

Queue Implementation using Array

class ArrayQueue:

def __init__(self, capacity):

self.capacity = capacity

self.queue = []

def enqueue(self, item):

if len(self.queue) < self.capacity:

self.queue.append(item)

else:

print("Array Queue is full!")

def dequeue(self):

if self.queue:

return self.queue.pop(0)

else:

return "Array Queue is empty!"

Queue Implementation using Linked List

class Node:

def __init__(self, data):

self.data = data

self.next = None

class LinkedListQueue:

def __init__(self):

self.front = self.rear = None

```
def enqueue(self, item):  
    new_node = Node(item)  
    if self.rear:  
        self.rear.next = new_node  
    self.rear = new_node  
    if not self.front:  
        self.front = new_node
```

```
def dequeue(self):  
    if self.front:  
        temp = self.front.data  
        self.front = self.front.next  
        if not self.front:  
            self.rear = None  
        return temp  
    else:  
        return "Linked List Queue is empty!"
```

Queue Implementation using Two Stacks

```
class StackQueue:  
    def __init__(self):  
        self.stack1 = []  
        self.stack2 = []  
  
    def enqueue(self, item):  
        self.stack1.append(item)  
  
    def dequeue(self):
```

```
if not self.stack2:
    while self.stack1:
        self.stack2.append(self.stack1.pop())
    return self.stack2.pop() if self.stack2 else "Stack Queue is empty!"
```

Priority Queue using Min-Heap (Tree concept)

```
import heapq
```

```
class PriorityQueue:
```

```
    def __init__(self):
```

```
        self.heap = []
```

```
    def enqueue(self, item):
```

```
        heapq.heappush(self.heap, item)
```

```
    def dequeue(self):
```

```
        if self.heap:
```

```
            return heapq.heappop(self.heap)
```

```
        else:
```

```
            return "Priority Queue is empty!"
```

Testing all implementations

```
print("Array Queue:")
```

```
aq = ArrayQueue(3)
```

```
aq.enqueue(1)
```

```
aq.enqueue(2)
```

```
aq.enqueue(3)
```

```
aq.enqueue(4) # Should not be added
```

```
print([aq.dequeue() for _ in range(4)])
```

```
print("\nLinked List Queue:")
```

```
llq = LinkedListQueue()
```

```
llq.enqueue(10)
```

```
llq.enqueue(20)
```

```
llq.enqueue(30)
```

```
print([llq.dequeue() for _ in range(4)])
```

```
print("\nStack Queue:")
```

```
sq = StackQueue()
```

```
sq.enqueue(100)
```

```
sq.enqueue(200)
```

```
sq.enqueue(300)
```

```
print([sq.dequeue() for _ in range(4)])
```

```
print("\nPriority Queue:")
```

```
pq = PriorityQueue()
```

```
pq.enqueue(5)
```

```
pq.enqueue(1)
```

```
pq.enqueue(3)
```

```
pq.enqueue(2)
```

```
print([pq.dequeue() for _ in range(5)])
```