Experiment-1.3

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Subject Name: DAA
Subject Code: 23CSH-301

1. **Aim:** Code to find frequency of elements in a given array in O(n) time complexity.

2. **Objective:** To find frequency of elements in a given array in O(n) time complexity.

3. **Input/Apparatus Used:** In this program, HashMap concept is used in order to get less complexity.

4. **Procedure/Algorithm: Pseudocode:**

Algorithm to find the frequency of each element of an array :
- Input the number of elements of an array.
- Input the array elements.
- Create another array to store the frequency of elements.
- Traverse the input array and update the count of the elements in the frequency array.
- Print the frequency array which displays the frequency of all the elements of the array.

Algorithm to find the frequency of each element of an array using hashing
- Input the number of elements of the array.
- Input the array elements.
- Create a hash table and update the element in one column and its frequency in the other column.
- Print the element along with its frequency.

Algorithm :

1. Create an extra space of size n (hm), use it as a HashMap.
2. Traverse the array from start to end.
3. For every element update hm[array[i]-1], i.e. hm[array[i]-1]++
4. Run a loop from 0 to n and print hm[array[i]-1] along with the index i

Sample Input:

1). arr[] = {10, 20, 20, 10, 10, 20, 5, 20}
2). arr[] = {10, 20, 20}

Sample Output:

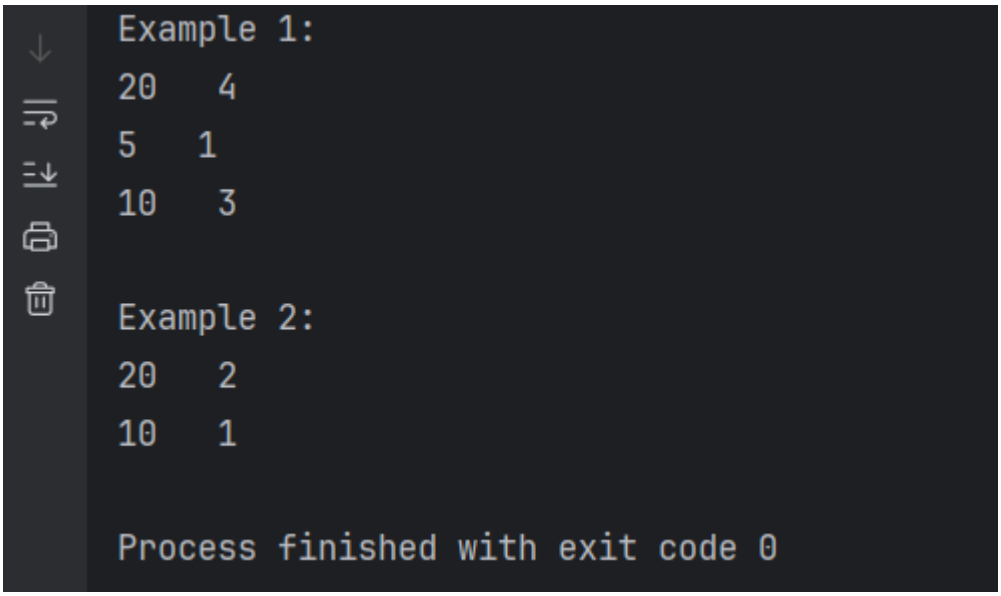
1). 10 3
20 4
5 1

2). 10 1
20 2

5. Code:

```java
import java.util.HashMap;
import java.util.Map;

class FrequencyCounter {

    static void countFrequency(int arr[]) {  2 usages
        HashMap<Integer, Integer> freqMap = new HashMap<>();

        for (int num : arr) {
            freqMap.put(num, freqMap.getOrDefault(num, defaultValue: 0) + 1);
        }

        for (Map.Entry<Integer, Integer> entry : freqMap.entrySet()) {
            System.out.println(entry.getKey() + "    " + entry.getValue());
        }
    }


    public static void main(String[] args) {
        int arr1[] = {10, 20, 20, 10, 10, 20, 5, 20};
        int arr2[] = {10, 20, 20};

        System.out.println("Example 1:");
        countFrequency(arr1);

        System.out.println("\nExample 2:");
        countFrequency(arr2);
    }
}
```

6. Output:


Example 1:
20 4
5 1
10 3
Example 2:
20 2
10 1
Process finished with exit code 0