

Machine Organization and Assembly Language Programming

Outline (subject to change)

1. Introduction to architecture and organization (Chapter 1)
2. Signed and unsigned numbers (Chapter 4. Sections 4.1 to 4.3)
3. Instruction set and assembly language (Chapter 3)
 - General computer structure
 - Memory structures: registers, information units, addressing
 - CPU: instructions
4. An example architecture: The MIPS 2000 (Chapter 3 and Appendix A)
 - Introduction to SPIM
 - Overview of MIPS: registers, data types, addressing.
 - Arithmetic-logic instructions;
 - Load and store instructions; branches
 - Instruction encoding; addressing revisited.
5. Procedures and stacks (Chapter 3)
6. RISC vs. CISC (Appendix E)
7. Performance metrics (Chapter 2)
8. Processor implementation. Single cycle implementation (Chapter 5)
 - Data path.
 - Multiple cycle implementation. Control.
 - A control alternative: microprogramming
9. Processor implementation. Pipelining (Chapter 6)
 - Data path
 - Data hazards. Forwarding
 - Control hazards.
10. Memory Hierarchy. Caches (Chapter 7)

- Cache organization. Parameters
- Cache write policies

11. Memory Hierarchy. Virtual Memory (Chapter 7)

- Multiprogramming
- Paging
- Virtual address translation: page tables and TLB's

12. Input-Output (Chapter 8)

- I/O architecture. Buses.
- I/O devices.
- I/O control

13. One or more of the following topics

- EPIC (or VLIW) ISA – Merced.
- Networks
- Floating-point. Arithmetic and functional units (Chapter 4)
- Parallel computers (Chapter 9)