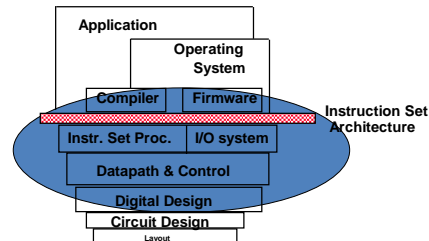
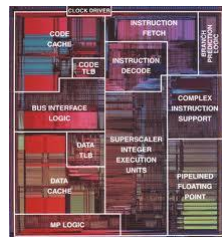




CS/SE 3340

Computer Architecture



Introduction

1



Instructor Information

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WWH of CS/SE 3340



- *What*
 - A course focuses on *fundamental concepts of computer system architecture*: multiple level abstraction, numbering systems and their computations (using MIPS architecture as vehicle)
- *Why*
 - Be able to explain computer architecture concepts which is important to design and build efficient and high performance software systems
 - Be able to do computation in binary and program in assembly languages is cool! ☺
- *How*
 - Participate, ask questions, ask for help as soon as needed!
 - **Spend efforts (e.g. taking good notes)!**
 - Be curious! ☺



Warning: this course requires serious effort!!!

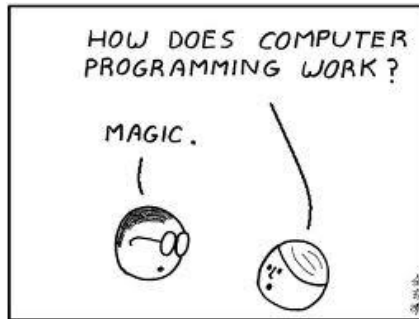
3

Curiosity, Discovery and Gecko Feet

<http://ed.ted.com/lessons/curiosity-discovery-and-gecko-feet-robert-full>

4

How Does Computer Work?



A lot of magic ☺? NOT!

5

What is a Computer Anyway?



Desktop



Server



Sandisk Clip



DOE ASCI White



Mobile Devices



Raspberry Pi

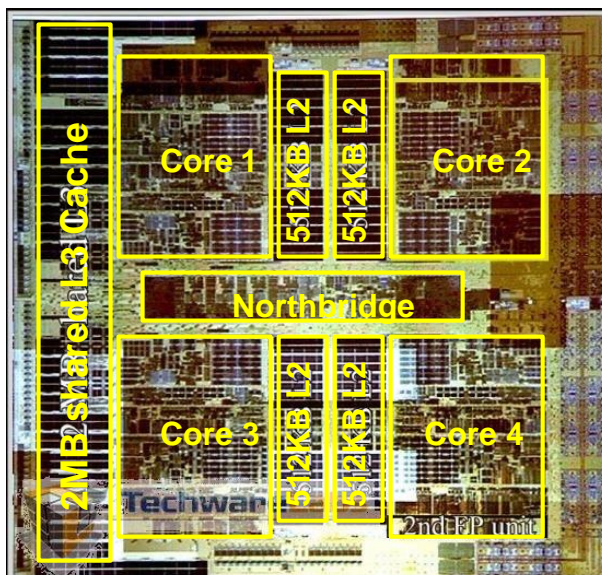
6

Classes of Computers

- *Desktop/mobile computers*
 - General purpose, variety of software
 - Subject to cost/performance tradeoff
- *Server computers*
 - Network based
 - High capacity, performance, reliability
 - Range from small servers to building sized
- *Embedded computers*
 - Hidden as components of systems
 - Stringent power/performance/cost constraints

7

Barcelona Multicore Chip (AMD)



- ❑ Four out-of-order cores on one chip
- ❑ 1.9 GHz clock rate
- ❑ 65nm technology
- ❑ Three levels of caches (L1, L2, L3) on chip
- ❑ Integrated Northbridge

<http://www.techwarelabs.com/reviews/processors/barcelona/>

8

What Makes Things Smart?

- Anything that has ability to compute (process information digitally) has become *Smart* !!!
 - *Smart Phone*
 - *Smart Meter (Grid)*
 - *Smart TV*
 - ... *Smart ???*

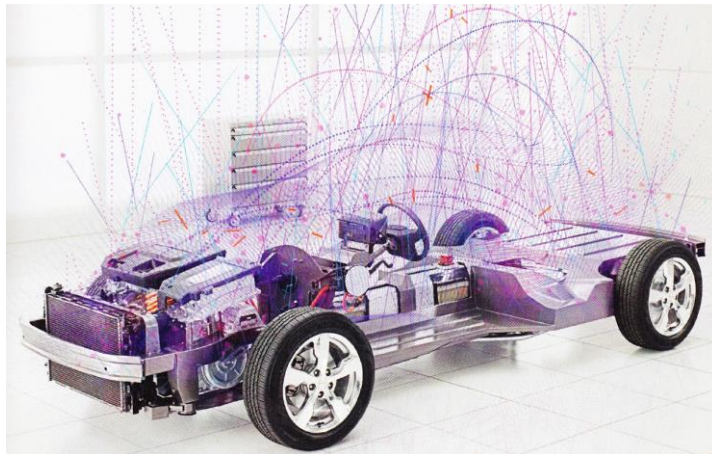


Smart Car? 😊



9

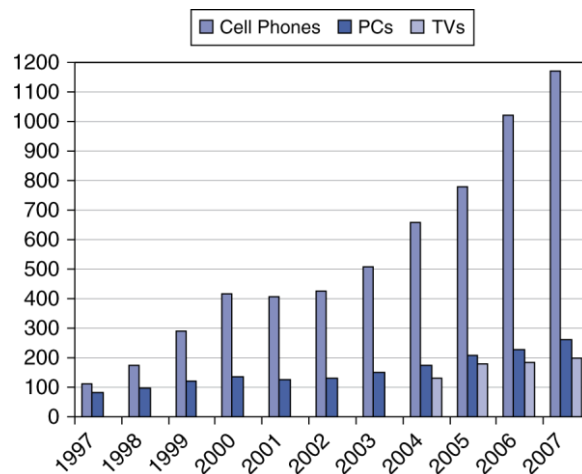
Chevy VOLT



IBM: Chevy Volt has > 10 millions LoC!

10

The Processor Market



11

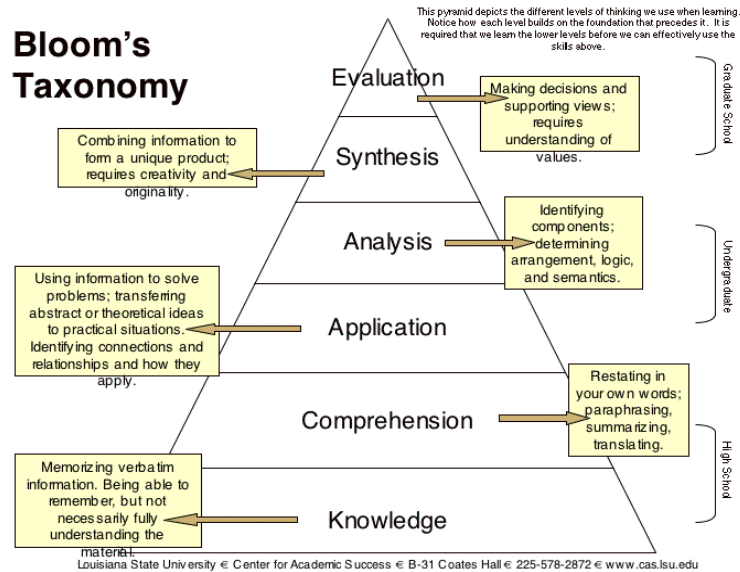
What In This for Me?

- *Knowledge and insights on computer architecture*
 - How programs are translated into the machine language
 - How the hardware executes programs
 - The hardware/software interface
 - What determines program performance and how it can be improved
 - How hardware designers improve performance
 - ...
- *Skill to program in assembly language*

12

Learning Levels

Bloom's Taxonomy



13

“The most valuable acquisitions in a scientific or technical education are the **general-purpose mental tools** which remains serviceable for a life-time.”

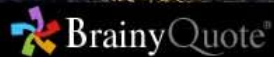
George Forsythe (1968)

14

A photograph of a sunset over a dark ocean. The sky is filled with dark, dramatic clouds, and a bright sun is low on the horizon, creating a shimmering reflection on the water's surface. The overall mood is contemplative and inspiring.

Education comes from within; you
get it by struggle and effort and
thought.

Napoleon Hill



15

“The road is *challenging* not because of
the mountains and the rivers that are in
your way, but because *your mind is afraid
of those rivers and mountains.*”

Nguyễn Bá Học

16

