CPSC 3125, Operating Systems

Examination 4

December 4. 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. Discuss the two methods of device communication.
   - Explain how I/O instructions work.
   - Explain how memory mapped I/O instructions work.
2. What is the *address space* of a hard disk drive? How does it relate to *sectors*? What is a sector?
3. With regard to RAID drives, give a simple eplanation of parity and explain why parity is important.
4. With regard to file systems, what is a *directory*? What attributes does a directory have? Can a directory include other directories?
5. What kind of information does an *inode* contain?
6. What is a *symbolic link*? Why do we need them?
7. What happens when the inode and bitmap are written to the disk, but not the data? What happens when the inode and data black are written to the disk, but not the bitmap? What happens when the data block and bitmap are written to the disk, but not the inode?
8. With respect to log structured file systems, what is the basic idea behind *sequential writes*? What is *write buffering*?
9. What is *wear out*, and what does that have to do with SSDs? What are *disturbances*, and what do they have to do with SSDs?
10. Describe *latent-sector errors*. Describe *block corruption*. What is the difference between the two.
11. Which has better long term reliability: HDDs or SSDs? Explain your answer. (This means that you should have a definitive answer and justify your answer with data and/or clear reasoning.)