

The Language Normal

BNF-converter

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This document was automatically generated by the *BNF-Converter*. It was generated together with the lexer, the parser, and the abstract syntax module, which guarantees that the document matches with the implementation of the language (provided no hand-hacking has taken place).

The lexical structure of Normal

Identifiers

Identifiers $\langle Ident \rangle$ are unquoted strings beginning with a letter, followed by any combination of letters, digits, and the characters `_` `'`, reserved words excluded.

Literals

Reserved words and symbols

The set of reserved words is the set of terminals appearing in the grammar. Those reserved words that consist of non-letter characters are called symbols, and they are treated in a different way from those that are similar to identifiers. The lexer follows rules familiar from languages like Haskell, C, and Java, including longest match and spacing conventions.

The reserved words used in Normal are the following:

Bool	Nat	as
cons	else	false
fix	fun	head
if	in	isempty
iszero	let	match
pred	return	succ
tail	then	true

The symbols used in Normal are the following:

```

;      =   (
:      )   {
}      <   >
[      ]   =>
,      .   0
->

```

Comments

Single-line comments begin with `//`.

Multiple-line comments are enclosed with `/*` and `*/`.

The syntactic structure of Normal

Non-terminals are enclosed between \langle and \rangle . The symbols $::=$ (production), $|$ (union) and ϵ (empty rule) belong to the BNF notation. All other symbols are terminals.

```

 $\langle Program \rangle ::= \langle ListExpr \rangle$ 

 $\langle ListExpr \rangle ::= \epsilon$ 
                |  $\langle Expr \rangle$ 
                |  $\langle Expr \rangle ; \langle ListExpr \rangle$ 

 $\langle Expr \rangle ::=$ 
    if  $\langle Expr \rangle$  then  $\langle Expr \rangle$  else  $\langle Expr \rangle$ 
    | let  $\langle Ident \rangle = \langle Expr \rangle$  in  $\langle Expr \rangle$ 
    | fun (  $\langle Ident \rangle : \langle Type \rangle$  ) { return  $\langle Expr \rangle$  }
    | {  $\langle ListBinding \rangle$  }
    |  $< \langle Ident \rangle = \langle Expr \rangle > \text{as } < \langle ListFieldType \rangle >$ 
    | match  $\langle Expr1 \rangle$  {  $\langle ListMatchCase \rangle$  }
    | [  $\langle ListExpr \rangle$  ] as [  $\langle Type \rangle$  ]
    |  $\langle Expr1 \rangle$ 

 $\langle MatchCase \rangle ::= < \langle Ident \rangle = \langle Ident \rangle > => \langle Expr \rangle$ 

 $\langle ListMatchCase \rangle ::= \epsilon$ 
                    |  $\langle MatchCase \rangle$ 
                    |  $\langle MatchCase \rangle ; \langle ListMatchCase \rangle$ 

 $\langle Binding \rangle ::= \langle Ident \rangle = \langle Expr \rangle$ 

```

$$\begin{aligned}
\langle \text{ListBinding} \rangle &::= \epsilon \\
&| \langle \text{Binding} \rangle \\
&| \langle \text{Binding} \rangle , \langle \text{ListBinding} \rangle \\
\langle \text{Expr1} \rangle &::= \langle \text{Expr1} \rangle \langle \text{Expr2} \rangle \\
&| \langle \text{Expr2} \rangle \\
\langle \text{Expr2} \rangle &::= \text{cons } \langle \text{Expr3} \rangle \langle \text{Expr3} \rangle \\
&| \text{head } \langle \text{Expr3} \rangle \\
&| \text{isempty } \langle \text{Expr3} \rangle \\
&| \text{tail } \langle \text{Expr3} \rangle \\
&| \text{succ } \langle \text{Expr3} \rangle \\
&| \text{pred } \langle \text{Expr3} \rangle \\
&| \text{iszero } \langle \text{Expr3} \rangle \\
&| \text{fix } \langle \text{Expr3} \rangle \\
&| \langle \text{Expr3} \rangle \\
\langle \text{Expr3} \rangle &::= \langle \text{Expr3} \rangle . \langle \text{Ident} \rangle \\
&| \text{true} \\
&| \text{false} \\
&| 0 \\
&| \langle \text{Ident} \rangle \\
&| (\langle \text{Expr} \rangle) \\
\langle \text{Type} \rangle &::= \langle \text{Type1} \rangle \rightarrow \langle \text{Type} \rangle \\
&| \{ \langle \text{ListFieldType} \rangle \} \\
&| < \langle \text{ListFieldType} \rangle > \\
&| [\langle \text{Type} \rangle] \\
&| \langle \text{Type1} \rangle \\
\langle \text{Type1} \rangle &::= \text{Bool} \\
&| \text{Nat} \\
&| (\langle \text{Type} \rangle) \\
\langle \text{FieldType} \rangle &::= \langle \text{Ident} \rangle : \langle \text{Type} \rangle \\
\langle \text{ListFieldType} \rangle &::= \epsilon \\
&| \langle \text{FieldType} \rangle \\
&| \langle \text{FieldType} \rangle , \langle \text{ListFieldType} \rangle \\
\langle \text{Typing} \rangle &::= \langle \text{Expr} \rangle : \langle \text{Type} \rangle
\end{aligned}$$