

# CS 1550 – Project 3: VM Simulator

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## 2 INTRODUCTION

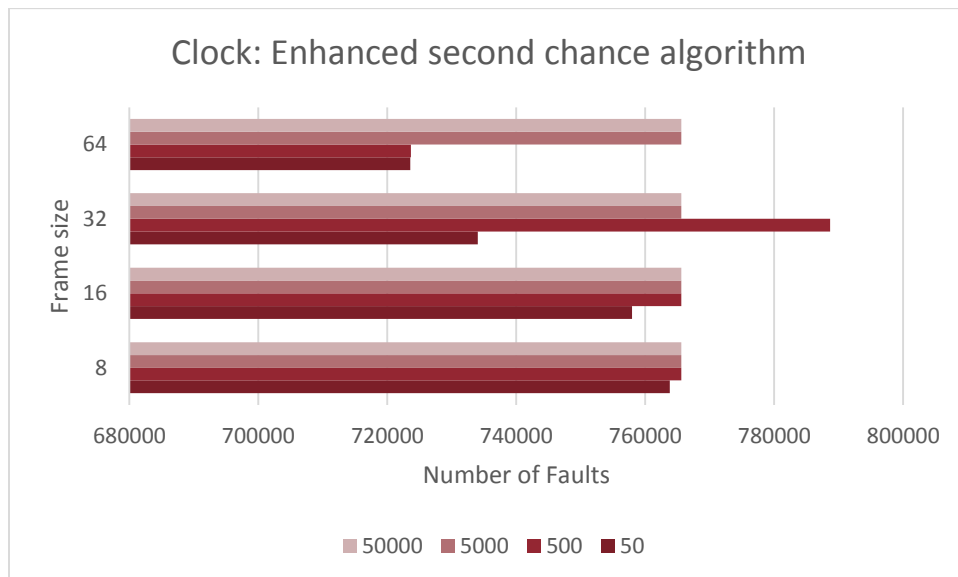
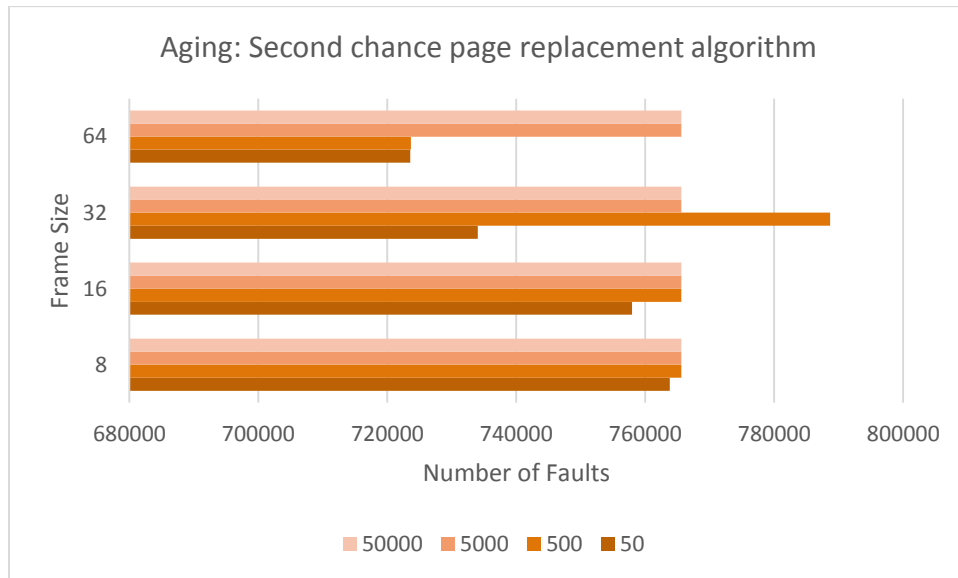
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There was a program made to simulate the paging replacement algorithms discussed in the course. There were four algorithms chosen for this assignment:

1. OPT or optimal page replacement
  - a. This is the best possible algorithm by metric of page fault count.
2. LRU or least recently used
  - a. The implementation used was a stack. The reference pages were put to the bottom of the stack and when the frame limit was reached items were popped off the top of the stack.
3. Aging or second-chance page-replacement algorithm
  - a. 8-bits were stored along with each frame. If the bit was used a one was written. Periodically a clock would shift the bits to the right pulling in a zero. The smallest valued page was removed if needed. Ties are settled arbitrarily.
4. Clock or enhanced second-chance replacement algorithm
  - a. Similar to the aging algorithm a clock is needed to update the information for the pages. Instead of an 8-bit variable, two bits are used. A recently used bit is set to 1 if the page reads or writes. A modified bit is set to 1 if the page writes. Periodically a clock will set the bits to 0. Any item with both bits set to zero is allowed to be removed.

### 3 AGING AND CLOCK COMPARISON

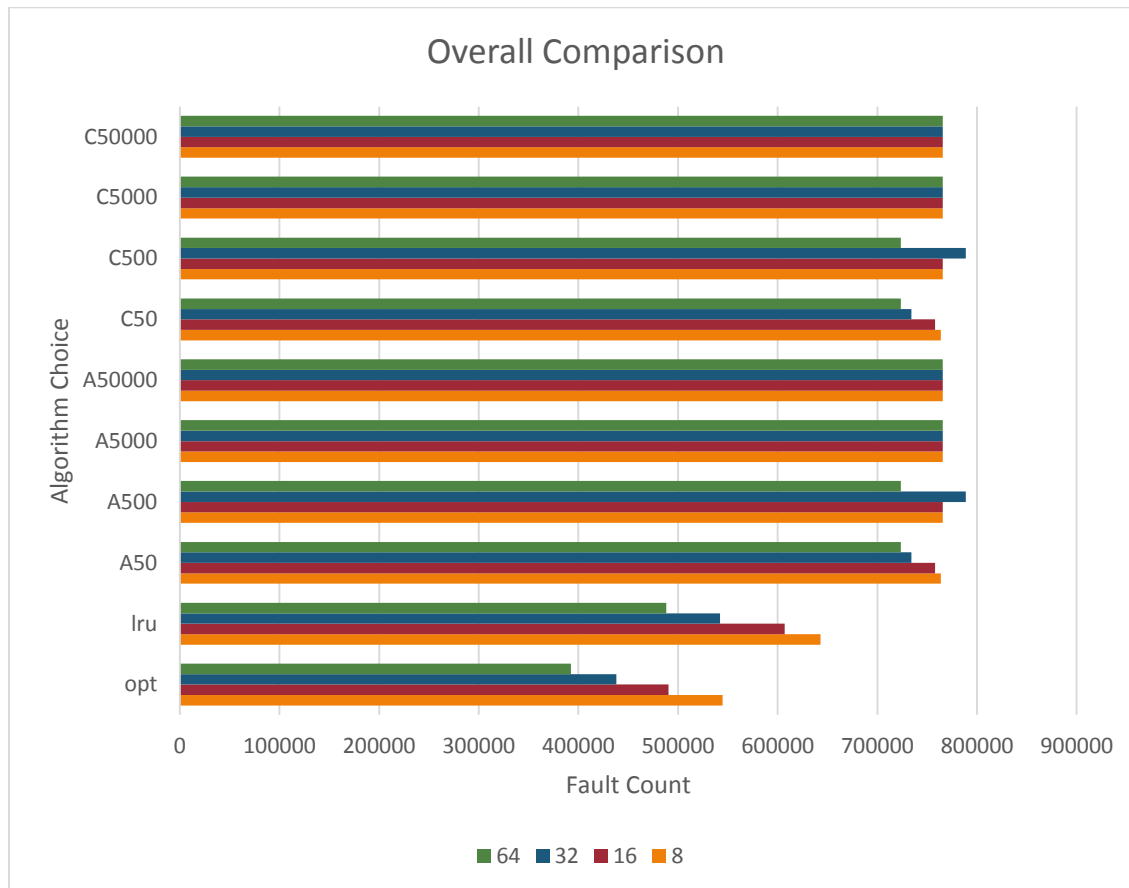
For Aging, there is a refresh parameter set. Chosen were the refresh rates in milliseconds of 50, 500, 5000 and 50000.



As it is clear to see from both charts, the lowest refresh rate of 50 milliseconds had the least number of page faults.

## 4 OVERALL COMPARISON

As is shown below the refresh rate from the previous two algorithms is a minor improvement compared with LRU and the most optimum algorithm. The four different bars on the graph show the different frame sizes of 8, 16, 32, and 64 frames. As the graph shows a bigger the frame size results in fewer faults.



## 5 CONCLUSIONS

The best algorithm to reduce page faults is OPT, but this is not realistic to implement because it requires knowing when each page will be needed in the future. A good algorithm that was simple to implement and showed good results when compared with OPT was LRU. This algorithm when compared to Aging and Clock clearly is the better of the three options.