LISP

MEMORANDUM

DATE: 10-23-70
MEMO NO.: NNR

TO: Mort Bernstein

FROM: Jeff Barnett

SUBJECT:

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Recently, I have implemented an infix to LISP translator. The translator it itself a LISP Program and includes a trivial on-line editor. Syntax equations detailing the infix input are enclosed. Translation equivalents are given for the operators along with their binding strengths. The rest of the translators equivalents are not given, try intuition. If that is not unambigbuous or gives confusing results, contact me. In any case, I would be interested in your comments, questions and criticisms.

Jeff

JB:sw

Attachments:

1. Syntax Conventions
2. LISP INFIX SYNTAX Definition
3. Binary Operator Definitions and Binary Strength

TO: Mort Bernstein

Attachment No. 1
10-23-70

SYNTAX CONVENTIONS

The following notations and conventions are used in the syntax equations:

$\alpha|\beta \ldots |\Delta$ means an α or a β or ... or a Δ

{ ... } meta brackets

$' α means zero or more α's supported by commas

[...] means the enclosed are optional

(α) means an α. This is an escape in case α is a meta character such as "}".

Capital letter items are terminal names.

Small letter items are meta names.

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Attachment No. 2
10-23-70

LISP INFIX SYNTAX DEFINITION

input	=	{definer|evaluation};
evaluation	=	expression
definer	=	{FUNCTION|MACRO|INSTRUCTION}|f-name| parameters| expression
f-name	=	variable
parameters	=	($' variable)
variable	=	simple-name|global-name
simple-name	=	identifier
global-name	=	identifiers:section-number
section-number	=	0|1|2| ... |127
expression	=	operand ${operator operand}
operator	=	←|/|*|+|-|LAND|LOR|LXOR|LQ|LS|GQ|GR|#|⊖|EQUAL| UNEQUAL|INTERSECTION|UNION|@|& |IN|AND|OR|ON
operand	=	simple-operand|array-reference|function-use
array-reference	=	operand ⌊subscript⌋
subscript	=	expression
function-use	=	operand($'expression)
simple-operand	=	direct-operand|named-operand
direct-operand	=	variable| datum
datum	=	simple-datum| complex-datum
simple-datum	=	nil|unsigned-number|array|functional|string| special-pointer|unspecial-pointer
nil	=	NIL|( )
complex-datums	=	quoted-s-expression

```
quoted-s-expression   = "s-expression

named-operand         = not-operand|signed-operand|recursive-operand|
                        lisp-operand|selector|conditional|progn|for-loop|
                        block|go-statement|return-statement

not-operand           = {NULL|NOT} operand

signed-operand        = {+|-} operand

recursive-operand     = (expression)

lisp-operand          = 's-expression

selector              = select|selectq

select                = SELECT expression ${WHEN expression THEN expression}
                        [ELSE expression]

selectq               = SELECTQ expression
                        ${WHEN{simple-datum|identifier|($'{simple-datum|identifier})}
                          THEN expression} [ELSE expression]

conditional           = IF expression THEN expression [ELSE expression]

progn                 = [$'expression]

for-loop              = FOR${{{WHILE|UNTIL|WHEN|UNLESS|TOP|BOTTOM}expression}|
                              {BIND bind-list}|
                              {variable{IN|ON|AT|NOW}expression}|
                              {variable←expression[{STEP|RESET}expression]}}
                          DO expression

block                 = {BLOCK|BEGIN}${{label|expression|bind-statement}[;]} END

label                 = identifier

bind-statement        = BIND bind-list

bind-list             = $'{variable[←expression]}

go-statement          = GO label

return-statement      = RETURN expression
```

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Attachment No. 3
10-23-70

BINARY OPERATOR DEFINITIONS AND BINARY STRENGTH

Operator	Hierarchy Seen From the Left	Hierarchy Seen From the Right	Interpretation
←	69	1	(SETQ - -) or (SETA - -)
/	65	65	(QUOTIENT - -)
*	63	63	(*TIMES - -)
+	60	60	(*PLUS - -)
-	60	60	(DIFFERENCE - -)
LAND	58	58	(*LOGAND - -)
LOR	55	55	(*LOGOR - -)
LXOR	51	51	(*LOGXOR - -)
LQ	45	45	(NOT(GREATERP - -))
LS	45	45	(LESSP - -)
GQ	45	45	(NOT(LESSP - -))
GR	45	45	(GREATERP - -)
#	41	41	(NOT(EQ - -))
=	41	41	(EQ - -)
EQUAL	41	41	(EQUAL - -)
UNEQUAL	41	41	(NOT(EQUAL - -))
INTERSECTION	35	35	(INTERSECTION - -)
UNION	32	31	(UNION - -)
@	28	27	(APPEND - -)
&	23	22	(CONS - -)
IN	17	18	(MEMBER - -)
AND	14	14	(AND - -)
OR	11	11	(OR - -)

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