231501058 CS23231 – D a t a S t r u c t u r e s

**Ex. No.: 12**

**Topological Sorting**

**Date: 24/5/24**

**Write a C prog ram to cre ate a graph and display the ordering of vertice s .**

**Algorithm:**

#include <stdio.h>

#include <malloc.h>

struct node {

int vertex;

struct node\* next;

};

struct Graph {

int numVertices;

struct node\*\* adjLists;

int\* visited;

};

struct node\* createNode(int v) {

struct node\* newNode = (struct node\*)malloc(sizeof(struct node));

newNode->vertex = v;

newNode->next = NULL;

return newNode;

}

struct Graph\* createGraph(int vertices) {

struct Graph\* graph = (struct Graph\*)malloc(sizeof(struct Graph)); graph->numVertices = vertices;

graph->adjLists = (struct node\*\*)malloc(vertices \* sizeof(struct node\*)); graph->visited = (int\*)malloc(vertices \* sizeof(int));

for (int i = 0; i < vertices; i++) {

graph->adjLists[i] = NULL;

graph->visited[i] = 0;

}

return graph;

}

void addEdge(struct Graph\* graph, int src, int dest) { struct node\* newNode = createNode(dest); newNode->next = graph->adjLists[src]; graph->adjLists[src] = newNode;

}void topologicalSortUtil(int v, struct Graph\* graph, int\* stack, int\* stackIndex) {

graph->visited[v] = 1;

struct node\* adjList = graph->adjLists[v];

struct node\* temp = adjList;



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while (temp != NULL) {

int connectedVertex = temp->vertex;

if (!graph->visited[connectedVertex]) {

topologicalSortUtil(connectedVertex, graph, stack, stackIndex);

}

temp = temp->next;

}

stack[(\*stackIndex)++] = v;

}

void topologicalSort(struct Graph\* graph) {

int\* stack = (int\*)malloc(graph->numVertices \* sizeof(int)); int stackIndex = 0;

for (int i = 0; i < graph->numVertices; i++) { if (graph->visited[i] == 0) {

topologicalSortUtil(i, graph, stack, &stackIndex);

}

}

for (int i = stackIndex - 1; i >= 0; i--) { printf("%d ", stack[i]);

}

free(stack);

}

int main() {

struct Graph\* graph = createGraph(6);

addEdge(graph, 5, 2);

addEdge(graph, 5, 0);

addEdge(graph, 4, 0);

addEdge(graph, 4, 1);

addEdge(graph, 2, 3);

addEdge(graph, 3, 1);

printf("Topological Sort: ");

topologicalSort(graph);

printf("\n");

return 0;

}

**OUTPUT**



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