Lab 9: Stack and Queue

COP 2500 CONCEPTS IN COMPUTER SCIENCE
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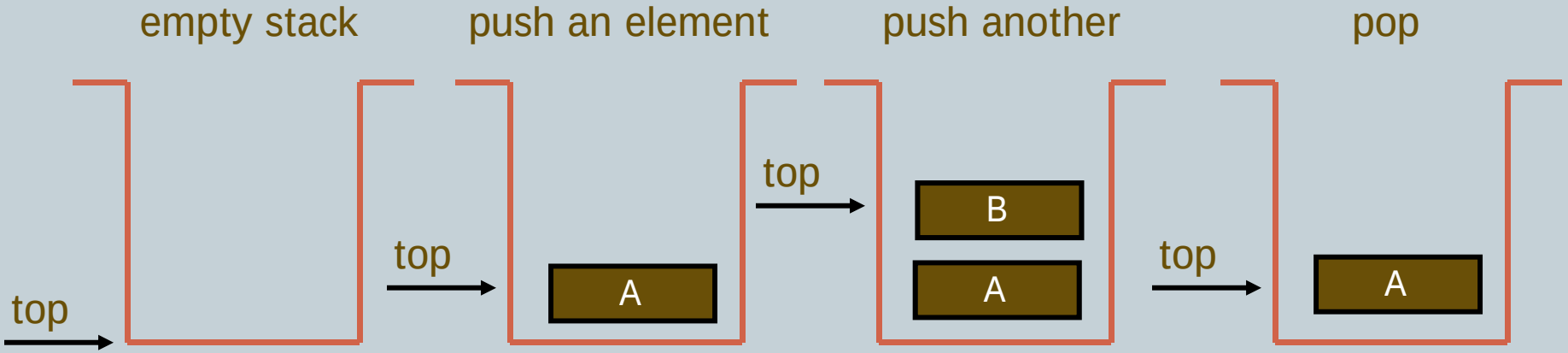
What is Stack?

- A stack is a list with the restriction
  - Insertions and Deletions can only be performed at the *top* of the list.
- Fundamental operations:
  - Push: Equivalent to an insert
  - Pop: Deletes the most recently inserted element
  - Peep: Examines the most recently inserted element
- Stack are known as LIFO (Last In, First Out) lists
  - The last element inserted will be the first to be retrieved

Push, Pop, and Peep

- Primary operations: Push and Pop
- Push
  - Add an element to the top of the stack
- Pop
  - Remove the element at the top of the stack
- Peep
  - Return the top element of the stack
  - Unlike the pop, this function does not removed the top element

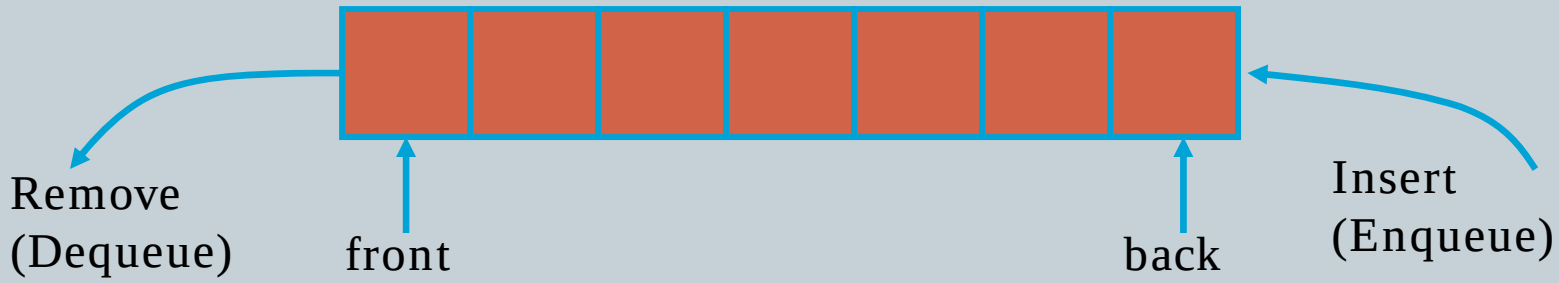


What is Queue?

- Like a stack, a *queue* is also a list. However, with a queue, insertion is done at one end, while deletion is performed at the other end.
- Accessing the elements of queues follows a First In, First Out (FIFO) order.
  - Like customers standing in a check-out line in a store, the first customer in is the first customer served.
- Basic operations:
  - Enqueue: insert an element at the rear of the list
  - Dequeue: delete the element at the front of the list

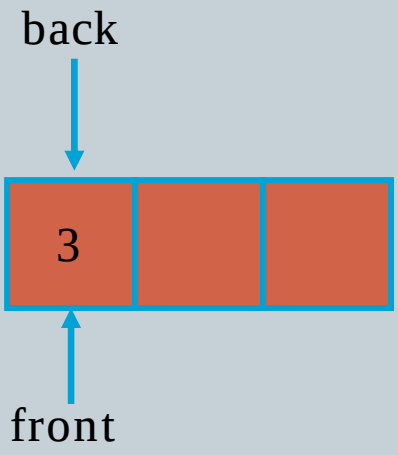
Enqueue and Dequeue

- Primary queue operations: Enqueue and Dequeue
- Like check-out lines in a store, a queue has a front and a back.
- Enqueue
  - Insert an element at the back of the queue
- Dequeue
  - Remove an element from the front of the queue

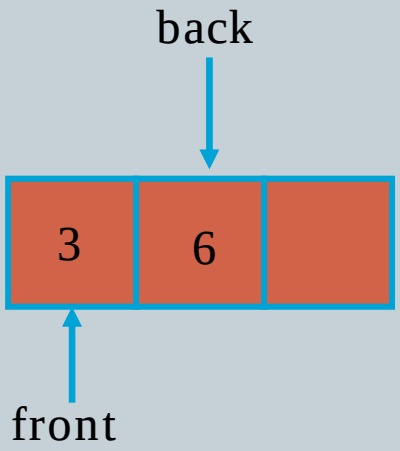


Enqueue

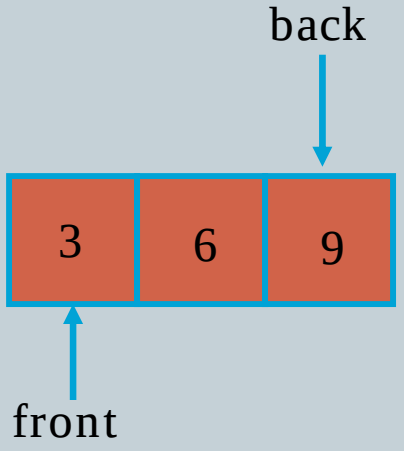
- When enqueuing, the front index is always fixed and the back index moves forward in the array.



Enqueue(3)



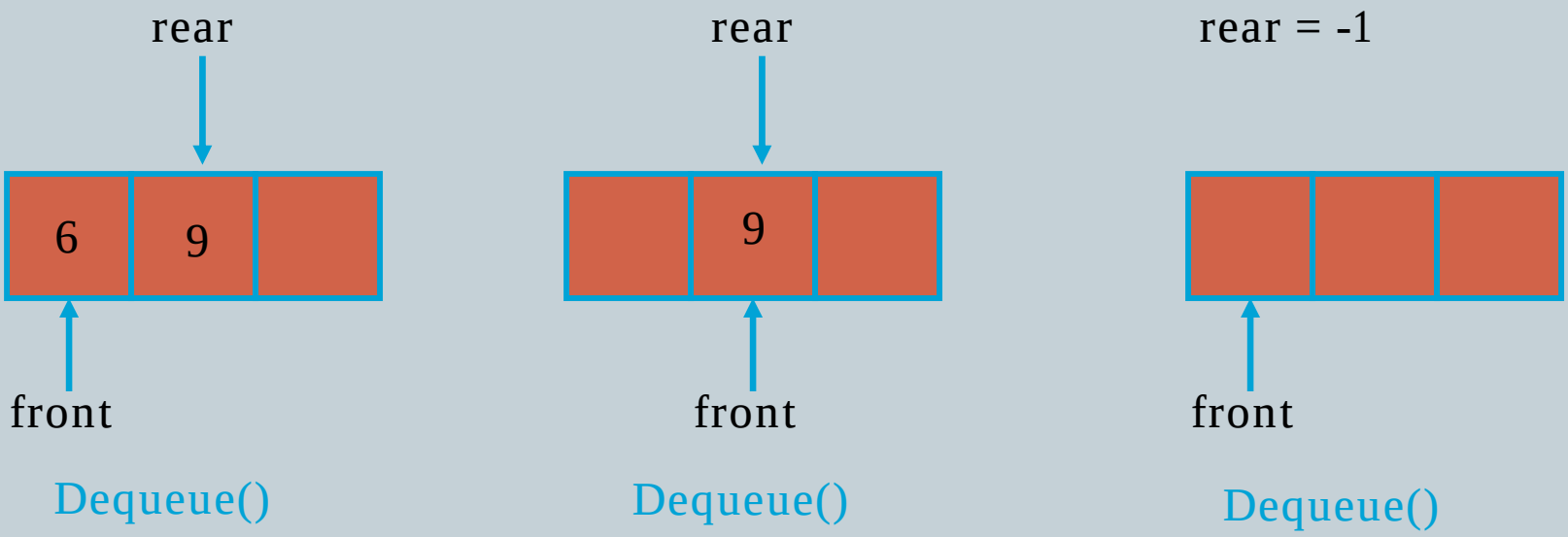
Enqueue(6)



Enqueue(9)

Dequeue

- When an item is dequeued, the front index moves by one element towards the back of the queue (thus removing the front item, so no copying to eighboring elements is needed).



References

- http://www.cs.ust.hk/~huamin/COMP171/stack-queue.ppt

Hints for Lab 9

- Modify only Push(), Pop(), Peek() functions for stack and Enqueue(), Dequeue() functions for queue.
- Work only one function at a time until the function is working.
- For Queue functions:
  - Variables – myqueue, back, and front are already declared.
  - document.queue.entry.value – is the value from the text box.
  - alert("This is alert"); - similar to document.write.
  - Do not remove display_queue();
- For Stack functions:
  - Variable – mystack and top are already declared.
  - document.stack.entry.value – is the value from the text box.
  - Do not removed display_stack();