CSE 3010 – Data Structures & Algorithms

Lecture #17

What will be covered today

- Announcement
- Test 1 answer discussion
- Axiomatic definitions for non-primitive operations of list ... Contd.
- Dynamic implementation of list
  - Singly linked list
  - Doubly linked list

Announcement

Date	Course	What	Remarks
15 January 2020 [Wednesday]	CSE 3010 Data Structures & Algorithms	Extra class between 3 pm and 3:50 pm	No class on Friday between 10:00 am and 10:50 am
18 January 2020 [Saturday]	CSE 3010 Data Structures & Algorithms	**In Class Assignment 1** during the class hour 9:00 am and 9:50 am On the MIIT LMS	Problem to be solved will require the stack data structure
18 January 2020 [Saturday]	CSE 3020 Database Systems I	**In Class Assignment 1** during the class hour 2:00 pm and 2:50 pm On the MIIT LMS	Continuing with the mini project description 'Ride Hailing Service' - using Relationships

Algebraic specification of LIST ADT – Axioms … Contd.

remove: LIST x ITEM -> LIST U ERROR

For all L ∈ LIST, k1, k2 ∈ ITEM and p1, p2 ∈ POS

```
remove(create(),k2) = ERROR
remove(insert(L,k1),k2) = remove(L,k2)
remove(insert(L,p1,k1),k2) =
                    remove(insert(L,p1,k1),k2)
```

Algebraic specification of LIST ADT – Axioms … Contd.

remove: LIST x POS -> LIST U ERROR

For all L ∈ LIST, k1, k2 ∈ ITEM and p1, p2 ∈ POS

```
remove(create(),p2) = ERROR
remove(insert(L,k1),p2) =
        if (p2 is valid) remove(L,p2)
        else ERROR
remove(insert(L,p1,k1),p2) =
        if (p2 is valid)
                if (p1 <= p2)
                        remove(insert(L,p1,k1),p2+1)
                else
                        remove(insert(L,p1,k1),p2)
        else
                ERROR
```

Algebraic specification of LIST ADT – Axioms … Contd.

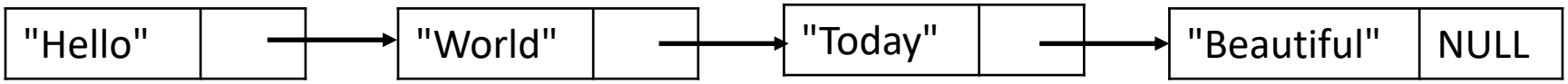
```
fetch: LIST x POS              -> ITEM U ERROR

For all L ∈ LIST, k1, k2 ∈ ITEM and p1, p2 ∈ POS

        fetch(create(),p2) = ERROR
        fetch(insert(L,k1),p2) =
                if (p2 is valid) fetch(L,p2)
                else ERROR
        fetch(insert(L,p1,k1),p2) =
                if (p2 is valid)
                   if (p1 <= p2) = fetch(insert(L,p1,k1),p2+1)
                   else fetch(L,p2)
                else ERROR
```

Exercise 1 (4 points): Using an example of a list, find out if this axiom is correct.

Submit on a piece of paper in my room by 5 pm today (14 January 2020)

Singly linked vs. Doubly linked list

Singly linked list



Doubly linked list