

\mathbf{C}^\pm : a simple language for calculus, inspired by C

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1 Lexical elements

$\langle token \rangle ::= \langle keyword \rangle$
| $\langle identifier \rangle$
| $\langle constant \rangle$
| $\langle string-literal \rangle$
| $\langle punctuator \rangle$

1.1 Keywords

$\langle keyword \rangle ::= \text{'bool'} \mid \text{'char'} \mid \text{'const'} \mid \text{'do'} \mid \text{'double'} \mid \text{'else'} \mid \text{'float'} \mid \text{'for'}$
| $\text{'if'} \mid \text{'int'} \mid \text{'long'} \mid \text{'return'} \mid \text{'unsigned'} \mid \text{'while'}$

1.2 Identifiers

$\langle identifier \rangle ::=$
| $\langle identifier-nondigit \rangle$
| $\langle identifier \rangle \langle identifier-nondigit \rangle$
| $\langle identifier \rangle \langle digit \rangle$

$\langle identifier-nondigit \rangle ::= \langle nondigit \rangle$

$\langle nondigit \rangle ::= \text{'_'} \mid \text{'a'} \mid \dots \mid \text{'z'} \mid \text{'A'} \mid \dots \mid \text{'Z'}$

$\langle digit \rangle ::= \text{'0'} \mid \dots \mid \text{'9'}$

1.3 Constants

$\langle constant \rangle ::=$
| $\langle integer-constant \rangle$
| $\langle floating-constant \rangle$
| $\langle character-constant \rangle$

1.3.1 Integer constants

$\langle integer-constant \rangle ::= \langle decimal-constant \rangle \langle integer-suffix \rangle?$

$\langle decimal-constant \rangle ::= \langle digit \rangle \mid \langle decimal-constant \rangle \langle digit \rangle$

$\langle digit \rangle ::= '0' \mid \dots \mid '9'$

$\langle integer-suffix \rangle ::=$
 $\langle unsigned-suffix \rangle \langle long-suffix \rangle?$
 $\mid \langle long-suffix \rangle \langle unsigned-suffix \rangle?$

$\langle unsigned-suffix \rangle ::= 'u' \mid 'U'$

$\langle long-suffix \rangle ::= 'l' \mid 'L'$

1.3.2 floating-constant

$\langle floating-constant \rangle ::= \langle decimal-floating-constant \rangle$

$\langle decimal-floating-constant \rangle ::=$
 $\langle fractional-constant \rangle \langle exponent-part \rangle? \langle floating-suffix \rangle?$
 $\mid \langle digit-sequence \rangle \langle exponent-part \rangle \langle floating-suffix \rangle?$

$\langle fractional-constant \rangle ::=$
 $\langle digit-sequence \rangle? '.' \langle digit-sequence \rangle$
 $\mid \langle digit-sequence \rangle '.'$

$\langle exponent-part \rangle ::=$
 $'e' \langle sign \rangle? \langle digit-sequence \rangle$
 $\mid 'E' \langle sign \rangle? \langle digit-sequence \rangle$

$\langle sign \rangle ::= '+' \mid '-'$

$\langle digit-sequence \rangle ::= \langle digit \rangle \mid \langle digit-sequence \rangle \langle digit \rangle$

$\langle floating-suffix \rangle ::= 'f' \mid 'l' \mid 'F' \mid 'L'$

1.4 String literals

$\langle string-literal \rangle ::=$
 $'"' \langle s-char-sequence \rangle? "'$
 $\mid 'L' "' \langle s-char-sequence \rangle? "'$

$\langle s-char-sequence \rangle ::=$
 $\langle s-char \rangle$
 $\mid \langle s-char-sequence \rangle \langle s-char \rangle$

$\langle s-char \rangle ::=$ any character except `"`, `\`, `\n`
 $\mid \langle escape-sequence \rangle$

1.5 Punctuator

$\langle \text{punctuator} \rangle ::=$ `‘[’` | `‘]’` | `‘(’` | `‘)’` | `‘{’` | `‘}’` | `‘,’` | `‘;’` | `‘++’` | `‘-’` | `‘*’` | `‘+’` | `‘-’` | `‘!’`
| `‘/’` | `‘%’` | `‘<’` | `‘>’` | `‘<=’` | `‘>=’` | `‘==’` | `‘!=’` | `‘&&’` | `‘||’` | `‘=’` | `‘*=’` | `‘=’` | `‘+=’` |
`‘-=’` | `‘^=’` | `‘#’` | `‘##’`