

EECS 281, Week 3: Monday

STL Containers

Type	Containers
	vector, deque, list, forward list
	(multi)set, (multi)map
	unordered_(multi)set, unordered_(multi)map
	queue, stack, priority queue

Vector

Deque

Vector vs. Deque?

Array

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List

Forward List

Iterator Invalidation

Vector _____

Deque _____

List _____

Sequence Containers Summary

Container	insert/remove front	insert/remove middle	insert/remove back	search
Vector				
Deque				
Array				
List				
Forward List				

Associative Containers

Set

Multiset

Map

Multipap

Unordered Associative Containers

Unordered set

Unordered multiset

Unordered map

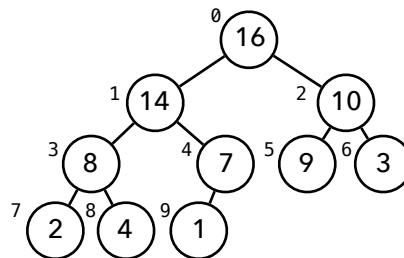
Unordered multipap

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Priority Queue

Heap

The (binary) heap data structure is an array that represents a nearly complete binary tree.



Heap property

Max-heap property: _____

Min-heap property: _____

Heap as an array

Number of elements: _____

root(): _____

parent(i): _____

left(i): _____

right(i): _____

height(): _____

Heap operations

buildMaxHeap produce a max-heap from an unordered array

maxHeapify(i) correct a single violation of the heap property in a subtree with root at i

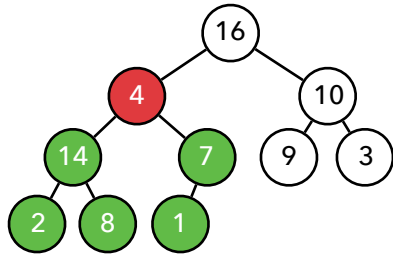
maxElement return the largest element

removeMaxElement remove the largest element

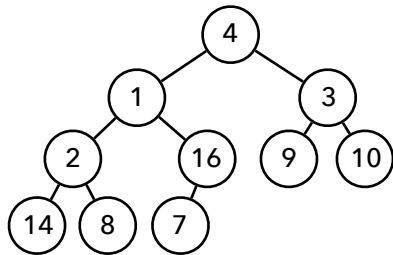
increaseKey(i, k) update the key of an element to a larger value k

insert(k) add an element with key k

maxHeapify

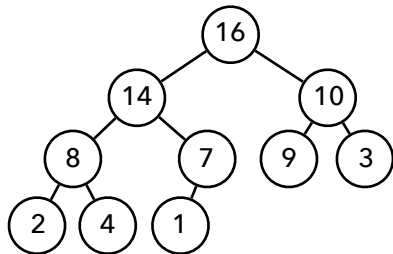


buildMaxHeap

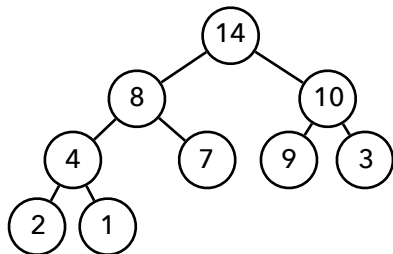


maxElement

removeMaxElement



insert



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Queue with Stacks

Implement `NewQueue`, a templated class that represents a queue using two stacks. Specifically, implement at least the following member functions:

- `size()`, which should return the size of the queue
- `empty()`, which should return true if the queue is empty and false otherwise
- `push()`, which should insert an element at the "end" of the queue
- `pop()`, which should remove an element from the "front" of the queue

Feel free to use `std::stack` that has the same methods: `size()`, `empty()`, `push()` and `pop()`.

When finished, take a picture of your code and email it to Maxim. Use additional pages if needed.