File created: 21-Aug-2022 18:08:56 **{DSK}<home>larry>medley>lispusers>HANOI.;2**

changes to: (VARS HANOICOMS)

previous date: 25-Feb-86 19:07:01 {DSK}<home>larry>medley>lispusers>HANOI.;1

Read Table: INTERLISP

Package: INTERLISP

Format: XCCS

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(RPAQQ HANOICOMS
       ((FNS DISPLAYPEGSANDRINGS DOHANOI FINDOTHER HANOI HANOIDEMO MOVEDIS MOVERING RINGSHADE SETUPRINGBITMAPS
             TRACK WHANOI XHANOI)
        (VARS (HANOIWINDOW))
        (DECLARE%: DONTCOPY (RECORDS PEG RING)
               (CONSTANTS XRINGSHADE ORINGSHADE XPEGSHADE)
               (CONSTANTS PEGMIN HANOIMARGIN (MAXVERTSPEED 30)
                      (MAXHORIZSPEED 44))
               (MACROS PEGN))
        (VARS EVENRINGSHADE ODDRINGSHADE PEGSHADE)
        (ALISTS (IDLE.FUNCTIONS Hanoi HanoiUsername))))

(DEFINEQ

(DISPLAYPEGSANDRINGS
  [LAMBDA (PEGS W)                                          (* edited%: " 1-Oct-84 12:41")
                                                            (* displays the pegs and the rings on them.)
    (for PEG in PEGS do (\CLEARBM W PEGSHADE (fetch PEGREGION of PEG))
                        (for RING in (fetch RINGS of PEG) do (\CLEARBM W (RINGSHADE (fetch RINGNUMBER of RING))
                                                                         (fetch RINGREGION of RING))
                                                             (COND
                                                                ((fetch RINGLABEL of RING)
                                                                 (CENTERPRINTINREGION (fetch RINGLABEL of RING)
                                                                        (fetch RINGREGION of RING)
                                                                        W])

(DOHANOI
  [LAMBDA (N SRC DST W)                                     (* lmm " 8-MAR-82 12:05")
    (COND
       ((EQ N 1)
        (MOVERING SRC DST W))
       (T (DOHANOI (SUB1 N)
                 SRC
                 (FINDOTHER SRC DST)
                 W)
          (MOVERING SRC DST W)
          (DOHANOI (SUB1 N)
                 (FINDOTHER SRC DST)
                 DST W])

(FINDOTHER
  [LAMBDA (S D)                                             (* bas%: "10-DEC-80 14:01")
    (for Z from 1 to 3 thereis (NOT (OR (EQ Z S)
                                        (EQ Z D])

(HANOI
  [LAMBDA (NRINGS WINDOW FONT ONCE)                         (* lmm " 9-MAR-82 09:52")
    (WHANOI NRINGS WINDOW FONT ONCE])

(HANOIDEMO
  [LAMBDA NIL                                               (* lmm "17-Feb-86 14:58")
    (PROG (HANOI.MOUSE.SPEED)
          (WHANOI 7 [COND
                        ((TYPENAMEP HANOIWINDOW 'WINDOW)
                         HANOIWINDOW)
                        (T (SETQ HANOIWINDOW
                            (CREATEW (create REGION
                                             LEFT _ 4
                                             BOTTOM _ 340
                                             WIDTH _ 500
                                             HEIGHT _ 300]
                 NIL T])

(MOVEDIS
  [LAMBDA (RING DY SX DX W)                                 (* lmm "17-Feb-86 14:58")
```

```
        (* moves RING from its position on the source peg whose left is SX to the peg whose left is DX at a height of DY)

    (PROG ((RINGREGION (fetch RINGREGION of RING))
           RINGWIDTH HORIZWIDTH MOVERIGHTFLG)
          [COND
             (HANOI.MOUSE.SPEED (GETMOUSESTATE)                    (* IPLUS 16 is because cursor can go negative.)
                    (SETQ VERTSPEED (IMIN (IMAX (IDIFFERENCE 17 (IQUOTIENT LASTMOUSEY 50))
                                                1)
                                          MAXVERTSPEED))
                    (SETQ HORIZSPEED (IMIN (IMAX (ADD1 (IQUOTIENT LASTMOUSEX 50))
                                                 1)
                                           MAXHORIZSPEED]
          (SETUPRINGBITMAPS RING (SETQ RINGWIDTH (fetch WIDTH of RINGREGION))
                 (SETQ MOVERIGHTFLG (IGREATERP DX SX))
                 W)                                                (* PROG is because FOR loop bug.)
          (PROG ((I (fetch BOTTOM of RINGREGION))
                 (TOPLIMIT (IDIFFERENCE PEGTOP VERTSPEED)))
            LP   (COND
                    ((IGREATERP TOPLIMIT I)
                     (BITBLT UPRINGBM 0 0 W SX I RINGWIDTH (IPLUS RINGHEIGHT VERTSPEED)
                            'INPUT
                            'REPLACE)
                     (SETQ I (IPLUS VERTSPEED I))
                     (GO LP)))
                 (BITBLT UPRINGBM 0 (IDIFFERENCE I TOPLIMIT)
                        W SX I RINGWIDTH (IPLUS RINGHEIGHT VERTSPEED)
                        'INPUT
                        'REPLACE))
          (BITBLT TOPUPRINGBM 0 0 W SX PEGTOP RINGWIDTH (IPLUS RINGHEIGHT VERTSPEED)
                 'INPUT
                 'REPLACE)
          (SETQ HORIZWIDTH (IPLUS RINGWIDTH HORIZSPEED))
          (for I from (COND
                        (MOVERIGHTFLG SX)
                        (T (IDIFFERENCE SX HORIZSPEED)))
             to (COND
                   (MOVERIGHTFLG (SUB1 (IDIFFERENCE DX HORIZSPEED)))
                   (T (ADD1 DX)))
             by (ITIMES (COND
                           ((IGREATERP DX SX)
                            1)
                           (T -1))
                        HORIZSPEED)
             do (BITBLT HORIZRINGBM 0 0 W I (IPLUS PEGTOP VERTSPEED)
                        HORIZWIDTH RINGHEIGHT 'INPUT 'REPLACE))
          (BITBLT HORIZRINGBM 0 0 W (COND
                                      (MOVERIGHTFLG (IDIFFERENCE DX HORIZSPEED))
                                      (T DX))
                 (IPLUS PEGTOP VERTSPEED)
                 HORIZWIDTH NIL 'INPUT 'REPLACE)                   (* Update the ring region's left)
          (replace LEFT of RINGREGION with (IPLUS (fetch LEFT of RINGREGION)
                                                  (IDIFFERENCE DX SX)))
          (for I from PEGTOP to (SUB1 (IDIFFERENCE PEGTOP RINGHEIGHT)) by (IMINUS VERTSPEED)
             do (BITBLT TOPDOWNRINGBM NIL NIL W DX I RINGWIDTH (IPLUS RINGHEIGHT VERTSPEED)
                        'INPUT
                        'REPLACE))
          (BITBLT TOPDOWNRINGBM NIL NIL W DX (IDIFFERENCE PEGTOP RINGHEIGHT)
                 RINGWIDTH
                 (IPLUS RINGHEIGHT VERTSPEED)
                 'INPUT
                 'REPLACE)
          (PROG [(I (IDIFFERENCE PEGTOP (IPLUS VERTSPEED RINGHEIGHT]
            LP   (COND
                    ((IGREATERP DY I)                              (* blt last ring image)
                     (BITBLT DOWNRINGBM 0 0 W DX DY RINGWIDTH (COND
                                                                ((IGREATERP VERTSPEED RINGHEIGHT)
                                                                 (IDIFFERENCE (IPLUS RINGHEIGHT VERTSPEED)
                                                                        (IDIFFERENCE DY I)))
                                                                (T (IPLUS RINGHEIGHT VERTSPEED)))
                            'INPUT
                            'REPLACE)
                     (RETURN)))
                 (BITBLT DOWNRINGBM 0 0 W DX I RINGWIDTH (IPLUS RINGHEIGHT VERTSPEED)
                        'INPUT
                        'REPLACE)
                 (SETQ I (IDIFFERENCE I VERTSPEED))
                 (GO LP))
          (replace BOTTOM of RINGREGION with DY)
          (RETURN RING])

(MOVERING
  [LAMBDA (SRC DST W)                                              (* rrb " 2-AUG-82 17:41")
    (PROG ([X (fetch RINGREGION of (CAR (fetch RINGS of (PEGN DST]
           RING)
          (push (fetch RINGS of (PEGN DST))
                (MOVEDIS [SETQ RING (pop (fetch RINGS of (PEGN SRC]
```

```
                    (IPLUS (fetch BOTTOM of X)
                           (fetch HEIGHT of X))
                    (TRACK SRC (fetch RINGREGION of RING))
                    (TRACK DST (fetch RINGREGION of RING))
                    W))
        (BLOCK])
```

(RINGSHADE

```
  [LAMBDA (RINGN)                                          (* rrb " 9-JUN-81 15:11")
    (COND
       ((EQ RINGN 'BASE)
        PEGSHADE)
       ((ZEROP (LOGAND RINGN 1))
        EVENRINGSHADE)
       (T ODDRINGSHADE])
```

(SETUPRINGBITMAPS

```
  [LAMBDA (RING RINGWIDTH MOVERIGHTFLG W)                  (* edited%: " 1-Oct-84 12:43")
```

(* sets up the ring bitmaps. There are 5 ring bitmaps%: up while on peg, up above peg, horizontal, down above peg and down while on peg.)

```
    (PROG ((PEGOFFSET (IQUOTIENT (IDIFFERENCE RINGWIDTH PEGWIDTH)
                                 2))
           (RINGREGION (fetch RINGREGION of RING))
           (RINGN (fetch RINGNUMBER of RING)))
          (AND FONT (DSPFONT FONT RDEST))
          (DSPOPERATION 'ERASE RDEST)
          [PROGN (\CLEARBM UPRINGBM)
                 (BITBLT NIL NIL NIL UPRINGBM 0 VERTSPEED RINGWIDTH RINGHEIGHT 'TEXTURE 'REPLACE (RINGSHADE
                                                                                                  RINGN))
                                                           (* put in peg)
                 (BITBLT NIL NIL NIL UPRINGBM PEGOFFSET 0 PEGWIDTH VERTSPEED 'TEXTURE 'REPLACE PEGSHADE)
                 (COND
                    ((fetch RINGLABEL of RING)             (* print in label if there is one.)
                     (DSPDESTINATION UPRINGBM RDEST)
                     (CENTERPRINTINAREA (fetch RINGLABEL of RING)
                            0 VERTSPEED RINGWIDTH RINGHEIGHT RDEST]
          [PROGN (\CLEARBM TOPUPRINGBM)
                 (BITBLT NIL NIL NIL TOPUPRINGBM 0 VERTSPEED RINGWIDTH RINGHEIGHT 'TEXTURE 'REPLACE (RINGSHADE
                                                                                                     RINGN))
                 (COND
                    ((fetch RINGLABEL of RING)             (* print in label if there is one.)
                     (DSPDESTINATION TOPUPRINGBM RDEST)
                     (CENTERPRINTINAREA (fetch RINGLABEL of RING)
                            0 VERTSPEED RINGWIDTH RINGHEIGHT RDEST]
          [PROGN (\CLEARBM DOWNRINGBM)
                 (BITBLT NIL NIL NIL DOWNRINGBM 0 0 RINGWIDTH RINGHEIGHT 'TEXTURE 'REPLACE (RINGSHADE RINGN))
                 (COND
                    ((fetch RINGLABEL of RING)             (* print in label if there is one.)
                     (DSPDESTINATION DOWNRINGBM RDEST)
                     (CENTERPRINTINAREA (fetch RINGLABEL of RING)
                            0 0 RINGWIDTH RINGHEIGHT RDEST)))   (* put in peg)
                 (BITBLT NIL NIL NIL DOWNRINGBM PEGOFFSET RINGHEIGHT PEGWIDTH VERTSPEED 'TEXTURE 'REPLACE
                        PEGSHADE))
          [PROGN (\CLEARBM TOPDOWNRINGBM)
                 (BITBLT NIL NIL NIL TOPDOWNRINGBM 0 0 RINGWIDTH RINGHEIGHT 'TEXTURE 'REPLACE (RINGSHADE RINGN)
                        )
                 (COND
                    ((fetch RINGLABEL of RING)             (* print in label if there is one.)
                     (DSPDESTINATION TOPDOWNRINGBM RDEST)
                     (CENTERPRINTINAREA (fetch RINGLABEL of RING)
                            0 0 RINGWIDTH RINGHEIGHT RDEST]
          [PROGN (\CLEARBM HORIZRINGBM)
                 (BITBLT NIL NIL NIL HORIZRINGBM (COND
                                                    (MOVERIGHTFLG HORIZSPEED)
                                                    (T 0))
                        0 RINGWIDTH RINGHEIGHT 'TEXTURE 'REPLACE (RINGSHADE RINGN))
                 (COND
                    ((fetch RINGLABEL of RING)             (* print in label if there is one.)
                     (DSPDESTINATION HORIZRINGBM RDEST)
                     (CENTERPRINTINAREA (fetch RINGLABEL of RING)
                            (COND
                               (MOVERIGHTFLG HORIZSPEED)
                               (T 0))
                            0 RINGWIDTH RINGHEIGHT RDEST]
          (RETURN])
```

(TRACK

```
  [LAMBDA (PN REGION)                                      (* lmm " 8-MAR-82 12:10")
                                                           (* returns the track offset for ring movement on a peg.)
    (IPLUS HANOIMARGIN (IPLUS (ITIMES RINGLARGEST (SUB1 PN))
                              (IQUOTIENT (IDIFFERENCE RINGLARGEST (fetch WIDTH of REGION))
                                     2])
```

```
(WHANOI
  [LAMBDA (RINGS W FONT ONCE)                                    (* lmm " 3-Dec-85 12:51")
                                                                 (* runs hanoi in a region of a displaystream)
    (PROG ([REGION (DSPCLIPPINGREGION NIL (SETQ W (COND
                                                    [(NULL W)
                                                     (OR HANOIWINDOW (SETQ HANOIWINDOW (CREATEW]
                                                    ((WINDOWP W))
                                                    (T (CREATEW W]
           [NRINGS (COND
                      ((NUMBERP RINGS)
                       RINGS)
                      (T (LENGTH RINGS]
           (HORIZSPEED 21)
           (VERTSPEED 17)
           PEGS RINGBM TOPUPRINGBM RINGLARGEST TOPDOWNRINGBM PEGWIDTH BASEWIDTH RINGHEIGHT MOVEMENTHEIGHT
           BASEHEIGHT PEGTOP RINGDISPLAYSTREAM HANOIWINDOW RINGDELTA UPRINGBM HORIZRINGBM DOWNRINGBM
           (RDEST (DSPCREATE)))
          (DECLARE (SPECVARS . T))
          (PROG (IMAGEHEIGHT)
                (SETQ BASEWIDTH (IDIFFERENCE (fetch WIDTH of REGION)
                                   (ITIMES HANOIMARGIN 2)))
                (SETQ RINGLARGEST (IQUOTIENT BASEWIDTH 3))       (* RINGDELTA is the difference in peg size on each side.)
                (COND
                   ([ZEROP (SETQ RINGDELTA (IQUOTIENT (IDIFFERENCE RINGLARGEST PEGMIN)
                                                      (ADD1 (ITIMES NRINGS 2]
                    (HELP "Not enough width for a display.")))

          (* leave one ring width for base, one for top of peg and two above peg for movement.
          Doesn't really use two heights at top, only one plus VERTSPEED)

                (SETQ RINGHEIGHT (IQUOTIENT (SETQ IMAGEHEIGHT (IDIFFERENCE (fetch HEIGHT of REGION)
                                                                  (ITIMES HANOIMARGIN 2)))
                                            (IPLUS NRINGS 4)))
                (COND
                   ((ZEROP RINGHEIGHT)
                    (HELP "Not enough height for display.")))
                (SETQ PEGWIDTH (IQUOTIENT (IDIFFERENCE RINGLARGEST (ITIMES RINGDELTA (SUB1 NRINGS)
                                                                           2))
                                          3))                    (* put extra in base if it comes out closer to pegwidth.)
                (COND
                   [(IGREATERP PEGWIDTH RINGHEIGHT)
                    (SETQ BASEHEIGHT (IMIN PEGWIDTH (IPLUS RINGHEIGHT (IDIFFERENCE IMAGEHEIGHT
                                                                          (ITIMES (IPLUS NRINGS 4)
                                                                                  RINGHEIGHT]
                   (T (SETQ BASEHEIGHT RINGHEIGHT)))
                (SETQ MOVEMENTHEIGHT (IPLUS [SETQ PEGTOP (IPLUS HANOIMARGIN BASEHEIGHT (ITIMES RINGHEIGHT
                                                                                               (ADD1 NRINGS]
                                            VERTSPEED))
                (DSPFONT FONT RDEST)
                (DSPFONT FONT W)
                (DSPOPERATION 'ERASE RDEST)
                (DSPOPERATION 'ERASE W))
          [PROG ((BASE (create REGION
                               LEFT _ HANOIMARGIN
                               BOTTOM _ HANOIMARGIN
                               WIDTH _ BASEWIDTH
                               HEIGHT _ BASEHEIGHT)))
                (SETQ PEGS (for PLEFT from (IPLUS HANOIMARGIN (IQUOTIENT (IDIFFERENCE RINGLARGEST PEGWIDTH)
                                                                         2))
                              by RINGLARGEST as I from 1 to 3
                              collect (create PEG
                                              PEGREGION _ (create REGION
                                                                  LEFT _ PLEFT
                                                                  BOTTOM _ (IPLUS BASEHEIGHT HANOIMARGIN)
                                                                  WIDTH _ PEGWIDTH
                                                                  HEIGHT _ (ITIMES RINGHEIGHT (ADD1 NRINGS)))
                                              RINGS _ (LIST (create RING
                                                                    RINGREGION _ BASE
                                                                    RINGNUMBER _ 'BASE]
          [PROG [(SOURCEPEG (PEGN 1))
                 (RINGLABELS (COND
                                ((LISTP RINGS)
                                 (REVERSE RINGS))
                                (T                               (* collect n NILs as lables.)
                                   (for I from 1 to RINGS collect NIL]
                (for RINGBOTTOM from (IPLUS HANOIMARGIN BASEHEIGHT) by RINGHEIGHT as RINGLEFT
                   from (IPLUS HANOIMARGIN (ITIMES RINGLARGEST (SUB1 1))) by RINGDELTA as I from 0
                   to (SUB1 NRINGS) as LABEL in RINGLABELS
                   do (push (fetch RINGS of SOURCEPEG)
                            (create RING
                                    RINGREGION _ (create REGION
                                                         LEFT _ RINGLEFT
                                                         BOTTOM _ RINGBOTTOM
                                                         WIDTH _ (IDIFFERENCE RINGLARGEST (ITIMES I 2 RINGDELTA))
                                                         HEIGHT _ RINGHEIGHT)
```

```
                                    RINGNUMBER _ (ADD1 (IDIFFERENCE NRINGS I))
                                    RINGLABEL _ LABEL)))          (* allocate bitmaps for ring movement)
               (SETQ HORIZRINGBM (BITMAPCREATE (IPLUS RINGLARGEST MAXHORIZSPEED)
                                               RINGHEIGHT))
               (SETQ UPRINGBM (BITMAPCREATE RINGLARGEST (IPLUS RINGHEIGHT MAXVERTSPEED)))
               (SETQ DOWNRINGBM (BITMAPCREATE RINGLARGEST (IPLUS RINGHEIGHT MAXVERTSPEED)))
               (SETQ TOPUPRINGBM (BITMAPCREATE RINGLARGEST (IPLUS RINGHEIGHT MAXVERTSPEED)))
               (SETQ TOPDOWNRINGBM (BITMAPCREATE RINGLARGEST (IPLUS RINGHEIGHT MAXVERTSPEED]
          (\CLEARBM W)
          (DISPLAYPEGSANDRINGS PEGS W)
          (bind (HERE _ 1)
                (THERE _ 3) do (DOHANOI NRINGS HERE THERE W)
                               (COND
                                  (ONCE (RETURN)))
                               (DISMISS 2000)
                               (SETQ HERE (PROG1 THERE
                                                 (SETQ THERE (FINDOTHER HERE THERE)))])
```

```
(XHANOI
  [LAMBDA NIL                                                    (* lmm " 8-MAR-82 15:59")
    (PROG ((EVENRINGSHADE XRINGSHADE)
           (ODDRINGSHADE ORINGSHADE)
           (PEGSHADE XPEGSHADE))
          (WHANOI '(X E R O X)
                  '(0 0 400 280)
                  (FONTCREATE 'LOGO 24])

)

(RPAQQ HANOIWINDOW NIL)

(DECLARE%: DONTCOPY

(DECLARE%: EVAL@COMPILE

(RECORD PEG (PEGREGION RINGS))

(RECORD RING (RINGREGION RINGNUMBER RINGLABEL))
)

(DECLARE%: EVAL@COMPILE

(RPAQQ XRINGSHADE 42405)

(RPAQQ ORINGSHADE 60375)

(RPAQQ XPEGSHADE 65535)

(CONSTANTS XRINGSHADE ORINGSHADE XPEGSHADE)
)

(DECLARE%: EVAL@COMPILE

(RPAQQ PEGMIN 2)

(RPAQQ HANOIMARGIN 5)

(RPAQQ MAXVERTSPEED 30)

(RPAQQ MAXHORIZSPEED 44)

(CONSTANTS PEGMIN HANOIMARGIN (MAXVERTSPEED 30)
       (MAXHORIZSPEED 44))
)

(DECLARE%: EVAL@COMPILE

(PUTPROPS PEGN MACRO [(N)
                      (CAR (SELECTQ N
                                (1 PEGS)
                                (2 (CDR PEGS))
                                (CDDR PEGS])
)
)

(RPAQQ EVENRINGSHADE 42405)

(RPAQQ ODDRINGSHADE 61375)

(RPAQQ PEGSHADE 65535)

(ADDTOVAR IDLE.FUNCTIONS [Hanoi (FUNCTION (LAMBDA (W)
                                          (HANOI (UNPACK "Interlisp.org")
                                                 W
                                                 '(TIMESROMAND 36])
```

(PUTPROPS **HANOI COPYRIGHT** ("Xerox Corporation" 1982 1983 1984 1985 1986))

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CONSTANT INDEX

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