Machine Organization and Assembly Language Programming

Outline (subject to change)

1. Introduction to architecture and organization (Chapter 1)
2. Signed and unsigned numbers (Chapter 3 Sections 3.1 to 3.3) (Will be done in sections.)
3. Instruction set and assembly language (Chapter 2 Sections 2.1 through 2.9, 2.16 and Appendix A Sections A.1, A.2, A.6, and A.10)
   - General computer structure
   - Overview of MIPS: registers, data types, addressing. Introduction to SPIM
   - Arithmetic-logic, load-store, branch instructions
   - Instruction encoding; addressing revisited
   - Procedures and stacks
   - RISC vs. CISC
4. Performance metrics (Chapter 4)
   - CPU execution time. CPI
   - Benchmarks
5. Processor implementation. Single cycle implementation (Chapter 5 Sections 5.1 through 5.4)
   - Data path
   - Control
6. Processor implementation. Multiple cycle implementation. (Chapter 5 Sections 5.5 and 5.6)
   - Data path
   - Control unit
   - Exceptions
7. Processor implementation. Pipelining (Chapter 6 Sections 6.1 through 6.6 and 6.8)
   - Data path
   - Data hazards. Forwarding
   - Control hazards and exceptions
8. Memory Hierarchy. Caches (Chapter 7 Sections 7.1 through 7.3)
   - Cache organization
   - Cache parameters for performance
   - Write policies
9. Memory Hierarchy. Virtual Memory (Chapter 7 Sections 7.4 and 7.5)
   - Paging systems
   - TLB’s

10. Input-Output (Chapter 8 Sections 8.1, 8.2, 8.4 and 8.5)
    - Disks
    - Buses

11. One or more of the following topics
    - EPIC (or VLIW) ISA – Itanium
    - Networks
    - Floating-point. Arithmetic and functional units
    - Parallel computers