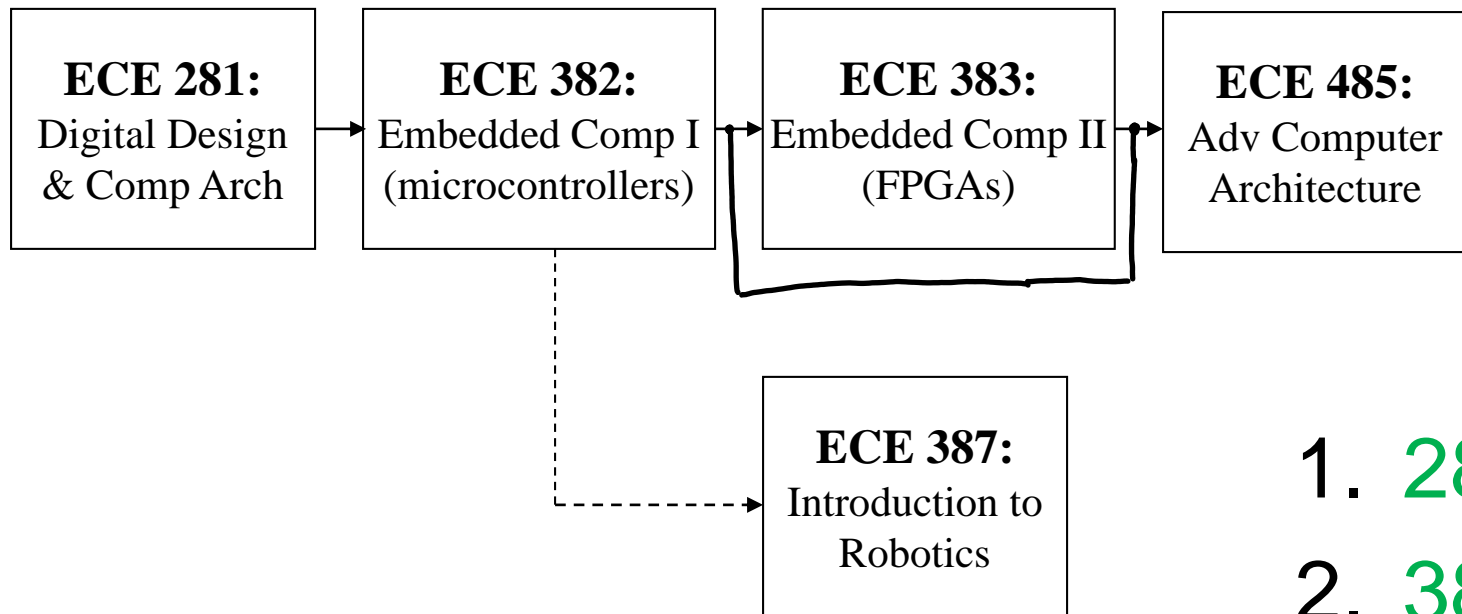

ECE485 Computer Architecture

Lesson 1

Computer Systems Courses



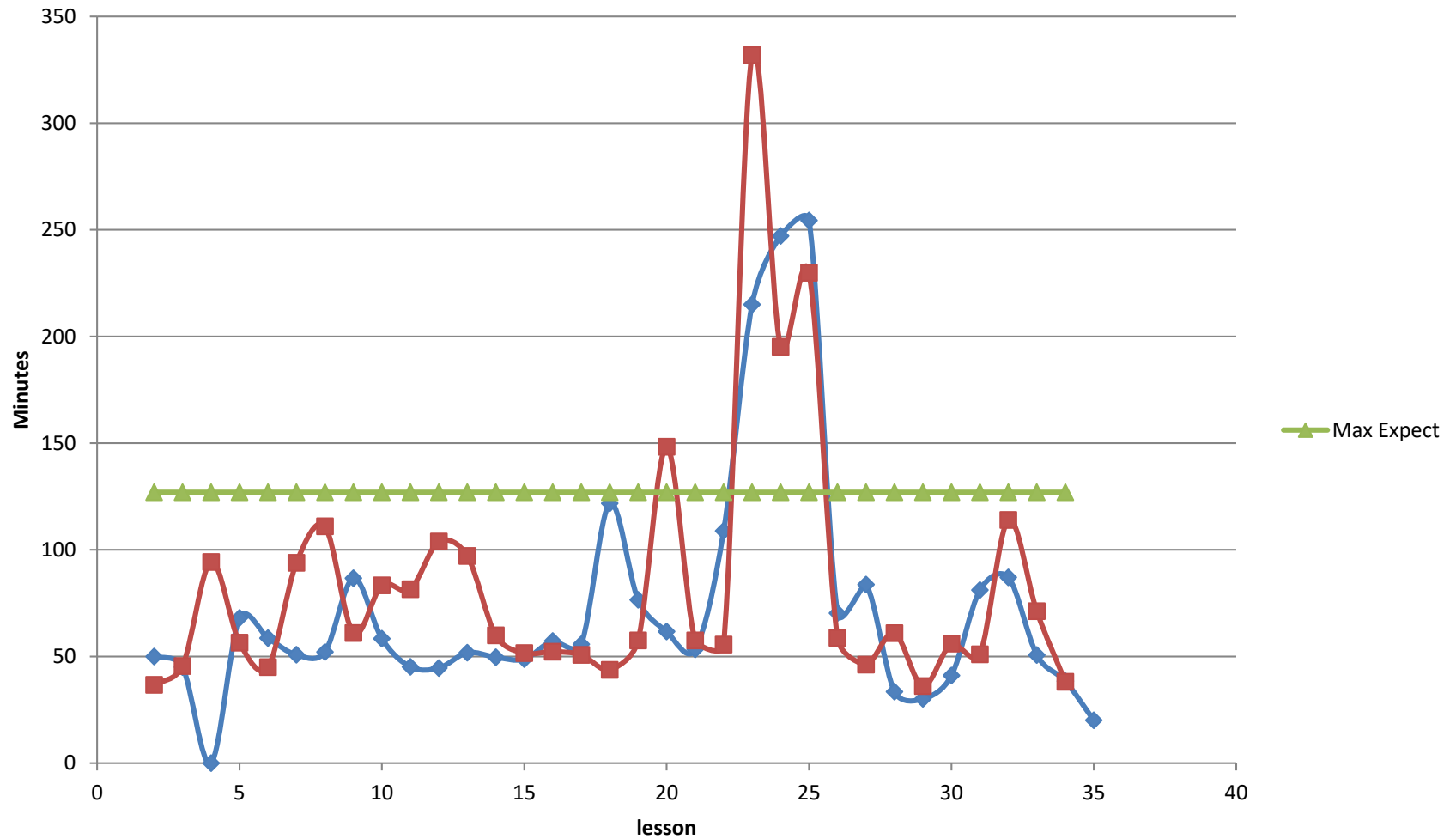
Which is the Best ECE CompE class?

1. 281
2. 382
3. 383
4. 387
5. 485

Course Overview

- Assess Architectures of Various Computers and their Subsystems
- Evaluate Architecture Performance Quantitatively
- Transition to Graduate Level Work
 - Resolve ill-Defined Problems
 - ~~Research paper~~
 - ~~Oral Presentation~~

Timelogs--ECE485



What is the textbook for this course?

1. *Computer Architecture and Organization*
2. *Computer Architecture: From Microprocessors to Supercomputers*
3. *Computer Architecture: A Quantitative Approach*

Course Overview

- Textbook
 - *Computer Architecture: A Quantitative Approach*,
★ Sixth Edition, 2019
by John Hennessy & David Patterson
 - The **Definitive Text** on computer architecture

Berkley

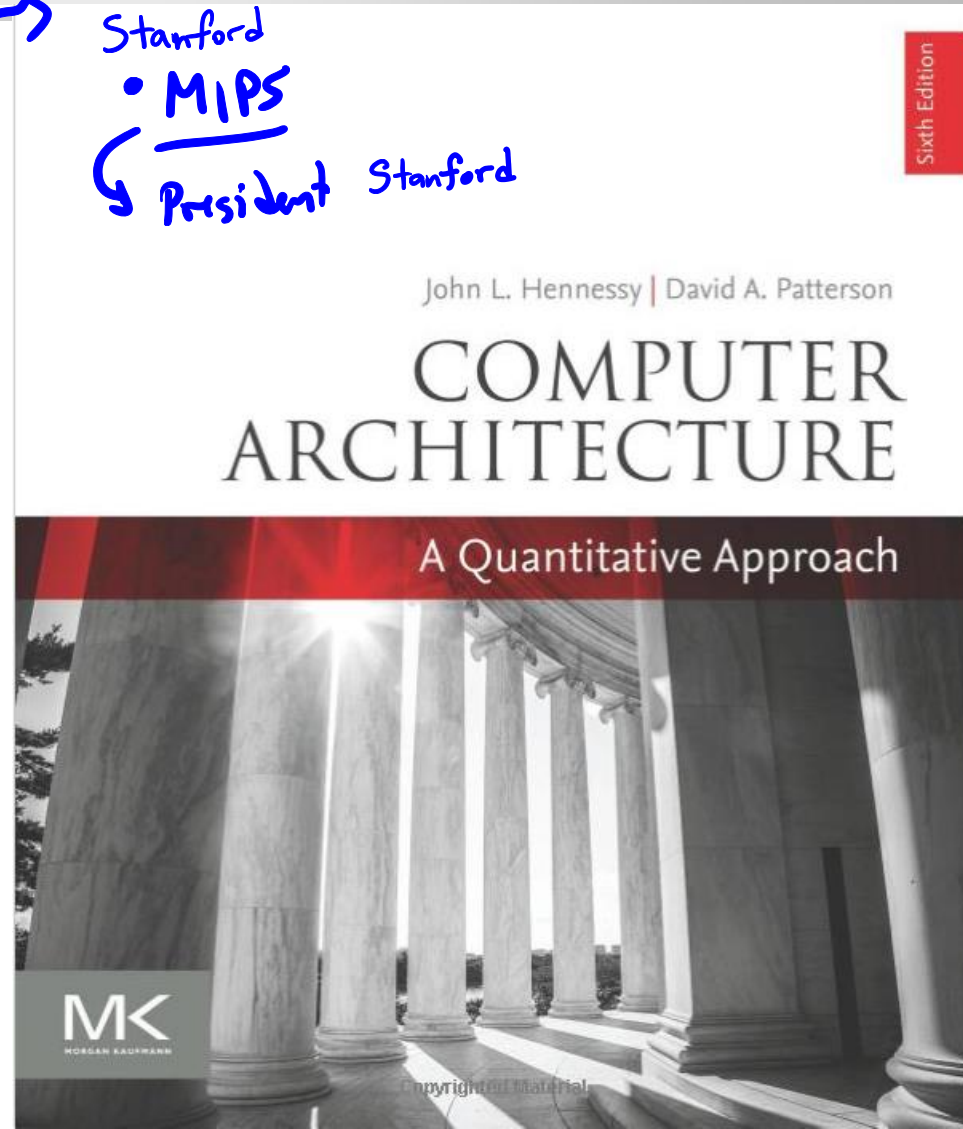
• SPARC → SUN

• RAID

Stanford

• MIPS

President Stanford



I have my textbook already?

1. yes
2. no
3. It is in the mail
4. I do not plan on getting the textbook

Course Website and Syllabus

- <https://usafa.blackboard.com>

202530-G-DFEC-ECE485-T2A : ADVANCED COMPUTER ARCHITECTURE

- Skills Review (due BOC M4)

- CPH (CPH1 due BOC M2)

- No extensions (like for TDYs) for assignment deadlines

- Vivado → not need until lesson 19

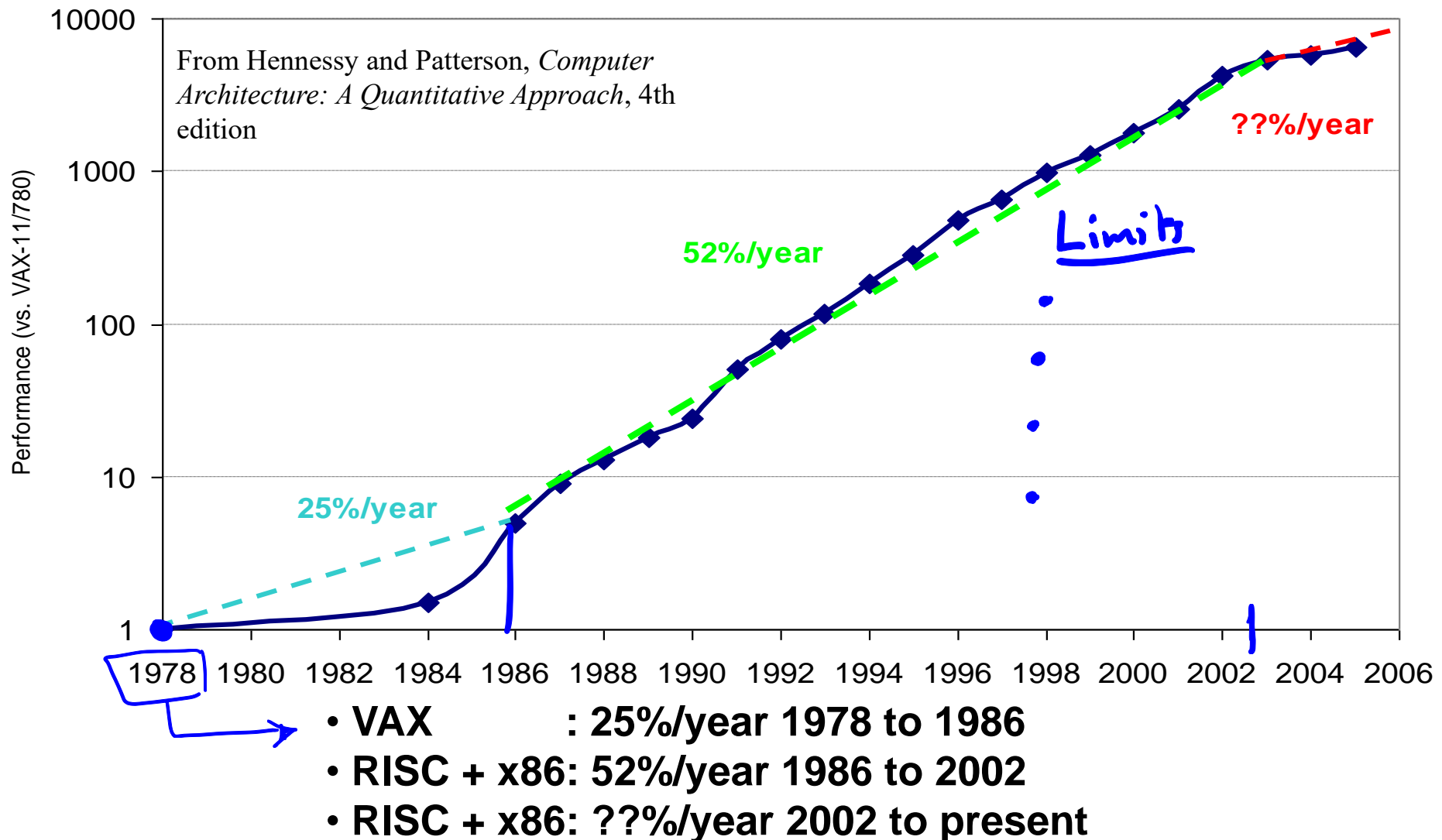
- Teams

- Gradescope

Computer Generations

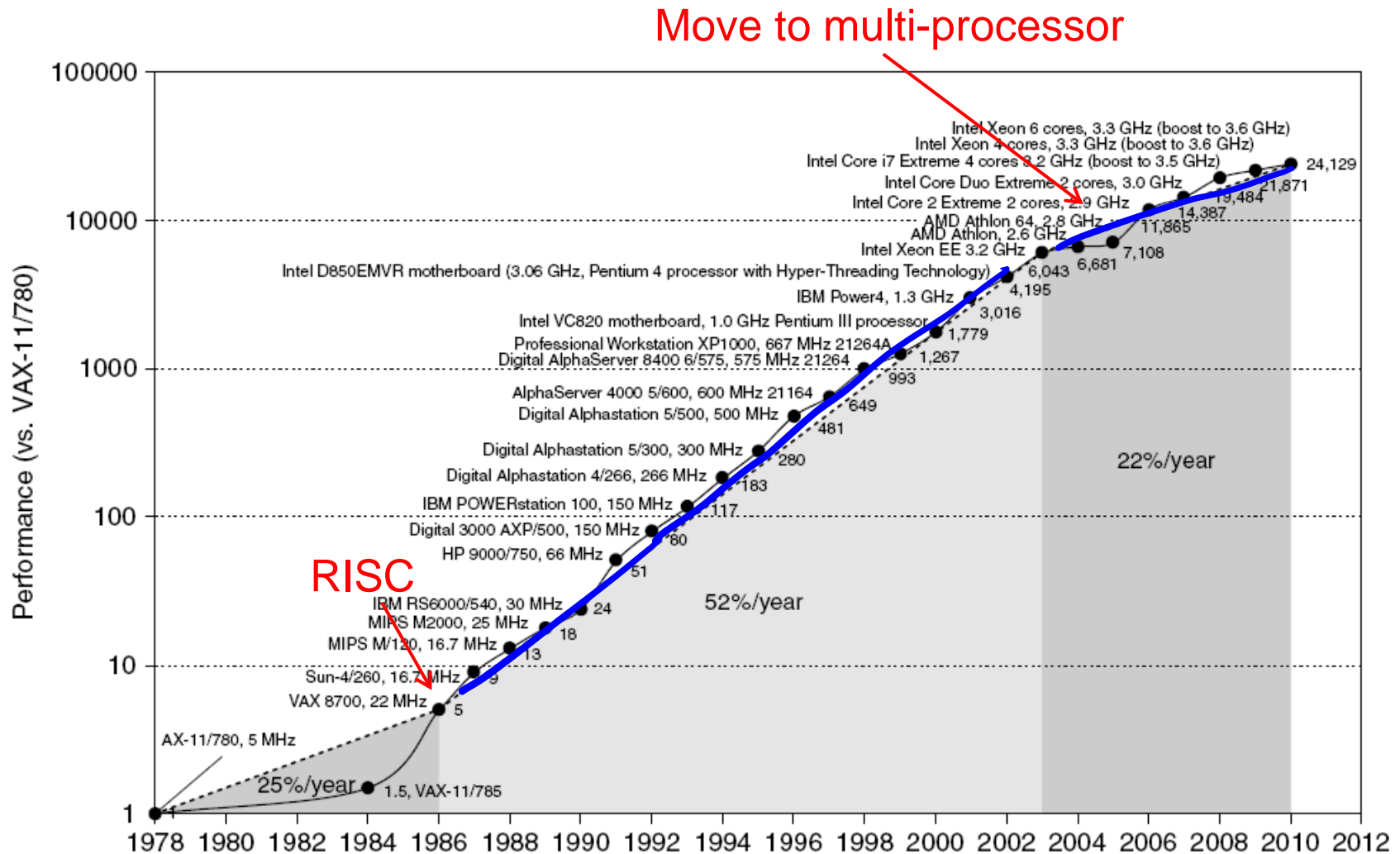
- 1st gen: vacuum tubes
- 2nd gen: transistors
- 3rd gen: MSI, LSI devices VLSI
- 4th gen: packing as many transistors onto one chip
- 5th gen: multiple cores

Crossroads: Uniprocessor Performance (2006 textbook)



Single Processor Performance

2012 textbook



The graph illustrates the exponential growth of computer performance over time. The Y-axis represents performance on a logarithmic scale, and the X-axis represents time in years. The growth rate is highest in the early 1980s (52%/year) and lowest in the late 2000s (3.5%/year).

Year	Computer Model	Performance (approx.)
1978	AX-11/780	5 MHz
1986	Sun-4/260	16.7 MHz
1988	MIPS M/120	16.7 MHz
1990	IBM RS6000/540	30 MHz
1992	Digital 3000 AXP/500	150 MHz
1994	Digital Alphastation 4/266	266 MHz
1996	AlphaServer 4000 5/600	600 MHz
1998	Digital AlphaServer 8400 6/575	575 MHz
2000	Intel D850EMVR motherboard	3.06 GHz
2002	Intel Core 2 Extreme	2.9 GHz
2004	Intel Xeon EE	3.2 GHz
2006	AMD Athlon 64	2.8 GHz
2008	Intel Core i7	4.0 GHz
2010	Intel Core i7	4.0 GHz
2012	Intel Core i7	4.0 GHz
2014	Intel Core i7	4.0 GHz
2016	Intel Core i7	4.0 GHz
2018	Intel Core i7	4.0 GHz

Bandwidth versus Latency?

1. Latency is the time it takes from the beginning to the end of an individual task
2. Bandwidth is the average throughput for all the tasks
3. If you increase the bandwidth, you also decrease the latency
4. 1 and 2 above
5. All the above

Trends in Hardware

Log-log plot of bandwidth and latency milestones

Which is easier to improve?

1. Bandwidth
2. Latency

