

EE-748: Advanced Topics

Computer Architecture

Course Introduction

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Lecture 0

CADSL

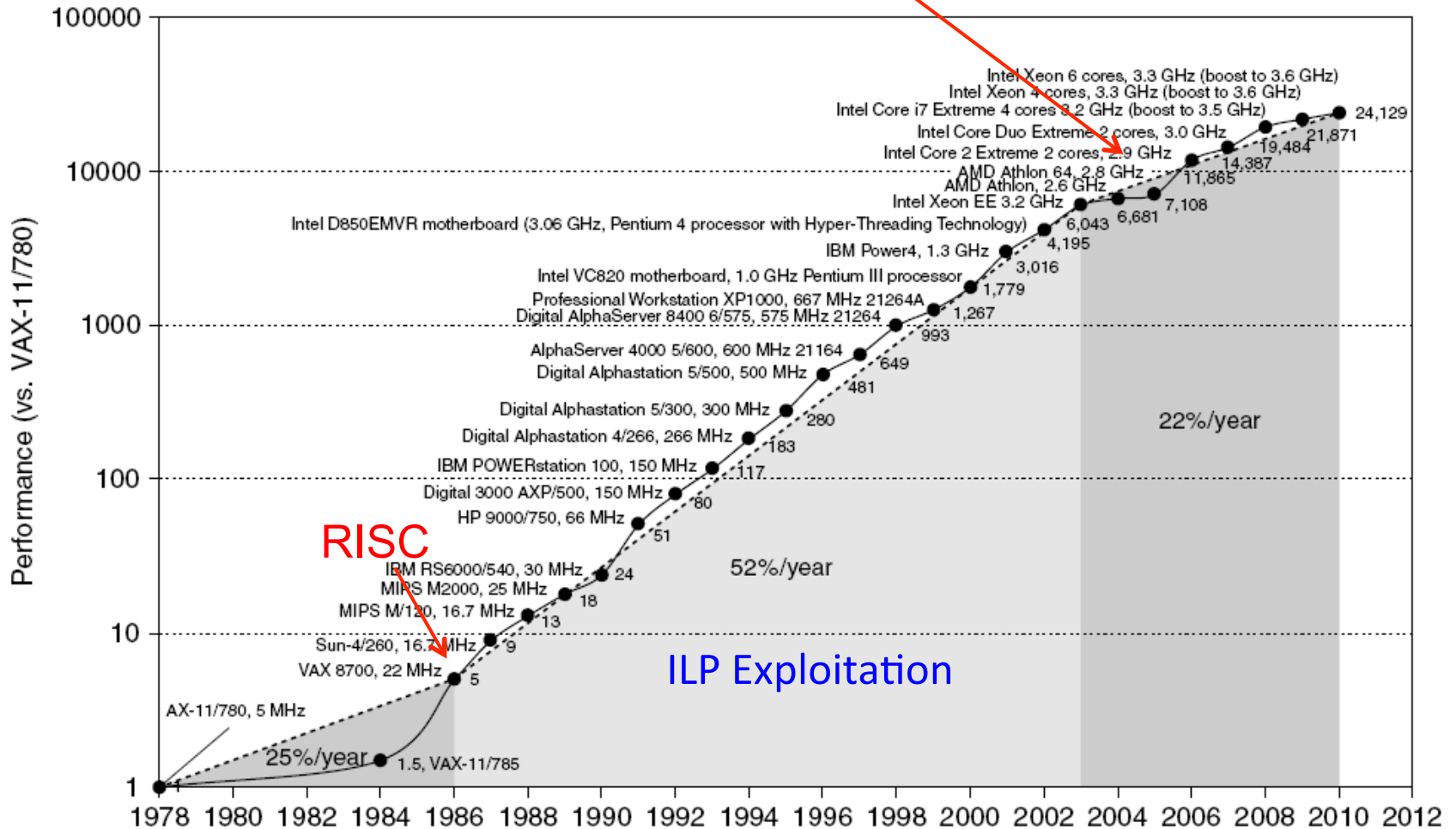
Computer Architecture's Changing Definition

- 1950s to 1960s:
Computer Architecture Course = Computer Arithmetic
- 1970s to mid 1980s:
Computer Architecture Course = Instruction Set Design, especially ISA appropriate for compilers
- 1990s onwards:
Computer Architecture Course = Design of CPU (Processor Microarchitecture), memory system, I/O system, Multiprocessors

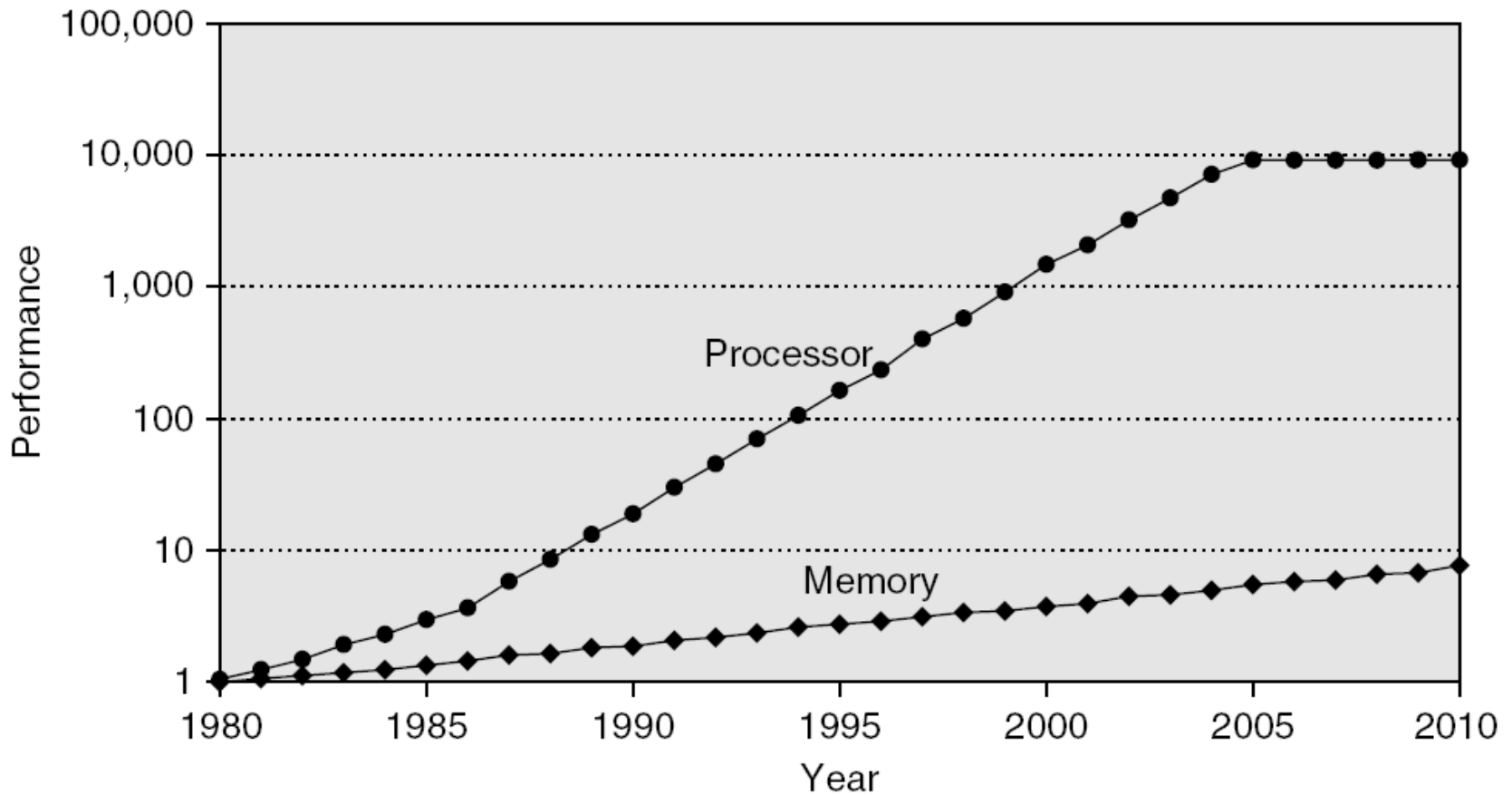


Single Processor Performance

Move to multi-processor



Memory Performance Gap



EE-748: Course Focus

Focus: Next generation general purpose processors

- Energy efficient single chip multi-processors with coarse/fine grain multithreading including dynamic cores
- CPU-GPGPU architecture
- Speculative multithreading
- Efficient Memory systems

Goal: Initiate research in this area

- Review previous and current research
 - Identify open issues and key opportunities
 - Propose initial approaches and demonstrate their potential
 - If we work hard enough, publish some ideas and results
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Course Outline

- ❖ Review of Computer Architecture
 - ❖ SMT architecture
 - ❖ Multi-core architecture (including CPU-GPU)
- ❖ Discussion on papers from
 - ❖ ISCA/Micro/HPCA/ICCD/DSN
 - ❖ Architecture Letters/ IEEE Trans. on Computers
 - ❖ About 20 papers



Your Participation

- ❖ Every class meeting
 - ❖ Read papers before class meeting
 - ❖ Submit review of paper at least a day before class
 - ❖ Actively participate in the class discussion
- ❖ Keep notes of class discussion
 - ❖ Submit after every paper discussion
- ❖ Lead one of class discussions
- ❖ Project (in group of max 3 students)
 - ❖ Original research on one open issue
 - ❖ Proposal, presentation and final paper
- ❖ Review papers of another groups



Who should take EE-748?

- ❖ Students interested in system research
 - ❖ Architecture, operation system, compilers
 - ❖ working in application areas interested in system implications

- ❖ Pre-requisite
 - ❖ CS-683: Advanced Computer Architecture,
or
 - ❖ EE-739: Processor Design



Caution!

- This is NOT a normal class room teaching course !!
- It is a research oriented course
- Participation in discussion is most important



Must to Read Papers Before Class

- ❖ Tilak Agerwala and S. Chatterjee, `Computer architecture: challenges and opportunities for the next the decade, IEEE Micro, May-June 2005
- ❖ Mark Hill and Michael Marty, [Amdahl's law in the multi-core era`](#), IEEE Computers, July 2008
- ❖ Shekhar Borkar and Andrew Chien, `The future of microprocessors`, Communications of ACM, vol. 54, no. 5, May 2011



Course Evaluation

- ❖ Mid Term Exam (10%)
 - Open Book/Notes/Internet Exam
- ❖ Quizzes (10%)
 - Open Book/Notes/Internet Exam
- ❖ Final Exam (10%)
 - Open Book/Notes/Internet Exam
- ❖ Course Projects (35%)
 - 1 projects [Decided during the first month]
 - Group (Max size 3)
- ❖ Class participation (35%)
 - Discussion in class



Grades

Absolute Grade

- > 95 : AA
- 85 – 94: AB
- 75 – 84: BB
- 65 – 94: BC
- 55 – 64: CC
- 45 – 54: CD
- 40 – 44: DD
- < 40 :FR



More Information

<http://www.ee.iitb.ac.in/~viren/Courses/2014/EE748.htm>



Thank You



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