

Computer Architecture Faculty of Computer Science & Engineering - HCMUT

Computer Architecture

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• The lecture material for this course has been adapted in part from UC Berkeley (US), Penn State, Publisher at UB and The Massachusetts Institute of Technology (M.I.T. US)



What is Computer???

"A computer is a data processing machine which is operated automatically under the control of a list of instructions (called a program) stored in its main memory."



Classes of Computers

- Personal computers
- Embedded computers
- Server/Supercomputers









Source: internet

Which class does ipad belong to?





How about smartphone?

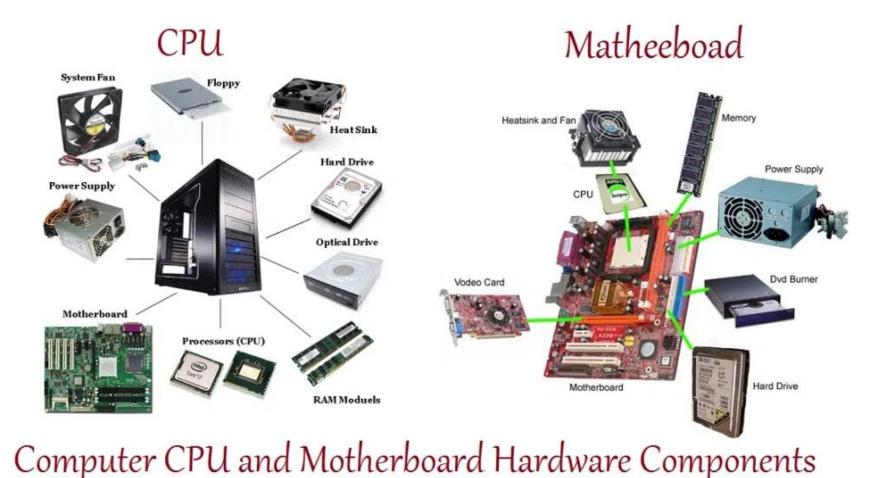


Computer Architecture

"Computer architecture refers to those attributes of a computer system visible to programmers, or those attributes that have a direct impact on the logical execution of programs."



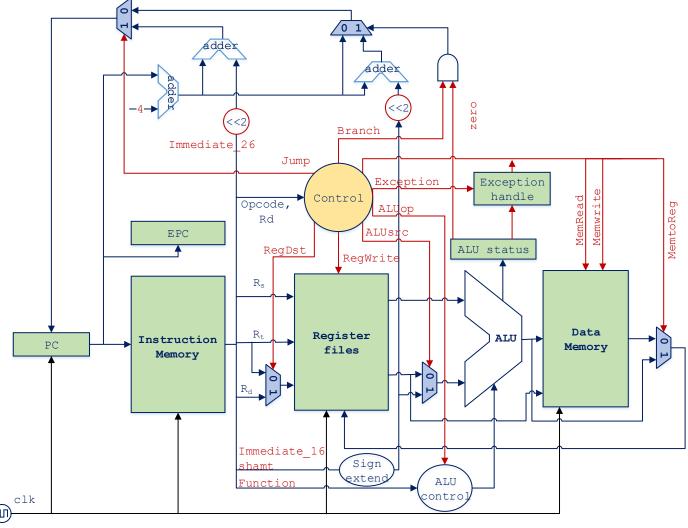
Don't get confused





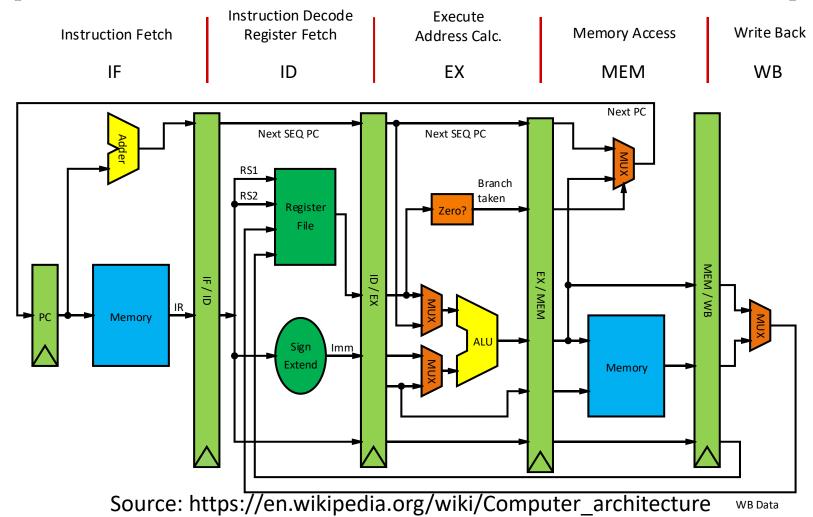
Source: https://informationq.com

Computer Architecture example





Computer Architecture example





Typical Attributes

- The instruction set (instruction types and operations)
- Basic data representation methods
- I/O mechanisms
- The basic units in the CPU
- Functions of the major components
- Instruction execution
- Memory organization (memory addressing techniques)
- The ways in which the basic components are interconnected



15-Aug-2

Course Overview

- Principle & organization of digital computers.
- Instruction Set Architecture of a Computer.
- Programming in assembly language (MIPS).
- Performance issues in computer architecture.



Why this Course ???

- To be professional in any field of computing today, not to regard the computer just as a black box executing programs by magic.
- To understand functional components that build up a computer system, their characteristics, performance, & interaction between them.
- To understand computer architecture in order to develop a program that runs efficiently on a system.
- To understand the tradeoff among various component features, such as CPU clock speed vs. memory size by design a system



Course Outcomes

- Students who complete this course will be able to
- Explain the structure of a computer system and deeply understand how it works at the hardware level.
- Develop assembly language programs that include complex constructs.
- Design and build basic software components which work efficiently on a known architecture.
- Analyze the performance of computer architecture and organization.



Course Schedule

| Introduction to Computer Abstraction and Technology | Week 1-2 |
|---|------------|
| Instructions – Language of the Computer with MIPS | Week 3-5 |
| Arithmetic for Computers | Week 6-7 |
| The Processor | Week 8-9 |
| Memory Systems | Week 10-11 |
| Storage and Other IO topics | Week 12-14 |



Course Materials

- Lectures:
 - Bk-elearning (http://e-learning.hcmut.edu.vn/)
- Textbooks:
 - David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann Publishers, 2017.
 - Pham Quoc Cuong, "Kiến trúc Máy tính", Nhà xuất bản Đại học Quốc gia TPHCM, ISBN: 978-604-73-4662-2
- Some well-known online courses
 - Edx, Coursera, Udemy



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Course Evaluation

- Quizzes (In class): 10% Midterm exam: 20%
- Lab works: 10% Final exam: 40%
- Assignments: 20%
 - Exams will be in multi-choice & open-books (for online)
- Bonus:
 - +3 pts for final exam if obtaining the certification of CompArch online course (email me first)
 - +3 pts for midterm if obtaining a certification/prize from qualified competition (email me)



Question???