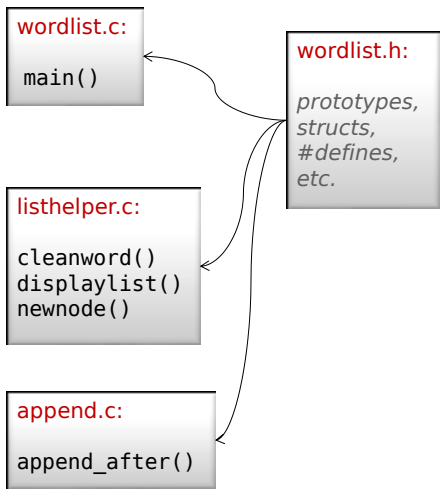
Lab: linked list of words

Overview: what the word-list program does

Program Structure

- wordlist.c
  - Function `main()` performs input, output, calls other functions
- listhelper.c
  - Miscellaneous functions used by main() to do I/O
- append.c
  - Function `append_after()` does the work of list-building
- wordlist.h
  - Contains shared information that is needed to "tie together" the other files

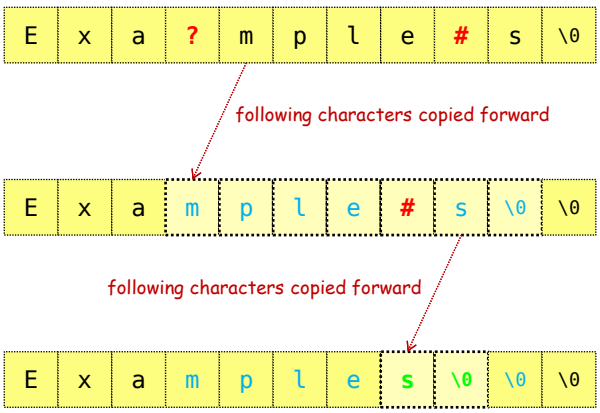


Overview: main()

- Open textfile for input
- "Clean up" the word
  - Remove non-alphabetic characters
    - » What if none left???
  - lowercase everything
- Close file handle, report results
  - Time the program
- "To do" at this point:
  - Add word to a linked list

Overview: `cleanword()`

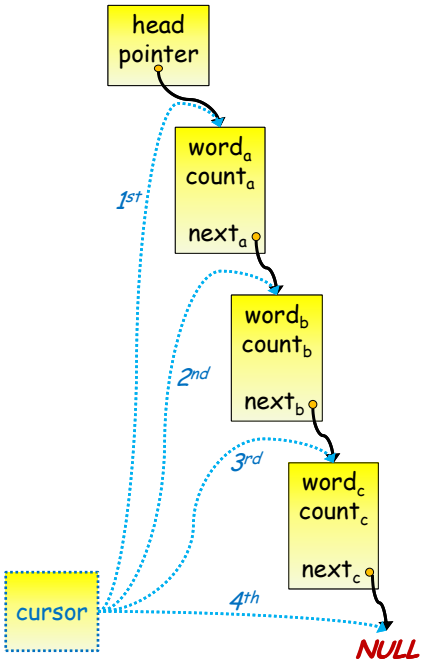
- For each character:
  - if (character is non-word), copy the rest of the word on top of it



Overview: `displaylist()`

Assuming the list has been created:

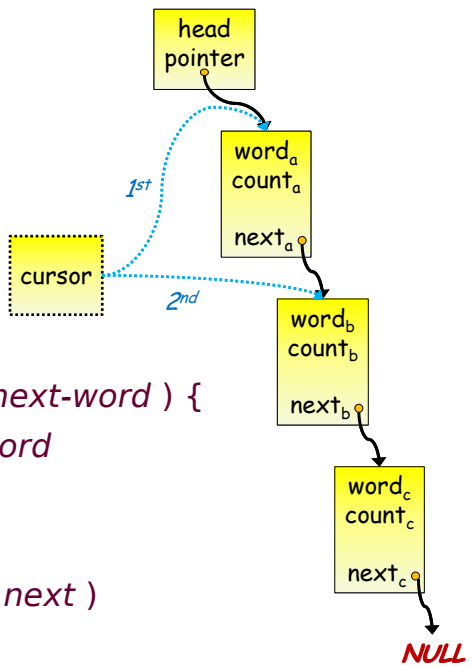
- "Walk the list" –
  - Cursor starts at head
  - if (cursor != NULL) {
    print node contents
    displaylist(*node's next*)
    }



Overview: `append_after()`

Creating the list:

- "Walk the list" –
  - Cursor starts at head
  - if (*new-word precedes next-word*) {
    insert between this-word
    and next-word
    } else {
    append_after(*node's next*)
    }



"*Walking*" *a Linked List Iteratively*

- This for() loop starts at the head of a linked list, and follows the chain of "next" pointers

```
for (cursor = head; cursor != NULL; cursor = cursor->next)
    printf( "( %6.2lf, %6.2lf, %6.2lf)  %5.1lf\t%6.2lf\n",
        cursor->x, cursor->y, cursor->z,
        cursor->weight, length(cursor) );
```

- Each element is processed in turn – here, it is simply displayed

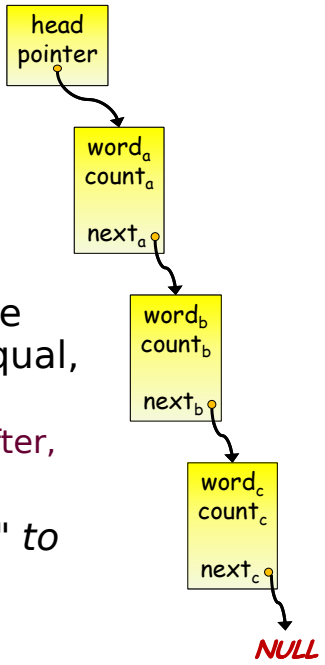
Binary Tree

Overview:

How the binary-tree assignment processes files of words

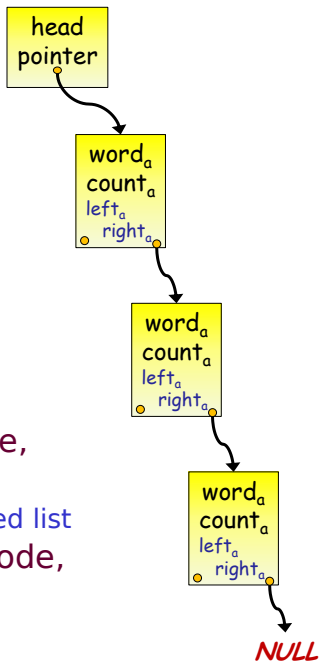
Consider an Ordered, Linked List...

- At each node, "previous" values are in previous nodes, while "later" values are in following nodes.
- Add a new node by walking the list until the current node is equal, or the next node is "later".
  - Add to current node or append after, as appropriate
- *What if new node is "previous" to current node?*
  - *Only happens at the head???*



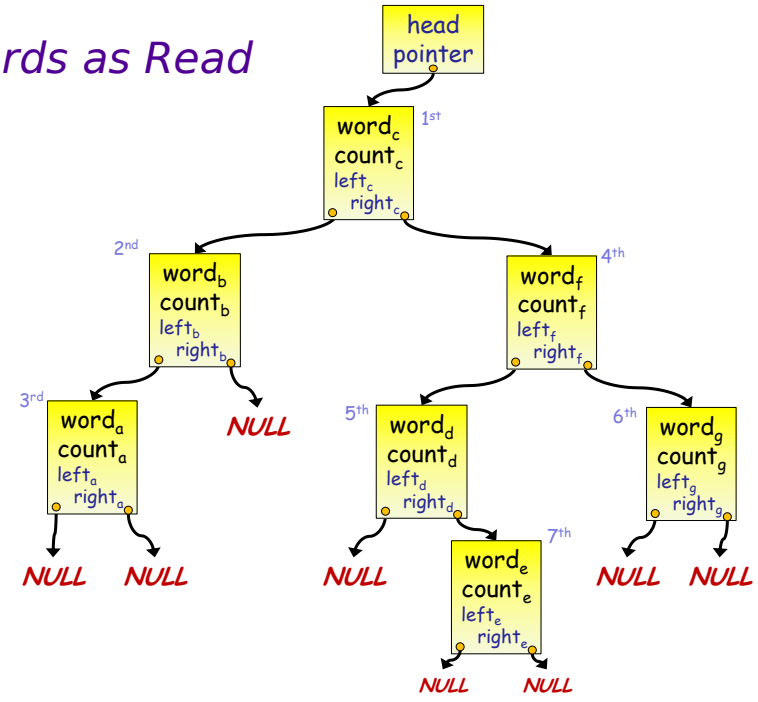
A new approach

- Each node has *two* pointers, "left" and "right" (or "before" and "after")
  - Instead of single "next" pointer
- To add a new node:
  - If new node equals current node, add to count
  - if new node "follows" current node, proceed to right/after pointer
    - As for the "next" pointer in the linked list
  - If new node "precedes" current node, proceed to left/before pointer



Add Words as Read

1) $word_c$
   - first word
2) $word_b$
   - add left
3) $word_a$
   - add left, add left
4) $word_f$
   - add right
5) $word_d$
   - add right, add left
6) $word_g$
   - add right, add right
7) $word_e$
   - add right, add left, add right



Display the Tree in Order

- Start at root node
  - Pointed to by head pointer

1) Recursively descend left subtree
2) Display current node
3) Recursively descend right subtree