

DS LAB Week 6

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1) Joesphus Problem:

```
1  #include <stdio.h>
2  #include <stdlib.h>
3  typedef struct node
4  {
5      int ele;
6      struct node *link;
7  } node_t;
8
9  typedef struct queue
10 {
11     node_t *front;
12     node_t *rear;
13 } queue;
14
15 void init(queue *p)
16 {
17     p->front = NULL;
18     p->rear = NULL;
19 }
20
21 void enqueue(queue *p, int ele)
22 {
23     node_t *temp = (node_t *)malloc(sizeof(node_t));
24     temp->ele = ele;
25     temp->link = temp;
26     if (p->front == NULL)
27     {
28         p->front = temp;
29         p->rear = temp;
30     }
31     else
32     {
33         p->rear->link = temp;
34         temp->link = p->front;
35         p->rear = temp;
36     }
37 }
38
39 int front(queue *p)
40 {
41     return p->front->ele;
42 }
43
44 void move(queue *p)
45 {
46     p->front = p->front->link;
47 }
48
```

```

48
49 void delete (queue *p)
50 {
51     node_t *temp = p->front->link;
52     if (temp == p->front)
53     {
54         return;
55     }
56     else
57     {
58         p->front->link = temp->link;
59         free(temp);
60     }
61 }
62
63 int main()
64 {
65     queue q;
66     init(&q);
67     int n, k;
68     printf("Enter n and k: ");
69     scanf("%d %d", &n, &k);
70     for (int i = 1; i <= n; i++)
71         enqueue(&q, i);
72     if (k == 1)
73     {
74         printf("Survivor: %d\n", n);
75     }
76     else
77     {
78         int count = 1;
79         while (n)
80         {
81             if (count < k - 1)
82             {
83                 move(&q);
84                 count++;
85             }
86             else
87             {
88                 delete (&q);
89                 count = 0;
90                 n--;
91             }
92         }
93         printf("Survivor: %d\n", front(&q));
94     }
95     return 0;
96 }

```

Output:

```
PS C:\Users\adith\Documents\C Programs> c
Enter n and k: 5 2
Survivor: 3
PS C:\Users\adith\Documents\C Programs\we
```

2) Queue operations:

```
1  #include<stdio.h>
2  #include<stdlib.h>
3
4  #define MAX 20
5
6  typedef struct stack {
7      int arr[MAX];
8      int top;
9  }stack;
10
11  typedef struct queue {
12      stack s;
13  }queue;
14
15  void init(stack *p) {
16      p->top = -1;
17  }
18
19  int push(stack *p,int ele) {
20      if(p->top == MAX-1) {
21          return 0;
22      }
23      else {
24          p->top++;
25          p->arr[p->top] = ele;
26      }
27      return 1;
28  }
29
30  int pop(stack *p,int *ele) {
31      if(p->top == -1) {
32          return 0;
33      }
34      else {
35          *ele = p->arr[p->top];
36          p->top--;
37      }
38      return 1;
39  }
40
41  void initq(queue *p) {
42      init(&p->s);
43  }
44
45  void enqueue(queue *p,int ele) {
46      push(&p->s,ele);
47  }
48
49  void dequeue(queue *p) {
50      stack temp; init(&temp);
51      int ele;
```

```

52     int state;
53     state = pop(&p->s,&ele);
54     while(state){
55         push(&temp,ele);
56         state = pop(&p->s,&ele);
57     }
58     pop(&temp,&ele);
59     state = pop(&temp,&ele);
60     while(state){
61         push(&p->s,ele);
62         state = pop(&temp,&ele);
63     }
64 }
65
66 void display(queue *q) {
67     for(int i=0;i<=q->s.top;i++) {
68         printf("%d ",q->s.arr[i]);
69     }
70     printf("\n");
71 }
72
73 int main() {
74     queue q;
75     initq(&q);
76     int choice,ele;
77     printf("1.Enqueue 2.Dequeue 3.Display 0:Exit\n");
78     scanf("%d",&choice);
79     do{
80         switch(choice){
81             case 1:
82                 printf("Enter the element :");
83                 scanf("%d",&ele);
84                 enqueue(&q,ele);
85                 break;
86             case 2:
87                 dequeue(&q);
88                 break;
89             case 3:
90                 display(&q);
91                 break;
92             case 0:
93                 break;
94         }
95         printf("1.Enqueue 2.Dequeue 3.Display 0:Exit\n");
96         scanf("%d",&choice);
97     }while(choice);
98     return 0;
99 }

```

Output:

```

PS C:\Users\adith\Documents\C Programs\week 6> cd "
1.Enqueue 2.Dequeue 3.Display 0:Exit
1
Enter the element :45
1.Enqueue 2.Dequeue 3.Display 0:Exit
1
Enter the element :876
1.Enqueue 2.Dequeue 3.Display 0:Exit
1
Enter the element :65
1.Enqueue 2.Dequeue 3.Display 0:Exit
3
45 876 65
1.Enqueue 2.Dequeue 3.Display 0:Exit
2
1.Enqueue 2.Dequeue 3.Display 0:Exit
3
876 65
1.Enqueue 2.Dequeue 3.Display 0:Exit
0
PS C:\Users\adith\Documents\C Programs\week 6>

```