Stacks and Queues

CS163 Lab 3

Stacks

Stack Operations (LIFO)

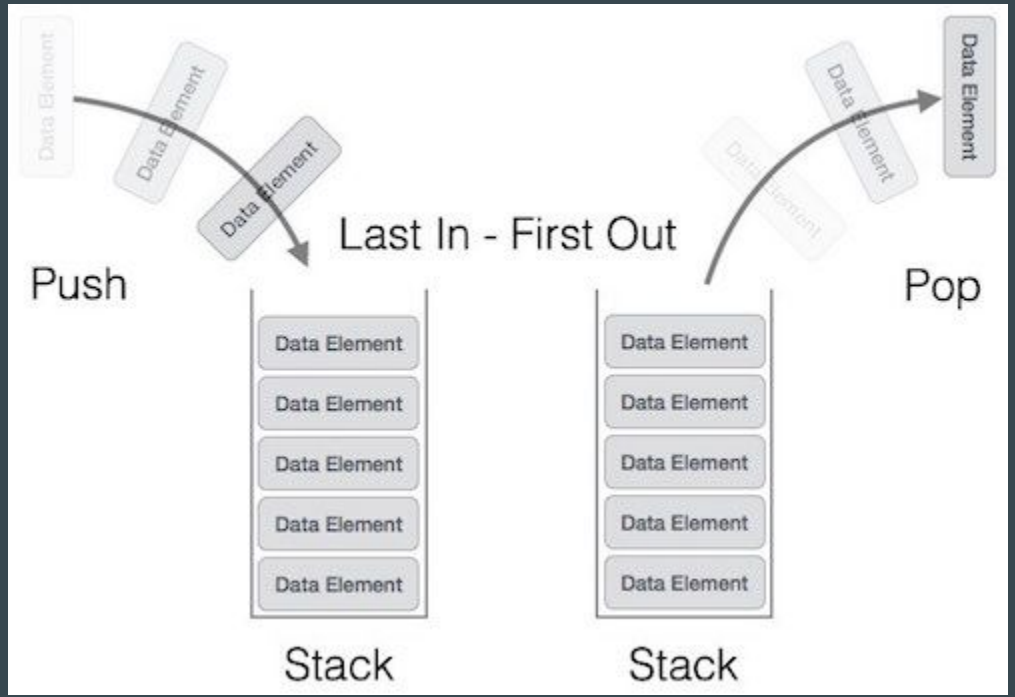
void push(data) - Put new data on top of the stack

void pop() - Remove the data on the top of the stack

peek (data &) - Retrieve the data on top of the stack (next data to be popped)

is_empty() - Returns true if the stack is empty, false if it's not empty

Stack Operations



Queues

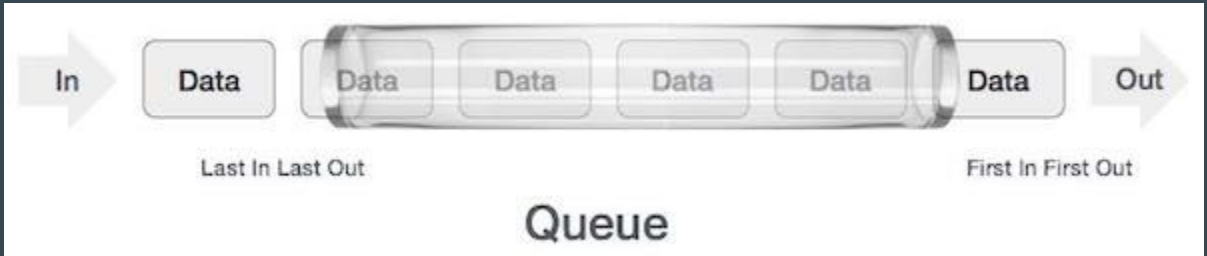
Queue Operations (FIFO)

void enqueue(data) - Put new data in the back of the queue

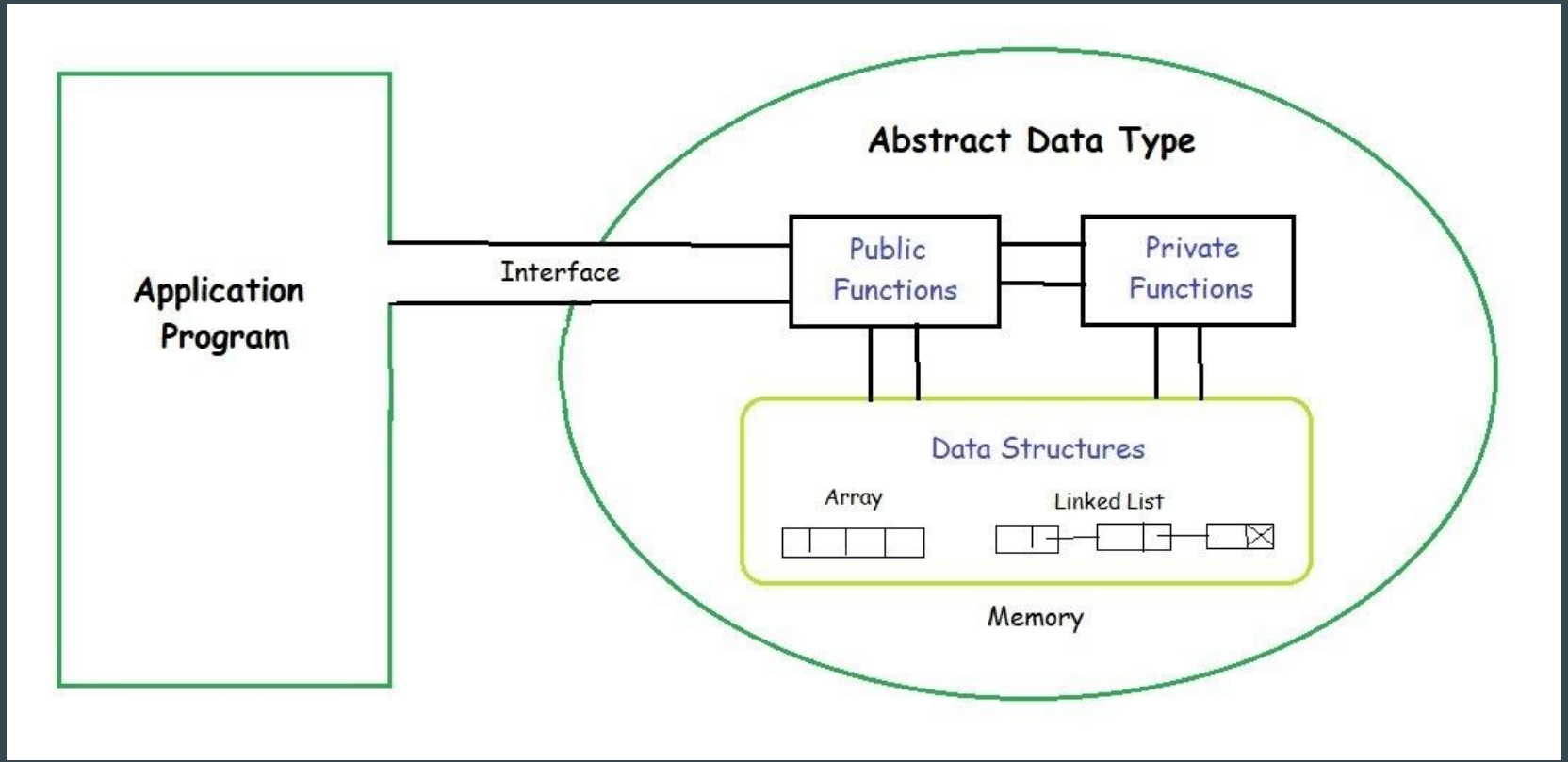
void dequeue() - Remove the data at the front of the queue

peek (data &) - Retrieve the data in the front of the queue (next data to be dequeued)

is_empty() - Returns true if the queue is empty, false if it's not empty



ADT vs Data Structure and the "Wall"

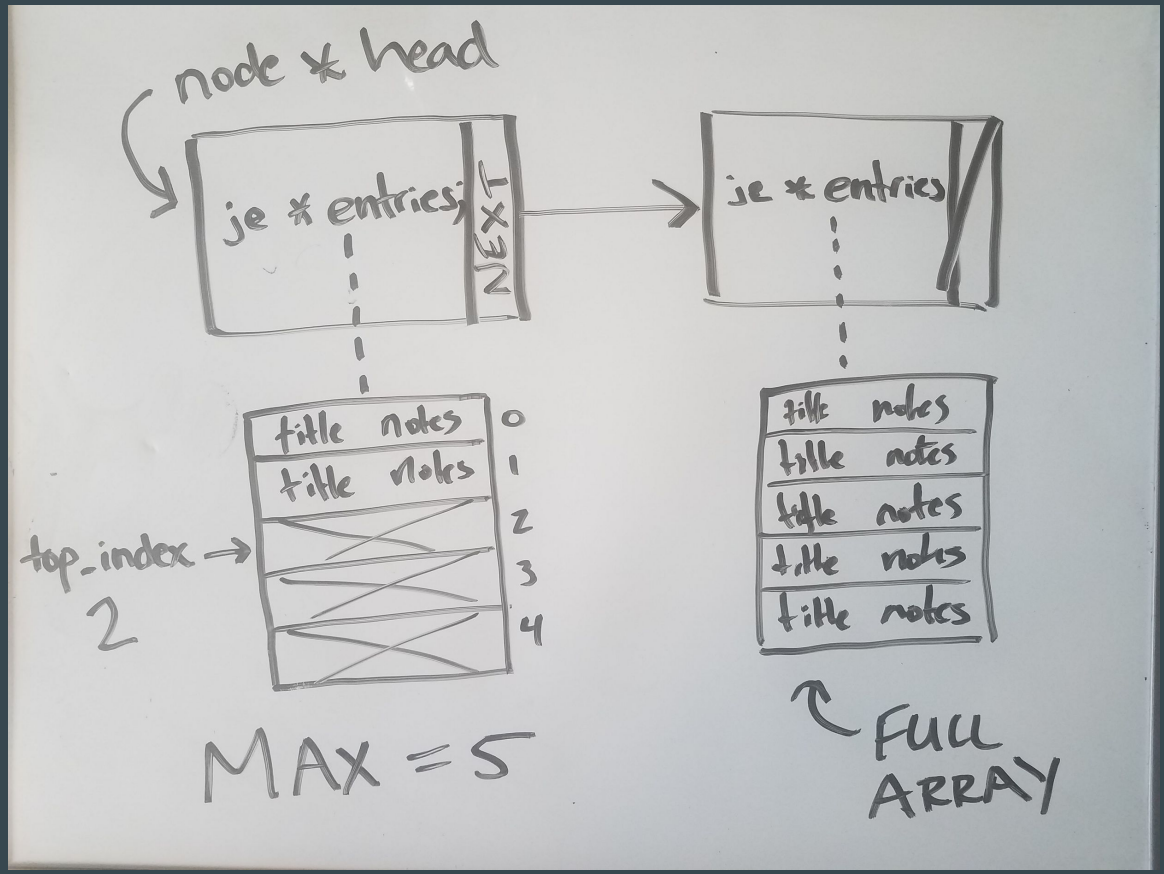


ADT vs Data Structure and the "Wall"

- ADT is the conceptual representation, model (Stack, Queue, List, etc)
- Data structures is a physical representation of a collection of data (Array, LLL)
- We can implement an ADT with different data structures (some better than others) BUT the functionality of the ADT will not change!
- We should be able to swap out a different data structure in the implementation and the client program wouldn't have to change.
- The "Wall" is what separates the client program (main) from the implementation of the ADT.
- Don't use nodes in main!
- Main should get user input/data and pass it over the "Wall" to the ADT implementation.

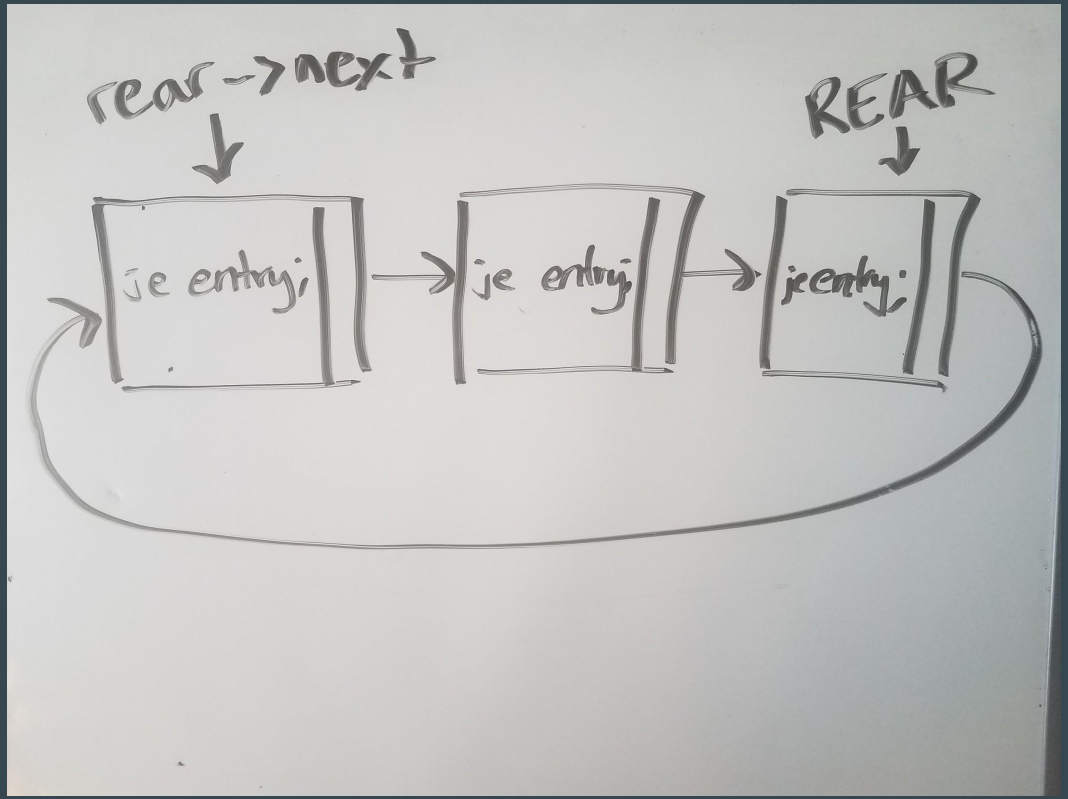
What Data Structure Should We Use For a Stack?

Linear Linked List of Dynamic Arrays



What Data Structure Should We Use For a Queue?

Circular Linked List



A Note on Memory Management

- How do I allocate my journal entry array with a size of MAX? (journal_entry * entries)

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- entries = new journal_entry[MAX];
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  (journal_entry * entries)
- entries = new journal_entry[MAX];
- How do I deallocate my journal entry array?
- delete [] entries; (don't forget [] !)