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

![Bar chart showing the number of distinct processors sold from 1998 to 2002. The chart distinguishes between Embedded computers, Desktops, and Servers.](chart.png)
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