```lisp
; vim: ts=2 sw=2 et:
(defpackage :small (:use :cl))
(in-package :small)
(defstruct our
  (help
"sbcl ---script lib.lisp [OPTIONS
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Lets have some fun.")
  (options
    '((enough   "-e" "enough items for a sample"   512)
      (file     "-f" "read data from file     "   "../data/auto93.csv")
      (help     "-h" "show help           "   nil)
      (license  "-l" "show license        "   nil)
      (p        "-p" "euclidean coefficient   "   2)
      (seed     "-s" "random number seed      "   10019)
      (todo     "-t" "start up action        "   "")))
  (copyright "
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OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE."))

(defvar *config* (make-our))

;;;; macros ---------------------------------------------------------------
(defstruct (few (:constructor %make-few))
  ok (lst (make-array 5 :fill-pointer 0)) max)

(defstruct (num (:constructor %make-num))
  (n 0) (w 1) (at 0) (txt "") (all (make-few))
  (lo most-positive-fixnum) (hi most-negative-fixnum))

(defstruct (sym (:constructor %make-sym))
  mode seen (n 0) (at 0) (txt "") (most 0))


;;;; macros ---------------------------------------------------------------
(defmacro aif (test yes &optional no)
  "Anaphoric if (traps result of conditional in 'it').."
  `(let ((it ,test)) (if it ,yes ,no)))

(defmacro whale (expr &body body)
  "Anaphoric while (traps result of conditional in 'a')."
  `(do ((a ,expr ,expr)) ((not a)) ,@body))

(defmacro ? (s x &rest xs)
  "Nested access to slots."
  (if (null xs) `(slot-value ,s ',x) `(? (slot-value ,s ',x) ,@xs)))

(defmacro $ (x &optional (our *config*))
  "Access  a config variable name."
  `(fourth (assoc ',x (our-options ,our))))

(defmacro with-csv ((lst file &optional out) &body body)
  "File row iterator."
  `(progn (csv ,file #'(lambda (,lst) ,@body)) ,out))

(defmacro inca (x a &optional (inc  1))
  `(incf (cdr (or (assoc ,x ,a :test #'equal)
                  (car (setf ,a (cons (cons ,x 0) ,a))))) ,inc))

;;;; random ---------------------------------------------------------------
(defun randf (&optional (n 1.0))
  (setf ($ seed)  (mod (* 16807.0d0 ($ seed)) 2147483647.0d0))
  (* n (- 1.0d0 (/ ($ seed)                    2147483647.0d0))))

(defun randi (&optional (n 1))
  (floor (* n (/ (randf 1000000.0) 1000000))))

;;;; strings --------------------------------------------------------------
(defun trim (x)
  "Remove whitespace front and back."
  (string-trim '(#\Space #\Newline #\Tab) x))

(defun num?(x)
  "Return a number, if you can. Else return trimmed string."
  (let ((y (ignore-errors (read-from-string x))))
    (if (numberp y) y (let ((x (trim x)))
                        (if (equal x "?") #\? x)))))

(defun subseqs (s &optional (sep #\,) (n 0))
  "Separate string on 'sep'."
  (aif (position sep s :start n)
    (cons (subseq s n it) (subseqs s sep (1+ it)))
    (list (subseq s n))))

;;;; operating system -----------------------------------------------------
(defun args ()
  "Return list of command line arguments."
  #+clisp (cdddr (cddr (coerce (EXT:ARGV) 'list)))
  #+sbcl  (cdr sb-ext:*posix-argv*))

(defun csv (file &optional (fn #'print))
  "Send to 'fn' one list from each line."
  (with-open-file (str file)
    (loop (funcall fn
           (subseqs (or (read-line str nil) (return-from csv)))))))

(defun cli (&optional (our (make-our)) (lst (args)))
  "Maybe update 'our' with data from command line."
  (labels ((cli1 (flag x) (aif (member flag lst :test #'equalp)
                               (cond ((equal x t)   nil) ; flip boolean
                                     ((equal x nil) t)   ; flip boolean
                                     (t             (or (num? (second it)) x)))
                               x)))
    (dolist (x (our-options our) our)
      (setf (fourth x) (cli1 (second x) (fourth x))))))
```

```
;;;; num  ------------------------------------------------------
(defmethod print-object ((o our) s)
  (format s "~a~%~%OPTIONS:~%" (our-help o))
  (dolist (x (our-options o))
    (format s " ~5a  ~a = ~a~%" (second x) (third x) (fourth x))))

(defun make-few (&key (max ($ enough)))
  (%make-few :max max))

(defmethod has ((f few))
  (with-slots (ok lst) f
    (unless ok
      (setf lst (sort lst #'<)
      ok t))
    lst))

(defmethod add ((f few) x)
  (vector-push x (? f lst))
  (setf (? f ok) nil))

(defun make-num (&key init (txt "") (at 0) )
  (let ((new (%make-num :txt txt :at at :w (if (find #\< txt) -1 1))))
    (dolist (x init new) (add new x))))

(defmethod add ((n num) x)
  (with-slots (n lo hi ok all) n
    (unless (eql x #\?)
      (incf n)
      (setf lo (min x lo)
            hi (max x hi)
            ok nil)
      (push x all)))
  x)

;;;; sym  ------------------------------------------------------
(defun make-sym (&key init (txt "") (at 0) )
  (let ((new (%make-sym :txt txt :at at)))
    (dolist (x init new) (add new x))))

(defmethod add ((s sym) x)
  (with-slots (n seen most mode) s
    (unless (eql x #\?)
      (incf n)
      (let ((now (inca x seen)))
        (if (> now most)
          (setf most now
                mode x))))))
  x)

;;;; ---------------------------------------------------------------------
(defvar *tests* nil)
(defvar *fails* 0)

(defmacro deftest (name params  doc  &body body)
  `(progn (pushnew  ',name *tests*)
          (defun ,name ,params ,doc ,@body)))

(defun demos (&optional what)
  (dolist (one *tests*)
    (let* ((what (string-upcase (string what)))
           (txt  (string-upcase (string one)))
           (doc  (documentation one 'function)))
      (when (or (not what) (search  what txt))
        (setf *config* (cli (make-our)))
        (multiple-value-bind (_ err)
          (ignore-errors (funcall one))
          (incf *fails* (if err 1 0))
          (if err
            (format t "~&~a [~a] ~a ~a~%" "FAIL" one doc err)
            (format t "~&~a [~a] ~a~%"    "PASS" one doc)))))))

(defun make () (load "lib"))

(deftest whale.(&aux (x '(1 2 3)))
  (whale (pop x) (print a)))

(deftest csv.()
  (let (head)
    (with-csv (line "../data/auto93.csv")
      (if head
        (format t "~s~%" (mapcar #'num? line))
        (setf head line)))))

(deftest num.()
  (make-num :init '(1 1 2 3 4 5 6 7)))

;;;; ---------------------------------------------------------------------
(setf *config* (cli (make-our)))
(if ($ help) (print *config*))
(if ($ license) (princ (our-copyright *config*)))
(demos ($ todo))
```