

//program to implement merge sort

#include<stdio.h>

#include<stdlib.h>

#include<time.h>

#include<math.h>

void mergesort(int a[],int n)

{

int b[100],c[100],p,j,i,q;

if(n>1)

{

p=0;

for(i=0; i<=floor(n/2)-1; i++)

{

b[p]=a[i];

p++;

}

q=0;

for(j=floor(n/2); j<=n-1; j++)

{

c[q]=a[j];

q++;

}

mergesort(b,p);

mergesort(c,q);

merge(b,c,a,p,q);

}

}

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

```
{
```

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

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

```
    {
```

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

```
        {
```

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

```
            i++;
```

```
        }
```

```
    else
```

```
    {
```

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

```
        j++;
```

```
    }
```

```
    k++;
```

```
}
```

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

```
{
```

```
    for(l=j; l<=q-1; l++)
```

```
    {
```

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

```
        k++;
```

```
    }
```

```
}
```

```
else
```

```
{
```

```
    for(l=i; l<=p-1; l++)
```

```
    {
```

```


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

}

int main()
{
    int n,a[20],i;
    clock_t start,end;
    double t;
    printf("ENTER THE LIMIT\n");
    scanf("%d",&n);
    printf("ENTER %d ELEMENTS\n",n);
    for(i=0; i<n; i++)
        scanf("%d",&a[i]);
    start=clock();
    mergesort(a,n);
    end=clock();
    printf("THE SORTED ARRAYS ARE \n");
    for(i=0; i<n; i++)
        printf("%d\t",a[i]);
    t=(double)(end-start)/CLOCKS_PER_SEC;
    printf("\nEXECUTION TIME : %f\n",t);
    return 0;
}

```

Output:

 "D:\Users\User\3D Objects\@SUB Access\Dock 1\2nd Yr\4th Sem\Lab\DAA\Programs\11_Merge sort\pgm\merge sort\bin\Debug\merge sort.exe"

```
ENTER THE LIMIT
6
ENTER 6 ELEMENTS
23 43 67 32 98 12
THE SORTED ARRAYS ARE
12      23      32      43      67      98
EXECUTION TIME : 0.000000

Process returned 0 (0x0)   execution time : 6.273 s
Press any key to continue.
```