EXPERIMENT NO:02

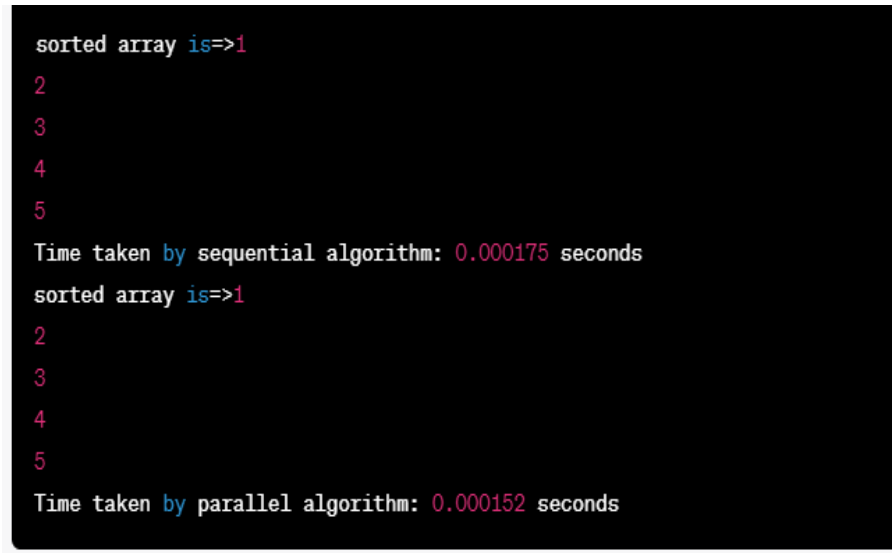
Name: Kshitija Sakhare
Class: BE(B2)
Roll No.: B212040

BUBBLE SORT:

```
#include<iostream>
#include<stdlib.h>
#include<omp.h>
using namespace std;

void bubble(int *, int);
void swap(int &, int &);
void bubble(int *a, int n)
{
    int swapped;
    for(  int i = 0; i < n;  i++ )
     {
        int first = i % 2;
        swapped=0;
        #pragma omp parallel for shared(a,first)
        for(  int j = first; j < n-1; j += 2 )
          {
           if( a[ j ]  >  a[ j+1 ]  )
            {
                  swap(  a[ j ],  a[ j+1 ]  );
                  swapped=1;
            }
             }
             if(swapped==0)
             break;
     }
}
void swap(int &a, int &b)
{

    int test;
    test=a;
    a=b;
    b=test;

}
int main()
{

    int *a,n;
    cout<<"\n enter total no of elements=>";
    cin>>n;
    a=new int[n];
```

```
    cout<<"\n enter elements=>";
    for(int i=0;i<n;i++)
{
        cin>>a[i];
    }
double start_time = omp_get_wtime(); // start timer for sequential algorithm
    bubble(a,n);
    double end_time = omp_get_wtime(); // end timer for sequential algorithm
 cout<<"\n sorted array is=>";
    for(int i=0;i<n;i++)
    {
        cout<<a[i]<<endl;
    }
 cout << "Time taken by sequential algorithm: " << end_time - start_time << " seconds" << endl;
start_time = omp_get_wtime(); // start timer for parallel algorithm
    bubble(a,n);
    end_time = omp_get_wtime(); // end timer for parallel algorithm
 cout<<"\n sorted array is=>";
    for(int i=0;i<n;i++)
    {
        cout<<a[i]<<endl;
    }
 cout << "Time taken by parallel algorithm: " << end_time - start_time << " seconds" << endl;
return 0;
}
```

OUTPUT:



MERGE SORT:

```
#include<iostream>
#include<stdlib.h>
#include<omp.h>
using namespace std;
void mergesort(int a[],int i,int j);
void merge(int a[],int i1,int j1,int i2,int j2);
void mergesort(int a[],int i,int j)
{
   int mid;
   if(i<j)
   {
      mid=(i+j)/2;
       #pragma omp parallel sections
      {
  #pragma omp section
         {
            mergesort(a,i,mid);
         }
         #pragma omp section
         {
            mergesort(a,mid+1,j);
         }
      }

   merge(a,i,mid,mid+1,j);
   }

}

void merge(int a[],int i1,int j1,int i2,int j2)
{
   int temp[1000];
   int i,j,k;
   i=i1;
   j=i2;
   k=0;
     while(i<=j1 && j<=j2)
   {
      if(a[i]<a[j])
      {
         temp[k++]=a[i++];
      }
      else
```

```
        {
            temp[k++]=a[j++];
                }
    }

    while(i<=j1)
    {
        temp[k++]=a[i++];
    }

    while(j<=j2)
    {
        temp[k++]=a[j++];
    }

    for(i=i1,j=0;i<=j2;i++,j++)
    {
        a[i]=temp[j];
    }
}


int main()
{
    int *a,n,i;
    double start_time, end_time, seq_time, par_time;

    cout<<"\n enter total no of elements=>";
    cin>>n;
    a= new int[n];

    cout<<"\n enter elements=>";
    for(i=0;i<n;i++)
    {
        cin>>a[i];
    }

    // Sequential algorithm
    start_time = omp_get_wtime();
    mergesort(a, 0, n-1);
    end_time = omp_get_wtime();
    seq_time = end_time - start_time;
    cout << "\nSequential Time: " << seq_time << endl;

    // Parallel algorithm
    start_time = omp_get_wtime();
```

```
    #pragma omp parallel
    {
        #pragma omp single
        {
            mergesort(a, 0, n-1);
        }
    }
    end_time = omp_get_wtime();
    par_time = end_time - start_time;
    cout << "\nParallel Time: " << par_time << endl;

    cout<<"\n sorted array is=>";
    for(i=0;i<n;i++)
    {
        cout<<"\n"<<a[i];
    }

    return 0;
}
```

OUTPUT