

File created: 16-May-90 18:22:09 {DSK}<usr>local>lde>lispcore>sources>IMPLICIT-KEY-HASH.;2

changes to: (IL:VARS IL:IMPLICIT-KEY-HASHCOMS)

previous date: 24-Jan-88 16:54:16 {DSK}<usr>local>lde>lispcore>sources>IMPLICIT-KEY-HASH.;1

Read Table: XCL

Package: XEROX-COMMON-LISP

Format: XCCS

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(IL:RPAQQ IL:IMPLICIT-KEY-HASHCOMS ((IL:STRUCTURES IMPLICIT-KEY-HASH-TABLE)
  (IL:VARIABLES *DELETED-IMPLICIT-HASH-SLOT*)
  (IL:FUNCTIONS MAKE-IMPLICIT-KEY-HASH-TABLE GET-IMPLICIT-KEY-HASH
    PUT-IMPLICIT-KEY-HASH IMPLICIT-KEY-MAP-HASH CLEAR-IMPLICIT-KEY-HASH
    IMPLICIT-KEY-REHASH ADJUST-IMPLICIT-KEY-HASH)
  (IL:FUNCTIONS GET-IK-VALUE PUT-IK-VALUE GET-IK-KEY REPROBE 16BIT++)
  (IL:SETFS GET-IMPLICIT-KEY-HASH GET-IK-VALUE)
  (FILE-ENVIRONMENTS "IMPLICIT-KEY-HASH"))))

(DEFSTRUCT (IMPLICIT-KEY-HASH-TABLE (:CONC-NAME IK-HASH-)
  (:CONSTRUCTOR %MAKE-IK-HASH-TABLE)
  (:COPIER NIL)
  (:PREDICATE NIL)
  (:FAST-ACCESSORS T))

  BASE
  (LAST-INDEX 0 :TYPE (UNSIGNED-BYTE 16))
  (NUM-SLOTS 0 :TYPE (UNSIGNED-BYTE 16))
  (NUM-KEYS 0 :TYPE (UNSIGNED-BYTE 16))
  (NULL-SLOTS 0 :TYPE (UNSIGNED-BYTE 16))
  KEY-ACCESSOR)

(DEFVAR *DELETED-IMPLICIT-HASH-SLOT* "Unique string")

(DEFUN MAKE-IMPLICIT-KEY-HASH-TABLE (&OPTIONAL (MIN-KEYS 20)
  (KEY-ACCESSOR :FIRST))
  ;; Does eq hashing
  (LET* ((NUM-SLOTS
    ;; num-slots is always a power of two
    (DO ((IDEAL-SIZE (ASH (TRUNCATE (1- MIN-KEYS)
      3)
      2))
      ((I 8 (+ I I)))
      ((> I IDEAL-SIZE)
      I)))
    (LOGICAL-SLOTS
    ;; 75% of NUM-SLOTS
    (+ (ASH NUM-SLOTS -1)
      (ASH NUM-SLOTS -2))))
    (%MAKE-IK-HASH-TABLE :BASE (IL:\\ALLOCBLOCK NUM-SLOTS IL:PTRBLOCK.GCT)
      :LAST-INDEX
      (1- NUM-SLOTS)
      :NUM-SLOTS LOGICAL-SLOTS :NUM-KEYS 0 :NULL-SLOTS LOGICAL-SLOTS :KEY-ACCESSOR KEY-ACCESSOR)))

(DEFUN GET-IMPLICIT-KEY-HASH (ITEM IK-HASH-TABLE)
  (IF (NOT (TYPEP IK-HASH-TABLE 'IMPLICIT-KEY-HASH-TABLE))
    (ERROR "Not an implicit key hash table: ~s" IK-HASH-TABLE))
  ;; Do first index outside of loop, so don't have to do setup on fast case
  (PROG* ((BITS (IL:\\EQHASHINGBITS ITEM))
    (LIMIT (IK-HASH-LAST-INDEX IK-HASH-TABLE))
    (INDEX (LOGAND BITS LIMIT))
    (BASE (IK-HASH-BASE IK-HASH-TABLE))
    (VALUE (GET-IK-VALUE BASE INDEX))
    (KEY-ACCESSOR (IK-HASH-KEY-ACCESSOR IK-HASH-TABLE))
    (DELETED-INDICATOR *DELETED-IMPLICIT-HASH-SLOT*)
    REPROBE)
    (COND
      ((EQ VALUE DELETED-INDICATOR)
      ;; Deleted slot -- continue
      )
      (VALUE
      ;; Slot is occupied
      (IF (EQ ITEM (GET-IK-KEY VALUE KEY-ACCESSOR))
        (GO FOUND)
        ;; Else try again
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    ))
    (T ;; Null slot
      (RETURN NIL)))
;; Compute reprobe interval
  (SETQ REPROBE (REPROBE BITS LIMIT))
  LP
;; Since table size is a power of two, any wraparound in the IPLUS16 will be consistent with the LOGAND
  (SETQ INDEX (LOGAND (16BIT+ INDEX REPROBE)
                      LIMIT))
  (SETQ VALUE (GET-IK-VALUE BASE INDEX))
  (COND
   ((EQ VALUE DELETED-INDICATOR)
    ;; Deleted slot -- continue
   )
   (VALUE ;; Slot is occupied
    (IF (EQ ITEM (GET-IK-KEY VALUE KEY-ACCESSOR))
        (GO FOUND)
        ;; Else try again
    ))
   (T ;; Null slot
    (RETURN NIL)))
  (GO LP)
FOUND
(RETURN VALUE)))

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(DEFUN PUT-IMPLICIT-KEY-HASH (ITEM IK-HASH-TABLE NEW-VALUE)

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;; Puthash nil is equivalent to remhash for these tables
(IF (NOT (TYPEP IK-HASH-TABLE 'IMPLICIT-KEY-HASH-TABLE))
    (ERROR "Not an implicit key hash table: ~s" IK-HASH-TABLE))
(PROG ((BITS (IL:\EQHASHINGBITS ITEM))
      (LIMIT (IK-HASH-LAST-INDEX IK-HASH-TABLE))
      (BASE (IK-HASH-BASE IK-HASH-TABLE))
      (KEY-ACCESSOR (IK-HASH-KEY-ACCESSOR IK-HASH-TABLE))
      (DELETED-INDICATOR *DELETED-IMPLICIT-HASH-SLOT*)
      INDEX VALUE FIRST-INDEX REPROBE DELETED-SLOT-INDEX)
  PHTOP

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;; Handle first probe outside loop in case it wins
  (SETQ INDEX (LOGAND BITS LIMIT))
  (SETQ VALUE (GET-IK-VALUE BASE INDEX))
  (COND
   ((EQ VALUE DELETED-INDICATOR)
    ;; Found a deleted slot -- continue lookup
    (SETQ DELETED-SLOT-INDEX INDEX))
   (VALUE ;; Slot is occupied
    (IF (EQ ITEM (GET-IK-KEY VALUE KEY-ACCESSOR))
        (GO FOUND)
        ;; else try again
    ))
   (T ;; Empty slot
    (GO ADDNEWENTRY)))

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;; Chase reprobe chain
  (SETQ FIRST-INDEX INDEX)
  (SETQ REPROBE (REPROBE BITS LIMIT))
  LP (SETQ INDEX (LOGAND (16BIT+ INDEX REPROBE)
                       LIMIT))
    (WHEN (EQ INDEX FIRST-INDEX)
      ;; We don't allow full occupancy, so if we get to the beginning without finding an empty slot, we must have found a deleted one
      (SETQ INDEX (OR DELETED-SLOT-INDEX (ERROR "No vacant slot in Implicit key hash table: ~s"
                                                IK-HASH-TABLE)))
      (GO ADDNEWENTRY))
    (SETQ VALUE (GET-IK-VALUE BASE INDEX))
    (COND
     ((EQ VALUE DELETED-INDICATOR)
      ;; Found a deleted slot -- continue lookup
      (SETQ DELETED-SLOT-INDEX INDEX))
     (VALUE ;; Slot is occupied
    ))

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      (IF (EQ ITEM (GET-IK-KEY VALUE KEY-ACCESSOR))
          (GO FOUND)
          ;; else try again
      ))
    (T ;; Empty slot
      (IF DELETED-SLOT-INDEX (SETQ INDEX DELETED-SLOT-INDEX))
      (GO ADDNEWENTRY)))
  (GO LP)
FOUND
  (IL:UNINTERRUPTABLY
    (SETF (GET-IK-VALUE BASE INDEX)
          (OR NEW-VALUE DELETED-INDICATOR))
    (IF (NULL NEW-VALUE)
        (DECF (IK-HASH-NUM-KEYS IK-HASH-TABLE))))
  (RETURN NEW-VALUE)
  ADDNEWENTRY

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;; Didn't find this item in table.

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  (IF (NULL NEW-VALUE)
      ;; Nothing to add
      (RETURN NEW-VALUE))
  (WHEN (EQ 0 (IK-HASH-NUM-SLOTS IK-HASH-TABLE))
    (IL:UNINTERRUPTABLY
      (LET* ((NUM-SLOTS (IK-HASH-NUM-SLOTS IK-HASH-TABLE))
            (NEW-ARRAY (IMPLICIT-KEY-REHASH IK-HASH-TABLE (MAKE-IMPLICIT-KEY-HASH-TABLE
                                                                ;; 1.5 times NUM-SLOTS
                                                                (+ NUM-SLOTS (ASH (1+ NUM-SLOTS)
                                                                -1))
                                                                KEY-ACCESSOR))))))
        (SETQ IK-HASH-TABLE (ADJUST-IMPLICIT-KEY-HASH IK-HASH-TABLE NEW-ARRAY))
        ;; update local state
        (SETQ LIMIT (IK-HASH-LAST-INDEX IK-HASH-TABLE))
        (SETQ BASE (IK-HASH-BASE IK-HASH-TABLE))
        ;; Non-NIL DELSLOT is an index into the old array
        (SETQ DELETED-SLOT-INDEX NIL)))
    (GO PHTOP))
  (IL:UNINTERRUPTABLY
    (IF (NOT (EQ INDEX DELETED-SLOT-INDEX))
        (DECF (IK-HASH-NUM-SLOTS IK-HASH-TABLE)))
    (INCF (IK-HASH-NUM-KEYS IK-HASH-TABLE))
    (SETF (GET-IK-VALUE BASE INDEX)
          NEW-VALUE))
  (RETURN NEW-VALUE))

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(DEFUN IMPLICIT-KEY-MAP-HASH (FN IK-HASH-TABLE)
  (IF (NOT (TYPEP IK-HASH-TABLE 'IMPLICIT-KEY-HASH-TABLE))
      (ERROR "Not an implicit key hash table: ~s" IK-HASH-TABLE))
  (LET* ((BASE (IK-HASH-BASE IK-HASH-TABLE))
        (LAST-INDEX (1+ (IK-HASH-LAST-INDEX IK-HASH-TABLE)))
        (LAST-ADDRESS (IL:\ADDBASE (IL:\ADDBASE BASE LAST-INDEX)
                                     LAST-INDEX))
        (KEY-ACCESSOR (IK-HASH-KEY-ACCESSOR IK-HASH-TABLE))
        (NULL-SLOT-INDICATOR *DELETED-IMPLICIT-HASH-SLOT*)
        VALUE)
    (LOOP (IF (EQ BASE LAST-ADDRESS)
              (RETURN NIL))
          (SETQ VALUE (IL:\GETBASEPTR BASE 0))
          (IF (AND VALUE (NOT (EQ VALUE NULL-SLOT-INDICATOR)))
              (FUNCALL FN VALUE (GET-IK-KEY VALUE KEY-ACCESSOR)))
          (SETQ BASE (IL:\ADDBASE BASE 2))))))

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(DEFUN CLEAR-IMPLICIT-KEY-HASH (IK-HASH-TABLE)
  (IF (NOT (TYPEP IK-HASH-TABLE 'IMPLICIT-KEY-HASH-TABLE))
      (ERROR "Not an implicit key hash table: ~s" IK-HASH-TABLE))
  (LET* ((BASE (IK-HASH-BASE IK-HASH-TABLE))
        (LAST-INDEX (1+ (IK-HASH-LAST-INDEX IK-HASH-TABLE)))
        (LAST-ADDRESS (IL:\ADDBASE (IL:\ADDBASE BASE LAST-INDEX)
                                     LAST-INDEX)))
    (IL:UNINTERRUPTABLY
      (LOOP (IF (EQ BASE LAST-ADDRESS)
                (RETURN NIL))
            (IL:\RPLPTR BASE 0 NIL)
            (SETQ BASE (IL:\ADDBASE BASE 2)))
      (SETF (IK-HASH-NUM-SLOTS IK-HASH-TABLE)
            (IK-HASH-NUM-SLOTS IK-HASH-TABLE))
      (SETF (IK-HASH-NUM-KEYS IK-HASH-TABLE)
            0))
    IK-HASH-TABLE))

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(DEFUN IMPLICIT-KEY-REHASH (FROM-TABLE TO-TABLE)
  (IF (NOT (TYPEP FROM-TABLE 'IMPLICIT-KEY-HASH-TABLE))
    (ERROR "Not an implicit key hash table: ~s" FROM-TABLE))
  (CLEAR-IMPLICIT-KEY-HASH TO-TABLE)
  (IF (NOT (< (IK-HASH-NUM-SLOTS FROM-TABLE)
              (IK-HASH-NUM-SLOTS TO-TABLE)))
    (ERROR "To table too small: ~s" TO-TABLE))
  (LET* ((FROM-BASE (IK-HASH-BASE FROM-TABLE))
         (FROM-LAST-INDEX (1+ (IK-HASH-LAST-INDEX FROM-TABLE)))
         (LAST-ADDRESS (IL:\ADDBASE (IL:\ADDBASE FROM-BASE FROM-LAST-INDEX)
                                     FROM-LAST-INDEX))
         (KEY-ACCESSOR (IK-HASH-KEY-ACCESSOR FROM-TABLE))
         (NULL-SLOT-INDICATOR *DELETED-IMPLICIT-HASH-SLOT*)
         VALUE)
    (LOOP (IF (EQ FROM-BASE LAST-ADDRESS)
              (RETURN TO-TABLE))
          (SETQ VALUE (IL:\GETBASEPTR FROM-BASE 0))
          (IF (AND VALUE (NOT (EQ VALUE NULL-SLOT-INDICATOR)))
              (PUT-IMPLICIT-KEY-HASH (GET-IK-KEY VALUE KEY-ACCESSOR)
                                       TO-TABLE VALUE))
            (SETQ FROM-BASE (IL:\ADDBASE FROM-BASE 2))))))

(DEFUN ADJUST-IMPLICIT-KEY-HASH (OLD-IK-TABLE NEW-IK-TABLE)
  (IL:UNINTERRUPTABLY
    (SETF (IK-HASH-BASE OLD-IK-TABLE)
          (IK-HASH-BASE NEW-IK-TABLE))
    (SETF (IK-HASH-LAST-INDEX OLD-IK-TABLE)
          (IK-HASH-LAST-INDEX NEW-IK-TABLE))
    (SETF (IK-HASH-NUM-SLOTS OLD-IK-TABLE)
          (IK-HASH-NUM-SLOTS NEW-IK-TABLE))
    (SETF (IK-HASH-NUM-KEYS OLD-IK-TABLE)
          (IK-HASH-NUM-KEYS NEW-IK-TABLE))
    (SETF (IK-HASH-NULL-SLOTS OLD-IK-TABLE)
          (IK-HASH-NULL-SLOTS NEW-IK-TABLE))
    (SETF (IK-HASH-KEY-ACCESSOR OLD-IK-TABLE)
          (IK-HASH-KEY-ACCESSOR NEW-IK-TABLE)))
  OLD-IK-TABLE)

(DEFMACRO GET-IK-VALUE (BASE INDEX)
  `(IL:\GETBASEPTR ,BASE (IL:LSH ,INDEX 1)))

(DEFMACRO PUT-IK-VALUE (BASE INDEX NEW-VALUE)
  `(IL:\RPLPTR ,BASE (IL:LSH ,INDEX 1)
    ,NEW-VALUE))

(DEFMACRO GET-IK-KEY (VALUE KEY-ACCESSOR)
  (ONCE-ONLY (VALUE KEY-ACCESSOR)
    `(IF (EQ KEY-ACCESSOR :FIRST)
        (IL:\GETBASEPTR ,VALUE 0)
        (FUNCALL ,KEY-ACCESSOR ,VALUE))))

(DEFMACRO REPROBE (BITS LAST-INDEX)
  `(LOGIOR (LOGAND (LOGXOR ,BITS (IL:LRSH ,BITS 8))
               (MIN 63 ,LAST-INDEX))
    1))

(DEFMACRO 16BIT+ (A B)
  `(IL:\LOLOC (IL:\ADDBASE ,A ,B)))

(DEFSETF GET-IMPLICIT-KEY-HASH PUT-IMPLICIT-KEY-HASH)

(DEFSETF GET-IK-VALUE PUT-IK-VALUE)

(DEFINE-FILE-ENVIRONMENT "IMPLICIT-KEY-HASH" :READTABLE "XCL"
  :PACKAGE "XCL"
  :COMPILER :COMPILE-FILE)

(IL:PUTPROPS IL:IMPLICIT-KEY-HASH IL:COPYRIGHT ("Venue & Xerox Corporation" 1987 1988 1990))

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