A Sample Tex Document

Mitchell Wand
Draft of 2002-12-19 18:05:07 wand

December 19, 2002

This document shows some samples of grammars and inference rules using the `mmm` and `mathpartir` packages. The accompanying style file `sample.sty` shows what I think of as good macro style. Much of it is overkill for a document this small, but you'll need at least this level of engineering for any reasonable-sized document.

1 The Syntax of PCF

Here is a forward reference to section 2.

Grammar

$$\begin{array}{rcll} \sigma, \tau & ::= & \mathbf{int} \mid \mathbf{bool} \mid (\sigma \to \tau) & \text{Types} \\ M, N, P, \ldots & ::= & x \mid \lambda x.M \mid (M_1\ M_2) & \text{Raw Terms} \end{array}$$

Grammar, using `altgrammar` (probably preferable)

$$\begin{array}{lll} \sigma, \tau & ::= \mathbf{int} \mid \mathbf{bool} \mid (\sigma \to \tau) & \text{Types} \\ M, N, P, \ldots & ::= x \mid \lambda x.M \mid (M_1\ M_2) & \text{Raw Terms} \end{array}$$

2 Typing Rules and Derivations

This refers to the grammar in section 1.

Typing Rules

$$\frac{}{x^{\tau} : \tau}\,\textsc{T-Var} \qquad \frac{}{c^{\tau} : \tau}\,\textsc{T-Const}$$

$$\frac{M : \tau_2}{\lambda x^{\tau_1}.M : (\tau_1 \to \tau_2)}\,\textsc{T-Abs} \qquad \frac{M_1 : (\tau_1 \to \tau_2) \qquad M_2 : \tau_1}{(M_1\ M_2) : \tau_2}\,\textsc{T-Comb}$$

Note that each line is centered, but the overall effect is pretty ugly. A better plan, at least in this case, is to organize this as one array per column:

Typing Rules, organized differently

$$\frac{}{x^{\tau} : \tau}\,\textsc{T-Var} \qquad \frac{}{c^{\tau} : \tau}\,\textsc{T-Const}$$

$$\frac{M : \tau_2}{\lambda x^{\tau_1}.M : (\tau_1 \to \tau_2)}\,\textsc{T-Abs} \qquad \frac{M_1 : (\tau_1 \to \tau_2) \qquad M_2 : \tau_1}{(M_1\ M_2) : \tau_2}\,\textsc{T-Comb}$$

These are just two options.

With `\inferrule`, rules are aligned on the separator, eg

Multiline Rules

$$\textsc{T-Comb1}\quad \frac{\begin{array}{c} M_1 : (\tau_1 \to \tau_2) \\ M_2 : \tau_1 \end{array}}{(M_1\ M_2) : \tau_2} \qquad \textsc{T-Comb2}\quad \frac{M_1 : (\tau_1 \to \tau_2) \qquad M_2 : \tau_1}{(M_1\ M_2) : \tau_2}$$

This is usually the right thing, unless you want to set a whole derivation:

A Type Derivation

$$\frac{\dfrac{x^{\mathbf{int}} : \mathbf{int}}{(\lambda x^{\mathbf{int}}.x) : (\mathbf{int} \to \mathbf{int})} \qquad 1 : \mathbf{int}}{((\lambda x^{\mathbf{int}}.x)\ 1) : \mathbf{int}}$$

Is this painful? You bet. Of course, you could write a tool to take a term, generate its typing derivation, and translate the derivation to TeX . . . .

Have fun!