

# EE2711: 計算機組織 (Computer Organization)

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## Objectives:

You can get familiar with the different implementation ways of CPU design and realize the operation principles of the basic units.

**Prerequisites:** Logic Design

**TA:** 黃繼平 (E-mail: [chipping@snsd.ee.nsysu.edu.tw](mailto:chipping@snsd.ee.nsysu.edu.tw))

**Reference Textbooks:** just for reference, not necessary

David A. Patterson, and John L. Hennessy, “Computer Organization and Design – The Hardware/Software Interface”, *4th Edition*, Morgan Kaufman Publishers, Inc., 2009.

## Course Outline:

Chapter 1 - Computer Abstractions and Technology

Chapter 2 - Instructions Language of the Computer

Chapter 3 - Arithmetic for computer (ALU)

Chapter 4 - The Processor: Datapath and Control

Chapter 4-1: Single-cycle implementation

Chapter 4-2: Multi-cycle implementation

Chapter 4-3: Enhancing Performance with Pipelining

Chapter 5 - Large and Fast Exploiting Memory Hierarchy

Chapter5-1: Part I: cache

## Grading Policy:

- No writing homework!

- **No final exam!**
- Term project I: Teaching Edge (40%)
- Term project II: Game Creator (40%)
- Term project III: Teamwork Fighting (20%): @ **Week 17**

< Details > :

(1) **Term project I: Teaching Edge (TE)**

- Main purpose: **learn to be a teacher, how to devise the topic to test others and solve the problem in more details?**
- Each group has **2** students.
- For the chosen specified lecture, you should design **3** different topics with your innovative ideas to show what you learn in the lecture actually.
- **Teaching content: please don't select the related parts of the MIPS assembly language because the MIPS assembly language will be assigned in the other term project.**
- Under **4-page** oral presentation slides (at most) for each topic, the shown content should provide the following items,
  - Problem statement
  - Solving procedure
  - Final solution
- Totally at most **12 pages** for one group oral presentation with **25 minutes**. (No hard copy)
- Naming rule of presentation slides: **TE\_GXX.ppt** (where XX is your group number)

(2) **Term project II: Game Creator (GC)**

- Main purpose: **design an interesting game in the form of the MIPS assembly language.**
- Each group has **2** students. (Group members should be very different with term project I).
- Oral presentation requirements:
  - Please define an interesting game in the form of complete texts.
  - Use MIPS assembly language (including all of the MIPS instructions introduced in the lectures) to show the game implementation.
  - Verify your overall successive instructions to achieve the game functionality successfully.

- Total number of instructions: **100 ~ 150**.
- Instruction categories: at least **15** kinds (Ex: add, lw, beq, j, ...).
- Totally at most **10 pages** for one group oral presentation with **20 minutes**. (No hard copy)
- Naming rule of presentation slides: **GC\_GXX.ppt** (where XX is your group number)

### (3) **Term project III: Teamwork Fighting (TF)**

- Main purpose: **make familiar with all of the CPU-related concepts**.
- Each group has **2** students. (Group members should be very different with term project I & II).
- Approach: You have the chance to solve the problems given within the limited time. The more problems you can successfully solve, the more scores you can get.

#### < Attention for all of the term projects >

- **Grading criterion for the first two projects:**
  - **Completeness** (50%)
  - **Innovation** (50%)
- **Presentation day:**
  - Teaching Edge (TE): **2 weeks** after your chosen specified lecture is finished by the instructor.
  - Game Creator (GC): **@ Week 14**
- You have to send out your presentation slides (\*.ppt / \*.pptx files) to **TA** by deadline of **11pm, the day before your oral presentation**. If you violate the hard rule, your term project score will be finally punished by discounted one half.