



FIGURE e4.14.18 Clock cycles 2 and 3 of the instruction sequence on page 4.13-26 with a load replacing sub. The bold lines are those active in a clock cycle, the italicized register numbers in color indicate a hazard, and the . . . in the place of operands means that their identity is information not needed by that stage. The values of the significant control lines, registers, and register numbers are labeled in the figures. The and instruction wants to read the value created by the lw instruction in clock cycle 3, so the hazard detection unit stalls the and and or instructions. Hence, the hazard detection unit is highlighted.