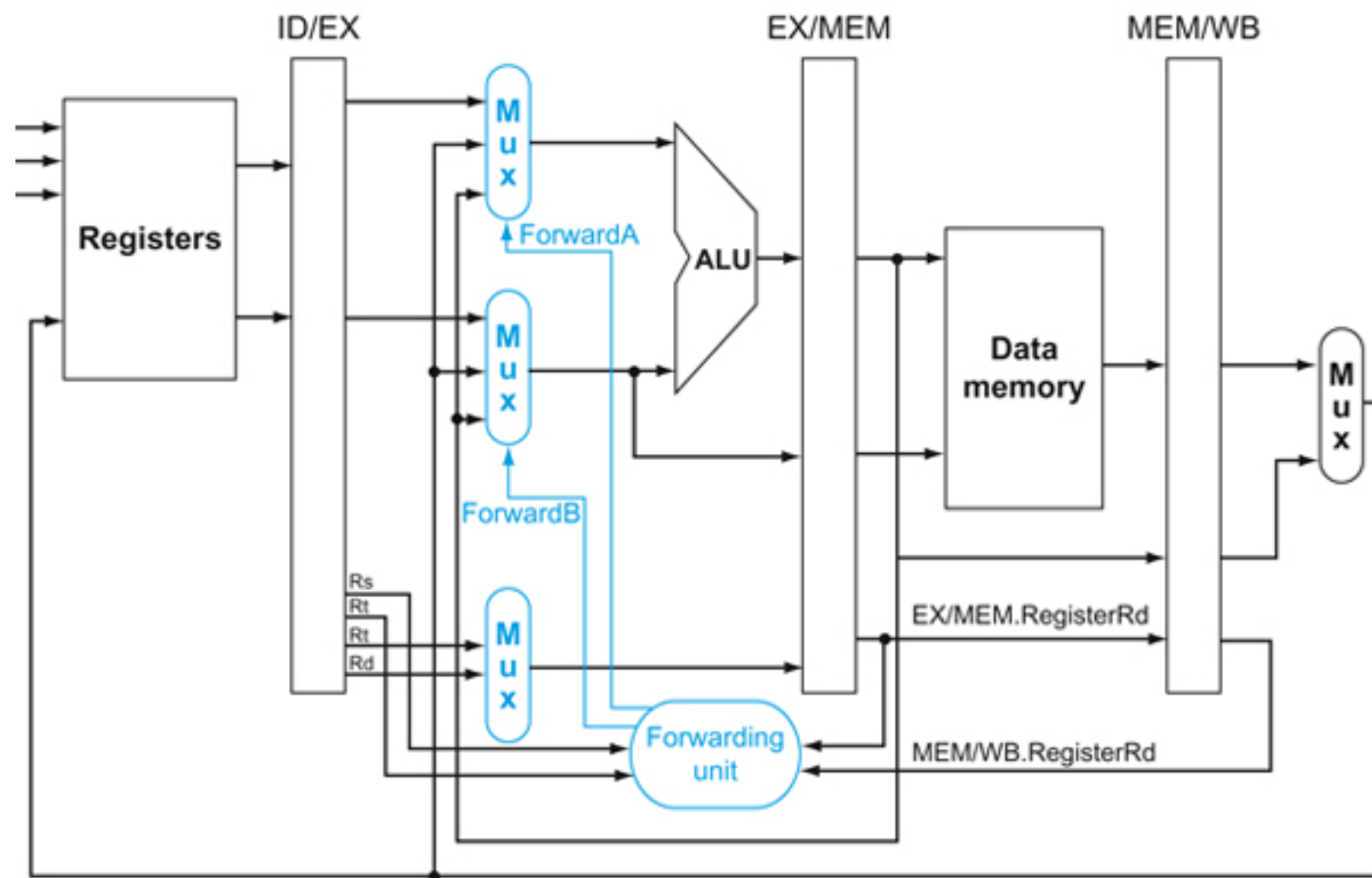


a. No forwarding



b. With forwarding

**FIGURE 4.54** On the top are the ALU and pipeline registers before adding forwarding. On the bottom, the multiplexors have been expanded to add the forwarding paths, and we show the forwarding unit. The new hardware is shown in color. This figure is a stylized drawing, however, leaving out details from the full datapath such as the sign extension hardware. Note that the ID/EX.RegisterRt field is shown twice, once to connect to the Mux and once to the forwarding unit, but it is a single signal. As in the earlier discussion, this ignores forwarding of a store value to a store instruction. Also note that this mechanism works for slt instructions as well.