ITBU 373, Operating Systems Homework 16

Chapter 20, *Operating Systems, Three Easy Pieces*

Readings

Read chapter 20 in the *Operating Systems, Three Easy Pieces* book.

Discussion Questions

Answer the discussion questions in writing.

1. What is the problem with simple linear (array-based) page tables? Why is it a problem?
2. Explain why large page tables lead to internal fragmentation.
3. Look at the table on page 217 (Figure 20.2), and explain each of the columns: PFN, valid, prot, present, dirty. What does each column represent? What does each column contain?
4. What is the difference between the base register and the bound register as used for segmentation and as used for paging?
5. How does the hybrid approach (as described in this chapter) lead to significant memory savings?
6. Briefly describe the concept of multi-level page tables.
7. What is a *page directory*?
8. What is a *page directory entry*?
9. The book mentions that we achieve greater efficiency in virtual memory management using a *level of indirection*. This should sound familiar. How is this related to the concept of *pointers* in C?
10. In the detailed multi-level example, we assume an address space of 16KB, pages of 64 bytes, with a 14 bit virtual address space, an 8 bit VPN, and a 6 bit offset. Show the math behind these assumptions. In other words, do the arithmetic.