Homework #7 (Spring 2000)

Homework 7 covers materials in sections 7.6-7.10 and chapter 8 of the textbook. You need NOT turn in the homework. However, you are strongly advised to work it out. Short solutions will be posted on course web home page shortly. We encourage you to work with your classmates as a group so that you can learn from each other.

Problems labeled with an (*) indicate that a solution is available in the Prentice Hall companion Website Gallery.

1. (Datapath) Problem 7-18 text book.
5. *(Barrel shifter) Problem 7-26 text book.
6. (Control word) Problem 7-27 text book.
7. *(Control word) Problem 7-28 text book.
8. (Datapath timing) Problem 7-30 text book.
15. (ASM) Problem 8-10 text book.
17. (Multiplier) Problem 8-14 text book.
25. *(Bus Transfer) Two different register transfer bus structures are shown below:

A. Single Bus Structure

B. Multiple Bus Structure

The following register transfer operations are desired:

K1: \[ R1 \leftarrow R2 \]
K2: \[ R3 \leftarrow R2 \]
K3: \[ R3 \leftarrow R0 \]
K4: \[ R2 \leftarrow R1 \]

(a) In the table below, write a sequence of register transfer operations for each bus structure. Use one line per clock cycle, and separate micro-operations that may proceed in parallel
You should use minimum number of clock cycles required to realize all four micro-operations for each bus structure.

<table>
<thead>
<tr>
<th>A. Single Bus Operation Sequence</th>
<th>B. Multiple Bus Operation Sequence</th>
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(b) Given the multiple bus transfer structure B, and given that \( SA1 = K1 + K2 \), and \( SA0 = 0 \). Write expression for \( SB1 \), and \( SB0 \) below.

<table>
<thead>
<tr>
<th>control</th>
<th>Boolean Function</th>
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<tbody>
<tr>
<td>( SB1 = )</td>
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<tr>
<td>( SB0 = )</td>
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