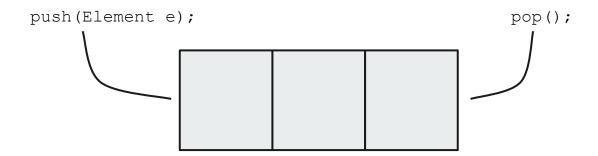
Queues in Java

Intermediate Programming Leap@CMU 2017

What are Queues?

- Data Structure
- First In First Out



Because Java

- Queues are an interface in Java, so you cannot declare a queue.
- A linked list is an implementation of a queue already available in Java (however, many more do exist)

```
LinkedList<Integer> aRandomQueue = new LinkedList<Integer>();
```

Queue Project

Goal: Create a Radix Sort algorithm

Input: The number of elements in a randomly generated array

Output: The sorted array

Example:

Num Elements: 10

Sorted array: [1, 2, 3, 4, 4, 5, 5, 78, 100, 101]

Radix Sort Explained

Radix sort is a non-comparison sort based upon the orderings of digits in a number.

- 1. Take a list of random numbers, say [8, 2, 101, 984, 32, 67, 115]
- 2. We then find the number with the most digits: [101, 984, 115], each has 3 digits. This is the number of times you're going to iterate through the algorithm
- 3. Now you're going to create 10 bins number 0 9
- 4. For each iterations, you are going to place the numbers in their respective bin based upon their nth digit from the right (e.g. on iteration 1, look at the ones place, on iteration 2, look at the 10s place, etc)

Worked Example

[8, 2, 101, 984, 32, 67, 115]

Iteration 1:

	101	32 2		984	115		67	8	
0	1	2	3	4	5	6	7	8	9

Worked Example (cont.)

[101, 2, 32, 984, 115, 67, 8]

Iteration 2:

8 2 10	01	115		32			67		984	
0		1	2	3	4	5	6	7	8	9

Worked Example (cont.)

[101, 2, 8, 115, 32, 67, 984]

Iteration 3:

8 2	101	2	3	4		7	8	984 9
67 32	115							

Done! [2, 8, 32, 67, 101, 115, 984]

Project Guidelines

```
[* ] = Implement Radix Sort

[** ] = User input (with error catching) and random array generation

[*** ] = Negative numbers

[**** ] = Lexicographical (alphabetical) sorting

[*****] = Big O Notation
```