**CS173 Intermediate Computer Science**

**Reading 13**

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Read Chapter 14.2-14.5 in the book.

You should come away with understanding:

* How to symbolically draw linked list type structures.
* How to use a struct to build a link list unit.
* How to use pointers to chain and manipulate a linked list.
* How to manage memory with new/delete in linked lists.

**1) What are the two components that are most commonly found in a node struct of a linked list?**

item member, link member

**2) What role does the head pointer play?**

It points to the first node in a dynamic linked list.

**3) What value do we give a pointer to indicate that it points to nothing?**

nullptr

**4) Explain why a linked list structure may be better than an array structure when we are inserting something in the middle of the list.**

In contrast with the linked list structure, which the task is mostly about changing pointer values, to insert a new item based on an array structure, we must shift the array elements to make room, which would be inefficient if we are shifting a large-sized array.

**5) Explain why a linked list structure might use more memory than an array structure when implementing a List.**

The linked list structure requires to have not only the data itself, but also the link, which is the location of next node, in a single node, ultimately requiring more memory space compared to an array structure, which only contains the data.

**6) Explain why a linked list structure might use less memory than an array structure when implementing a List.**

We define the size of the array prior to actually implementing and utilizing it thus, in some cases, a linked list structure might use less memory than an array structure when the pre-determined size of the array is large enough to surpass the memory usage compared to the memory usage of the linked list structure. In other words, dynamically linked list, which can contract the number of list members, allows us to make cases when the memory usage is less than the fixed sized array structure.

**7) Assume you have a linked list List structure using the following struct. Assume the list is already built and contains 10 items. Show how you can insert a link at the 4th position in the structure with the value 100.**

struct Node {

int value;

Node\* next;

};

Node\* head;

// code not shown to build the link lists with 10 items

// you sketch the steps below (or write code) to insert a new item with value 100 in the 4th spot in the List.

Node\* fourthNode = new Node;

fourthNode->value = 100;

fourthNode->next = nullptr;

currentPtr = head;

for (int count = 1; count < 3 && currentPtr != nullptr; count++) {

currentPtr = currentPtr ->next;

}

if (currentPtr != nullptr) {

fourthNode ->next = currentPtr ->next;

currentPtr->next = fourthNode;

}