Introduction to Digital Computers - Fall 1997
Assignment No. 9
Course homepage:
http://www.eng.tau.ac.il/~guy/Digital_Computers/dc_home.html

Deadline: May 26th

1. Consider the shifter environment in the DLX datapath. A shift is characterized by the following parameters:

   (a) *diff* $\in [0, 31]$ - the shift amount ;

   (b) *right* $\in \{0, 1\}$ - the shift direction ; and

   (c) *fill* $\in \{0, 1\}$ - the fill-bit which is zero when zeros are padded and either zero or one when the sign is extended.

   The shifter deals with three types of shifts: shift instructions, shift before store, and shift after load.

   For each type of shift specify how the shift parameters are determined. Justify the equations you write.

2. Consider the ALU environment in the DLX datapath. The ALU performs the following tasks:

   (a) addition and subtraction instructions (with a two's complement adder/subtractor);

   (b) increment PC;

   (c) effective address computation;

   (d) logical instructions (bitwise and, or, and xor); and

   (e) comparisons for test-set instructions.

   Show how the task is determined. Specify the required control signals and justify your equations.

3. The DLX control receives two types of signals from the datapath:

   (a) C_{in} - inputs to the combinational circuit that computes the control signals that are output by the control and sent to the datapath.

   (b) N_{in} - inputs to the combinational circuit that computes the next state of the control.

   Give two examples of signals that belong to each of these types. Explain why each type of signal is required. Discuss problems associated with signals belonging to C_{in}.