

File created: 20-Aug-2021 20:44:50 {DSK}<Users>kaplan>Local>medley3.5>git-medley>sources>CMLSTRING.;2

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Read Table: INTERLISP

Package: INTERLISP

Format: XCCS

::
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(RPAQQ **CMLSTRINGCOMS**

;; run-time support

(FUNCTIONS CL::SIMPLE-STRING= CL::SIMPLE-STRING-EQUAL)

(FUNCTIONS %%STRING-BASE-COMPARE %%STRING-BASE-COMPARE-EQUAL %%STRING-UPCASE %%STRING-DOWNCASE)

;; User entry points

(FUNCTIONS CL:MAKE-STRING CL:NSTRING-CAPITALIZE CL:NSTRING-DOWNCASE CL:NSTRING-UPCASE STRING
CL:STRING-CAPITALIZE CL:STRING-DOWNCASE STRING-EQUAL CL:STRING-GREATERP CL:STRING-LEFT-TRIM
CL:STRING-LESSP CL:STRING-NOT-EQUAL CL:STRING-NOT-GREATERP CL:STRING-NOT-LESSP
CL:STRING-RIGHT-TRIM CL:STRING-TRIM CL:STRING-UPCASE CL:STRING/= CL:STRING< CL:STRING<=
CL:STRING= CL:STRING> CL:STRING>=)

(OPTIMIZERS CL:STRING= STRING-EQUAL)

;; Internal macros

(DECLARE%: DONTCOPY DOEVAL@COMPILE (FUNCTIONS WITH-ONE-STRING WITH-ONE-STRING-ONLY WITH-STRING
WITH-TWO-UNPACKED-STRINGS %%UNPACK-STRING %%ADJUST-FOR-OFFSET
%%CHECK-BOUNDS %%PARSE-STRING-ARGS %%STRING-LENGTH))

;; Compiler options

(PROP FILETYPE CMLSTRING)

(DECLARE%: DONTEVAL@LOAD DOEVAL@COMPILE DONTCOPY (LOCALVARS . T))))

;; run-time support

(CL:DEFUN **CL::SIMPLE-STRING=** (STRING1 STRING2)

[LET ((END1 (%%STRING-LENGTH STRING1))

(END2 (%%STRING-LENGTH STRING2)))

(CL:IF (EQ END1 END2)

(LET (BASE1 BASE2 OFFSET1 OFFSET2 TYPENUMBER1 TYPENUMBER2)

(%%UNPACK-STRING STRING1 BASE1 OFFSET1 TYPENUMBER1)

(%%UNPACK-STRING STRING2 BASE2 OFFSET2 TYPENUMBER2)

(CL:IF (NOT (EQ 0 OFFSET1))

(SETQ END1 (+ END1 OFFSET1)))

(CL:IF (NOT (EQ 0 OFFSET2))

(SETQ END2 (+ END2 OFFSET2)))

(EQ END1 (%%STRING-BASE-COMPARE BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 OFFSET1 END1 OFFSET2
END2))))])

(CL:DEFUN **CL::SIMPLE-STRING-EQUAL** (STRING1 STRING2)

[LET ((END1 (%%STRING-LENGTH STRING1))

(END2 (%%STRING-LENGTH STRING2)))

(CL:IF (EQ END1 END2)

(LET (BASE1 BASE2 OFFSET1 OFFSET2 TYPENUMBER1 TYPENUMBER2)

(%%UNPACK-STRING STRING1 BASE1 OFFSET1 TYPENUMBER1)

(%%UNPACK-STRING STRING2 BASE2 OFFSET2 TYPENUMBER2)

(CL:IF (NOT (EQ 0 OFFSET1))

(SETQ END1 (+ END1 OFFSET1)))

(CL:IF (NOT (EQ 0 OFFSET2))

(SETQ END2 (+ END2 OFFSET2)))

(EQ END1 (%%STRING-BASE-EQUAL BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 OFFSET1 END1
OFFSET2 END2))))])

(CL:DEFUN **%%STRING-BASE-COMPARE** (BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1 START2 END2)

;; Return index into base1 of first inequality

;; Can use eq for character comparisons because they are immediate datatypes. Can use eq for numeric equality since Indices are always in the
;; fixnum range

(CL:IF (EQ START1 START2)

(CL:DO ((INDEX START1 (CL:1+ INDEX))

(ENDINDEX (MIN END1 END2)))

([OR (EQ INDEX ENDINDEX)

(NOT (EQ (%%ARRAY-READ BASE1 TYPENUMBER1 INDEX)

(%%ARRAY-READ BASE2 TYPENUMBER2 INDEX)

INDEX))

(CL:DO [(INDEX1 START1 (CL:1+ INDEX1))

(INDEX2 START2 (CL:1+ INDEX2))

(ENDINDEX (MIN END1 (+ START1 (- END2 START2))

([OR (EQ INDEX1 ENDINDEX)

```
(NOT (EQ (%%ARRAY-READ BASE1 TYPENUMBER1 INDEX1)
          (%%ARRAY-READ BASE2 TYPENUMBER2 INDEX2]
INDEX1))))
```

(CL:DEFUN **%%STRING-BASE-COMPARE-EQUAL** (BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1 START2 END2)

;; Return index into base1 of first case insensitive inequality
 ;; Can use eq for character comparisons because they are immediate datatypes.
 ;; Char-upcase has been expanded out and simplified below.

```
(CL:IF (EQ START1 START2)
  (CL:DO ((INDEX START1 (CL:1+ INDEX))
          (ENDINDEX (MIN END1 END2)))
    ([OR (EQ INDEX ENDINDEX)
          (NOT (EQ (%%CHAR-UPCASE-CODE (\LOLOC (%%ARRAY-READ BASE1 TYPENUMBER1 INDEX)))
                  (%%CHAR-UPCASE-CODE (\LOLOC (%%ARRAY-READ BASE2 TYPENUMBER2 INDEX]
INDEX))
          (CL:DO [(INDEX1 START1 (CL:1+ INDEX1))
                  (INDEX2 START2 (CL:1+ INDEX2))
                  (ENDINDEX (MIN END1 (+ START1 (- END2 START2]
          ([OR (EQ INDEX1 ENDINDEX)
                (NOT (EQ (%%CHAR-UPCASE-CODE (\LOLOC (%%ARRAY-READ BASE1 TYPENUMBER1 INDEX1)))
                        (%%CHAR-UPCASE-CODE (\LOLOC (%%ARRAY-READ BASE2 TYPENUMBER2 INDEX2]
INDEX1))))))
```

(CL:DEFUN **%%STRING-UPCASE** (STRING START END)

;; Assumes string is a string. Start and end define a subsequence. Destructively upcases string and returns it

```
(LET ((BASE (%%ARRAY-BASE STRING))
      (OFFSET (%%ARRAY-OFFSET STRING))
      (TYPENUMBER (%%ARRAY-TYPE-NUMBER STRING)))
  (%%ADJUST-FOR-OFFSET START END OFFSET)
  (CL:DO ((INDEX START (CL:1+ INDEX))
          ((EQ INDEX END)
           STRING)
          (%%ARRAY-WRITE (CL:CHAR-UPCASE (%%ARRAY-READ BASE TYPENUMBER INDEX))
                          BASE TYPENUMBER INDEX))))
```

(CL:DEFUN **%%STRING-DOWNCASE** (STRING START END)

;; Assumes string is a string. Start and end define a subsequence. Destructively downcases string and returns it

```
(LET ((BASE (%%ARRAY-BASE STRING))
      (OFFSET (%%ARRAY-OFFSET STRING))
      (TYPENUMBER (%%ARRAY-TYPE-NUMBER STRING)))
  (%%ADJUST-FOR-OFFSET START END OFFSET)
  (CL:DO ((INDEX START (CL:1+ INDEX))
          ((EQ INDEX END)
           STRING)
          (%%ARRAY-WRITE (CL:CHAR-DOWNCASE (%%ARRAY-READ BASE TYPENUMBER INDEX))
                          BASE TYPENUMBER INDEX))))
```

;; User entry points

(CL:DEFUN **CL:MAKE-STRING** (SIZE &KEY (INITIAL-ELEMENT NIL INITIAL-ELEMENT-P) FATP)

"Makes a simple string"
 (LET ((STRING (MAKE-VECTOR SIZE :ELEMENT-TYPE 'CL:STRING-CHAR :FATP FATP)))
 (CL:IF INITIAL-ELEMENT-P (FILL-ARRAY STRING INITIAL-ELEMENT)
 STRING))

(CL:DEFUN **CL:NSTRING-CAPITALIZE** (STRING &KEY START END)

"Given a string, returns it with the first letter of every word in uppercase and all other letters in lowercase. A word is defined to be a sequence of alphanumeric characters delimited by non-alphanumeric characters"

```
[WITH-ONE-STRING-ONLY STRING START END (CL:DO ((INDEX START (CL:1+ INDEX))
          (ALPHA-P NIL)
          (WAS-ALPHA-P NIL ALPHA-P)
          CHAR)
        ((EQ INDEX END)
         STRING)
        (SETQ CHAR (CL:CHAR STRING INDEX))
        (SETQ ALPHA-P (CL:ALPHANUMERICP CHAR))
        (CL:SETF (CL:CHAR STRING INDEX)
                  (CL:IF (AND ALPHA-P (NOT WAS-ALPHA-P))
                        (CL:CHAR-UPCASE CHAR)
                        (CL:CHAR-DOWNCASE CHAR)))))]
```

(CL:DEFUN **CL:NSTRING-DOWNCASE** (STRING &KEY START END)

"Given a string, returns that string with all uppercase alphabetic characters converted to lowercase."
 (WITH-ONE-STRING-ONLY STRING START END (%%STRING-DOWNCASE STRING START END)))

```
(CL:DEFUN CL:NSTRING-UPCASE (STRING &KEY START END)
  "Given a string, returns that string with all lower case alphabetic characters converted to uppercase."
  (WITH-ONE-STRING-ONLY STRING START END (%%STRING-UPCASE STRING START END)))
```

```
(CL:DEFUN STRING (X)
  "Coerces X into a string. If X is a string, X is returned. If X is a symbol, X's pname is returned. If X is a
  character then a one element string containing that character is returned. If X cannot be coerced into a
  string, an error occurs."
  (CL:TYPECASE X
    (STRING X)
    (CL:SYMBOL (CL:SYMBOL-NAME X))
    (CL:CHARACTER (CL:MAKE-STRING 1 :INITIAL-ELEMENT X))
    (CL:OTHERWISE (CL:ERROR "~S cannot be coerced into a string" X))))
```

```
(CL:DEFUN CL:STRING-CAPITALIZE (STRING &KEY START END)
  "Given a string, returns a new string that is a copy of it with the first letter of every word in uppercase
  and all other letters in lowercase. A word is defined to be a sequence of alphanumeric characters delimited
  by non-alphanumeric characters"
  (WITH-ONE-STRING STRING START END (LET ((NEW-STRING (CL:MAKE-STRING SLEN)))
    (CL:DOTIMES (INDEX START)
      (CL:SETF (CL:SCHAR NEW-STRING INDEX)
        (CL:CHAR STRING INDEX)))
    (CL:DO ((INDEX START (CL:1+ INDEX))
      (ALPHA-P NIL)
      (WAS-ALPHA-P NIL ALPHA-P)
      CHAR)
      ((EQ INDEX END))
      (SETQ CHAR (CL:CHAR STRING INDEX))
      (SETQ ALPHA-P (CL:ALPHANUMERICP CHAR))
      (CL:SETF (CL:SCHAR NEW-STRING INDEX)
        (CL:IF (AND ALPHA-P (NOT WAS-ALPHA-P))
          (CL:CHAR-UPCASE CHAR)
          (CL:CHAR-DOWNCASE CHAR))))
    (CL:DO ((INDEX END (CL:1+ INDEX))
      (EQ INDEX SLEN))
      (CL:SETF (CL:SCHAR NEW-STRING INDEX)
        (CL:CHAR STRING INDEX)))
    NEW-STRING)))
```

```
(CL:DEFUN CL:STRING-DOWNCASE (STRING &KEY START END)
  "Given a string, returns a new string that is a copy of it with all uppercase case alphabetic characters
  converted to lowercase."
  (WITH-ONE-STRING STRING START END (%%STRING-DOWNCASE (COPY-VECTOR STRING (CL:MAKE-STRING SLEN))
    START END)))
```

```
(CL:DEFUN STRING-EQUAL (STRING1 STRING2 &KEY START1 END1 START2 END2)
  "Compare two strings for case insensitive equality"
  (CL:IF (OR START1 END1 START2 END2)
    [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
      (CL:IF (EQ SLEN1 SLEN2)
        (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
          (EQ END1 (%%STRING-BASE-COMPARE-EQUAL BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1
            END1 START2 END2))))]
    (CL::SIMPLE-STRING-EQUAL STRING1 STRING2)))
```

```
(CL:DEFUN CL:STRING-GREATERP (STRING1 STRING2 &KEY START1 END1 START2 END2)
  "Case insensitive version of STRING>"
  [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
    (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
      (LET* ((INDEX (%%STRING-BASE-COMPARE-EQUAL BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1
        START2 END2))
        (REL-INDEX (- INDEX START1)))
        (COND
          ((EQ REL-INDEX SLEN2)
            (CL:IF (> SLEN1 SLEN2)
              (- INDEX OFFSET1)))
          ((EQ INDEX END1)
            NIL)
          ((CL:CHAR-GREATERP (%ARRAY-READ BASE1 TYPENUMBER1 INDEX)
            (%ARRAY-READ BASE2 TYPENUMBER2 (+ START2 REL-INDEX))))
            (- INDEX OFFSET1]))
```

```
(CL:DEFUN CL:STRING-LEFT-TRIM (CHAR-BAG STRING)
  "Trim only on left"
  (WITH-STRING STRING (LET [(LEFT-END (CL:DO ((INDEX 0 (CL:1+ INDEX)))
    ((OR (EQ INDEX SLEN)
      (NOT (CL:FIND (CL:CHAR STRING INDEX)
        CHAR-BAG)))
      INDEX))]
    (CL:SUBSEQ STRING LEFT-END SLEN))))
```

```
(CL:DEFUN CL:STRING-LESSP (STRING1 STRING2 &KEY START1 END1 START2 END2)
  "Case insensitive version of STRING<"
  [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
    (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
      (LET* ((INDEX (%%STRING-BASE-COMPARE-EQUAL BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1
        START2 END2))
        (REL-INDEX (- INDEX START1)))
        (COND
          ((EQ INDEX END1)
            (CL:IF (< SLEN1 SLEN2)
              (- INDEX OFFSET1)))
          ((EQ (- INDEX START1)
            SLEN2)
            NIL)
          ((CL:CHAR-LESSP (%%ARRAY-READ BASE1 TYPENUMBER1 INDEX)
            (%%ARRAY-READ BASE2 TYPENUMBER2 (+ START2 REL-INDEX)))
            (- INDEX OFFSET1]))))
```

```
(CL:DEFUN CL:STRING-NOT-EQUAL (STRING1 STRING2 &KEY START1 END1 START2 END2)
  "Compare two string for case insensitive equality"
  [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
    (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
      (LET ((INDEX (%%STRING-BASE-COMPARE-EQUAL BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1
        START2 END2))
        (CL:IF (AND (EQ INDEX END1)
          (EQ SLEN1 SLEN2))
          NIL
          (- INDEX OFFSET1))))]
```

```
(CL:DEFUN CL:STRING-NOT-GREATERP (STRING1 STRING2 &KEY START1 END1 START2 END2)
  "Case insensitive version of STRING<="
  [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
    (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
      (LET* ((INDEX (%%STRING-BASE-COMPARE-EQUAL BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1
        START2 END2))
        (REL-INDEX (- INDEX START1)))
        (COND
          ((EQ INDEX END1)
            (- INDEX OFFSET1))
          ((EQ (- INDEX START1)
            SLEN2)
            NIL)
          ((CL:CHAR-NOT-GREATERP (%%ARRAY-READ BASE1 TYPENUMBER1 INDEX)
            (%%ARRAY-READ BASE2 TYPENUMBER2 (+ START2 REL-INDEX)))
            (- INDEX OFFSET1]))))
```

```
(CL:DEFUN CL:STRING-NOT-LESSP (STRING1 STRING2 &KEY START1 END1 START2 END2)
  "Case insensitive version of STRING>="
  [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
    (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
      (LET* ((INDEX (%%STRING-BASE-COMPARE-EQUAL BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1
        START2 END2))
        (REL-INDEX (- INDEX START1)))
        (COND
          ((EQ REL-INDEX SLEN2)
            (- INDEX OFFSET1))
          ((EQ INDEX END1)
            NIL)
          ((CL:CHAR-NOT-LESSP (%%ARRAY-READ BASE1 TYPENUMBER1 INDEX)
            (%%ARRAY-READ BASE2 TYPENUMBER2 (+ START2 REL-INDEX)))
            (- INDEX OFFSET1]))))
```

```
(CL:DEFUN CL:STRING-RIGHT-TRIM (CHAR-BAG STRING)
  "Trim only on right"
  (WITH-STRING STRING (LET [(RIGHT-END (CL:DO ((INDEX (CL:1- SLEN)
    (CL:1- INDEX)))
    ((OR (< INDEX 0)
      (NOT (CL:FIND (CL:CHAR STRING INDEX)
        CHAR-BAG))))
    (CL:1+ INDEX))])
    (CL:SUBSEQ STRING 0 RIGHT-END))))]
```

```
(CL:DEFUN CL:STRING-TRIM (CHAR-BAG STRING)
  ;; Given a set of characters (a list or string) and a string, returns a copy of the string with the characters in the set removed from both ends.
  (WITH-STRING STRING (LET* [(LEFT-END (CL:DO ((INDEX 0 (CL:1+ INDEX))
    ((OR (EQ INDEX SLEN)
      (NOT (CL:FIND (CL:CHAR STRING INDEX)
        CHAR-BAG))))
    INDEX))])
```

```

(RIGHT-END (CL:DO ((INDEX (CL:1- SLEN)
                        (CL:1- INDEX)))
                 ((OR (< INDEX LEFT-END)
                     (NOT (CL:FIND (CL:CHAR STRING INDEX)
                                   CHAR-BAG)))
                  (CL:1+ INDEX))))
(CL:SUBSEQ STRING LEFT-END RIGHT-END)))

```

```

(CL:DEFUN CL:STRING-UPCASE (STRING &KEY START END)
  "Given a string, returns a new string that is a copy of it with all lower case alphabetic characters
  converted to uppercase."
  (WITH-ONE-STRING STRING START END (%%STRING-UPCASE (COPY-VECTOR STRING (CL:MAKE-STRING SLEN))
                                                    START END)))

```

```

(CL:DEFUN CL:STRING/= (STRING1 STRING2 &KEY START1 END1 START2 END2)
  "Compare two strings for case sensitive inequality"
  [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
   (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
    (LET ((INDEX (%%STRING-BASE-COMPARE BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1 START2
                                     END2)))
      (CL:IF (AND (EQ INDEX END1)
                  (EQ SLEN1 SLEN2))
              NIL
              (- INDEX OFFSET1)))]

```

```

(CL:DEFUN CL:STRING< (STRING1 STRING2 &KEY START1 END1 START2 END2)
  "A string A is less than a string B if in the first position in which they differ the character of A is less
  than the corresponding character of B according to char< or if string A is a proper prefix of string B (of
  shorter length and matching in all the characters of A). Returns either NIL or an index into STRING1"
  [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
   (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
    (LET* ((INDEX (%%STRING-BASE-COMPARE BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1 START2
                                     END2))
           (REL-INDEX (- INDEX START1)))
      (COND
       ((EQ INDEX END1)
        (CL:IF (< SLEN1 SLEN2)
                (- INDEX OFFSET1)))
       ((EQ (- INDEX START1)
             SLEN2)
        NIL)
       ((CL:CHAR< (%%ARRAY-READ BASE1 TYPENUMBER1 INDEX)
                  (%%ARRAY-READ BASE2 TYPENUMBER2 (+ START2 REL-INDEX)))
        (- INDEX OFFSET1)))]

```

```

(CL:DEFUN CL:STRING<= (STRING1 STRING2 &KEY START1 END1 START2 END2)
  [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
   (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
    (LET* ((INDEX (%%STRING-BASE-COMPARE BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1 START2
                                     END2))
           (REL-INDEX (- INDEX START1)))
      (COND
       ((EQ INDEX END1)
        (- INDEX OFFSET1))
       ((EQ (- INDEX START1)
             SLEN2)
        NIL)
       ((CL:CHAR<= (%%ARRAY-READ BASE1 TYPENUMBER1 INDEX)
                    (%%ARRAY-READ BASE2 TYPENUMBER2 (+ START2 REL-INDEX)))
        (- INDEX OFFSET1)))]

```

```

(CL:DEFUN CL:STRING= (STRING1 STRING2 &KEY START1 END1 START2 END2)
  "Compare two strings for case sensitive equality"
  (CL:IF (OR START1 END1 START2 END2)
         [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
          (CL:IF (EQ SLEN1 SLEN2)
                 (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
                  (EQ END1 (%%STRING-BASE-COMPARE BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1
                                                    START2 END2)))))]
         (CL::SIMPLE-STRING= STRING1 STRING2)))

```

```

(CL:DEFUN CL:STRING> (STRING1 STRING2 &KEY START1 END1 START2 END2)
  [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
   (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
    (LET* ((INDEX (%%STRING-BASE-COMPARE BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1 START2
                                     END2))
           (REL-INDEX (- INDEX START1)))
      (COND
       ((EQ REL-INDEX SLEN2)
        (CL:IF (> SLEN1 SLEN2)
                (- INDEX OFFSET1)))

```

```

      (EQ INDEX END1)
      NIL)
      ((CL:CHAR> (%ARRAY-READ BASE1 TYPENUMBER1 INDEX)
              (%ARRAY-READ BASE2 TYPENUMBER2 (+ START2 REL-INDEX)))
       (- INDEX OFFSET1))

```

```

(CL:DEFUN CL:STRING>= (STRING1 STRING2 &KEY START1 END1 START2 END2)
  [%%PARSE-STRING-ARGS STRING1 STRING2 START1 END1 START2 END2
   (WITH-TWO-UNPACKED-STRINGS STRING1 STRING2 START1 END1 START2 END2
    (LET* ((INDEX (%STRING-BASE-COMPARE BASE1 TYPENUMBER1 BASE2 TYPENUMBER2 START1 END1 START2
                                END2))
           (REL-INDEX (- INDEX START1)))
      (COND
        ((EQ REL-INDEX SLEN2)
         (- INDEX OFFSET1))
        ((EQ INDEX END1)
         NIL)
        ((CL:CHAR>= (%ARRAY-READ BASE1 TYPENUMBER1 INDEX)
                    (%ARRAY-READ BASE2 TYPENUMBER2 (+ START2 REL-INDEX)))
         (- INDEX OFFSET1))

```

```

(DEFOPTIMIZER CL:STRING= (STRING1 STRING2 &REST OPTIONS)
  (CL:IF OPTIONS
    'COMPILER:PASS
    `(CL::SIMPLE-STRING= ,STRING1 ,STRING2)))

```

```

(DEFOPTIMIZER STRING-EQUAL (STRING1 STRING2 &REST OPTIONS)
  (CL:IF OPTIONS
    'COMPILER:PASS
    `(CL::SIMPLE-STRING-EQUAL ,STRING1 ,STRING2)))

```

:: Internal macros

```

(DECLARE%: DONTCOPY DOEVAL@COMPILE

```

```

(DEFMACRO WITH-ONE-STRING (STRING START END &REST FORMS)
  "WITH-ONE-STRING is used to set up string operations. The keywords are parsed, and STRING is coerced into a
  string. SLEN is bound to the string length"
  `(LET [(SLEN (VECTOR-LENGTH (SETQ ,STRING (STRING ,STRING)
                               (%CHECK-BOUNDS ,START ,END SLEN)
                               ,@FORMS))

```

```

(DEFMACRO WITH-ONE-STRING-ONLY (STRING START END &REST FORMS)
  ;; Like WITH-ONE-STRING but only strings allowed
  `(PROGN (CL:IF (NOT (CL:STRINGP ,STRING))
                 (CL:ERROR 'CONDITIONS:SIMPLE-TYPE-ERROR :EXPECTED-TYPE 'STRING :CULPRIT ,STRING))
          (LET [(SLEN (VECTOR-LENGTH ,STRING)
                 (%CHECK-BOUNDS ,START ,END SLEN)
                 ,@FORMS)))

```

```

(DEFMACRO WITH-STRING (STRING &REST FORMS)
  ;; WITH-STRING is like WITH-ONE-STRING, but doesn't process keywords
  `(LET [(SLEN (VECTOR-LENGTH (SETQ ,STRING (STRING ,STRING)
                               ,@FORMS))

```

```

(DEFMACRO WITH-TWO-UNPACKED-STRINGS (STRING1 STRING2 START1 END1 START2 END2 &REST FORMS)
  ;; Used to set up string comparison operations. String1 and string2 are unpacked and start1, end1, start2, end2 are adjusted for non-zero offsets.
  ;; Base1 and base2, typenumber1, typenumber2, offset1 and offset2 are bound to the appropriate unpacked quantities
  `(LET (BASE1 BASE2 OFFSET1 OFFSET2 TYPENUMBER1 TYPENUMBER2)
        (%UNPACK-STRING ,STRING1 BASE1 OFFSET1 TYPENUMBER1)
        (%UNPACK-STRING ,STRING2 BASE2 OFFSET2 TYPENUMBER2)
        (%ADJUST-FOR-OFFSET ,START1 ,END1 OFFSET1)
        (%ADJUST-FOR-OFFSET ,START2 ,END2 OFFSET2)
        ,@FORMS))

```

```

(DEFMACRO %%UNPACK-STRING (OBJECT BASE OFFSET TYPENUMBER &OPTIONAL LENGTH)
  `[COND
    [(CL:SYMBOLP ,OBJECT)
     (SETQ ,BASE (fetch (LITATOM PNAMEBASE) of ,OBJECT))
     (SETQ ,OFFSET 1)
     (SETQ ,TYPENUMBER (CL:IF (fetch (LITATOM FATNAMEP) of ,OBJECT)
                              %%FAT-CHAR-TYPENUMBER
                              %%THIN-CHAR-TYPENUMBER))
     ,@(CL:IF LENGTH
              `[(SETQ ,LENGTH (fetch (LITATOM PNAMELENGTH) of ,OBJECT)])]
              (T [COND

```

```

[ (%%ONED-ARRAY-P ,OBJECT)
  (SETQ ,BASE (fetch (ARRAY-HEADER BASE) of ,OBJECT))
  (SETQ ,OFFSET (fetch (ARRAY-HEADER OFFSET) of ,OBJECT))
  (SETQ ,TYPENUMBER (fetch (ARRAY-HEADER TYPE-NUMBER) of ,OBJECT)]
(T (SETQ ,BASE (%%ARRAY-BASE ,OBJECT))
  (SETQ ,OFFSET (%%ARRAY-OFFSET ,OBJECT))
  (SETQ ,TYPENUMBER (%%ARRAY-TYPE-NUMBER ,OBJECT))
,@ (CL:IF LENGTH
  `[(SETQ ,LENGTH (fetch (ARRAY-HEADER FILL-POINTER) of ,OBJECT)]))

```

```

(DEFMACRO %%ADJUST-FOR-OFFSET (START END OFFSET)
  `(CL:WHEN (NOT (EQ 0 ,OFFSET))
    (SETQ ,START (+ ,START ,OFFSET))
    (SETQ ,END (+ ,END ,OFFSET)))

```

```

(DEFMACRO %%CHECK-BOUNDS (START END LENGTH)
  `[PROGN [COND
    ((NULL ,END)
     (SETQ ,END ,LENGTH))
    (> ,END ,LENGTH)
     (CL:ERROR "End out of bounds: ~S" ,END)]
  (COND
    ((NULL ,START)
     (SETQ ,START 0))
    (NOT (<= 0 ,START ,END))
     (CL:ERROR "Improper substring bounds: ~s ~s" ,START ,END])

```

```

(DEFMACRO %%PARSE-STRING-ARGS (STRING1 STRING2 START1 END1 START2 END2 &REST FORMS)
  ;; Used to set up string comparison operations. The keywords are defaulted, bounds are checked and Slen1 and Slen1 are bound to substring
  ;; lengths"

```

```

  `(LET [(SLEN1 (%%STRING-LENGTH ,STRING1))
        (SLEN2 (%%STRING-LENGTH ,STRING2))
        (%%CHECK-BOUNDS ,START1 ,END1 SLEN1)
        (%%CHECK-BOUNDS ,START2 ,END2 SLEN2)
        (SETQ SLEN1 (- ,END1 ,START1))
        (SETQ SLEN2 (- ,END2 ,START2))
        ,@FORMS)

```

```

(DEFMACRO %%STRING-LENGTH (STRING)
  `(COND
    ((%STRINGP ,STRING)
     (fetch (ARRAY-HEADER FILL-POINTER) of ,STRING))
    ((CL:SYMBOLP ,STRING)
     (fetch (LITATOM PNAMELENGTH) of ,STRING))
    [(CL:CHARACTERP ,STRING)
     (VECTOR-LENGTH (SETQ ,STRING (STRING ,STRING))
      (T (CL:ERROR 'XCL:TYPE-MISMATCH :EXPECTED-TYPE '(OR STRING CL:SYMBOL CL:CHARACTER)
                  :NAME
                  ,STRING :VALUE ,STRING :MESSAGE "a string, symbol or character")))]
  )

```

;; Compiler options

```

(PUTPROPS CMLSTRING FILETYPE CL:COMPILE-FILE)

(DECLARE%: DONTEVAL@LOAD DOEVAL@COMPILE DONTCOPY

(DECLARE%: DOEVAL@COMPILE DONTCOPY

(LOCALVARS . T)
)
)

(PUTPROPS CMLSTRING COPYRIGHT ("Venue & Xerox Corporation" 1985 1986 1987 1990 2021))

```

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%STRING-UPCASE	2	STRING-EQUAL	3	CL:STRING/=	5
CL:MAKE-STRING	2	CL:STRING-GREATERP	3	CL:STRING<	5
CL:NSTRING-CAPITALIZE	2	CL:STRING-LEFT-TRIM	3	CL:STRING<=	5
CL:NSTRING-DOWNCASE	2	CL:STRING-LESSP	4	CL:STRING=	5
CL:NSTRING-UPCASE	3	CL:STRING-NOT-EQUAL	4	CL:STRING>	5
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