CSE 101 3-30-21

ADTs (Abstract Data Types)

An ADT consists of

(1) a set of 'mathematical' structures, called the states

(2) a set of operations on states.
= categories:

- manipulation Procedures: convert from one state to another.
- access functions: return information about a state.

Ex Integer Queue

states : finite sequences of integers
including ( ) empty seq.
typical : (, , , ,)
↑ front ↑ back

operations

- manipulation Proc :
  - Enqueue(): insert int at back
  - Dequeue(): deletes front element
- access fcns :
  - getFront() : returns front
  - getLength() : return length
  - isEmpty() : return true iff in empty state

Possible history of states

op	state	return value
.	( )	-
Enqueue(5)	(5)	-
Enqueue(1)	(5, 1)	-
Enqueue(7)	(5, 1, 7)	-
Dequeue()	(1, 7)	-
Enqueue(3)	(1, 7, 3)	-
getLength()	-	3
isEmpty()	-	false
:	:	:

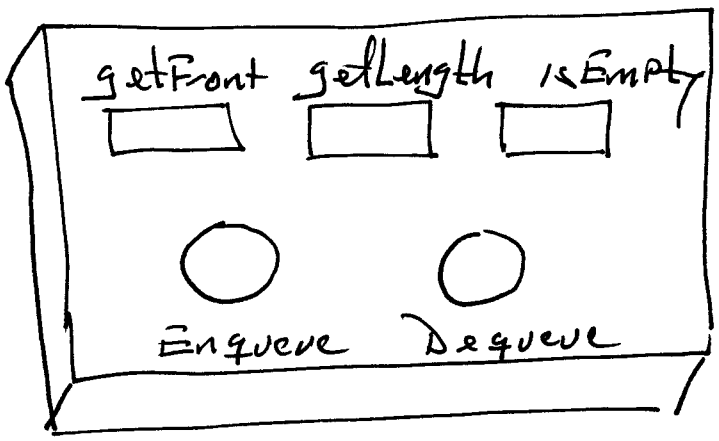
note: cannot Dequeue() on empty state ( ). same for getFront()

Preconditions:

Dequeue() : not isEmpty()
getFront() : not isEmpty()

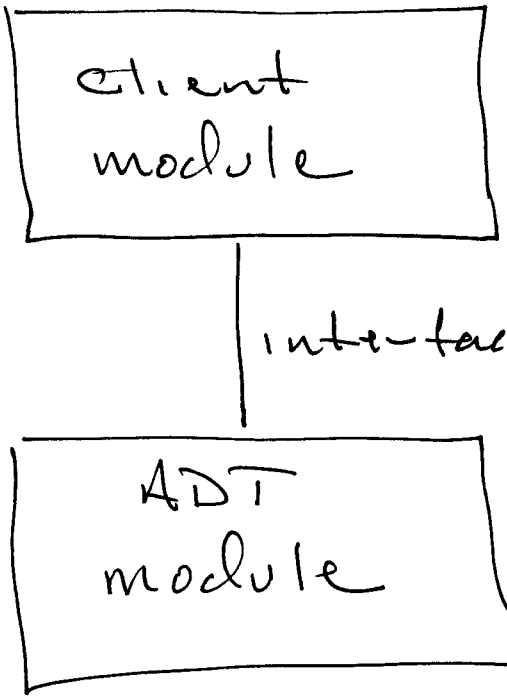
Preconditions should be ~~stated~~ in terms of access fcn. calls.

Black Box picture

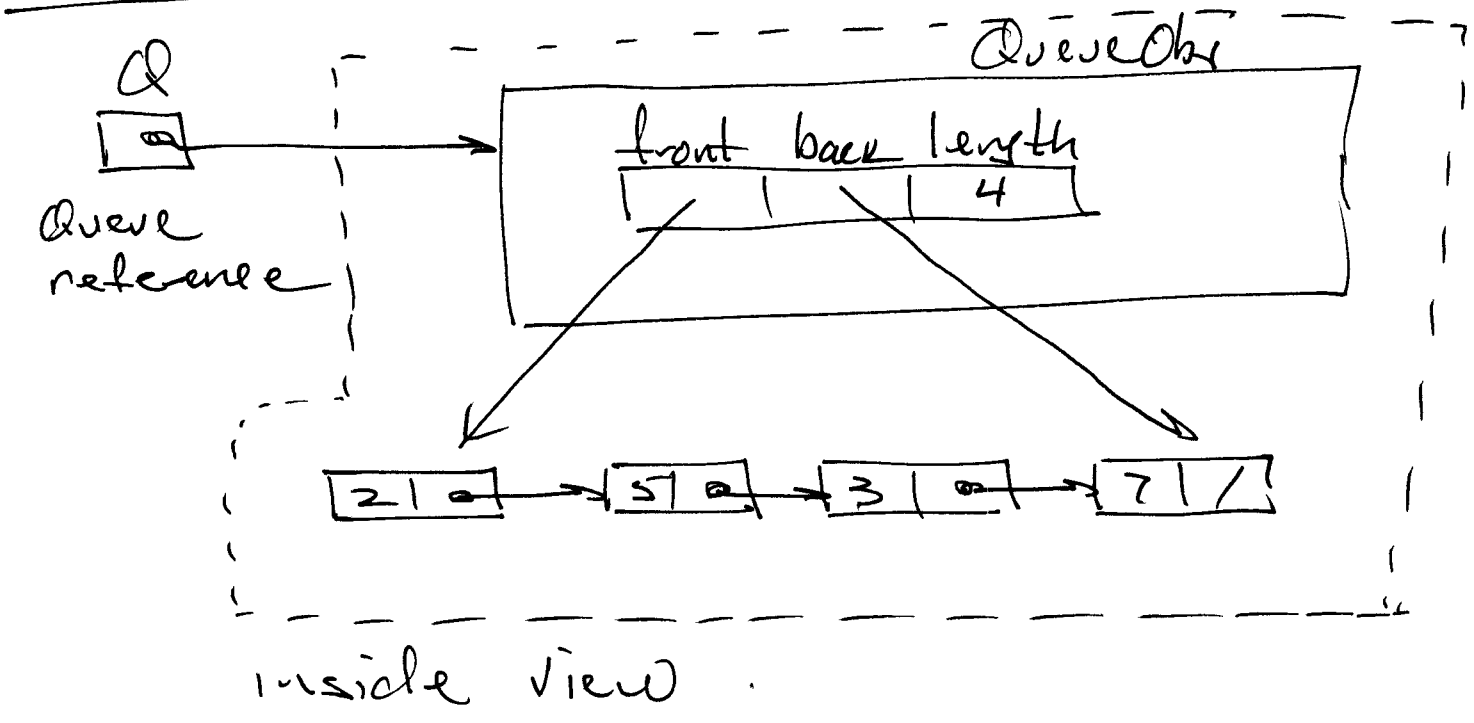


- Data hiding : user doesn't know how it works.

structure chart



Integer Queue in C!



client view: (2, 5, 3, 7)

See Examples/C/Queue