
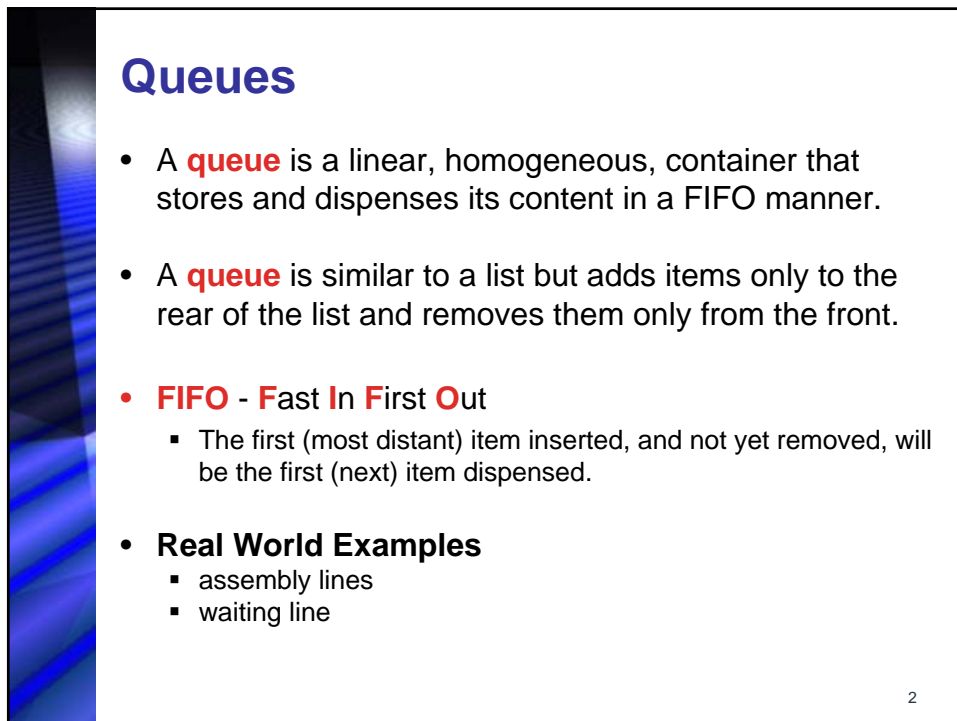


**CSC 124**  
<http://faculty.cua.edu/elsharkawy/csc-124.htm>

**Abstract Data Types:**  
**Queues**

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## Queues

- A **queue** is a linear, homogeneous, container that stores and dispenses its content in a FIFO manner.
- A **queue** is similar to a list but adds items only to the rear of the list and removes them only from the front.
- **FIFO - Fast In First Out**
  - The first (most distant) item inserted, and not yet removed, will be the first (next) item dispensed.
- **Real World Examples**
  - assembly lines
  - waiting line

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## Queues

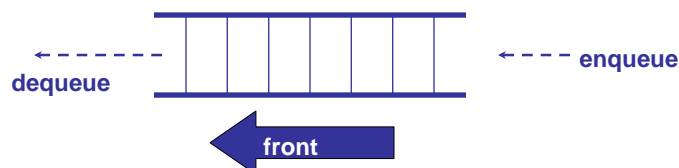
- As with our linked list example, by storing generic Object references, any object can be stored in the queue
- Queues often are helpful in simulations or any situation in which items get “backed up” while awaiting processing

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## Queue Operations

- We can define the operations for a queue
  - **enqueue** - add an item to the rear of the queue
  - **dequeue** (or serve) - remove an item from the front of the queue
  - **empty** - returns true if the queue is empty

### An Abstract Picture



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## Queue Representation

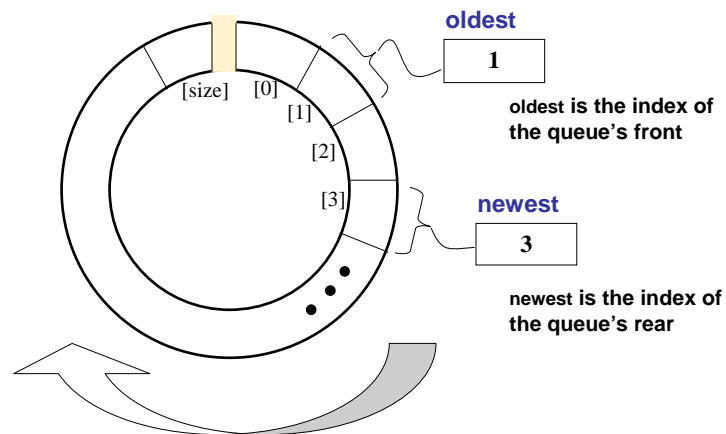
- A queue can be represented by a singly-linked list; it is most efficient if the references point from the front toward the rear of the queue
- A queue can be represented by an array, using the remainder operator (%) to “wrap around” when the end of the array is reached and space is available at the front of the array

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## Ring Buffer Representation

### Bounded List Representation

This is best accomplished by treating an array like it is a circular structure, also called a **ring buffer**.



Note: This representation requires  $n+1$  cells for a queue of length  $n$ .

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