

B Typing Rules

The following rules, for the sake of brevity, abbreviate *Producer* as P . No rules are given for arbitrary expressions E . Instead, these four rules are meant to augment the typing rules for standard expressions.

$$(return) \frac{\Gamma, \vdash E : \tau}{\Gamma, \vdash (\mathbf{return} E) : P(\tau)}$$

$$(bind) \frac{\Gamma, \vdash M_1 : P(\tau_1) \quad \Gamma, v : \tau_1 \vdash M_2 : P(\tau_2)}{\Gamma, \vdash (\mathbf{bind} (v M_1) M_2) : P(\tau_2)}$$

$$(reify) \frac{\Gamma, \vdash M_1 : P(\tau_1) \quad \Gamma, v : (S \rightarrow (\tau_1 + \{\perp\}) \times S) \vdash M_2 : P(\tau_2)}{\Gamma, \vdash (\mathbf{reify} (v M_1) M_2) : P(\tau_2)}$$

$$(reflect) \frac{\Gamma, v : S \vdash E : (\tau + \{\perp\}) \times S}{\Gamma, \vdash (\mathbf{reflect} (v) E) : P(\tau)}$$