

Program Code:

//dfs

```
#include<stdio.h>
#include<stdlib.h>
#include <time.h>
```

```
double time_elapsed(struct timespec start, struct timespec end)
{
    double t;
    t = (end.tv_sec - start.tv_sec);
    t += (end.tv_nsec - start.tv_nsec) * 0.000000001;
    return t;
}
```

```
void dfs(int i,int count, int *visit,int *counter, int **adj,int n)
{
    visit[i]=1;
    counter[i]=count;
    for(int j=0;j<n;j++)
    {
        if(adj[i][j]==1 && visit[j]==0)
        {
            dfs(j,count,visit,counter,adj,n);
        }
    }
}
```

```
int count_components_dfs(int **g, int n)
{
    int count=0;
    int visit[n], counter[n];
    for(int i=0;i<n;i++)
        visit[i]=0;

    for(int i=0;i<n;i++)
    {
        if(visit[i]==0)
        {
            count++;
            dfs(i,count,visit,counter,g,n);
        }
    }
    return count;
}
```

```

void main()
{
    int t,i,n,j,temp;
    FILE* fptr=fopen("session8_dfsbfs_ip2.txt","r");
    FILE* fop=fopen("dfs_op2.txt","w");
    fscanf(fptr, "%d", &t);
    struct timespec start, end;

    clock_gettime(CLOCK_REALTIME, &start);
    for(i=0;i<t;i++)
    {
        fscanf(fptr,"%d",&n);
        int **adj=(int **)malloc(n*sizeof(int *));
        for(j=0;j<n;j++)
            adj[j]=(int *)malloc(n*sizeof(int *));
        for(j=0;j<n;j++)
            for(int k=0;k<n;k++)
            {
                fscanf(fptr,"%d",&adj[j][k]);
            }
        temp=count_components_dfs(adj,n);
        fprintf(fop,"%d\n",temp);
    }
    clock_gettime(CLOCK_REALTIME, &end);
    fprintf(fop,"%lf sec spent on dfs\n",time_elapsed(start, end));
    fclose(fptr);
    fclose(fop);
}

```

//bfs

```

#include<stdio.h>
#include<stdlib.h>
#include <time.h>

```

```

double time_elapsed(struct timespec start, struct timespec end)
{
    double t;
    t = (end.tv_sec - start.tv_sec);
    t += (end.tv_nsec - start.tv_nsec) * 0.000000001;
    return t;
}

```

```

void bfs(int i, int *visit, int **adj,int n,int* queue,int f,int r)
{
    visit[i]=1;
    for(int j=0;j<n;j++)
    {
        if((adj[i][j]==1) && (visit[j]==0))
        {

```

```

        visit[j]=1;
        queue[++r]=j;
    }
}

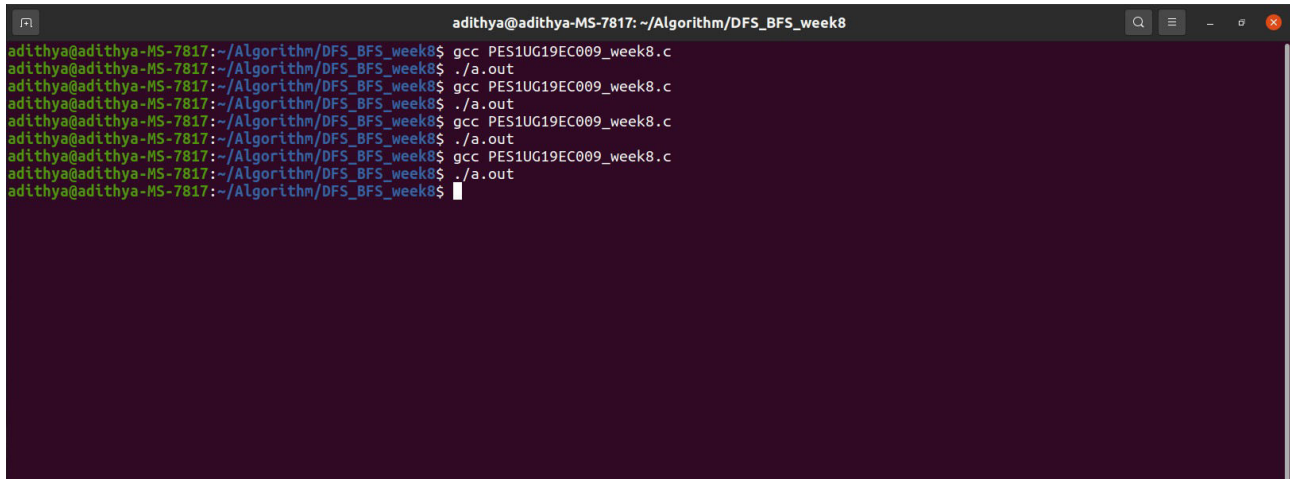
int count_components_bfs(int **g, int n)
{
    int count=0,queue[n],f=-1,r=-1;;
    int visit[n];
    for(int i=0;i<n;i++)
        visit[i]=0;
    for(int i=0;i<n;i++)
    {
        if(visit[i]==0)
        {
            ++count;
            bfs(i,visit,g,n,queue,f,r);
        }
    }
    while(f<r)
    {
        bfs(queue[f],visit,g,n,queue,f,r);
    }
    return count;
}

void main()
{
    int t,i,n,j,temp;
    FILE* fptr=fopen("session8_dfsbfs_ip2.txt","r");
    FILE* fop=fopen("bfs_op2.txt","w");
    fscanf(fptr, "%d", &t);
    struct timespec start, end;
    clock_gettime(CLOCK_REALTIME, &start);
    for(i=0;i<t;i++)
    {
        fscanf(fptr,"%d",&n);
        int **adj=(int **)malloc(n*sizeof(int *));
        for(j=0;j<n;j++)
            adj[j]=(int *)malloc(n*sizeof(int *));
        for(j=0;j<n;j++)
            for(int k=0;k<n;k++)
            {
                fscanf(fptr,"%d",&adj[j][k]);
            }
        temp=count_components_bfs(adj,n);
        fprintf(fop,"%d\n",temp);
    }
    clock_gettime(CLOCK_REALTIME, &end);
}

```

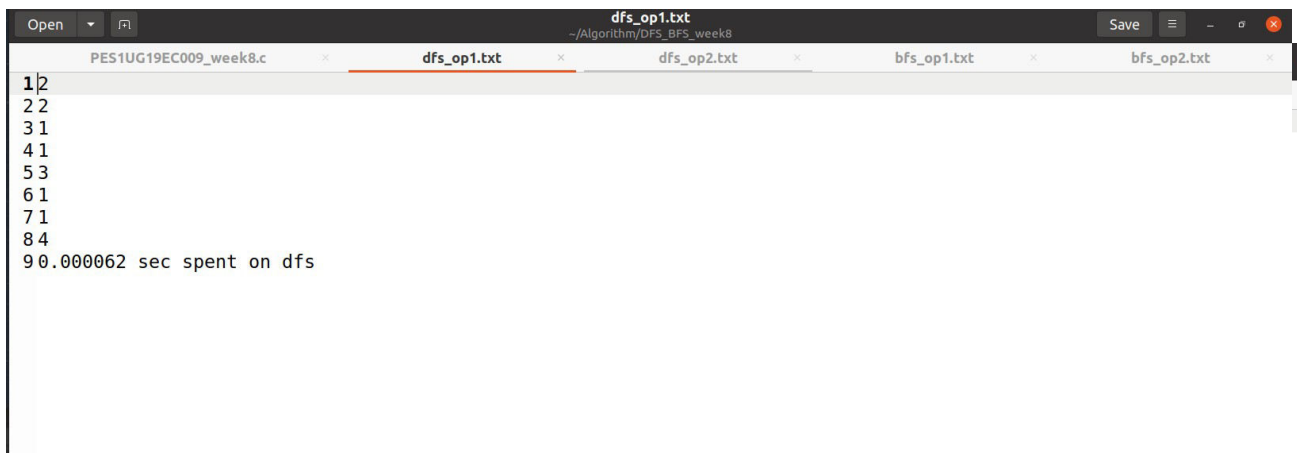
```
    fprintf(fop,"%lf sec spent on bfs\n",time_elapsed(start, end));  
    fclose(fp);  
    fclose(fop);  
}
```

OUTPUT



```
adithya@adithya-MS-7817: ~/Algorithm/DFS_BFS_week8  
adithya@adithya-MS-7817:~/Algorithm/DFS_BFS_week8$ gcc PES1UG19EC009_week8.c  
adithya@adithya-MS-7817:~/Algorithm/DFS_BFS_week8$ ./a.out  
adithya@adithya-MS-7817:~/Algorithm/DFS_BFS_week8$ gcc PES1UG19EC009_week8.c  
adithya@adithya-MS-7817:~/Algorithm/DFS_BFS_week8$ ./a.out  
adithya@adithya-MS-7817:~/Algorithm/DFS_BFS_week8$ gcc PES1UG19EC009_week8.c  
adithya@adithya-MS-7817:~/Algorithm/DFS_BFS_week8$ ./a.out  
adithya@adithya-MS-7817:~/Algorithm/DFS_BFS_week8$ gcc PES1UG19EC009_week8.c  
adithya@adithya-MS-7817:~/Algorithm/DFS_BFS_week8$ ./a.out  
adithya@adithya-MS-7817:~/Algorithm/DFS_BFS_week8$
```

DFS OUTPUT 1



```
1 2  
2 2  
3 1  
4 1  
5 3  
6 1  
7 1  
8 4  
9 0.000062 sec spent on dfs
```

DFS OUTPUT 2

```
Open  dfs_op2.txt  Save
PES1UG19EC009_week8.c  dfs_op1.txt  dfs_op2.txt  bfs_op1.txt  bfs_op2.txt
1 100
2 1
30.003908 sec spent on dfs
```

BFS OUTPUT 1

```
Open  bfs_op1.txt  Save
PES1UG19EC009_week8.c  dfs_op1.txt  dfs_op2.txt  bfs_op1.txt  bfs_op2.txt
1 2
2 2
3 1
4 1
5 3
6 1
7 1
8 5
90.000129 sec spent on bfs
```

BFS OUTPUT 2

```
Open  bfs_op2.txt  Save
PES1UG19EC009_week8.c  dfs_op1.txt  dfs_op2.txt  bfs_op1.txt  bfs_op2.txt
1 100
2 1
30.005548 sec spent on bfs
```