Final Exam Review Suggestions (Part 3)

As you prepare for the Final Exam, I recommend that you review your lecture notes (and the related examples), the readings in the textbook, and the self-study exercises.

The third segment of the course focused on the following topics:

- Translation processing (Harris, 6.4-6.5)
- Microarchitecture (Harris, 7.1-7.3 and 7.5.1)

Note that the syllabus listed the following topic, which we did not cover:

- Memory systems (Harris, 8.1-8.3)

Instead, we covered an introduction to pipelined processors (pages 425-429).

The following self-study exercises were available:

- Lab Exercise #10 -- Assembler Processing
- Lab Exercise #11 -- ARM Datapath and Control

On the next three pages are 12 sample questions (the answer key is below).

25. E
26. A
27. C
28. B
29. D
30. C
31. E
32. A
33. B
34. A
35. A
36. D
The following symbol table was constructed by an assembler from the ARM assembly language source file named "final.s".

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Value</th>
<th>Abs/Rel</th>
<th>Local/Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>check</td>
<td>.text+0000284</td>
<td>Rel</td>
<td>Local</td>
</tr>
<tr>
<td>max</td>
<td>00000007</td>
<td>Abs</td>
<td>Local</td>
</tr>
<tr>
<td>verify</td>
<td>.text+0000008</td>
<td>Rel</td>
<td>Local</td>
</tr>
</tbody>
</table>

25. Consider the symbol table in Figure 7 and the ARM assembly language statement shown below. Assuming that it is contained in "final.s" at the relative address shown, what will be the object code for that statement?

(text+0x0004):   cmp  r5, #max

A)  e1450007 (base 16)
B)  e3407005 (base 16)
C)  e3505007 (base 16)
D)  e1570005 (base 16)
E)  None of the above.

26. Consider the symbol table in Figure 7 and the ARM assembly language statement shown below. Assuming that it is contained in "final.s" at the relative address shown, what will be the object code for that statement?

(text+0x0008):   eorlt  r4, r11, r7

A)  b02b4007 (base 16)
B)  b024b007 (base 16)
C)  e02b4007 (base 16)
D)  e024b007 (base 16)
E)  None of the above.

27. Consider the symbol table in Figure 7 and the ARM assembly language statement shown below. Assuming that it is contained in "final.s" at the relative address shown, what will be the object code for that statement?

(text+0x0034):   bcs  verify

A)  2affffcc (base 16)
B)  2a00002c (base 16)
C)  2afffff3 (base 16)
D)  2a00000d (base 16)
E)  None of the above.

28. Consider the symbol table in Figure 7 and the ARM assembly language statement shown below. Assuming that it is contained in "final.s" at the relative address shown, what will be the object code for that statement?

(text+0x0050):   bl  check

A)  ebffff73 (base 16)
B)  eb00008b (base 16)
C)  ebffffdcc (base 16)
D)  eb00022c (base 16)
E)  None of the above.
The contents of the control and general-purpose registers for an ARM processor are shown below (in hexadecimal) after an instruction has been fetched, but before any other actions have occurred.

CPSR: 60000000
R[00]: 00000000  R[04]: 04040404  R[08]: 08080808  R[0C]: 0C0C0C0C
R[01]: 01010101  R[05]: 05050505  R[09]: 09090909  R[0D]: 7FFFFF00
R[02]: 02020202  R[06]: 06060606  R[0A]: 0A0A0A0A  R[0E]: 00010888
R[03]: 03030303  R[07]: 07070707  R[0B]: 0B0B0B0B  R[0F]: 00012000

29. Consider the information in Figure 8. If the IR currently contains the value shown below, what will happen when the instruction is executed?

IR: 322A2003  (eorcc  r2, r10, #3)

A) Register r14 will be changed to the value 00012000 (base 16)
B) Register r2 will be changed to the value 0A0A0A09 (base 16)
C) Register r2 will be changed to the value 0A0A0A0A (base 16)
D) No register in the set {r0-r14} will be changed.
E) None of the above.

30. Consider the information in Figure 8. If the IR currently contains the value shown below, what will happen when the instruction is executed?

IR: E0841006  (add  r1, r4, r6)

A) Register r14 will be changed to the value 00012000 (base 16)
B) Register r1 will be changed to the value 10101010 (base 16)
C) Register r1 will be changed to the value 0A0A0A0A (base 16)
D) No register in the set {r0-r14} will be changed.
E) None of the above.

31. Consider the information in Figure 8. If the IR currently contains the value shown below, what will happen when the instruction is executed?

IR: E5975005  (ldr  r5, [r7, #5])

A) Register r14 will be changed to the value 00012000 (base 16)
B) Register r5 will be changed to the value 07070712 (base 16)
C) Register r5 will be changed to the value 0707070C (base 16)
D) No register in the set {r0-r14} will be changed.
E) None of the above.

32. Consider the information in Figure 8. If the IR currently contains the value shown below, what will happen when the instruction is executed?

IR: EB000100  (bl  printf)

A) Register r14 will be changed to the value 00012000 (base 16)
B) Register r14 will be changed to the value 00012100 (base 16)
C) Register r14 will be changed to the value 00012400 (base 16)
D) No register in the set {r0-r14} will be changed.
E) None of the above.
The contents of the control and general-purpose registers for an ARM processor are shown below (in hexadecimal) after an instruction has been fetched, but before any other actions have occurred.

CPSR: 60000000  
R[00]: 00000000  R[04]: 04040404  R[08]: 08080808  R[0C]: 0C0C0C0C  
R[01]: 01010101  R[05]: 05050505  R[09]: 09090909  R[0D]: 7FFFFFFF  
R[02]: 02020202  R[06]: 06060606  R[0A]: 0A0A0A0A  R[0E]: 00010888  
R[03]: 03030303  R[07]: 07070707  R[0B]: 0B0B0B0B  R[0F]: 00012000

33. Consider the information in Figure 9. If the IR currently contains the value shown below, what will happen when the instruction is executed?

IR: 0AFFFe6  (beq loop)

A) Register r15 will be changed to the value 00012004 (base 16)  
B) Register r15 will be changed to the value 00011f98 (base 16)  
C) Register r15 will be changed to the value 00011fe6 (base 16)  
D) Register r15 will be changed to the value 0001201a (base 16)  
E) None of the above.

34. Consider the information in Figure 9. If the IR currently contains the value shown below, what will happen when the instruction is executed?

IR: E7846008  (str r6, [r4, r8])

A) Register r15 will be changed to the value 00012004 (base 16)  
B) Register r15 will be changed to the value 00011f98 (base 16)  
C) Register r15 will be changed to the value 00011ff8 (base 16)  
D) Register r15 will be changed to the value 00012020 (base 16)  
E) None of the above.

35. Consider the information in Figure 9. If the IR currently contains the value shown below, what will happen when the instruction is executed?

IR: CA000011  (bgt done)

A) Register r15 will be changed to the value 00012004 (base 16)  
B) Register r15 will be changed to the value 00011fbc (base 16)  
C) Register r15 will be changed to the value 00011ffe (base 16)  
D) Register r15 will be changed to the value 00012044 (base 16)  
E) None of the above.

36. Consider the information in Figure 9. If the IR currently contains the value shown below, what will happen when the instruction is executed?

IR: EB000530  (bl getchar)

A) Register r15 will be changed to the value 00012004 (base 16)  
B) Register r15 will be changed to the value 00010b40 (base 16)  
C) Register r15 will be changed to the value 00011ad0 (base 16)  
D) Register r15 will be changed to the value 000134c0 (base 16)  
E) None of the above.