# CSCI 132:
# Basic Data Structures and Algorithms

Queues (Linked List implementation)

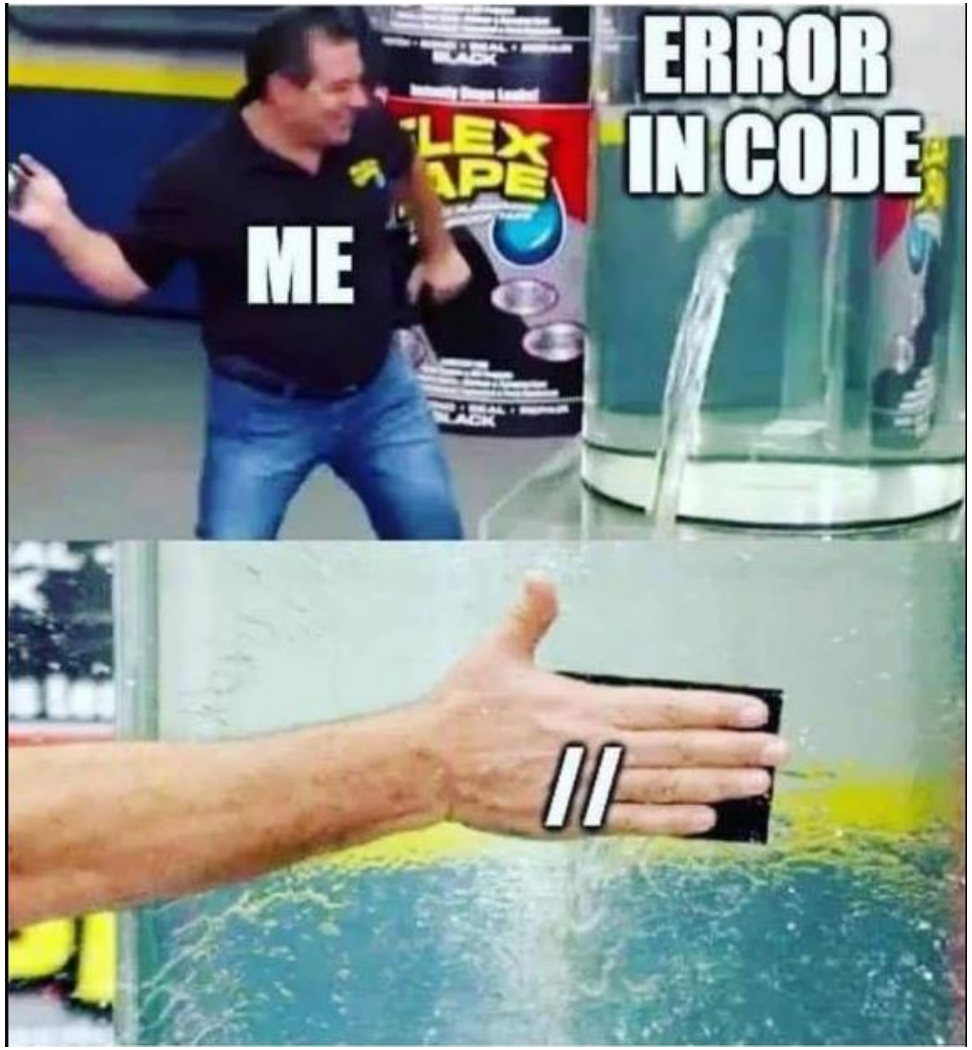
Reese Pearsall

Spring 2025

# Announcements

Lab 8 due **tomorrow** at 11:59 PM

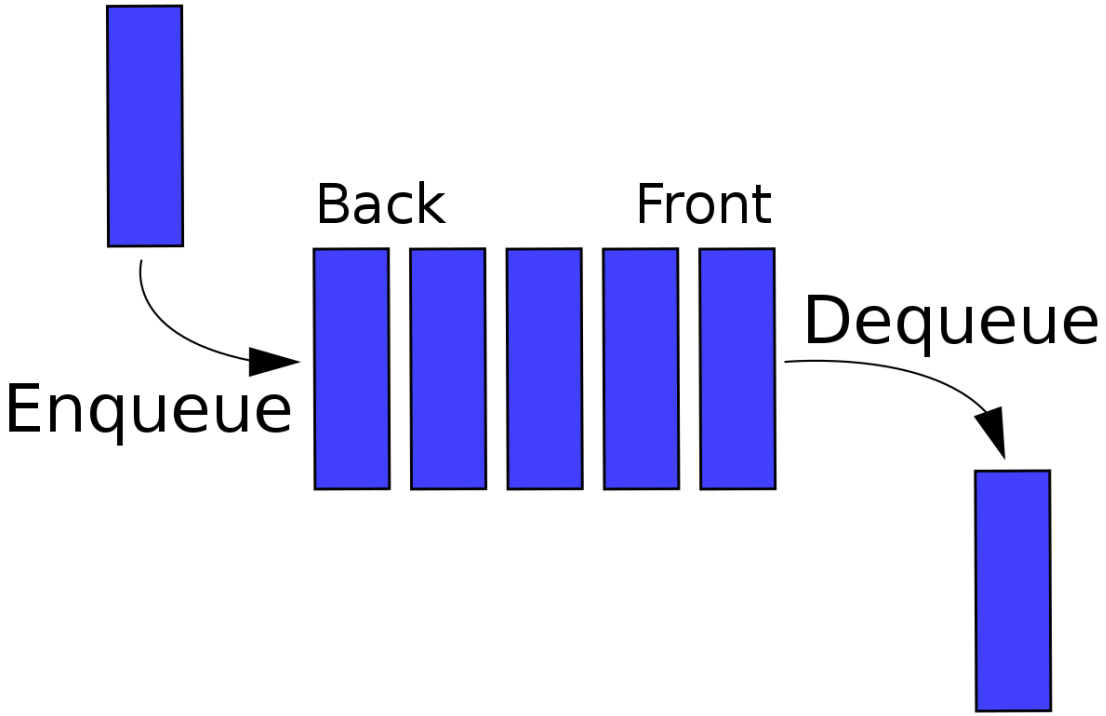
Program 3 posted, due  April 4th

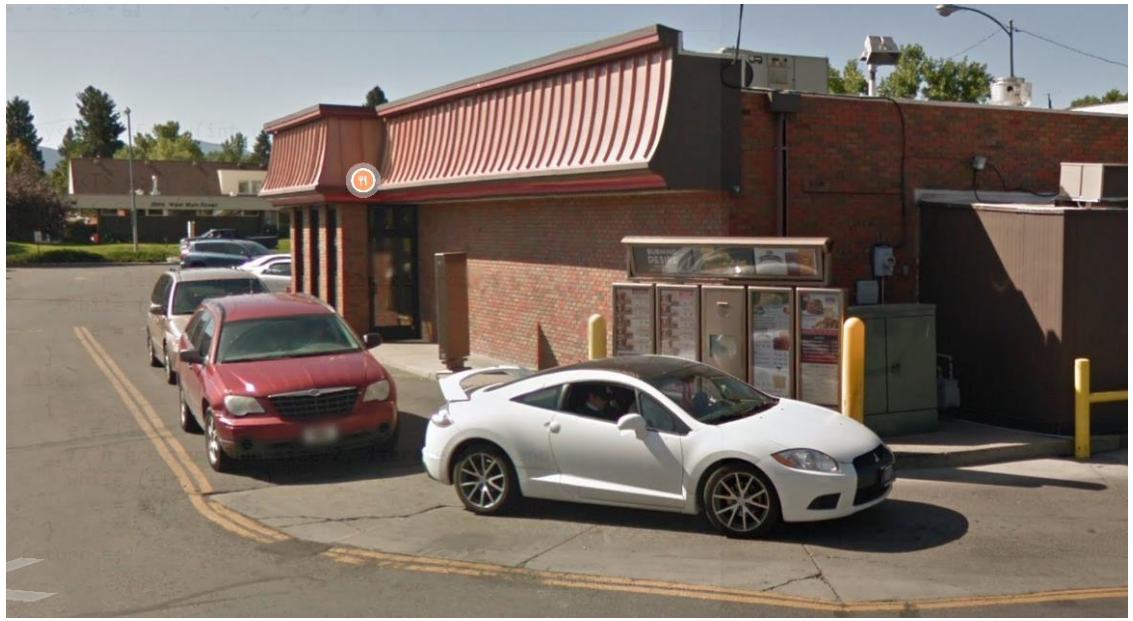


# Announcements

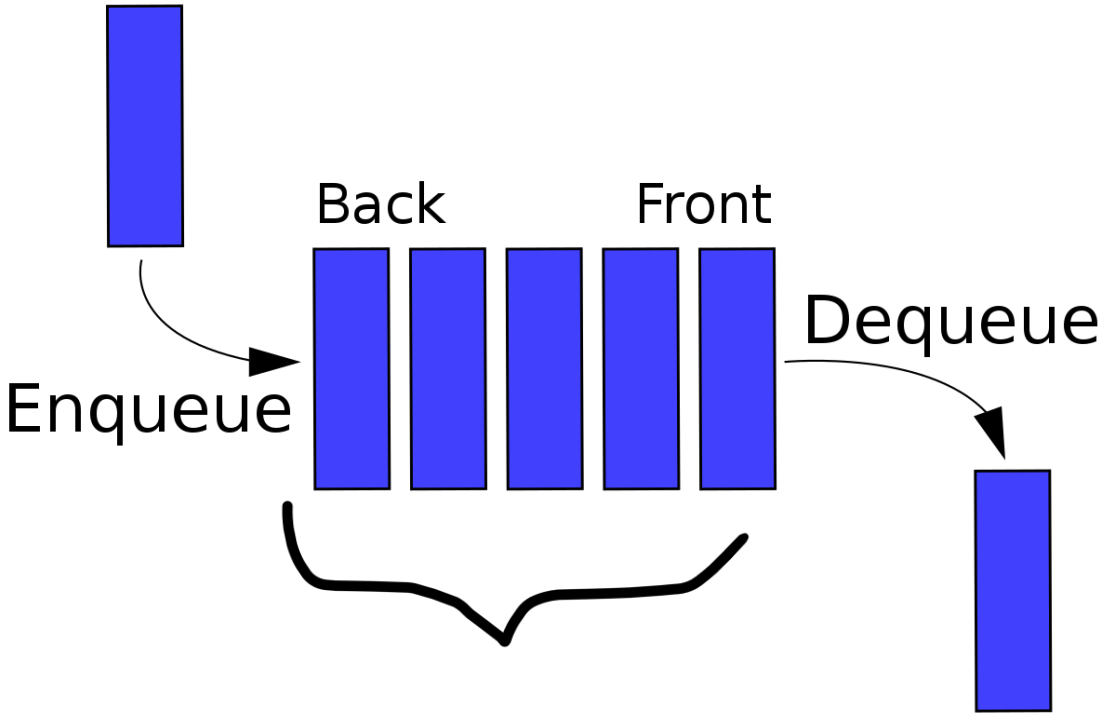
Lab 8

A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion



# A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion

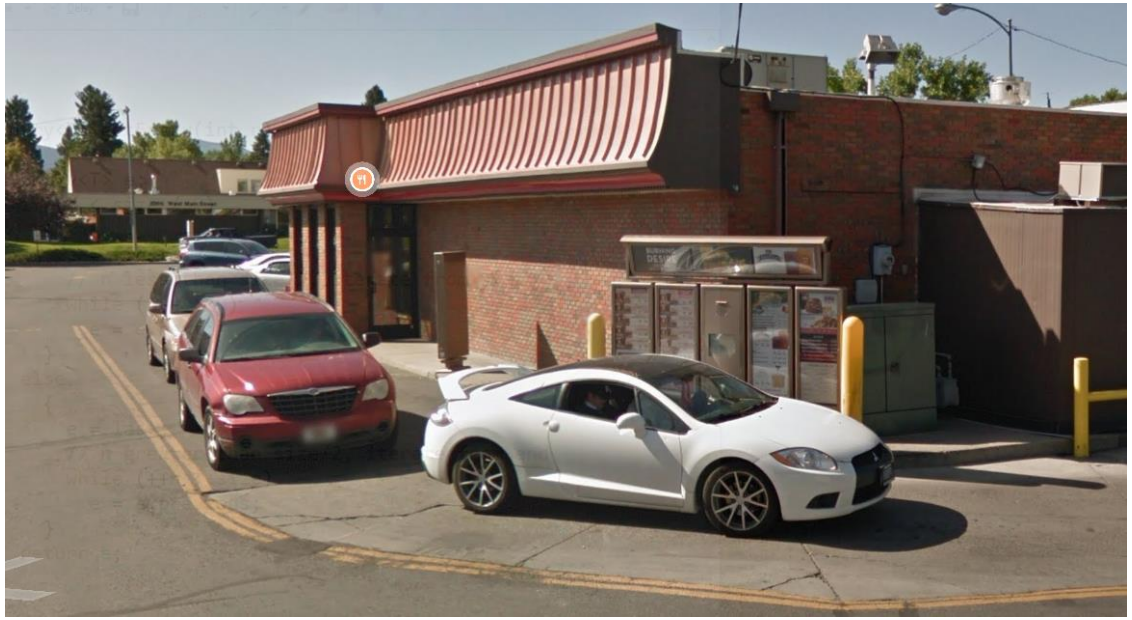



Once again, we need a data structure to hold the data of the queue

- Linked List (today)
- Array (tomorrow)

Elements get added to the **`Back`** of the Queue.

Elements get removed from the **`Front`** of the queue



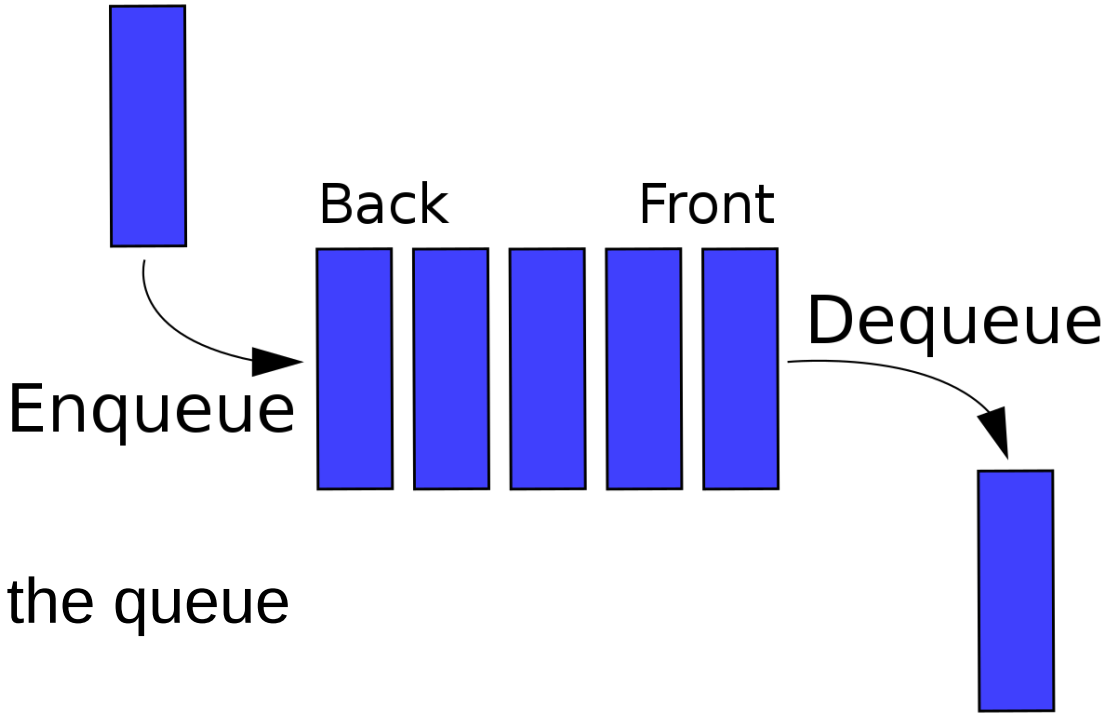
A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion

The Queue ADT has the following methods:

**Enqueue-** Add new element to the queue

**Dequeue-** Remove element from the queue

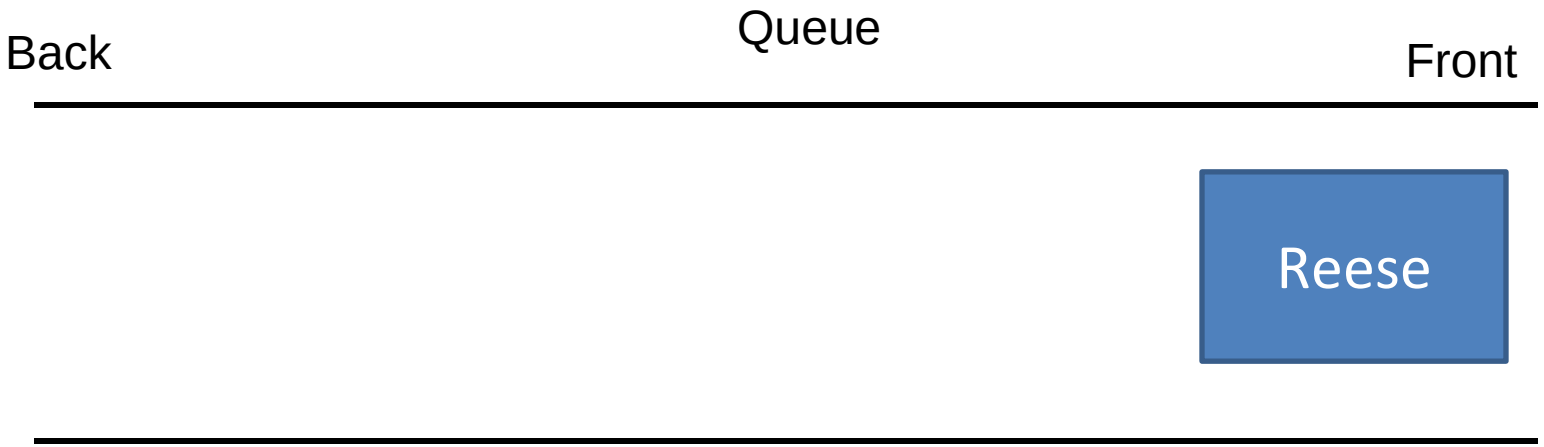
** Always remove the front-most element




**Peek()**- Return the element that is at the front of the queue

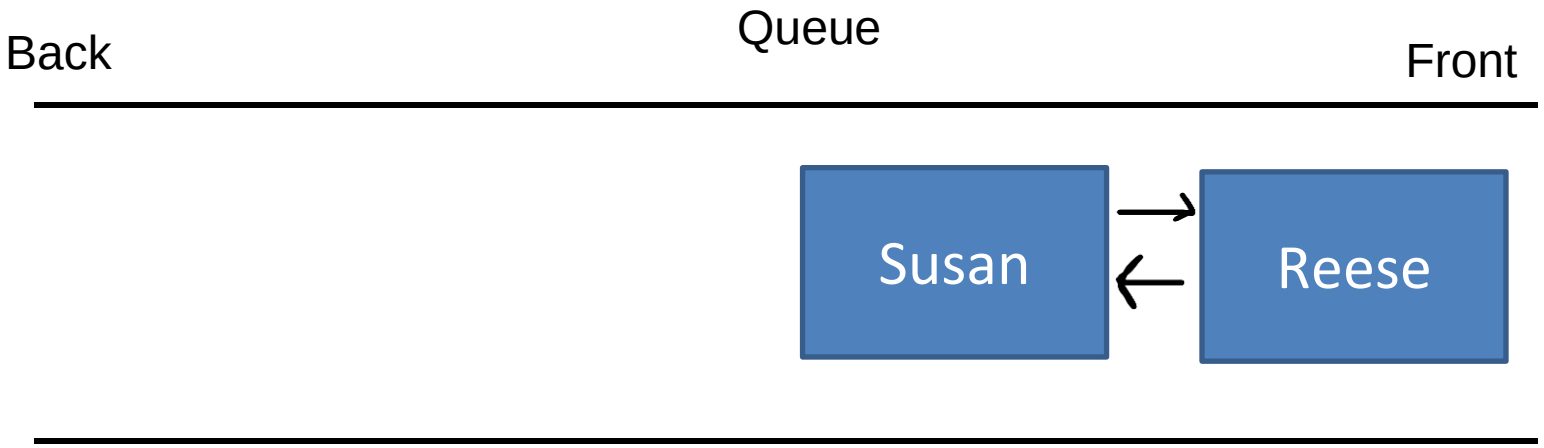
**IsEmpty()** – Returns true if queue is empty, returns false is queue is not empty

A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion



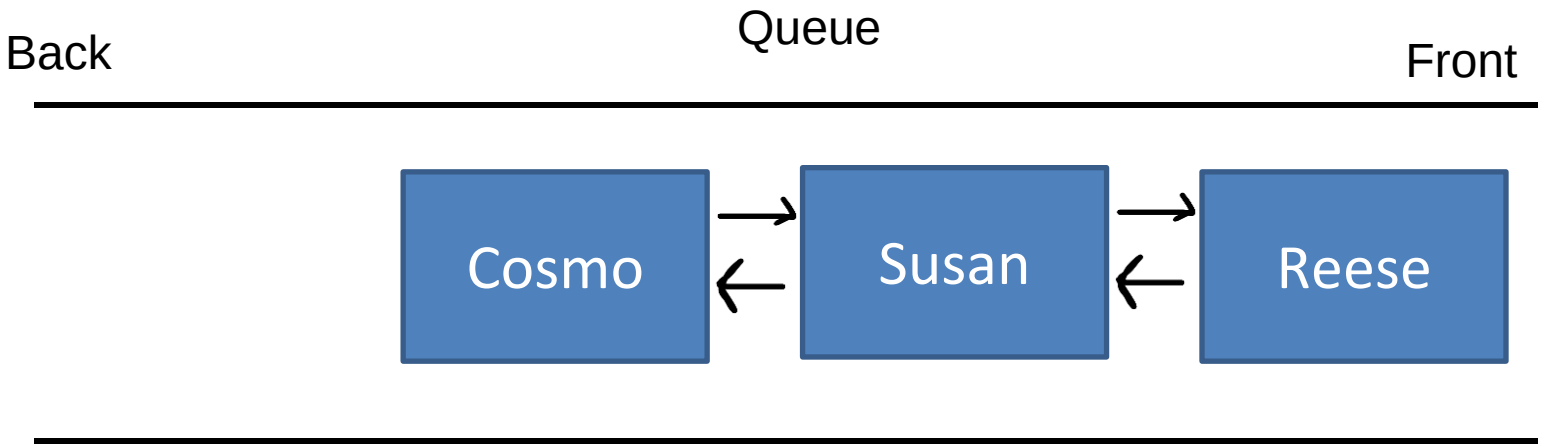

queue.enqueue(“Reese”);

A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion




```
queue.enqueue("Reese");
queue.enqueue("Susan");
```

A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion




```
queue.enqueue("Reese");
queue.enqueue("Susan");
queue.enqueue("Cosmo");
```

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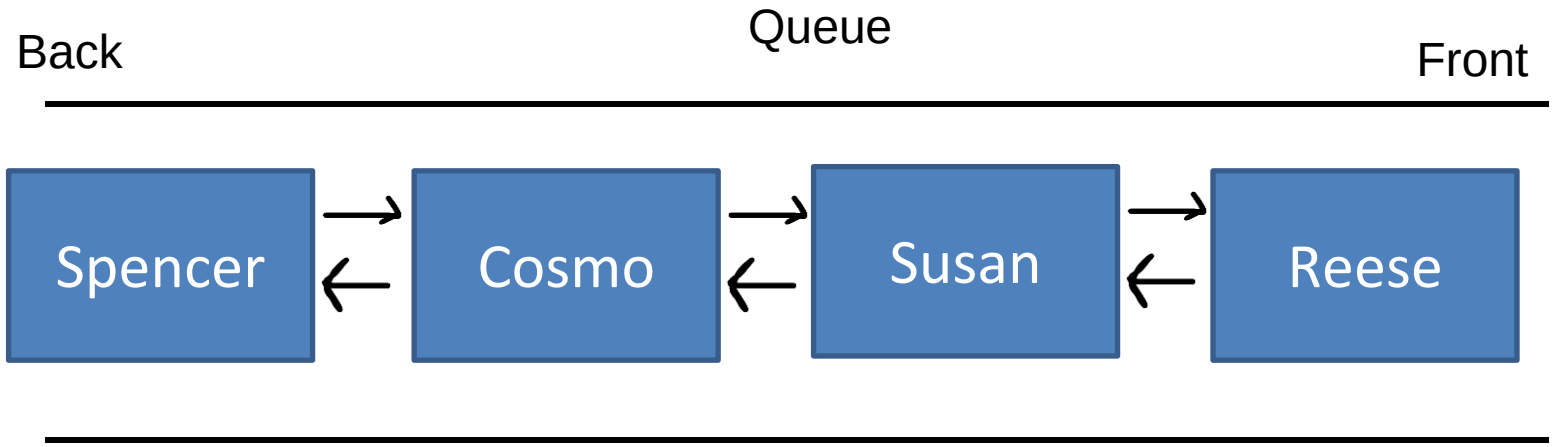
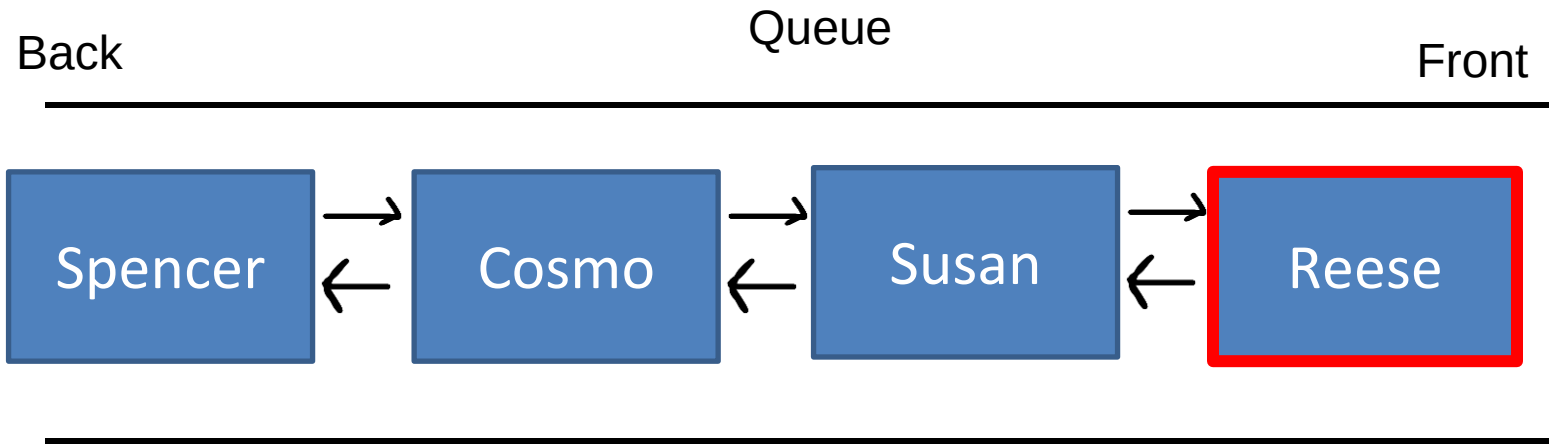



```
queue.enqueue(“Reese”);
queue.enqueue(“Susan”);
queue.enqueue(“Cosmo”);
queue.enqueue(“Spencer”);
```

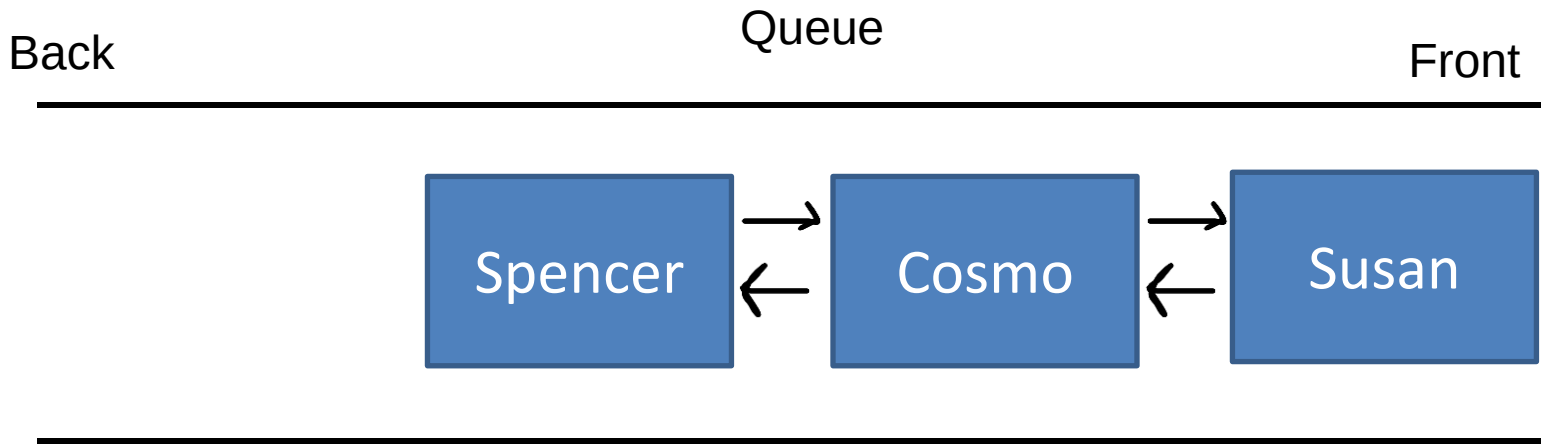
A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion




```
queue.enqueue("Reese");
queue.enqueue("Susan");
queue.enqueue("Cosmo");
queue.enqueue("Spencer");
```

```
queue.dequeue()
```

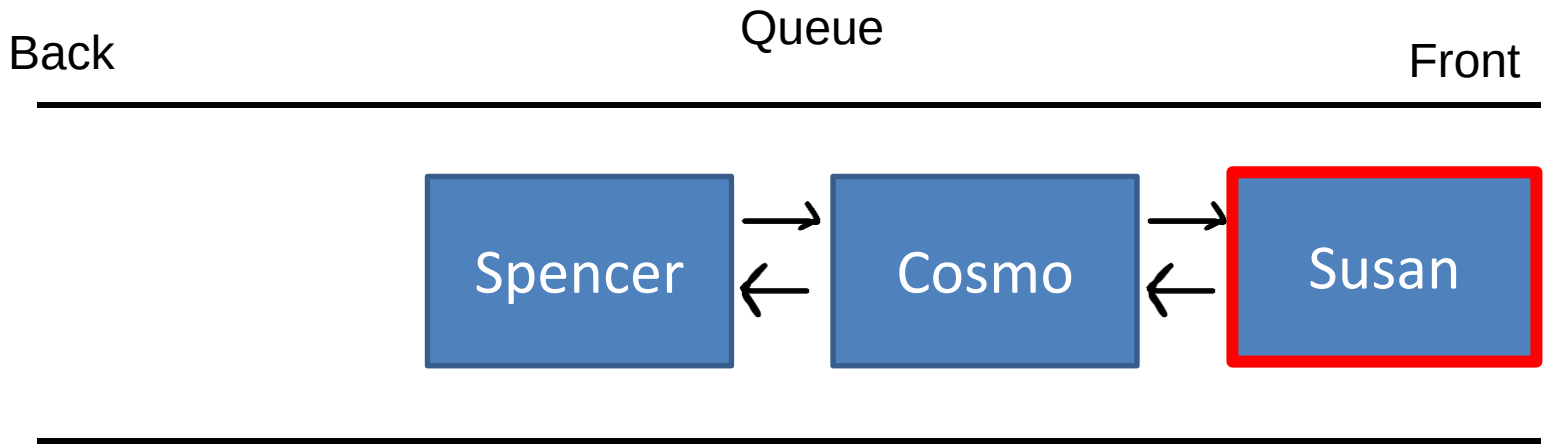
A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion




```
queue.enqueue("Reese");
queue.enqueue("Susan");
queue.enqueue("Cosmo");
queue.enqueue("Spencer");
```

```
queue. dequeue()
```

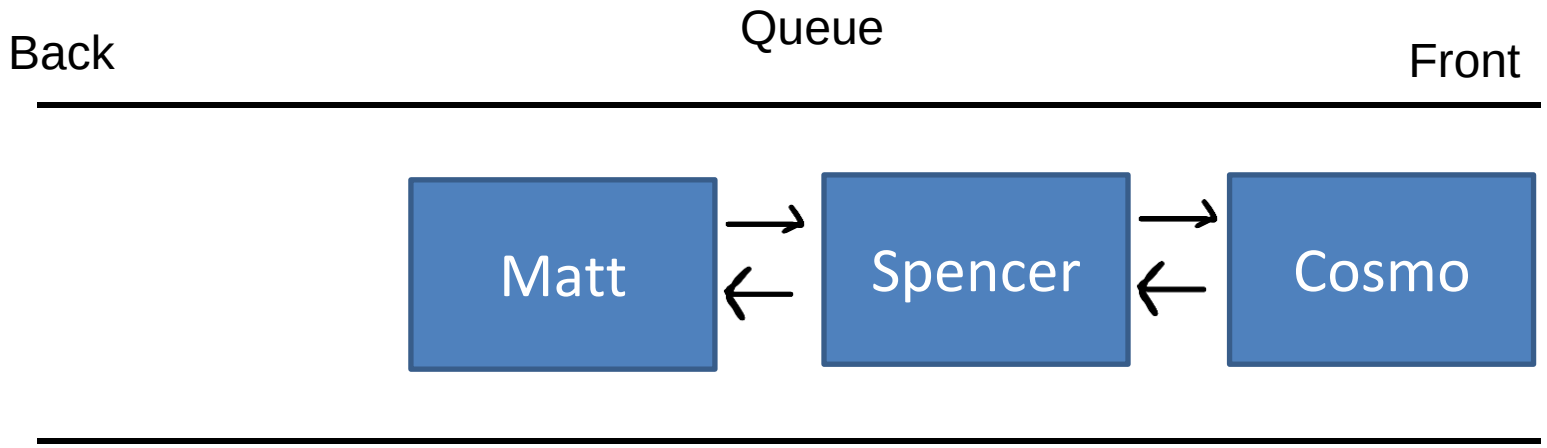
A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion




```
queue.enqueue("Reese");
queue.enqueue("Susan");
queue.enqueue("Cosmo");
queue.enqueue("Spencer");
```

```
queue. dequeue()
queue. dequeue()
```

A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion

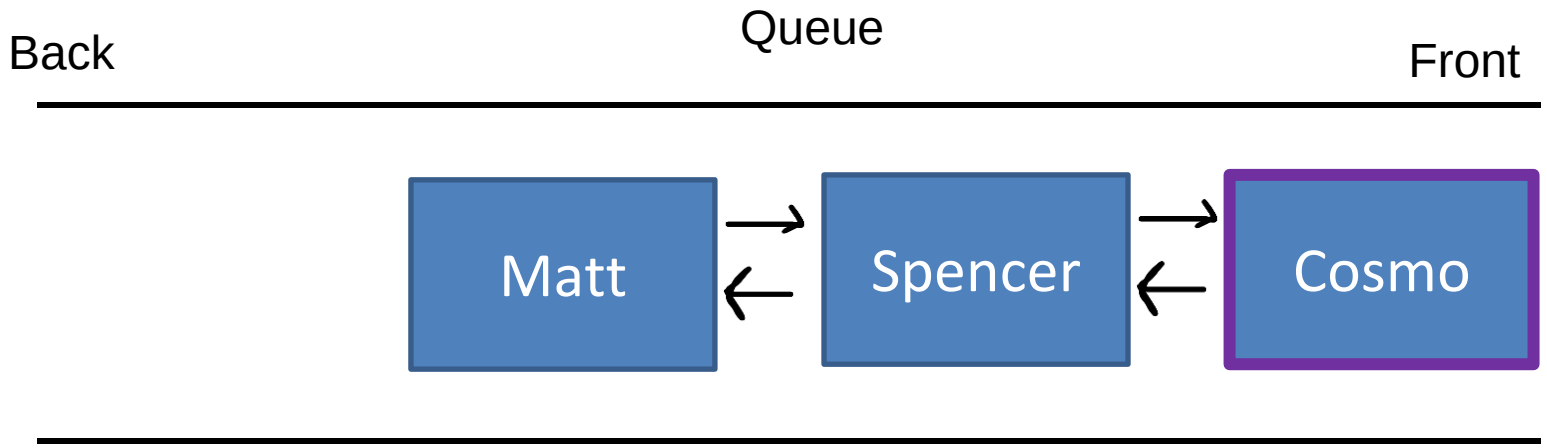



```
queue.enqueue("Reese");
queue.enqueue("Susan");
queue.enqueue("Cosmo");
queue.enqueue("Spencer");
```

```
queue. dequeue()
queue. dequeue()

queue.enqueue("Matt");
```

A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion

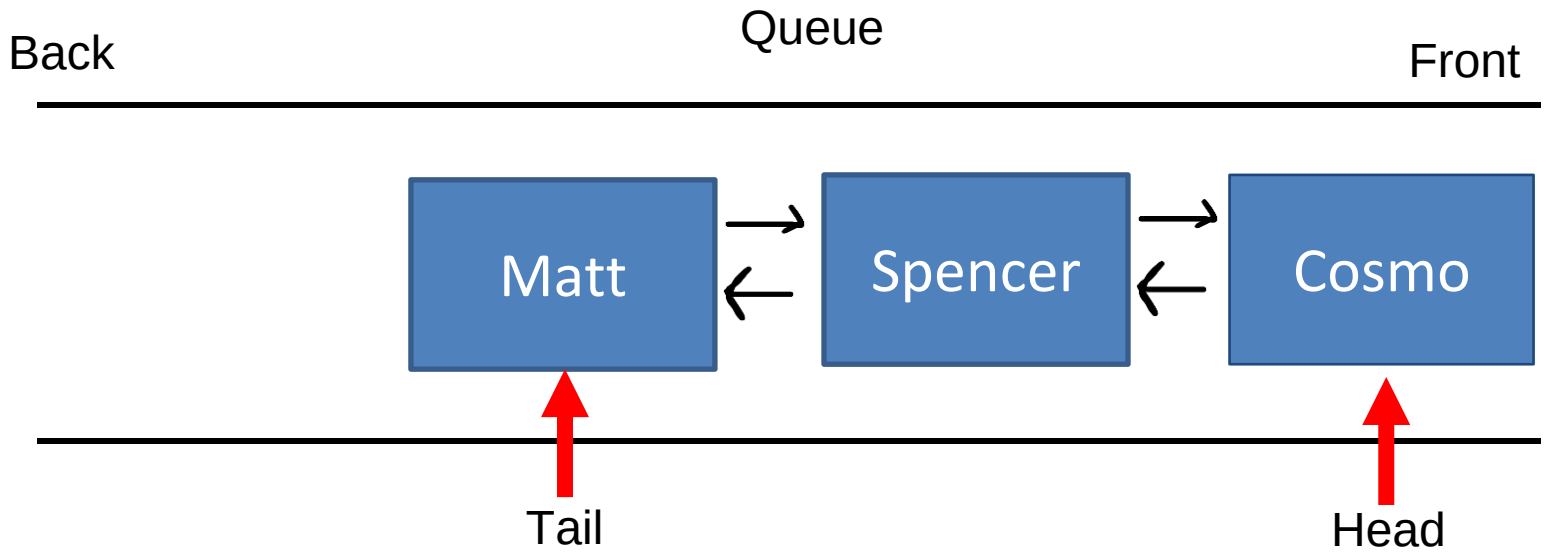



```
queue.enqueue("Reese");
queue.enqueue("Susan");
queue.enqueue("Cosmo");
queue.enqueue("Spencer");
```

```
queue. dequeue()
queue. dequeue()

queue.enqueue("Matt");
queue.peek()
    → "Cosmo"
```

A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion

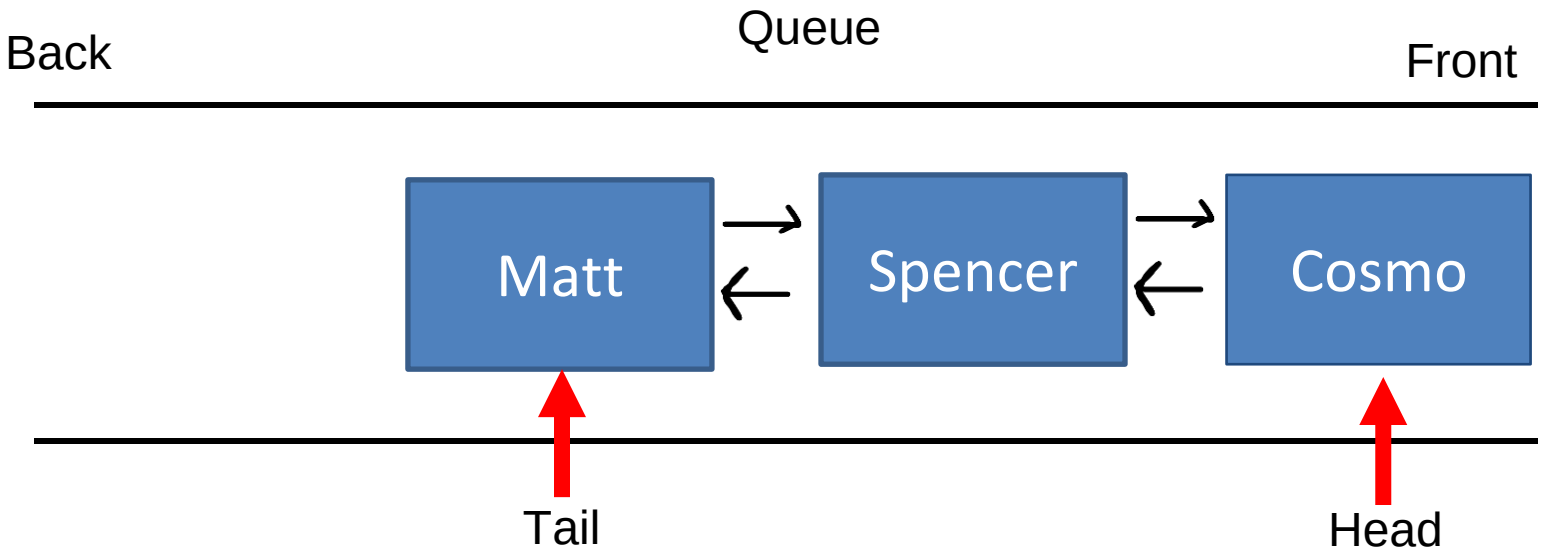



Linked List Implementation

When we enqueue, we add the element to ???

When we dequeue, we remove the element from ???

A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion

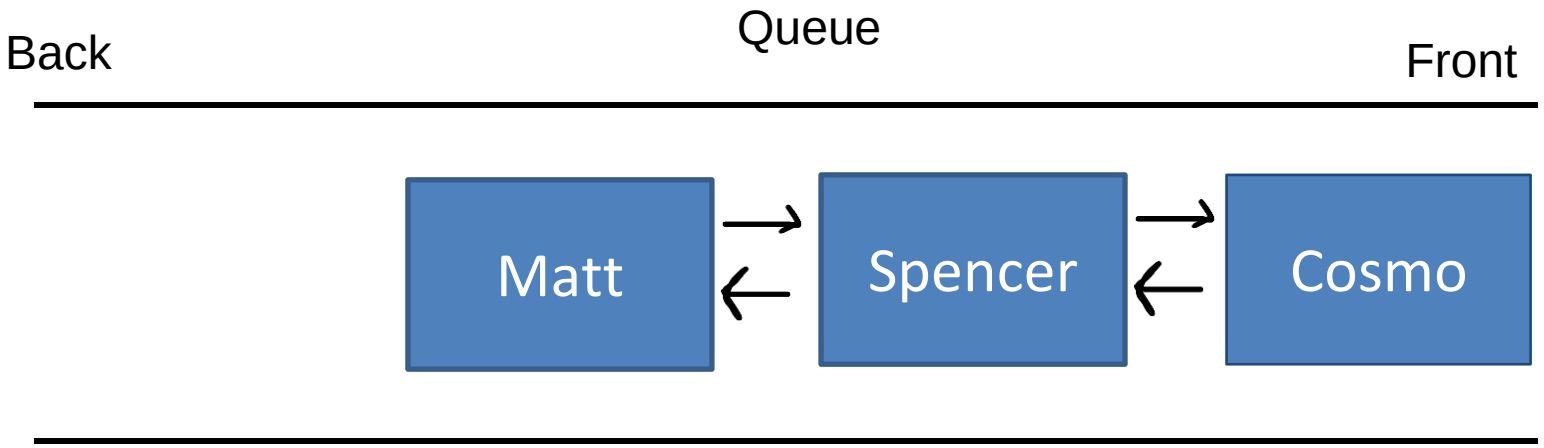



Linked List Implementation

When we enqueue, we add the element to the end of the linked list

When we dequeue, we remove the element from the beginning of the linked list

A **Queue** is a data structure that holds data, but operates in a First-in First-out (**FIFO**) fashion




As we use our queue, we might need to keep track of a few things

- The **size** of the queue
- The **front** of the queue (not when we use LLs)
- The **back** of the queue (not when we use LLs)