MAC 286 Data Structures Fall 2020 **(Due Oct. 13, 2020)**

Data Structure Summary: Doubly-Linked List

Instructor: Prof. Oehrlein

- The summary should be turned in to Blackboard, with a suggested due date of **Tuesday, October 13**.
- Clear and complete explanations to all parts with correct and tested code will be graded as satisfactory.

Describing a doubly-linked list

(a) Define a doubly-linked list in your own words. What are they? What are their key features? What is useful about them?

(b) Why would we use a doubly-linked list instead of a singly-linked list?

(c) For each of the methods you think is important for a doubly-linked list, describe in words and/or images how and why they work.

(d) What are the time complexities of some of the important methods for a doubly-linked list?

A circular doubly-linked list

(a) In a circular doubly-linked list, there is no front or end; the nodes form a full circle. Instead of keeping track of the node at the front, we keep track of a current node instead. Write a class for a circular doubly-linked list using the attached Job class as your node objects. It should have:

- A private instance variable for the current node
- A getCurrent() method that returns a reference to the current node
- A method to insert a node before the current node
- A method to delete the current node
- A method to advance the current node to the next node in the list
- A method to check whether the list is empty
- A method to print the list, starting with the current node

(b) Write tests for these methods. Why did you choose these test cases? (Think about any edge cases as you do this.) Did you get what you expected?

(c) One thing we might use this for is a simple job scheduler for a computer. The list would keep track of every process that the computer needs to do, and it would run each for a set amount of time before moving onto the next job. If the job completely finished, it would be removed from the list. If it didn't, then the amount of time it still needed to run for would be updated. This is called round-robin scheduling.

Suppose I gave you information a list of job names, when they would arrive, and how long they would take. **Outline** how exactly a function to run these jobs with a round-robin scheduler would work using the Job methods and the methods for your list. **You don't need to write code, and you don't need to work out all the details.** Explaining in words (for example, sentences like "when (thing happens), I would use (this method) to do (other thing)" will work) and helpful images is enough.