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COEN 177L - Thursday 5:15PM
Lab 8 - Memory Management

Report

Implementation of Page Replacement Algorithms

FIFO - This algorithm was implemented by using the sample code provided in the lab document. The algorithm checks if the requested page is in the cache and if it is, then it sets the boolean variable *foundInCache* to true and breaks the for-loop. If the requested page is not found in the cache, then it prints the page at which the fault occurred, replaces the old page that is first in the queue with the new page, increments the page fault counter, and increments the *counter* variable to keep track of the next page in the queue.

Results with accesses.txt and page size of 50:
10000 Total Memory Requests
9515 Total Page Faults
Miss Rate = 0.951500
Hit Rate = 0.048500

LRU - This algorithm begins by setting the current item of the outer for-loop to be the *oldest* item in the queue. If the page is found, page entries that are younger than the current *oldest* entry have their *time* variable incremented (because they haven't been used), the boolean variable is set to true, and the *time* variable for the found entry is set to 0 since it was just accessed. The page entries that haven't been used have *time* incremented. If the page is not found in the cache, then the oldest page in the queue is found, the page at which the fault occurred is printed, the oldest page in the queue is replaced with the new page and its *time* variable set to 0, and the fault counter is increased.

Results with accesses.txt and page size of 50:
10000 Total Memory Requests
9510 Total Page Faults
Miss Rate = 0.951000
Hit Rate = 0.049000

Second chance - This algorithm first searches for the page request and if it is found in the cache, then it sets the *flag* variable to 1 (to indicate the 2nd chance). If the page request is not found, the fault counter is increased and the algorithm looks for the first page entry that has its *flag* set to 0 (after its two chances) while keeping track of the last checked page in the queue. When the algorithm finds the next page with *flag* set to 0, it replaces this page with the new page, sets its *flag* to 0 (to indicate that it is a fresh entry), and prints the page at which the fault occurred.

Results with accesses.txt and page size of 50:
10000 Total Memory Requests
9510 Total Page Faults

Miss Rate = 0.951000
Hit Rate = 0.049000

<u>Testing of Algorithms</u>
Shell script with testInput.txt and testInput10K.txt:

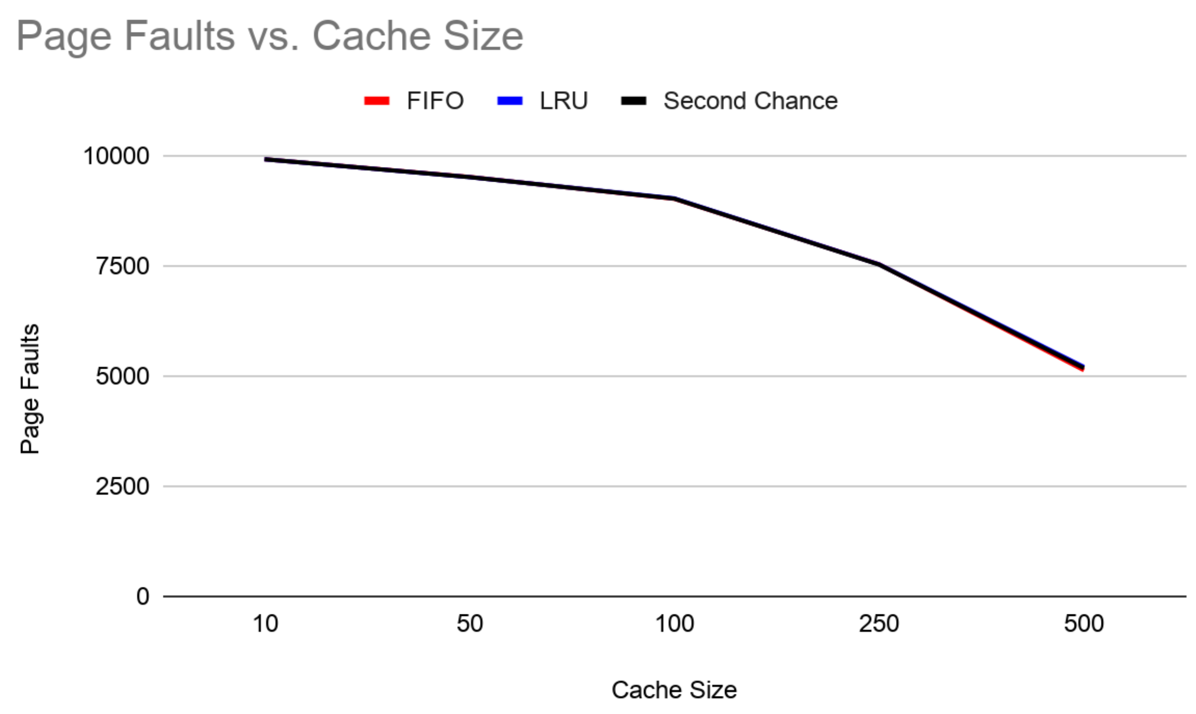
Table 1 - testInput10K.txt

Cache Size	FIFO (Page Faults)	LRU (Page Faults)	Second Chance (Page Faults)
10	9900	9898	9897
50	9511	9514	9507
100	8970	8966	8962
250	7444	7436	7415
500	5084	5049	5052

Shell script with accesses.txt:

Table 2 - accesses.txt

Cache Size	FIFO (Page Faults)	LRU (Page Faults)	Second Chance (Page Faults)
10	9916	9915	9915
50	9515	9510	9510
100	9018	9029	9022
250	7534	7532	7526
500	5130	5206	5178



As shown in the above graph, all the algorithms have very similar performance (in terms of hit rate) on the accesses.txt file. The only noticeable impact on hit rate for all the algorithms was increasing the cache size, which reduces the amount of page faults and subsequently improves the hit rate.