CSE 101-01 1-10-23

Handout on ADTs in C:

Abstract Data Type (ADT)

Def'n

An ADT consists of:

(1) A set S of "structures" called states.

(2) A set of operations on states.

- Manipulation procedures: changes the state of an instance.
- Access functions: return information about a state.

Ex. Queue ADT. (of integers)

states: finite sequences of integers

e.g.		len.
	(5, 1, -7, 2, 3, -18)	6
	(9)	1
	( )	0

operations

- manip. proc.:
  - Enqueue( )
  - Dequeue( )
- access fcns:
  - getFront( )
  - getLength( )
  - isEmpty( )

history of states:

Operation	state	return
	( )	
Enqueue(5)	(5)	—
Enqueue(1)	(5, 1)	—
Enqueue(7)	(5, 1, 7)	—
Dequeue( )	(1, 7)	—
Enqueue(3)	(1, 7, 3)	—
getFront( )	(1, 7, 3)	1
getLength( )	(1, 7, 3)	3
isEmpty( )	(1, 7, 3)	false

note: Dequeue( ) is undefined on empty state.

Preconditions:

define constraints on operations, i.e. to what ~~states~~ they can be applied.

Policy: if a Precondition is Violated, Print an error message detailing

- what ADT
- what ADT operation
- what precondition,

then quit the Program.

We state preconditions in a comment block, in terms of access function calls.

Post conditions:

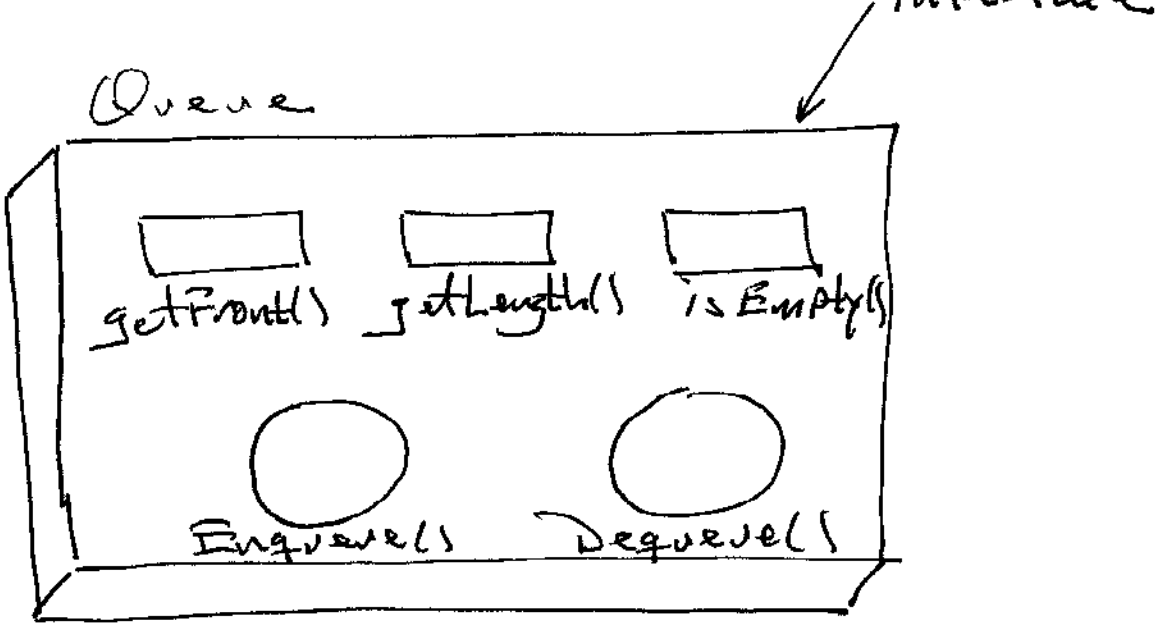
things that are true after the op. is performed.

in C: Dequeue(Q)

in C++: Q.Dequeue()

↑ implicit 1st argument

Black Box Picture



information hiding:

client interacts with an ADT only through interface.