HPC Lab Assignment 3

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Problem statement:

Parallel Search Algorithm-(MPI)
Design and implement parallel algorithms utilizing all resources available.
for Binary Search for Sorted Array
Depth-First Search (tree or an undirected graph) OR
Breadth-First Search (tree or an undirected graph) OR
Best-First Search that (traversal of graph to reach a target in the shortest possible path)

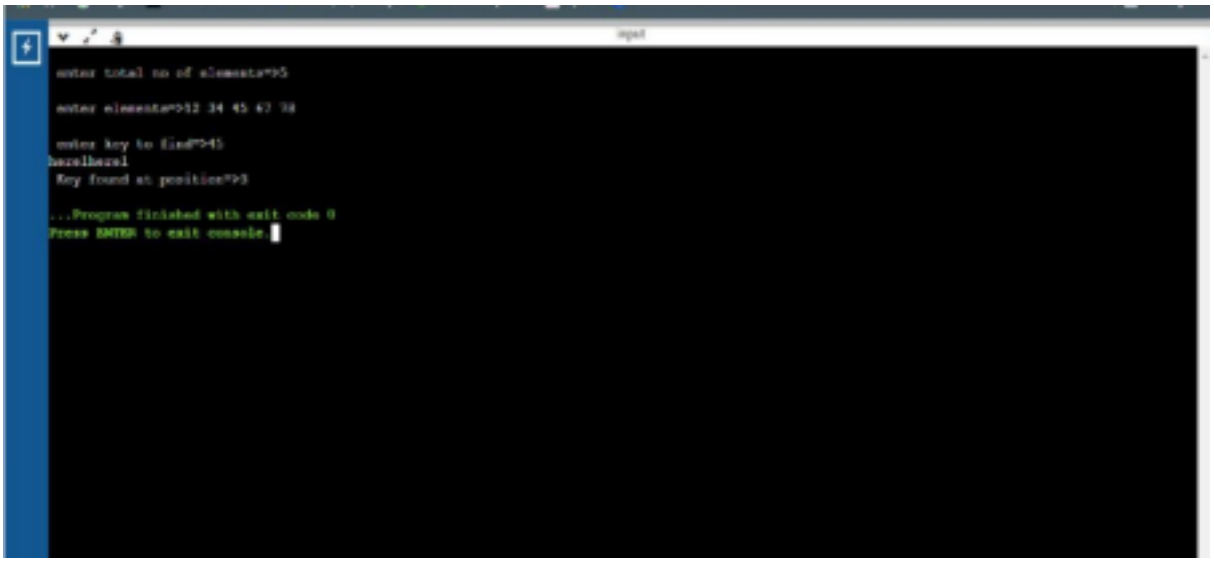
1. Code implementation for Binary Search for Sorted Array

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

int binary(int *, int, int, int);

int binary(int *a, int low, int high, int key)
{ int mid; mid=(low+high)/2; int low1,low2,high1,high2,mid1,mid2,found=0,loc=-
  1;
  #pragma omp parallel sections
  {
    #pragma omp section
    {
      low1=low;
      high1=mid;
      while(low1<=high1)
      {
        if(!(key>=a[low1] && key<=a[high1]))
```

```
    {
       low1=low1+high1;
       continue;
    }
     cout<<"here1"; mid1=(low1+high1)/2;
     if(key==a[mid1])
     {
       found=1;
       loc=mid1;
       low1=high1+1;
     }
     else if(key>a[mid1])
     {
     low1=mid1+1;
     }
     else if(key<a[mid1])
        high1=mid1-1;
   }
}
#pragma omp section
{
  low2=mid+1;
  high2=high;
  while(low2<=high2)
  {
     if(!(key>=a[low2] && key<=a[high2]))
     {
        low2=low2+high2;
        continue;
     }
     cout<<"here2"; mid2=(low2+high2)/2;
     if(key==a[mid2])
     {
     found=1;
        loc=mid2;
        low2=high2+1;
     }
```

```
        else if(key>a[mid2])
        {
        low2=mid2+1;
        }
        else if(key<a[mid2])
           high2=mid2-1;
     }
    }
  } return
  loc;
}

int main()
{ int *a,i,n,key,loc=-1; 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];
   }
   cout<<"\n enter key to find=>";
   cin>>key;
   loc=binary(a,0,n1,key);
   if(loc==-1) cout<<"\n Key
   not found."; else cout<<"\n
   Key found at
   position=>"<<loc+1;
   return 0;
}
```

OUTPUT


input
enter total no of elements=>5
enter elements=>12 34 45 67 78
enter key to find=>45
hazelhazel
Key found at position=>3
...Program finished with exit code 0
Press ENTER to exit console.