

approx_sm^{13,45}

$$\begin{aligned}
& \text{approx_sm}(es; In; Out; Cmd; isupdate; Rsp; Delta; Q) \\
\equiv_{\text{def}} & \exists \text{expl}:\mathbf{E}(Out) \rightarrow (\{e:\mathbf{E}(In) \mid \uparrow(isupdate(In(e)))\} \text{ List}) \\
& ((\forall e:\mathbf{E}(Out). \\
& \quad (\forall e':\mathbf{E}(In). (e' \in \text{expl}(e)) \Rightarrow e' \text{ c} \leq e) \\
& \quad \& ((\neg \text{is-query}(In; isupdate; e)) \Rightarrow (\neg(\uparrow \text{null}(\text{expl}(e))))) \\
& \quad \& (\forall e_1, e_2:\mathbf{E}(Out). \text{expl}(e_1) \leq \text{expl}(e_2) \vee \text{expl}(e_2) \leq \text{expl}(e_1)) \\
& \quad \& (\forall e:\mathbf{E}(Out). \\
& \quad \quad (\text{is-query}(In; isupdate; e) \Rightarrow (Out(e) = Q(In(\text{expl}(e)), In(e)))) \\
& \quad \quad \& ((\neg \text{is-query}(In; isupdate; e)) \Rightarrow (Out(e) = Delta(In(\text{expl}(e)))))
\end{aligned}$$

clarification:

$$\begin{aligned}
& \text{approx_sm}(es; In; Out; Cmd; isupdate; Rsp; Delta; Q) \\
\equiv_{\text{def}} & \exists \text{expl}:\text{es-E-interface}(es; Out) \rightarrow (\{e:\text{es-E-interface}(es; In) \mid \uparrow(isupdate(In(e)))\} \text{ List}) \\
& ((\forall e:\text{es-E-interface}(es; Out). \\
& \quad (\forall e':\text{es-E-interface}(es; In). \\
& \quad \quad (e' \in \text{expl}(e) \in \text{es-E-interface}(es; In)) \Rightarrow \text{es-causle}(es; e'; e)) \\
& \quad \& ((\neg \text{is-query}(In; isupdate; e)) \Rightarrow (\neg(\uparrow \text{null}(\text{expl}(e))))) \\
& \quad \& (\forall e_1:\text{es-E-interface}(es; Out), e_2:\text{es-E-interface}(es; Out). \\
& \quad \quad \text{expl}(e_1) \leq \text{expl}(e_2) \in \text{es-E-interface}(es; In) \text{ List} \\
& \quad \quad \vee \text{expl}(e_2) \leq \text{expl}(e_1) \in \text{es-E-interface}(es; In) \text{ List}) \\
& \quad \& (\forall e:\text{es-E-interface}(es; Out). \\
& \quad \quad (\text{is-query}(In; isupdate; e) \Rightarrow (Out(e) = Q(In(\text{expl}(e)), In(e)) \in Rsp)) \\
& \quad \quad \& ((\neg \text{is-query}(In; isupdate; e)) \Rightarrow (Out(e) = Delta(In(\text{expl}(e))) \in Rsp)))
\end{aligned}$$