Practical 1 (A)

Parallel BFS using OpenMP

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


class node
{
   public:

    node *left, *right;
    int data;

};

class Breadthfs
{

 public:

 node *insert(node *, int);
 void bfs(node *);

};


node *insert(node *root, int data)
// inserts a node in tree
{

    if(!root)
    {
        root=new node;
        root->left=NULL;
        root->right=NULL;
        root->data=data;
        return root;
}

queue<node *> q;
q.push(root);

while(!q.empty())
{

        node *temp=q.front();
        q.pop();

        if(temp->left==NULL)
        {

                temp->left=new node;
                temp->left->left=NULL;
                temp->left->right=NULL;
                temp->left->data=data;
                return root;
        }
        else
        {

        q.push(temp->left);

        }

        if(temp->right==NULL)
        {

                temp->right=new node;
                temp->right->left=NULL;
                temp->right->right=NULL;
                temp->right->data=data;
                return root;
        }
        else
        {

        q.push(temp->right);

        }

    }

}


void bfs(node *head)
{

        queue<node*> q;
        q.push(head);

        int qSize;

        while (!q.empty())
        {
                qSize = q.size();
                #pragma omp parallel for
               //creates parallel threads
                for (int i = 0; i < qSize; i++)
                {
                        node* currNode;
                        #pragma omp critical
                        {
                          currNode = q.front();
                          q.pop();
                          cout<<"\t"<<currNode->data;

                        }// prints parent node
                        #pragma omp critical
                        {
                        if(currNode->left)// push parent's left node in queue
                                q.push(currNode->left);
```

```
 if(currNode->right)
                        q.push(currNode->right);
                  }// push parent's right node in queue

            }
      }

}

int main(){

   node *root=NULL;
   int data;
   char ans;

   do
   {
         cout<<"\n enter data=>";
         cin>>data;
```

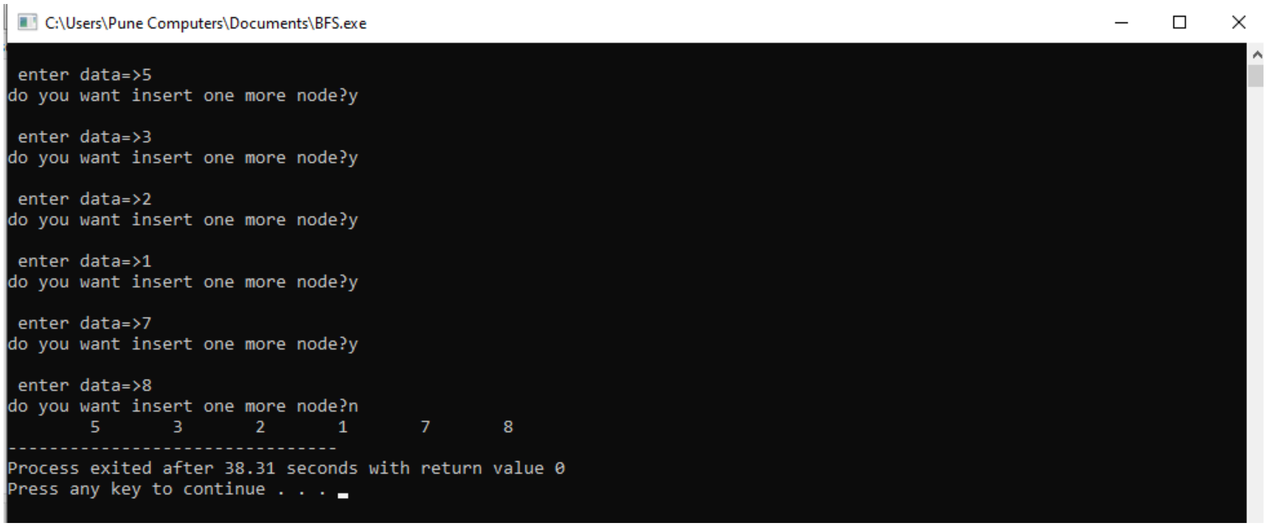
```
         root=insert(root,data);

         cout<<"do you want insert one more node?";
         cin>>ans;

   }while(ans=='y'||ans=='Y');

   bfs(root);

   return 0;
}
```

Run Commands:

1) `g++ -fopenmp bfs.cpp -o bfs`

2) `./bfs`

OUTPUT:



```
 enter data=>5
do you want insert one more node?y

 enter data=>3
do you want insert one more node?y

 enter data=>2
do you want insert one more node?y

 enter data=>1
do you want insert one more node?y

 enter data=>7
do you want insert one more node?y

 enter data=>8
do you want insert one more node?n
        5       3       2       1       7       8
--------------------------------
Process exited after 38.31 seconds with return value 0
Press any key to continue . . .
```