MODULE 1: Computer Systems Fundamentals

Lecture 1.2
Standards Organizations and Moore's Law

Prepared By:
- Scott F. Midkiff, PhD
- Luiz A. DaSilva, PhD
- Kendall E. Giles, PhD

Electrical and Computer Engineering
Virginia Tech

Lecture 1.2 Objectives

- Describe key standards organizations related to computer systems
- State Moore's Law

Standards 1/2

- De facto standards
  - Shared designs and practices
  - Often promulgated by a single company
- Specifications
  - A shared specification of functionality and interface
  - Often set by a group of companies or an industry consortium
  - Sometimes evolve to become standards
  - Example: Integrated Drive Electronics (IDE) for disk interfaces developed by Western Digital, Control Data Corporation, and Compaq Computer

Standards 2/2

- Standards
  - A formal specification of functionality and interface
  - Standardization through a chartered entity with at least some independence
- Example standards bodies
  - IEEE – Institute of Electrical and Electronics Engineers (a subset works with standards)
  - ANSI – American National Standards Institute
  - ISO – International Organization for Standards
  - ITU – International Telecommunication Union

Standards and Evolution

- Example: Ethernet local area networks
  - Ethernet was first developed at Xerox
  - An industry group (Digital Equipment Corporation, Intel, and Xerox) then developed the “DIX” specification
    - Led to successful commercialization
  - Later standardized through the IEEE 802 standards group as IEEE 802.3
    - Led to widespread adoption and evolution

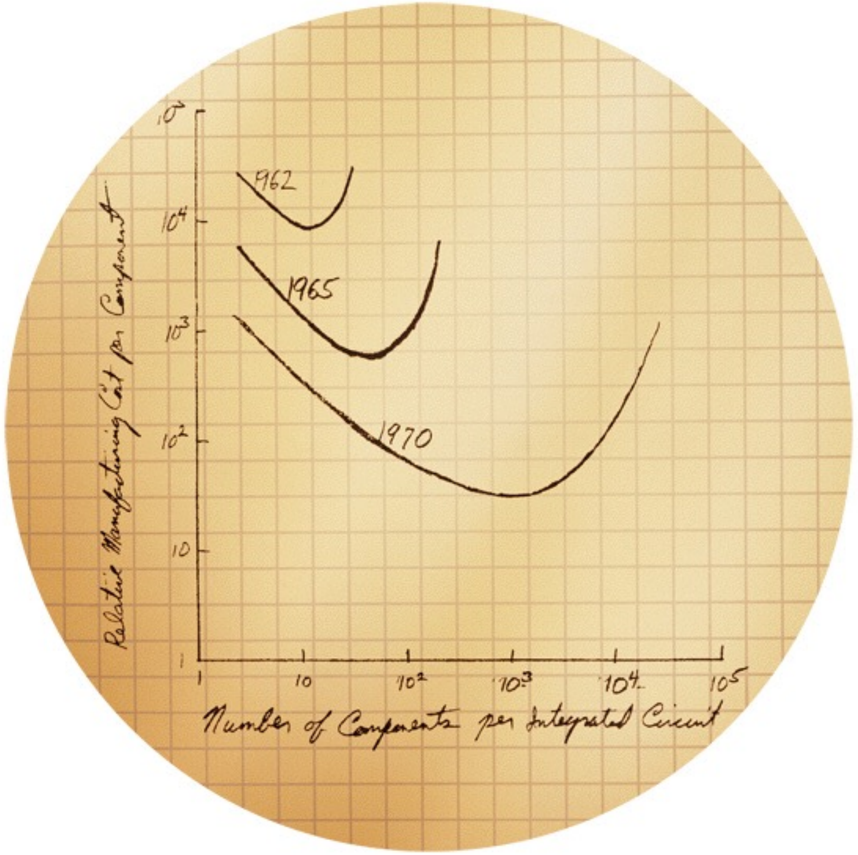
CHECK POINT

As a checkpoint of your understanding, please pause the video and make sure you can:

- Describe key standards organizations related to computer systems

If you have any difficulties, please review the lecture video before continuing.

Moore's Law



- States that the number of transistors on a chip will double about every two years
- Has held, with minor variations, for over 50 years
- This growth had enabled tremendous advances in computers

In 1965, Gordon Moore sketched out his prediction of the pace of silicon technology. Decades later, Moore's Law remains true, driven largely by Intel's unparalleled silicon expertise.

Beyond Moore's Law

- Moore's Law is still holding, but there are predictions of its demise
  - Growing challenges in semiconductor fabrication due to feature size
  - Growing challenges in design due to complexity
  - Growing challenges in thermal management due to high clock rates
- Approaches
  - Advance technology to continue Moore's Law
  - More radical departures in technology and design

Beyond Moore's Law: Some Alternatives

- Advanced lithography and processes for fabrication
- Exotic technologies–biological materials, quantum computing
- Design complexity favors uniformity leading, for example, to multicore processors to increase computational power without increasing clock rate
- System on a chip

CHECK POINT

As a checkpoint of your understanding, please pause the video and make sure you can:

- State Moore's Law

If you have any difficulties, please review the lecture video before continuing.

Summary

- Interoperability is aided by specifications and standards
- There have been rapid advances in computer systems, largely due to hardware advances as predicted by Moore's Law

MODULE 1: Computer Systems Fundamentals

Lecture 1.2
Standards Organizations and Moore's Law

Prepared By:
- Scott F. Midkiff, PhD
- Luiz A. DaSilva, PhD
- Kendall E. Giles, PhD

Electrical and Computer Engineering
Virginia Tech