BSM 206 Computer Organization
Spring 2017

Assist. Prof. Ferhat Dikbıyık

General Information

- Instructor: Assist. Prof. Ferhat Dikbıyık
  - fdikbiyik@sakarya.edu.tr, 1153
- Lectures:
  - Monday 09:00-12:00, 1108
  - Monday 15:00-18:00, 1105
  - There will be an additional one hour lab/application class given by senior students. Attendance is not obligatory, but highly recommended. Time and place will be anounced later.
- Office Hours: Monday 14:00 - 15:00
  & Thursday 14:00 - 15:00
  & Friday 14:00 - 15:00

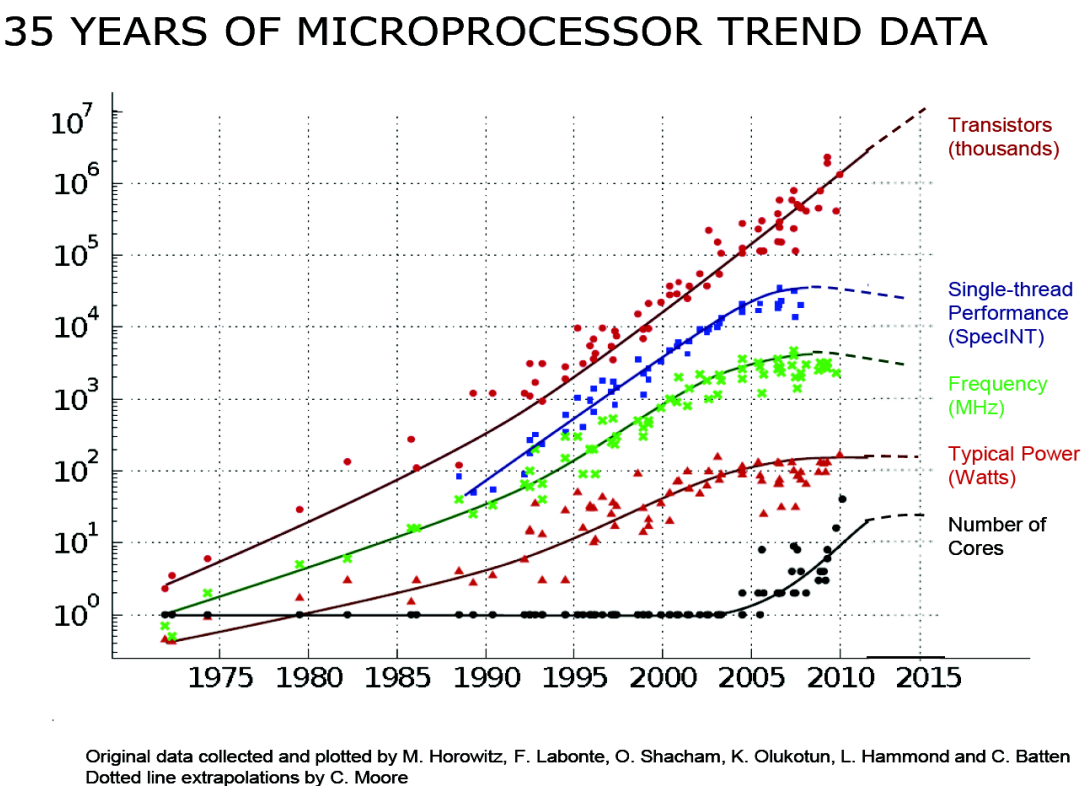
Why Computer Organization?

- Yes, I know, required class…
- Embarrassing if you are a BS in CS/CE and can't make sense of the following terms: DRAM, pipelining, cache hierarchies, I/O, virtual memory
- Embarrassing if you are a BS in CS/CE and can't decide which processor to buy: 3 GHz P4 or 2.5 GHz Athlon (helps us reason about performance/power)
- Obvious first step for chip designers, compiler/OS writers
- Will knowledge of the hardware help me write better programs?

Must a Programmer Care About Hardware?

- Memory management: if we understand how/where data is placed, we can help ensure that relevant data is nearby
- Thread management: if we understand how threads interact, we can write smarter multi-threaded programs
- Why do we care about multi-threaded programs?

Microprocessor Performance



50% improvement every year!!
What contributes to this improvement?

Microprocessor Performance

- Historical contributions to performance:
  - Better processes (faster devices) ~20%
  - Better circuits/pipelines ~15%
  - Better organization/architecture ~15%

In the future, bullet-2 will help little and bullet-3 will not help much for a single core!

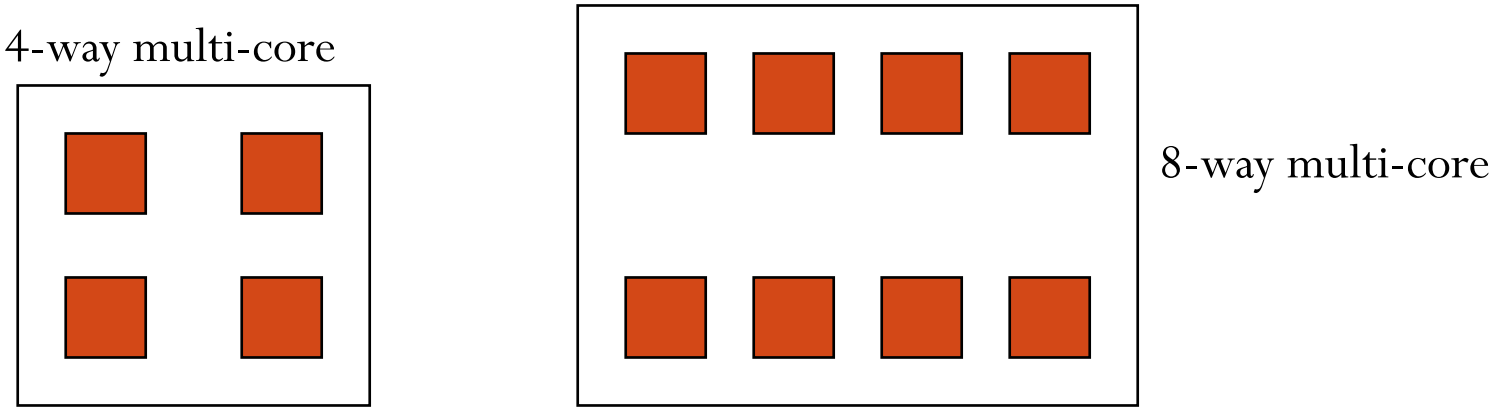
	Pentium	P-Pro	P-II	P-III	P-4	Itanium	Montecito
Year	1993	95	97	99	2000	2002	2005
Transistors	3.1M	5.5M	7.5M	9.5M	42M	300M	1720M
Clock Speed	60M	200M	300M	500M	1500M	800M	1800M

Moore's Law in action

At this point, adding transistors to a core yields little benefit

Microprocessor Performance

- In the past, a new chip directly meant 50% higher performance for a program
- Today, one can expect only a 20% improvement, unless… the program can be broken up into multiple threads
- Expect #threads to emerge as a major metric for software quality



Who am I?

www.sakarya.edu.tr/~fdikbiyik

- BS: İstanbul University
- MS and PhD: University of California, Davis, USA
- Teaching:
  - IST 108 Olasılık ve İstatistik
  - BSM 203 Logic Circuits
  - BSM 206 Computer Organization
  - BSM 445 Kuyruk Teorisi
  - BSM 450 Fiber Optik Ağlar
  - BSM 534 Network Optimization in Optical Networks
  - SG 507 Siber Savaşlar
- Research:
  - Computer Networks (Specifically Optical Networks and correlation between disasters and communication networks)

Lecture Notes

- Course notes will be uploaded to SABIS system every week.
- Textbooks:
  - Fundamentals of Logic Design, 6th Ed., C.H. Roth and K. Linsey, Cengage Learning, 2010. (Only Chapter 12)
  - *Computer Organization and Design, 4th Ed., D.A. Patterson and J.L. Hennessy, Elseiver, 2011. (You definitely need this book)*
    - *5th edition is also fine.*

Grading

- Homework 10%
- Project %20
- Midterm 30%
- Final 40%
- Some pop-up bonus questions will be asked in class. The bonus points may be given to project, midterm, or final exam.

Grading

- Homework 10%
  - There will be 5 homeworks (2% each). A homework every other week.
  - Questions will be mixed of mostly small and some large problems.
  - You are required to solve at least one question on board in class. Each solving will give you one “check mark”.
- Project %20
- Midterm 30%
- Final 40%

Grading

- Homework 10%
- Project %20
  - Project is about writing a well-known algorithm in assembly language (MIPS) and showing what happens at the hardware at each instruction.
  - It can be done within groups of up to 3 students.
  - You are required to present the project in class in English. Presentation will give you two “check marks”.
- Midterm 30%
- Final 40%

Grading

- Homework 10%
- Project %20
- Midterm 30%
- Final 40%
  - 20% of project will be given as bonus points to the final exam.
  - ***Students must have at least three "check marks" to attend the final exam.***

Course policies and some reminders

- **Reading Assignments**
  - For each week instructor will give you reading assignments from textbook. These assignments are not graded, however very important to understand the topics and to be prepared.
- **Homeworks (including Project)**
  - Homeworks will not be accepted after due date unless instructor suggested otherwise.
  - All students are expected to work individually (unless stated otherwise). Discussions among students are encouraged, but homework must be prepared, written, and submitted individually.
  - Do not waste your time by googling the homework questions. Solving may take much shorter time.
- **Exams**
  - Students who could not take the midterm exam with a valid excuse (health problems or loss from a family member) can take a make-up exam as long as their excuses are verified. Make-up exam will be ORAL.
  - Make-up exams for Finals are official, please refer to academic calendar and announcements.

To succeed from this course...

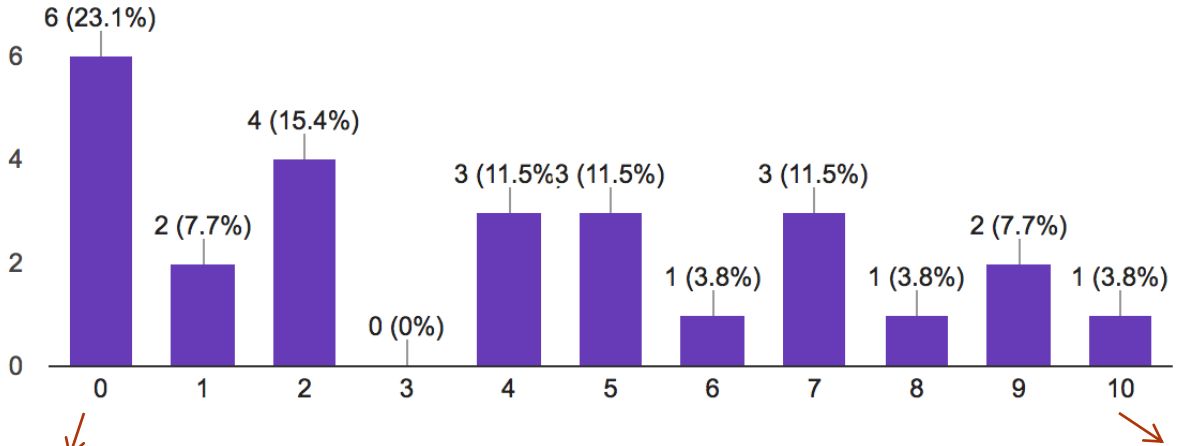
- ***Attend Lectures!***
  - Lecture covers many fundamental topics that are not in course notes.
  - Many scientific research show that there is a positive correlation between attendance and grades.

To succeed from this course...

Spring 2016 BSM 206 Computer Organization Survey

Derse düzenli gelmeyen bir öğrencinin bu dersten sadece ders materyallerini kullanarak başarılı olabileceğine inanıyor musunuz? Do you believe that a student, who does not attend the class on a regular basis, can succeed from this course by just studying on course materials?

(26 responses)



Kesinlikle inanmıyorum.
I absolutely do not believe so.

Kesinlikle inanıyorum.
I certainly believe so.

To succeed from this course...

- ***Attend Lectures!***
  - Lecture covers many fundamental topics that are not in course notes.
  - Many scientific research show that there is a positive correlation between attendance and grades.
- ***Read course materials!***
  - Read and print the course slides before the lectures so that you can take notes on them in class.
- ***Learn, not memorize!***
  - If you understand the fundamentals, then you do not need to memorize.

To succeed from this course...

- ***Do your homework!***
  - Homework help you to better understands the topics.
  - Best way to prepare exams.
- ***Be interactive!***
  - Interactively join discussions in class.
  - Do not hesitate to ask questions.
- ***Extra help!***
  - Dot not hesitate to come to my office during office hours or by appointment via e-mail to discuss a homework problem or any aspect of the course.
  - Do not wait until exams. Earlier you ask for help, more time you have to work on topics

Academic Honesty Code

- Be honest all the time.
- Act fairly towards others.
- Take group as well as individual responsibility for honorable behavior.
- When there are disagreements, be respectful and try to solve the conflict by rules.
- Do not offer or receive homework solutions.
- Learn plagiarism and take necessary steps to avoid it.
- Do not forget that you have right to object your grades. Learn the procedures.

Academic Honesty Code

- Do not ask extra points for yourself. Note that extra points given to a person or to a group is unfair to others.
- Learn the rules -ignorance is not an excuse.
- According to the regulations, the unethical academic behaviours (e.g., cheating (offering/receiving help) on exams, submitting same homework) deserve punishments that vary from condemnation to one-(or two-)semester suspension. No extra points earned by cheating is worthy to face any accusation and the guilt that you may experience
- Please check the regulations from following web addresses:
  - http://www.ogrisl.sakarya.edu.tr/ddepo/yuksekogretim_kurumlari_ogrenci_disiplin_yonetmeligi.pdf
  - http://www.ogrisl.sakarya.edu.tr/yonerge/SAU_Lisans_Onlisans_Yonetmelik.pdf