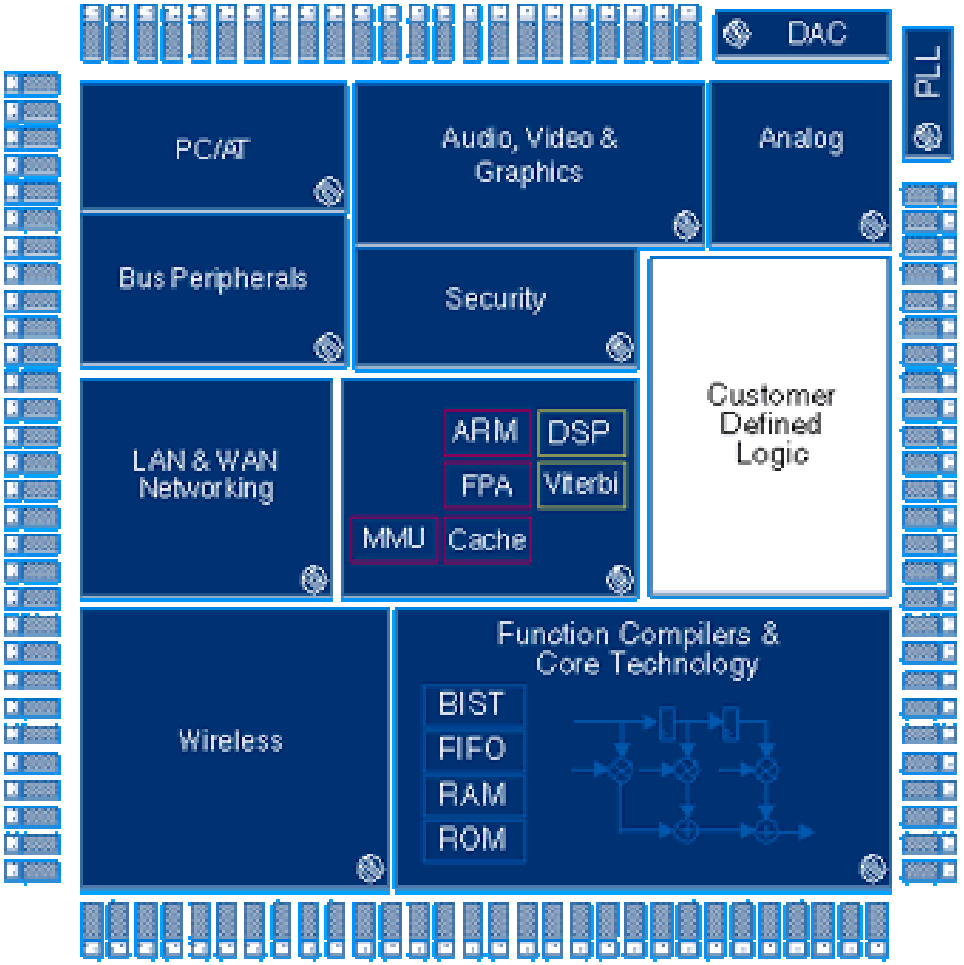
Modern PC Design: System-on-a-Chip

12 million logic gates can now be placed on a single chip

Computer designers must be experienced:

- **in both hardware and software co-design,**
- **as well as in embedded applications,**
- **be familiar with optimization techniques to perform the specific program using the least size, power, and time.**



How do we design such large systems….

Course Textbook

Textbook: **Computer Organization and Design**
"The Hardware/Software Interface"
John L. Hennessy & Patterson
Morgan Kaufmann Publishers, 2nd edition
ISBN = 1-55860-428-6, http://www.mkp.com

Material are based on this textbook! Avoiding it will be hard.

The Spim Simulator

Spim download: http://www.cs.wisc.edu/~larus/spim.html

Spim runnable code samples (Hello World.s, simplecalc.s, ...)
http://vip.cs.utsa.edu/classes/cs2734s98/overview.html

Please download & install first week of class.

Optional Textbook: **The C Programming Lanaguage**
Brian W. Kernighan & Dennis M. Ritche
Pentice Hall, 2nd Edition, ISBN = 0-13-110362-8

Course Instructors

Co-Instructors: Francis Wolff & Papachristou

fxw12 Office/Phone: Olin Room 514 Phone: (216)-368-5038

cap2 Office/Phone: Olin Room 506 Phone: (216)-368-5277

Email preferred form of communication

Wolff: fxw12@po.cwru.edu

Papachristou: cap2@po.cwru.edu

Office hours: generally before & after class

Course Website:

http://bear.ces.cwru.edu/eecs_314

http://129.22.150.65/eecs_314

Course Graders / Teaching Assistants

Priority: Graders/TAs then Instructor

Primary Grader: Ramakrishnan Vijayakumar

Office: Olin 413, Embedded Systems Lab
Phone: TBA

Preferred form of communication

email: rxv20@po.cwru.edu
email: bxg28@po.cwru.edu

Office hours: TBA

Course Grading

Exams = Projects = 25% each

Total: 4 exams and 1 programming project

Homeworks assigned for next class day

Tentative Exam dates:

((disclaimer: subject to change in time/topics) 1 week advanced confirmation notice)

Wednesday	February 6:	Chapters 3,2,1
Monday	March 4:	Chapter 4
Monday	April 8:	Chapter 5-6
Monday	April 29:	Chapter 6-7-8

Course Schedule

Class: Monday & Wednesday 4:30-5:45pm

1st Class: Monday January 14

No Class: Monday January 21 (MLK day)

Spring Break: March 11 - 15

Last Class: April 29 (Last Exam)

Get Unix & NT accounts

Course Outline Concepts

1. Introduction: Introduction to architecture & assembly.
2. Instruction Set Design: Cost and performance.
3. Computer System Design: Single- & Multi- Cycle.
4. Data Path Design: ALU, Multipliers, Registers, ...
5. Instruction Sequencing & Control: FSM & Microcode.
6. Pipeline Design: Fundamental principles.
7. Memory Systems: RAM, Cache, Memory hierarchies.
8. Input - Output and Communications: buses.