Type Lattice

$$\frac{n_1 < n_2}{uint\langle n_1\rangle <: uint\langle n_2\rangle} \qquad \frac{n_1 < n_2}{int\langle n_1\rangle <: int\langle n_2\rangle} \qquad \frac{}{uint\langle n\rangle <: int\langle 2n\rangle} \qquad \frac{\tau_1 <: \tau_2 \qquad \Gamma \vdash e : \tau_1}{\Gamma \vdash e : \tau_2}$$

Expressions

$$\frac{\text{VAR}}{\Gamma(x) = \tau} \qquad \frac{\text{UNOP}}{\Gamma \vdash e : \tau \qquad \ominus : \tau \to \tau} \qquad \frac{\text{BINOP}}{\Gamma \vdash e_1 : \tau_1 \qquad \Gamma \vdash e_2 : \tau_2 \qquad \oplus : \tau_1 \to \tau_2 \to \tau_3}$$

VAR
$$\frac{\Gamma(x) = \tau}{\Gamma \vdash x : \tau}$$

UNOP
$$\frac{\Gamma \vdash e : \tau \qquad \ominus : \tau \to \tau}{\Gamma \vdash \ominus e : \tau}$$

BINOP
$$\frac{\Gamma \vdash e_1 : \tau_1 \qquad \Gamma \vdash e_2 : \tau_2 \qquad \oplus : \tau_1 \to \tau_2 \to \tau_3}{\Gamma \vdash e_1 \oplus e_2 : \tau_3}$$

ARRGET
$$\frac{\Gamma \vdash e : uint\langle max\rangle \qquad \Gamma \vdash a : array\langle \tau, n\rangle}{\Gamma \vdash a[e] : \tau}$$

FNCALL
$$\frac{\mathbb{F}(f) = fdec\, f(x_1 : \tau_1, \ldots, x_n : \tau_n) : \tau_r \qquad \Gamma \vdash e_1 : \tau_1 \qquad \cdots \qquad \Gamma \vdash e_n : \tau_n}{\Gamma \vdash f(e_1, \ldots, e_n) : \tau_r}$$

TRUE
$$\frac{}{\Gamma \vdash true : bool}$$

FALSE
$$\frac{}{\Gamma \vdash false : bool}$$

ARRLITERAL
$$\frac{\forall i : \Gamma \vdash e_i : \tau}{\Gamma \vdash [e_1, \ldots, e_n] : array\langle \tau, n\rangle}$$

POSNUMBER
$$\frac{\ell >= 0 \qquad n = \lceil \log_2 \ell \rceil}{\Gamma \vdash \ell : uint\langle n\rangle}$$

NEGNUMBER
$$\frac{\ell < 0 \qquad n = \lceil \log_2 |\ell| \rceil + 1}{\Gamma \vdash \ell : int\langle n\rangle}$$