

Figure 7.11 Complete single-cycle MIPS processor

ALUOp	Meaning
00	add
01	subtract
10	look at funct field
11	n/a

Table 7.1 ALUOp encoding

Table 7.2 is a truth table for the ALU decoder. Recall that the meanings of the three *ALUControl* signals were given in Table 5.1. Because *ALUOp* is never 11, the truth table can use don't care's X1 and 1X instead of 01 and 10 to simplify the logic. When *ALUOp* is 00 or 01, the ALU should add or subtract, respectively. When *ALUOp* is 10, the decoder examines the funct field to determine the *ALUControl*. Note that, for the R-type instructions we implement, the first two bits of the funct field are always 10, so we may ignore them to simplify the decoder.

The control signals for each instruction were described as we built the datapath. Table 7.3 is a truth table for the main decoder that summarizes the control signals as a function of the opcode. All R-type instructions use the same main decoder values; they differ only in the