

PROGRAM 8

Sort a given set of N integer elements using Merge Sort technique and compute its time taken. Run the program for different values of N and record the time taken to sort.

//Code

```
#include<iostream>
```

```
#include<ctime>
```

```
using namespace std;
```

```
void merge(int a[],int b[],int c[],int p,int q){
```

```
    int i=0,j=0,k=0;
```

```
    while(i<p && j<q){
```

```
        if(b[i]<c[j])
```

```
            a[k++]=b[i++];
```

```
        else
```

```
            a[k++]=c[j++];
```

```
    }
```

```
    if(i==p)
```

```
        for(int l=j;l<q;l++)
```

```
            a[k++]=c[l];
```

```
    else
```

```
        for(int l=i;l<p;l++)
```

```
            a[k++]=b[l];
```

```
}
```

```
void merge_sort(int a[],int n){
```

```
    if(n>1){
```

```
        int c[n/2],b[n/2];
```

```
        for(int i=0;i<n/2;i++)
```

```
            b[i]=a[i];
```

```
        for(int i=0,j=n/2;j<n;i++,j++)
```

```
            c[i]=a[j];
```

```
        merge_sort(b,n/2);
```

```
        merge_sort(c,n-n/2);
```

```

        merge(a,b,c,n/2,n-n/2);
    }
}

int main(){
    int n;
    cout<<" Enter n: ";
    cin>>n;
    int a[n];
    cout<<" Enter elements: ";
    for(int i=0;i<n;i++)
        cin>>a[i];
    clock_t start=clock();
    merge_sort(a,n);
    cout<<" Sorted: ";
    for(int i=0;i<n;i++)
        cout<<a[i]<<" ";
    cout<<endl<<" Time: "<<(clock()-start)<<" clock cycles "<<endl;
}

```

//Output

```

> clang++-7 -pthread -std=c++17 -o main main.cpp
> ./main
Enter n: 5
Enter elements:
23
45
14
2
89
Sorted: 2 14 23 45 89
Time: 44 clock cycles
> █

```