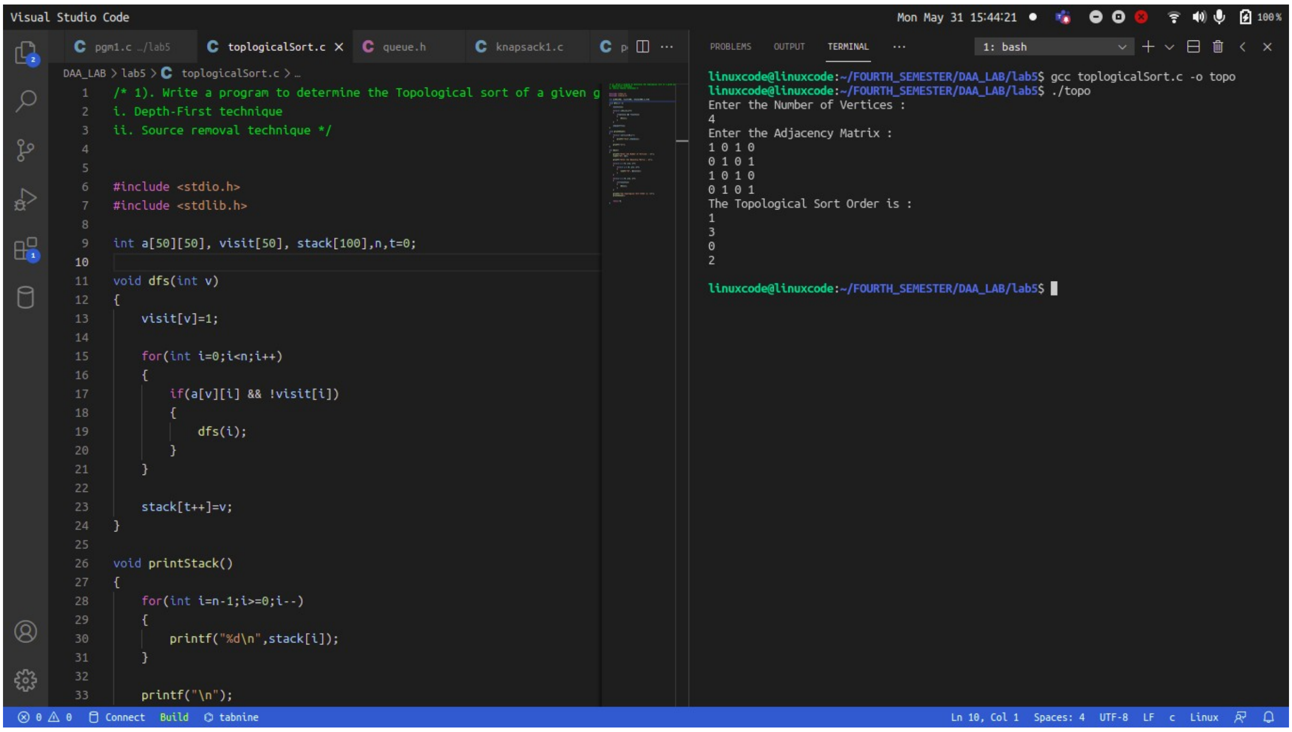
LAB 5:

```
/* 1). Write a program to determine the Topological sort of a given graph using
i. Depth-First technique
ii. Source removal technique */


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

int a[50][50], visit[50], stack[100],n,t=0;

void dfs(int v)
{
visit[v]=1;

for(int i=0;i<n;i++)
{
if(a[v][i] && !visit[i])
{
dfs(i);
}
}

stack[t++]=v;
}

void printStack()
{
for(int i=n-1;i>=0;i--)
{
printf("%d\n",stack[i]);
}

printf("\n");
}

int main()
{
printf("Enter the Number of Vertices : \n");
scanf("%d", &n);
printf("Enter the Adjacency Matrix : \n");
for(int i = 0; i<n; i++)
{
for(int j = 0; j<n; j++)
{
scanf("%d", &a[i][j]);
}
}

for(int i = 0; i<n; i++)
{
if(!visit[i])
{
dfs(i);
}
}

printf("The Topological Sort Order is :\n");
printStack();

return 0;
}
```

OUTPUT :



```
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{
    visit[v]=1;

    for(int i=0;i<n;i++)
    {
        if(a[v][i] && !visit[i])
        {
            dfs(i);
        }
    }

    stack[t++]=v;
}

void printStack()
{
    for(int i=n-1;i>=0;i--)
    {
        printf("%d\n",stack[i]);
    }

    printf("\n");
```
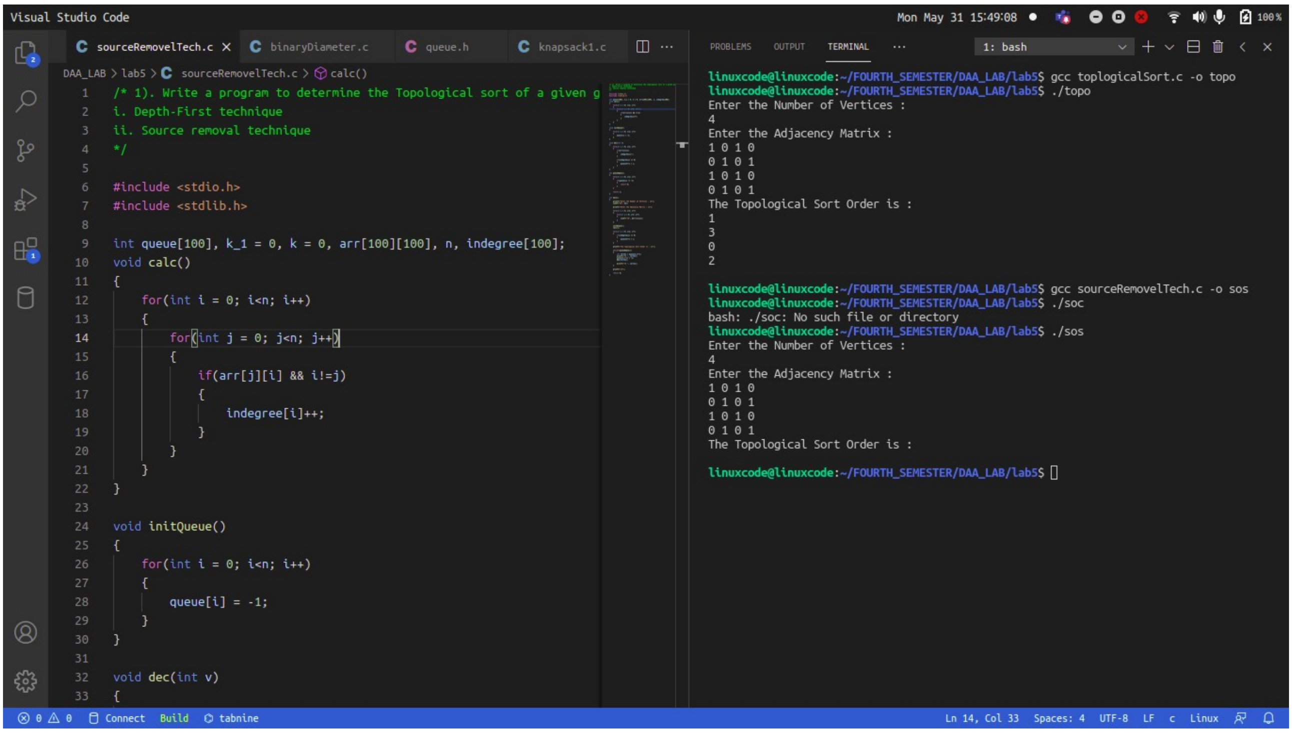

```
linuxcode@linuxcode:~/FOURTH_SEMESTER/DAA_LAB/lab5$ gcc toplogicalSort.c -o topo
linuxcode@linuxcode:~/FOURTH_SEMESTER/DAA_LAB/lab5$ ./topo
Enter the Number of Vertices :
4
Enter the Adjacency Matrix :
1 0 1 0
0 1 0 1
1 0 1 0
0 1 0 1
The Topological Sort Order is :
1
3
0
2

linuxcode@linuxcode:~/FOURTH_SEMESTER/DAA_LAB/lab5$
```

```c
/* 1). Write a program to determine the Topological sort of a given graph using
i. Depth-First technique
ii. Source removal technique
*/

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

int queue[100], k_1 = 0, k = 0, arr[100][100], n, indegree[100];
void calc()
{
for(int i = 0; i<n; i++)
{
for(int j = 0; j<n; j++)
{
if(arr[j][i] && i!=j)
{
indegree[i]++;
}
}
}
}

void initQueue()
{
for(int i = 0; i<n; i++)
{
queue[i] = -1;
}
}

void dec(int v)
{
for(int i = 0; i<n; i++)
{
if(arr[v][i])
{
indegree[i]--;
}
if(indegree[i] == 0)
{
queue[k++] = i;
}
}
}

int queueEmpty()
```

```
{
for(int i = 0; i<n; i++)
{
if(queue[i] != -1)
{
return 0;
}
}

return 1;
}

int main()
{
printf("Enter the Number of Vertices : \n");
scanf("%d", &n);
printf("Enter the Adjacency Matrix : \n");

for(int i = 0; i<n; i++)
{
for(int j = 0; j<n; j++)
{
scanf("%d", &arr[i][j]);
}
}
initQueue();
calc();
for(int i = 0; i<n; i++)
{
if(indegree[i] == 0)
{
queue[k++] = i;
}
}
printf("The Topological Sort Order is : \n");
while(!queueEmpty())
{
int vertex = queue[k_1++];
printf("%d ", vertex);
queue[k_1-1] = -1;
dec(vertex);

printf("%d ", vertex);
}
printf("\n");

return 0;
}
```

OUTPUT :



```c
/* 1). Write a program to determine the Topological sort of a given g
i. Depth-First technique
ii. Source removal technique
*/

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

int queue[100], k_1 = 0, k = 0, arr[100][100], n, indegree[100];
void calc()
{
    for(int i = 0; i<n; i++)
    {
        for(int j = 0; j<n; j++)
        {
            if(arr[j][i] && i!=j)
            {
                indegree[i]++;
            }
        }
    }
}

void initQueue()
{
    for(int i = 0; i<n; i++)
    {
        queue[i] = -1;
    }
}

void dec(int v)
{
```

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The Topological Sort Order is :
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3
0
2

linuxcode@linuxcode:~/FOURTH_SEMESTER/DAA_LAB/lab5$ gcc sourceRemovelTech.c -o sos
linuxcode@linuxcode:~/FOURTH_SEMESTER/DAA_LAB/lab5$ ./soc
bash: ./soc: No such file or directory
linuxcode@linuxcode:~/FOURTH_SEMESTER/DAA_LAB/lab5$ ./sos
Enter the Number of Vertices :
4
Enter the Adjacency Matrix :
1 0 1 0
0 1 0 1
1 0 1 0
0 1 0 1
The Topological Sort Order is :

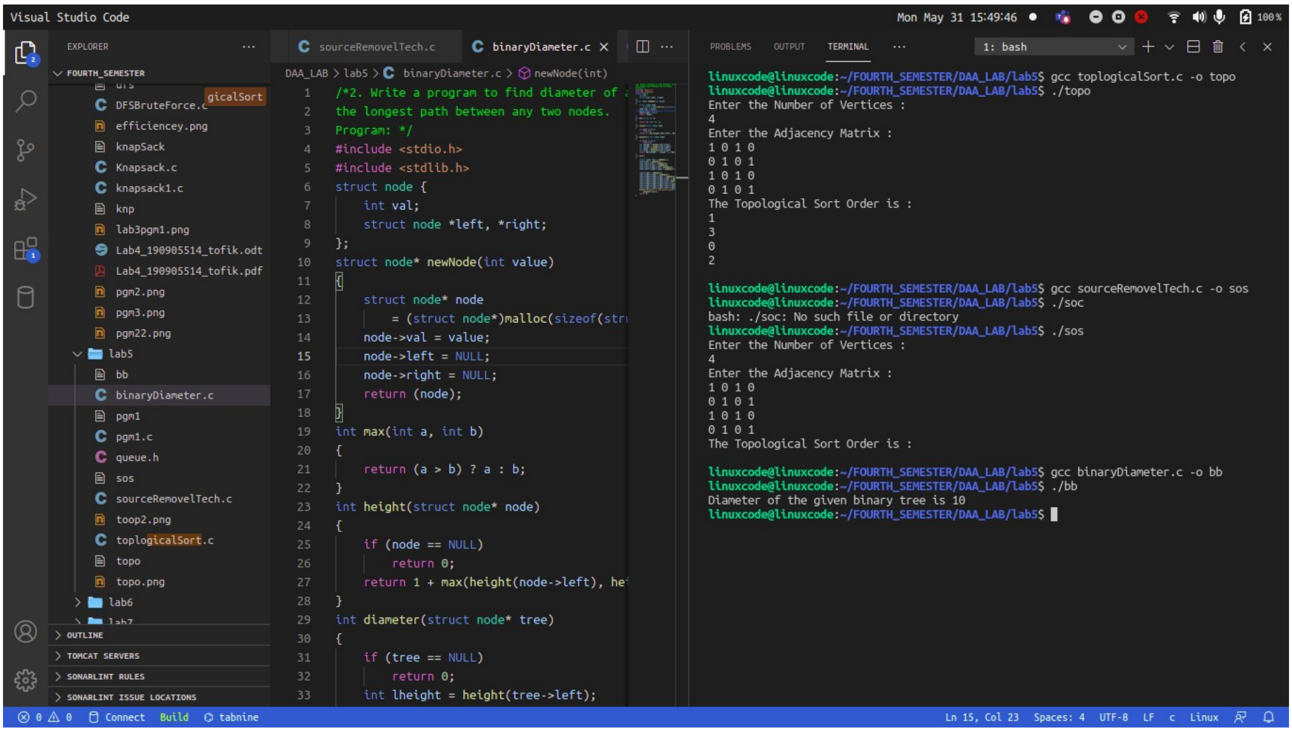
linuxcode@linuxcode:~/FOURTH_SEMESTER/DAA_LAB/lab5$ 
```

```c
/*2. Write a program to find diameter of a binary tree. Diameter of a binary tree is
the longest path between any two nodes.
Program: */
#include <stdio.h>
#include <stdlib.h>
struct node {
int val;
struct node *left, *right;
};
struct node* newNode(int value)
{
struct node* node
= (struct node*)malloc(sizeof(struct node));
node->val = value;
node->left = NULL;
node->right = NULL;
return (node);
}
int max(int a, int b)
{
return (a > b) ? a : b;
}
int height(struct node* node)
{
```

```
if (node == NULL)
return 0;
return 1 + max(height(node->left), height(node->right));
}
int diameter(struct node* tree)
{
if (tree == NULL)
return 0;
int lheight = height(tree->left);
int rheight = height(tree->right);
int ldiam = diameter(tree->left);
int rdiam = diameter(tree->right);
return max(lheight + rheight + 1, max(ldiam, rdiam));
}
int main()
{
struct node* root = newNode(1);
root->left = newNode(2);
root->left->left = newNode(4);
root->left->right = newNode(5);
root->left->right->left= newNode(6);
root->left->right->right = newNode(7);

root->right = newNode(3);
root->right->right = newNode(8);
root->right->right->right = newNode(9);
root->right->right->right->right = newNode(10);
root->right->right->right->left= newNode(11);
root->right->right->right->left->left = newNode(12);
root->right->right->right->left->right = newNode(13);
root->right->right->right->left->right->left = newNode(14);
root->right->right->right->left->right->right = newNode(15);
printf("Diameter of the given binary tree is %d\n",
diameter(root));
return 0;
}
```

OUTPUT :



```c
/*2. Write a program to find diameter of a
the longest path between any two nodes.
Program: */
#include <stdio.h>
#include <stdlib.h>
struct node {
    int val;
    struct node *left, *right;
};
struct node* newNode(int value)
{
    struct node* node
        = (struct node*)malloc(sizeof(stru
    node->val = value;
    node->left = NULL;
    node->right = NULL;
    return (node);
}
int max(int a, int b)
{
    return (a > b) ? a : b;
}
int height(struct node* node)
{
    if (node == NULL)
        return 0;
    return 1 + max(height(node->left), he
}
int diameter(struct node* tree)
{
    if (tree == NULL)
        return 0;
    int lheight = height(tree->left);
```

```
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Enter the Number of Vertices :
4
Enter the Adjacency Matrix :
1 0 1 0
0 1 0 1
1 0 1 0
0 1 0 1
The Topological Sort Order is :

linuxcode@linuxcode:~/FOURTH_SEMESTER/DAA_LAB/lab5$ gcc binaryDiameter.c -o bb
linuxcode@linuxcode:~/FOURTH_SEMESTER/DAA_LAB/lab5$ ./bb
Diameter of the given binary tree is 10
linuxcode@linuxcode:~/FOURTH_SEMESTER/DAA_LAB/lab5$ █
```