Divisie W&I, FEW
Vrije Universiteit

Tentamen Computerorganisatie
19 december 2001

All questions count eually.
Final grade = max(midterm, part 1 of the exam) + part 2 of the exam
(Dutch version on the other side)

PLEASE WRITE NEATLY.

PART 1
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1. Computer 1 has a 10-stage pipeline. The clock cycle is 2 nsec. Computer 2 has a 20-stage pipeline. The clock cycle is 5 nsec. If the execution time of a program on computer 1 is 100 sec, how long will it take on computer 2? Assume there is no I/O. Ignore branches.

2. In a Hamming code, part of the bits are used for parity. For a character with 12 real data bits, what percentage of the the total bits are wasted on parity. Note: The total length is more than 12 bits.

3. LBA addresses use 24 bits to address a 512-byte sector. What is the largest possible disk with LBA?

4. Draw a clocked D latch.

5. The Pentium has a 32-bit word and 32-bit registers. Nevertheless, the Pentium chip has 33 address lines. Explain.

PART 2
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6. Give an optimal IJVM program to compute I = 2*J + 1

7. A computer has 8 registers, R0 through R7. The arithmetic instructions use three registers, for example, R1 = R2 + R5. Give an example of two consecutive instructions with a RAW (Read After Write) dependence.

8. A computer has a virtual memory with 4 KB pages. The page table is:

Virtual page	Physical page
0	4
1	3
2	-
3	6
4	1
5	0
6	-
7	2

For each of the following virtual adresses, compute the corresponding physical address where it exists: 0, 4096, 8191, 8192, 16384.

9. An assembler has a concept 'macro'. Are macros processed on pass 1 or on pass 2? Explain

10. The computers in a multicomputer are connected by a 5-dimensional hypercube. How many CPUs can this system have at most?