

George Gabricht
ggabrich - 56735102

```
ggabrich@andromeda-32 21:35:10 ~/ics46/hw/hw3
[$ make
echo -----compiling main.cpp to create executable program main-----
-----compiling main.cpp to create executable program main-----
g++ -gddb -std=c++11 main.cpp OrderedArrayList.cpp OrderedLinkedList.cpp -o main
ggabrich@andromeda-32 21:35:15 ~/ics46/hw/hw3
[$ valgrind main random_small.txt
==7478== Memcheck, a memory error detector
==7478== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==7478== Using Valgrind-3.13.0 and LibVEX; rerun with -h for copyright info
==7478== Command: main random_small.txt
==7478==
Testing OrderedArrayList:
0.030364
Alfredo
Andalusians
Arkansas
Arturo
Calvinist
Canadianizations
Carmichael
Fischbein
Hereford
Hollandaise
Intel
Kingstown
Kirov
Lippincott
Mae
Mauritius
Reginald
Rick
Tuscanizes
Xavier
abandoned
academics
administrator
adobe
advancing
alarmed
alarmingly
aliments
amenable
ammo
apex
append
bait
baller
blabbed
brevity
bungalows
bushel
cots
courtrooms
credibility
crews
crumbly
dailies
deceases
defines
dialup
dictionaries
digestive
```

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dictionaries
digestive
digests
dilate
divider
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espousing
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fabricated
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flawless
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fungi
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get
gigantic
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granny
guarantees
gulches
humanely
implacable
inferno
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insertion
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interactive
involved
jonquil
levelled
literal
matings
muddiness
municipal
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nude
outsiders
outstripping
packages
painless
patients
plausible
plenipotentiary
plenipotentiary
pricers
recurrent
reenabled
retreated
richest
roundoff
ruffled
satires
scotch
shined
shuttles
sloth
snails

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sloth
snails
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spiritedly
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step
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superposition
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theater
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treetops
trick
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unloading
upland
vague
variously
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weakened
whoever
workingman

0.012505

Testing OrderedLinkedList:

0.008996

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0.008102

==7478==

==7478== HEAP SUMMARY:

==7478== in use at exit: 72,704 bytes in 1 blocks

==7478== total heap usage: 180 allocs, 179 frees, 1,569,910 bytes allocated

==7478==

==7478== LEAK SUMMARY:

==7478== definitely lost: 0 bytes in 0 blocks

==7478== indirectly lost: 0 bytes in 0 blocks

==7478== possibly lost: 0 bytes in 0 blocks

==7478== still reachable: 72,704 bytes in 1 blocks

==7478== suppressed: 0 bytes in 0 blocks

==7478== Rerun with --leak-check=full to see details of leaked memory

==7478==

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```
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==7478==
==7478== LEAK SUMMARY:
==7478==    definitely lost: 0 bytes in 0 blocks
==7478==    indirectly lost: 0 bytes in 0 blocks
==7478==    possibly lost: 0 bytes in 0 blocks
==7478==    still reachable: 72,704 bytes in 1 blocks
==7478==           suppressed: 0 bytes in 0 blocks
==7478== Rerun with --leak-check=full to see details of leaked memory
==7478==
==7478== For counts of detected and suppressed errors, rerun with: -v
==7478== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
ggabrich@andromeda-32 21:35:24 ~/ics46/hw/hw3
|$ main
Testing OrderedArrayList:
15.669
0.07381
17.6565

Testing OrderedLinkedList:
22.274
25.2114
13.8195

ggabrich@andromeda-32 21:37:14 ~/ics46/hw/hw3
$ █
```

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```
// uses recursive binary search algorithm to find and return index of key
// else returns index of where key belongs in sorted array.
int OrderedArrayList::binary_search(string key, int min, int max) { // O(log N)
    int mid = min + (max - min) / 2;
    if (min > max) {
        return mid;
    } else if (key < buf[mid]) {
        return binary_search(key, min, mid - 1);
    } else if (key > buf[mid]) {
        return binary_search(key, mid + 1, max);
    } else {
        return mid;
    }
}

// copies all items from index hole down to the end of the array
// leaving a hole at index hole for insertion.
void OrderedArrayList::copy_down(int hole) { // O(N)
    for (int ndx = size; ndx > hole; ndx--) {
        buf[ndx] = buf[ndx - 1];
    }
    ++size;
}

// inserts string word into the array list
void OrderedArrayList::insert(string word) { // O(N)
    if (size >= 0.8*capacity) {
        buf = resizeArray(capacity, buf);
        capacity *= 2;
    } else if (isEmpty()) {
        buf[size++] = word;
    } else {
        int result = binary_search(word, 0, size - 1);
        copy_down(result);
        buf[result] = word;
    }
}
```

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// inserts a new node in lexicographical order.

```
static void insert(string word, ListNode *L) { // O(N)
    for (ListNode * cur = L; cur != nullptr; cur = cur->next) {
        if (cur->info > word) {
            cur->next = new ListNode(cur->info, cur->next);
            cur->info = word;
            Break;
        } else if (cur->next == nullptr) {
            cur->next = new ListNode(word, nullptr);
            break;
        }
    }
}
```

// inserts a new node in lexicographical order in

// linked list with value of string word

```
void OrderedLinkedList::insert(string word) { // O(N)
    if (isEmpty()) {
        head = new ListNode(word, nullptr);
    } else {
        ListNode::insert(word, head);
    }
}
```

void insert_all_words(string file_name, OrderedList & L) // O(N^2)

```
{
    double eTime;
    Timer t;// declare timer object
    ifstream wordFile;
    string newWord;
    wordFile.open(file_name);
    if (wordFile.is_open()) {
        t.start();// start timer
        while (getline(wordFile, newWord)) {
            L.insert(newWord);
        }
        t.elapsedUserTime(eTime); // stop timer
        wordFile.close();
    }
    cout << eTime << endl;// report time
}
```