

Computer Architecture: A Science of Tradeoffs

The Soul of Computer Architecture (A Science of Trade-offs)

- * ***Choices/Trade-offs: The ISA***
 - *Dynamic/Static Interface*
 - *Fixed-length, Uniform Decode vs...*
 - *Condition Codes vs...*
 - *Load/Store vs...*
 - *Help for Programmer vs help for Microarchitect
(addressing modes, data types, unaligned access)*
 - *Hardware Interlocks vs...*
 - *VLIW vs...*
 - *0, 1, 2, 3, address machines*
 - *Compatibility (e.g., delayed branch)*
 - *Precise exceptions vs...*

*** Choices/Trade-offs: The μ architecture**

- CPI vs. t (or IPC vs frequency)
- ASIC vs programmed control
- in-order vs out-of-order
- Speculative vs Stand around and wait
- Superscalar
- Use of Chip real estate
(tomorrow: the Refrigerator!)
- Pipeline depth
- Partitioning (until when?)

Choices/tradeoffs: The System

- **MP granularity (loosely coupled vs. tightly)**
- **Distributed shared memory versus centralized**
- **Interconnection structure**
- **Use of commodity vs tailored parts**