

5000 \$PAGE METASYMBOLS

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THESE SYMBOLS ARE USED IN THIS MANUAL TO REPRESENT INSTANCES OF THE FOLLOWING KIND OF OBJECTS, IF PRECEDED DIRECTLY BY A "!" THEY INDICATE AN EVALUATED OCCURANCE AND IF NOT PRECEDED BY A "!" THEY INDICATE AN EXPLICIT OCCURANCE, (EG, <VECTOR> MUST BE REPLACED BY AN EXPLICIT VECTOR BUT !<VECTOR> CAN BE REPLACED BY ANY COLLECTION OF OBJECTS THAT EVALUATE TO A VECTOR.

6000
6100
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6650

<VECTOR> A VECTOR
<ATOM> AN ATOM
<STRING> A STRING
<BOOLEAN> A BOOLEAN
<FRAME> A FRAME
<OBJECT> ANY TYPE OF OBJECT
<NUMBER> A NUMBER
<SELECTION> [!<NUMBER> << TO !<NUMBER> >>]

6700
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6720
6730
6800
6900

ANYTIME !<STRING>, OR !<NUMBER> ARE USED THE UNCOLON FORM IS ALSO USABLE,

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7100
7200
7300
7400

ALSO THE FOLLOWING SYMBOLS ARE USED AS INDICATED,

<< >> TO BRACKET OPTIONAL ITEMS

7500 \$PAGE GETTING ON AND OFF
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7700

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8500

GETTING ON THE MACHINE

WALK UP TO ONE OF THE TERMINALS AND TURN IT ON LINE, THEN HIT RETURN THAT,S A KEY ON THE RIGHT SIDE OF THE KEYBOARD, YOU SHOULD GET SOME TYPING AND THEN A MESSAGE TO ENTER USER CODE, ENTER YOUR USER CODE OR B5700 AND HIT RETURN, THEN A PASSWORD IS REQUESTED AND YOU SHOULD GIVE YOUR PASSWORD OR IF YOU USED B5700 THE WORD DEMO, AT THIS POINT YOU SHOULD GET SOME MORE MESSAGES AND WHEN THEYRE DONE YOURE ON.

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9300
9400

GETTING ON TO SMALLTALK

SMALLTALK IS ENTERED BY TYPING RUN SMALL/SMALL, IF YOU ARE DOING ANY RECURSIVE FUNCTIONS OR ANY DEEP NESTING OF PROCEDURE CALLS YOU MAY NEED MORE STACK, IF THIS IS THE CASE TYPE RUN SMALL/SMALL WITH STACK=1000, 1000 WORDS SHOULD BE ENOUGH FOR MOST PURPOSES IF MORE IS NEEDED ANY NUMBER THAT IS APPROPRIATE CAN BE USED INSTEAD,

9500

GETTING OUT OF SMALLTALK

9600 IF YOU DO NOT HAVE A PROMPT CHARACTER (IE, ! OR D; ETC.)
 9700 THEN EITHER HIT THE BREAK KEY IF TYPING IS OCCURING OR ///#
 9800 IF THERE IS NO TYPING.
 9900 THEN TYPE CANDE# AND THE RETURN.
 9910
 9912
 9914 GETTING OFF THE MACHINE
 9916 AFTER YOUR OUT OF SMALLTALK TYPE BYE AND RETURN.
 9918
 9920

10000 \$PAGE OBJECTS
 10100
 10200
 10300 OBJECTS ARE THE BASIC UNIT IN SMALL TALK, THEY DO THE JOB
 10400 OF BOTH PROCESS AND DATA, THEY ARE USED TO IMPLEMENT DATA STUCTURES,
 10500 PROCEDURES, CONTROL STRUCTURES AND EVERYTHING ELSE IN SMALLTALK.
 10600
 14998
 14999

15000 PARTS OF OBJECTS
 15100
 15200
 15300 OBJECTS HAVE THE FOLLOWING PARTS, THE FUNCTION OF THE DIFFERENT
 15400 PARTS WILL BE DISCUSSED IN THE SUCCEEDING PARAGRAPHS,
 15500 THE PARTS ARE IN TWO GROUPS, THE INSTANCE PARTS AND THE CLASS PARTS.
 15600

15700 CLASS PARTS:
 15800 THE CLASS PARTS DEFINE HOW THIS OBJECT ACTS AS A CLASS OF OTHER
 15900 OBJECTS, ALL OBJECTS THAT HAVE A CLASS PART ARE SAID TO BE
 16000 CLASSIFIED, THE PARTS ARE AS FOLLOWS:
 16100 LVAR\$ LOCAL VARIABLES
 16200 IVAR\$ INSTANCE VARIABLES
 16300 CVAR\$ CLASS VARIABLES
 16400 DEF VECTOR OF ACTIONS FOR WHEN CONTROL IS PASSED
 16500 ISNEW VECTOR OF ACTIONS FOR WHEN A NEW INSTANCE IS CREATED
 16600 INIT VECTOR OF ACTIONS FOR WHEN THE CLASS IS CREATED,
 16700 ... ALSO A LIST OF VALUES CORRESPONDING TO THE CLASS VARIABLES
 16800

16900 INSTANCE PARTS:
 17000 EACH OBJECT IS AN INSTANCE OF SOME OTHER OBJECT, THE FIRST
 17100 PART IS THE NAME OF THAT OBJECT, THE REST OF THE INSTANCE PARTS
 17200 ARE LISTS OF VALUES, ONE LIST CORRESPONDING TO THE INSTANCE
 17300 VARIABLES FOR EACH OF THE OBJECTS THAT THIS OBJECT IS AN INSTANCE
 17400 OF EITHER DIRECTLY OR AS AN INSTANCE OF AN INSTANCE ... ALL
 17500 OBJECTS THAT ARE CLASSIFIED ARE CONSIDERED TO BE AN INSTANCE OF
 17510 THEMSELVES.
 17600
 17700

20000 \$PAGE GIVING CONTROL TO AN OBJECT
 20100
 20200
 20300
 20400 WHEN CONTROL IS GIVEN TO AN OBJECT THE FOLLOWING THINGS HAPPEN:
 20410
 20500 BIND VARIABLES
 20600 EACH SET OF VARIABLES IS PUSHED ONTO THE DICTIONARY WITH THE
 20700 APPROPRIATE VALUES, THE INSTANCE VARIABLES GET THEIR VALUES

20800 FROM THE INSTANCE PARTS OF THE OBJECT IT SELF, THE CLASS
 20900 VARIABLES VALUES COME FROM EACH OBJECT WHICH THE OBJECT
 21000 GETTING CONTROL IS AN INSTANCE OF EITHER DIRECTLY OR INDIRECTLY
 21100 THE LOCAL VARIABLES ARE ALL SET TO NIL, THE VARIABLES ARE
 21200 BOUND IN AN ORDER TO CAUSE THE MOST DISTANT UP THE CLASS
 21300 CHAIN TO BE BOUND FIRST, THUS VRIABLES WITH THE SAME NAME
 21400 WHICH ARE CLOSER ON THE CLASS CHAIN HAVE PRECEDENCE OVER THOSE
 21500 FURTHER AWAY.

21510
 21600 EVALUATE DEFS

21610
 21700 EACH DEF VECTOR IN THE CLASS CHAIN IS EVALUATED IN THE
 21800 REVERSE ORDER TO WHICH THE VARIABLES WERE BOUND UNTIL
 21900 ONE OF THE DEF VECTORS EXECUTES A RETURN (x, x+, OR x-), IF
 22000 NONE OF THEM EXECUTES A RETURN THEN SELF IS RETURNED
 22100 PASSIVELY.

22200
 22300
 25000 \$PAGE CREATING A NEW OBJECT

25100
 25200
 25300
 25400 THE OBJECT ANEW IS USED TO CREATE NEW OBJECTS.

25500
 25600 ANEW <ATOM> << WITH <VECTOR> >>

25700
 25800 THE ATOM IS THE NAME OF THE OBJECT THAT THE NEW OBJECT WILL BE AN
 25900 INSTANCE OF, THE ATOM CLASS CAN BE USED HERE AS THE DUMMY CLASS,
 26000 THE WITH PART IS USED TO SPECIFY THE CLASS PARTS IF THE OBJECT
 26100 IS TO BE CLASSIFIED, THE VECTOR IN THE WITH PART HAS THHE FOLLOWING
 26200 FORM:

26300
 26400 (<PART> <VECTOR> <PART> <VECTOR> ...)

26500
 26600 WHERE THE PARTS CAN BE ANY OF THE FOLLOWING LVARs IVARs CVARs
 26700 DEF ISNEW OR INIT, CORRESPONDING TO THE OBVIOUS CLASS PARTS, THE
 26800 VECTOR FOLLOWING EACH PART NAME IS TAKEN AS THE VALUE OF THAT PART,
 26900 ANY PART NOT SPECIFIED IS TAKEN TO BE THE EMPTY VECTOR,
 27000 IF THE WITH PART IS NOT PRESENT THEN ALL OF THE ISNEW
 27100 VECTORS FOR ALL OF THE OBJECTS ON THE CLASS CHAIN ARE EVALUATED
 27200 WITH THE PROPER VARIABLE ENVIRONEMENTS, THE ORDER IS FROM FURTHEST
 27300 DOWN THE CLASS CHAIN TO THE CLOSEST,
 27500 THEN THE INIT VECTOR FROM THE WITH PART IS
 27600 EVALUATED.

27700
 27800
 28000 ONLY A FEW OF THE PREDEFINED OBJECTS CAN BE USED AS A CLASS
 28100 (IE, HAVE INSTANCES OF THEM),
 28200 THESE ARE VECTOR, STRING, ATOM,
 28300 THIER SYNTAX IS AS FOLLOWS:

28310
 28400 ANEW STRING !<NUMBER>

28500
 28600 WILL RETURN A STRING OF BLANKS NUMBER LONG.

28700
 28800 ANEW VECTOR !<NUMBER>

28900

29000 WILL RETURN A VECTOR OF NILS NUMBER LONG,
29100
29200 ANEW ATOM :<STRING>
29300
29400 WILL RETURN A ATOM WITH NAME <STRING> AND VALUE
29500 NIL,
29600
30000 \$PAGE EVALUATING A VECTOR AS PROGRAM
30100
30200
30300
30400 WHEN EVALUATING A VECTOR THERE IS ALWAYS AN OBJECT WITH CONTROL
30500 AND THE REMAINING PART OF THE VECTOR BEING EVALUATED,
30600 WHEN EVALUATING A VECTOR THERE ARE CERTAIN OBJECTS WHICH ACT
30700 IN A SPECIAL WAY IF THEY ARE TAKEN EXPLICITLY OUT OF THE VECTOR
30800 AND GIVEN CONTROL, THEY ARE THE FOLLOWING:
30900 ATOMS RETURN THEIR VALUE ACTIVELY (THAT IS THEIR VALUE GAINS
31000 CONTROL,
31100 VECTORS ARE EVALUATED AS PROGRAM,
31200
31300 EVALUATION PROCEEDS AS FOLLOWS:
31400 THE FIRST OBJECT IN THE VECTOR IS GIVEN CONTROL AND SENT THE REST
31500 OF THE VECTOR AS A MESSAGE, THAT OBJECT MAY CONSUME ANY NUMBER OF
31600 OBJECTS OFF THE FRONT OF THE REST OF THE VECTOR,
31700 IT THEN RETURNS A VALUE, IF THIS VALUE IS RETURNED ACTIVELY
31800 THEN THAT OBJECT RETURNED AS THE VALUE IS GIVEN CONTROL AND SENT
31900 THE REST OF THE VECTOR AS A MESSAGE, IF THE VALUE IS RETURNED
32000 PASSIVELY THEN THE NEXT OBJECT IN THE VECTOR IS GIVEN CONTROL
32100 AND SENT THE REMAINING PART OF THE VECTOR AS A MESSAGE, THIS
32200 CONTINUES UNTIL THE END OF THE VECTOR IS REACHED, AT THIS
32300 POINT THE LAST OBJECT THAT WAS RETURNED IS RETURNED AS
32400 THE VALUE OF THE VECTOR AND IS EITHER ACTIVE OR PASSIVE
32500 DEPENDING ON HOW IT WAS RETURNED TO THE VECTOR, THERE ARE A
32600 COUPLE OF EXCEPTIONS THE THE ABOVE, IF AT ANY TIME AN OBJECT
32700 RETURNS IT SELF ACTIVELY AND HAS NOT CONSUMED ANY OF THE VECTOR
32800 THEN THAT OBJECT IS NOT GIVEN CONTROL AGAIN BUT CONTROL IS EITHER
32900 PASSED TO THE NEXT OBJECT IF THERE IS ONE OR THE OBJECT IS
33000 RETURNED AS THE VALUE OF THE VECTOR IF AT THE END OF THE VECTOR,
33100
40000 \$PAGE SYNTAX
40100 THE OBJECTS WHICH CAN BE DIRECTLY INPUTTED TO SMALLTALK
40200 ARE ATOMS, NUMBERS, STRINGS, VECTORS, AND COMMENTS, THE
40300 OBJECT READ READS LINES OF 72 CHARACTERS OR LESS UNTIL A
40400 DOIT (*) IS ENCOUNTERED, (SO A DOIT CANNOT BE PART OF THE
40500 INPUT), LINE BOUNDARIES ARE MEANINGLESS,
40510 IF *- IS ENCOUNTERED THEN ALL INPUT TO READ IS IGNORED,
40600
40650 ATOMS ARE SEQUENCES OF CHARACTERS WHICH
40700 START WITH ANY CHARACTER OTHER THAN A BLANK,(,),",OR %
40800 AND STOP AT A BLANK,(,OR) AND DO NOT MEET THE
40900 CONDITIONS REQUIRED OF A NUMBER,
41000
41100 NUMBERS ARE SEQUENCES OF CHARACTERS WHICH START WITH A DIGIT
41200 OR = DIGIT AND STOP AT A BLANK,(,OR) AND
41300 ARE OF THE FOLLOWING FORM:
41310 = DDD ... D .DD ... D e = D D
41320 /- /----- /- /- /-

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41330                                     /-----/
41400      WHERE D IS A DIGIT, DD ... D IS A SEQUENCE OF DIGITS,
41410      AND THE "UNDERLINED" PARTS ARE OPTIONAL.
41420      THE NUMBER AFTER THE @ IS THE EXPONENT PART OF
41430      SCIENTIFIC NOTATION.
41500      THE SIZE LIMITS ARE APPROXIMATELY 4,314@68 FOR THE
41600      LARGEST ABSOLUTE VALUE AND 8,758@-47 FOR THE SMALLEST.
41700
41750      STRINGS ARE SEQUENCES OF CHARACTERS WHICH
41800      START WITH A " AND STOP WITH THE NEXT ".
41900      (THE "S ARE NOT PART OF THE INTERNAL FORM OF THE STRING).
42000
42100      COMMENTS ARE LIKE STRINGS BUT START AND STOP WITH A %,
42200
42300      VECTORS ARE SPECIFIED BY USING ( ) AROUND THE OBJECTS
42400      TO BE INCLUDED IN THE VECTOR.
42500
42600      OBJECTS NOT COMPLETED WHEN A DOIT IS READ WILL BE SUPPLIED WITH
42700      MISSING CLOSING ",%,),OR BLANK.
42800      ALSO EXTRA )S ARE IGNORED.
42900
43000      EXAMPLES:
43100
43150      ATOMS:
43200      THISISANATOM
43300      A3
43400      3A
43500      #
43600      =>
43700
43750      NUMBERS:
43800      0
43900      23
44000      5.1@6
44050      -5@-12
44100      -3.5
44200
44210
44250      STRINGS:
44300      "THIS IS A STRING"
44310      "#$%&()="
44320      ""
44380
44390      COMMENTS:
44400      %THIS IS A COMMENT%
44410      %SO IS THIS %
44420      %%
44480
44490      VECTORS:
44500      (THIS IS A VECTOR OF ATOMS)
44600      (THIS VECTOR CONTAINS 6 ATOMS & 2 NUMBERS)
44700      (X + 3)
44800      (1 1 2 3 5 8 13 21)
44900
45000      $PAGE TOPLEVEL AND DEBUGGER
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45200
45300

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45400 TOPLEVEL
45500
45600 THE TOPLEVEL OF SMALLTALK AFFECTIVELY REPEATS THE VECTOR
45700 (USER). THE ATOM USER IS ORIGINALLY ASSIGN AN OBJECT WHOSE DEF IS
45800 (CR READ PROMPT " ;" EVAL PRINT). THE USER CAN CHANGE THE VALUE
45900 OF USER TO ANY OBJECT DESIRED.
46000
46100
46200 DEBUGGER
46300
46400 WHEN AN ERROR IS DETECTED AN ERROR MESSAGE IS PRINTED ON THE TTY,
46500 SOME CONTEXT INFORMATION IS PRINTED AND CONTROL IS PASSED TO
46600 THE DEBUGGER. THE DEBUGGER IS JUST LIKE THE TOPLEVEL EXCEPT THE
46700 VECTOR REPEATED IS (DEBBUGER) WHOSE INITIAL DEF IS (CR
46800 READ PROMPT " D!" EVAL PRINT, ALSO WHEN IN THE DEBBUGER THE
46900 CONTEXT IS LEFT THE SAME AS WHEN THE ERROR OCCURED. THIS
47000 ALLOWS THE INSPECTION OF VARIABLES ETC. WHEN IN THE DEBUGGER
47100 IF THE USER WHISHES TO POP UP ONE LEVEL OF CONTEXT (IE UP TO THE
47200 NEXT OUTER OBJECT WITH CONTROL) THE OBJECT UP1 CAN BE USED,
47300 TO JUST GET OUT OF THE DEBBUGER ///# IS RECOMMENDED.
47400
47500
50100
50200
50300 \$PAGE MESSAGE AND CONTROL OBJECTS
50400
50500
50600 | WILL RETURN THE VALUE OF THE NEXT PIECE IN THE MESSAGE
50700
50800 ; RETURNS THE NEXT EXPLICIT OBJECT IN THE MESSAGE
50900
51000 & SAME AS ; EXCEPT THE OBJECT IS ALSO STILL THE NEXT OBJECT
51100 IN THE MESSAGE
51200
51300 @ <ATOM> RETURNS NOT FALSE IF THE NEXT OBJECT IN THE MESSAGE IS
51400 <ATOM> AND FALSE OTHER WISE
51500
51600 \$ <VECTOR> RETURNS THE VECTOR OR ATOM
51700 \$ <ATOM>
51800
51900 #+ RETURNS THE VALUE OF THE NEXT PIECE ACTIVELY
52000
52100 #- RETURNS THE VALUE OF THE NEXT PIECE EXCEPT THAT ALL RETURNS
52200 EVALUATED ARE TAKEN AS PASSIVE RETURNS
52300
52400 x GETS THE VALUE OF THE NEXT PIECE AND RETURNS IT AS THE VALUE
52500 OF THE OBJECT WITH CONTROL
52600
52700 x+ SAME AS x EXCEPT RETURNS IT ACTIVELY
52800
52900 x- SAME AS x EXCEPT RETURNS IT PASSIVELY
53000
53300
53400 REPEAT <VECTOR> EXECUTES THE VECTOR REPEATEDLY
53500
53600 DONE << WITH ;<OBJECT> >> WILL EXIT THE MOST RECENT REPEAT
53700 THE WITH PART IS USED TO SPECIFY A VALUE

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62900

FOR THE REPEAT

AGAIN WILL CAUSE THE MOST RECENT REPEAT TO START OVER

APPLY <ATOM> << TO :<VECTOR> >> << IN :<FRAME> >>
: <ATOM>

GIVES CONTROL TO THE VALUE OF THE FIRST ATOM WITH
EITHER THE CURRENT MESSAGE OR IF THE TO IS USED VECTOR AS
THE MESSAGE. THE IN PART IS USED TO PROVIDE A DIFFERENT
CONTEXT FOR IT TO BE EVALUATED IN. IF THE FRAME IS USED
THE CONTEXT IS THAT POINTED TO BY THE FRAME, IF THE ATOM
IS USED THE CONTEXT IS THE CURRENT CONTEXT PLUS THE
VARIABLES OF THE VALUE OF THE ATOM

EVAPPLY :<OBJECT> << TO :<VECTOR> >> << IN :<FRAME> >>
: <ATOM>

SAME AS APPLY EXCEPT THE OBJECT GIVEN CONTROL IS THE
EVALUATED OBJECT

\$PAGE UTILITIES

TYPE :<STRING>

WILL TYPE THE CONTENTS OF THE FILE NAMED BY THE STRING
ON THE TTY
RETURNS FALSE IF THE FILE IS INACCESSIBLE AND
TRUE OTHERWISE.

FILIN :<STRING>

READS FROM THE FILE NAMED BY STRING AS IF IT WERE THE TTY
RETURNS FALSE IF THE FILE IS INACCESSIBLE AND
TRUE OTHERWISE.

FILEOUT :<STRING> << ADD >> << ONLY :<ATOM> >>
: <VECTOR>

FINDS OR CREATES THE FILE NAMED BY STRING. THEN EITHER ADDS TO
(IN THE CASE OF ADD) OR REPLACES THE CURRENT CONTENTS OF THE
FILE. IF THE :<VECTOR> FORM IS USED THE FOLLOWING HAPPENS FOR
EACH ELEMENT OF THE VECTOR:
IF THE ELEMENT IS AN ATOM AND ITS VALUE IS
CLASSIFIED ITS DEFINITION IS PUT OUT IN SUCH A WAY AS IT CAN
BE READ BACK IN BY FILIN. IF THE ELEMENT IS A VECTOR
THE VECTOR IS WRITTEN OUT.
IF THE :<ATOM> FORM IS USED THE VALUE OF THE ATOM SHOULD
BE A VECTOR. THE ATOM IS WRITTEN OUT IN SUCH A WAY AS TO CAUSE
THE VECTOR TO BE ASSIGNED BACK INTO THE ATOM UPON BEING READ
IN BY FILIN. THE VECTOR IS THEN TREATED AS IN THE
ABOVE CASE.
IF NEITHER OF THE ABOVE FORMS IS USED IT ACTS AS IF THE VECTOR
RETURNED FROM DEFS HAD BEEN SPECIFIED.
RETURNS FALSE IF THE FILE IS INACCESSIBLE
AND TRUE OTHERWISE.

62905 SHOW <ATOM> << TO >> << PRINTER >>
62910
62915 THE ATOM'S VALUE MUST BE CLASSIFIED,
62920 THE CLASS PARTS ARE SHOWN WITH A REASONABLE FORMAT,
62925 IF PRINTER IS SPECIFIED OUTPUT IS TO THE LINE PRINTER
62930 OTHERWISE TTY,
62935
63000 CANDE
63100
63200 RETURNS TO CANDE (THE SUPERVISORY PROGRAM),
63300
63400 TRACE << MINE >> << YOURS >> << <= >> << PIECES >>
63500 << ONLY !<VECTOR> >>
63600
63700 ANY OR ALL OF THE DIFFERENT OPTIONS CAN BE SPECIFIED AT ONE
63800 TIME. THEY HAVE A CUMULATIVE AFFECT, EACH IS DESCRIBED BELOW,
63900 MINE: TRACES THE USER DEFINED OBJECTS,
64000 YOURS: TRACES THE PREDEFINED OBJECTS,
64100 <= : TRACES ALL ASSIGNMENTS,
64200 PIECES: TRACES EACH PIECE (SEE EVALUATING A VECTOR),
64300 ONLY : TRACES ONLY THE OBJECTS NAMED IN THE VECTOR,
64400
64500 UNTRACE
64600
64700 TURNS OFF ALL TRACING,
64800
64900 DEFS
65000
65100 RETURNS A VECTOR OF THE ATOMS WHOSE VALUES HAVE BEEN CLASSIFIED
65200
65300
70000 \$PAGE DATA STRUCTURE OBJECTS
70100
70200 THE DATA STRUCTURE CLASSES THAT ARE PROVIDED ARE
70205 BOOLEANS, ATOMS, NUMBERS, STRINGS AND VECTORS,
70210 BOOLEANS CAN TAKE ON THE VALUES TRUE AND FALSE,
70215 ATOMS ASSOCIATE A NAME WITH A VALUE, THEY ARE LIKE
70220 VARIABLES IN MOST OTHER LANGUAGES. ALL ATOMS WITH
70225 THE SAME NAME ARE THE SAME ATOM,
70230 NUMBERS ARE STANDARD FLOATING POINT NUMBERS,
70235 VECTORS AND STRINGS ARE SEQUENCES OF OBJECTS OR
70240 CHARACTERS RESPECTIVELY. THEY ARE INDEXED BY USE OF
70245 SELECTIONS. INDEXING IS FROM 1,
70250
70255
70300 !<BOOLEAN> => <VECTOR>
70310
70320 IF THE BOOLEAN IS TRUE EVALUATE THE VECTOR AND SKIP THE
70330 REST OF THE ENCLOSING VECTOR,
70340 IF THE BOOLEAN IS FALSE CONSUME THE VECTOR AND CONTINUE,
70350
70360 !<BOOLEAN> <OP> !<BOOLEAN>
70370
70380 WHERE <OP> CAN BE AND, OR, OR XOR,
70390 THE STANDARD LOGICAL OPERATIONS, RETURN THE APPROPRIATE
70400 BOOLEAN,
70410

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70420 :<BOOLEAN> NOT
70430
70440 RETURNS TRUE IF <BOOLEAN> IS FALSE AND FALSE OTHERWISE,
70450
70460 :<BOOLEAN> PRINT
70470
70480 PRINTS EITHER TRUE OR FALSE ON THE TTY.
70490
70500 :<BOOLEAN> ISA <OBJECT>
70510
70520 IF OBJECT IS THE ATOM BOOLEAN RETURNS TRUE,
70530 IF THE OBJECT IS THE ATOM ? RETURNS THE ATOM BOOLEAN,
70540 OTHERWISE RETURNS FALSE.
70550
70560
71100
71200
71300 :<ATOM> PRINT PRINTS THE ATOMS NAME ON THE TTY
71400 CHARS RETURNS THE ATOMS NAME AS A STRING
71500 EVAL RETURNS THE VALUE OF THE ATOM ACTIVELY
71600 EVAL- RETURNS THE VALUE OF THE ATOM PASSIVELY
71700 = <ATOM> RETURNS THE ATOM IF THE ATOMS ARE THE SAME
71800 AND FALSE OTHERWISE
71900 ISA <OBJECT> IF OBJECT IS EITHER THE ATOM ? OR ATOM THEN
72000 IT RETURNS THE ATOM ATOM AND FALSE
72100 OTHERWISE
72200 <- :<OBJECT> ASSIGNS THE OBJECT TO THE VALUE OF THE ATOM AND
72300 RETURNS THE OBJECT.
72400
72410
72500 :<NUMBER> <NOP> :<NUMBER>
72600 WHERE <NOP> CAN BE +, -, *, /, DIV, MOD, POWER, AND, OR, XOR,
72700 LSHIFT, MIN, MAX, LESS, LEQ, GTR, OR GEQ,
72800
72900 THESE PERFORM THE STANDARD OPERATION AND COMPARISONS
73100 THE LOGICAL OPERATIONS ARE BITWISE ACROSS THE WHOLE
73200 WORD.
73300
73400 :<NUMBER> = :<OBJECT>
73500 :<NUMBER> NEQ :<OBJECT>
73600
73700 RETURN FALSE FOR FALSE AND THE FIRST NUMBER FOR TRUE.
73800
73900 :<NUMBER> ISA <OBJECT>
74000
74100 IF THE OBJECT IS THE ATOM NUMBER RETURNS TRUE,
74200 IF THE OBJECT IS THE ATOM ? RETURNS THE ATOM NUMBER,
74210 OTHERWISE RETURNS FALSE.
74300
74400 :<NUMBER> IPART
74500
74600 RETURNS THE INTEGER PART OF THE NUMBER.
74700
74800 :<NUMBER> FPART
74900
75000 RETURNS THE FRACTIONAL PART OF THE NUMBER.
75100

75200 :<NUMBER> PRINT
75300
75400 PRINTS THE NUMBER ON THE TTY,
75500
75600 * :<NUMBER>
75700
75800 RETURNS THE ADDITIVE INVERSE OF THE NUMBER,
75900
76000 :<STRING> LENGTH
76100
76200 RETURNS THE NUMBER OF CHARACTERS IN THE STRING,
76300
76400 :<STRING> = :<STRING>
76500
76600 RETURNS FALSE FOR NOT THE SAME STRING AND THE STRING OTHERWISE,
76700
76800 :<STRING> + :<STRING>
76900
77000 RETURNS THE CONCATENATION OF THE TWO STRINGS,
77100
77200 :<STRING> PRINT
77300
77400 PRINTS THE CHARACTERS IN THE STRING SURROUNDED BY "S ON THE
77500 TTY AND RETURNS THE STRING,
77600
77700 :<STRING> ISA <OBJECT>
77800
77900 IF THE OBJECT IS THE ATOM STRING RETURNS TRUE,
78000 IF THE OBJECT IS THE ATOM ? RETURNS THE ATOM STRING,
78010 OTHERWISE RETURNS FALSE,
78100
78200 :<STRING> <SELECTION>
78300
78400 RETURNS A STRING CONTAINING THE CHARACTERS IN THE SELECTED
78500 PART OF THE STRING,
78600
78700 <:<STRING> <SELECTION> <" << ALL >> :<STRING>
78800
78900 IF ALL IS USED THE SECOND STRING MUST BE A SINGLE CHARACTER,
79000 IN REPLACES EACH CHARACTER IN THE SELECTED PART OF THE FIRST
79100 STRING IF ALL IS NOT USED THE SECOND STRING REPLACES THE
79200 SELECTED PART OF THE FIRST, POSSIBLY CHANGING ITS LENGTH,
79300 IN BOTH CASES THE SECOND STRING IS RETURNED,
79400
79500 <:<STRING> << <SELECTION> >> FIND FIRST << NON >> :<STRING>
79600 LAST
79700
79800 RETURNS THE INDEX OF THE FIRST (LAST) OCCURANCE
79900 (NON OCCURANCE) OF ANY OF THE CHARACTERS OF THE SECOND STRING
80000 IN THE FIRST STRING AND 0 IF NO OCCURANCE (NON OCCURANCE)
80100 OCCURS,
80200
80300 :<VECTOR> LENGTH
80400
80500 THE NUMBER OF OBJECTS IN THE VECTOR,
80600
80700 :<VECTOR> + :<VECTOR>

80800
80900 RETURNS THE CONCATENATION OF THE TWO VECTORS,
81000
81100 :<VECTOR> ISA <OBJECT>
81200
81300 IF THE OBJECT IS THE ATOM VECTOR RETURNS TRUE,
81400 IF THE OBJECT IS THE ATOM ? RETURNS THE ATOM VECTOR,
81410 OTHERWISE RETURNS FALSE,
81500
81600 :<VECTOR> <SELECTION>
81700
81800 RETURNS THE SELECTED PART OF THE VECTOR AS A VECTOR,
81900 IF THE SELECTION DOES NOT CONTAIN THE TO PART THE SELECTED
82000 OBJECT IS RETURNED (NOT A VECTOR CONTAINING IT),
82100
82200 :<VECTOR> <SELECTION> <= << ALL >> :<OBJECT>
82300
82400 IF THE ALL IS USED EACH ELEMENT IN THE SELECTED PART IS
82500 REPLACED BY THE OBJECT,
82600 IF THE ALL PART IS NOT USED AND THE SELECTION CONTAINS A TO
82700 THEN THE OBJECT MUST BE A VECTOR WHICH WILL REPLACE THE
82800 SELECTED PART, POSSIBLY CHANGING ITS LENGTH,
82900 IF THE ALL PART IS NOT USED AND THE SELECTION DOES NOT
83000 CONTAIN A TO THE OBJECT REPLACES THE ELEMENT SELECTED,
83100 IN ALL CASES THE OBJECT IS RETURNED,
83200
83300 :<VECTOR> << <SELECTION> >> FIND FIRST << NON >> :<OBJECT>
83350 LAST
83400
83500 RETURNS THE INDEX OF THE FIRST (LAST) OCCURANCE
83600 (NON OCCURANCE) OF THE OBJECT IN THE VECTOR,
83700 RETURNS 0 IF THERE IS NO OCCURANCE (NON OCCURANCE),
83800
83900 :<VECTOR> PRINT << DEPTH :<NUMBER> >>
84000
84100 PRINTS THE VECTOR ON THE TTY, IF DEPTH IS USED ANY VECTORS
84200 NESTED DEEPER THAN THE NUMBER WILL APPEAR AS (),
84300
84400 :<VECTOR> EVAL
84500
84600 EVALUATES THE VECTOR (SEE ABOVE),
84700
84800 :<VECTOR> MAP :<VECTOR>
84900
85000 GIVES CONTROL TO EACH ELEMENT OF THE FIRST VECTOR WITH THE
85100 SECOND VECTOR AS MESSAGE, RETURNS A VECTOR OF THE VALUES
85200 GENERATED,
85300
85400
90000 \$PAGE MISCELLANEOUS OBJECTS
90100
90200
90210 ISA <OBJECT>
90212 <OBJECT>
90220
90230 CONSUME THE OBJECT AND RETURN FALSE ACTIVELY,
90240
90300 SELF

90400
90500 RETURNS THE CURRENT USER OBJECT ACTIVELY,
90600
90700 FRAME
90800
90900 RETURNS A FRAME (FOR USE WITH APPLY) THAT REFERS TO
91000 THE CURRENT ENVIRONMENT.
91100
91200 NULL :<OBJECT>
91300
91400 RETURNS TRUE IF THE OBJECT IS NIL AND FALSE OTHERWISE,
91500
91600 ERROR :<STRING>
91700
91800 ENTERS THE DEBUGGER AND USES THE STRING AS THE ERROR MESSAGE,
91900
92000 UP1
92100
92200 WHEN IN THE DEBUGGER WILL EXIT THE MOST RECENT USER OBJECT AND
92300 RETURN TO THE DEBUGGER,
92400
92410 CONTINUE << WITH :<OBJECT> >> << ADD :<NUMBER> >>
92420
92430 WHEN IN THE DEBUGGER WILL CONTINUE EXECUTION WHERE IT WAS
92440 SUSPENDED, THE OBJECT WITH CONTROL AFTER THE CONTINUE IS
92450 EITHER THE OBJECT AFTER THE WITH OR NIL, THE ADD PART IS
92460 USED TO MOVE THE VECTOR POINTER TO SKIP OVER SOME OF THE
92470 MESSAGE,
92480
92500 ///
92600
92700 EXITS TO THE TOPLEVEL, CAN BE USED ANY TIME OUTPUT IS NOT
92800 COMING OUT,
92900
93000 (BREAK KEY)
93100
93200 CAN BE HIT WHILE OUTPUT IS HAPPENING ON THE TTY AND IS
93300 EQUIVALENT TO A DONE,
93400
93500 PRINT
93600 NIL
93700 .
93800
93900 THESE LIKE ALL ATOMS HAVE INITIALLY THE VALUE NIL,
94000 THE , IS CONVENTIONALLY USED AS A LOGICAL SEPERATOR,
94100
94110
94200 ANEW ...
94300
94400 (SEE CREATING A NEW OBJECT)
94500
110000 \$PAGE EDITOR
110100
110200
110300
110400 THE EDITOR IS USED TO MODIFY ANY OF THE SIX VECTORS WHICH
110500 MAKE UP THE GLASS PART OF AN OBJECT, IT IS NOT AUTOMATICALLY

110600 LOADED, SO BEFORE ITS FIRST USE AFTER ENTERING SMALLTALK IT MUST
 110700 BE FILIN-ED THUSLY:
 110800
 110900 FILIN "EDITOR/SMALL"
 111000
 111100 THE EDITOR IS CALLED AS FOLLOWS:
 111200
 111300 EDIT <ATOM> ,S <PART>
 111400
 111500 WHERE THE ATOM HAS AS VALUE THE OBJECT TO BE MODIFIED
 111600 AND <PART> INDICATES WHICH VECTOR IS TO BE MODIFIED
 111700 IT CAN BE ANY OF: LVARs,IVARs,CVARs,DEF,ISNEW,
 111800 OR INIT,
 111900
 112000 ONCE IN THE EDITOR YOU ARE IN A LOOP VERY MUCH LIKE THE TOPLEVEL
 112100 EXCEPT THAT A NUMBER OF ADDITIONAL OBJECTS ARE DEFINED.
 112200 THERE IS ALSO SOMETHING CALLED THE CURRENT VECTOR WHICH IS THE
 112300 VECTOR THAT IS BEING EDITED. IT IS INITIALIZED TO BE THE VECTOR
 112400 SPECIFIED BY <PART>. ALL CHANGES ARE MADE TO A LOCAL
 112500 COPY UNTIL DONE IS USED (SEE DONE AND /// BELOW). A P (SEE BELOW)
 112600 IS DONE JUST BEFORE THE LOOP IS ENTERED TO SHOW YOU WHAT IS BEING
 112700 EDITED. THE EDITING OBJECTS FOLLOW:
 112800
 112900
 114000 INSERT !<VECTOR> BEFORE !<NUMBER>
 114100 AFTER
 114200
 114300 INSERTS THE ELEMENTS OF THE VECTOR BEFORE (AFTER)
 114400 THE <NUMBER>TH ELEMENT
 114500
 114600 REPLACE !<NUMBER> << TO !<NUMBER> >> WITH !<VECTOR>
 114700
 114800 REPLACES THE ELEMENTS SPECIFIED BY THE <NUMBER>S WITH THE
 114900 ELEMENTS OF THE VECTOR
 115000
 115100 SWAP !<NUMBER> << TO !<NUMBER> >> WITH !<NUMBER> << TO !<NUMBER> >>
 115200
 115300 EXCHANGES THE TWO SPECIFIED SECTIONS
 115400
 115500 ENTER !<NUMBER>
 115600
 115700 MAKES THE VECTOR AT <NUMBER>TH POSITION IN THE CURRENT
 115800 VECTOR THE NEW CURRENT VECTOR
 115900
 116000 EXIT
 116100
 116200 IS THE INVERSE OF ENTER, GET YOU BACK TO THE
 116300 OLD CURRENT VECTOR
 116400
 116500 EXIT*
 116600
 116700 REPEATEDLY DOES EXITS UNTIL THE ORIGINAL VECTOR IS
 116800 REACHED
 116900
 117000 PUSH !<NUMBER> << TO !<NUMBER> >>
 117100
 117200 DOES THE EQUIVALENT OF PUTTING () AROUND THE SPECIFIED

```
117300          SECTION
117400
117500 PULL :<NUMBER>
117600
117700          EFFECTIVELY REMOVES A SET OF ( )
117800
117900 P
118000
118100          PRINTS THE CURRENT VECTOR DEPTH 1
118200          (I.E. ANY VECTORS THAT ARE ELEMENTS OF THE CURRENT VECTOR
118300          ARE INDICATED BY ( ) )
118400
118500
118600 DONE
118700
118800          DONE GETS YOU OUT OF THE EDITOR AND ACTUALLY DOES THE
118900          CHANGES TO THE VALUE OF THE OBJECT SPECIFIED
119000          IN THE EDIT COMMAND
119100
119200 ///
119300
119400          /// IS USED IF YOU WANT TO GET OUT OF THE EDITOR
119500          WITH OUT EFFECTING ANY CHANGES
119600
119700 END
119800
119900          RETURNS THE LENGTH OF THE CURRENT VECTOR
120000
120100
```

LABEL 00000000PRNT 00177074?USER=HAYNES ; EXECUTE COPY /HAYNES

COPY /HAYNES