

Introduction and Course Overview

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CS 210: Computing and Culture

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Introduction

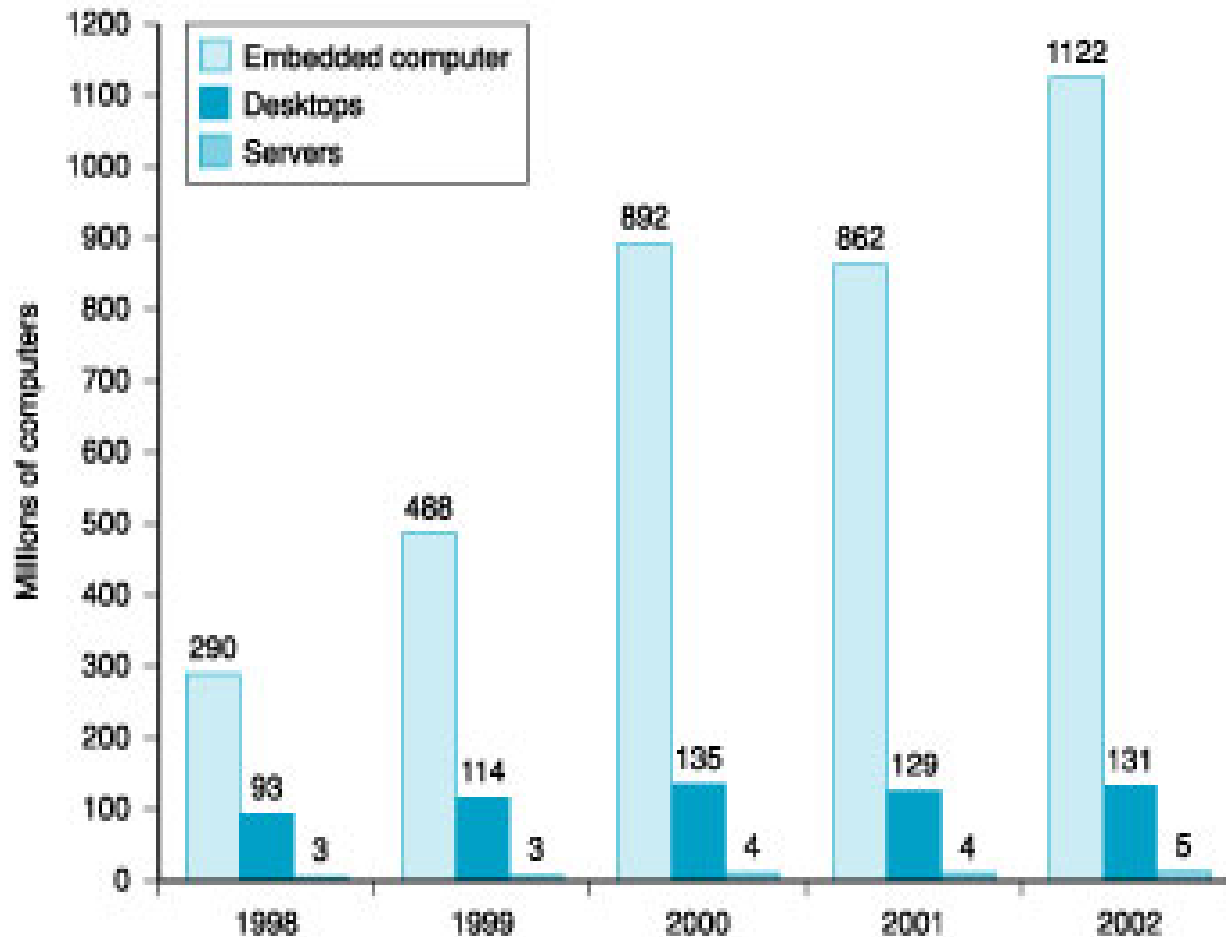
- What do we mean by a computer?
 - Different types: desktop, servers, embedded devices
 - Different uses: automobiles, graphics, finance, genomics...
 - Different manufacturers: Intel, Apple, IBM, Microsoft, Sun...
 - Different underlying technologies and different costs!
- Analogy: Consider a course on “automotive vehicles”
 - Many similarities from vehicle to vehicle (e.g., wheels)
 - Huge differences from vehicle to vehicle (e.g., gas vs. electric)
- Best way to learn:
 - Focus on a specific instance and learn how it works
 - While learning general principles and historical perspectives

Components of Computing Systems

- Hardware: Circuit boards, chips, disk drives, peripherals, wires, etc.
- Software: Programs (sequences of instructions for the computer to carry out)
- Data (information in its digital form)



Distinct Processors Sold



Historical Perspective

- ENIAC built in World War II was the first general purpose computer
 - Used for computing artillery firing tables
 - 80 feet long by 8.5 feet high and several feet wide
 - Each of the twenty 10 digit registers was 2 feet long
 - Used 18,000 vacuum tubes, weighed 30 tons
 - Performed 1900 additions per second



–Since then:

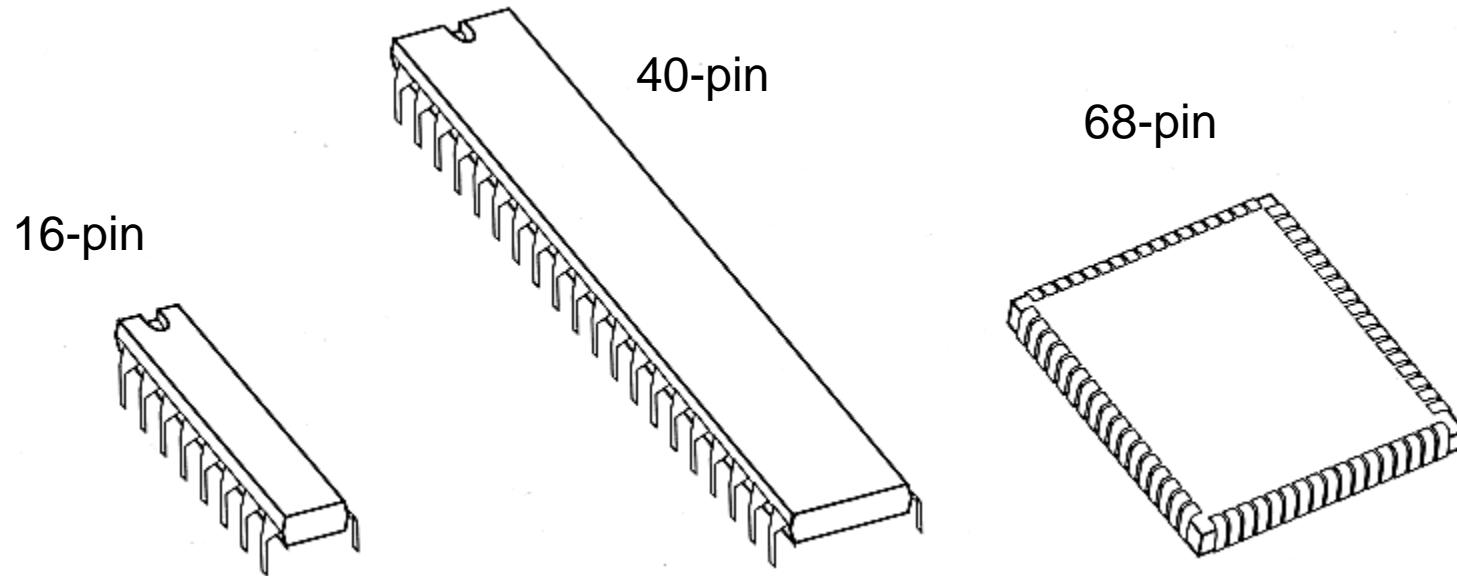
Moore's Law:

**transistor capacity doubles
every 18-24 months**

Technologies for Building Processors and Memory

- **Transistor:** An on/off switch controlled by an electric signal
- **Vacuum tube:** Consists of a hollow glass tube about 5 to 10 cm long from which as much air has been removed as possible; Uses an electron beam to transfer data
- **Very large scale integrated (VLSI) circuit:** A device containing hundreds of thousands to millions of transistors

Integrated Circuits (Chips)



SSI: 1 to 10 gates LSI: 100 to 100,000 gates VLSI: more than 100,000 gates
MSI: 10 to 100 gates

SSI: Small-Scale Integration
MSI: Medium-Scale Integration
LSI: Large-Scale Integration
VLSI: Very-Large-Scale Integration

Manufacturing Chips

- **Silicon crystal ingot:** A rod composed of a silicon crystal that is between 8 and 12 inches in diameter and about 12 to 24 inches long
- **Wafer:** A slice from a silicon ingot no more than 0.1 inch thick, used to create chips
- **Dies:** The individual rectangular sections that are cut from a wafer, more informally known as chips
- **Yield:** The percentage of good dies from the total number of dies on the wafer
- **Bonding:** The process of connecting dies to I/O pins
- **CMOS** (complementary metal oxide semiconductor): Does not directly consume power when idle

Networking

- Is the Internet a cultural phenomenon?

What Do We Mean By “Culture”?

- The term “**Culture**” (from the Latin *cultura* stemming from *colere*, meaning “to cultivate”) generally refers to patterns of human activity and the symbolic structures that give such activity significance.
- Culture vs. Nature
- Culture=Civilization? “Primitive” cultures
- Material, Social, and Spiritual Culture
- Cultural phenomena, artifacts, and behavioral patterns

UNESCO Definition of Culture

- “Universal Declaration on Cultural Diversity”, UNESCO (the United Nations Educational, Scientific and Cultural Organization), 2002: *“... culture should be regarded as the set of distinctive spiritual, material, intellectual and emotional features of society or a social group, and that it encompasses, in addition to art and literature, lifestyles, ways of living together, value systems, traditions and beliefs.”*

Material Culture

- Work of Artisans and Builders; Industry and Technology
- Agriculture: Cultivation of Land
- Cuisine (a specific set of cooking traditions and practices, often associated with a specific culture); Dress?
- Does the Information Technology (IT) Industry belong here?

Spiritual Culture

- Language
- Religion and Morality/Ethics
- Popular culture:
 - Cinematography
 - Radio and Television
 - Folk and popular music
 - Folk and modern dance
 - Sports and games
- “High culture”:
 - Art (painting, sculpture)
 - Literature
 - Classical music and dance, theater

Social and Intellectual Culture

- Science, philosophy and education
- History
- Law and law enforcement
- Architecture
- Medicine and physical culture/fitness
- Ecology (norms and patterns of interacting with the environment/Nature)
- Human reproductive and sexual behavior, adoption
- Business and Corporate Culture
- Military culture
- Political culture