Experiment 3

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Subject Name: DAA Lab   **Subject Code:** 20CSP-312

1.Aim/Overview of the practical:

Counting frequencies of array elements

2.Task to be done/ Which logistics used:

In this program, we need to count the occurrence of each unique element present in the array. One of the approach to resolve this problem is to maintain one array to store the counts of each element of the array. Loop through the array and count the occurrence of each element and store it in another array fr.
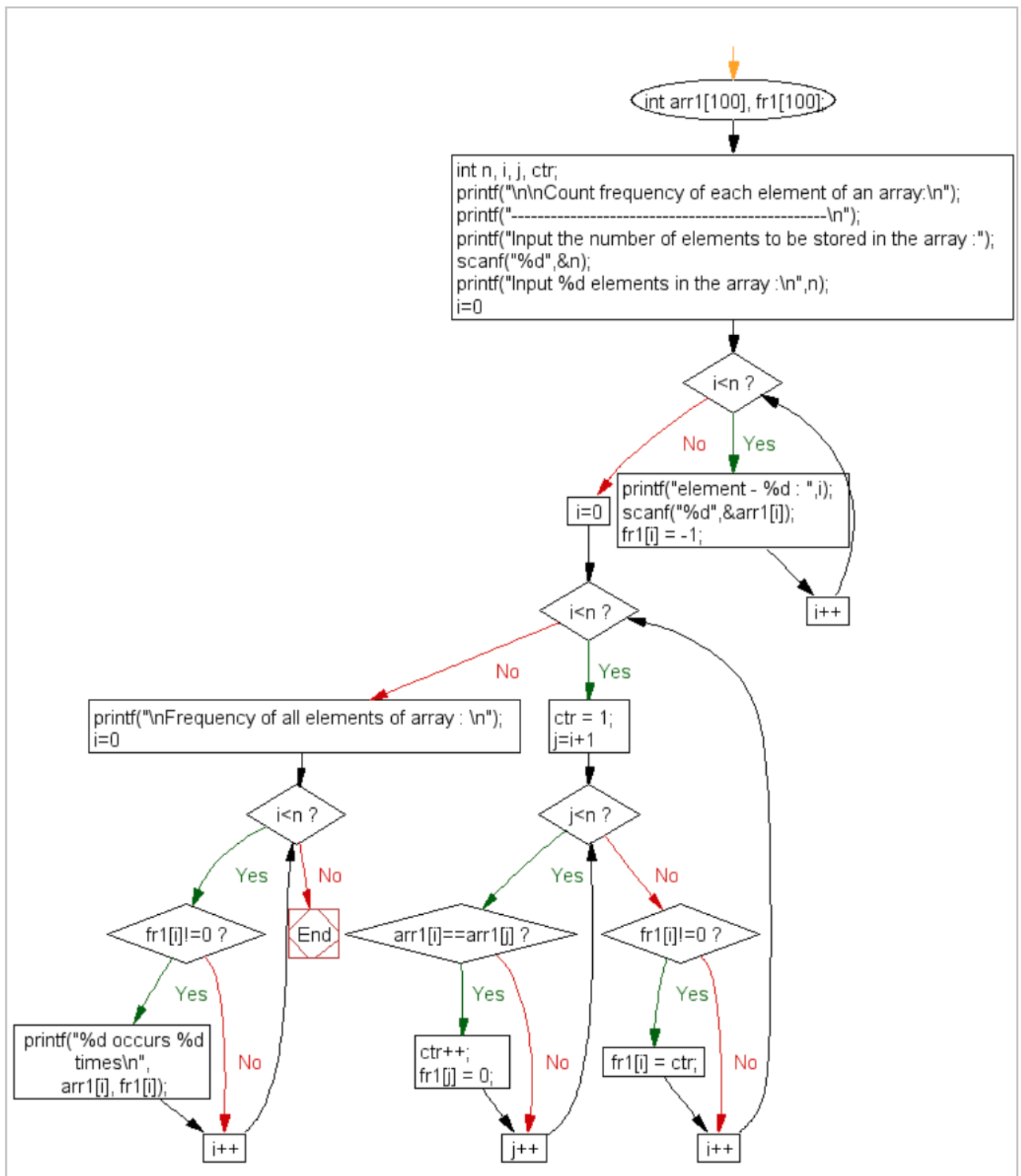Simple Method
Hashing Method

3.Algorithm/Flowchart (For programming based labs)

Algorithm to find the frequency of each ele 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.

Flowchart

int arr1[100], fr1[100];

```
int n, i, j, ctr;
printf("\n\nCount frequency of each element of an array:\n");
printf("--------------------------------------------\n");
printf("Input the number of elements to be stored in the array :");
scanf("%d",&n);
printf("Input %d elements in the array :\n",n);
i=0
```

i<n ?

No → i=0

Yes ↓

```
printf("element - %d : ",i);
scanf("%d",&arr1[i]);
fr1[i] = -1;
```

i++

i<n ?

No →
```
printf("\nFrequency of all elements of array : \n");
i=0
```

Yes →
```
ctr = 1;
j=i+1
```

i<n ?

Yes → fr1[i]!=0 ?

No → End

j<n ?

Yes → arr1[i]==arr1[j] ?

No → fr1[i]!=0 ?

fr1[i]!=0 ?
Yes →
```
printf("%d occurs %d
times\n",
arr1[i], fr1[i]);
```
No → i++

arr1[i]==arr1[j] ?
Yes →
```
ctr++;
fr1[j] = 0;
```
No → j++

fr1[i]!=0 ?
Yes → fr1[i] = ctr;
No → i++

i++

j++

i++

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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.

4.Steps for experiment/practical/Code:

Simple

```c
#include <stdio.h>

void main()
{
    int arr1[100], fr1[100];
    int n, i, j, ctr;


        printf("\n\nCount frequency of each element of an array:\n");
        printf("-------------------------------------------------\n");

        printf("Input the number of elements to be stored in the array :");
        scanf("%d",&n);

        printf("Input %d elements in the array :\n",n);
        for(i=0;i<n;i++)
           {
        printf("element - %d : ",i);
        scanf("%d",&arr1[i]);
      fr1[i] = -1;
        }
      for(i=0; i<n; i++)
```

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```c
{
    ctr = 1;
    for(j=i+1; j<n; j++)
    {
        if(arr1[i]==arr1[j])
        {
            ctr++;
            fr1[j] = 0;
        }
    }

    if(fr1[i]!=0)
    {
        fr1[i] = ctr;
    }
}
printf("\nThe frequency of all elements of array : \n");
for(i=0; i<n; i++)
{
    if(fr1[i]!=0)
    {
        printf("%d occurs %d times\n", arr1[i], fr1[i]);
    }
}
}
```

Using Hashing

```cpp
#include<iostream>

using namespace std;

int ElementInArr(int arr[],int n, int x)

{

int count = 0;
```

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```cpp
for(int i = 0; i<n; i++){

if(arr[i] == x)

count++;

}

return count;

}

int main ()

{

int arr[] = {1,2,3,4,3,1,4,2,4,1,3};

int n = sizeof(arr)/sizeof(arr[0]);

int x;

cout<<"Enter The Element :";

cin>>x;

cout << "Frequency of " << x << " in the array is: " << ElementInArr(arr, n, x);

}
```

5. Observations/Discussions/ Complexity Analysis:
Simple Method
Time Complexity: $O(n^2)$
Auxiliary Space: $O(n)$

Hashing Method
Time Complexity: $O(n)$
Auxiliary Space: $O(n)$

6. Result/Output/Writing Summary:

```
Count frequency of each element of an array:
-------------------------------------------------
Input the number of elements to be stored in the array :5
Input 5 elements in the array :
element - 0 : 4
element - 1 : 5
element - 2 : 5
element - 3 : 6
element - 4 : 3

The frequency of all elements of array :
4 occurs 1 times
5 occurs 2 times
6 occurs 1 times
3 occurs 1 times


...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter The Element :5
Frequency of 5 in the array is: 0

...Program finished with exit code 0
Press ENTER to exit console.
```

Learning outcomes (What I have learnt):

1.Learn simple method for count the frequncies of array elements.
2.Learn about the complexities.
3.Learn Hashing method.

Evaluation Grid (To be created as per the SOP and Assessment guidelines by the faculty):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.			
2.			
3.			