

Midterm Two Review

Overview

This document provides a high-level review of the topics covered on the second midterm. It does not list every fact.

Course Material

You are responsible for knowing the information covered during lecture and in the textbook for the sections that we've covered since the first midterm. The best sources for this information are: (1) the textbook (2) the lecture videos and (3) extra material posted on Canvas. Plan to understand high-level concepts, pseudo-code and procedures that we discussed, and how to relate material across chapters.

The best way to study this material is to work through multiple explanations. See how I explained the material, compare that with what the book covered. Try to identify how the concepts from Chapter 1 apply to ideas in Chapter 2, etc.

Book Sections

We studied material from the following sections in your book:

- Section 5.1: Enforced Modularization with Virtualization
- Section 5.4: Virtualizing Memory (5.4.1 - 5.4.3)
- Section 5.5: Threads sections (5.5.1 - 5.5.5)
- Section 5.2: Bounded Buffers and Synchronization

Course Concepts

More particularly, we covered the following topics:

- Virtualization:
 - Multiplexity/Aggregation/Emulation
 - Time vs. Space Multiplexing
 - Threads, Virtual Memory, and Bounded Buffers
 - The Operating System
- Threads:
 - Yield and Context Switches
 - Lineage tree and how do we cleanup threads
- Virtual Memory:
 - Virtual Address Spaces and how we map between physical and virtual
 - The hardware/software divide for translating a virtual memory
- Bounded Buffers:
 - Send/Receive interface emulated on memory
- Synchronization:
 - Race Conditions
 - Mutual Exclusion and its properties

- Mutual Exclusion algorithms, their pros and cons
- Synchronization Primitives (semaphores, monitors, locks, condition variables)
- Deadlocks
- Classic Synchronization problems

Book Questions:

Your book includes several exercises at the end of each chapter and also includes some longer problems (listed as problem sets) at the end of the book. The problem sets are a good set of practice problems, especially for synchronization.

- Exercises 5.1, 5.2, 5.5, 5.6 (skip D), 5.7
- Problem 5: “Goomble”
- Problem 7: “Banking on Local Remote Procedure Call” Note: a gate is a function call executed in a different virtual address space (think, like, a system call).
- Problem 11: “Ben’s Web Service”. Change 11.3 to be: “What is the minimal physical address width? What is the maximum sensible physical address width?”