Regras Indutivas Adicionadas

Deivid Santos, Henrique Andreata, João Vitor Pioner, Matheus Battiston

If then sem else:

$$IfNoElse_1 \frac{\langle b,s\rangle \rightarrow^{b} \langle b', s'\rangle}{\langle if\ b\ then\ c_1, s\rangle \rightarrow^{c} \langle if\ b'\ then\ c_1, s'\rangle}$$

$$IfNoElse_2 \frac{}{\langle if\ true\ then\ c_1, s\rangle \rightarrow^{c} \langle c_1, s\rangle}$$

$$IfNoElse_3 \frac{}{\langle if\ false\ then\ c_1, s\rangle \rightarrow^{c} \langle skip, s\rangle}$$

Multiplicação:

$$Multiplicacao_1 \frac{\langle a_1,s\rangle \rightarrow^{a} \langle a_1', s'\rangle}{\langle a_1 \times a_2, s\rangle \rightarrow^{a} \langle a_1' \times a_2, s'\rangle}$$

$$Multiplicacao_2 \frac{\langle a_2,s\rangle \rightarrow^{a} \langle a_2', s'\rangle}{\langle nu \times a_2, s\rangle \rightarrow^{c} \langle nu \times a_2', s'\rangle}$$

$$Multiplicacao_3 \frac{}{\langle num_1 \times num_2, s\rangle \rightarrow^{a} \langle num, s\rangle} com\ num = num_1 * num_2$$

Subtração:

$$Subtracao_1 \frac{\langle a_1,s\rangle \rightarrow^{a} \langle a_1', s'\rangle}{\langle a_1 - a_2, s\rangle \rightarrow^{a} \langle a_1' - a_2, s'\rangle}$$

$$Subtracao_2 \frac{\langle a_2,s\rangle \rightarrow^{a} \langle a_2', s'\rangle}{\langle nu - a_2, s\rangle \rightarrow^{c} \langle nu - a_2', s'\rangle}$$

$$Subtracao_3 \frac{}{\langle num_1 - num_2, s\rangle \rightarrow^{a} \langle num, s\rangle} com\ num = num_1 - num_2$$

DoWhile:

$$DoWhile \frac{}{\langle Do\ c\ while\ b, s\rangle \rightarrow^{c} \langle c; if\ b\ then (Do\ c\ while\ b), else\ skip\ , s'\rangle}$$

Incremento atômico (inc x):

$$Inc\ \frac{}{\langle inc\ x, s\rangle \rightarrow^{c} \langle skip, s[x/x{+}1]\rangle}$$

Comando de atribuição de valor aleatório à variável (any x):

$$Any\ \frac{}{\langle any\ x, s\rangle \rightarrow^{c} \langle\ skip, s[x/num]\rangle}$$

And (&&):

$$And_1\ \frac{\langle bl_1, s\rangle \rightarrow\ False}{\langle bl_1 \&\&\ bl_2, s\rangle \rightarrow^{c} \langle False, s'\rangle}$$

$$And_2\ \frac{\langle bl_1, s\rangle \rightarrow True\ \langle bl_2, s\rangle \rightarrow bl_2'}{\langle bl_1 \&\&\ bl_2, s\rangle \rightarrow^{c} \langle bl_2', s'\rangle}$$

$$And_3\ \frac{\langle b_1, s\rangle \rightarrow \langle b_1', s'\rangle}{\langle b_1 \&\&\ b_2, s\rangle \rightarrow^{c} \langle b_1' \&\&\ b_2, s'\rangle}$$

$$And_4\ \frac{\langle b_2, s\rangle \rightarrow \langle b_2', s'\rangle}{\langle bl_1 \&\&\ b_2, s\rangle \rightarrow^{c} \langle bl_1 \&\&\ b_2', s'\rangle}$$

Or (||):

$$Or_1\ \frac{\langle bl_1, s\rangle \rightarrow False\ \langle bl_2, s\rangle \rightarrow bl}{\langle bl_1 \|\|\ bl_2, s\rangle \rightarrow^{c} \langle bl, s\rangle}$$

$$Or_2\ \frac{\langle bl_1, s\rangle \rightarrow True\ \langle bl_2, s\rangle \rightarrow b}{\langle bl_1 \|\|\ b_2, s\rangle \rightarrow^{c} \langle True, s\rangle}$$

$$Or_3 \frac{\langle b_1,s\rangle \to \langle b_1',s'\rangle}{\langle b_1 \,||\, b_2, s\rangle \to^c \langle b_1' \,||\, b_2, s'\rangle}$$

$$Or_4 \frac{\langle b_2,s\rangle \to \langle b_2,s\rangle}{\langle bl_1 || \, b_2, s'\rangle \to^c \langle bl_1 \,||\, b_2', s'\rangle}$$

Maior que (>):

$$Maior_1 \frac{\langle a_1,s\rangle \to^a \langle a_1',s'\rangle}{\langle\, a_1 > \, a_2, \, s\rangle \to^a \langle\, a_1' > a_2 \,,s\rangle}$$

$$Maior_2 \frac{\langle a_2,s\rangle \to^a \langle a_2',s'\rangle}{\langle nu > a_2, \, s\rangle \to^a \langle\, nu > a_2' \,,s\rangle}$$

$$Maior_3 \frac{}{\langle nu_1 > nu_2, \, s\rangle \to^a \langle\, if\ nu_1 > nu_2\ then\ True\ else\ False \,,s\rangle}$$

Menor que (<):

$$Menor_1 \frac{\langle a_1,s\rangle \to^a \langle a_1',s'\rangle}{\langle\, a_1 < \, a_2, \, s\rangle \to^a \langle\, a_1' < a_2 \,,s\rangle}$$

$$Menor_2 \frac{\langle a_2,s\rangle \to^a \langle a_2',s'\rangle}{\langle nu \, < a_2, \, s\rangle \to^a \langle\, nu < a_2' \,,s\rangle}$$

$$Menor_3 \frac{}{\langle nu_1 > nu_2, \, s\rangle \to^a \langle\, if\ nu{<}nu\ then\ True\ else\ False \,,s\rangle}$$

Igual a (=):

$$Igual_1 \frac{\langle a_1,s\rangle \rightarrow^a \langle a_1',s'\rangle}{\langle a_1 = a_2,\ s\rangle \rightarrow^a \langle a_1' == a_2,s\rangle}$$

$$Igual_2 \frac{\langle a_2,s\rangle \rightarrow^a \langle a_2',s'\rangle}{\langle nu = a_2,\ s\rangle \rightarrow^a \langle nu == a_2',s\rangle}$$

$$Igual_3 \frac{}{\langle nu_1 = nu_2,\ s\rangle \rightarrow^a \langle if\ nu_1 = nu_2\ then\ True\ else\ False,s\rangle}$$

Exemplo:

Exemplo 1:

```
do {
   inc x
} while (x < 1)
Resultado
y = 3
x = 1
```

Exemplo 2:

```
x = 4
y = 0
if x > 3  && y == 0 {
    y = 3 * x
    inc x
}
Resultado
y = 12
x = 5
```

Exemplo 3:

```
x = 1
y = 10
do inc x
    while x < y - 5

x = 5
```

y = 10

Exemplo 4:

```
x = 1
y = 0
if x == 4 || y > 10  {
    y = 5
}
any x
```

Resultado

x = any

y = 0

Exemplo main:

```
do {
   x = x + 1
} while (x < 2)
```

Resultado

x = 3

y = 2