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CS492

Page Replacement Algorithm Analysis

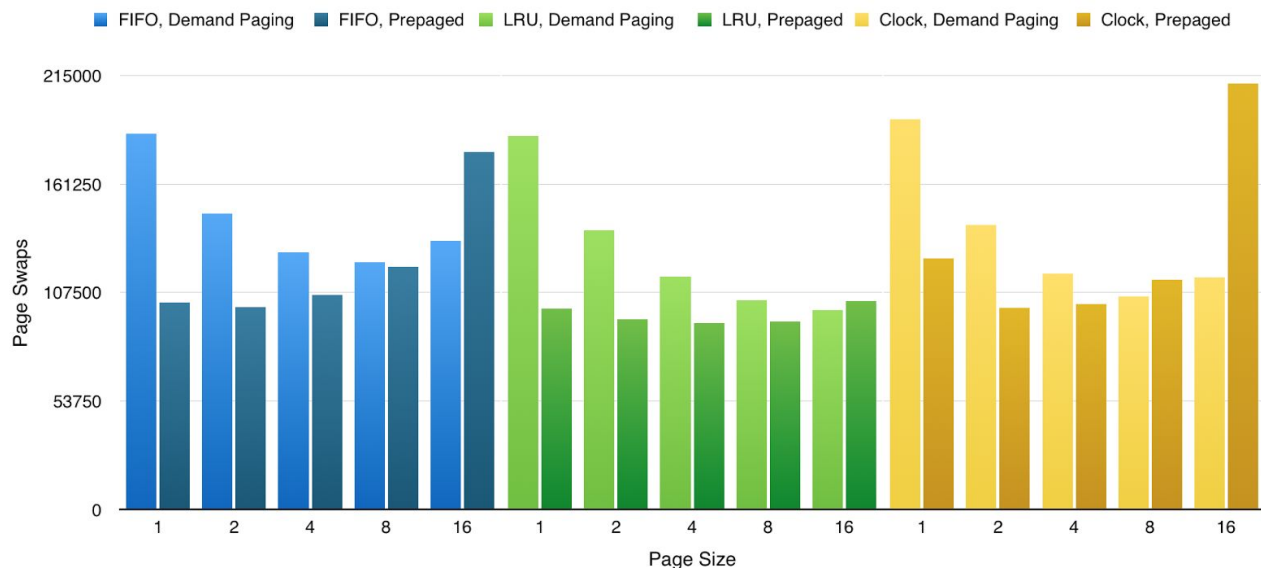
I pledge my honor that I have abided by the Stevens Honor System.

Based on our findings, LRU is the most efficient algorithm for virtual page management. Clock is a close second, with FIFO being least efficient in terms of number of page swaps. Prepaging proved more efficient than demand paging for page sizes of less than 8. This is because for this given ptrace, there was not a lot of locality so prepaging was actually less efficient for each algorithm for page sizes of 8 and above.

Overall, the page replacement algorithms that were implemented were simple to implement. The clock algorithm takes 4x as many lines of code as FIFO and LRU. We expected that FIFO would be least efficient as it was the simplest to implement - this proved to be correct. LRU was similarly simple but was significantly more efficient than FIFO. We expected that clock would be much more efficient since it was so complex (justifying the number of lines of code) however it only proved to be about as efficient as LRU.

If a completely random memory access trace were provided, there would be significantly more page faults with prepaging. The idea of prepaging is to load two contiguous pages at once, because, if a program accesses a certain memory location it is more likely to access the memory locations adjacent to it. This is known as the principle of locality. If the memory accesses were completely random, violating the principle of locality, then prepaging would result in many more cache misses and decrease the efficiency of the program.

Graph: Page Swaps v Page Size



Demand Paging

Page Size	Algorithm	Page Swaps
1	FIFO	186384
2	FIFO	146739
4	FIFO	127322
8	FIFO	122718
16	FIFO	133157
1	LRU	185065
2	LRU	138450
4	LRU	115484
8	LRU	103543
16	LRU	98929
1	CLOCK	193564
2	CLOCK	140915
4	CLOCK	116850
8	CLOCK	105686
16	CLOCK	115076

Prepaging

Page Size	Algorithm	Page Swaps
1	FIFO	102416
2	FIFO	100214
4	FIFO	106486
8	FIFO	120172
16	FIFO	177156
1	LRU	99702
2	LRU	94316
4	LRU	93189
8	LRU	92504
16	LRU	103297
1	CLOCK	124602
2	CLOCK	100090
4	CLOCK	101679
8	CLOCK	114043
16	CLOCK	211305