**INFO6205 31514 Program Structure & Algorithms SEC 01 Spring 2024**

**Assignment 6**

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**Task:**

To determine--for sorting algorithms--what is the best predictor of total execution time: comparisons, swaps/copies, hits (array accesses), memory used, or some combination of these.

**Testcase Screenshots:**

**Heap Sort:**

A screenshot of a computer

Description automatically generated

A graph of a number of different colored lines

Description automatically generated

**Merge Sort:**

A screenshot of a computer

Description automatically generated

A graph of different colored lines

Description automatically generated

**Quick Sort Dual Pivot:**

A screenshot of a computer

Description automatically generated

A graph of different colored lines

Description automatically generated

**Relationship Analysis and Conclusion:**

The efficiency of sorting algorithms is often influenced by multiple factors rather than just one. For instance, while quicksort as we see in our results involve many comparisons but fewer swaps, heapsort has fewer comparisons but more swaps. Therefore, assessing a combination of metrics offers a more precise estimation of execution time.

In addition, the number of array accesses or hits, plays a pivotal role in sorting performance. Algorithms that minimize unnecessary array accesses or memory movements tend to exhibit better efficiency, particularly on architectures where memory access times are critical. Hence, considering the number of hits is a reliable predictor of algorithm performance. This can be seen in the graphs above for each type of sort.

The data is also attached in a tabular format in the excel sheet attached.