The Definition of Snail

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1 Snail の構文定義

EBNF 記法を用いて Snail の具象構文を以下に示す.

$$
\begin{aligned}
\textit{toplevel} ::= {} & \textit{let}\ [\textit{rec}]\ \textit{var}\ \{\textit{var}\ [\ :\ \langle \textit{type} \rangle]\} : \langle \textit{type} \rangle = \langle \textit{term} \rangle\ \{\langle \textit{mutual-recursion-top-let} \rangle\} \\
| {} & \textit{typedef}\ \textit{cons}\ \{\textit{var}\} = [\ |\ ]\ \{\langle \textit{type-dec} \rangle\ |\ \}\ \langle \textit{type-dec} \rangle\ \{\langle \textit{mutual-recursion-type} \rangle\} \\
\textit{mutual-recursion-type} ::= {} & \textit{and}\ \textit{cons}\ \{\textit{var}\} = [\ |\ ]\ \{\langle \textit{type-dec} \rangle\ |\ \}\ \langle \textit{type-dec} \rangle \\
\textit{mutual-recursion-top-let} ::= {} & \textit{and}\ \textit{var}\ \{\textit{var}\ [\ :\ \langle \textit{type} \rangle]\}\ :\ \langle \textit{type} \rangle = \langle \textit{term} \rangle \\
\textit{type-dec} ::= {} & \textit{cons}\ [\textit{of}\ \langle \textit{type} \rangle] \\
\textit{type} ::= {} & \langle \textit{type} \rangle \to \langle \textit{type} \rangle \\
| {} & !\ '['\ \langle \textit{expmod} \rangle\ ']'\ '\{'\ \langle \textit{type} \rangle\ '\}' \\
| {} & \langle \textit{simple-type} \rangle \\
| {} & \langle \textit{type} \rangle\ \langle \textit{simple-type} \rangle \\
\textit{expmod} ::= {} & \textit{int} \\
| {} & \infty \\
\textit{simple-type} ::= {} & '('\ \langle \textit{type} \rangle\ ')' \\
| {} & \textit{var} \\
| {} & \textit{cons} \\
| {} & () \\
\textit{pattern} ::= {} & \langle \textit{simple-pattern} \rangle \\
| {} & \langle \textit{pattern} \rangle\ \langle \textit{simple-pattern} \rangle \\
| {} & \langle \textit{simple-pattern} \rangle\ \textit{binop}\ \langle \textit{simple-pattern} \rangle
\end{aligned}
$$

$$
\begin{aligned}
\textit{simple-pattern} ::= {} & '(' \ \langle \textit{pattern} \rangle \ ')' \\
| \ & \textit{var} \\
| \ & \textit{cons} \ '[' \ \langle \textit{simple-pattern} \rangle \ ']' \\
| \ & [\,] \\
| \ & \_
\end{aligned}
$$

$$
\textit{mutual-recursion-let} ::= \textit{and} \ \textit{var} \ \{\textit{var} \ [: \ \langle \textit{type} \rangle]\} : \ \langle \textit{type} \rangle = \langle \textit{term} \rangle
$$

$$
\begin{aligned}
\textit{term} ::= {} & \langle \textit{simple-term} \rangle \\
| \ & \langle \textit{term} \rangle \ \langle \textit{simple-term} \rangle \\
| \ & \textit{let} \ [\textit{rec}] \ \textit{var} \ \{\textit{var} \ [: \ \langle \textit{type} \rangle]\} : \langle \textit{type} \rangle = \langle \textit{term} \rangle \ \{\langle \textit{mutual-recursion-let} \rangle\} \ \textit{in} \ \langle \textit{term} \rangle \\
| \ & \textit{fun} \ \{\textit{var} \ [: \ \langle \textit{type} \rangle]\} \ \rightarrow \langle \textit{term} \rangle \\
| \ & \textit{match} \ \langle \textit{term} \rangle \ \textit{with} \ [\,|\,] \ \{\langle \textit{pattern} \rangle \rightarrow \langle \textit{term} \rangle \ |\ \} \ \langle \textit{pattern} \rangle \rightarrow \langle \textit{term} \rangle \\
| \ & \textit{if} \ \langle \textit{term} \rangle \ \textit{then} \ \langle \textit{term} \rangle \ \textit{else} \ \langle \textit{term} \rangle
\end{aligned}
$$

$$
\begin{aligned}
\textit{simple-term} ::= {} & '(' \ \langle \textit{term} \rangle \ [: \langle \textit{type} \rangle] \ ')' \\
| \ & ! \ \langle \textit{term} \rangle \\
| \ & \textit{int} \\
| \ & \textit{float} \\
| \ & \textit{string} \\
| \ & \textit{var} \\
| \ & \textit{cons} \ [\langle \textit{simple-term} \rangle] \\
| \ & () \\
| \ & [\,] \\
| \ & \textit{list}
\end{aligned}
$$

いくつかの終端記号の意味を以下のように定義する.

- var 先頭が小文字で始まる文字列.
- cons 先頭が大文字で始まる文字列.
- list 組み込みリストの構文糖衣,[1,2,3] など.
- string 文字列リテラル.
- int 整数リテラル.
- float 小数リテラル.