

CS 3305: Operating Systems
Department of Computer Science
The University of Western Ontario
Programming Assignment 4
Winter, 2010

Purpose:

The goals of this assignment are the following:

- Understand basic operating system concepts related to virtual memory
- Understand and simulation two page replacement policies
- Compare the performance of such policies

Description:

A *memory trace* is a list of memory addresses referenced by the instructions of the processes. This assignment requires that you compare the results of LRU and FIFO on memory traces using a simulator.

You are to build a simulator that reads a memory trace and simulates the action of a virtual memory system that uses a single level page table. As the simulator examines each referenced memory address, it should check to see if the corresponding page is loaded. If not, it should choose a page to remove from memory. You should always choose an empty available frame over a frame that is not available e.g., you only replace a frame if there is no frame that is available.

Please note that in a real system, if the page to be replaced is dirty, it must be saved to disk and the new page is to be loaded into memory from disk. The page table is then updated. However, this assignment is just a simulation. You should update the frame table and the page table. You do not actually need to read and write data from disk.

A sample trace is provided on the web page. You may want to create other traces for testing and debugging purposes.

Your program, *simulator.c*, must at the start of execution read a file called “config”. This file has one line consisting of three parameters in this order:

- The number of frames to be used in the simulation;
- The name of the file with the memory trace. You may assume that each line of the file is a page reference and that page references may vary from 0 to 1023.
- Either LRU (indicating that LRU should be used) or FIFO (indicating that FIFO should be used).

An example line is the following: 4 trace LRU

The output of the program should be the number of page faults encountered.