**Experiment 1.3**

**Aim*:*** *Evaluate the complexity of the developed program to find frequency of elements 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)