

update-antecedent^{11,40}

$$\begin{aligned}
& \text{update-antecedent}\{i:l\}(es; Cmd; Sys; Config; u) \\
\equiv_{\text{def}} & (\forall e:\{e:E(Sys) \mid \uparrow\text{cupdate?}(Sys(e))\} \cdot (u(e) < e)) \\
& \& (\forall e:\{e:E(Sys) \mid \uparrow\text{cupdate?}(Sys(e))\} \cdot \\
& \quad ((\uparrow((u(e)) \in_b Sys)) \\
& \quad \Rightarrow (\text{valid-sys}(es; Config; Sys; u(e)) \& \text{cupdate-cmds}(Sys(e)) = \text{sys-cmds}(Sys(u(e)))))) \\
& \& ((\uparrow((u(e)) \in_b Config)) \\
& \quad \Rightarrow ((\uparrow\text{ccsucc?}(Config(u(e)))) \\
& \quad \& \text{ccsucc-id}(Config(u(e))) = \text{loc}(e) \\
& \quad \& \text{let } n = \text{ccsucc-num}(Config(u(e))) \text{ in} \\
& \quad \quad (n < \|\text{cmd-history}(u(e))\| \\
& \quad \quad \& \text{cupdate-cmds}(Sys(e)) = \text{nth_tl}(n; \text{cmd-history}(u(e)))))) \\
& \& (\forall e_1, e_2:\{e:E(Sys) \mid \uparrow\text{cupdate?}(Sys(e))\} \cdot \\
& \quad (u(e_1) < \text{loc } u(e_2)) \Rightarrow (\text{loc}(e_1) = \text{loc}(e_2)) \Rightarrow (e_1 < \text{loc } e_2)) \\
& \& (\forall e:\{e:E(Sys) \mid \uparrow\text{cupdate?}(Sys(e))\}, s:E. \\
& \quad (s < \text{loc } u(e)) \\
& \quad \Rightarrow (((\uparrow(s \in_b Sys)) \& \text{valid-sys}(es; Config; Sys; s)) \\
& \quad \quad \vee ((\uparrow(s \in_b Config)) \& (\uparrow\text{ccsucc?}(Config(s)))))) \\
& \quad \Rightarrow (\exists e':\{e:E(Sys) \mid \uparrow\text{cupdate?}(Sys(e))\} \cdot (u(e') = s))
\end{aligned}$$

clarification:

$$\begin{aligned}
& \text{update-antecedent}\{i:l\} \\
& \quad (es; Cmd; Sys; Config; u) \\
\equiv_{\text{def}} & (\forall e:\{e:es\text{-E-interface}(es; Sys) \mid \uparrow\text{cupdate?}(Sys(e))\} \cdot \text{es-causl}(es; (u(e)); e)) \\
& \& (\forall e:\{e:es\text{-E-interface}(es; Sys) \mid \uparrow\text{cupdate?}(Sys(e))\} \cdot \\
& \quad ((\uparrow((u(e)) \in_b Sys)) \\
& \quad \Rightarrow (\text{valid-sys}(es; Config; Sys; u(e)) \\
& \quad \& \text{cupdate-cmds}(Sys(e)) = \text{sys-cmds}(Sys(u(e))) \in (Cmd \text{ List}))) \\
& \& ((\uparrow((u(e)) \in_b Config)) \\
& \quad \Rightarrow ((\uparrow\text{ccsucc?}(Config(u(e)))) \\
& \quad \& \text{ccsucc-id}(Config(u(e))) = \text{es-loc}(es; e) \in \text{Id} \\
& \quad \& \text{let } n = \text{ccsucc-num}(Config(u(e))) \text{ in} \\
& \quad \quad (n < \|\text{cmd-history}\{i:l\} \\
& \quad \quad \quad (es; Config; Cmd; Sys; (u(e)))\|) \\
& \quad \quad \& \text{cupdate-cmds}(Sys(e)) \\
& \quad \quad = \\
& \quad \quad \text{nth_tl}(n; \text{cmd-history}\{i:l\}(es; Config; Cmd; Sys; (u(e))) \\
& \quad \quad \in (Cmd \text{ List})))))) \\
& \& (\forall e_1:\{e:es\text{-E-interface}(es; Sys) \mid \uparrow\text{cupdate?}(Sys(e))\}, \\
& \quad e_2:\{e:es\text{-E-interface}(es; Sys) \mid \uparrow\text{cupdate?}(Sys(e))\} \cdot \\
& \quad \text{es-locl}(es; (u(e_1)); (u(e_2))) \\
& \quad \Rightarrow (\text{es-loc}(es; e_1) = \text{es-loc}(es; e_2) \in \text{Id})
\end{aligned}$$

$$\begin{aligned}
&\Rightarrow \text{es-locl}(es; e_1; e_2) \\
&\& (\forall e:\{e:\text{es-E-interface}(es; Sys) \mid \uparrow\text{cupdate?}(Sys(e))\}, s:\text{es-E}(es). \\
&\text{es-locl}(es; s; (u(e))) \\
&\Rightarrow (((\uparrow(s \in_b Sys)) \& \text{valid-sys}(es; Config; Sys; s)) \\
&\quad \vee ((\uparrow(s \in_b Config)) \& (\uparrow\text{ccsucc?}(Config(s))))) \\
&\Rightarrow (\exists e':\{e:\text{es-E-interface}(es; Sys) \mid \uparrow\text{cupdate?}(Sys(e))\} . (u(e') = s \in \text{es-E}(es)))
\end{aligned}$$