Semántica de las expresiones aritméticas y booleanas de paso corto

$[nat_{sos}]$ $\quad \langle n, s \rangle \Rightarrow_A \mathcal{N}[\![n]\!]$

$[var_{sos}]$ $\quad \langle x, s \rangle \Rightarrow_A s\,x.$

$[op_1]$ $\quad \dfrac{\langle a_1, s \rangle \Rightarrow_A \langle a_1', s \rangle}{\langle a_1 \; op \; a_2, s \rangle \Rightarrow_A \langle a_1' \; op \; a_2, s \rangle}$

$[op_2]$ $\quad \dfrac{\langle a_1, s \rangle \Rightarrow_A n_1}{\langle a_1 \; op \; a_2, s \rangle \Rightarrow_A \langle \mathcal{N}^{-1}(n_1) \; op \; a_2, s \rangle}$

$[op_3]$ $\quad \dfrac{\langle a_2, s \rangle \Rightarrow_A \langle a_2', s \rangle}{\langle n_1 \; op \; a_2, s \rangle \Rightarrow_A \langle n_1 \; op \; a_2, s \rangle}$

$[op_4]$ $\quad \dfrac{\langle a_2, s \rangle \Rightarrow_A n_2}{\langle n_1 \; op \; a_2, s \rangle \Rightarrow_A \langle n_1 \; op \; \mathcal{N}^{-1}(n_2), s \rangle}$

$[op_5]$ $\quad \langle n_1 \; op \; n_2, s \rangle \Rightarrow_A \mathcal{N}[\![n_1]\!] \; op \; \mathcal{N}[\![n_2]\!]$

$[true_{sos}]$ $\quad \langle true, s \rangle \Rightarrow_B tt$

$[false_{sos}]$ $\quad \langle false, s \rangle \Rightarrow_B ff$

$[op_{sos}^1]$ $\quad \dfrac{\langle a_1, s \rangle \Rightarrow_A \langle a_1', s \rangle}{\langle a_1 \; op \; a_2, s \rangle \Rightarrow_A \langle a_1' \; op \; a_2, s \rangle}$ $\qquad op \equiv \; = \; o \; \leq$

$$\left[op_{sos}^2\right] \quad \frac{\langle a_1, s\rangle \Rightarrow_A n_1}{\langle a_1 \oplus a_2, s\rangle \Rightarrow_B \langle \mathcal{N}^{-1}(n_1) \oplus a_2, s\rangle}$$

$$\left[op_{sos}^3\right] \quad \frac{\langle a_2, s\rangle \Rightarrow_A \langle a_2', s\rangle}{\langle n_1 \oplus a_2, s\rangle \Rightarrow_B \langle n_1 \oplus a_2', s\rangle}$$

$$\left[op_{sos}^4\right] \quad \frac{\langle a_2, s\rangle \Rightarrow_A n_2}{\langle n_1 \oplus a_2, s\rangle \Rightarrow_B \langle n_1 \oplus \mathcal{N}^{-1}(n_2), s\rangle}$$

$$\left[eq_{sos}^{tt}\right] \quad \langle n_1 = n_2, s\rangle \Rightarrow_B tt \qquad si\ \mathcal{N}[\![n_1]\!] = \mathcal{N}[\![n_2]\!]$$

$$\left[eq_{sos}^{ff}\right] \quad \langle n_1 = n_2, s\rangle \Rightarrow_B ff \qquad si\ \mathcal{N}[\![n_1]\!] \neq \mathcal{N}[\![n_2]\!]$$

$$\left[leq_{sos}^{tt}\right] \quad \langle n_1 \leq n_2, s\rangle \Rightarrow_B tt \qquad si\ \mathcal{N}[\![n_1]\!] \leq \mathcal{N}[\![n_2]\!]$$

$$\left[leq_{sos}^{ff}\right] \quad \langle n_1 \leq n_2, s\rangle \Rightarrow_B ff \qquad si\ \mathcal{N}[\![n_1]\!] > \mathcal{N}[\![n_2]\!]$$

$$\left[not_{sos}^1\right] \quad \frac{\langle b, s\rangle \Rightarrow_B \langle b', s\rangle}{\langle \neg b, s\rangle \Rightarrow_B \langle \neg b', s\rangle}$$

$$\left[not_{sos}^2\right] \quad \frac{\langle b, s\rangle \Rightarrow_B d}{\langle \neg b, s\rangle \Rightarrow_B \langle \neg B^{-1}(d), s\rangle} \qquad con\ d \in \{tt, ff\}$$

$$y\ B^{-1}(tt) = true$$
$$B^{-1}(ff) = false$$

$$\left[not_{sos}^3\right] \quad \langle \neg true, s\rangle \Rightarrow_B \langle false, s\rangle$$

$$\left[not_{sos}^4\right] \quad \langle \neg false, s\rangle \Rightarrow_B \langle true, s\rangle$$

$$\left[conj_{sos}^1\right] \quad \frac{\langle b_1, s\rangle \Rightarrow_B \langle b_1', s\rangle}{\langle b_1 \wedge b_2, s\rangle \Rightarrow_B \langle b_1' \wedge b_2, s\rangle}$$

$$\left[conj_{sos}^2\right] \quad \frac{\langle b_1, s\rangle \Rightarrow_B d_1}{\langle b_1 \wedge b_2, s\rangle \Rightarrow \langle B^{-1}(d_1) \wedge b_2, s\rangle}$$

$$\left[conj_{sos}^3\right] \quad \frac{\langle b_2, s\rangle \Rightarrow_B \langle b_2', s\rangle}{\langle d_1 \wedge b_2, s\rangle \Rightarrow_B \langle d_1 \wedge b_2', s\rangle}$$

$$[conj_{sos}^4] \quad \frac{<b_2, s> \Rightarrow_B d_2}{<d_1 \wedge b_2, s> \Rightarrow_B <d_1 \wedge B^{-1}(d_2), s>}$$

$$[conj_{sos}^5] \quad <true \wedge true> \Rightarrow_B tt$$

$$[conj_{sos}^6] \quad <false \wedge true> \Rightarrow_B ff$$

$$[conj_{sos}^7] \quad <true \wedge false> \Rightarrow_B ff$$

$$[conj_{sos}^7] \quad <false \wedge false> \Rightarrow_B ff$$

Semántica operacional de paso corto revisada.

$$[ass_{sos}^1] \quad \frac{<a, s> \Rightarrow_A <a', s>}{<x := a, s> \Rightarrow <x := a', s>}$$

$$[ass_{sos}^2] \quad \frac{<a, s> \Rightarrow_A n}{<x := a, s> \Rightarrow <x := \mathcal{N}^{-1}(n), s>} \quad , a \notin Num$$

$$[ass_{sos}^3] \quad <x := n, s> \Rightarrow_e s[x \mapsto \mathcal{N}[\![n]\!]]$$

$$[skip_{os}] \quad <skip, s> \Rightarrow s$$

$$[comp_{sos}^1] \quad \frac{<S_1, s> \Rightarrow <S_1', s'>}{<S_1; S_2, s> \Rightarrow <S_1'; S_2, s'>}$$

$$[comp_{sos}^2] \quad \frac{<S_1, s> \Rightarrow s'}{<S_1; S_2, s> \Rightarrow <S_2, s'>}$$

$\left[if_{sos}^{1} \right]$ $\dfrac{<b,s> \Rightarrow_{B} <b',s>}{<if\ b\ then\ S_1\ else\ S_2,s> \Rightarrow <if\ b'\ then\ S_1\ else\ S_2,s>}$

$\left[if_{sos}^{2} \right]$ $\dfrac{<b,s> \Rightarrow d}{<if\ b\ then\ S_1\ else\ S_2,s> \Rightarrow <if\ B^{-1}(d)\ then\ S_1\ else\ S_2>}$

$\left[if_{sos}^{tt} \right]$ $<if\ true\ then\ S_1\ else\ S_2,s> \Rightarrow <S_1,s>$

$\left[if_{sos}^{ff} \right]$ $<if\ false\ then\ S_1\ else\ S_2,s> \Rightarrow <S_2,s>.$

$\left[while_{sos} \right]$ $<while\ b\ do\ S,s> \Rightarrow <if\ b\ then\ (S;\ while\ b\ do\ S)\ else\ skip,s>.$