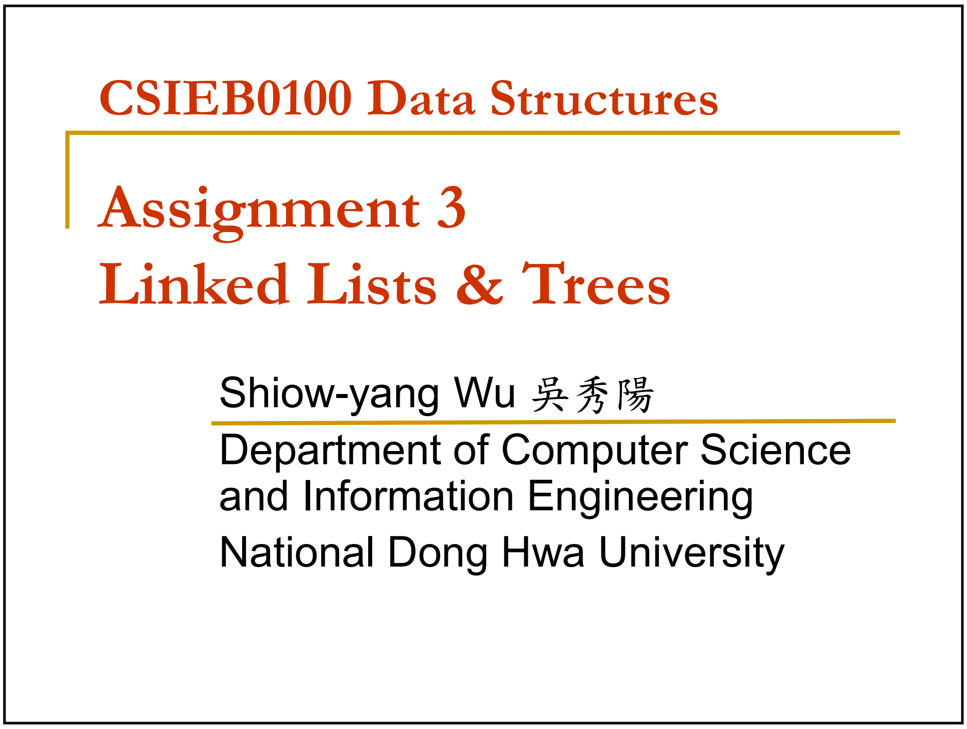

CSIEB0100 Data Structures

Assignment 3
Linked Lists & Trees

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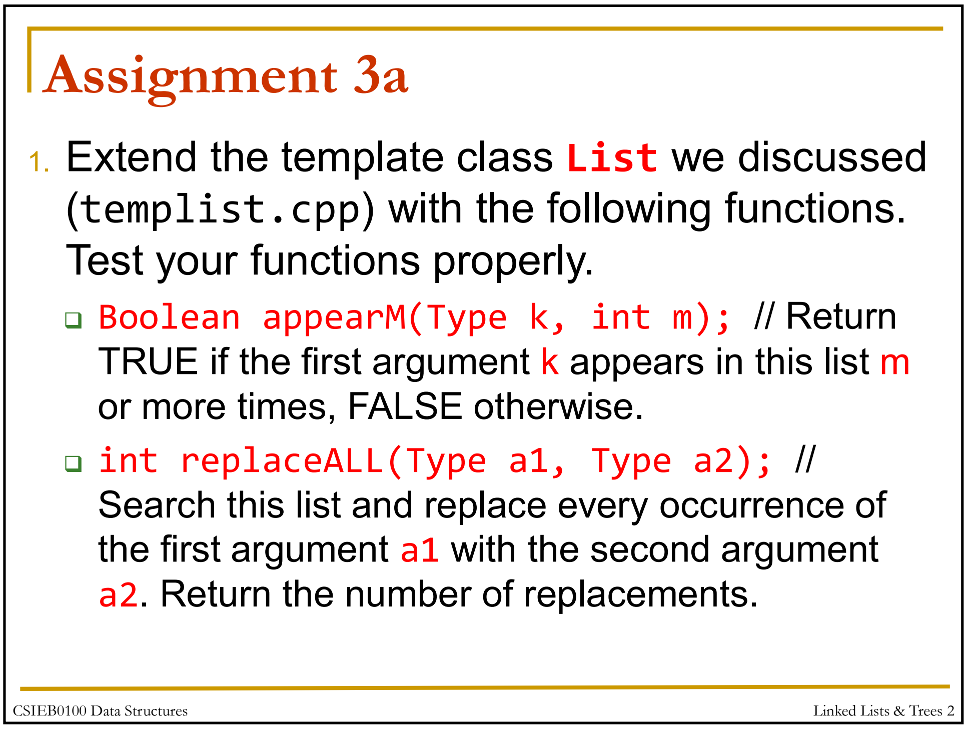
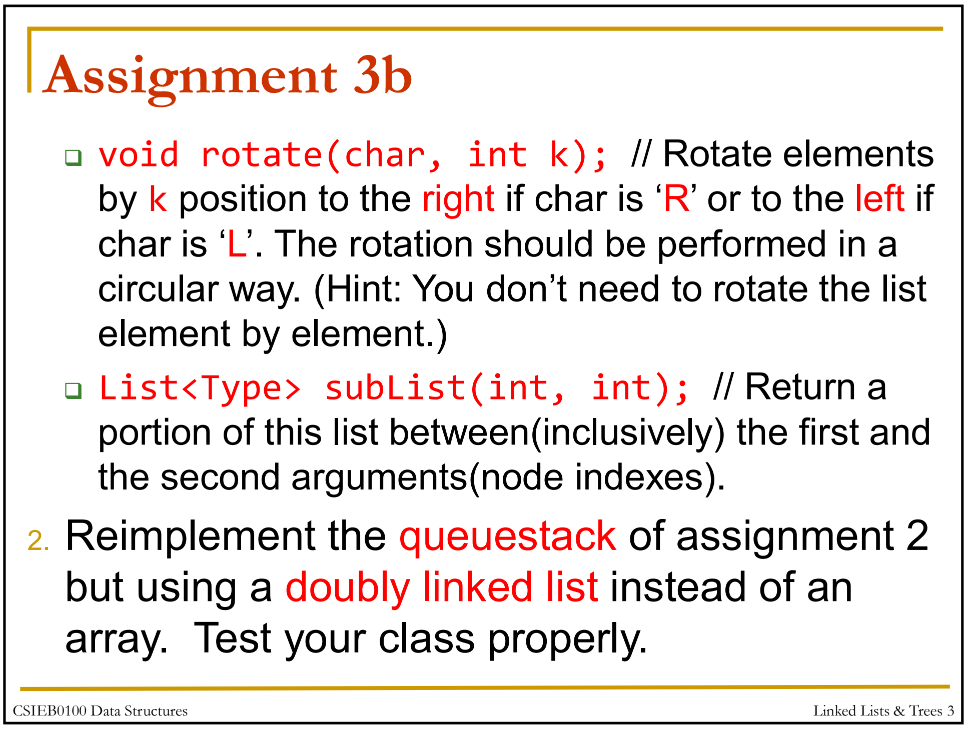


Assignment 3a

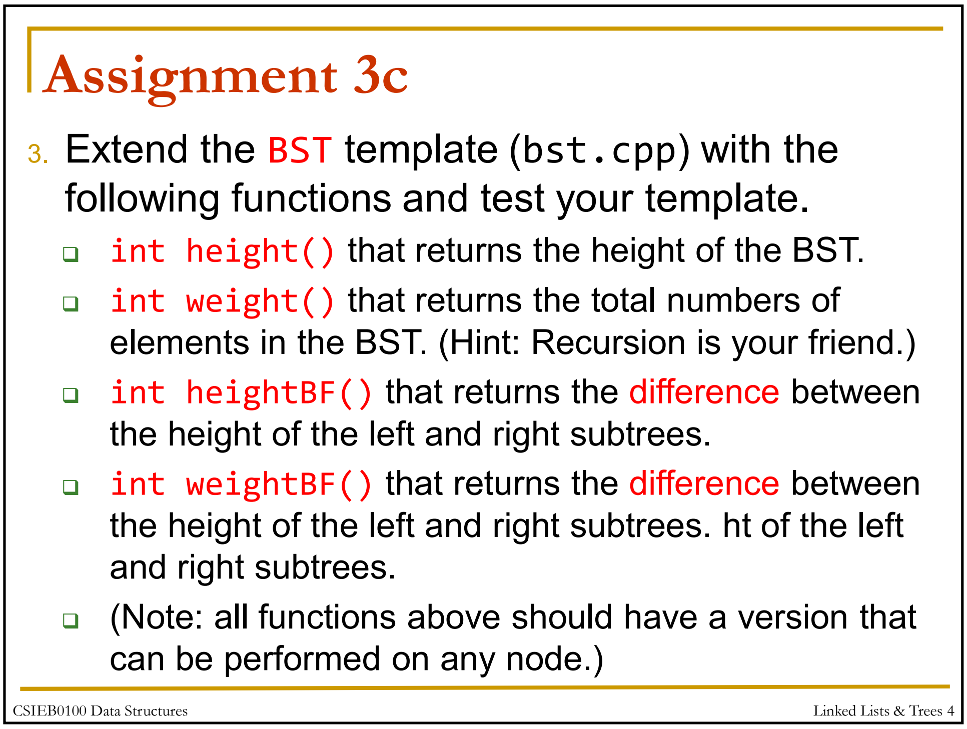
1. Extend the template class **`List`** we discussed (`templist.cpp`) with the following functions. Test your functions properly.
   - `Boolean appearM(Type k, int m);` // Return TRUE if the first argument `k` appears in this list `m` or more times, FALSE otherwise.
   - `int replaceALL(Type a1, Type a2);` // Search this list and replace every occurrence of the first argument `a1` with the second argument `a2`. Return the number of replacements.



Assignment 3b

- `void rotate(char, int k);` // Rotate elements by k position to the right if char is ‘R’ or to the left if char is ‘L’. The rotation should be performed in a circular way. (Hint: You don’t need to rotate the list element by element.)
- `List<Type> subList(int, int);` // Return a portion of this list between(inclusively) the first and the second arguments(node indexes).

2. Reimplement the queuestack of assignment 2 but using a doubly linked list instead of an array. Test your class properly.



Assignment 3c

3. Extend the `BST` template (`bst.cpp`) with the following functions and test your template.
    - `int height()` that returns the height of the BST.
    - `int weight()` that returns the total numbers of elements in the BST. (Hint: Recursion is your friend.)
    - `int heightBF()` that returns the difference between the height of the left and right subtrees.
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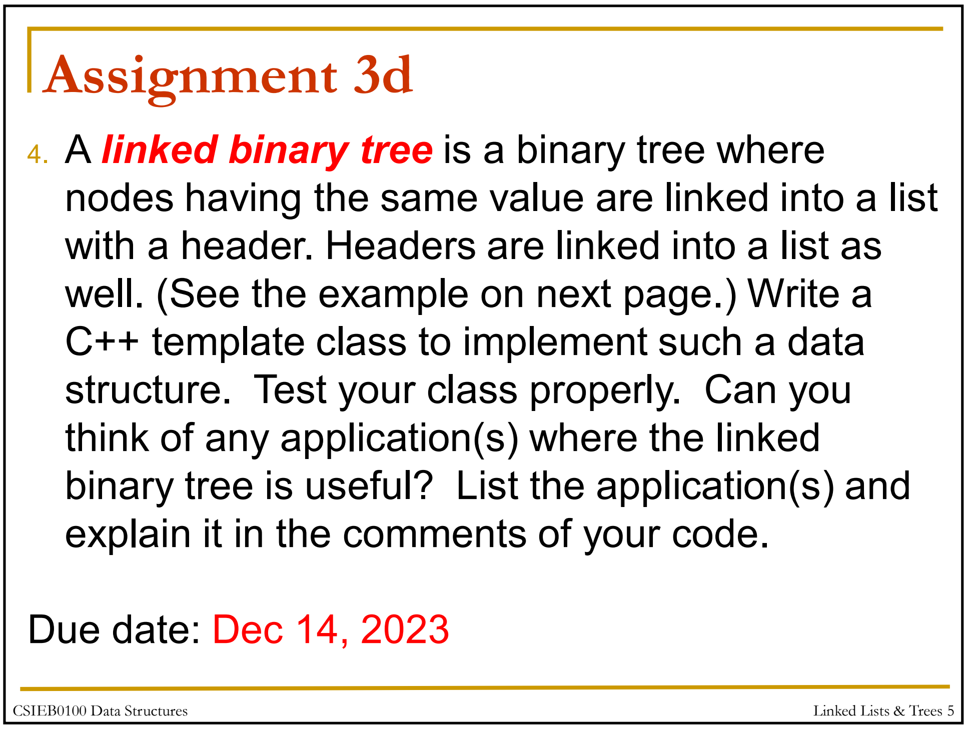
    - (Note: all functions above should have a version that can be performed on any node.)

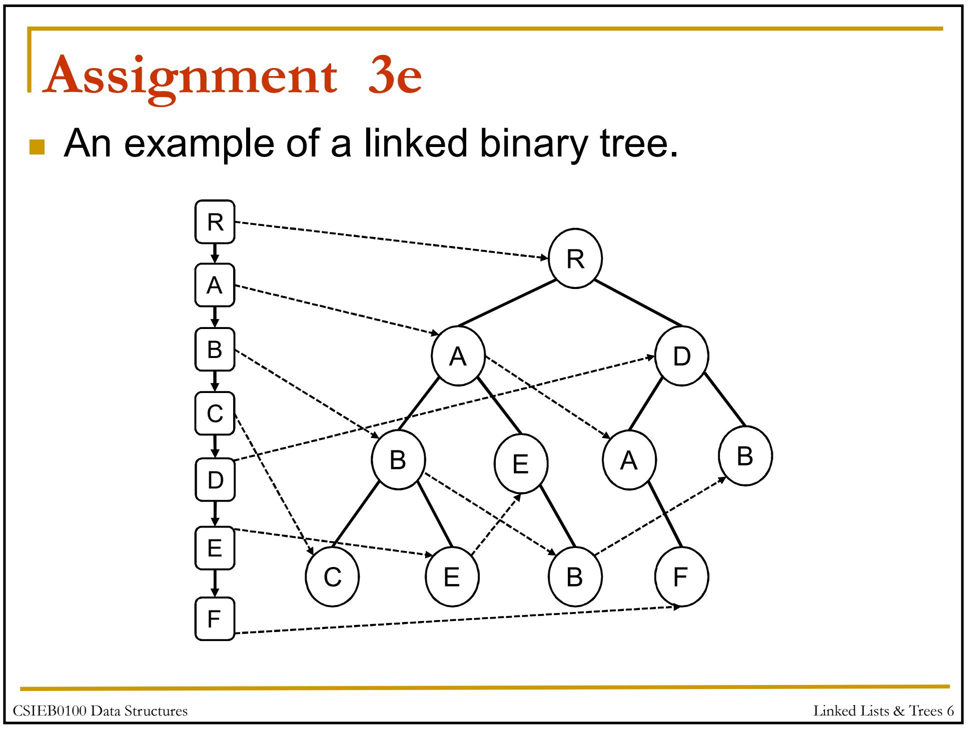


Assignment 3d

4. A ***linked binary tree*** is a binary tree where nodes having the same value are linked into a list with a header. Headers are linked into a list as well. (See the example on next page.) Write a C++ template class to implement such a data structure. Test your class properly. Can you think of any application(s) where the linked binary tree is useful? List the application(s) and explain it in the comments of your code.

Due date: Dec 14, 2023

CSIEB0100 Data Structures Linked Lists & Trees 5



Assignment 3e

- An example of a linked binary tree.

CSIEB0100 Data Structures Linked Lists & Trees 6