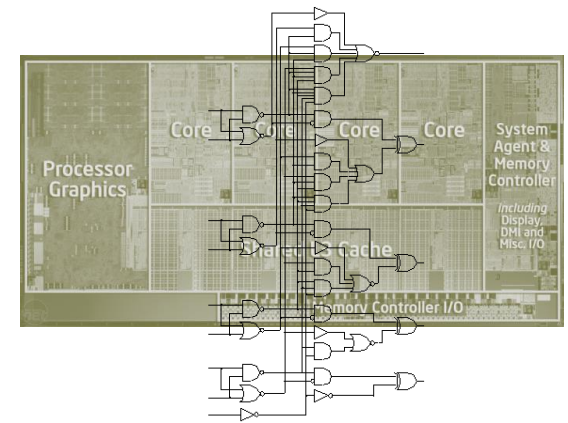




고려대학교
KOREA UNIVERSITY



COSE221, COMP211 Logic Design

Lecture 0. Course Introduction

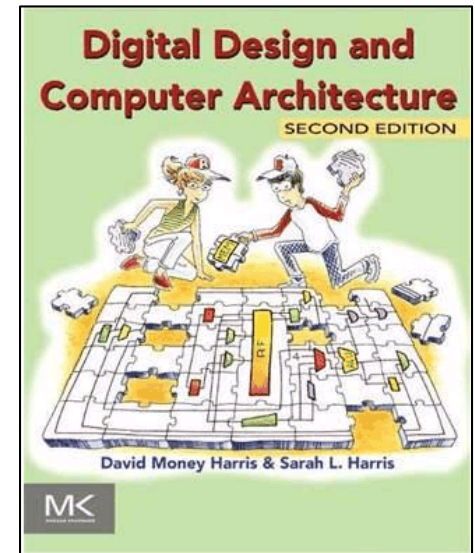
Prof. Taeweon Suh

Computer Science & Engineering

Korea University

Course Information

- Instructor
 - Prof. Taeweon Suh
- Textbook
 - **Digital Design and Computer Architecture** by David Money Harris and Sarah L. Harris, Morgan Kaufmann, 2nd Ed, 2012 (**Required**), **No translated version please!**
- Prerequisite
 - C language (Not strictly required though)
- Office hours
 - After class as needed
 - By appointment at Lyceum 307
- Lecture slides will be posted on the class web at <http://esca.korea.ac.kr/>
- Contact Information
 - suhtw@korea.ac.kr
 - 02-3290-2397



Your Computers?

- You have spent 1 year as a computer science major
- Your computers?



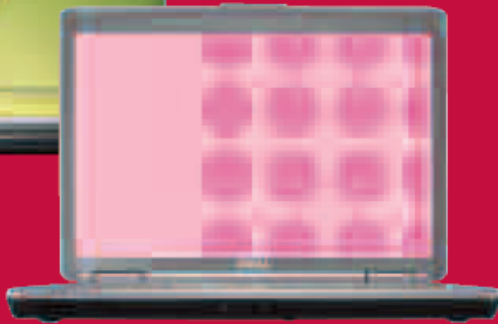
- How is the computer able to execute all those applications?

Your FAQ

전화 구매 대비 11만원 저렴

₩999,000

(온라인 구매시, 부가세 별도)



1GB 메모리로 무료 업그레이드

Inspiron™ 1420 노트북

제품코드 : Q541042N

14.1형으로 누리는 강력한 멀티미디어!
인텔 최신 프로세서로 더 자유롭게!

- 인텔® 센트리노® 듀오 프로세서 기술
인텔® 코어™2 듀오 프로세서 T7250
(2.0GHz/2MB L2 캐시/800MHz FSB)
- 한글정품 Windows Vista® Home Premium
- 512MB DDR2 SDRAM 메모리 / 160GB SATA HDD
- 128MB NVIDIA® GeForce® 8400M GS
- 14.1형 Wide XGA

2GB 하드로 무료 업그레이드

Inspiron™ 530s 데스크탑

제품코드 : Q241024N



22형 와이드로 더 넓게! 더 실감나게!
파워가 다른 생생한 엔터테인먼트!

- 인텔® 코어™2 듀오 프로세서 E6550
(2.33GHz/4MB 캐시/1333MHz FSB)
- 한글정품 Windows Vista® Home Premium
- 2GB DDR2 SDRAM 메모리
- 250GB SATA HDD
- 최대 128MB ATI Mobility™ Radeon® X1300 Hypermemory
- 22형 Wide LCD

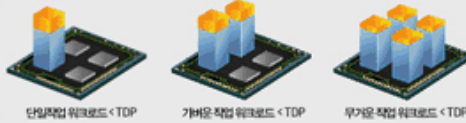
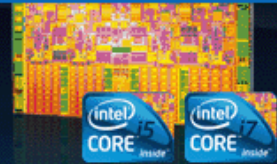
Your FAQ

강력한 멀티코어의 이름

인텔 코어 i 시리즈 프로세서!

인텔 코어 i 프로세서는 향상된 터보 부스트 기술, 하이퍼스레딩 기술(only i7) 증가된 인텔 스마트 캐시, 저비용 저전력 플랫폼이 특징입니다. 강력한 성능과 높은 3D 게임 체감지수를 느끼고 싶다면 i5, i7 탑재 시스템을 준비하세요.

코어 i 시리즈 시스템 더 보러가기



인텔 코어 i5, i7 런필드 프로세서는 터보부스트 기술을 강화하였습니다.

터보부스트 기술은 기존 프로세서의 쓰레드 처리 방식과 달리 처리가 필요한 코어에 나머지 코어 쓰레드를 집중함으로 최적화된 성능 향상과 에너지 효율을 제공합니다.

BEST HIT!!
런필드 시스템
인기상품



인텔 코어 i5 런필드 750

[2.66GHz | 8MB | 쿼드코어 | 40nm 공정]

지포스 GT220 512MB / DDR3 3기가
인텔 순정 DH55TC 마더보드
S-ATA2 320GB / DVD멀티 광드라이브
6채널 HD오디오 | 기가비트랜 포트 | 400W 정격파워
스타일리쉬 명품 케이스 | 2채널 스피커

₩ 709,000

구매하기



인텔 펜티엄 듀얼코어 클락데일 G6950

[2.8GHz | 3MB | 듀얼코어 | 32nm 공정]

지포스 GT240 1GB / DDR3 3기가
인텔 순정 DH55TC 마더보드
S-ATA2 320GB / DVD멀티 광드라이브
6채널 HD오디오 | 기가비트랜 포트 | 450W 정격파워
명품 저전력 최고급 케이스 | 2채널 스피커

₩ 629,000

구매하기



21.5인치 FULL HD + 인텔 코어 i3 클락데일 530

[무결정 | 10000:1] [2.93GHz | 4MB | 쿼드코어 | 32nm 공정]

지포스 GT240 512MB / DDR3 3기가
인텔 H55칩셋 고급형 마더보드
S-ATA2 500GB / DVD멀티 광드라이브
6채널 HD오디오 | 기가비트랜 포트 | 450W 정격파워
3R 고급 케이스 | 2채널 스피커 | 키보드&마우스

₩ 899,000

구매하기

Your FAQ

막강한 4세대 하스웰을 탑재한 최강의 데스크탑 DELL XPS 8700을

11번가에서 **막강한 혜택**으로 만난다!

혜택
1

게이밍 PC의 절대지존! 하스웰 NEW데스크탑 신상특가!

DELL XPS 8700 - W240554KR

- 4세대 인텔®코어™ i7-4770프로세서
(3.40GHz, 터보 부스트 작동 시 3.90GHz)
- NVIDIA GeForce GTX 650 Ti GDDR5 1GB
- 16GB 듀얼채널 DDR3 SDRAM 1600MHz 메모리
- 대용량 2TB 7200 RPM SATA 하드 드라이브 6.0 Gb/s
- 사용 편의성과 내구성을 고려한 독특한 커브 디자인
- 16배속 DVD+/-RW 슈퍼 드라이브
- 1년 프리미엄 서비스
- 정품 Windows7 홈프리미엄 SP1 한국어(64비트)



→ 1,499,000원 →

1,349,000원

Abstraction

- Abstraction helps us deal with complexity
 - Hide lower-level detail

Abstraction Analogies

Driver



**Abstraction
layer**



**Machine
Details**



**Combustion
Engine in a car**



**Break system
in a car**

Customer



**Abstraction
layer**



**Machine
Details**



**Hardware board in a
vending machine**

Abstractions in Computer

Programming using APIs



facebook



Operating Systems

Provides APIs (Application Programming Interface)

Instruction Set Architecture (ISA)

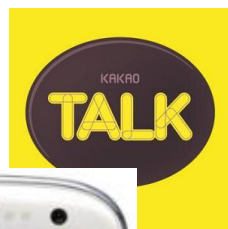
Hardware Implementation
(x86)

Assembly language
or
Machine language



Abstractions in Smartphones

Application Programming
using APIs



facebook



Operating System



Instruction Set Architecture
(ISA)

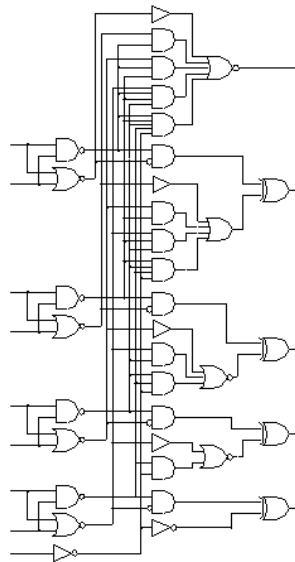


Hardware
Implementation
(ARM)

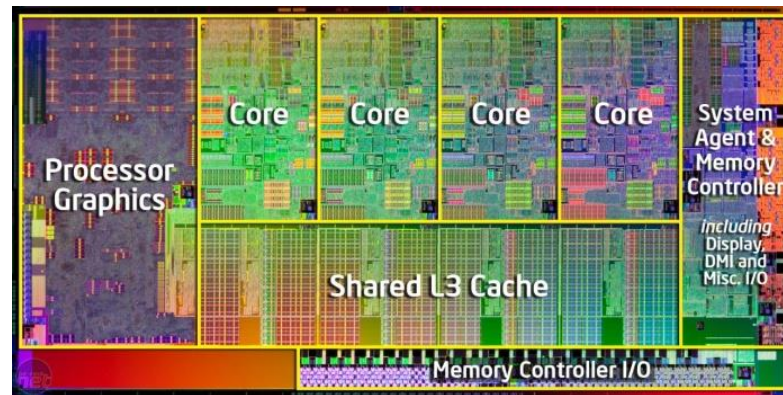


Hardware in Computer

- Computer architecture course next semester will cover how to build a CPU with the basic elements



Digital Logic
(COSE221,
COMP211)



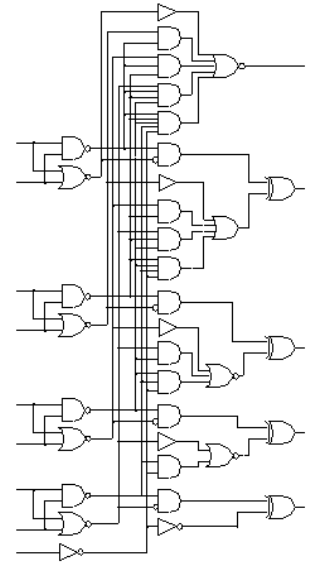
2nd Generation Core i7 processor
995 million transistors in 216mm² (32nm technology)
(COSE222, COMP212)

Ultimate Goal

**Understand How Your Computer
Works Really!**

Objectives

- Understand principles of digital design and gain hands-on experience in designing digital logic
 - Digital and transistors
 - Number systems
 - Combinational logic
 - Sequential logic
 - Digital building blocks
 - Adder, Subtractor, Multiplier, Divider
 - Memory
 - Verilog HDL (Hardware Description Language)
- **Basically, this course sets the stage for studying computer architecture next semester**



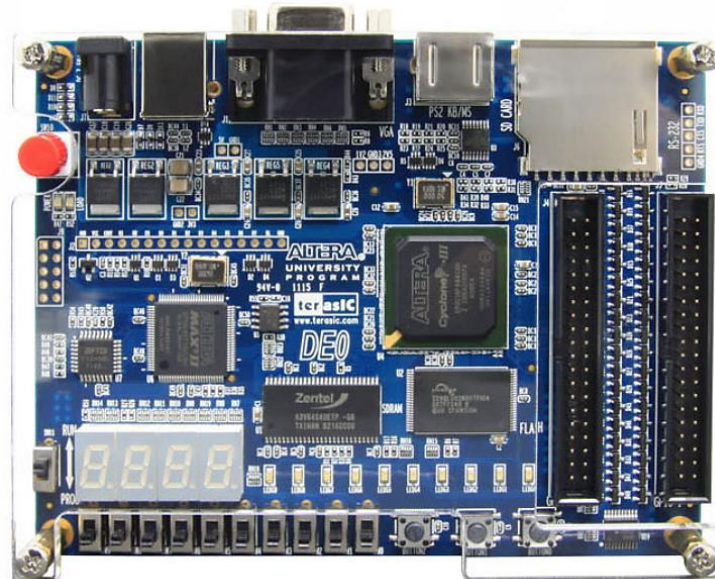
Expectations

- You will have a lot of fun throughout this class
- After successfully completing this course, you should be able to design
 - **Digital logic in vending machine, digital watches, microwave, your dishwasher, your HD TV etc**
 - **Basically, ANY digital logic you want! Isn't it cool?**



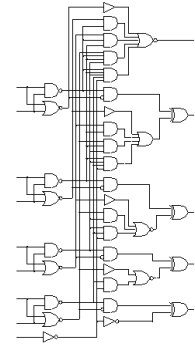
Grading Policy

- Exams: 60%
 - Midterm: 30%
 - Final: 30%
- 2 Quizzes: 10%
- Assignments (with experiments): 30%
- **F**ail rule
 - You will be given an “F” if absent more than 3 times
 - 2 late show-ups will be counted as 1 absence



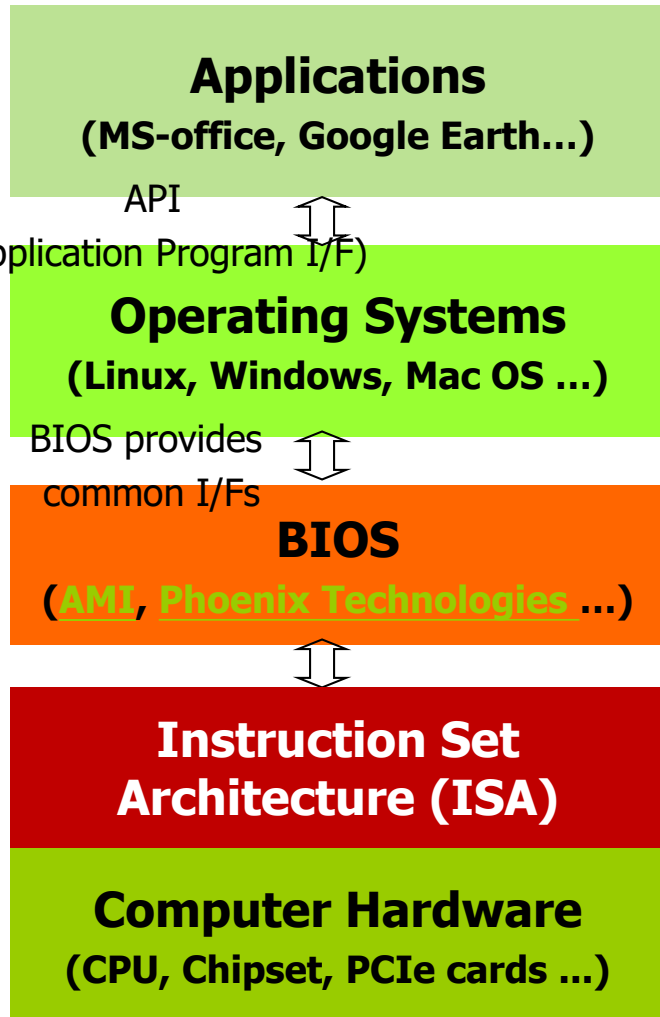
Prof. Suh's Courses

- **Logic Design** (COSE221, COMP211) offered in spring semester for sophomore students
- **Computer Architecture** (COSE222, COMP212) offered in fall semester for sophomore students
- **Embedded Systems** (COMP427) offered in spring semester for senior students



Backup Slides

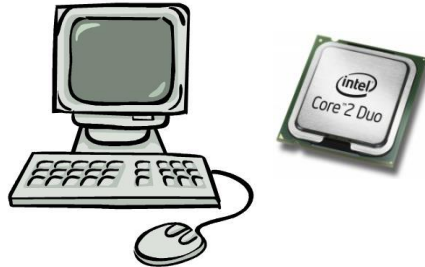
Hardware/Software Stack in Computer



- Application software
 - Written in high-level language
- System software
 - Compilers
 - Translates the code written in high-level language to machine code
 - Operating Systems
 - Handling input/output
 - Managing memory and storage
 - Scheduling tasks & sharing resources
 - BIOS (Basic Input/Output System)
- ISA
 - Interface between hardware and low-level software
- Hardware
 - Processor, memory, I/O controllers

Another View

```
int main()
{
    int a, b, c;
    a = 3;
    b = 9;
    c = a + b;
    return c;
}
```

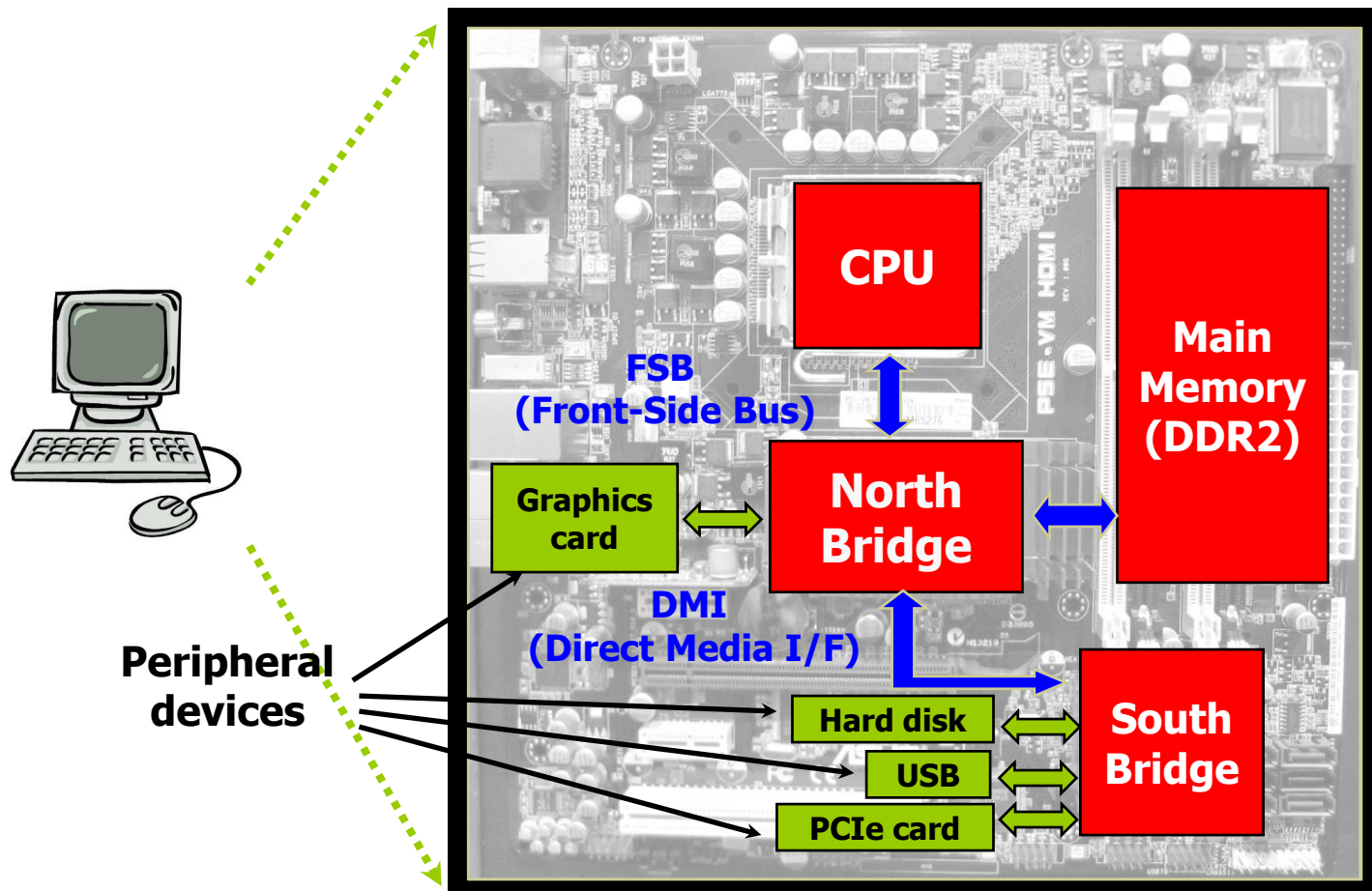


- **COMP169 C Programming**
- **COMP166 Computer Programming**
- **And Java, C++, C# ...**

- **COMP212 Computer Architecture course is where software meets hardware**

- **COMP211 Computer Logic Design**

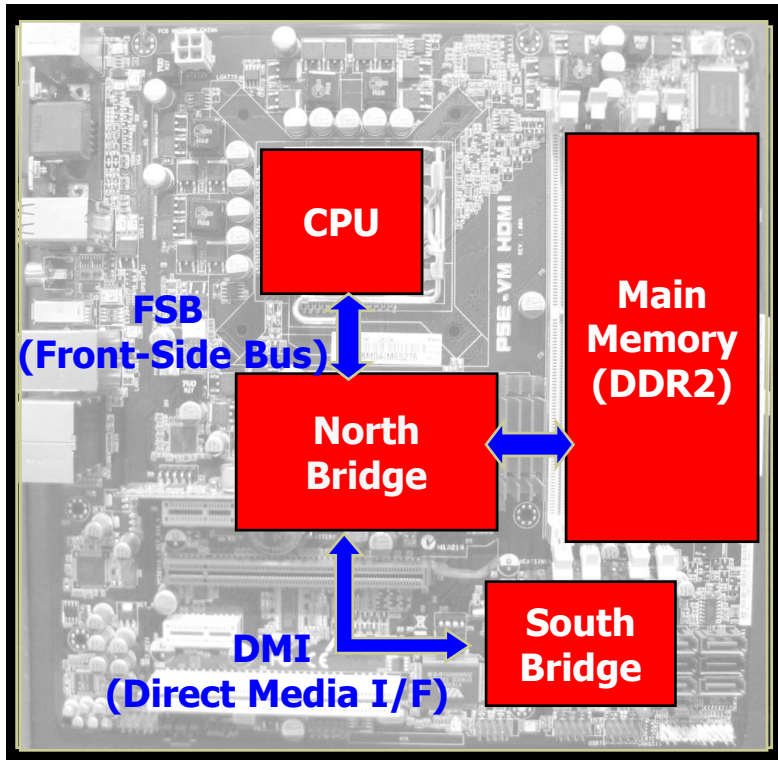
A Computer System (as of 2008)



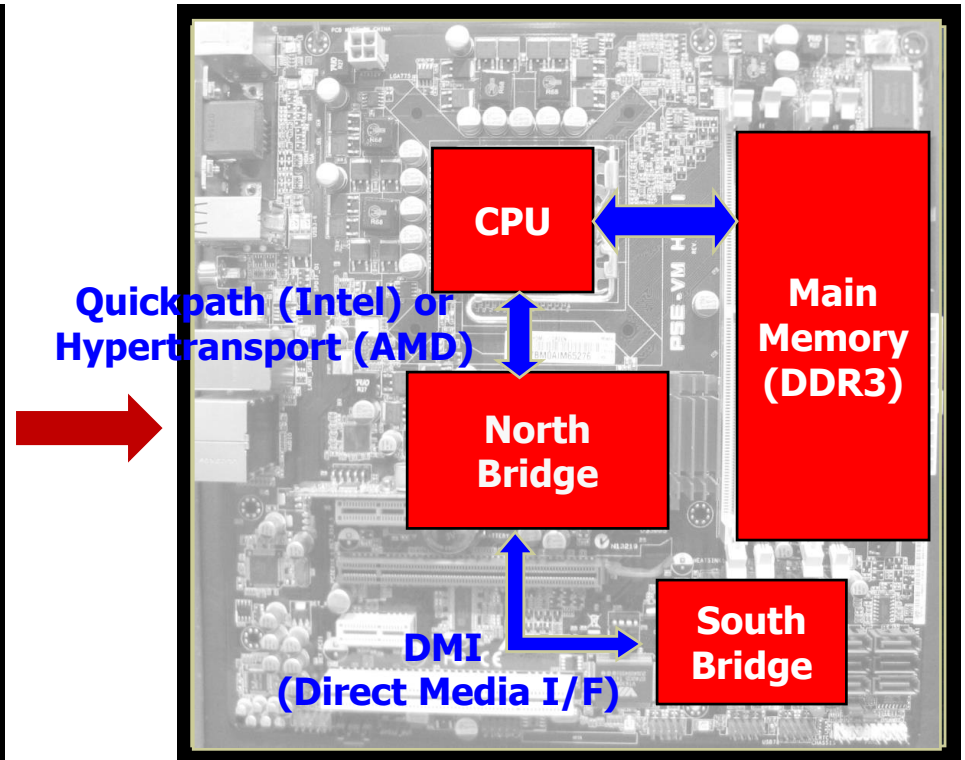
But, don't forget the big picture!

Present and More...

- Core 2 Duo – based Systems



- Core i7– based Systems



Keep in mind that CPU and computer systems are evolving at a fast pace