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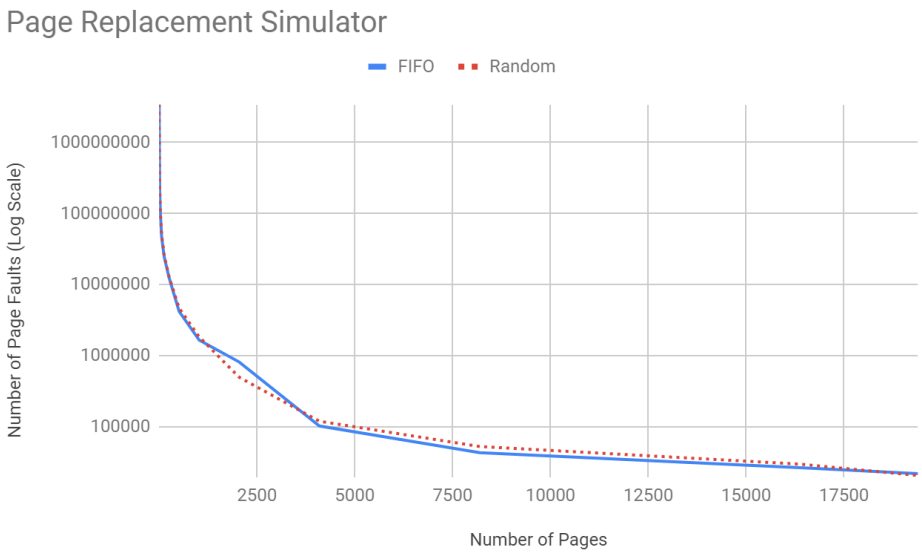
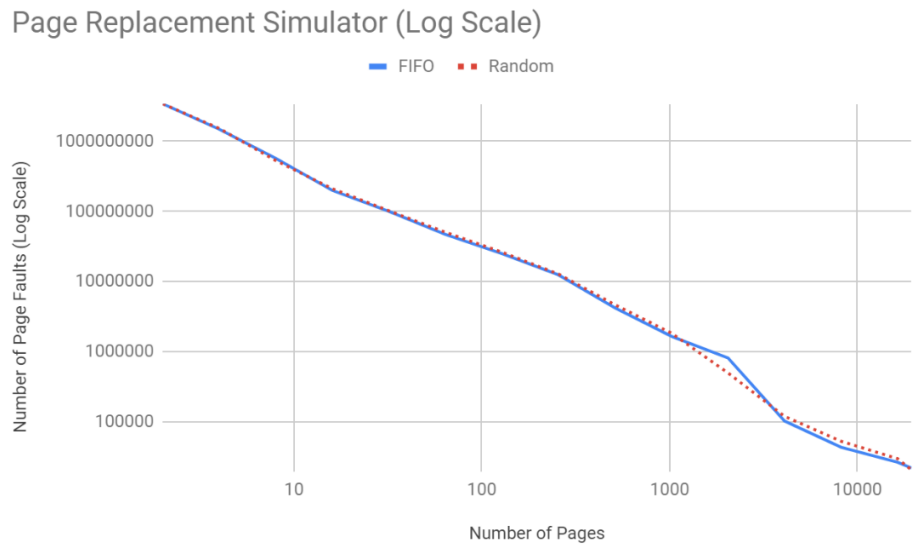
COS 421

Page Replacement Simulator Analysis



Graph A: y-axis scaled logarithmically for readability



Graph B: both axes scaled logarithmically for comparison

I implemented the FIFO algorithm using an array of long pointers. For choosing the number of pages, I used powers of 2 to double the number of pages for each simulation. This seemed adequate enough since both policies ended up having similar results. When both axes are scaled logarithmically (Graph B), FIFO decreases the number of page faults mostly linearly as more pages are available for storage. In terms of comparison, it matches with the random policy up until about 1000 pages available. Here, the random policy continues linearly while FIFO takes a larger number of page faults. However, the rest of the graph continues as normal as FIFO starts producing less page faults than random policy, though not by much. I was actually surprised it didn't do a little bit better, but FIFO really only works if the same page number is used in sequence, which apparently didn't happen too often.

I also implemented random page number replacement using the same data structure of long pointers in an array. As with the FIFO policy, I used powers of 2 to double the number of pages for each simulation. The random policy also decreases mostly linearly until about 1000 pages, where it takes a slightly sharper decrease. It ends up matching the FIFO algorithm mostly until 1000 pages, where it does approximately 300000 less page faults, but then starts having higher numbers of page faults compared to FIFO at higher numbers of pages available. I was also surprised at the performance of random. I expected more erratic results, like rotating between higher and lower page faults compared to FIFO, but it ended up being mostly consistent through all the simulations.

Overall, I was surprised at the consistency of both algorithms, they both decreased in the number of page faults at a similar rate. I also measured the times for each simulation, and they tended to run a lot lower than I anticipated. I was also surprised that both algorithms were fairly similar in results across multiple numbers of pages. In class we talked about how using

randomness is actually not a bad option for general purposes, that that proved itself here in these simulations, mostly matching with FIFO results. I probably could have used a few more data points to try and capture more variance between the policies, but I think the results would have been close to the same anyways.