

# 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