Architecture & Organization 1

• Architecture is those attributes visible to the programmer
  — Instruction set, number of bits used for data representation, I/O mechanisms, addressing techniques.
  — e.g. Is there a multiply instruction?

• Organization is how features are implemented
  — Control signals, interfaces, memory technology.
  — e.g. Is there a hardware multiply unit or is it done by repeated addition?
Architecture & Organization 2

- All Intel x86 family share the same basic architecture
- The IBM System/370 family share the same basic architecture

- This gives code compatibility
  - At least backwards
- Organization differs between different versions
Structure & Function

- Structure is the way in which components relate to each other.
- Function is the operation of individual components as part of the structure.
Function

• All computer functions are:
  — Data processing
  — Data storage
  — Data movement
  — Control
Functional view

Operating Environment
(source and destination of data)

Data Movement Apparatus

Control Mechanism

Data Storage Facility

Data Processing Facility
Operations (1) Data movement
Operations (2) Storage
Operation (3) Processing from/to storage
Operation (4)
Processing from storage to I/O
Structure - Top Level

- Computer
- Main Memory
- Input Output
- Systems Interconnection
- Central Processing Unit
- Main Memory
- Input Output
- Communication lines
- Peripherals
Structure - The CPU
Structure - The Control Unit

- CPU
- Control Unit
- Memory
- Registers and Decoders
- Sequencing Login
- Control Unit Registers and Decoders
- Control Memory
Outline of the Book (1)

- Computer Evolution and Performance
- Computer Interconnection Structures
- Internal Memory
- External Memory
- Input/Output
- Operating Systems Support
- Computer Arithmetic
- Instruction Sets
Outline of the Book (2)

- CPU Structure and Function
- Reduced Instruction Set Computers
- Superscalar Processors
- Control Unit Operation
- Microprogrammed Control
- Multiprocessors and Vector Processing
- Digital Logic (Appendix)
Internet Resources
- Web site for book

  - links to sites of interest
  - links to sites for courses that use the book
  - errata list for book
  - information on other books by W. Stallings

  - Math
  - How-to
  - Research resources
  - Misc
Internet Resources
- Web sites to look for

- WWW Computer Architecture Home Page
- CPU Info Center
- ACM Special Interest Group on Computer Architecture
- IEEE Technical Committee on Computer Architecture
- Intel Technology Journal
- Manufacturer’s sites
  — Intel, IBM, etc.
Internet Resources
- Usenet News Groups

- comp.arch
- comp.arch.arithmetic
- comp.arch.storage
- comp.parallel