CPSC 3125, Operating Systems Homework 26

Chapter 32, *Operating Systems, Three Easy Pieces*

Readings

Read chapter 32 in the *Operating Systems, Three Easy Pieces* book.

Discussion Questions

Answer the discussion questions in writing.

1. Explain an *atomicity-violation* bug. What causes it? How do you prevent it?
2. Explain an *order-violation* bug. What causes it? How do you prevent it?
3. What is a *deadlock*?
4. The book states that there are four conditions for a deadlock. For each of these, explain why the condition prevents a deadlock, and how the absence of the condition can contribute to a deadlock.
   (a) mutual exclusion
   (b) hold-and-wait
   (c) no preëmption
   (d) circular wait
5. Discuss the general theory of avoiding deadlocks by manipulating the scheduling of threads.
6. Discuss the general theory of avoiding deadlocks by *detect and recover*.
7. (not in book) Implementors of threading libraries can implement threads in user space, kernel space, or using a hybrid of user space threads and kernel space threads. Briefly discuss the advantages and disadvantages of each. See for example:
   - `http://www.cs.iit.edu/~cs561/cs450/ChilkuriDineshThreads/dinesh's%20files/User%20and%20Kernel%20Level%20Threads.html`
   - `https://www.ibm.com/docs/en/aix/7.1?topic=processes-kernel-threads-user-threads`