



$$\begin{aligned}
 S[1:0] &= \text{Stage}[1:0] \\
 S'[3:2] &= \text{Stage 2} + \text{Stage 3} + \{2'd0; \text{Stage 1}[3:2]\} \\
 &\rightarrow c' : \text{carry} \\
 \Rightarrow S[3:2] &= S'[3:2] \\
 \Rightarrow S[7:4] &= \text{Stage 4} + \{1'd0; c'; S'[3:2]\}
 \end{aligned}$$

