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4. Compare the times it takes to sort a random array vs a linked list with a bubble sort.

Bubble sort was a new sort for me. I have heard of it but never coded it myself. I seemed simple enough but as the values got bigger the sort toke a long time to complete.

The code was straight forward for an array. We go through the array checking to see if the position we are at is greater than the position+1. If so, we swap those values. We continue this down the line till we reach then end with the biggest value in the array.

I used a while loop with a bool variable, called sorted, that checks if it is false. If so, the loop continues. The next line changes sorted to true. In the for loop there is an if statement that checks the position is greater than position+1. If that if statement is used the sorted is changed to false and the while loop will continue. Once the for loop can go through the array and never trigger the if statement then sorted ends as true and the array is sorted.

The linked list required me to create my own class. I kept it bare since I did not need everything it had to offer. The bubble sort is the same, but it required a few tricks to swap out the node. I used a trailing pointer to stay one node back of the current pointer. A while loop like the array bubble sort kept going till bool sorted returned true. If a value less than current is found, then a temp pointer is used to hold the next object. The trailer.next points to temp, current.next points to temp.next. This moves the position+1 object to position. From there current will equal temp, trailer equal current and current equal current.next. Position is now in front of position+1 and the links are back in order. Sorted becomes false and the loop runs again. If position is less than position+1 then the pointers just move down the list. Doing the swap this way keeps our object data consistent and isn't changed in the process.

Lastly the main just creates the array with random objects and times the two searches. It prints the results to console so you can see the speed of one to the other