

CS4100: 計算機結構

Prof. Ren-Song Tsay

蔡仁松 教授



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What People Said About Me

- 理論與實務平衡
- “人好但不苟且”有原則
- “點石成金”



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What do you **want** to be?

- In 15 seconds
- Your name
- Use a picture to describe what you would like to be in ten years?

Google人工智慧完勝歐洲棋王

- 1/27/2016 《自然》 期刊報導，Google的英國人工智慧公司Google DeepMind 的AlphaGo以5：0橫掃歐洲圍棋冠軍。這是電腦首度擊敗職業圍棋手，堪稱人工智慧里程碑，3月將挑戰世界冠軍。

Robots replace human jobs?



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Prof. Ren-Song Tsay 蔡仁松教授

- Class Room (Delta) 台達館 #105
- Tuesday and Thursday 10:10~12:00
- 100 minutes each session
- Alternate Lecture and Lab sessions

- Course Web Site:
 - Login to lms.nthu.edu.tw
- Office Hours:
 - Every Thursday 08:00~10:00
 - Office: Delta #616

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Course Objective

- Students can analyze and realize basic computer architecture designs
- Estimated work load: in average 9 hours each week out of class work
 - Suggest at least 4-hour preview time.

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Prerequisite

- Prerequisite course:
 - Digital Logic design
 - Programming
- Courses to follow:
 - OS
 - Compiler
 - Advanced Computer Architecture
 - System Designs

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Teaching Assistants Office Hours

- **Monday 10:00~12:00@綜二737**
胡宇康 ykhorizon.light@gmail.com
- **Monday 15:30~17:30@綜二737**
楊奕君 k16272002@gmail.com
- **Tuesday 13:30~15:30@綜二737**
張筠 takojoyce@gmail.com
- **Wednesday 15:30~17:30@綜二738**
金國丞 david128kim@gmail.com

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Text Book

Computer Organization and Design: The Hardware/Software Interface, 5th ed., Asian ed.
David Patterson and John Hennessy, 2014



RISC, RAID



史丹福大學校長

Reference:

John L. Hennessy, *Computer Architecture: A Quantitative Approach*, 5th Edition, 2011

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Topics Covered	
<u>Topic</u>	<u>Chapter</u>
Computer Abstraction and Technology	I
Instructions: Language of the Computer	2
The Processor: The Processor	4
Exploiting Memory Hierarchy	5
Parallel Processors from Client to Cloud	6
(Arithmetic for Computers	3)

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Class Schedule	
<ul style="list-style-type: none">• 2/16/16 ~ 6/16/16• Unscheduled quizzes• No midterms and no final	
<ul style="list-style-type: none">• Term Project Schedule	
projects	1st submission2nd submission
Project 1	3/264/2
Project 2	4/305/7
Project 3	6/46/11
<ul style="list-style-type: none">• Tutorials:<ul style="list-style-type: none">◦ 3/1, 3/29, 5/3	

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Class Rules

- Be honest
 - Forced out if cheating
- No missing classes
 - Dismissed if miss classes more than two times
 - Fixed seating
- Be on time
 - Quizzes on random dates at the beginning of class sessions
 - No late project submission

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Grading

- Quizzes: 30%
- Term Projects: 70% (20+25+25)
- For fairness, graduate students will be evaluated in a higher standard.
- Final grade may subject to adjustment

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Term Projects

- By individual
- Grading metric: (may change, check LMS)
 - Correctness (60%)
 - 1st submission: 15% TA's test cases+10% all students' test cases.
 - 2nd submission: 10% TA's +20% all students' test cases.
 - Performance (5%), get no points if any test is incorrect
 - Test cases ($20\% * (1 - 1.5^{-n})$)
 - Help you verify format at the 1st submission
 - Grade only at the 2nd submission
 - Demo & Report (20%)
 - at the 2nd due

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Term Projects

1. Implement a single-cycle, functional processor simulator
2. Implement a pipelined, functional processor simulator
3. Implement a processor simulator with virtual memory architecture

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Other choices

- Processor power optimization
 - >50% consumed by registers
 - Clock gating?
- Timing accurate multicore simulator
- Your own proposals approved by teacher
- Evaluation:
 - Published on an A-class conference: A+
 - Published on a B-class conference: A

Grade Distribution of 2011/12 class

	90+ A+	85+ A	80+ A-	77+ B+	73+ B	70+ B-	67+ C+	63+ C	50+ D	49- F
2011	12.0%	9.6%	18.1%	8.4%	6.0%	7.2%	3.6%	8.4%	13.3%	13.3%
	40%			33%				27%		
2012	23.2%	5.4%	8.9%	1.8%	12.5%	10.7%	1.8%	12.5%	1.8%	19.6%
	48%			27%				21%		

Why Study Computer Architecture?



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