Experiment 1.3

Aim: *Evaluate the complexity of the developed program to find frequency ofelements in a given array. (Using hash maps)*

Objectives: *To understand the concept of Hash maps and Arrays.*

Input/Apparatus Used: *VS CODE*

Procedure/Algorithm:

1. *Define a function named findFrequency that takes an array (arr[]) and its size (n)as parameters.*
    - *Create an unordered_map named mp to store element frequencies.*
2. *Iterate through the array using a loop with index i ranging from 0 to n-1:*
    - *Increment the frequency of arr[i] in the mp map.*
3. *Iterate through the elements in the mp map:*
    - *Print the element and its corresponding frequency.*
4. *End of the findFrequency function.*
5. *In the main function:*
    - *Declare an integer array named arr and initialize it with elements.*
    - *Calculate the size of the array (n) using sizeof(arr) / sizeof(arr[0]).*
    - *Call the findFrequency function with arr[] and n as arguments.*
6. *End of the program.*

Code:

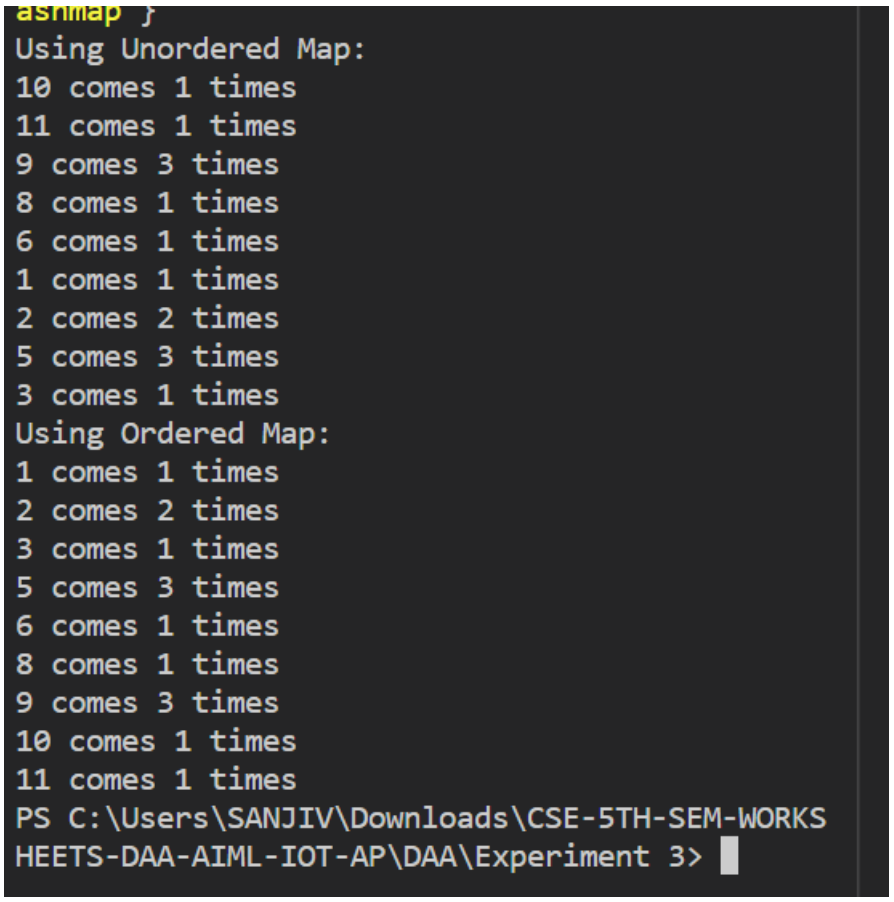
```
#include <bits/stdc++.h>
using namespace std;
void findFrequency(int arr[], int n)
{
unordered_map<int, int> mp;
  for (int i = 0; i < n; i++) {
     mp[arr[i]]++;
  }
  for (auto i : mp) {
    cout <<i.first << " comes "<< i.second << " times" << endl;
    }
}
void findFrequencyOrdered(int arr[], int n)
{
  map<int, int> mp;
  for (int i = 0; i < n; i++) {
     mp[arr[i]]++;
  }
  for (auto i : mp) {
    cout <<i.first << " comes "<< i.second << " times" << endl;
    }
}

int main(){
  int arr[] = { 1, 2, 5, 2, 3, 6, 5, 5, 8, 9, 11, 9, 9, 10 };
  int n = sizeof(arr) / sizeof(arr[0]);
  cout<<"Using Unordered Map:"<<endl;
  findFrequency(arr, n);

  cout<<"Using Ordered Map:"<<endl;
```

```
    findFrequencyOrdered(arr, n);
    return 0;
}
```

Observations/Outcome :



Time Complexity: O(1)