

**pre-p**<sup>11,40</sup>

$$\begin{aligned}
& \text{pre-p}(es; i; ds; a; p; P) \\
& \equiv_{\text{def}} (\forall x:\text{Id}. \text{subtype\_rel}(\text{es-vartype}(es; i; x); \text{fpf-cap}(ds; \text{id-deq}; x; \text{top}))) \\
& \quad \text{c}\wedge ((\text{alle-at}(es; \\
& \quad \quad i; \\
& \quad \quad e.((\text{es-kind}(es; e) = \text{locl}(a)) \\
& \quad \quad \Rightarrow (\text{subtype\_rel}(\text{es-valtype}(es; e); \text{p-outcome}(p)) \\
& \quad \quad \quad \text{c}\wedge ((\uparrow(P(\text{es-state-when}(es; e)))) \\
& \quad \quad \quad \wedge (\text{es-val}(es; e) \\
& \quad \quad \quad = \\
& \quad \quad \quad \text{random}\{2:n\}(p; i; a)(\text{es-kind-index}(es; \text{locl}(a); e)))))) \\
& \quad \wedge \text{alle-at}(es; \\
& \quad \quad i; \\
& \quad \quad e.\text{existse-ge}(es; \\
& \quad \quad \quad e; \\
& \quad \quad \quad e'.((\text{es-kind}(es; e') = \text{locl}(a)) \\
& \quad \quad \quad \vee (\neg(\forall t:\text{rationals}. \\
& \quad \quad \quad \uparrow(P(\text{es-state-after-elapsed}(es; e'; t)))))) \\
& \quad \wedge ((\forall t:\text{rationals}. \uparrow(P(\text{es-init-elapsed}(es; i; t)))) \\
& \quad \Rightarrow (\exists e:\text{es-E}(es). (\text{loc}(e) = i)))
\end{aligned}$$

*clarification:*

$$\begin{aligned}
& \text{pre-p}(es; i; ds; a; p; P) \\
& \equiv_{\text{def}} (\forall x:\text{Id}. \text{subtype\_rel}(\text{es-vartype}(es; i; x); \text{fpf-cap}(ds; \text{id-deq}; x; \text{top}))) \\
& \quad \text{c}\wedge ((\text{alle-at}(es; \\
& \quad \quad i; \\
& \quad \quad e.((\text{es-kind}(es; e) = \text{locl}(a) \in \text{Knd}) \\
& \quad \quad \Rightarrow (\text{subtype\_rel}(\text{es-valtype}(es; e); \text{p-outcome}(p)) \\
& \quad \quad \quad \text{c}\wedge ((\uparrow(P(\text{es-state-when}(es; e)))) \\
& \quad \quad \quad \wedge (\text{es-val}(es; e) \\
& \quad \quad \quad = \\
& \quad \quad \quad \text{random}\{2:n\}(p; i; a)(\text{es-kind-index}(es; \text{locl}(a); e)) \\
& \quad \quad \quad \in \text{p-outcome}(p)))))) \\
& \quad \wedge \text{alle-at}(es; \\
& \quad \quad i; \\
& \quad \quad e.\text{existse-ge}(es; \\
& \quad \quad \quad e; \\
& \quad \quad \quad e'.((\text{es-kind}(es; e') = \text{locl}(a) \in \text{Knd}) \\
& \quad \quad \quad \vee (\neg(\forall t:\text{rationals}. \\
& \quad \quad \quad \uparrow(P(\text{es-state-after-elapsed}(es; e'; t)))))) \\
& \quad \wedge ((\forall t:\text{rationals}. \uparrow(P(\text{es-init-elapsed}(es; i; t)))) \\
& \quad \Rightarrow (\exists e:\text{es-E}(es). (\text{es-loc}(es; e) = i \in \text{Id})))
\end{aligned}$$

