# Stacks and Queues

Chapter 18

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  - Dynamic Stack
    - There is no max size
    - Often implemented using a Linked List

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  - top
    - Returns the item on the top of the stack
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    - top
        - Returns the item on the top of the stack
    - capacity
        - For static stacks, returns the maximum number of items allowed
    - isEmpty
        - Returns true if the stack is empty

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    - A good way to handle this is through an exception

## Template Stacks

- Similar to our other containers and structures, both the dynamic and static stacks can made into a template stack

## Stacks in the STL

- In the STL, we have seen vectors and lists already

- The STL also contains a stack

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```
stack< int, vector<int> > intStack; // vector stack
stack< int, list<int> > intStack; // list stack
stack< int> intStack; // Deque stack
```

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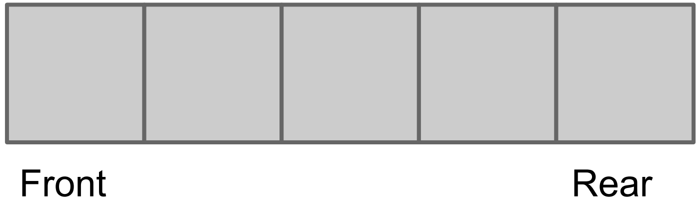

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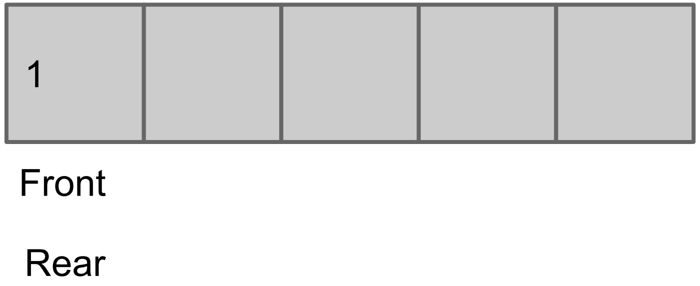
  - As items are added, they go from the front down



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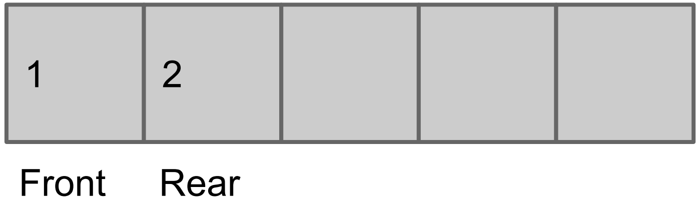

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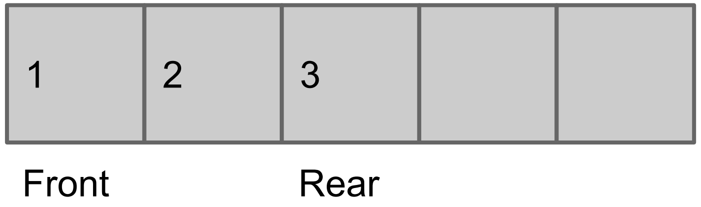

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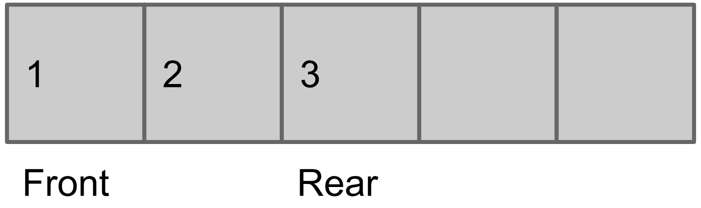

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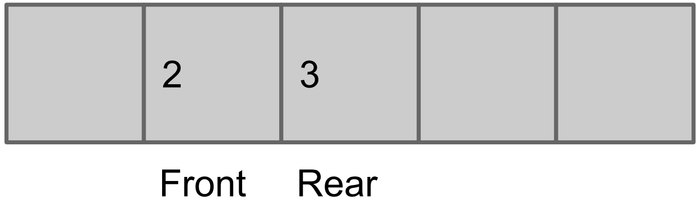

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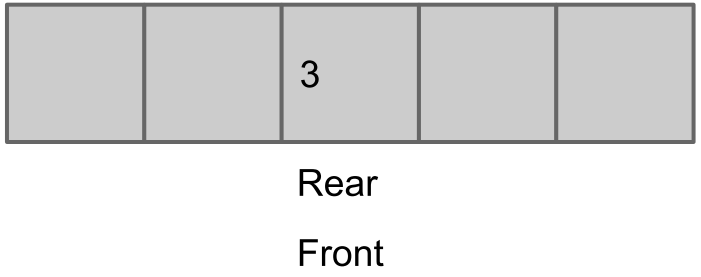

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- This problem is solved with a circular array
  - rear = (rear + 1) % queueSize;

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  - Enqueue with no room
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- This can be solved with exceptions

## Queue

- How about Dynamic Queues?

## Queues in the STL

- There are two Queue like structures in the STL
    - Queue
    - Deque (pronounced deck or deek)

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    - push
      - push an item to the back of the queue
    - pop
      - remove the first element on the queue

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  - It allows quick access to the front and back of the queue

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- The ‘deque’ operations are a bit different
  - push_back
    - places an item at the end of the queue
  - pop_front
    - removes the first item in the queue
  - front
    - returns the first item on the queue