

Algorithms

CMPT 435

– Assignment 3 - 100 points

Goals	<ul style="list-style-type: none">to implement searching and hashing, and to understand their performance.
Requirements and Notes	<ul style="list-style-type: none">Download the the text file <code>magicitems.txt</code> from our web site if you don't have it already.Read it line by line into an array.Sort the array using one of your sort implementations from Assignment Two. (Include a copy of your sorting code in this assignment's directory so that it's easy to compile.)Develop your own implementation of <i>linear</i> and <i>binary</i> search. [60 points]Randomly select 42 items.Perform a <i>linear search</i> on the (sorted) array for each of those randomly selected items. Print the number of comparisons for each search and compute the overall average.Perform a <i>binary search</i> on the (sorted) array for the same "randomly" selected items as before. Print the number of comparisons for each search and compute the overall average.Record your results in a table in your LaTeX document. Also note the asymptotic running time of each sort and explain why it is that way.Develop your own implementation of a hash table (with chaining) of size 250. Use the hash function we spoke about in class (and in the example code on our web site at https://www.labouseur.com/courses/algorithms/Hashing.java.html). [30 points]Load your hash table with the magic items.Retrieve the same 42 (no longer-) randomly selected items from your hash table. Print the number of (<i>get</i> + comparisons) for each item and compute the overall average. (Every <i>get</i> is one, then count the comparisons needed to handle chaining.)Add your results to the LaTeX document, including the asymptotic running time of hashing with chaining and explain why it is that way. [10 points] <p>As usual, your code must separate structure from presentation, be professionally formatted yet uniquely yours (show some personality), use and demonstrate best practices, and make me proud to be your teacher. [−∞ if not]</p>
Resources	<ul style="list-style-type: none">Linear and binary search are described in our text in sections 10.2 and 27.3.Hash tables with chaining are described in our text in section 11.2.
Submitting Your Work	<p>In addition to your source code, commit your LaTeX document in both <code>.tex</code> and <code>.pdf</code> forms to your GitHub repository. For your code, make many commits to GitHub. If you don't make enough commits, I will not accept your work. Be sure that you make your final commit for this assignment on or before the due date. (See our syllabus for those details.)</p>