Write the algorithm and program for implementation of queue using linked list

ALGORITHM

Step 1: Allocate the space for the new node PTR

Step 2: SET PTR -> DATA = VAL

Step 3: IF FRONT = NULL

SET FRONT = REAR = PTR

SET FRONT -> NEXT = REAR -> NEXT = NULL

ELSE

SET REAR -> NEXT = PTR

SET REAR = PTR

SET REAR -> NEXT = NULL

[END OF IF]

Step 4: END

PROGRAM:

#include <stdio.h>

#include <stdlib.h>

// A linked list (LL) node to store a queue entry

struct QNode {

int key;

struct QNode\* next;

};

// The queue, front stores the front node of LL and rear

// stores the last node of LL

struct Queue {

struct QNode \*front, \*rear;

};

// A utility function to create a new linked list node.

struct QNode\* newNode(int k)

{

struct QNode\* temp

= (struct QNode\*)malloc(sizeof(struct QNode));

temp->key = k;

temp->next = NULL;

return temp;

}

// A utility function to create an empty queue

struct Queue\* createQueue()

{

struct Queue\* q

= (struct Queue\*)malloc(sizeof(struct Queue));

q->front = q->rear = NULL;

return q;

}

// The function to add a key k to q

void enQueue(struct Queue\* q, int k)

{

// Create a new LL node

struct QNode\* temp = newNode(k);

// If queue is empty, then new node is front and rear

// both

if (q->rear == NULL) {

q->front = q->rear = temp;

return;

}

// Add the new node at the end of queue and change rear

q->rear->next = temp;

q->rear = temp;

}

// Function to remove a key from given queue q

void deQueue(struct Queue\* q)

{

// If queue is empty, return NULL.

if (q->front == NULL)

return;

// Store previous front and move front one node ahead

struct QNode\* temp = q->front;

q->front = q->front->next;

// If front becomes NULL, then change rear also as NULL

if (q->front == NULL)

q->rear = NULL;

free(temp);

}

// Driver code

int main()

{

struct Queue\* q = createQueue();

enQueue(q, 10);

enQueue(q, 20);

deQueue(q);

deQueue(q);

enQueue(q, 30);

enQueue(q, 40);

enQueue(q, 50);

deQueue(q);

printf("Queue Front : %d \n", q->front->key);

printf("Queue Rear : %d", q->rear->key);

return 0;

}

Output:

