

CSE 3010 – Data Structures & Algorithms

Lecture #16

What will be covered today

- Test announcement
- Axiomatic definitions for non-primitive operations of list
 - `isEmpty`
 - `size`
 - `contains`

Test 1 announcement

Date of Test	13 th January 2020
Time	9:00 am
Duration	50 minutes
Format	Closed Book
Type	Quiz
Through	LMS through Safe Exam Browser
Syllabus	Until Axiomatic Definitions of Non-Primitive Operations on List Data Structure

LIST – Algebraic specification of operations

Types:

LIST, ITEM, BOOLEAN, POS

where ITEM is of some type the LIST will contain

BOOLEAN is either True or False

POS is {INTEGER ≥ 0 }

Operations:

create:	-> LIST
insert: LIST x ITEM	-> LIST
insert: LIST x POS x ITEM	-> LIST
remove: LIST x ITEM	-> LIST U ERROR
remove: LIST x POS	-> LIST U ERROR
size: LIST	-> {INTEGER ≥ 0 }
contains: LIST x ITEM	-> BOOLEAN
fetch: LIST x POS	-> ITEM U ERROR
isEmpty: LIST	-> BOOLEAN

Algebraic specification of LIST ADT - Axioms

For all $L \in \text{LIST}$, $k1, k2 \in \text{ITEM}$ and $p1, p2 \in \text{POS}$

`isEmpty(create()) = True`

`isEmpty(insert(L,k1)) = False`

`isEmpty(insert(L,p1,k1)) = False`

`size(create()) = 0`

`size(insert(L,k1)) = size(L) + 1`

`size(insert(L,p1,k1)) = size(L) + 1`

Algebraic specification of LIST ADT – Axioms ... Contd.

contains: LIST x ITEM -> BOOLEAN

For all $L \in \text{LIST}$, $k1, k2 \in \text{ITEM}$ and $p1, p2 \in \text{POS}$

`contains(create(),k2) = False`

`contains(insert(L,k1),k2) =`

`if (k1 = k2) True`

`else contains(L,k2)`

`contains(insert(L,p1,k1),k2) =`

`if (k1 = k2) True`

`else contains(L,k2)`