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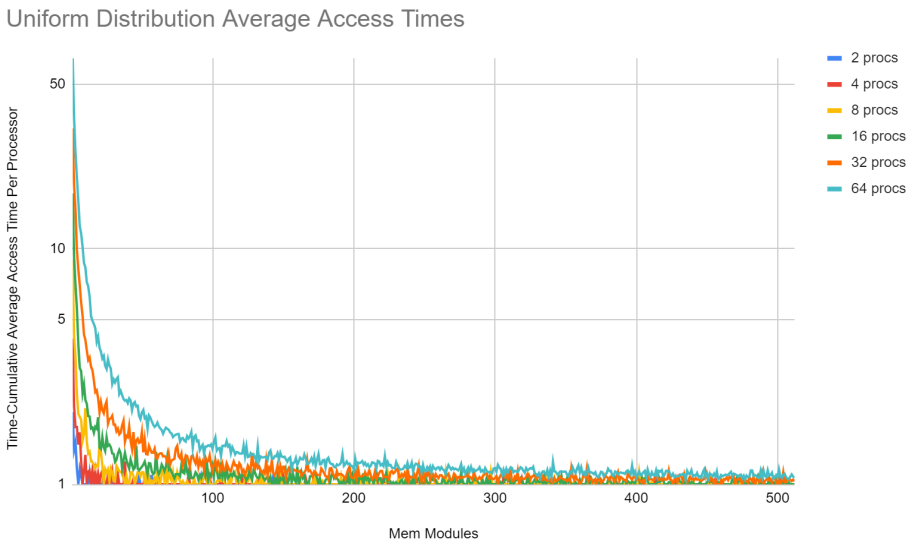
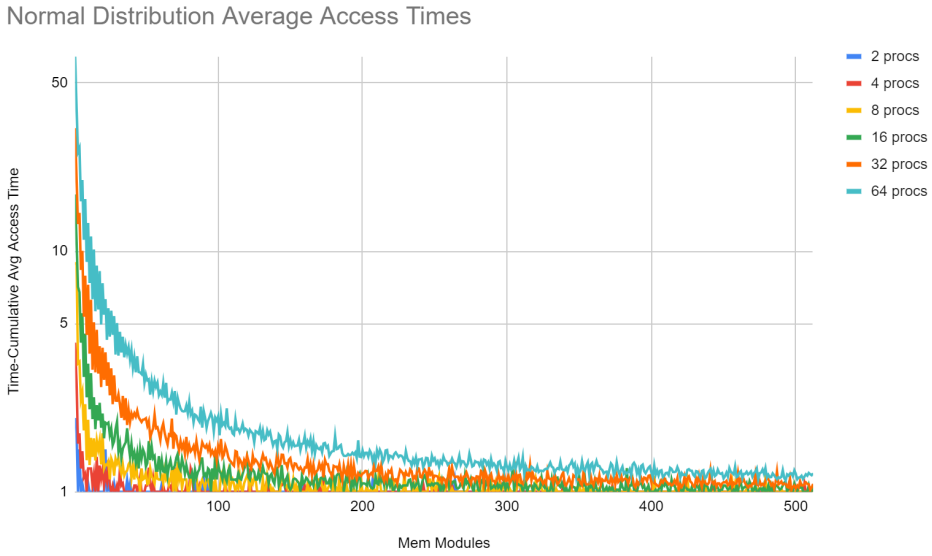
231P: HW #1

Uniform Distribution



Normal Distribution



Analysis

Based on the comparison between the Uniform and Normal distribution access schemes, it seems that as a whole, the uniform distribution graph has a lower system time-cumulative average access time than the normal distribution graph.

This could be explained as the fact that the normal distribution scheme does not give equal chance of selection to all memory modules, causing the peak modules to be accessed too often and have a long queue of waiting processors. A uniform distribution scheme lacks bias in the module selection process, so all memory modules can be equally utilized and the queue can be evenly distributed across all modules. Therefore, the uniform distribution is more practical in order to minimize the processor queue for each memory module.

In reality, the normal distribution scheme is a bit more realistic, since processes will choose to access memory located around the area that it last accessed. So in the code, we simulated this by choosing an initial random mean (random memory location) for each process. Then for each cycle of memory allocation, there is a higher probability that the process will choose close to that random mean.

Number of Memory Modules effect on System Access Time

In both distribution graphs, the relationship between number of memory modules and time-cumulative average access time follows the same logarithmic pattern. Increasing memory modules can significantly improve access time until a certain threshold, which seems to be around 200 memory modules based on the simulation. After that, increased memory modules have diminished returns and may not justify purchasing more expensive memory modules for marginal decrease in access time.