

COMP1511 PROGRAMMING FUNDAMENTALS

Lecture 13

Linked Lists: inserting anywhere in the list, searching through a linked list for specific conditions





COMP1511 Programming Fundamentals



- Adding at the start of a linked list
- Multi-file projects • A bit more about memory Slow intro to linked lists
- - Printing out a linked list (traversing the list)

LAST WEEK...



COMP1511 Programming Fundamentals

- Linked lists
 - Adding to a linked list at any point
- - Searching through a linked
 - list for specific conditions



WHERE IS THE CODE?

LIVE LECTURE CODE CAN BE FOUND HERE:

https://cgi.cse.unsw.edu.au/~cs1511/21T3/live/Week08/



A REHASH: LINKED LISTS **A NODE**

- the list

a node

[contains some data and also a pointer to the next node of the same data type]

struct node { **int** data; struct node *next;

• Linked list is made up of many nodes • Each node has some data and a pointer to the next node, creating a linked structure that forms

some data of type int

pointer to the next node, which also has some data of type int and a pointer to the next node

A REHASH: LINKED LISTS

MANY NODES

 We can create a linked list, by having many nodes together, with each struct node next pointer giving us the address of the node that follows it

some data of type int

A pointer to the first node pointer to the next node, which also has some data of type int and a pointer to the next node some data of type int

pointer to the next node, which also has some data of type int and a pointer to the next node



A REHASH: LINKED LISTS

- 1, 2, 4



• Let's say we have a list with numbers:

• How will this look in a linked list structure?



LINKED LISTS **FINDING WHERE TO INSERT**

- problem)
- to put a 3 between 2 and 4...

• I could have a condition that will help me find at which point to insert (specified by my

• In my list, for example, it could be that I want

• This would involve searching through the list to find 2 (or if the list is in order, it may be to find the value less than the one I am inserting and the value after to be greater than the value I am inserting and then insert by creating a new node and linking it to the right space...

LINKED LISTS (INSERT 3)



LINKED LISTS (INSERT 3) 2. CREATE A NODE



CURRENT

0x68A



0x3B4

ſ	4	
ISERT IERE	NULL -	→ NULL

LINKED LISTS (INSERT



CURRENT

0x68A

LINKED LISTS **LET'S SEE THE CODE**

linked list.c

//that will keeo track of where you are struct node *current = head; //the create node function we wrote last week struct node *new node = create node(data, NULL); //which signals the end of the list while (current != NULL) { //Check where to insert new node->next = current->next; current->next = new node; } current = current->next; **return** head;

```
struct node *insert middle(int data, struct node *head) {
   //create a pointer and point it to the head of the list
   //create the new node that you want to insert by using
   //Start traversing through my list by checking if I am at NULL
```

```
//(this decision assumes nodes are in numerical order)
if (current->data < data && current->next->data > data) {
```

//increment to the next node - otherwise you have an infinite loop!

//return the head of the list with the new node attached in

LINKED LISTS (INSERT 5)

WHAT IF WE WANT TO INSERT AT THE END OF THE LIST 1, 2, 4? **1. FIND WHERE TO INSERT: IS CURRENT LESS THAN 5 AND NEXT MORE THAN 5? WHAT IF WE ARE AT THE END?**





LINKED LISTS (INSERT 5) 2. CREATE A NODE



CURRENT

0x68A



0x3B4

ſ		
ISERT IERE	NULL	→ NULL

LINKED LISTS (INSERT 5) 3. INSERT NODE



CURRENT



LINKED LISTS **LET'S SEE THE CODE**

linked list.c

```
struct node *insert endnode(int data, struct node *head) {
    //create a pointer and point it to the head of the list
    //that will keeo track of where you are
    struct node *current = head;
    //create the new node that you want to insert by using
    //the create node function we wrote last week
    struct node *new node = create node(data, NULL);
    //Loop through until you get to the last node in the list
    //You want to stop at the last node and not go past it
    while (current->next != NULL) {
        current = current->next;
    //Set the new node as the last node, but pointing the current node to it
    current->next = new node;
    new node->next = NULL;
    return head;
```

BREAK TIME (5 MINUTES)





PROBLEM TIME

Let's go back to our FIFA World Cup problem, and practice searching through the linked list for certain conditions and inserting new nodes in different places.



FEEDBACK?

PLEASE LET ME KNOW ANY FEEDBACK FROM TODAY'S LECTURE!

www.menti.com

Code: 7158 9760



WHAT DID WE LEARN **TODAY?**

LINKED LIST: SEARCHING FOR WHERE TO **INSERT AND INSERTING**

linked_list.c



world_cup_prep.c

ANY QUESTIONS? DON'T FORGET YOU CAN ALWAYS EMAIL US ON CS1511@CSE.UNSW.EDU.AU FOR ANY ADMIN QUESTIONS

PLEASE ASK IN THE FORUM FOR CONTENT RELATED QUESTIONS

