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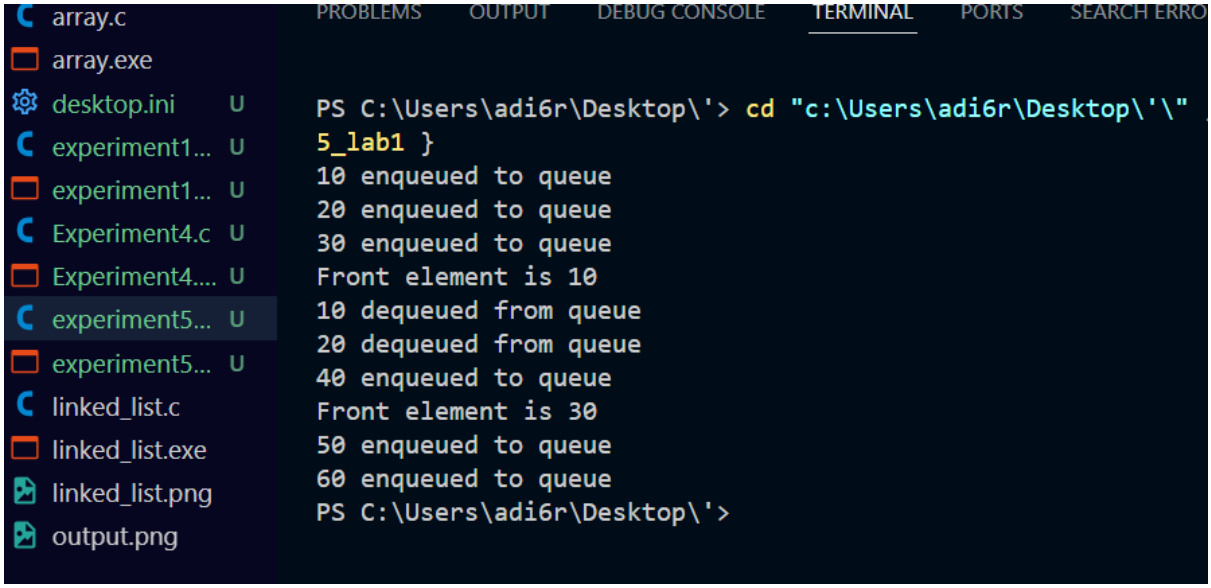
Lab Assignment 1: Queue Implementation Using Arrays

```
#include <stdio.h>
#include <stdlib.h>
#define MAX_SIZE 100
int queue[MAX_SIZE];
int front = -1, rear = -1;

int is_empty() {
   return front == -1;
}

int is_full() {
   return (rear + 1) % MAX_SIZE == front;
}
void enqueue(int item)
 {
   if (is_full())
 {
       printf("Queue Overflow\n");
       return;
   }
   if (is_empty())
{
       front = rear = 0;
 }
 else
{
       rear = (rear + 1) % MAX_SIZE;
   }
   queue[rear] = item;
   printf("%d enqueued to queue\n", item);
}
int dequeue()
 {
   if (is_empty())
{
       printf("Queue Underflow\n");
       return -1;
   }
```

```
    int item = queue[front];
    if (front == rear)
 {
        front = rear = -1;
 }
else
{
        front = (front + 1) % MAX_SIZE;
 }
    return item;
}
int peek()
{
    if (is_empty())
{
        printf("Queue is Empty\n");
        return -1;
    }
    return queue[front];
}

int main()
{
    enqueue(10);
    enqueue(20);
    enqueue(30);
    printf("Front element is %d\n", peek());

    printf("%d dequeued from queue\n", dequeue());
    printf("%d dequeued from queue\n", dequeue());

    enqueue(40);
    printf("Front element is %d\n", peek());

    // Trying to enqueue more elements than the queue capacity
    enqueue(50);
    enqueue(60);

    return 0;

}
```



Lab Assignment 2: Queue Implementation Using Linked Lists

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

// Node structure
struct Node
{
    int data;
    struct Node* next;
};

// Queue structure
struct Queue
{
    struct Node* front;
    struct Node* rear;
};

// Function to create a new node
struct Node* newNode(int data)
 {
    struct Node* node = (struct Node*)malloc(sizeof(struct Node));
    node->data = data;
    node->next = NULL;
    return node;
}
```

```
// Function to check if the queue is empty
int isEmpty(struct Queue* queue)
 {
   return queue->front == NULL;
}

// Function to enqueue an item to the queue
void enqueue(struct Queue* queue, int data)
{
   struct Node* node = newNode(data);
   if (isEmpty(queue))
      {
       queue->front = queue->rear = node;
      }
Else
     {
       queue->rear->next = node;
       queue->rear = node;
     }
}

// Function to dequeue an item from the queue
int dequeue(struct Queue* queue)
{
   if (isEmpty(queue))
       {
       printf("Queue is empty\n");
       return -1;
       }

   int data = queue->front->data;
   struct Node* temp = queue->front;
   queue->front = queue->front->next;

   if (queue->front == NULL)
     {
       queue->rear = NULL;
     }

   free(temp);
   return data;
}

// Function to peek the front element of the queue
int peek(struct Queue* queue)
{
   if (isEmpty(queue))
    {
       printf("Queue is empty\n");
       return -1;
```

```
    }
    return queue->front->data;
}

int main()
 {
    struct Queue* queue = (struct Queue*)malloc(sizeof(struct Queue));
    queue->front = queue->rear = NULL;

    enqueue(queue, 10);
    enqueue(queue, 20);
    enqueue(queue, 30);

    printf("Front element is %d\n", peek(queue));

    printf("%d dequeued from queue\n", dequeue(queue));
    printf("%d dequeued from queue\n", dequeue(queue));

    enqueue(queue, 40);
    printf("Front element is %d\n", peek(queue));

    return 0;
}
```