Lab 4 Single-Cycle Processor

Design a single-cycle processor by former design such as register file , memory , ALU , instruction and decoder. You could make additional module if needed.

Initial state and memory specification：

PC (Program Counter)：

Size：32 bits

Value：0

Instruction memory：

Size：8 * 32 (8 個 32-bit word)

Value： **(We'll test a hidden case for the completeness of your program)**

Address	Content
0	10000000 00000001 00000000 00000000 (LOAD M1 R0)
1	10000000 00000110 00000001 00000000 (LOAD M6 R1)
2	00100000 00000000 00000001 00000010 (ADD R0 R1 R2)
3	00001000 00000010 00000101 00000011 (SL R2 5 R3)
4	00010000 00000011 00000001 00000001 (SUB R3 R1 R1)
5	00000100 00000000 00000010 00000010 (SR R0 2 R2)
6	01000000 00000101 00000001 00000000 (STORE M5 R1)
7	01000000 00000011 00000010 00000000 (STORE M3 R2)

Register file：

Size：4 * 32 (four 32-bit registers)

Value：R[0]~R[3] are 0

Data memory：

Size：8 * 32 (eight 32-bit words)

Value：M[0]~M[7]　in the order of 0, 1, 2, 3, 4, 5, 6, 7

Result：

Register file：

R0	R1	R2	R3
1	218	0	224

Data memory：

M0	M1	M2	M3	M4	M5	M6	M7
0	1	2	0	4	218	6	7

Requirement：

1. Project demo : we'll announce the schedule later.
2. Require contents of report:
   (1) Datapath (You could refer to P.326 FIGURE 4.21(Fourth Edition) P.311 FIGURE 5.21(Third Edition) and must illustrate functionality of each component in the report)
   (2) waveform (You just need to run the instructions in the instruction memory and detail the behavior of your processor in each cycle.)
   (3) reflection (about 200 words)
3. Deadline : 8/12/2011 (Thu.)
4. If you have any question, please post your problem on e3-platform . Other students may benefit from your question. You could contact with TAs , too.:

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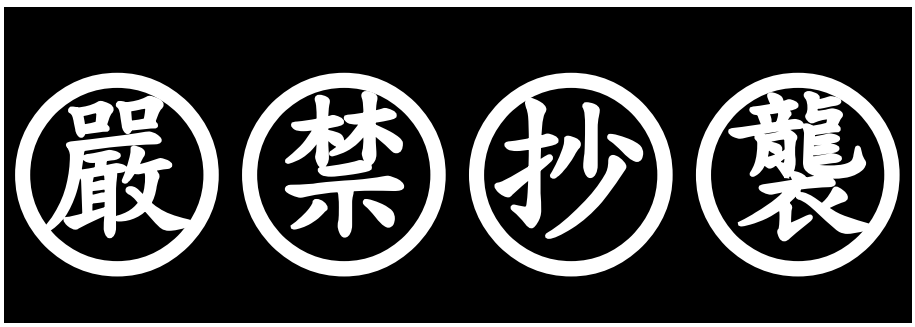
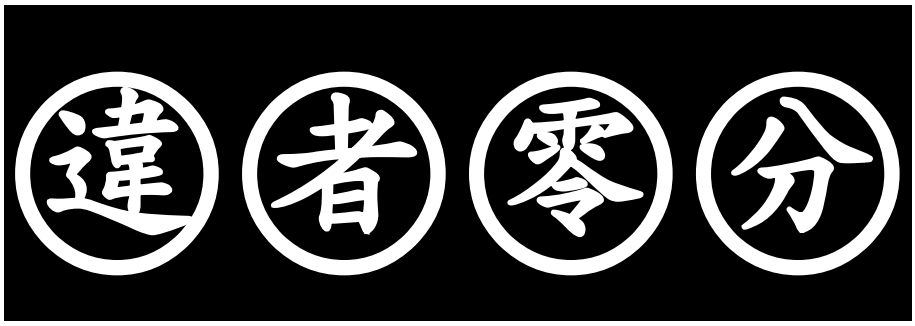
Submission details：

1. Please zip all of the requested files (including codes, reports…) into one file (.rar, .zip), and filename format is (your student ID)_(index of this lab)_v(your homework version). Ex: 9817000_4_v1.zip. Note that do not paste your codes on your documentation. Please submit the original .v files.
2. Please submit your homework before due time (23:59:59 on due day). The submission time is based on e3 platform.
3. If any violation of the rules above is found, -5 grades per violation.

Late submission：

1. Your grade will be 10% discount for late submission for 1~2 days, 15% discount for 3~4 days, 20% discount for 5~6 days and 40% discount for more than 6 days.
2. Notice: No cheating! Or your grade will be 0!




違者零分