

This experiment was to first make a minimum leftist heap and minimum skew heap. The operations included insert, deletemin, preorder traversal, inorder traversal, and levelorder traversal for both heaps. After creating the both heaps, testing was needed to compare the timing of the minimum leftist heap to to the minimum skew heap. The tests were done using pseudo random numbers using the srand and rand C++ functions. Random numbers were first inserted into the leftist heap and skew heap. Then a combination of insertions and deletions were performed on both structures based on a probability function that was calculated from the pseudo random numbers.

Data was generated in three main loops. The outer loop generated the number of insertions into the structures, but only 10% of this total number was used for the insertion and deletion inner loop. The number of insertions started at 50,000 and doubled until 400,000 items were inserted into the structure. The second inner loop generated a seed to be used for the pseudo random number. This experiment used seed values of 1 to 5. The four inner loops were for the insertion only loop and the combination of insertion and deletion loop (two loops for each structure). It printed out the execution time of each inner loop. These times were put into an Excel spreadsheet to generate the graphs below comparing the execution time vs. number of insertions.

The minimum leftist heap performed slightly better in the both tests. The execution time for both structures took longer as n increased. Both structures demonstrated $O(\log n)$ performance even though the worst case skew heap performance is $O(n)$. The skew heap can have a worst case scenario of $O(n)$ if it is a skew tree. The minimum leftist heap would be a better choice since the minimum leftist heap performed better with all of these tests and has a better worst case of $O(\log n)$. The average execution times are in the table below as well as the graphs comparing the two structures.

n	MinLeftistHeap Ir	MinLeftistHeap Insert and Delete (s)	SkewHeap Insert (s)	SkewHeap Insert and Delete (s)
50000	0.0137042	0.000665	0.0151008	0.0005902
100000	0.0287132	0.0013348	0.0337782	0.0012076
200000	0.0626946	0.0027138	0.0771882	0.002527
400000	0.1299728	0.005057	0.1583604	0.0045928

