**EXPERIMENT-8:**

**TITLE: SORTING IN LINEAR TIME LOWER BOUNDS**

1. **Write a program to perform count sort**

**Code:**

#include<stdio.h>

int main()

{

int count[10],i,n,j,A[10];

for(i=0;i<10;i++)

{

count[i]=0;

}

printf("Enter number of elements you want (less than 10): ");

scanf("%d",&n);

int B[n];

for(i=0;i<n;i++)

{

scanf("%d",&B[i]);

}

for(i=0;i<n;i++)

{

j=B[i];

count[j]++;

}

////////////////////////

printf("Index Count\n");

for(i=0;i<10;i++)

{

printf("%d\t%d\n",i,count[i]);

}

int sumcount[10],counter=0;

for(i=0;i<10;i++)

{

counter=count[i]+counter;

sumcount[i]=counter;

}

printf("Index Count\n");

for(i=0;i<10;i++)

{

printf("%d\t%d\n",i,sumcount[i]);

}

for(i=0;i<10;i++)

{

A[i]=0;

}

for(i=0;i<10;i++)

{

j=sumcount[i];

while(count[i]--)

{

A[j]=i;

//count[i]--;

j--;

}

}

printf("Sorted Array is:\n");

for(i=1;i<n+1;i++)

{

printf("%d\t",A[i]);

}

return 0;

}

1. **Write a program to perform radix sort**

**Code:**

#include<iostream>

using namespace std;

// A Function to get the number with the maximum number in the array

int getMax(int arr[], int n)

{

int mx = arr[0];

for (int i = 1; i < n; i++)

if (arr[i] > mx)

mx = arr[i];

return mx;

}

void countSort(int arr[], int n, int exp)

{

int output[n]; // output array

int i,count[10];

for(i=0;i<10;i++)

{

count[i]=0;

}

for (i = 0; i < n; i++)

count[ (arr[i]/exp)%10 ]++;

for (i = 1; i < 10; i++)

count[i] += count[i - 1];

for (i = n - 1; i >= 0; i--)

{

output[count[ (arr[i]/exp)%10 ] - 1] = arr[i];

count[ (arr[i]/exp)%10 ]--;

}

for (i = 0; i < n; i++)

{

arr[i] = output[i];

}

}

void radixsort(int arr[], int n)

{

int m = getMax(arr, n);

for (int exp = 1; m/exp > 0; exp \*= 10)

{

countSort(arr, n, exp);

}

}

void print(int arr[], int n)

{

cout<<endl<<"Sorted array is: "<<endl;

for (int i=0;i<n;i++)

{

cout<<"The "<<i+1<<" element: "<<arr[i]<<endl;

}

}

int main()

{

int n,i;

printf("Code of Radix Sort\n");

printf("Enter the number of elements you want in the array to be sorted: ");

scanf("%d",&n);

int arr[n];

for(i=0;i<n;i++)

{

printf("Element %d: ",i+1);

scanf("%d",&arr[i]);

}

radixsort(arr, n); //Call to Radixsort function that performs the sort!!!

print(arr, n); //Call to the print function to print the sorted array

return 0;

}