REVI THIMMA REDDY-192325025

38. Design a C program to simulate SCAN disk scheduling algorithm.

AIM

To design a C program that simulates the **SCAN Disk Scheduling Algorithm**, where the disk arm moves in one direction to service requests until it reaches the end of the disk, then reverses direction and services requests in the opposite direction.

ALGORITHM

1. **Start**
2. Read the total number of disk requests and their corresponding track numbers.
3. Sort the disk track requests in increasing order.
4. Separate the requests into two groups:
   - Requests to the left of the initial head position.
   - Requests to the right of the initial head position.
5. If the head moves to the left, service the requests in the left group first, then reverse direction to service the requests in the right group.
6. If the head moves to the right, service the requests in the right group first, then reverse direction to service the requests in the left group.
7. Calculate the total number of movements made by the disk arm.
8. Print the sequence of serviced requests and the total number of disk movements.
9. **Stop**

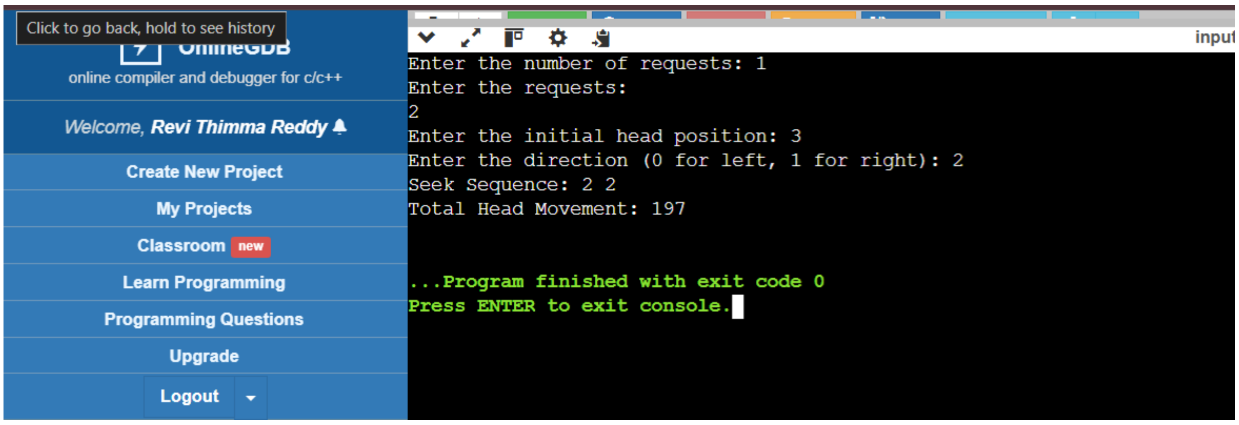
PROCEDURE

1. Include necessary libraries (stdio.h for input/output and stdlib.h for memory management).
2. Read the total number of disk requests and their track numbers.
3. Sort the disk track numbers in increasing order to simulate the SCAN algorithm.
4. Separate the requests into two groups based on the initial position of the disk head (left and right).
5. Simulate the movement of the disk arm, first servicing the requests in one direction, then reversing the direction to service the remaining requests.
6. Calculate the total number of disk movements as the sum of the absolute differences between the current position and the serviced request.
7. Display the total number of disk movements and the sequence of serviced requests.
8. **End**

CODE:

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

void SCAN(int arr[], int n, int start, int direction) {
    int total_distance = 0;
    int current_position = start;

    for (int i = 0; i < n - 1; i++) {
        for (int j = i + 1; j < n; j++) {
            if (arr[i] > arr[j]) {
                int temp = arr[i];
                arr[i] = arr[j];
                arr[j] = temp;
            }
        }
    }

    int left[n], right[n];
    int left_count = 0, right_count = 0;

    for (int i = 0; i < n; i++) {
        if (arr[i] < start) {
            left[left_count++] = arr[i];
        } else {
            right[right_count++] = arr[i];
        }
    }

    int i;

    if (direction == 0) {
        for (i = left_count - 1; i >= 0; i--) {
            total_distance += abs(left[i] - current_position);
            current_position = left[i];
        }

        total_distance += abs(current_position);
        current_position = 0;

        for (i = 0; i < right_count; i++) {
            total_distance += abs(right[i] - current_position);
            current_position = right[i];
        }
    } else {
        for (i = 0; i < right_count; i++) {
            total_distance += abs(right[i] - current_position);
            current_position = right[i];
        }

        total_distance += abs(current_position);
        current_position = 0;

        for (i = left_count - 1; i >= 0; i--) {
            total_distance += abs(left[i] - current_position);
            current_position = left[i];
        }
    }

    printf("Total Number of Disk Movements: %d\n", total_distance);
}

int main() {
    int n, start, direction;

    printf("Enter the number of disk requests: ");
    scanf("%d", &n);

    int arr[n];

    printf("Enter the disk track numbers:\n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr[i]);
    }

    printf("Enter the initial position of the disk head: ");
    scanf("%d", &start);

    printf("Enter the direction of the head movement (0 for left, 1 for right): ");
    scanf("%d", &direction);

    SCAN(arr, n, start, direction);

    return 0;
}
```

OUTPUT:



```
Enter the number of requests: 1
Enter the requests:
2
Enter the initial head position: 3
Enter the direction (0 for left, 1 for right): 2
Seek Sequence: 2 2
Total Head Movement: 197


...Program finished with exit code 0
Press ENTER to exit console.
```