

# Specification of the CBN Simply-Typed Lambda Calculus

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This document demonstrates the use of the Ott tool to generate  $\text{\LaTeX}$ input definitions. It uses the `ottalt`  $\text{\LaTeX}$ package available from <http://users.eecs.northwestern.edu/~jesse/code/latex/>.

## 1 Syntax of STLC

$typ, T$	$::=$	types
	$\circ$	base type
	$T_1 \rightarrow T_2$	function types
$exp, e, v$	$::=$	expressions
	$x$	variables
	$\lambda x. e$	abstractions
	$e_1 e_2$	applications
$ctx, \Gamma$	$::=$	typing context
	$\bullet$	empty context
	$\Gamma, x : T$	assumption

## 2 Typing rules for STLC

$\boxed{\Gamma \vdash e : T}$	$(Typing\ rules)$	
$\frac{\text{TYPING-VAR} \quad \text{uniq}\Gamma \quad x : T \in \Gamma}{\Gamma \vdash x : T}$	$\frac{\text{TYPING-ABS} \quad \Gamma, x : T_1 \vdash e : T_2}{\Gamma \vdash \lambda x. e : T_1 \rightarrow T_2}$	$\frac{\text{TYPING-APP} \quad \Gamma \vdash e_1 : T_1 \rightarrow T_2 \quad \Gamma \vdash e_2 : T_1}{\Gamma \vdash e_1 e_2 : T_2}$

## 3 Small-step rules for STLC

$\boxed{e \longrightarrow e'}$	$(Small\text{-}step\ operational\ semantics)$
$\frac{\text{STEP-BETA}}{(\lambda x. e_1) e_2 \longrightarrow e_1[x \rightsquigarrow e_2]}$	$\frac{\text{STEP-APP} \quad e_1 \longrightarrow e'_1}{e_1 e_2 \longrightarrow e'_1 e_2}$