

Operating System Labs July-Dec-2017

Assignment 7

Exercise 1:

Write a program to simulate hybrid Least Recently Used (LRU) and Least Frequently Used (LFU) virtual memory page replacement algorithm. The LRU algorithm replaces the least recently used items first so you need to keep track of which page is used when. The idea of LFU is very simple Counts how often an item is needed. Those that are used least often are replaced first. The idea behind this hybrid of LRU and LFU is to build a tradeoff of both. If there is a situation when there is a completion for page to be replaced is between most frequently used pages or most recently used pages the hybrid algorithm will replace any of the recently used pages (according to LRU) to keep the frequently use page in frame.

Specifications of the page replacement simulator is as follows:

The input to this program are the total number of physical memory frames (maximum 100), (b) a sequence of page references (integers in the range 0 to 99 separated by space in single line) e.g.:

5

51 7 34 0 8 51 34 7 8 45 50 34 21 8 0 45 34 51 35

The program will first read all the memory references and store them in a local array or suitable data structure. Then, it will play back these references one by one and print out for each reference the current allocation state of physical memory frames in the following format:

34: [51| 7|34| |]

This line means that after using page 34, frames 0, 1 and 2 are occupied by pages 51, 7 and 34, and frames 3 and 4 are empty. Frames must start with open square bracket [, end with closed square bracket] and be separated with vertical bar |. One-digit page numbers should have an extra space to the left so that frames are always 2 characters wide. Each page fault should be signaled by an F character two spaces to the right of the closed bracket, for example:

45: [51| 7|34| 45| 8] F

After processing all the memory references, the program should finally print the total number of page faults and the miss rate (total number of page faults divided by number of references).