# Lab Assignment 24 (Implementing Linked Lists, Stacks & Queues)

1. Write a program named **Lab24A** that will make a linked list of names.
   1. Create a class named **MyLinkedNode** that will have
      1. Two instance variables: one to hold the name (String) and one to point to the next node (data type: MyNode). This will be like the Node class in the MyLinkedList in the PowerPoint.

Make the instance variables public, so the methods from the PowerPoint will work.

* + 1. A constructor that receives a String parameter and sets the name field to it and the next field to null.
  1. Create a class named **MyLinkedList** that will be like the one in the PowerPoint. (But won’t have all the methods.)
     1. It should have
        1. the head, tail & size fields
        2. a constructor that sets all fields to null & zero
        3. The **addLast** method (void method with 1 string parameter)
        4. The **getFirst** method (String method – no parameters)
        5. The **getLast** method (String method – no parameters)
     2. It should have a **toString** method (returns a String and has no parameters) that traverses the list and returns a string with all the data in the nodes (starting with the first one.) Use the code to traverse a linked list in the PowerPoint as a starting point.
     3. Add a boolean method that receives a String parameter and traverses the linked list. It should return a true if the String is in the list and false otherwise.
  2. Back in the main class, do the following:
     1. Create a MyLinkedList object
     2. Read each name from the text file, Lab24A.txt, and add it to the linked list.
     3. Print the linked list using its toString method
     4. Ask the user to input a name and call the boolean method to determine if that name is in the list. Print a statement to say if it is or not.

1. Write a program named **Lab24B** where you will create a queue structure from scratch (not using existing Java list structures.)
   1. Create a class named **Cars** that you will make objects of. It should have the following:
      1. Instance variables to hold the car make (String), model (String), and year (int)
      2. A constructor that receives a parameter for each instance variable and fills in the instance variables.
      3. An int method that returns the car year (no parameters)
      4. A String method that returns the car make (no parameters)
      5. A String **toString** method (no parameter) that returns a String with all the instance variables and labels, like we’ve made in other classes.
   2. Create a class named **MyQueueNode**, that is a generic class. It should have the same instance variables and methods that the MyQueueNode from the PowerPoint has. (Make the instance variables public to simplify things a little.)
   3. Create a class named **MyQueue**, that is a generic class. It should have the same instance variables and methods that the MyQueue class in the PowerPoint does.
   4. The MyQueueNode and MyQueue should be built from scratch and not use any predefined Java list or ArrayList structures.
   5. In the main class, do the following:
      1. Create a MyQueue object
      2. For each line of car data in the text file (Lab24B.txt), create a **Cars** object and add it to the MyQueue object using the enQueue method.
      3. Print the queue using the MyQueue toString method.
      4. Remove the first 3 objects from the queue using the dequeue method and print each object as you do so. (Print a statement before this that says what you are doing.)
2. Write a program named **Lab24C** where you will create a stack structure from scratch (not using existing Java list structures.)
   1. Create a class named **Drinks** that you will make objects of. It should have the following:
      1. Instance variables to hold the drink name (String), container type (String), and size (int)
      2. A constructor that receives a parameter for each instance variable and fills in the instance variables.
      3. A String method named toString (no parameter) that returns a String with all the instance variables and labels, like we’ve made in other classes.
   2. Create a class named **MyStackNode**, that is a generic class. It should have the same instance variables and methods that the MyStackNode from the PowerPoint has.
   3. Create a class named **MyStack**, that is a generic class. It should have the same instance variables and methods that the MyStack class in the PowerPoint does.  
      Note: the toString method should start from the top of the stack and then go through the rest of the stack as it creates the String to return.
   4. The MyStackNode and MyStack should be built from scratch and not use any predefined Java list or ArrayList structures.
   5. In the main class, do the following:
      1. Create a MyStack object
      2. For each line of drink data in the text file (Lab24C.txt), create a **Drinks** object and add it to the MyStack object using the push method.
      3. Print the stack using the MyStack toString method.
      4. Remove the first 2 objects from the stack using the pop method and print each object as you do so. (Print a statement before this that says what you are doing.)