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#include<stdio.h>

#include<sys/time.h>

#include<math.h>

void mergesort(int a[],int low,int high);

void merge(int a[],int low,int mid,int high);

main()

{

int a[100],n,i;

double t1,t2;

struct timeval tm;

printf("\n Enter the size of the array:");

scanf("%d",&n);

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

a[i]=rand()%100;

printf("The array elements are:");

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

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

gettimeofday(&tm,NULL);

t1=tm.tv_sec+tm.tv_usec/1000000.0;

mergesort(a,0,n-1);

gettimeofday(&tm,NULL);

t2=tm.tv_sec+tm.tv_usec/1000000.0;

mergesort(a,0,n-1);

printf("\n The sorted array is:");

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

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

printf("\n The Execution time is %lf",t2-t1);
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}

void mergesort(int a[],int low,int high)
{
    int mid;
    mid=(low+high)/2;
    if(low<high)
    {
        mergesort(a,low,mid);
        mergesort(a,mid+1,high);
        merge(a,low,mid,high);
    }
}

void merge(int a[],int low,int mid,int high)
{
    int i=low,j=mid+1,k=low,b[100];
    while(i<=mid && j<=high)
    {
        if(a[i]<a[j])
            b[k++]=a[i++];
        else
            b[k++]=a[j++];
    }

    while(i<=mid)
        b[k++]=a[i++];
    while(j<=high)
        b[k++]=a[j++];
}

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for(i=low;i<=high;i++)
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  a[i]=b[i];
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}
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