Cálculo de Programas
Resolução - Ficha 01

Eduardo Freitas Fernandes

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Exercício 1

$$
\begin{aligned}
\pi_1 \cdot (f \times g)\ (x,y) &= \{\text{def. composição}\} \\
&\quad \pi_1((f \times g)(x,y)) \\
&= \{\text{(F1)}\} \\
&\quad \pi_1(f\ x, g\ y) \\
&= \{\text{(F2)}\} \\
&\quad f\ x \\
&= \{\text{(F1)}\} \\
&\quad f(\pi_1(x,y)) \\
&= \{\text{def. composição}\} \\
&\quad f \cdot \pi_1
\end{aligned}
$$

$$
\begin{aligned}
\pi_2 \cdot (f \times g)\ (x,y) &= \{\text{def. composição}\} \\
&\quad \pi_2((f \times g)(x,y)) \\
&= \{\text{(F1)}\} \\
&\quad \pi_2(f\ x, g\ y) \\
&= \{\text{(F2)}\} \\
&\quad g\ y \\
&= \{\text{(F1)}\} \\
&\quad g(\pi_2(x,y)) \\
&= \{\text{def. composição}\} \\
&\quad g \cdot \pi_2
\end{aligned}
$$

$$
\begin{aligned}
(f \times g)\ (x,y) &= \{\text{(F1)}\} \\
&\quad (f\ x, g\ y) \\
&= \{\text{(F2)}\} \\
&\quad (f(\pi_1(x,y)), g(\pi_2(x,y))) \\
&= \{\text{def. composição}\} \\
&\quad (f \cdot \pi_1, g \cdot \pi_2) \\
&= \{\text{def. split}\} \\
&\quad \langle f \cdot \pi_1, g \cdot \pi_2 \rangle
\end{aligned}
$$

Exercício 2
Exercício 3
Exercício 4

Exercício 5

$$\underbrace{\langle h, k\rangle \cdot f}_{k} = \underbrace{\langle h \cdot f, k \cdot f\rangle}_{\langle h,f\rangle}$$

$$\iff \{(\mathrm{F7})\}$$

$$\begin{cases} \pi_1 \cdot \langle h, k\rangle \cdot = h \cdot f \\ \pi_2 \cdot \langle h, k\rangle \cdot = k \cdot f \end{cases}$$

$$\iff \{\text{Cancelamento-}\times\}$$

$$\begin{cases} h \cdot f \\ k \cdot f \end{cases}$$

Exercício 6

Exercício 7

Exercício 8

Exercício 9

```
acronym :: String -> String
acronym = map head . words

short :: String -> String
short = uncurry (++) . (id >< (' ':)) . split head last . words
```

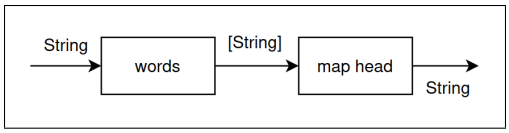

Figura 1: acronym

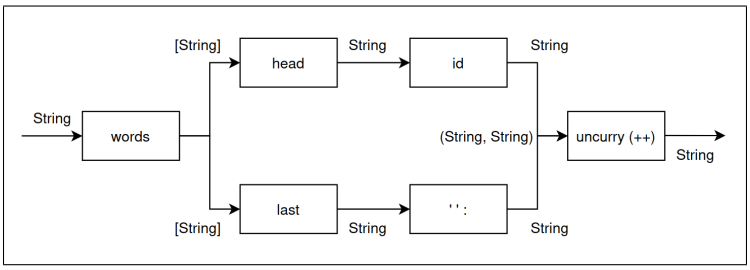

Figura 2: short