

Chapter 1: Fundamentals of Quantitative Design & Analysis (Part 1)

What is computer architecture?
Why study computer architecture?
Common principles

What is Computer Architecture?**Previously, Computer Architecture ~ ISA**

Instruction set architectures

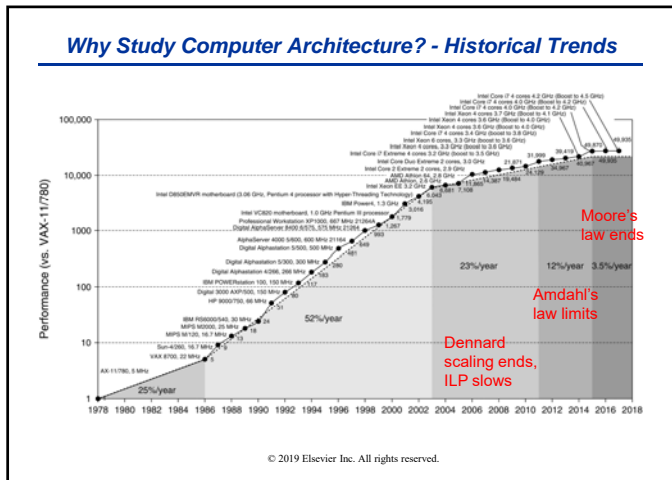
- Most ISAs today are general-purpose register based
 - Operands may be registers or memory locations
 - Register-memory vs. load-store
- Addressing modes
 - Register, immediate, displacement, ...
- Operand sizes
 - 8 bits, 16 bits, 32 bits, 64 bits, SP and DP FP
- Operations: Arithmetic, memory, control flow, floating point
- Encoding: fixed vs. variable length

Action no longer in ISA

- But not always the case: CISC vs. RISC – what happened?


Our main focus: organization

Goals of the Computer Architect



Why Study Computer Architecture?

Why Study Computer Architecture Today?



"Nobel Prize for Computing". Newly named Turing Award winners foretell a "new golden age" for computer architecture at ISCA.

Golden Age of Computer Architecture!

See slides here:
<http://iscaconf.org/isca2018/docs/HennessyPattersonTuringLectureISCA4June2018.pdf>

Full video here:
<https://www.acm.org/hennessy-patterson-turing-lecture>

QnA: Why software community needs to hardware now?
<https://youtu.be/3LVeEIsn8Ts?t=4268>

Relationship to Prerequisites

Prerequisite
 How to design a computer?

This course
 How to design a computer WELL?
 Emphasis on Quantitative vs. Qualitative

Be sure to check the handout for details on the prerequisites