

Type Lattice

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

Expressions

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

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

$$\frac{\text{FNCALL} \quad \mathbb{F}(f) = fdecf(x_1 : \tau_1, \dots, x_n : \tau_n) : \tau_r \quad \Gamma \vdash e_1 : \tau_1 \quad \dots \quad \Gamma \vdash e_n : \tau_n}{\Gamma \vdash f(e_1, \dots, e_n) : \tau_r} \quad \frac{\text{TRUE}}{\Gamma \vdash true : bool}$$

$$\frac{\text{FALSE}}{\Gamma \vdash false : bool} \quad \frac{\text{ARRLITERAL} \quad \forall i : \Gamma \vdash e_i : \tau}{\Gamma[e_1, \dots, e_n] : array\langle \tau, n \rangle} \quad \frac{\text{POSNUMBER} \quad \ell \geq 0 \quad n = \lceil \log_2 \ell \rceil}{\Gamma \vdash \ell : uint\langle n \rangle}$$

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