CS 314: Operating Systems Lab

Assignment 5: Memory Management

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The experiment compares the impact of frame size on page faults across different ejection policies (FIFO, LRU, Random, and Optimal) under both Global and Local allocation policies. The primary observations from the plotted data are as follows:

1. **Global Allocation Policy**:

   o As frame size increases, page faults decrease significantly from 1024 frames to 2048 frames, particularly under the FIFO, LRU, and Random policies. After 2048 frames, page faults stabilize across all policies, remaining at a minimal level.

   o The **Optimal** ejection policy consistently maintains the lowest page faults across all frame sizes. This is expected as the Optimal policy theoretically minimizes page faults by anticipating future page references.

   o The **Random** ejection policy initially exhibits a high page fault count at 1024 frames, which drops significantly at 2048 frames. However, it generally performs worse than FIFO and LRU, likely due to its lack of structure in managing pages.

2. **Local Allocation Policy**:

   o Similar to Global allocation, Local allocation shows a substantial reduction in page faults from 1024 frames to 2048 frames. After this threshold, page faults stabilize across all policies.

   o **FIFO** and **LRU** perform similarly across most frame sizes, though LRU exhibits slightly fewer page faults at smaller frame sizes. This trend is likely due to LRU's consideration of recent usage, which provides a slight advantage.

   o The **Random** policy again shows the highest page faults at 1024 frames and does not perform as well as FIFO or LRU. The **Optimal** policy, while initially experiencing higher page faults than in Global allocation, eventually stabilizes to a minimal level as frame sizes increase.

3. **Comparison of Allocation Policies**:

   o For both Global and Local allocation, the Optimal policy generally achieves minimal page faults across all frame sizes. This confirms that it is effective regardless of allocation policy, though its performance advantage is more pronounced in Global allocation.

   o Local allocation generally results in higher page faults than Global allocation, particularly for FIFO and LRU at smaller frame sizes. This suggests that Global allocation benefits from the flexibility of a shared pool of frames, while Local allocation may suffer due to restricted frame access.

Total Page Faults vs. Number of Frames (Global Allocation)

Total Page Faults vs. Number of Frames (Local Allocation)