CPSC 3125, Operating Systems

Examination 2

October 7. 2021

1 Instructions

The CSU Honor Code applies to this examination. You may not use your textbook, your notes, or any other written or electronic material, including the internet. You may not give or receive aid from another person. Violations of the Honor Code will result in the failure of this examination and dismissal from the course. Submission of your answers to this examination constitutes an acknowledgment of the Honor Code and your compliance therewith.

Please answer the following questions. Please answer in complete sentences. Please answer all questions briefly and succinctly — no long essays permitted. Do not use short answers unless the question specifically calls for short answers. You must exhibit understanding of the material covered by the question.

Submit your answers in accordance with the instructions given orally in class. Late submissions will result in failure of this examination.

2 Questions

1. What is the *address space* of a running program?
2. When you call `malloc()`, the call results in memory allocations to both the stack and the heap. Why does this happen? What does the memory allocated from the heap contain? What does the memory allocated from the stack contain?
3. What is the idea that forms the basis of *base and bounds*?
4. What is *external fragmentation* and why does it occur? What is *internal fragmentation* and why does it occur?
5. Why may requests for memory allocation (from the heap) fail when there is external fragmentation?
6. Briefly describe *segmentation*. Briefly describe *paging*. How are they used? What are they used for?
7. Briefly discuss the TLB *cache replacement policy*. Why do we need it? What does it do? Why is it important?
8. What is the difference between the base register and the bound register as used for segmentation and as used for paging?
9. Briefly describe the concept of multi-level page tables.
10. Describe how the OS uses the *high watermark* and the *low watermark* in the context of the page replacement policy.
11. How does the *clock algorithm* work in the context of page replacement?