Digital Circuit Laboratory

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Taiwan, R.O.C.

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Goals

◆ Learn the digital circuit design (i.e., logical design) in Verilog

- ■ Combinational circuit
- ■ Synchronous sequential circuit
- ■ Input and output circuit and protocol

◆ Practice hardware description language: Verilog

◆ Practice EDA Tools for the FPGA Design

Syllabus (1/2)

- ◆ W01 09/12(一) Not go to class
- ◆ W01 09/16(五) Mat 1: Introduction to Vivado and Lab 1: Sequential Multiplier
- ◆ W02 09/19(一) TAs meet all students.
- ◆ W02 09/23(五) Mat 2: Introduction to Verilog and Lab 2: Matrix Multiplication Simulation
- ◆ W03 09/26(一) Lab 1 Demo Check
- ◆ W03 09/30(五) Mat 2: Introduction to Verilog and Lab 3: Simple ALU Simulation
- ◆ W04 10/03(一) Lab 2 Demo Check
- ◆ W04 10/07(五) Mat 3: Introduction to FPGAs
- ◆ W05 10/10(一) Holiday
- ◆ W05 10/14(五) Lab 4: Push Button and LED Control
- ◆ W06 10/17(一) Lab 3 Demo Check
- ◆ W06 10/21(五) Lab 5: Character LCD Control
- ◆ W07 10/24(一) Lab 4 Demo Check
- ◆ W07 10/28(五) Lab 6: UART Communications
- ◆ W08 10/31(一) Lab 5 Demo Check
- ◆ W08 11/04(五) Experiment Time 沒有課程規劃，自行利用
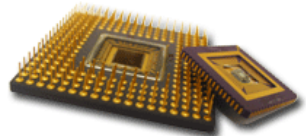
Syllabus (2/2)

- W09 11/07(一) Online Test
- W09 11/11(五) Lab 7: Matrix Multiplication Circuit for Real
- W10 11/14(一) Lab 6 Demo Check and Review Test
- W10 11/18(五) Lab 8: SD Card Reader Circuit
- W11 11/21(一) Lab 7 Demo Check
- W11 11/25(五) Lab 9: Password Cracking
- W12 11/28(一) Lab 8 Demo Check
- W12 12/02(五) Lab 10: VGA Graphic Display 重要、困難
- W13 12/05(一) Lab 9 Demo Check
- W13 12/09(五) Final Project Topics 基本會有三種主題，如果有想法可以自行增加
- W14 12/12(一) Lab 10 Demo Check
- W14 12/16(五) Experiment Time
- W15 12/19(一) Experiment Time
- W15 12/23(五) Experiment Time
- W16 12/26(一) Experiment Time
- W16 12/30(五) Final Project and Demo (End of Class)
- W17 01/02(一) Holiday
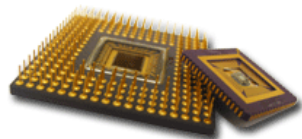
Recommended Books

◆ Logic Design:
  - M. Morris Mano, Michael D. Ciletti, Digital Design, Sixth Edition, Pearson Education, 2019.
  - Randy Katz, Gaetano Borriello, Contemporary Logic Design, Pearson Education, 2005.

◆ Verilog: there are plenty of good Verilog books and on-line resources.
  - Peter J. Ashenden, Digital Design: An Embedded Systems Approach Using Verilog, Morgan Kaufmann Publishers, 2008.
  - Pong P. Chu, FPGA Prototyping by Verilog Examples: Xilinx Spartan-3 version, J. Wiley $\&$ amp; Sons, 2008.
  - M. B. Lin. Digital System Designs and Practices, Wiley, 2008.
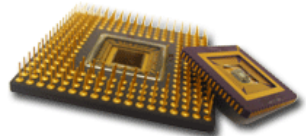
Staff and Evaluation

◈ Instructor:
  - Prof. Lan-Da Van (范倫達), EC419, #54815, ldvan@cs.nctu.edu.tw

◈ Website: http://viplab.cs.nctu.edu.tw/course/DCL2022_Fall.php

◈ Grades
  - 10 Labs   50%
  - 1 Online Tests   20%
  - 1 Final Project   30%

  期末不會什麼開根號*10，最多就是線型調分，感覺最多就+5

◈ Lecture Location and Time:
  - EC022 (工三館022教室), Friday 10:10AM – 12:00noon

◈ Lab Location and Time:
  - EC220 (工三館220教室), Monday, 18:30PM~21:30PM

◈ Office hours
  - TA Office Hour:
    - 陳聖文：wdb870914@gmail.com
    - 劉承昀：cyl008.cs10@nycu.edu.tw
    - 王怡和：benson35669.cs10@nycu.edu.tw
    - 侯宣任：jasonsmart110489@gmail.com
    - 陳虹蓓：peipei.cs09@nycu.edu.tw
    - 廖昶竣：appleblue3324@gmail.com
 - Teacher Office Hour: EC-419, Friday: 8:00AM~10:00AM.
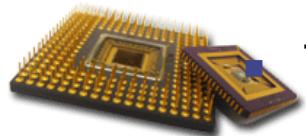
Lab Regulations

- Lab is individual lab NOT team lab.
- Each Lab has 10 days for practice/working. If more than 10 days, this lab grade will be zero. That means no extension is available!!!
- At the due date, you will be asked to submit your file(s) to E3 by 6:00pm. If any delay happens for submission from your side, this lab grade will also be zero. That means no delay is available!!!
- The TA will ask you some questions if needed for each lab. Your answer will be part of grade.
- Please do NOT copy.
- If TA finds out the (part) answer you show is copied from others, the lab grade will be zero.
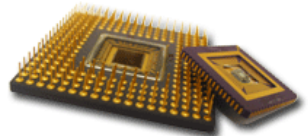
Online Test Exam

◈ Online test exam is individual exam NOT team exam.

◈ You can take one USB flash disk to store the necessary data but you have to back up to the PC you used before the exam. During the exam, no internet and no outsourcing data.

◈ The TA will ask you some questions if needed for each online test exam. Your answer will be part of grade.

◈ Please do NOT copy.

◈ If TA finds out the (part) answer you show is copied from others, the exam will be zero.
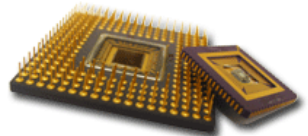
Final Project Regulations

- ◈ Final project is team work within 4 people at most.
- ◈ Please list every member task and weighting.
- ◈ Please do NOT copy code or others from other teams.
- ◈ No extension is available!!! If exceeding the due date, this final project grade will be zero.
- ◈ The TA will ask you some questions if needed for the final project. Your answer will be part of grade.