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Computer Science 483

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Simulating Page Replacement

For a better understanding of the basic concepts of demand paging this project required to implement the LRU page replacement algorithm. The LRU algorithm has been implemented on an Ubuntu virtual machine using CLion as directed by the instructions.

To better understand the effect of the frame size and the effect of the number of frames have on the number of page faults several simulations were run. The project required to allocate frames in order to divide the given amount of 4MB memory into frames sizes of 512 Bytes, 1 KB, 2 KB and 4 KB. The relationship between frame size and total memory limits the maximum number of frames that can be utilized using the following relationship:, where n can take values from 1 to max number of frames.

The algorithm implementation was run and the output (frames, misses, and miss rate) was redirected to a Microsoft Excel document. In order to better understand the differences between the allocations the results were plotted in the two following graphs.

It can be observed that an increase in the pages size significantly reduces the number of page faults which is correlated with the page fault rate. At the same time we can observe that in increase in the number of pages also significantly reduces the number of page faults and the page fault rate. The requirement for the simulation was to identify the optimum size and number of frames for the given process such that the fault rate is below 10 %. Further analysis of data revealed several combinations of frame sizes and frame numbers as candidate solutions. For example a page size of 512 bytes with over 2976 pages can fulfill the requirements just as well as a page size of 4 KB with over 379 pages. After considering all possible candidate solutions a page size of 4KB with 1024 pages was chosen as the “optimal solution”.

Documentation

C2C Plazas check for grammar and spelling mistakes (ESL)