- [ ] None of the above

No Comments

QUESTION 9

Correct Answer

Score 5

How Many Comparisons in a Merge Sort? › Multiple Choice Easy Algorithms Core CS

QUESTION DESCRIPTION

How many comparisons are required to merge two sorted lists of sizes m and n into a single sorted list of size $m+n$?

CANDIDATE ANSWER

Options: (Expected answer indicated with a tick)

- [ ] O(m)
- [ ] O(n)
- [x] O(m+n)
- [ ] O(logm +logn)

No Comments