//Program_10

Design and implement C/C++ Program to sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of n> 5000 and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

```
#include<stdio.h>
#include<time.h>
#include<stdlib.h>
void quicksort(int a[],int low,int high);
int partition(int a[],int low,int high);
void swap(int*,int*);

void quicksort(int a[],int low,int high)
{
	if(low<high)
	{
		int pi = partition(a,low,high);
		quicksort(a,low,pi-1);
		quicksort(a,pi+1,high);
	}
}

void swap(int *a,int *b)
{
	int c=*a;
	*a=*b;
	*b=c;
}

int partition(int a[],int low,int high)
{

	int pivot=a[high];
	int i=low-1;
	for(int j=low;j<=high-1;j++)
	{
		if(a[j]<=pivot)
		{
			i++;
			swap(&a[i],&a[j]);
		}
	}
	swap(&a[i+1],&a[high]); return (i+1);
}

void main()
{
	srand(time(NULL));
```

```
	int a[100000],n=100000;
	int elements[n];
	for(int i=0;i<n;i++)
	{
		elements[i]=rand()%1000;
	}
	for(int size=5000;size<=n;size+=2000)
	{
		int arr[size];
		for(int i=0;i<size;i++)
		{
			arr[i]=elements[i];
		}
	clock_t start=clock();
	quicksort(a,0,size);
	clock_t end=clock();
	printf("Total time taken to sort %d elements is %lf\n",size,((double)(end-
start)/CLOCKS_PER_SEC));
	}


}
```

Output:

```
Total time taken to sort 5000 elements is 0.159233
Total time taken to sort 7000 elements is 0.311002
Total time taken to sort 9000 elements is 0.513555
Total time taken to sort 11000 elements is 0.768506
Total time taken to sort 13000 elements is 1.074325
Total time taken to sort 15000 elements is 1.427355
Total time taken to sort 17000 elements is 1.831501
Total time taken to sort 19000 elements is 2.292143
Total time taken to sort 21000 elements is 2.793515
Total time taken to sort 23000 elements is 3.349112
Total time taken to sort 25000 elements is 3.956382
Total time taken to sort 27000 elements is 4.614421
Total time taken to sort 29000 elements is 5.323305
Total time taken to sort 31000 elements is 6.082229
Total time taken to sort 33000 elements is 6.892491
Total time taken to sort 35000 elements is 7.752297
Total time taken to sort 37000 elements is 8.663079
Total time taken to sort 39000 elements is 9.623990
Total time taken to sort 41000 elements is 10.635663
Total time taken to sort 43000 elements is 11.698251
Total time taken to sort 45000 elements is 12.813103
Total time taken to sort 47000 elements is 13.975877
Total time taken to sort 49000 elements is 15.189443
Total time taken to sort 51000 elements is 16.454203
Total time taken to sort 53000 elements is 17.769678
Total time taken to sort 55000 elements is 19.135549
Total time taken to sort 57000 elements is 20.552507
Total time taken to sort 59000 elements is 22.021911
Total time taken to sort 61000 elements is 23.555847
Total time taken to sort 63000 elements is 25.106810
Total time taken to sort 65000 elements is 26.725805
```