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Lab 3 Report

Graphs of Relationship between number of frames and page fault rate

Note: Graph uses the sample test file to produce the page fault rate for each frame size. Statistics produced from the Lab 3 program designed for this assignment.

Analysis

In the graphs above, I wanted to present the line graph to show the relationship holds for any frame size, but it was a little bit difficult to see the results for FIFO since the results for FIFO and LRU were very similar, so I created a bar graph with the table to show the results of all the page replacement algorithms for better readability.

The graphs above represent the page fault rate after sampling and simulating the algorithm for 10,000 page references for 4 different frame sizes (128, 256, 512, 1024).

The relationship between the frame size and the page fault rate shows an indirect relationship. As shown above, it shows that as the frame size increases, the lower the page fault rate. For example, in the first in first out page replacement algorithm, the page fault rate for using a frame size of 128 was about 0.95, then it decreases as the frame size increases to 256, producing a page fault rate of about 0.9, then increases to a frame size of 512, producing a page fault rate of about 0.85 and produces a page fault rate of about 0.75 as the frame size increases again to 1024. In the least recently used page replacement algorithm, we can see a similar trend that produces similar results to the first in first out page replacement algorithm and shows that a bigger frame size decreases the page fault rate. In the graph showing the optimal page replacement algorithm, when the frame size was 128, the page fault rate was about 0.75, and decreases to a page fault rate of about 0.65 to 0.6 to 0.5 for frame sizes 256, 512, and 1024 respectively. The main reason why the page fault rate decreases as the frame size increases is because more pages can be added for reference in memory when the frame size increases. When the frame size is very small for a large amount of pages that need to be referenced, it will experience a lot of page faults since the program is trying to find the page reference in memory to execute the page but the page is not ready in memory to be executed by the CPU. The larger the frame size, the higher variety of pages that can be stored and referenced quickly and the lower the page fault rate.