**Homework Five Project Report**

In this homework project, I continued to practice with content from the previous homework assignment by creating a helper and cpp file from scratch, furthering my understand of scope for variables, classes, and methods (as well as the **scope resolution operator ::**). Something I learned in the homework assignment is the use of a doubly linked list’s memory to edit a list without needing to specifically delete certain nodes. By linking nodes, we can do many things such as add temp node(s) to an existing linked list, skip over a specific node, connect a new node into the list, thereby inserting it, etc. By implementing previously defined functions like check and rcheck from Lab8 we were able to see the changes in the memory address, which helped me understand the functionality of linked lists. Overall, this assignment was a helpful dive into more linked list applications with more complex functions like sort, insert, and erase.

Test cases are extremely important for finding program functionality and diagnosing errors; thus, this homework assignment contained many test cases to cover a wide range of possible outputs from calling constructors, methods, and operators.

**My Test Cases:**

int main() //my test cases

{

Linkedlist list1(10); //list with size of 10; tests explicit constructor

Linkedlist list2; //empty list; tests default constructor

list1.check();

list1.rcheck();

list2.check(); //should be empty

list2.rcheck(); //should be empty

cout << list1.empty() << endl; //tests empty function; should output 0

cout << list2.empty() << endl; //tests empty function; should output 1

list1.clear(); //empties the list a

list1.check(); //should be empty

list1.rcheck(); //should be empty

cout << list1.empty() << endl; //tests empty function; should output 1

cout << list2.empty() << endl; //tests empty function; should output 1

cout << "--------------------------------------\n\n";

Linkedlist list3(8); //list with size of 8; tests explicit constructor

Linkedlist list4(5); //list with size of 5; tests explicit constructor

list3.check();

list4.check();

list3 = list4; //sets list 3 equal to list 4; list 3 should now be the same as 4

list3.check();

list3.rcheck();

list3.pop\_back(); //remove the last element

list3.check();

list3.rcheck();

list3.pop\_front(); //remove the first element

list3.check();

list3.rcheck();

list3.push\_back(337); //add the element 100 to the end of the list

list3.check();

list3.rcheck();

list3.push\_front(666); //add the element 199 to the front of the list

list3.check();

list3.rcheck();

cout << "--------------------------------------\n\n";

Linkedlist list5; //empty list; tests default constructor

cout << list5.empty() << endl; //tests empty function; should output 1

for(int i = 0; i < 10; i++){

list5.push\_front(i); //list should go from 9 to 0

}

cout << list5.empty() << endl; //tests empty function; should output 0

list5.check();

list5.sort(); //tests sort function; list should now go from 0 to 9

list5.check();

list5.insert(5,1234); //tests insert function; adds a new element at position 5 with a value of 1234

list5.check();

list5.rcheck();

list5.erase(5); //tests erase function; removes the node at position 5 that we added from the list

list5.check();

list5.rcheck();

return 0;

}

**Output for My Test Cases:**

Node 0 Elem: 0 Address: 0x1da8c60 Next Address: 0x1da8c80 Prev Address: 0

Node 1 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0x1da8c60

Node 2 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 3 Elem: 3 Address: 0x1da8cc0 Next Address: 0x1da8ce0 Prev Address: 0x1da8ca0

Node 4 Elem: 4 Address: 0x1da8ce0 Next Address: 0x1da8d00 Prev Address: 0x1da8cc0

Node 5 Elem: 5 Address: 0x1da8d00 Next Address: 0x1da8d20 Prev Address: 0x1da8ce0

Node 6 Elem: 6 Address: 0x1da8d20 Next Address: 0x1da8d40 Prev Address: 0x1da8d00

Node 7 Elem: 7 Address: 0x1da8d40 Next Address: 0x1da8d60 Prev Address: 0x1da8d20

Node 8 Elem: 8 Address: 0x1da8d60 Next Address: 0x1da8d80 Prev Address: 0x1da8d40

Node 9 Elem: 9 Address: 0x1da8d80 Next Address: 0 Prev Address: 0x1da8d60

----------------------------------------------------------------------

Node 0 Elem: 9 Address: 0x1da8d80 Next Address: 0 Prev Address: 0x1da8d60

Node 1 Elem: 8 Address: 0x1da8d60 Next Address: 0x1da8d80 Prev Address: 0x1da8d40

Node 2 Elem: 7 Address: 0x1da8d40 Next Address: 0x1da8d60 Prev Address: 0x1da8d20

Node 3 Elem: 6 Address: 0x1da8d20 Next Address: 0x1da8d40 Prev Address: 0x1da8d00

Node 4 Elem: 5 Address: 0x1da8d00 Next Address: 0x1da8d20 Prev Address: 0x1da8ce0

Node 5 Elem: 4 Address: 0x1da8ce0 Next Address: 0x1da8d00 Prev Address: 0x1da8cc0

Node 6 Elem: 3 Address: 0x1da8cc0 Next Address: 0x1da8ce0 Prev Address: 0x1da8ca0

Node 7 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 8 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0x1da8c60

Node 9 Elem: 0 Address: 0x1da8c60 Next Address: 0x1da8c80 Prev Address: 0

----------------------------------------------------------------------

It is an empty list!

----------------------------------------------------------------------

It is an empty list!

----------------------------------------------------------------------

0

1

It is an empty list!

----------------------------------------------------------------------

It is an empty list!

----------------------------------------------------------------------

1

1

--------------------------------------

Node 0 Elem: 0 Address: 0x1da8d40 Next Address: 0x1da8d20 Prev Address: 0

Node 1 Elem: 1 Address: 0x1da8d20 Next Address: 0x1da8d00 Prev Address: 0x1da8d40

Node 2 Elem: 2 Address: 0x1da8d00 Next Address: 0x1da8ce0 Prev Address: 0x1da8d20

Node 3 Elem: 3 Address: 0x1da8ce0 Next Address: 0x1da8cc0 Prev Address: 0x1da8d00

Node 4 Elem: 4 Address: 0x1da8cc0 Next Address: 0x1da8ca0 Prev Address: 0x1da8ce0

Node 5 Elem: 5 Address: 0x1da8ca0 Next Address: 0x1da8c80 Prev Address: 0x1da8cc0

Node 6 Elem: 6 Address: 0x1da8c80 Next Address: 0x1da8c60 Prev Address: 0x1da8ca0

Node 7 Elem: 7 Address: 0x1da8c60 Next Address: 0 Prev Address: 0x1da8c80

----------------------------------------------------------------------

Node 0 Elem: 0 Address: 0x1da8e20 Next Address: 0x1da8e40 Prev Address: 0

Node 1 Elem: 1 Address: 0x1da8e40 Next Address: 0x1da8e60 Prev Address: 0x1da8e20

Node 2 Elem: 2 Address: 0x1da8e60 Next Address: 0x1da8e80 Prev Address: 0x1da8e40

Node 3 Elem: 3 Address: 0x1da8e80 Next Address: 0x1da8ea0 Prev Address: 0x1da8e60

Node 4 Elem: 4 Address: 0x1da8ea0 Next Address: 0 Prev Address: 0x1da8e80

----------------------------------------------------------------------

Node 0 Elem: 0 Address: 0x1da8c60 Next Address: 0x1da8c80 Prev Address: 0

Node 1 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0x1da8c60

Node 2 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 3 Elem: 3 Address: 0x1da8cc0 Next Address: 0x1da8ce0 Prev Address: 0x1da8ca0

Node 4 Elem: 4 Address: 0x1da8ce0 Next Address: 0 Prev Address: 0x1da8cc0

----------------------------------------------------------------------

Node 0 Elem: 4 Address: 0x1da8ce0 Next Address: 0 Prev Address: 0x1da8cc0

Node 1 Elem: 3 Address: 0x1da8cc0 Next Address: 0x1da8ce0 Prev Address: 0x1da8ca0

Node 2 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 3 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0x1da8c60

Node 4 Elem: 0 Address: 0x1da8c60 Next Address: 0x1da8c80 Prev Address: 0

----------------------------------------------------------------------

Node 0 Elem: 0 Address: 0x1da8c60 Next Address: 0x1da8c80 Prev Address: 0

Node 1 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0x1da8c60

Node 2 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 3 Elem: 3 Address: 0x1da8cc0 Next Address: 0 Prev Address: 0x1da8ca0

----------------------------------------------------------------------

Node 0 Elem: 3 Address: 0x1da8cc0 Next Address: 0 Prev Address: 0x1da8ca0

Node 1 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 2 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0x1da8c60

Node 3 Elem: 0 Address: 0x1da8c60 Next Address: 0x1da8c80 Prev Address: 0

----------------------------------------------------------------------

Node 0 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0

Node 1 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 2 Elem: 3 Address: 0x1da8cc0 Next Address: 0 Prev Address: 0x1da8ca0

----------------------------------------------------------------------

Node 0 Elem: 3 Address: 0x1da8cc0 Next Address: 0 Prev Address: 0x1da8ca0

Node 1 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 2 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0

----------------------------------------------------------------------

Node 0 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0

Node 1 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 2 Elem: 3 Address: 0x1da8cc0 Next Address: 0x1da8d00 Prev Address: 0x1da8ca0

Node 3 Elem: 337 Address: 0x1da8d00 Next Address: 0 Prev Address: 0x1da8cc0

----------------------------------------------------------------------

Node 0 Elem: 337 Address: 0x1da8d00 Next Address: 0 Prev Address: 0x1da8cc0

Node 1 Elem: 3 Address: 0x1da8cc0 Next Address: 0x1da8d00 Prev Address: 0x1da8ca0

Node 2 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 3 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0

----------------------------------------------------------------------

Node 0 Elem: 666 Address: 0x1da8d20 Next Address: 0x1da8c80 Prev Address: 0

Node 1 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0x1da8d20

Node 2 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 3 Elem: 3 Address: 0x1da8cc0 Next Address: 0x1da8d00 Prev Address: 0x1da8ca0

Node 4 Elem: 337 Address: 0x1da8d00 Next Address: 0 Prev Address: 0x1da8cc0

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Node 0 Elem: 337 Address: 0x1da8d00 Next Address: 0 Prev Address: 0x1da8cc0

Node 1 Elem: 3 Address: 0x1da8cc0 Next Address: 0x1da8d00 Prev Address: 0x1da8ca0

Node 2 Elem: 2 Address: 0x1da8ca0 Next Address: 0x1da8cc0 Prev Address: 0x1da8c80

Node 3 Elem: 1 Address: 0x1da8c80 Next Address: 0x1da8ca0 Prev Address: 0x1da8d20

Node 4 Elem: 666 Address: 0x1da8d20 Next Address: 0x1da8c80 Prev Address: 0

----------------------------------------------------------------------

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1

0

Node 0 Elem: 9 Address: 0x1da9000 Next Address: 0x1da8fe0 Prev Address: 0

Node 1 Elem: 8 Address: 0x1da8fe0 Next Address: 0x1da8fc0 Prev Address: 0x1da9000

Node 2 Elem: 7 Address: 0x1da8fc0 Next Address: 0x1da8fa0 Prev Address: 0x1da8fe0

Node 3 Elem: 6 Address: 0x1da8fa0 Next Address: 0x1da8f80 Prev Address: 0x1da8fc0

Node 4 Elem: 5 Address: 0x1da8f80 Next Address: 0x1da8f60 Prev Address: 0x1da8fa0

Node 5 Elem: 4 Address: 0x1da8f60 Next Address: 0x1da8f40 Prev Address: 0x1da8f80

Node 6 Elem: 3 Address: 0x1da8f40 Next Address: 0x1da8f20 Prev Address: 0x1da8f60

Node 7 Elem: 2 Address: 0x1da8f20 Next Address: 0x1da8f00 Prev Address: 0x1da8f40

Node 8 Elem: 1 Address: 0x1da8f00 Next Address: 0x1da8ee0 Prev Address: 0x1da8f20

Node 9 Elem: 0 Address: 0x1da8ee0 Next Address: 0 Prev Address: 0x1da8f00

----------------------------------------------------------------------

Node 0 Elem: 0 Address: 0x1da9000 Next Address: 0x1da9020 Prev Address: 0

Node 1 Elem: 1 Address: 0x1da9020 Next Address: 0x1da9040 Prev Address: 0x1da9000

Node 2 Elem: 2 Address: 0x1da9040 Next Address: 0x1da9060 Prev Address: 0x1da9020

Node 3 Elem: 3 Address: 0x1da9060 Next Address: 0x1da9080 Prev Address: 0x1da9040

Node 4 Elem: 4 Address: 0x1da9080 Next Address: 0x1da90a0 Prev Address: 0x1da9060

Node 5 Elem: 5 Address: 0x1da90a0 Next Address: 0x1da90c0 Prev Address: 0x1da9080

Node 6 Elem: 6 Address: 0x1da90c0 Next Address: 0x1da90e0 Prev Address: 0x1da90a0

Node 7 Elem: 7 Address: 0x1da90e0 Next Address: 0x1da9100 Prev Address: 0x1da90c0

Node 8 Elem: 8 Address: 0x1da9100 Next Address: 0x1da9120 Prev Address: 0x1da90e0

Node 9 Elem: 9 Address: 0x1da9120 Next Address: 0 Prev Address: 0x1da9100

----------------------------------------------------------------------

Node 0 Elem: 0 Address: 0x1da9000 Next Address: 0x1da9020 Prev Address: 0

Node 1 Elem: 1 Address: 0x1da9020 Next Address: 0x1da9040 Prev Address: 0x1da9000

Node 2 Elem: 2 Address: 0x1da9040 Next Address: 0x1da9060 Prev Address: 0x1da9020

Node 3 Elem: 3 Address: 0x1da9060 Next Address: 0x1da9080 Prev Address: 0x1da9040

Node 4 Elem: 4 Address: 0x1da9080 Next Address: 0x1da9140 Prev Address: 0x1da9060

Node 5 Elem: 1234 Address: 0x1da9140 Next Address: 0x1da90a0 Prev Address: 0x1da9080

Node 6 Elem: 5 Address: 0x1da90a0 Next Address: 0x1da90c0 Prev Address: 0x1da9140

Node 7 Elem: 6 Address: 0x1da90c0 Next Address: 0x1da90e0 Prev Address: 0x1da90a0

Node 8 Elem: 7 Address: 0x1da90e0 Next Address: 0x1da9100 Prev Address: 0x1da90c0

Node 9 Elem: 8 Address: 0x1da9100 Next Address: 0x1da9120 Prev Address: 0x1da90e0

Node 10 Elem: 9 Address: 0x1da9120 Next Address: 0 Prev Address: 0x1da9100

----------------------------------------------------------------------

Node 0 Elem: 9 Address: 0x1da9120 Next Address: 0 Prev Address: 0x1da9100

Node 1 Elem: 8 Address: 0x1da9100 Next Address: 0x1da9120 Prev Address: 0x1da90e0

Node 2 Elem: 7 Address: 0x1da90e0 Next Address: 0x1da9100 Prev Address: 0x1da90c0

Node 3 Elem: 6 Address: 0x1da90c0 Next Address: 0x1da90e0 Prev Address: 0x1da90a0

Node 4 Elem: 5 Address: 0x1da90a0 Next Address: 0x1da90c0 Prev Address: 0x1da9140

Node 5 Elem: 1234 Address: 0x1da9140 Next Address: 0x1da90a0 Prev Address: 0x1da9080

Node 6 Elem: 4 Address: 0x1da9080 Next Address: 0x1da9140 Prev Address: 0x1da9060

Node 7 Elem: 3 Address: 0x1da9060 Next Address: 0x1da9080 Prev Address: 0x1da9040

Node 8 Elem: 2 Address: 0x1da9040 Next Address: 0x1da9060 Prev Address: 0x1da9020

Node 9 Elem: 1 Address: 0x1da9020 Next Address: 0x1da9040 Prev Address: 0x1da9000

Node 10 Elem: 0 Address: 0x1da9000 Next Address: 0x1da9020 Prev Address: 0

----------------------------------------------------------------------

Node 0 Elem: 0 Address: 0x1da9000 Next Address: 0x1da9020 Prev Address: 0

Node 1 Elem: 1 Address: 0x1da9020 Next Address: 0x1da9040 Prev Address: 0x1da9000

Node 2 Elem: 2 Address: 0x1da9040 Next Address: 0x1da9060 Prev Address: 0x1da9020

Node 3 Elem: 3 Address: 0x1da9060 Next Address: 0x1da9080 Prev Address: 0x1da9040

Node 4 Elem: 4 Address: 0x1da9080 Next Address: 0x1da90a0 Prev Address: 0x1da9060

Node 5 Elem: 5 Address: 0x1da90a0 Next Address: 0x1da90c0 Prev Address: 0x1da9080

Node 6 Elem: 6 Address: 0x1da90c0 Next Address: 0x1da90e0 Prev Address: 0x1da90a0

Node 7 Elem: 7 Address: 0x1da90e0 Next Address: 0x1da9100 Prev Address: 0x1da90c0

Node 8 Elem: 8 Address: 0x1da9100 Next Address: 0x1da9120 Prev Address: 0x1da90e0

Node 9 Elem: 9 Address: 0x1da9120 Next Address: 0 Prev Address: 0x1da9100

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Node 0 Elem: 9 Address: 0x1da9120 Next Address: 0 Prev Address: 0x1da9100

Node 1 Elem: 8 Address: 0x1da9100 Next Address: 0x1da9120 Prev Address: 0x1da90e0

Node 2 Elem: 7 Address: 0x1da90e0 Next Address: 0x1da9100 Prev Address: 0x1da90c0

Node 3 Elem: 6 Address: 0x1da90c0 Next Address: 0x1da90e0 Prev Address: 0x1da90a0

Node 4 Elem: 5 Address: 0x1da90a0 Next Address: 0x1da90c0 Prev Address: 0x1da9080

Node 5 Elem: 4 Address: 0x1da9080 Next Address: 0x1da90a0 Prev Address: 0x1da9060

Node 6 Elem: 3 Address: 0x1da9060 Next Address: 0x1da9080 Prev Address: 0x1da9040

Node 7 Elem: 2 Address: 0x1da9040 Next Address: 0x1da9060 Prev Address: 0x1da9020

Node 8 Elem: 1 Address: 0x1da9020 Next Address: 0x1da9040 Prev Address: 0x1da9000

Node 9 Elem: 0 Address: 0x1da9000 Next Address: 0x1da9020 Prev Address: 0

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**Output for Given Test Cases:**

1. ---Testing constructor and check function

Node 0 Elem: 0 Address: 0x237cc60 Next Address: 0x237cc80 Prev Address: 0

Node 1 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cc60

Node 2 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 3 Elem: 3 Address: 0x237ccc0 Next Address: 0 Prev Address: 0x237cca0

----------------------------------------------------------------------

Node 0 Elem: 3 Address: 0x237ccc0 Next Address: 0 Prev Address: 0x237cca0

Node 1 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 2 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cc60

Node 3 Elem: 0 Address: 0x237cc60 Next Address: 0x237cc80 Prev Address: 0

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2. ---Testing push front 7

before push front:

Node 0 Elem: 0 Address: 0x237cc60 Next Address: 0x237cc80 Prev Address: 0

Node 1 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cc60

Node 2 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 3 Elem: 3 Address: 0x237ccc0 Next Address: 0 Prev Address: 0x237cca0

----------------------------------------------------------------------

Node 0 Elem: 7 Address: 0x237cce0 Next Address: 0x237cc60 Prev Address: 0

Node 1 Elem: 0 Address: 0x237cc60 Next Address: 0x237cc80 Prev Address: 0x237cce0

Node 2 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cc60

Node 3 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 4 Elem: 3 Address: 0x237ccc0 Next Address: 0 Prev Address: 0x237cca0

----------------------------------------------------------------------

Node 0 Elem: 3 Address: 0x237ccc0 Next Address: 0 Prev Address: 0x237cca0

Node 1 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 2 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cc60

Node 3 Elem: 0 Address: 0x237cc60 Next Address: 0x237cc80 Prev Address: 0x237cce0

Node 4 Elem: 7 Address: 0x237cce0 Next Address: 0x237cc60 Prev Address: 0

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3. ---Testing push back -1

before push back:

Node 0 Elem: 7 Address: 0x237cce0 Next Address: 0x237cc60 Prev Address: 0

Node 1 Elem: 0 Address: 0x237cc60 Next Address: 0x237cc80 Prev Address: 0x237cce0

Node 2 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cc60

Node 3 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 4 Elem: 3 Address: 0x237ccc0 Next Address: 0 Prev Address: 0x237cca0

----------------------------------------------------------------------

Node 0 Elem: 7 Address: 0x237cce0 Next Address: 0x237cc60 Prev Address: 0

Node 1 Elem: 0 Address: 0x237cc60 Next Address: 0x237cc80 Prev Address: 0x237cce0

Node 2 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cc60

Node 3 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 4 Elem: 3 Address: 0x237ccc0 Next Address: 0x237cd00 Prev Address: 0x237cca0

Node 5 Elem: -1 Address: 0x237cd00 Next Address: 0 Prev Address: 0x237ccc0

----------------------------------------------------------------------

Node 0 Elem: -1 Address: 0x237cd00 Next Address: 0 Prev Address: 0x237ccc0

Node 1 Elem: 3 Address: 0x237ccc0 Next Address: 0x237cd00 Prev Address: 0x237cca0

Node 2 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 3 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cc60

Node 4 Elem: 0 Address: 0x237cc60 Next Address: 0x237cc80 Prev Address: 0x237cce0

Node 5 Elem: 7 Address: 0x237cce0 Next Address: 0x237cc60 Prev Address: 0

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4. ---Testing insert 5 at position 2

before insert:

Node 0 Elem: 7 Address: 0x237cce0 Next Address: 0x237cc60 Prev Address: 0

Node 1 Elem: 0 Address: 0x237cc60 Next Address: 0x237cc80 Prev Address: 0x237cce0

Node 2 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cc60

Node 3 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 4 Elem: 3 Address: 0x237ccc0 Next Address: 0x237cd00 Prev Address: 0x237cca0

Node 5 Elem: -1 Address: 0x237cd00 Next Address: 0 Prev Address: 0x237ccc0

----------------------------------------------------------------------

Node 0 Elem: 7 Address: 0x237cce0 Next Address: 0x237cc60 Prev Address: 0

Node 1 Elem: 0 Address: 0x237cc60 Next Address: 0x237cd20 Prev Address: 0x237cce0

Node 2 Elem: 5 Address: 0x237cd20 Next Address: 0x237cc80 Prev Address: 0x237cc60

Node 3 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cd20

Node 4 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 5 Elem: 3 Address: 0x237ccc0 Next Address: 0x237cd00 Prev Address: 0x237cca0

Node 6 Elem: -1 Address: 0x237cd00 Next Address: 0 Prev Address: 0x237ccc0

----------------------------------------------------------------------

Node 0 Elem: -1 Address: 0x237cd00 Next Address: 0 Prev Address: 0x237ccc0

Node 1 Elem: 3 Address: 0x237ccc0 Next Address: 0x237cd00 Prev Address: 0x237cca0

Node 2 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 3 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cd20

Node 4 Elem: 5 Address: 0x237cd20 Next Address: 0x237cc80 Prev Address: 0x237cc60

Node 5 Elem: 0 Address: 0x237cc60 Next Address: 0x237cd20 Prev Address: 0x237cce0

Node 6 Elem: 7 Address: 0x237cce0 Next Address: 0x237cc60 Prev Address: 0

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5. ---Testing front

7

1234

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6. ---Testing back

-1

5678

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7. ---Testing sort

before sort:

Node 0 Elem: 1234 Address: 0x237cce0 Next Address: 0x237cc60 Prev Address: 0

Node 1 Elem: 0 Address: 0x237cc60 Next Address: 0x237cd20 Prev Address: 0x237cce0

Node 2 Elem: 5 Address: 0x237cd20 Next Address: 0x237cc80 Prev Address: 0x237cc60

Node 3 Elem: 1 Address: 0x237cc80 Next Address: 0x237cca0 Prev Address: 0x237cd20

Node 4 Elem: 2 Address: 0x237cca0 Next Address: 0x237ccc0 Prev Address: 0x237cc80

Node 5 Elem: 3 Address: 0x237ccc0 Next Address: 0x237cd00 Prev Address: 0x237cca0

Node 6 Elem: 5678 Address: 0x237cd00 Next Address: 0 Prev Address: 0x237ccc0

----------------------------------------------------------------------

Node 0 Elem: 0 Address: 0x237cce0 Next Address: 0x237cd40 Prev Address: 0

Node 1 Elem: 1 Address: 0x237cd40 Next Address: 0x237cd60 Prev Address: 0x237cce0

Node 2 Elem: 2 Address: 0x237cd60 Next Address: 0x237cd80 Prev Address: 0x237cd40

Node 3 Elem: 3 Address: 0x237cd80 Next Address: 0x237cda0 Prev Address: 0x237cd60

Node 4 Elem: 5 Address: 0x237cda0 Next Address: 0x237cdc0 Prev Address: 0x237cd80

Node 5 Elem: 1234 Address: 0x237cdc0 Next Address: 0x237cde0 Prev Address: 0x237cda0

Node 6 Elem: 5678 Address: 0x237cde0 Next Address: 0 Prev Address: 0x237cdc0

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Node 0 Elem: 5678 Address: 0x237cde0 Next Address: 0 Prev Address: 0x237cdc0

Node 1 Elem: 1234 Address: 0x237cdc0 Next Address: 0x237cde0 Prev Address: 0x237cda0

Node 2 Elem: 5 Address: 0x237cda0 Next Address: 0x237cdc0 Prev Address: 0x237cd80

Node 3 Elem: 3 Address: 0x237cd80 Next Address: 0x237cda0 Prev Address: 0x237cd60

Node 4 Elem: 2 Address: 0x237cd60 Next Address: 0x237cd80 Prev Address: 0x237cd40

Node 5 Elem: 1 Address: 0x237cd40 Next Address: 0x237cd60 Prev Address: 0x237cce0

Node 6 Elem: 0 Address: 0x237cce0 Next Address: 0x237cd40 Prev Address: 0

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