

CS180 - Stacks & Queues

Note Title

9/20/2012

Announcements

- HW due Sunday.
- Next HW will be up today.
on stacks.
- Midterm will be week after next.

Last time: Stacks

Two versions of code up.

- Array based
- From outside, just like STL.

LIFO

last in first out

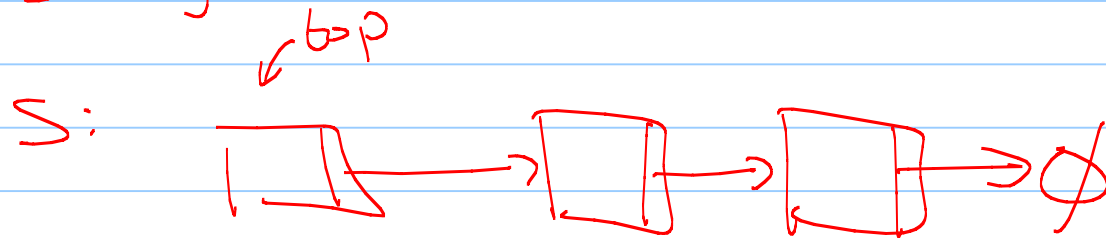
Linked Stacks

Underlying data will be kept in a linked list, not an array.

#include "SLinkedList.h"

private:

SLinkedListObj S;
int _size;



Big-O for stacks

size : $O(1)$

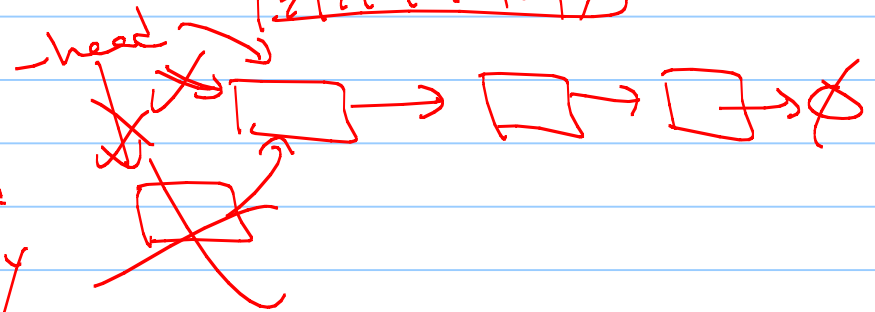
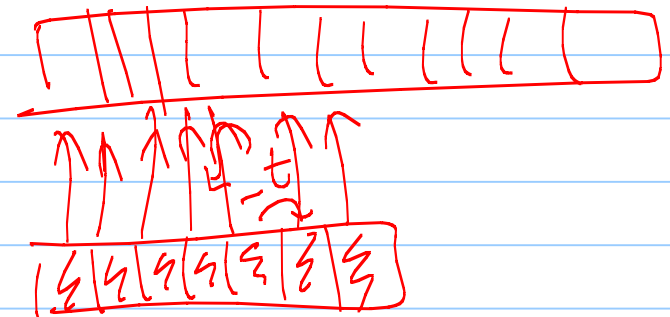
empty : $O(1)$

top : $O(1)$

pop : $O(1)$ in array
 $O(1)$ in linked

push : $O(1)$ in linked
 ~~$O(1)$~~ or $O(n)$ in array

use linked structure -
 $O(1)$ time

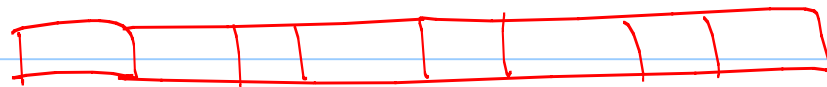


Queue

British for what word?

Line

remove
from front

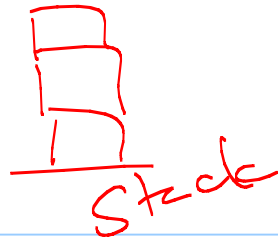


add to
end

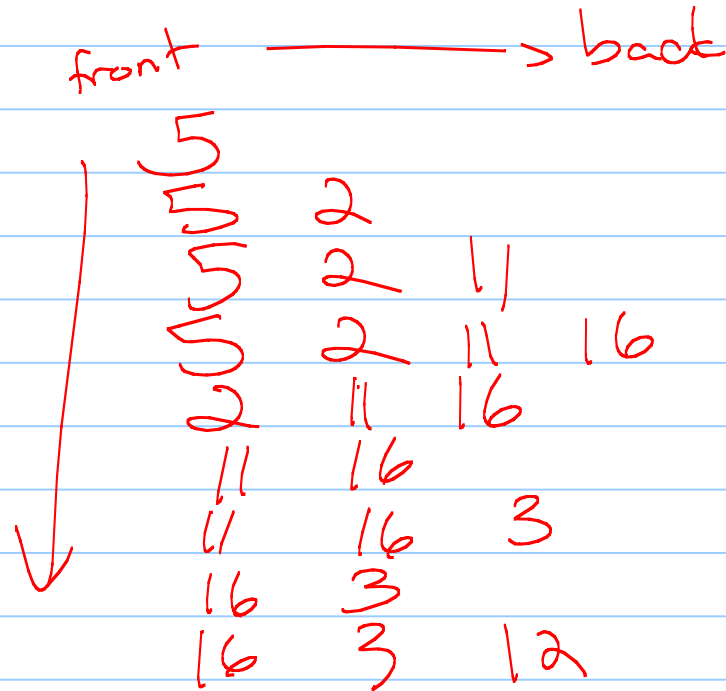
FIFO

first in first out

Behavior



push(5)
push(2)
push(11)
push(16)
pop()
pop()
push(3)
pop()
push(12)



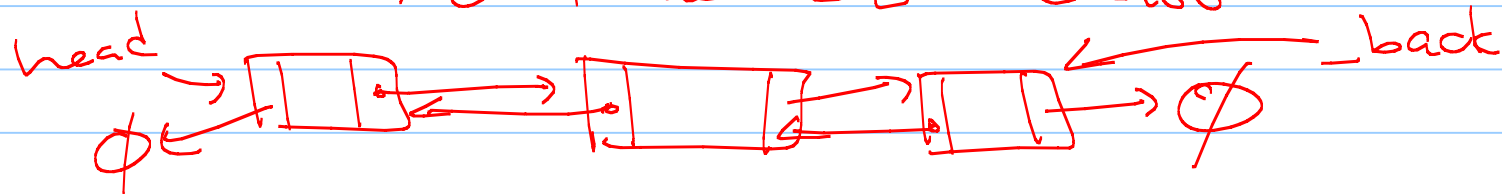
Setup

- Templating again
- Underlying structure is really a list with some functionality
- Private data:

① array-based

② linked-based

↳ can't use SLinked List

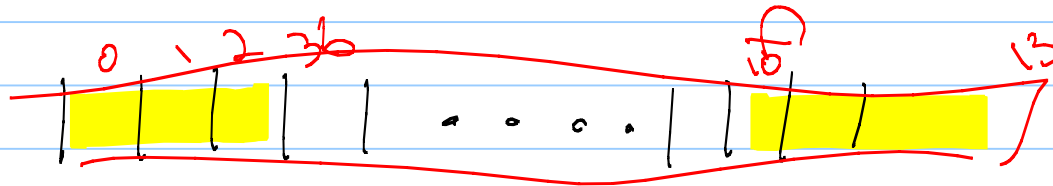
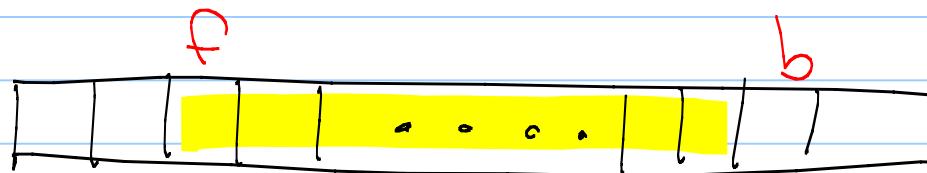
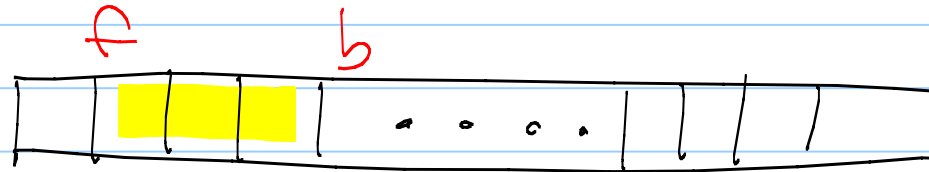
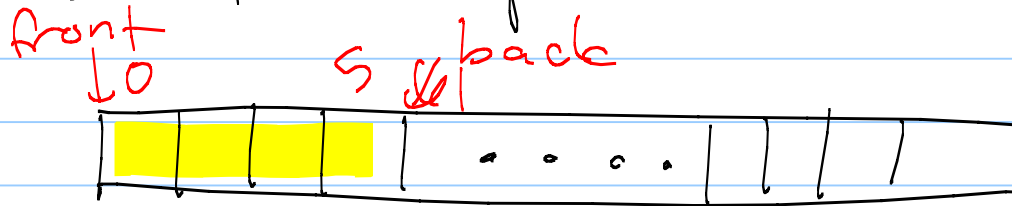


Functions

- size
- empty
- push
- pop
- top

Array Queues

- We must wrap around! Why?



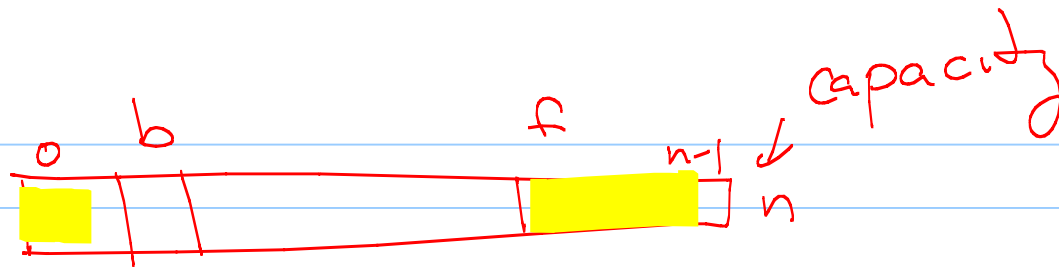
Two options

- A lot of if statements

- Modular arithmetic : remainders
in C++, %

$x \% y$: remainder when x is divided
by y

$x \% 2 = 0$ if x is even



$$f \% n$$

if f is greater than n , this
will "wrap around".

$$f = (f + 1) \% n$$

Linked Queues

How to work?

Need head & tail

↑
remove

↑
add

