Syntax

Action Fields	f_i	$::=$	$f_{a_1} \mid \cdots \mid f_{a_k}$	
Result Fields	f_r	$::=$	$f_{r_1} \mid \cdots \mid f_{r_k}$	
Fields	f	$::=$	$f_i \mid f_r$	
Actions	i	$::=$	$\{f_{a_1} = v_{a_1},\ \ldots\ ,\ f_{a_k} = v_{a_k}\}$	
Results	r	$::=$	$\{f_{r_1} = v_{r_1},\ \ldots\ ,\ f_{r_k} = v_{r_k}\}$	
Predicates	a, b	$::=$	0	*Identity*
		$\mid$	1	*False*
		$\mid$	$f = n$	*Test*
		$\mid$	$a + b$	*Sum*
		$\mid$	$a \cdot b$	*Product*
		$\mid$	$\neg\ a$	*Negation*
Policies	p, q	$::=$	a	*Test*
		$\mid$	$act(p)$	*Slice Actions*
		$\mid$	$res(p)$	*Slice Results*
		$\mid$	inj_i	*Injection Action*
		$\mid$	inj_r	*Injection Result*
		$\mid$	$f \leftarrow n$	*Update*
		$\mid$	$p + q$	*Choice*
		$\mid$	$p \cdot q$	*Sequential Concatenation*
		$\mid$	p^*	*Kleene Star*

Semantics

$$
\begin{array}{rcl}
[\![\cdot]\!] & : & P(A) \times P(R) \to P(A) \times P(R) \\
[\![0]\!](-,-) & \triangleq & (\varnothing, \varnothing) \\
[\![1]\!](is, rs) & \triangleq & (is, rs)
\end{array}
$$

$$
\begin{aligned}
[\![f = n]\!](is, rs) &\triangleq && (\mathsf{filter}\ (f = n)\ is, \mathsf{filter}\ (f = n)\ rs) \\
[\![a + b]\!](is, rs) &\triangleq && \mathsf{let}\ (is_a, rs_a) = [\![a]\!](is, rs) \\
&\quad \mathsf{let}\ (is_b, rs_b) = [\![b]\!](is, rs) \\
&\quad (is_a \cup is_b, rs_a \cup rs_b) \\
[\![a \cdot b]\!](is, rs) &\triangleq && \mathsf{let}\ (is_a, rs_a) = [\![a]\!](is, rs) \\
&\quad \mathsf{let}\ (is_b, rs_b) = [\![b]\!](is, rs) \\
&\quad (is_a \cap is_b, rs_a \cap rs_b) \\
[\![\neg a]\!](is, rs) &\triangleq && \mathsf{let}\ (is', rs') = [\![a]\!](is, rs) \\
&\quad (is - is', rs - rs') \\
[\![act(p)]\!](is, rs) &\triangleq && \mathsf{let}\ (is', rs') = [\![p]\!](is, rs)\ \mathsf{in}\ (is', rs) \\
[\![res(p)]\!](is, rs) &\triangleq && \mathsf{let}\ (is', rs') = [\![p]\!](is, rs)\ \mathsf{in}\ (is, rs') \\
[\![inj_i(i)]\!](is, rs) &\triangleq && (\{i\} \cup is, rs) \\
[\![inj_r(r)]\!](is, rs) &\triangleq && (is, \{r\} \cup rs) \\
[\![f \leftarrow n]\!](is, rs) &\triangleq && (\mathsf{map}\ (f \leftarrow n)\ is, \mathsf{map}\ (f \leftarrow n)\ rs) \\
[\![p + q]\!](is, rs) &\triangleq && \mathsf{let}\ (is_p, rs_p) = [\![p]\!](is, rs) \\
&\quad \mathsf{let}\ (is_q, rs_q) = [\![q]\!](is, rs) \\
&\quad (is_p \cup is_q, rs_p \cup rs_b) \\
&\quad \ldots\ldots\ldots \\
[\![p \cdot q]\!](is, rs) &\triangleq && \mathsf{let}\ (is', rs') = [\![p]\!](is, rs) \\
&\quad [\![q]\!](is', rs') \\
[\![p^*]\!]\varphi &\triangleq && ()?
\end{aligned}
$$