

Delimiters

$\langle singleQuote \rangle ::= '$

$\langle doubleQuote \rangle ::= ''$

$\langle terminator \rangle ::= ';'$

Primitive Types

$\langle int \rangle ::= [\text{integer}]$

$\langle bool \rangle ::= \text{'true'} \mid \text{'false'}$

$\langle char \rangle ::= \langle singleQuote \rangle [\text{character}] \langle singleQuote \rangle$

$\langle string \rangle ::= \langle doubleQuote \rangle [\text{character}^*] \langle doubleQuote \rangle$

$\langle null \rangle ::= \text{'null'}$

Algebraic Data Types and Typeclasses

$\langle generic \rangle ::= '[' \langle ident \rangle [',' \langle ident \rangle]^* ']'$

$\langle adt \rangle ::= \text{'type'} \langle ident \rangle [\langle generic \rangle] [':' \langle ident \rangle [\langle generic \rangle]]^* \{ '[' \langle ident \rangle ':' \langle type \rangle [',' \langle ident \rangle ':' \langle type \rangle]^* ']' \} \langle terminator \rangle$

$\langle typeclass \rangle ::= \text{'typeclass'} \langle ident \rangle \{ '[' \langle ident \rangle '=' \langle type \rangle [',' \langle ident \rangle '=' \langle type \rangle]^* ']' \} \langle terminator \rangle$

$\langle instance \rangle ::= \text{'instance'} \langle ident \rangle ':' \langle ident \rangle \{ '[' \langle prog \rangle ']' \}$

Types

$\langle type \rangle ::= \text{'int'} \mid \text{'bool'} \mid \text{'char'} \mid \text{'string'} \mid \text{'null'}$
| $\langle type \rangle \text{'->'} \langle type \rangle$
| $\text{'('} [\langle type \rangle [',' \langle type \rangle]^* \text{')' } \text{'->'} \text{'('} [\langle type \rangle [',' \langle type \rangle]^* \text{')' }$
| $\text{'List'} \mid \text{'Array'} \mid \text{'Set'} \text{'('} \langle type \rangle \text{'}'$
| $\text{'Tuple'} \text{'('} \langle type \rangle [',' \langle type \rangle]^* \text{'}'$
| $\text{'Dict'} \text{'('} [\langle type \rangle \text{'}' , \langle type \rangle \text{'}'$
| $\langle ident \rangle [\text{'('} \langle type \rangle \text{'}']$

Arithmetic and Boolean Operators

$\langle arithOp \rangle ::= \text{'+'} \mid \text{'-'} \mid \text{'*'} \mid \text{'/'} \mid \text{'%'}$

$\langle boolOp \rangle ::= \text{'<'} \mid \text{'>'} \mid \text{'<='} \mid \text{'>='} \mid \text{'!' } \mid \text{'!='} \mid \text{'==' } \mid \text{'\&\&'} \mid \text{'||'}$

$\langle op \rangle ::= \langle arithOp \rangle \mid \langle boolOp \rangle$

Functions

$\langle param \rangle ::= \langle ident \rangle ' : ' \langle type \rangle ['=' \langle atom \rangle]$

$\langle lowerBoundOp \rangle ::= ' : > '$

$\langle upperBoundOp \rangle ::= ' < : '$

$\langle bounding \rangle ::= [\langle lowerBoundOp \rangle \langle ident \rangle] [\langle upperBoundOp \rangle \langle ident \rangle]$

$\langle templateTypes \rangle ::= ' [' \langle ident \rangle \langle bounding \rangle [' , ' \langle ident \rangle \langle bounding \rangle]^* '] '$

$\langle funDef \rangle ::= ' \mathbf{fn} ' \langle ident \rangle [\langle templateTypes \rangle] ' (' [\langle param \rangle [' , ' \langle param \rangle]^*] ') ' [' - > ' \langle type \rangle] '=' \langle smp \rangle \langle terminator \rangle$

$\langle prog \rangle ::= [\langle funDef \rangle]^* \langle exp \rangle$

$\langle app \rangle ::= \langle atom \rangle [[' [' \langle type \rangle [' , ' \langle type \rangle]^* '] ']^* [' (' [\langle smp \rangle [' , ' \langle smp \rangle]^* ') ']^*]$

$\langle lambda \rangle ::= ' | ' [\langle param \rangle [' , ' \langle param \rangle]^*] ' | ' [' - > ' \langle type \rangle] '=' \langle smp \rangle \langle terminator \rangle$

Pattern Matching and Switches

$\langle value \rangle ::= \langle ident \rangle ' (' [\langle value \rangle [' , ' \langle value \rangle]] ') '$
| $\langle prim \rangle$
| $' _ '$

$\langle caseVal \rangle ::= \langle ident \rangle ' : ' \langle type \rangle$
| $\langle value \rangle$

$\langle match \rangle ::= ' \mathbf{match} ' (' \langle smp \rangle ') ' \{ ' \mathbf{case} ' \langle caseVal \rangle '=' \langle smp \rangle [' \mathbf{case} ' \langle caseVal \rangle '=' \langle smp \rangle]^* ' \}$

$\langle matchSwitch \rangle ::= \langle match \rangle \mid \langle switch \rangle$

Expressions

$\langle atom \rangle ::= \langle int \rangle \mid \langle bool \rangle \mid \langle char \rangle \mid \langle string \rangle \mid \langle null \rangle$
| $' (' \langle smp \rangle ') '$
| $\langle ident \rangle [' . ' \langle ident \rangle]^*$

$\langle tight \rangle ::= \langle app \rangle [' | > ' \langle app \rangle]$
| $' \{ ' \langle exp \rangle ' \}$

$\langle utight \rangle ::= [\langle op \rangle] \langle tight \rangle$

$\langle smp \rangle ::= \langle utight \rangle [\langle op \rangle \langle utight \rangle]$
| $' \mathbf{if} ' (' \langle smp \rangle ') ' \langle smp \rangle [' \mathbf{else} ' \langle smp \rangle]$
| $' \mathbf{List} ' \mid ' \mathbf{Tuple} ' \mid ' \mathbf{Array} ' \mid ' \mathbf{Set} ' \{ ' [\langle smp \rangle [' , ' \langle smp \rangle]^*] ' \}$

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| 'Dict' '{'[(smp)':'(smp)[',' (smp)':'(smp)']*]''
| <matchSwitch>
| <typeclass>
| <instance>
| <adt>
| <prog>
| <lambda>

<exp> ::= <smp>[<terminator><exp>]
| ['lazy' 'val' <ident>[':'<type>] '=' <smp><terminator><exp>
| 'include' <file><terminator><exp>

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