

Introduction

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1 Administrivia

Announcements

Assignment

Read 2.1–2.4.

Outline

1. Syllabus.
2. Introduction.

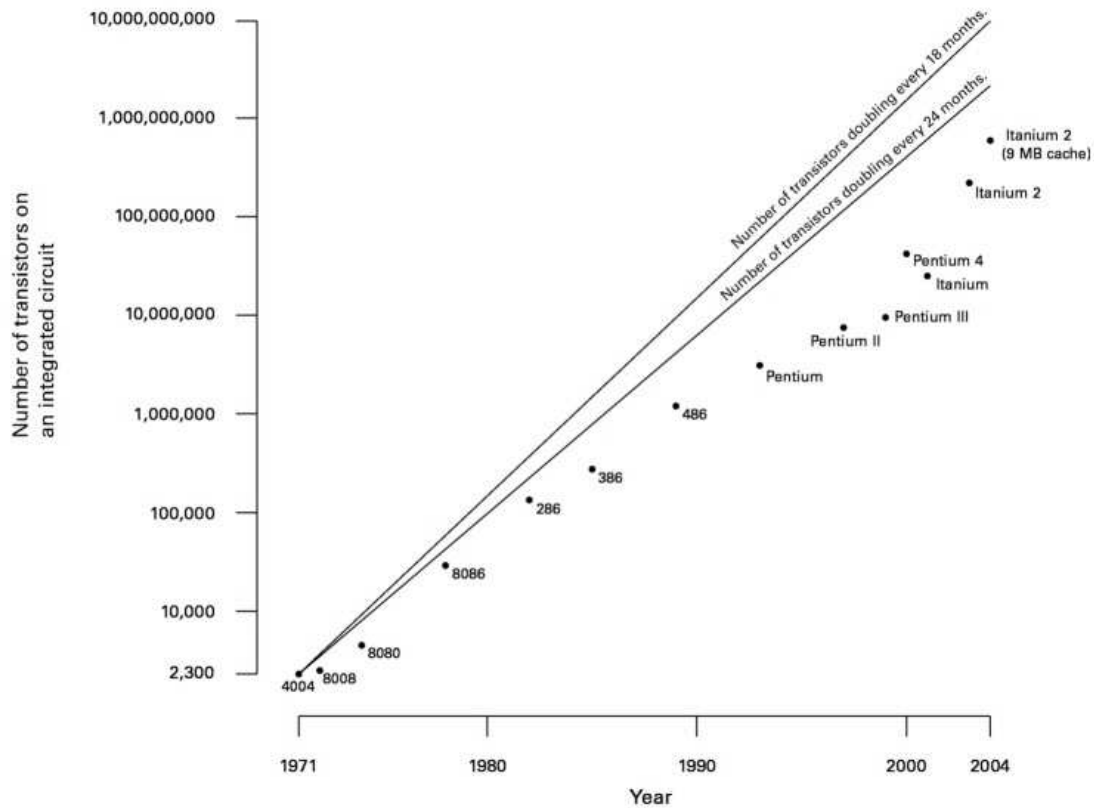
Coming Up

CPU operations, operands, and instruction representation.

2 Introduction

Moore's law: the number of transistors on a chip doubles every two years. What has this given us?

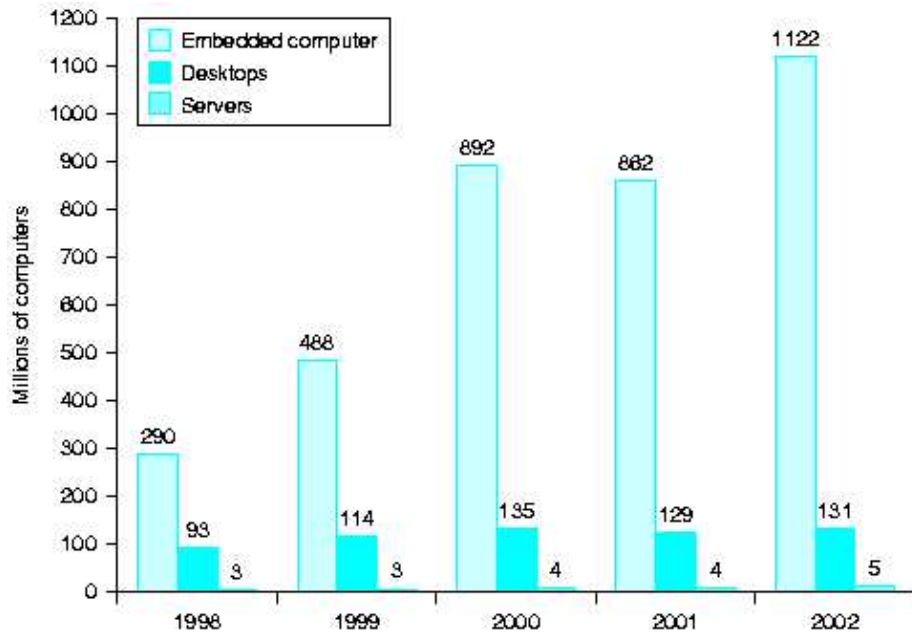
Moore's Law



What have architects done with these transistors?

Types of computing systems:

1. Personal systems: desktop and laptops.
2. Servers: Today's "mainframes." File servers have more storage and faster I/O; CPU speed not so critical. Compute servers tend to have more of everything.
3. Supercomputers: super servers. Large scale simulations — weather, automotive, nuclear.
4. Embedded: the largest category. Where are they?



The three “legs” of performance:

1. Algorithms.
2. Architecture.
3. Technology.

Layered system design:

1. Hardware.
2. Operating system.
3. System software.
4. Application software.
5. User.

Compilation process:

1. HLL and compiler.
2. Assembly and assembler.

One-to-one correspondence to machine code (usually).

3. Binary machine code.

How does Java fit into this model?

Components of a computer:

1. Input, output.

Connection structures:

- (a) PCI, AGP, IDE, SCSI buses.
- (b) Parallel, serial, PS2 ports.
- (c) USB, Firewire.

2. Memory.

Hierarchy:

- (a) Registers.
- (b) L1 and L2 caches.
- (c) Memory.
- (d) Hard disk.
- (e) Floppy, CD, Zip, flash drive, tape, etc.

Technologies:

- (a) Flip flops.

- (b) Static, dynamic RAM.
 - (c) Flash
 - (d) Disk technology.
3. Control, datapath. (Processor, CPU)

A little history:

1. What *was* a computer? Why did some dream of mechanized computers?
2. Babbage and Lovelace: Analytical Engine.
3. Eckert and Mauchly: ENIAC.
Total market for electronic computers. Application areas?
4. Univac, 1951.
Census.
5. IBM System/360, 1964.
6. DEC PDP-8.
7. CDC and Cray: supercomputing.
8. Solid state memory. Microprocessors (Intel 4004, 1971).
9. Personal computers: Apple, IBM, others.
10. DEC VAX: 32-bit minicomputer. Pinnacle of CISC architecture.
11. Berkeley RISC and Stanford MIPS: RISC architectural revolution.
12. Intel x86.