

$$\begin{aligned}
&stateMatch : \mathcal{A} \times \hat{\mathcal{E}}^* \times \mathbb{N} \rightarrow \{\beta \mid \beta : \mathcal{V} \rightarrow \mathcal{O}\} \cup \{\perp\} \\
&stateMatch(a, \hat{t}, i) := \\
&\quad \text{let } \beta = match(a, e) \text{ in} \\
&\quad \begin{cases} \beta & \text{if } \beta \neq \perp \wedge \exists t \in groundTraces(\hat{t}) \text{ such that } necessaryShadow(a, t, i) \\ \perp & \text{otherwise} \end{cases}
\end{aligned}$$