CSC 4320/6320: Operating Systems

5 Points

Homework 6 (Extra Credit)

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Work on the following problems and submit your own answers. You are allowed to discuss with other students. However, do not copy the solutions from peers or other sources. If the assignment has programming component, your program(s) must compile with **gcc** and execute on **snowball.cs.gsu.edu**! Please see https://cscit.cs.gsu.edu/sp/guide/snowball for more details.

Instructions:

- Upload an electronic copy (MS word or pdf) of your answer sheet to the folder named "HW6" in iCollege.
- Please add the course number, homework number, and your name at the top of your answer sheet.
- Please write down your answers with the question number only in the answer sheet.
- To receive extra credit, your submission must be your original work. Your explanation/description are not expected to match with other students or sources.
- Also submit your .c file (c program), if you are asked to write a program.
- Name your file in the format of CSC4320_HW6_FisrtnameLastname (.docx/.pdf)
- Deadline: Submit by April 25, 2025, 11:59 pm

1. Consider a logical address space of 64 pages of 1,024 words each, mapped onto a physical memory of 32 frames.
   (a) (½ point) How many bits are there in the logical address? Explain.
   (b) (½ point) How many bits are there in the physical address? Explain.
2. (1 point) Assuming a 1-KB page size, what is the page number and offset for the address reference 42095 (provided as decimal number)? Hint: Think in terms of binary representation.
3. Consider a computer system with a 32-bit logical address and 8-KB page size. The system supports up to 1 GB of physical memory. How many entries are there in each of the following? Explain.
   (a) (½ point) A conventional, single-level page table
   (b) (½ point) An inverted page table
4. (1 point) Consider a paging system with the page table stored in memory. If we add TLBs, and if 75 percent of all page-table references are found in the TLBs, what is the effective memory reference time? (Assume that finding a page-table entry in the TLBs takes 2 nanoseconds, if the entry is present. Also, a memory reference takes 50 nanoseconds.) Explain your computation.
5. Consider the following page reference string:

   `7, 2, 3, 1, 2, 5, 3, 4, 6, 7, 7, 1, 0, 5, 4, 6, 2, 3, 0 , 1.`

   Assuming demand paging with three frames, how many page faults would occur for the following replacement algorithms? Show step-by-step computation.
   (a) (½ point) LRU replacement
   (b) (½ point) Optimal replacement

Question:	1	2	3	4	5	Total
Points:	1	1	1	1	1	5
Bonus Points:	0	0	0	0	0	0
Score:						