

Program 9a

Write a program to traverse a graph using BFS method.

Code:

```
#include <stdio.h>

#include <stdlib.h>

#define MAX 100

struct Queue {
    int items[MAX];
    int front, rear;
};

void initQueue(struct Queue* q) {
    q->front = -1;
    q->rear = -1;
}

int isEmpty(struct Queue* q) {
    return q->front == -1;
}

void enqueue(struct Queue* q, int value) {
    if (q->rear == MAX - 1) {
        printf("Queue is full\n");
        return;
    }
```

```

        if (q->front == -1) {
            q->front = 0;
        }
        q->rear++;
        q->items[q->rear] = value;
    }
}

int dequeue(struct Queue* q) {
    if (isEmpty(q)) {
        printf("Queue is empty\n");
        return -1;
    }
    int item = q->items[q->front];
    q->front++;
    if (q->front > q->rear) {
        q->front = q->rear = -1;
    }
    return item;
}

void BFS(int graph[MAX][MAX], int n, int startVertex) {
    int visited[MAX] = {0};
    struct Queue q;
    initQueue(&q);

```

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visited[startVertex] = 1;

enqueue(&q, startVertex);

printf("BFS Traversal: ");

    while (!isEmpty(&q)) {

int currentVertex = dequeue(&q);

printf("%d ", currentVertex);

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

            if (graph[currentVertex][i] == 1 && !visited[i]) {

                visited[i] = 1;

                enqueue(&q, i);

            }

        }

    }

printf("\n");

}

int main() {

    int graph[MAX][MAX], n, startVertex;

printf("Enter the number of vertices in the graph: ");

    scanf("%d", &n);

printf("Enter the adjacency matrix of the graph:\n");

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

            for (int j = 0; j < n; j++) {

                scanf("%d", &graph[i][j]);

```

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    }

    }

printf("Enter the starting vertex (0 to %d): ", n - 1);

scanf("%d", &startVertex);

BFS(graph, n, startVertex);

return 0;

}

```

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Enter the number of vertices in the graph: 4
Enter the adjacency matrix of the graph:
0 1 0 0
1 0 1 1
0 1 0 1
0 1 1 0
Enter the starting vertex (0 to 3): 0
BFS Traversal: 0 1 2 3

```

WAP to traverse a graph using BFS method

```

#include <bits/stdc++.h>
using namespace std;
#define MAX 100

Stack queue;
int startVertex;
int front, rear;

void initialize(Stack queue, int n) {
    queue = new int[n];
    front = -1;
    rear = -1;
}

int isEmpty(Stack queue) {
    return front > rear;
}

void enqueue(Stack queue, int value) {
    if (rear < MAX - 1) {
        queue[rear] = value;
        rear++;
    }
}

int dequeue(Stack queue) {
    if (front < MAX - 1) {
        int value = queue[front];
        front++;
        return value;
    }
    return -1;
}

void BFS(int graph[MAX][MAX], int n, int startVertex) {
    initialize(queue, n);
    enqueue(queue, startVertex);
    visited[startVertex] = 1;
    while (!isEmpty(queue)) {
        int vertex = dequeue(queue);
        printf("%d ", vertex);
        for (int i = 0; i < n; i++) {
            if (graph[vertex][i] & !visited[i]) {
                enqueue(queue, i);
                visited[i] = 1;
            }
        }
    }
}

```

