

# CS240

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# Queue ADT

## Queue ADT

- *Queue()* - Creates an empty Queue.
- *isEmpty()* - Returns a boolean value.
- *length()* - Returns number of items in the queue.
- *enqueue(item)* - Adds the item to the back of the queue.
- *dequeue()* - Removes and returns the item from the front of the queue.

# Exercise

```
1 q = Queue()
2 q.enqueue("A")
3 q.enqueue("B")
4 q.enqueue("C")
5 q.dequeue()
6 q.enqueue("D")
7
8 while not q.isEmpty():
9     print(q.dequeue())
```

1: A B C

2: B C D

3: D B C

# Exercise

```
1 q1 = Queue()
2 q2 = Queue()
3 q1.enqueue("A")
4 q1.enqueue("B")
5 q1.enqueue("C")
6
7 while not q1.isEmpty():
8     q2.enqueue(q1.dequeue())
9
10 while not q2.isEmpty():
11     print(q2.dequeue())
```

1: A B C

2: C B A

3: CRASH!

# Python List Implementation...

# Python List Queue *Amortized* Performance

1

<i>Queue()</i>	$O(1)$
<i>isEmpty()</i>	$O(1)$
<i>length()</i>	$O(1)$
<i>enqueue()</i>	$O(1)$
<i>dequeue()</i>	$O(1)$

2

<i>Queue()</i>	$O(1)$
<i>isEmpty()</i>	$O(1)$
<i>length()</i>	$O(1)$
<i>enqueue()</i>	$O(n)$
<i>dequeue()</i>	$O(1)$

3

<i>Queue()</i>	$O(1)$
<i>isEmpty()</i>	$O(1)$
<i>length()</i>	$O(1)$
<i>enqueue()</i>	$O(1)$
<i>dequeue()</i>	$O(n)$

# Python List Queue Amortized Performance

<i>Queue()</i>	$O(1)$
<i>isEmpty()</i>	$O(1)$
<i>length()</i>	$O(1)$
<i>enqueue()</i>	$O(1)$
<i>dequeue()</i>	$O(n)$

- Good enough?

# Linked List Implementation



# Circular Array Implementation

# Priority Queue ADT

## Priority Queue ADT

- *PriorityQueue()* - Creates an empty Priority Queue.
- *isEmpty()* - Returns a boolean value.
- *length()* - Returns number of items in the priority queue.
- *enqueue(item, priority)* - Adds the item to the priority queue.
- *dequeue()* - Removes and returns the item with the highest priority.

Implementation?

# Discrete Event Simulations