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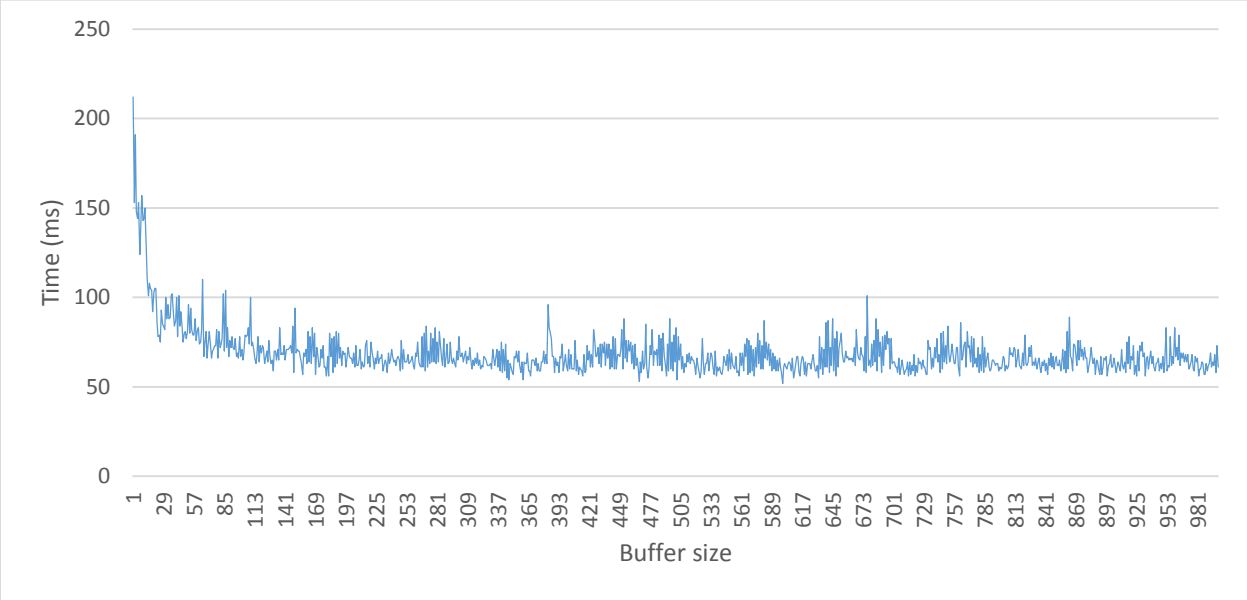
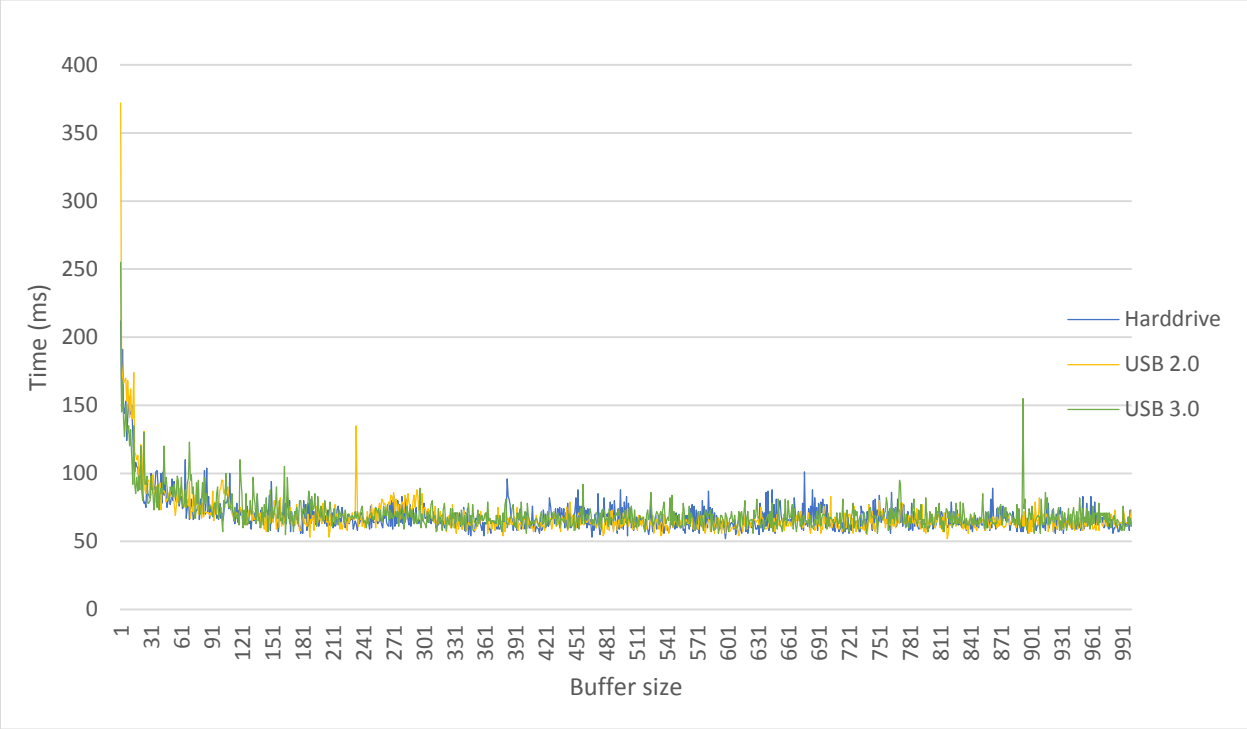
For this assignment, we were required to create an unbuffered reader to read through a file and count the frequency of the final letter and perform the same task with a buffered reader. We know the buffered read is faster than the unbuffered read, but we do not know how much faster the buffered is. In order to test how much faster the buffered reader is, we ran the program 1000 times, each time with a bigger buffer than the last. The graph below shows the results of the buffered reader, with a buffer size of 1 to 1000.



As shown on the graph, the time it takes for the program to read and count the frequency dramatically decrease as the buffer size decreases. However, the time taken stops decreasing around when the buffer size is 100. This shows that a buffer size greater than around 100 will have not improve the run time of the program.

Running the program on a USB was also a requirement for this assignment. This graph below shows the results of the USB compared to the HDD.



As shown on the graph above, the time taken is dramatically slow on the USB 2.0 when the buffer size is 1, but the time taken for both the HDD and the USB 3.0 are similar. This is intriguing as I would have thought the time taken for the USB 3.0 would be slow than the HDD. Also, when the buffer size is around 200, the take taken for all three devices are similar. This is also very interesting as I would have thought both USB2.0 and 3.0 would be slower than the HDD. Also, the graph shows that both the USB2.0 and 3.0 have a random spike, whereas the HDD have smaller but more frequent spikes. This could be because the USB devices are flash drives whereas the HDD is a disk.

In conclusion, a buffered reader is significantly faster than an unbuffered reader, but after a certain size, the program's runtime will not increase. Also, USB devices do not seem to run any slower after a certain buffer size but will be significantly slow if the buffer is small.