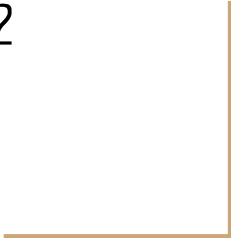# Programming, Problem Solving, and Algorithms

CPSC203, 2023 W2

Announcements

- Welcome back from Reading Week!

- See edX for information on Test 4.

- Reminder to book yourself a Test 4 slot next week!

- Project 1 is due soon!

Slides from the Assigned Videos

Today's Plan...

1. Announcements! (5 mins)

2. Weekly Videos Review/Questions (10 mins)

3. Demo to motivate Queues

Slides from the Assigned Videos

Data Structure: Queue

To orchestrate the fill, we'll use a data structure called a QUEUE.

Queue:
          enqueue(k) -- places data k onto the structure, at the "end"
          dequeue() -- removes and returns the "first" element from the
structure

Class Demo: Motivating Queues

In Python: Collections.deque
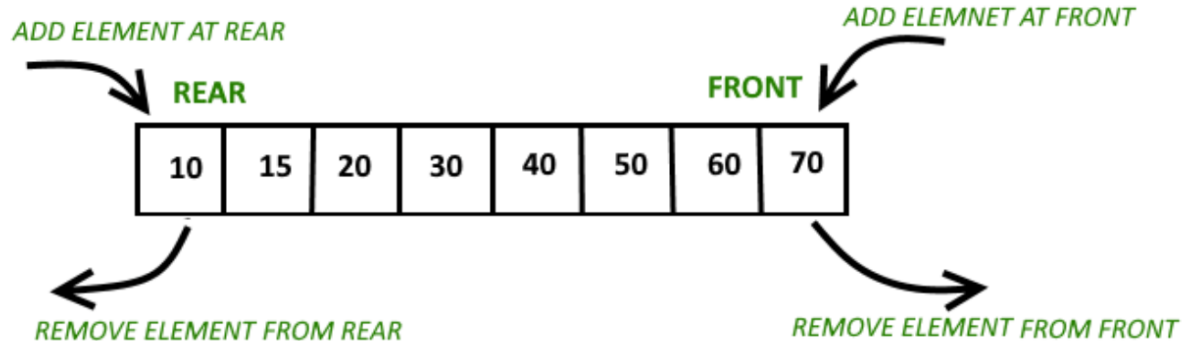
Pronounced "Deck" → **Deque in Python**

Read   Courses   Practice

Deque (Doubly Ended Queue) in Python is implemented using the module "**collections**". Deque is preferred over a list in the cases where we need quicker append and pop operations from both the ends of the container, as deque provides an **O(1)** time complexity for append and pop operations as compared to a list that provides O(n) time complexity.

ADD ELEMENT AT REAR   ADD ELEMNET AT FRONT

REAR   FRONT

| 10 | 15 | 20 | 30 | 40 | 50 | 60 | 70 |

REMOVE ELEMENT FROM REAR   REMOVE ELEMENT FROM FRONT

In Python: Collections.deque

Operations on deque

Example 1: Appending Items Efficiently

- **append()**:- This function is used to insert the value in its argument to the right end of the deque.
- **appendleft()**:- This function is used to insert the value in its argument to the left end of the deque.

In Python: Collections.deque

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Example 2: Popping Items Efficiently

- **pop()**:- This function is used to delete an argument from the right end of the deque.
- **popleft()**:- This function is used to delete an argument from the left end of the deque.

Example 3: Accessing Items in a deque

- **index(ele, beg, end)**:- This function returns the first index of the value mentioned in arguments, starting searching from beg till end index.
- **insert(i, a)** :- This function inserts the value mentioned in arguments(a) at index(i) specified in arguments.
- **remove()**:- This function removes the first occurrence of the value mentioned in arguments.
- **count()**:- This function counts the number of occurrences of value mentioned in arguments.

Source: GeeksForGeeks