Assignment #4 Write Up

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December 6th, 2022

Experiment 1:

Data:

- The first loop had a recorded time of 0.118 ms whereas the second loop had a recorded time of 0.116 ms.

Procedure:

- The size of the arrays was 1 million (a1 and a2).

Observation/Interpretation:

- On the first loop, there was more work to do, but the cache was hitting. On the other hand, the second loop had less work to do, but the cache was missing. Although one loop has significantly more "work/task" to do, when the occurrence of the cache misses is similar, the runtime also is very similar. The difference was exceptionally minuscule (0.002 milliseconds of the gap in this case).

Experiment 3:

Data (in milliseconds):

Data Type:	Size	Time consumed (milliseconds)
List implemented in an array	1 million indices	1.332
Linked list	1 million nodes	3.160
Unrolled linked list	1 million nodes	0.556

Observation/ Interpretation:

- Initially, to even out the conditions, I assigned 1 million indices and nodes depending on the data structure. After the data collection procedure, the table displayed that unrolled linked list was the fastest, unrolled list implemented in an array was in the middle, and the linked list took the most amount of time. This data strongly suggests an idea that cache misses occurring the most on the linked list, a list implemented in an array in the middle (2nd most cache misses), then lastly unrolled linked list. This result was unorthodox as theoretically, array is supposed to have the least amount of time consumed due to having the least amount of cache misses, then unrolled linked list, and linked list afterwards. In this specific experiment, unrolled linked list had the least amount.