UNIVERSITY AT ALBANY
State University of New York

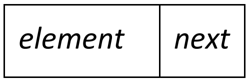
COLLEGE OF ENGINEERING AND APPLIED SCIENCES
DEPARTMENT OF COMPUTER SCIENCE

**ICSI213 Data Structures**

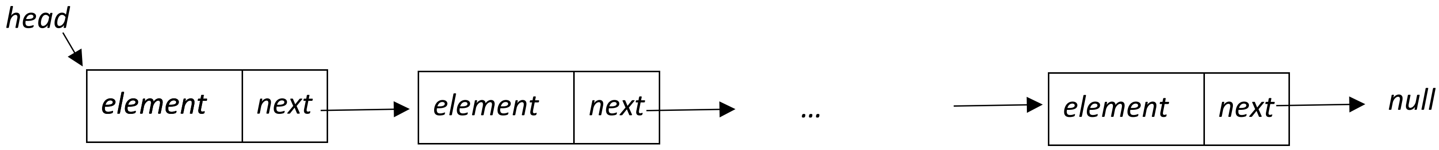
Notice that students are expected to start the lab as soon as the description is available and seek feedback during the lab. Labs are contiguous study of the lecture or used as stepping-stones for the projects. Skipping lab activities would impact the learning significantly.

## Lab 01 Linked Lists

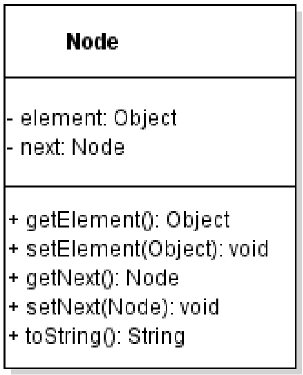
A singly linked list contains a list of nodes that are stored in a linked allocation. A node contains an element (*element*) and a reference to its successor (*next*). The successor of the last node is null.



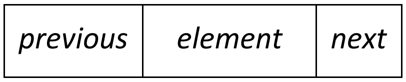
There is only one external reference, a reference to the head node (*head*), in a linked list.  Starting with the head node, we can follow the successor links (*next*) to reach a node at a specific position.



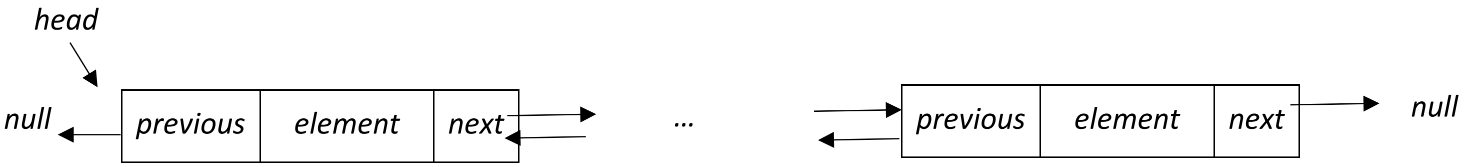
In *Node* class, the *getters* and *setters* are designed to return a reference to the element or its successor of a node or to change the element or its successor of a node, respectively.



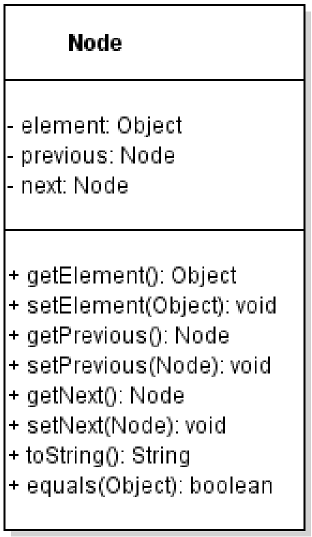
A doubly linked list contains nodes each of which has one more value, a reference to its predecessor(*previous*).



There is only one external reference, a reference to the head node (*head*), in a linked list.  Starting with the head node, we can follow the successor links (*next*)/move forward or follow the predecessor links(previous)/move backward to reach a node at a specific position. The first node doesn't have a predecessor and the last node doesn't have a successor.



In *Node* class, the *getters* and *setters* are designed to return a reference to the element, its successor or its predecessor of a node or to change the element of, its successor or its predecessor of a node, respectively.



For this lab, you will work with a partner to solve the following problems. Submit one PDF file with all solutions included.

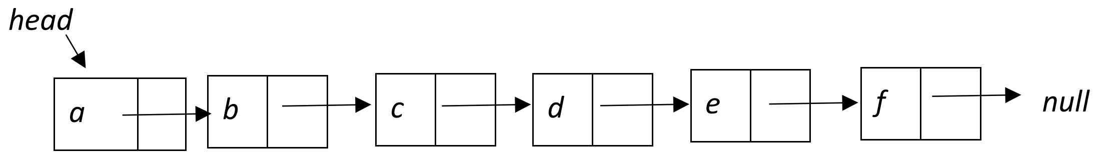
| | |
|---|---|
| Question 1 | 1 point |
| Question 2 | 1 point |
| Question 3 | 1 point |
| Question 4 | 1 point |
| Question 5 | 1 point |
| Total/ 5 | 5 points |

Given the following,

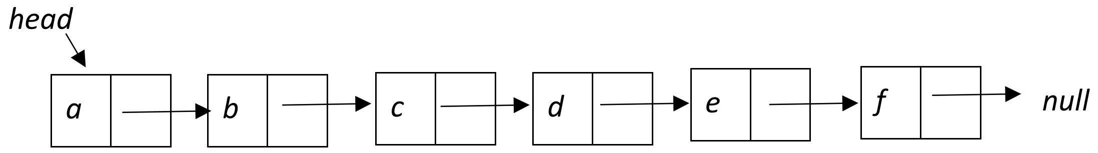
- *Node* class for a singly linked list and *Node* class for a doubly linked list
- Method *find*(*int index*) that returns a reference to the node at position *index* in this linked list.
- Method *size*() that returns the number of the nodes in this linked list.

Given the linked list, what will happen to the list after the code segment is executed? If the code segment returns a reference, what object does this reference point at?

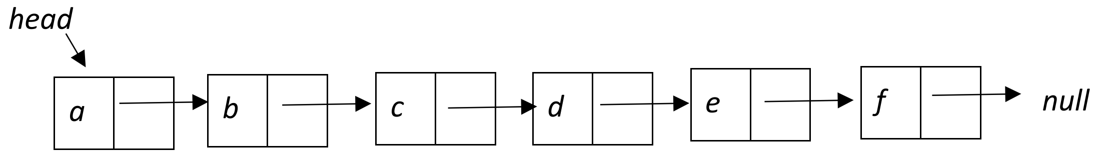
**_this_.head.getNext()**



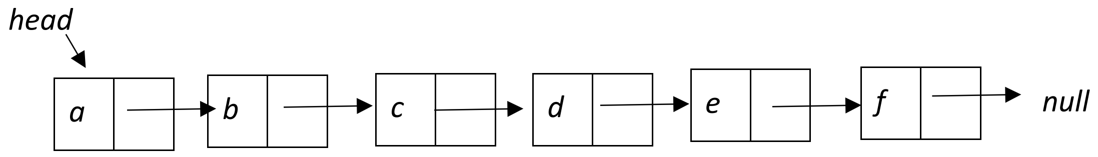
**_this_.head.setNext(new Node("n"))**



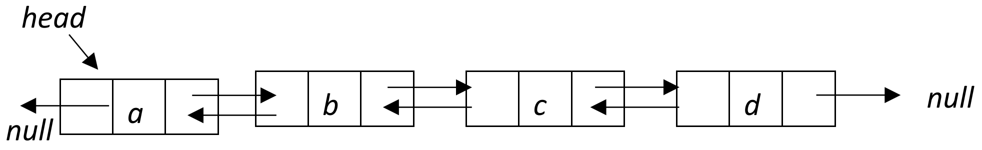
**_this_.head.getNext().setNext(new Node("n"))**



**_find(_size() – 2).setNext(null)**



**_find(_size() – 2).setPrevious(null)**


head
null
a
b
c
d
null