Queues

- Ordered collection data
- FIFO: First-In-First-Out
  - A new element is added at the end, the existing elements are deleted from the front (the other end)
Queues

Operations

- Enqueue: inserts an element in the queue
- Dequeue: delete an element from the queue
- IsEmpty: reports if the queue is empty or not
- IsFull: report if the queue is full or not
- Initialize: create a new empty queue
- Destroy: delete all contents of the queue
A queue in an array

- Think about possible problems if using an array

The head index is not necessarily at index 0
- Circular array → Two indices for Head and Tail

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- Enqueue(3)
- Enqueue(5)
- Enqueue(8)
A queue in an array

5 8

8

8 7

8 7 3

8 7 3 1

Dequeue()
Dequeue()
Enqueue(7)
Enqueue(3)
Enqueue(1)

A queue in an array

2 8 7 3 1

2 10 8 7 3 1

Enqueue(2)
Enqueue(10)

What are indices of Head and Tail for IsFull and IsEmpty?
A queue in an array

- Check “Queue_Array.cpp”

A queue in a linked list

- Three variables:
  - pHead: a base pointer
  - pTail: a pointer of the tail node.
  - nNumItem: # of items

- Add an item into the tail of the list
- Remove an item from the front of the list
A queue in a linked list

Queue

- pFront
- pTail
- nNumItems

Check “Queue_LinkedList.cpp”
Queue Applications

- Waiting in line in real life
- Keyboard buffer in Computer Science