임베디드 시스템설계 중간고사
2009년 4월 22일 10:30 ~ 13:00
open only the textbook

1. (Q1-9) Create a UML state diagram for the issue-comand() behavior of the controller class of Figure 1.27.

2. (Q2-5) Write ARM assembly code to implement the following C assignments.
   a. x = a + b;
   b. y = (c - d) + (e - f);
   c. z = a*(b + c) - d*e;

3. (Q2-10) write ARM assembly code for the following loops.

   a. int a[20], b[20], z[20];
      for (i=0; i<20; i++)
         z[i] = a[i]*b[i];
   b. int a[10,10];
      int z[10], b[10];
      for (i=0; i<10; i++)
         for (j=0; j<10; j++)
             z[i] = a[i,j]*b[i];

4. (Q3-21) If we want the average memory access time of a machine whose hit rate is 93%, with a cache access time of 5ns and a main memory access time of 80 ns, what cache hit rate must we achieve?

5. (Q3-24) The code in page 150 in the textbook is executed by the ARM processor with each instruction executed exactly once. Show the contents of instruction cache for these configurations, assuming that each line hold one ARM instruction. Also assume that the code fragment is loaded starting from 0x0000
   (a) directed-mapped, four lines
   (b) direct mapped, eight lines

(c) tow-way set-associative, four line per set

6. (Q4-6) Draw an ARMA timing diagram for a burst write operation that writes four location.

7. (Q5-9) Draw CDFG for the following C code (in page 286 in textbook) before and after applying dead code elimination tot he if statement.

8. (Q5-10) unroll the loop below
   a. two times
   b. three times

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for (i=0; i<32; i++)
    x[i] = a[i]*c[i];
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9. (Q5-21) Find all the def-use pairs for each code fragment given below.
   a. x = a + b;
   if (x < 20) proc1();
   else {
       y = c + d;
       while (y < 10)
           y = y + e;
   }
   b. r = 10;
   s = a - b;
   for (i=0; i<10; i++)
       x[i] = a[i]*b[s];
   c. x = a - b;
   y = c - d;
   z = e - f;
   if (x<10) {
       q = y + e;
       z = e + f;
   }
   if (z < y) proc1();

10. (Q6-8) Given the following periodic tasks

Task	Period	Execution time
P1	5 ms	1 ms
P2	10 ms	2 ms
P3	10 ms	2 ms
P4	15 ms	3 ms

   a. Show a cyclostatic schedule for the tasks

   b. Compute the CPU untilization for the system

11. (Q6-19) For the periodic processes shown below.
   a. Schedule the processes using an RMS policy
   b. Schedule the processes using EDF policy

process	CPU time	Deadline
P1	1	3
P2	1	4
P3	2	6