Problem Selection in Software Design:
The Data for Protocol A1

by

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November 1976

Technical Report #94

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This work was partially supported by NSF Grant GJ-36414 and the Department of Information and Computer Science of the University of California, Irvine.
Instructions

1.0 Instructions and Task Descriptions

1.1 General Instructions

In this session I would like you to begin work on the design task described on the following page. You are to do the specified design such that when you are done your design could be given to another individual for implementation.

The attached page contains the specifications for the required design. Please speak aloud what you are doing and thinking while you work. If you are silent for more than a few seconds I will prompt you by saying "speak."

Thank you for your cooperation.

1.2 Design Task A

In order to utilize many programs and facilities of timeshared computers users must be able to create and modify files of information which are stored on disk. The programs used for this task are commonly known as text editors. Your task is to design such a text editor for the PDP-10
2.0 Transcription of Protocol A1

The numbers on the left hand side of the page are the line numbers referred to in the discussions of the protocols in the text. Lines preceded by a "S" are transcriptions of audio information. Lines preceded by an "A" are actions obtained from the visual portions of the tapes.

S1: ALL RIGHT.
S2: I GUESS THE FIRST THING I WOULD DO
S3: WHEN POSED WITH THIS PROBLEM WOULD BE
S4: TO ATTEMPT TO DEFINE THE CLASS THEN THE SUBCLASS
S5: THAT I WAS GOING TO ATTACK INCLUDING THE AH,
S6: TYPE OF EDITOR.
S7: SINCE YOU CANNOT BUILD A TEXT EDITOR TO INCLUDE
S8: ALL OF THE FUNCTIONS THAT ARE AVAILABLE.
S9: IN TEXT EDITORS.
S10: IN THAT SOME OF THEM HAVE TO DO WITH BASIC APPROACH
S11: TO THE FILE THAT ONE TAKES.
S12: AHMM. OKAY.
S13: ONE BASIC DECISION IS THAT THE SORT OF OPERATING
S14: SYSTEM THAT IT IS GOING TO BE INTERFACING TO.
S15: AH. THERE IS AT LEAST FOUR AVAILABLE FOR THE
S16: PDP-10 THAT I KNOW OF.
S17: AH. MOST OF THOSE FOUR
S18: ALL USE SEQUENTIAL FILES FOR TEXT.
S19: THERE AREN'T ANY STRUCTURED FILES
S20: SO THAT A STRUCTURED EDITOR
S21: ISN'T AH TOO IMPORTANT AH
S22: AFTER THE STYLE OF EDIT ON THE SEVEN.
S23: ONE MIGHT HOWEVER DECIDE TO GO TO
S24: A STRUCTURED FILE IF AH
S25: ONE EXPECTED THE TEXT EDITOR TO RUN ON A VERY
S26: SMALL PDP-10 SYSTEM.
S27: HOWEVER MOST TENS BEING SOLD THESE DAYS PROBABLY
S28: HAVE THE VIRTUAL MEMORY CAPABILITY
S29: AND CERTAINLY MOST ALL IN THE FUTURE WILL.
S30: SO, THAT
S31: MUCH MORE EFFICIENT APPROACH PROBABLY
S32: WOULD BE TO USE THE VIRTUAL MEMORY CAPABILITIES
S33: OF THE MOST OF THE OPERATING SYSTEMS OF THE
S34: 10 TO MANAGE THE TEMPORARY FILE
S35: AND SIMPLY BRING ALL THE TEXT INVOLVED
S36: INTO CORE AND WORK ON IT DIRECTLY.
S37: AND AS LONG THE MANAGEMENT FACILITIES YOU USE DON'T
S38: TAKE TOO MUCH PAGING OVERHEAD THEN THERE SHOULDN'T
S39: BE ALOT OF PROBLEMS WITH
A40: [WRITES "FILE I/O"]
S41: AH USING EVERYTHING INCORE AND
S42: NOT PAYING ATTENTION TO AH I/O
S43: EXCEPT SEQUENTIALLY TO BRING THE
S44: FILE IN AND TO WRITE IT OUT AT THE END.
S45: AHMMM. LET'S SEE.
A46: [WRITES "TYPE OF EDITOR"]
S47: I GUESS THE SECOND THING TO DO
S48: IS TO DECIDE THE AH
S49: TYPE OF EDITOR IT IS TO BE.
S50: WHETHER IT IS JUST A SIMPLE ONE
S51: AH OR AH SAY LINE ORIENTED OR
S52: SAY CHARACTER ORIENTED LIKE TECO.
A53: [WRITES "LINE OR CHARACTER"]
S54: AH OR MORE COMPLEX ONE INVOLVING SPELLING
S55: CORRECTION AND AH COMPLEX STRING MANIPULATION.
A56: [WRITES "SIMPLE OR ELABORATE"]
S57: AH.
S58: TECO IN ITSELF HAS A LOT OF FACILITIES BEYOND
S59: WHAT TYPICAL TEXT EDITOR HAS BUT
S60: IT LACKS A LOT OF THE INTERACTIVE SORT OF
S61: THINGS THAT EDITORS LIKE QED AND SOS HAVE.
S62: MY OWN INCLINATION I GUESS IS TO FOLLOW
S63: MY OWN PREFERENCE
S64: FAILING
S65: IF I DONT HAVE AH USER INSISTENCE ON ONE
S66: KIND OF TEXT EDITOR OR ANOTHER IS SIMPLY TO
S67: CREATE ONE THAT I LIKE.
S68: AH, AND
S69: MY OWN PREFERENCE IS TOWARD A TECO-LIKE
S70: EDITOR WITH PERHAPS
S71: EXTENSIONS FOR A FEW OF THE COMMON FACILITIES
S72: THAT I USE.
S73: THE YOU KNOW LIKE MACRO FACILITIES.
S74: AH.
S75: LET'S SEE.
S76: THE FIRST THING IS AH FILE I/O.
S77: AHMMM. AND VIRTUAL MEMORY.
S78: ON SOME SYSTEMS TO GET TO AH
S79: HANDLE MEMORY MANAGEMENT PARTICULARLY ON AH
S80: KA10 BASED SYSTEMS AND AH ONES WHERE
S81: MEMORY IS EXTENDED GRADUALLY AS OPPOSED TO
S82: ON TENEX WHERE YOU CAN
S83: GRAB MEMORY AT ANY TIME YOU HAVE
S84: TO HAVE A LITTLE BIT OF MANAGEMENT FACILITY
S85: TO EXTEND MEMORY PERIODICALLY AS REQUIRED.
SO THAT SIMPLY INITIALIZING THE WHOLE PAGE SPACE WOULD INVOLVE A LOT OF OVERHEAD FOR SMALL FILES WHICH PROBABLY IS THE LARGEST PERCENTAGE OF CASES.

VIRTUAL MEMORY MANAGEMENT VERSUS INTERNAL SOFTWARE FILE STRUCTURE.

THE SECOND ONE IS THE AH STYLE OF EDITOR.

LINE OR CHARACTER ORIENTED.

SIMPLE OR ELABORATE.

THE THIRD CASE WOULD BE WHETHER IT IS PROGRAMMING LANGUAGE OR INTERACTIVE.

PROGRAMMING LANGUAGE OR INTERACTIVE.

SIMPLE OR ELABORATE.

THE THIRD CASE WOULD BE WHETHER IT IS PROGRAMMING LANGUAGE OR INTERACTIVE.

PROGRAMMING LANGUAGE OR INTERACTIVE.

SIMPLE OR ELABORATE.

SIMPLE OR ELABORATE.

THE IMPLEMENTATION, THE INTERNALS IN SO MUCH AS THE EXTERNAL FORM MAY DICTATE A LOT OF THE DETAILS.

MY OWN CHOICE IS FOR A CHARACTER EDITOR WITH FAIRLY ELABORATE FACILITIES AND THE STYLE OF A PROGRAMMING LANGUAGE.

THE, IN ORDER TO IMPLEMENT IT I THINK I WOULD TAKE A SERIES OF STEPS AND AH BUILD FIRST THE BASIC EDITOR SO AS TO HAVE A CHANCE TO EXPERIMENT WITH IT BY AH WITH IT'S USE JUST TO MAKE SURE I WASN'T GETTING TO FAR AWAY.

AH ITS ARRANGEMENTS AT THE HALF WAY POINT.

AH.

SO JUST BUILD THE BASIC FACILITIES AH SIMPLE SEARCH.

(SIMPLE SEARCH, ADDRESSING, INSERTION)

DELETION, CHANGE, LISTING, I/O"

ADDRESSING.

AH INSERTION

AH DELETION

CHANGE

AND AH LISTING.

AH.

THEN AH MACRO AND CONDITIONAL FACILITIES.

MACRO AND CONDITIONAL FACILITIES"

AND THEN THIRD
S138: MAKE FEATURES ON THE ORDER OF SPELLING
S139: KEYWORD SEARCH.
A140: [WRITES "SPELLING, KEYWORD (CORRECTION), SEARCH"]
S141: WITH CORRECTION IMPLIED.
S142: AND SO ON.
S143: AH THE LAST CATEGORY
S144: I WOULD PERSONALLY WOULDN'T IMPLEMENT UNLESS
S145: THERE WAS ALOT SUBSTANTIAL NEED FOR
S146: IT.
S147: SINCE ALOT OF TIME IT IS SIMPLY
S148: EXTRA SPACE OVERHEAD IN THE EDITOR.
S149: HOWEVER FOR WRITING PAPERS SPELLING IS
S150: PROBABLY A REASONABLE AH ---
S151: PERHAPS NOT SUCH FOR PROGRAMS.
S152: A THIRD KIND OF EDITOR
S153: OR AH OR AN ADDITIONAL KIND OF EDITOR
S154: WE COULD HAVE WOULD BE STRUCTURED FOR AH
S155: A PARTICULAR PROGRAMMING SYSTEM.
A156: [WRITES "STRUCTURED FOR PROGRAMMING LANGUAGE"]
S157: SO THAT ONE MIGHT WRITE AN ALGOL EDITOR
S158: OR A LISP EDITOR AH
S159: AND I WILL ASSUME THAT WAS NOT WHAT WAS
S160: INTENDED.
S161: THOSE TEND
S162: THERE'S AH IT IS PROBABLY POSSIBLE WITH SOME EFFORT
ONE
S163: TO BUILD ONE AN EDITOR WHICH IS
S164: PARTICULARIZED TO A CERTAIN LANGUAGE BY THE
S165: INPUT, THE SYNTAX FOR THE LANGUAGE.
S166: WITH CERTAIN RULES, PERHAPS TAGS
S167: ABOUT STRUCTURE
S168: BUT THAT IS PROBABLY TOO SPECIFIC FOR GENERAL USE.
S169: OKAY.
S170: GIVEN THAT THE
S171: EDITOR IS GOING TO BE
S172: AH THAT THE ULTIMATE FORM OF THE EDITOR
S173: WILL INCLUDE FAIRLY SUBSTANTIAL
S174: PROGRAMMING FACILITIES
S175: PERHAPS MACROS OR OTHER PROGRAMMING TOOLS
S176: INCLUDING CONDITIONALS AND AH
S177: SEARCHING WILL PROBABLY BE MOST IMPORTANT
S178: OPERATION ON THE DATA THAT WILL BE
A179: [WRITES "DATA OPERATIONS"]
S180: GOING ON.
S181: AH WILL INCLUDE
S182: SEARCHING
S183: SOME GENERAL PATTERN MATCHING
A184: [WRITES "SEARCH (PATTERN MATCHING)"]
S185: INCLUDING PROBABLY ALTERNATIVES.
S186: AND WILDCARDS
S187: SO THAT ONE OF THE THINGS THAT WE WILL
S188: PROBABLY HAVE TO ELIMINATE IS
S189: SOME OF THE FASTER SEARCH SCHEMES
A190: [WRITES "FAST SEARCH"]
S191: LIKE THE ONES THAT DO LINEAR TIME.
S192: HAVE TO INVESTIGATE AH
S193: AH THOSE SCHEMES
S194: BUT PROBABLY HAVE TO ELIMINATE THEM
S195: SIMPLY BECAUSE THEY AH
S196: THE WELL KNOWN ALGORITHMS DON'T INCLUDE
S197: PROVISIONS FOR AH WILDCARDING AND
S198: ALTERNATE CHOICES IN THE CONSTRUCTION
S199: OF A STATE MACHINE.
S200: AH.
S201: WE HAVE INSERTION,
A202: [WRITES "INSERTION"]
S203: DELETION,
A204: [WRITES "DELETION"]
S205: AH,
S206: CHANGE.
S207: CHANGE
S208: LISTING TO BOTH THE USER AND THE OUTPUT.
A209: [WRITES "LIST (USER AND OUTPUT)"]
S210: AH.
S211: INSERTION REALLY COMES IN TWO DIFFERENT
S212: IS PROBABLY SUBSTANTIALLY DIFFERENT IF THE
S213: INPUT IS FROM THE USER OR IF THE INPUT
S214: IS FROM A FILE.
S215: FROM A FILE THE INPUT IS ALWAYS SEQUENTIAL
S216: WHEREAS THE USER MAY WELL BE INSERTING
S217: IT AT VARIOUS PLACES IN THE FILE.
S218: AH.
S219: TYPICALLY ON A FILE LIKE AH
S220: OH, EH
S221: SOURCE FILE FOR A PROGRAM
S222: OR A DOCUMENT THERE WILL BE ALOT OF MODIFICATIONS
S223: AT VARIOUS POINTS IN THE TEXTS AND SECTIONS
S224: MIGHT WELL BE LEFT FOR LATER
S225: WORK SO THAT THERE WILL BE ALOT
S226: OF MODIFICATIONS TO THE
S227: POINTS INTERNAL TO THE TEXT RATHER
S228: THAN SIMPLY AT THE END.
S229: AH. SO THAT
S230: VARIOUS SCHEMES ONE MIGHT TAKE WOULD
S231: HAVE TO TAKE INTO ACCOUNT THAT
S232: IN SOME CASES THE INPUT WILL BE COMING
S233: IN SEQUENTIALLY AND OTHER CASES RANDOMLY.
S234: AH
S235: SOME OF THE ONES I CAN THINK OF FOR
S236: INSERTING MIGHT BE AH
S237: LINKED STRUCTURES OR
S238: AH TREE STRUCTURES.
S239: AND TREE STRUCTURES IN PARTICULAR COULD
S240: GET OUT OF HAND IF THERE IS NO PROVISION FOR
CREATING BALANCED TREE. IF THAT WAS A TREE SEARCH ACCESS WERE IMPORTANT. AH.
WHERE AS THAT SORT OF APPROACH MIGHT WELL WORK PERFECTLY WELL FOR USER INPUT AH CONVERSELY IF IT IS A VERY LARGE FILE AH WHERE WE TEND TO BRING THE WHOLE FILE INTO VIRTUAL MEMORY AND AS WITH TECO EDIT IT A PAGE AT A TIME THEN ONLY A RELATIVELY SMALL PORTION OF THE FILE IN MEMORY AT ANY ONE TIME THEN A LINKED STRUCTURE OR A TREE STRUCTURES OR SOME OTHER FORM OF STRUCTURE THAT DOESN'T REQUIRE MOVING THE ENTIRE DATA BASE EVERY TIME AN INSERTION IN THE MIDDLE OR BEGINNING IS MADE MIGHT WELL BE ADVISABLE.
ON THE OTHER HAND IF ONLY SMALL FILES ARE EXPECTED THEN IT MAKES IT WORTH THE OVERHEAD TO BOTH IN- CODE AREA AND IN STORAGE SPACE TO INCLUDE PROVISIONS FOR LINKED STRUCTURES.
AGAIN FROM MY OWN EXPERIENCE AH TYPE OF DATA.
I GUESS I WILL SPECIFY TO SOME EXTENT THE EXPECTED TYPE OF DATA AH MODERATELY LARGE FILE.
SAY AH OH TWENTY K TO THIRTY K WORDS AS AH AS A MINIMUM SIZE WHICH FOR WHICH THE TEXT EDITOR SHOULD EXHIBIT GOOD SPEED.
SHOULD EXPECT THAT IF THE FILES GROW VERY LARGE THAT THE SPEED MIGHT WELL DECLINE PARTICULARLY IN SEARCHES.
SINCE FOR TEXT SEARCH PRETTY WELL HAVE PROCESS THE WHOLE FILE.
AND FOR A VIRTUAL MEMORY SYSTEM THAT IS GOING TO INVOLVE PAGING OVERHEAD.
ON THE OTHER HAND, IT SHOULD BE POSSIBLE FOR A LARGE FILE TO DO INSERTIONS AND MODIFICATIONS AT RELATIVELY GOOD SPEED.
S293: EVEN IF A SEARCH OF THE WHOLE FILE TAKES A
S294: WHILE.
S295: AH.
S296: SO I GUESS THAT
S297: I SHOULD WRITE DOWN PERFORMANCE
A298: [WRITES "PERFORMANCE"]
S299: AND THAT'S AH
S300: FAST MODIFICATION AND AH
S301: LOCAL MODIFICATION.
A302: [WRITES "FAST LOCAL MODIFICATIONS AND SEARCHES"]
S303: THERE MAY NOT BE NO HELP FOR GLOBAL OPERATIONS.
S304: AND AH,
S305: REASONABLE GLOBAL CHANGES.
A306: [WRITES "REASONABLE GLOBAL CHANGES"]
A307: [WRITES "(LINEAR TIME INCREASE WITH SIZE OF FILE")
A308: [WRITES "FOR > 30K"]
S309: WHERE REASONABLE MEANS LINEAR TIME
S310: INCREASE.
S311: WITH AH LARGE SIZE FILES.
S312: FOR AH
S313: ABOVE THIRTY K FILES.
S314: AND AH REASONABLY FAST SET UP AND FAST I/O IN
A315: [WRITES "REASONABLY FAST I/O"]
S316: GENERAL.
S317: THAT IT SHOULDN'T TAKE FOREVER
S318: TO READ THE FILE INTO YOUR INTERNAL
S319: FORMAT OR TO WRITE IT OUT.
S320: I GUESS I CAN WRITE DOWN THE
S321: ALTERNATIVE TO VIRTUAL MEMORY
S322: VERSUS AH SOFTWARE FILE STRUCTURE.
S323: ALL RIGHT THEN
S324: I GUESS AT THAT POINT THE AH
S325: THING I WOULD LIKE TO DO IS
S326: AH SPECIFY THE NATURE OF THE DATA STRUCTURE
S327: THAT I WOULD LIKE TO USE TO SUPPORT
S328: THE OPERATIONS THAT I HAVE LISTED.
S329: AH,
S330: SEARCHING BASICALLY REQUIRES
S331: A AH AH LINEAR PASS OVER THE DATA
S332: BUT IN GENERAL WE WANT TO SEARCH BOTH BACKWARDS
S333: AND FORWARDS SO THAT WE NEED
S334: IF WE USE A LINK STRUCTURE IT WILL
S335: HAVE TO AH
S336: PROVIDE REASONABLY FAST AH
S337: SEARCHING FROM A GIVEN POINT
S338: SO THAT IF I WANT TO GIVE LOCAL SEARCHES
S339: LIKE THE PREVIOUS LINE AND THE NEXT LINE
S340: OR THE NEXT FIVE LINES THAT SHOULD
S341: GO QUITE FAST.
S342: IT SHOULD NOT REQUIRE STARTING FROM THE
S343: BEGINNING TO FIND THE LAST
S344: LINE BEFORE WHERE YOU ARE.
S345: AH.
S346: CERTAINLY IF IT IS A SEARCH FROM
S347: A PARTICULAR POINT
S348: ANY PARTICULAR POINT INCLUDING THE CURRENT
S349: POINT IT SHOULDN'T TAKE VERY LONG.
S350: SO LISTING IMPLIES INDEXING.
S351: SO THAT AH
S352: YOU CAN WRITE DOWN SOME DATA STRUCTURE CONSTRAINTS.
A353: [WRITES "DATA STRUCTURE CONSTRAINTS"]
S354: AH
S355: FAST LOCAL MOVEMENT.
A356: [WRITES "FAST LOCAL MOVEMENT"]
S357: PLUS OR MINUS -- CHARACTERS.
A358: [WRITES "PLUS OR MINUS N CHARACTERS"]
S359: WE NEED FAST INDEXING.
A360: [WRITES "FAST ABSOLVE INDEXING"]
S361: I JUST PUT DOWN LINES
S362: PLUS OR MINUS N CHARACTERS OR LINES OR ACCESS
A363: [WRITES "NTH CHARACTER OR LINES"]
S364: TO THE NTH LINE AS AN ADDITIONAL CONSTRAINT
S365: IN THAT
S366: SPECIFICALLY BECAUSE I SAY
S367: A CHARACTER EDITOR
S368: AHMM WITH AH LINE FEATURES AH
S369: DOESN'T MEAN THAT AWE WANT TO EXCLUDE
S370: LINE ORIENTED OPERATIONS.
S371: IN THAT IN WHAT YOU MAY COMMONLY DO IS DO
S372: TO DO SOME INTRALINE EDITING TO CHANGE A LINE
S373: INTO SEVERAL LINES BY DOING
S374: LINE INSERTIONS IN THE MIDDLE OF A LINE.
S375: BUT STILL A FOR A LOT OF PURPOSES LINES ARE
S376: QUITE SIGNIFICANT EVEN IF THAT IS NOT
S377: THE WAY IN WHICH YOU WISH TO DO YOUR EDITING.
S378: SO THAT SEARCHING FOR LINES AS A BUILT IN
S379: FUNCTION IS PROBABLY USEFUL AND YOU MAY WELL
S380: WISH TO SEARCH FOR A PARTICULAR LINE OR MOVE
S381: TO A PARTICULAR LINE.
S382: SO THAT THE INDEXING AND MOVEMENT IS PROBABLY
S383: IMPORTANT.
S384: AHMM
S385: NOW FOR EDITING OTHER SORTS OF FILES INSTEAD
S386: OF SIMPLE TEXT FILES AHMM
S387: ONE MIGHT WISH TO SEARCH FOR THINGS BESIDES
S388: A PARTICULAR AH
S389: STRING OR A PARTICULAR NUMBER OF CHARACTERS OR NUMBER
S390: OF LINES BUT AH
S391: I WILL EXCLUDE THAT
S392: AND ASSUME THAT THE CONSTRAINT TEXT
S393: EDITOR ELIMINATES THE EDITING OF BINARY FILES
S394: THAT IS A SUBSTANTIALLY MORE COMPLEX TASK.
S395: AH, LET'S SEE.
S396: WHAT OTHER CONSTRAINTS DO WE HAVE ON
Protocol Transcription

S397: DATA STRUCTURES.
S398: GUESS WE WANT FAST INSERTION.
A399: [WRITES "FAST LOCAL INSERTIONS AND CHANGES"]
S400: CHANGE IN GENERAL.
S401: EVEN AT THE COST OF A LITTLE BIT HIGHER TIME
A402: [WRITES "EVEN AT MODERATE COST IN SPACE AND I/O TIME"]
S403: IN DOING AH AT AH MODERATE COST IN
S404: SPACE AND I/O TIME.
S405: SINCE MOST OF THE TIME IS PROBABLY SPENT IN
S406: MODIFYING A FILE.
S407: SO AS LONG AS THE I/O DOES NOT GO UP
S408: EXORBITANTLY IT PROBABLY ALRIGHT.
S409: AH.
S410: OKAY, IT OCCURS TO ME AS I AM THINK ABOUT THIS
S411: IS THAT ANOTHER MINOR CONSIDERATION IN
S412: AH DESIGN OF SUCH THINGS INVOLVES
S413: THE RELATIONSHIP OF AH
S414: THE INTERNAL STRUCTURE TO THE EXTERNAL FORMAL.
A415: [WRITES "RELATIONSHIP OF INTERNAL STRUCTURE TO"]
A416: [WRITES "EXTERNAL FORMAT (AVOID BYTE PROCESSING")
A417: [WRITES "IF POSSIBLE?)"]
S418: THAT IS THE I KNOW THAT ON THE PDP-10
S419: BYTES ARE PACKED IN WORDS AND THE
S420: FASTEST WAY TO MOVE TO EXTERNAL FORMAT
S421: STORAGE WOULD BE TO AVOID BYTE PROCESSING.
S422: HOWEVER
S423: AH AS I AM GOING OVER THESE CONSTRAINTS
S424: VARIOUS POSSIBLE DATA STRUCTURES
S425: OCCUR TO ME AND AH
S426: ONE MOST OF THEM EXCLUDE THE
S427: POSSIBILITY OF AH
S428: SIMPLE LINEAR ARRAYS OF CHARACTERS.
S429: FOR THE SIMPLE LINEAR ARRAY THEN I/O
S430: CAN SIMPLY BE DONE DIRECTLY FROM THE BUFFER
S431: DIRECTLY FROM THE MAIN TEXT BUFFER
S432: AVOIDING AH
S433: AH BYTE PROCESSING.
S434: BY SIMPLY MOVING WHOLE WORDS. AS LONG
S435: AS THE DATA IS KEPT PACKED INTERNALLY
S436: SUCH THAT THE INTERNAL FORMAT IS
S437: IDENTICAL TO EXTERNAL ONE.
S438: ON THE OTHER HAND IT WILL SLOW DOWN
S439: OPERATIONS QUITE A BIT FOR LARGE FILES.
S440: MY EXPERIENCE WITH TECO INDICATES
S441: THAT THE FILE SIZE GETS SUBSTANTIAL CHANGES
S442: TOWARDS THE BEGINNING OF THE FILE
S443: CAN TAKE QUITE A WHILE CAUSE OF THE BLT
S444: OF THE CHARACTER MOVEMENT REQUIRED.
S445: PERHAPS WHAT WE CAN DO IS AH
S446: MAKE USE OF AH
S447: FRACTION OF THE TIME A FILE HAS
S448: AH EVEN NUMBER OF CHARACTERS IN THEM
S449: GIVEN SECTION AND USE THAT TO
S450: FACILITATE
S451: WORD MOVES.
S452: HOWEVER, IT OCCURRS TO ME THAT THAT IS FAIRLY
S453: UNLIKELY.
S454: THAT IF, EVEN IF
S455: WE INSISTED THAT A BLOCK BEGIN ON
S456: AN EVEN BOUNDARY, A WORD
S457: BOUNDARY THEN IN WRITING INTO THE
S458: FILE WE WOULD HAVE TO
S459: WE WOULD ONLY TWENTY PERCENT OF THE TIME
S460: GIVEN THAT THERE IS FIVE CHARACTERS
S461: IN A WORD WOULD WE HAVE
S462: AHMM AN EVEN NUMBER OF BYTES PER
S463: AN EVEN NUMBER OF CHARACTERS PER BLOCK.
S464: PER INTERNAL BLOCK.
S465: ASSUMING SOME SORT OF INTERNAL BLOCK
S466: STRUCTURE.
S467: OKAY.
S468: THE OTHER THING
S469: I GUESS THAT AH
S470: FOR AHMM SIMPLICITY AND CONCENTRATION
S471: OF SPACE I THINK YOU WOULD LIKE
S472: TO A COMMON STRUCTURE FOR BOTH
S473: THE MAIN FILE ADN THE MAIN BUFFER.
S474: [WRITES "COMMON STRUCTURE FOR MAIN BUFFER AND FOR"]
S475: [WRITES "PROGRAM" TEXT]
S476: AND FOR AH PROGRAM TEXT.
S477: WHERE PROGRAM TEXT I MEAN COMMANDS TO THE
S478: TEXT EDITOR ITSELF AND ANY STORED MACRO COMMANDS
S479: AHMM.
S480: AHMM.
S481: ALTERNATIVE STRUCTURES.
S482: [WRITES "ALTERNATIVE STRUCTURES"]
S483: WHAT CHOICES ARE THERE?
S484: AHMM.
S485: SIMPLE VECTOR.
S486: [WRITES "SIMPLE VECTOR"]
S487: THIS IS USED IN BOTH THE AHMM PDP-10 AND 6201 TECOS.
S488: AH. PACKED.
S489: [WRITES "(PACKED) PDP-10 AND 6201 TECO"]
S490: OTHER REASONABLE CHOICES
S491: ANOTHER CHOICE WOULD BE LINKED BLOCK.
S492: WITH SOME NUMBER OF CHARACTERS PACKED PER BLOCK.
S493: [WRITES "LINKED BLOCKS (N CHARANTS/BLOCK)"]
S494: I WILL EXCLUDE UNPACKED FORMS BECAUSE
S495: THAT WILL TOO LIMIT THE SIZE OF THE FILE.
S496: WOULD NOT BE ABLE TO GET
S497: QUITE REASONABLY SIZED FILES INTO THE MACHINE
S498: BECAUSE WE WOULD RUN OUT OF SPACE.
S499: SO, AH
S500: N IS PROBABLY IN THE RANGE OF SO
S501: AH COUPLE HUNDRED
S502: ORDER OF MMAGNITUDE ANYWAY.
A503: [WRITES "(N = 200?)"]
S504: AH.
S505: WHAT ELSE COULD WE USE.
S506: I GUESS AH
S507: LINKED BLOCKS WITH AH POINTER ARRAY.
A508: [WRITES "LINKED BLOCKS WITH POINTER ARRAYS "]
S509: AH.
S510: AH. THAT ONES IS USED IN TECO
S511: QED RATHER.
A512: [WRITES "SUE QED"]
S513: THATS AH DISK SPACE.
S514: THIS ALLOWS THE POSSIBLY OF ALLOWING
S515: CHARACTER AND LINE COUNTERS STORED IN
S516: ALONG WITH THE POINTERS SO THAT
S517: YOU CAN DO FAST ABSOLUTE INDEXING AS
A518: [WRITES "CHAR AND LINE COUNTERS BOTH STORED "]
A519: [WRITES "WITH POINTERS"]
A520: [WRITES "FAST INDEXING"]
S521: WELL AS FAST LOCAL
S522: RELATIVE INDEXING.
S523: IN PARTICULAR YOU CAN DO AH
S524: FAST CHARACTER OR LINE INDEXING
S525: SEARCHES ARE PARTICULAR FAST.
S526: HOWEVER AS LONG AS THE LINES ARE KEPT
S527: PACKED IN THE BLOCK THEN
S528: THE SEARCH ISN'T TOO BAD.
S529: ALSO IF I GUESS FOR
S530: LIKE THE BLOCKS THEMSELVES TO BE LINKED.
S531: TO MAKE THE SIMPLIFIED SEARCHING FROM BLOCK
S532: TO BLOCK SEARCH.
A533: [WRITES "LINKED BLOCKS TO SIMPLIFY SEARCH?"]
A534: [WRITES "PERHAPS POINTERS IN ARRAY ARE OK?"]
S535: MAYBE NOT.
S536: PERHAPS THE POINTERS ARE ENTIRELY
S537: ADEQUATE.
S538: IT IS ONLY ANOTHER LOAD OR TWO.
S539: TO GET TO THE NEXT BLOCK.
S540: POINTERS IN THE ARRAY.
S541: AH.
S542: THE SEARCH IS PROBABLY ONE OF THE MOST
S543: CPU INTENSIVE ACTIVITIES
S544: THAT WE HAVE TO ENGAGE IN.
S545: IF WE DON'T NEED TO DO ALOT OF LARGE
S546: SCALE MOVES THEN IT MAY IT MAY
S547: BE VERY WELL TO AH
S548: USE THAT TO
S549: SIMPLIFY THE
S550: IT MAY BE WELL THAT WE WANT TO OPTIMIZE
S551: THAT SEARCH.
S552: AH IT OCCURS TO ME THAT ANOTHER
S553: ALTERNATIVE WOULD BE THE SIMPLE
VECTOR WITH THE NULL SPACE INTERNAL.

[WRITES "SIMPLE VECTOR WITH NULL SPACE INTERNAL TO IT"]

TO IT.

THAT IS TO SAY LEAVE ZERO BYTES.

TAKE THE APPROACH THAT TECO DOES AND THROW AWAY ZERO BYTES.

[WRITES "DELETE INTERNAL NULLS (REDUCE MOVES)"]

SO THAT WHAT WE CAN DO IS ON OUTPUT WE CAN DELETE THE NULLS.

INTERNAL NULLS.

SO THAT WHEN WE WANT TO DO INSERTIONS WE CAN JUST TAKE UP SOME OF THE NULL SPACE THAT WILL REDUCE MOVES.

BUT AT ALL UNFORTUNATELY INCREASE THE INDEXING TIME.

[WRITES "INCREASE INDEXING TIME"]

AT THE WITH THE ADVANTAGE OF DECREASING THE MODIFICATION TIME.

[WRITES "DECREASE MODIFICATION TIME"]

TIME.

THERE IS A FEW OTHERS THAT I SUPPOSE WE COULD THINK OF LIKE AH

SOME SORT OF AH HASH SEARCH BY LINE NUMBER

BUT MOST OF THOSE THAT I CAN THINK OF ARE NOT SUITABLE FOR SEQUENTIAL SEARCH WHICH IS PROBABLY THE ACTIVITY THAT REQUIRES THE MOST EFFORT.

PLUS WE WILL OFTEN BE DOING AH CHARACTER EDITING OFTEN BE ALLOWING LINE SPLITTING.

NOW SUBLOCKS WILL COMPLICATE THE LINKED BLOCK SCHEME.

I GUESS THE ISSUE HERE IS HOW MUCH EH RELATIVE TIME IS INVOLVED BETWEEN ONE OF THESE TWO LINKED SCHEMES AND THE VECTOR SCHEME. IN TERMS OF DOING MODIFICATION.

AH,

[WRITES "STRUCTURED COMPARISON"]

NEED TO CALCULATE THE RELATIVE TIME REQUIRED MOVING THE WHOLE TEXT AS OPPOSED TO THE OVERHEAD INVOLVED IN MAINTAINING LINKED BLOCKS.

PLUS, WE MAY WELL BE ABLE TO AH MAKE USE OF THE SPECIALIZED I/O FORMATS ON THE TEN TO DUMP THE WHOLE FILE WITH I/O TRANSFER OR WITH AH SIMPLE UNBUFFERED TRANSFER

SO THAT WE DON'T HAVE TO COPY THE STUFF
S605: INTO TEXT BUFFERS.
S606: SO THAT
S607: SIMPLE VECTOR MAY WIN SO MUCH ON BETWEEN THE
S608: I/O AND SIMPLER SEARCH AND NO OVERHEAD
S609: THAT AH WE CAN AVOID LINKED BLOCKS.
S610: AH, PROBABLY
S611: I GUESS THAT AH
S612: BETWEEN THE TWO LINKED BLOCK SCHEMES
S613: PROBABLY C IS WORTH THE OVERHEAD.
S614: AH IN PARTICULAR AH
S615: THAT WE GET REASONABLY FAST INDEXING.
S616: OR SINCE WITH THE LINKED BLOCKS WE HAVE
S617: TO GO BUMPING DOWN THE BLOCKS THERE
S618: SHOULD BE---- PAGE FAULTS.
S619: SO THAT THE SIMPLE LINKED BLOCK SCHEME
S620: WOULD PROBABLY LOSE WHEREAS
S621: LINKED BLOCKS WITH POINTER ARRAYS
S622: WE GET TO HAVE ALL OUR OFF BLOCK INDEXING
S623: IN OUR COUNTS LOCALIZED SO THAT
S624: WE CAN REFERENCE ALL THE INDEXING DATA
S625: WITHOUT
S626: ACCESSING ALOT OF PAGES.
S627: SINCE YOU TO GET TO THE NTH CHARACTERS
S628: IN EITHER OF THESE SCHEMEES YOU PASS
S629: THROUGH ALL OF THE INTERMEDIATE
S630: ---- BUT WITH SCHEME C THE INTERMEDIATES
S631: ARE ONLY A COUPLE OF WORDS AND ALL OF THOSE
S632: INTERMEDIATES ARE LOCALIZED WITHIN
S633: THE POINTER PAGES.
S634: AH SO THAT C PROBABLY WINS OVER B
S635: AH AS BETWEEN THE SIMPLE VECTOR WITH NULL SPACES
S636: VERSUS THE SIMPLE VECTOR PACKED
S637: I GUESS THE MAIN QUESTION
S638: IS HOW DOES IT AFFECT INDEXING.
S639: IT IS EASY TO SEE THAT IT IS PROBABLY FASTER
S640: FOR REASONABLY SIZED FILES THAN
S641: MOVING ALL THE STUFF SEEING.
S642: WE WOULD BE ABLE TO SEARCH FOR AH
S643: AH YOU WOULDN'T BE ABLE TO SEARCH FOR THE NULL
S644: WITH WORD WISE COMPARISONS SO THERE WOULD BE
S645: THAT DISADVANTAGE.
S646: YOU COULD PROBABLY DO SOME SORT OF WORD WISE MOVE
S647: PROBABLY LIKE THE 10 HAS THE COMBINED
S648: SHIFT YOU COULD PROBABLY LOAD
S649: AH ONE WORD SHIFT RIGHT COMBINE
S650: ASSUMING THAT THE WORST
S651: ----- ---- A LINE.
S652: IF YOU ARE MOVING FIVE BYTES YOU COULD SIMPLY
S653: MOVE WHOLE WORDS AT A TIME.
S654: IF YOU ARE ASSUMING STUFF WASN'T BYTE ALIGNED
S655: YOU COULD STILL GET BY
S656: PERHAPS MOVE FIVE BYTES AT A TIME IN ABOUT
Let’s see
You have a load

[Writes "MOVE"]
A move
A LSHC
[Writes "LSCH"]
AH MOVEM
[Writes "MOVEM"]
AH LSH
[Writes "LSHC"]
C
AND AH
AND AH
A AOJ on some condition.

[Writes "AOJN"]
So that would be a reasonably fast
Way you could move into the registers.
And you could use a BLT or a three word
Loop to move it if it is a line.
AH whereas with the NULLS
You probably much have to AHMMM
Search for stuff on a character
Basis.

So that if you didn’t find any reasonably
Soon it could take you a long time to
Move the stuff.
Plus you would have about five times as many
You have you would be going
Around the loop about fives times as often.
It would be something like load byte
[Writes "DPB"]
AH TEST
AHM and DPB
Now you put DPB up there
And so now it is a three byte loop.
Jump and AH
[Writes "LDB"]
[Writes "JUMPE"]
And something like
SOJ or something like that
So it would be four instructions.
Also that’s for moving down and
It would just be a BLT if it were just a line.
Suppose we could consider what sort of
AH
What sort of reason able numbers we might
Assign to these.
Suppose we kept spaces NULLS every
AH
Say twenty percent
[Writes "NULLS 20 PERCENT"]
That’s awful lot.
OF COURSE IF WE RAN OUT OF SPACE WE COULD START USING LESS NULLS OR SQUEEZE THEM OUT.
THE OTHER THING WITH THAT HAVE TO SEARCH BOTH WAYS WE HAVE NULLS IN THE FILE.
ON THE OTHER HAND IF THEY ARE NEARBY SUPPOSE I WONDER HOW FAR WE WOULD HAVE TO MOVE WELL LET'S SEE.
I WONDER HOW MANY CHARACTERS YOU WOULD WANT TO INSERT AT ONE TIME.
THAT IS HOW MUCH SPACE YOU WOULD MUNCH UP.
CHARACTERS.
CHANGED AT ONE TIME.
I GUESS IF YOU WANTED TO CAREFULLY TAILOR THIS YOU WOULD HAVE TO DO SOME STUDY
OF WHAT THE TYPICALLY NUMBER CHARACTERS INVOLVED WAS.
AH.
HMMMM.
LET'S SEE.
YEH, THE OVERHEAD IS PROBABLY QUITE A BIT MORE.
LET'S SEE.
IT WOULD ALSO SLOW DOWN THE SEARCH A LITTLE BIT ADD A COUPLE OF INSTRUCTIONS TO THE SEARCH
LOOP.
ALSO IF YOU DID THAT TO --- TEXT STRINGS THEN YOU COULD HAVE A FLAG TO KEEP THE
YOU ARE GOING TO USE THE SAME ROUTINES TO DO CHANGES ON BOTH THE AH
MACROS AND THE MAIN TEXT BUFFER THEN YOU 'D PROBABLY WANT TO AVOID THAT
FOR THE MACROS UNLESS YOU 'D EXPECT TO EDIT THE BUFFERS.
NOW THAT WOULD BE A NICE FEATURE TO EDIT THE BUFFERS.
EXCEPT YOU 'D PROBABLY BE EDITTING THOSE LESS THAN YOU WOULD THE MAIN BUFFER.
AND THIS ONE WOULD BE PARTICULARLY BAD IF EXPECTED TO USE THE THING ALOT FOR INTERPRETIVE EXECUTION.
THAT IS TO SAY FOR EXECUTING SUBSTANTIALLY SIZED MACRO COMMANDS.
HMMMM.
PROBABLY THAT--- WOULD BE BETTER FOR GENERAL USE GIVEN THAT WE CAN WRITE A FAIRLY
FAST LOOP.
WONDER HOW BAD THAT WOULD BE?
LET'S SEE WHAT'S THE TIME.
THAT LOOP IS SOMETHING LIKE A COUPLE OF MEMORY REFERENCES.
THOSE ARE REALLY FAST.
BECAUSE THEY ARE IN REGISTERS.
S761: THE STUFF IS ALL IN REGISTERS.
S762: IT IS JUST THOSE TWO ARE THE ONLY
S763: TIME.
S764: SO THAT IS PROBABLY ON A RANDOM MACHINE.
S765: THAT IS PROBABLY TWO MIKES APiece.
S766: FIVE TO SIX MIKES FOR THE LOOPS.
S767: THAT WOULD BE SOMETHING LIKE
S768: WELL LET'S SEE,
S769: WE SAID WE HAVE A THIRTY K
A771: [WRITES "8*5 = 40 MS * 10 MS"]
S774: IT IS A VERY BIG FILE THEN IT SLOWS DOWN.
S775: I WONDER HOW MANY FILES WILL GET TO BE A HUNDRED K.
S776: PROBABLY NOT TOO MANY.
S777: WITH SEARCH GETTING OUT OF HAND
S778: BEFORE GETTING THAT LARGE.
S779: BUT YOU CAN STILL HANDLE IT BUT --- SLOW.
S780: YEH PROBABLY NULLs WON'T SAVE YOU ENOUGH
S781: GIVEN THAT IS ALL THE TIME IT TAKES
S782: TO DO A WHOLE MOVE.
S783: YOU'D PROBABLY SPEND MORE TIME THINKING ABOUT IT.
S784: PLUS IF YOU'D HAD TO DO ONE OF THESE THAT'S
S785: MORES LIKE FOUR AND FOUR AND
S786: AH THOSE ALL BYTE POINTERS
S787: YOU COULD THEM IN REGISTERS BETTER THAN THREE ----.
S788: BECAUSE YOU HAVE GOT TO DO THAT WHOLE
S789: EXTRACT.
S790: THAT IS PROBABLY TWO.
S791: THAT IS MORE LIKE A
S792: THAT'S PROBABLY TAKE LONGER TO DO IT.
S793: PLUS YOU ARE GOING TO
S794: AROUND THAT THING FIVE TIMES.
S795: IF YOU HAD TO MOVE
S796: THAT IS EQUAL TO FOURTY.
S797: FOR AH, PER WORD.
S798: SUPPOSE WE WERE GOING TO MOVE A HUNDRED WORDS OR
S799: TWO HUNDRED WORDS THAT
S800: WOULD BE
S801: AH
S802: TEN MILLISECONDS.
S803: THAT ISN'T VERY LONG.
S804: EXCEPT THAT DOESN'T GUARANTEE US THAT WE
S805: ARE DONE.
S806: BECAUSE IF WE RUN OUT OF SPACE
S807: WE STILL HAVE TO EXPAND IT
S808: AND IT'S GOING TO SLOW DOWN INDEXING.
S809: SLOW INDEXING.
S810: OH.
S811: THAT'S A REAL CONSIDERATION.
A812: [WRITES "SLOW INDEXING WITH SVN"]
S813: IN ORDER TO DO INDEXING IT
S814: IS GOING TO TAKE SOMETHING.
S815: INDEXING WITH SV IS VIRTUALLY NEGLIGIBLE,
S816: JUST A FEW INSTRUCTIONS.
S817: THAT IS GOING TO BE MORE LIKE PROPORTIONAL
S818: TO N.
S819: -- CHARACTERS.
S820: WE COULD USE THAT
S821: MAYBE WE COULD HAVE POINTER BLOCKS
S822: BUT THEN
S823: IF WE HAD POINTERS WE MIGHT AS WELL JUST HAVE LINKED
S824: BLOCKS TO SIMPLIFY MATTERS.
S825: IF --- OR AH SV
S826: WE FIGURED OUT EARLIER THAT WE WANTED TO DO
S827: LVP IS MUCH BETTER THAN LVK VERSUS
S828: BETWEEN THOSE TWO
S829: I GUESS THE REAL QUESTION IS BEHAVIOR FOR
S830: LARGE FILES.
S831: HMMM.
S832: WELL, MANIPULATIONS FOR AH
S833: THE POINTER BLOCKS ARE PROBABLY GOING TO
S834: BE AH
S835: ALOT OF THE SAME SORT OF THING.
S836: BUT THEY ARE GOING TO BE MUCH SMALLER.
S837: ONLY A FEW MAYBE A HUNDRED WORDS OR SO.
S838: SO IT IS THAT SORT OF TIME
S839: 1 TO TEN MILISECONDS FOR AN INSERTION.
S840: AH.
S841: AH INSERT, -----
S842: AH --------
S843: AND THAT'S THE TEN MILISECONDS IS QUITE LARGE.
S844: AHMM. HOW MUCH FASTER IS THE I/O?
S845: THE I/O, WELL THE I/O IS GOING TO INVOLVE
S846: RUNNING THROUGH WITH THE BYTE LOOP
S847: SO IT IS GOING TO BE THAT MUCH FOR THE
S848: WHOLE THING.
S849: AND THAT'S GOING TO BE ----.
S850: SO THAT IS PROBABLY GOING TO BE FIVE TIMES
S851: THAT.
S852: SO THAT IS GOING TO BE MORE LIKE AT LEAST
S853: MAYBE MORE LIKE ONE SECOND.
S854: AND THIS ONE IS GOING TO BE
S855: THAT IS JUST TO BECAUSE WE HAVE TO COPY
S856: IT.
S857: WHEREAS SV IS GOING TO BE A BIT LIKE AH
S858: AHMM,
S859: PROBABLY COMPARABLE.
S860: WELL THE ONE SECOND
S861: IS PROBABLY SMALL COMPARED WITH THIS
S862: TRANSFER TIME.
S863: EXCEPT PROBABLY NOT TOO BAD.
S864: YES, THAT IS SMALL COMPARED TO DISK TRANSFER
S865: TIME.
S866: YOU CAN'T MOVE THAT THEIRY K TO DISK IN
S867: THAT LONG.
S869: UNLESS IT
S870: UNLESS THE DISK SYSTEM WAS GOING TO ALLOW
S871: YOU TO DO REALLY FAST I/O.
S872: LIKE CONTIGUOUS I/O BUT THE TEN
S873: NONE OF THE TEN FILE SYSTEMS ARE SET UP THAT
S874: WAY.
S875: NO CONTIGUOUS FILES.
S876: OKAY I SUPPOSE AT THIS POINT AH
S877: THEY OFFER
S878: LET'S SEE SV IS GOING TO HAVE RELATIVELY
S879: SLOW LINE INDEXING UNLESS WE KEEP A LINE POINTER
S880: TABLE.
S881: HAS SLOW LINE INDEXING.
S882: KEEP POINTER TABLE.
A883: [WRITES "SLOWING INDEXING"]
S884: OKAY WHY DON'T WE PUT THIS OFF
S885: PUT THIS ASIDE FOR A BIT AND AH
S886: WE CAN LEAVE THIS AH
S887: THAT PART OF THE DECISION OFF FOR A WHILE.
A888: [WRITES "DELEY DECISION "]
S889: LET'S SEE.
S890: HOW MUCH SPECIALIZATION IS THERE INVOLVED
S891: WITH THAT.
S892: WELL NOT TOO MUCH IF WE ALWAYS GO THROUGH
S893: ROUTINES TO GET AT THE DATA.
A894: [WRITES "USE SUBROUTINE OR"]
A895: [WRITES "MACROS TO OPTIMIZE FINAL ACCESS"]
S896: PERHAPS WE CAN DO IT WITH MACROS SO THAT IT WOULD
S897: EXPAND INLINE.
S898: POSSIBLE.
S899: LET'S DELAY THIS DECISION.
S900: USE SUBROUTINE OR MACRO, OR MACROS.
S901: AH TO OPTIMIZE FINAL ACCESS.
S902: ALL RIGHT.
S903: I GUESS THE NEXT THING THAT COMES UP IS THE
S904: GENERAL FORM OF THE USER INTERFACE.
A905: [WRITES "FORM OF COMMAND INTERFACE AND"]
S906: COMMAND INTERFACE.
S907: AND HOW THAT DictATES THE UNDERLYING
S908: AH PROGRAM STRUCTURE.
A909: [WRITES "UNDERLYING PROGRAM STRUCTURE"]
S910: LET'S SEE.
S911: WE PROBABLY WANT IT TO BE A
S912: PRETTY MUCH A PROGRAMMING TYPE LANGUAGE THING.
S913: AH.
S914: I GUESS MY INCLINATION IS TOWARDS A
S915: TECO OR TRAC TYPE SCHEME.
S916: TECO INVOLVES LESS OVERHEAD CHARACTERS
S917: SO SIMPLE THINGS DON'T TAKE A WHOLE LOT OF CHARACTERS.
S918: AH.
S919: I AM NOT TOO INCLINED TO AH
S920: DO THINGS THAT INVOLVE MULTIPLE LETTER COMMANDS
S921: MORE
S922: ANYMORE THAN TWO.
S923: SIMPLY BECAUSE FOR AN EXPERIENCED USER IT INCREASES THE NUMBER OF CHARACTERS YOU HAVE TO TYPE
S924: AH
S925: DO COMMAND RECOGNITION IF YOU WANTED TO HELP
S926: A LEARNING USER.
A927: [WRITES "COMMAND RECOGNITION (?)"]
S928: HMMMM.
S929: HOW DOES THAT IMPACT UPON COMMAND SCANNING.
S930: EVEN FOR TECO THERE IS AH IT IS AN UNAMBIGUOUS IF WE MAKE THE THING UNAMBIGUOUS WE CAN ALLOW A931: [WRITES "UNAMBIGUOUS (?)"]
S932: EXPANSION BUT THEN THE USER NEVER GETS TO TYPE IN THE LONG FORM BECAUSE IF HE DID IT WOULD MEAN SOMETHING ELSE FOR A TECO TYPE INPUT.
S933: IF YOU ALWAYS USED DELIMITERS AS IN QED THEN IT WOULD THEN IT WOULDN'T HAVE TO DO THAT.
S934: AH.
S935: SINGLE CHARACTER. HMMM.
A936: [WRITES "DELIMITERS VERSUS SINGLE CHARACTER"]
S937: I GUESS THE BASIC CHOICE I WOULD MAKE ON THAT WOULD BE TO TO MAKE IT FASTER FOR THE EXPERIENCED USER.
A938: [WRITES "CHOICE - FASTER FOR EXPERIENCED USER"]
S939: I GUESS THAT IS SOMETHING TO HAVE ALL ALONG.
S940: IS THAT I WANT THAT THE DECISIONS I HAVE BEEN MAKING OR THE STRICTLY AS REGARDS THE STYLE OF THE EDITOR AND AH SORT OF SORT OF ACTIVITY THAT I WOULD LIKE TO DO,
S941: THE MAIN CONSTRAINTS, NAMELY SPEED RATHER THAN ANYTHING SAY THAN EASE OF USE.
S942: AH INDICATES AN EXPERIENCED USER.
S943: AH THAT REFLECTS SIMPLY MY OWN PREFERENCES.
S944: I CAN SEE THAT THERE ARE OTHER WAYS TO DO TO GO ABOUT IT BUT I WOULDN'T BUT IT IF I WAS BUILDING AN EDITOR FOR MY OWN USE I WOULD INSIST ON SPEED FOR SIMPLE THINGS BECAUSE I AM NOT VERY PATIENT WITH PROGRAMS THAT TAKE A LONG TIME.
S945: AND AH AND EVEN LESS PATIENT WITH PROGRAMS THAT INSIST ON TELLING ME MORE THAN I CARE TO TELLING ME THINGS THAT I ALREADY KNOW.
S946: AH,
S947: THAT'S NOT NECESSARILY THE THING YOU WOULD LIKE FOR AN INTRODUCTORY SYSTEM.
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S973: BUT AH,
S974: FOR AN EXPERIENCED USER IT IS PROBABLY SUPERIOR.
S975: AH,
S976: NO,
S977: REDUNDANT OUTPUT.
A978: [WRITES "NO REDUNDANT OUTPUT"]
S979: STILL WE COULD DO COMMAND RECOG
S980: AH COMMAND EXPANSION WITHOUT GETTING INTO TROUBLE.
S981: AH THAT'S BASICALLY WHAT QED DOES I GUESS.
S982: YES.
S983: AH.
S984: OPTIONAL AH COMPLETION, EXPANSION.
A985: [WRITES "OPTIONAL EXPANSION ALA QED"]
S986: YES.
S987: TO AH, ASSIST USER.
S988: ----
S989: WE CAN PUT THAT IN LATER.
S990: LATER EDITION, NOT FIRST VERSION.
S991: TO ASSIST USER (NORMALLY OFF)
S992: OKAY.
S993: I GUESS AH BASED ON MY OWN USE OF TEXT EDITORS
S994: AND MY OWN CHOICE IS TO BASICALLY BUILD
S995: A TECO.
A996: [WRITES "TECO (LINE 10 AND 620 AND NOVA, ETC)"]
S997: WITH AH EXTENSIONS
S998: WHICH IS WHAT I HAVE SEEN DONE ALOT OF PLACES
S999: ELSEWHERE.
S1000: AH,
S1001: TECO COMMANDS,
S1002: I DON'T THINK THAT THERE
S1003: GIVEN THAT THE TECO IS AVAILABLE
S1004: ON A NUMBER OF MACHINES NOW
S1005: AH,
S1006: THERE IS NO OTHER OBVIOUS CHOICES FOR A CHARACTER
S1007: EDITOR OTHER THAN PROGRAMMING LANGUAGES OTHER
S1008: THAN SNOBOL OR TRAC.
S1009: AH,
S1010: I GUESS I PREFER THAT IT BE COMPATIBLE
S1011: TO MOST COMMON DIALECTS RATHER THAN
S1012: BE THE SAME WITH ALL THE NAMES CHANGED
S1013: LIKE PDP-11 EDIT.
S1014: HM TWO, 620, ETC. ETC.
S1015: NO AH GRATUITOUS CHANGES.
A1017: [WRITES "NO GRATUITOUS CHANGES AS IN"]
A1018: [WRITES "PDP-11 EDIT"]
S1019: AHMM. ADD SOME FEATURES AND AH AND
S1020: SOME SORT OF INTERACTIVE REPLACE.
A1021: [WRITES "ADD INTERACTIVE REPLACE (AND SEARCH?)"]
S1022: AH. FOR SEARCH,
S1023: THATS FROM QED.
A1024: [WRITES "(FROM QED)"]
S1025: AH LET'S SEE WHAT OTHER THINGS ARE USEFUL THAT
S1027: I AM MISSING.
S1028: AHMM.
S1029: ---- FEATURES.
S1030: FORMATTER FOR MACROS.
A1031: [WRITES "FORMATTER FOR MACROS"]
S1032: INTERNAL EXECUTION FORMAT
A1033: [WRITES "INTERNAL EXECUTION FORMAT FOR MACROS?"]
S1034: THESE, THE CONCERNS ABOUT MACROS ARE MAINLY IF
S1035: WE WISH TO GET AS A LATER FEATURE WANT TO MAKE
S1036: THESE MORE USEFUL.
S1037: THE ALTERNATE MIGHT BE TO
S1038: EXPAND THOSE TO GIVE THEM NAMES AND ALL.
S1039: THAT MIGHT MAKE IT TOO COMPLEX OR INVOLVE TOO MUCH
OVERHEAD.
S1040: ON THE OTHER HAND IT WOULD MAKE IT EASIER TO READ.
S1041: OF COURSE THEN YOU START BUILDING TRAC.
S1042: AND MIGHT JUST AS WELL HAVE IT.
S1043: ALL THERE.
S1044: TECO'S MAIN VIRTUE IS THAT IT ISN'T
S1045: THAT THERE ISN'T TOO MUCH GOING ON THAT YOU DON'T
HAVE
S1046: AH
S1047: OVERLY COMPLEX SUBROUTINE STRUCTURE.
S1048: ON THE OTHER HAND SOMETIMES THAT IS JUST WHAT YOU
WANT.
S1049: WILL LET YOU WRITE SUBROUTINES.
S1050: AH YES.
S1051: ONE I DEFINITELY WANT TO ADD IS AH INITIALIZATION
S1052: FILE.
A1053: [WRITES "INITIALIZATION FILE (MACRO COMMANDS)"]
S1054: VERY HANDY FOR MAKING TECO DO WHAT YOU WANT.
S1055: MACRO COMMAND FILE.
S1056: CAN JUST EXECUTE THAT AND THE FILE CAN DO WHAT IT
WANTS.
S1057: LET'S SEE WHAT ELSE IS A HANDY FEATURE.
S1058: I GUESS AN OPTION THAT'S NOT AT ALL CLEAR IS
S1059: DISPLAY FACILITIES.
A1060: [WRITES "DISPLAY FACILITIES"]
S1061: THAT AH
S1062: GRAPHICS,
A1063: [WRITES "GRAPHICS I/O"]
S1064: AH AH AHMM
S1065: LIKE IF YOU USE A TABLET OR LIGHT PEN,
S1066: OR WINDOW DISPLAY.
A1067: [WRITES "TABLE OR LIGHT PEN"]
A1068: [WRITES "WINDOW DISPLAY"]
S1069: THOSE ARE REALLY
S1070: AH
S1071: THAT REALLY MAKES IT VERY DIFFERENT EDITOR
S1072: AH
S1073: THEN PROBABLY AH
S1074: WITH AH TOO LARGE
A1075: [WRITES "VERY DIFFERENT EDITOR"]
S1076: TO BE REALLY FAST ON A PDP-10.
S1077: ON THE OTHER HAND PARTICULARLY GIVEN
S1078: THE THAT YOU HAVE TO DUMP ALL THAT TEXT DOWN ON
S1079: THE MACHINE AND ESPECIALLY WHEN YOU THE
S1080: GUY WANTS TO MOVE THE WINDOW,
S1081: SLOW WITHOUT SPECIAL AH
S1082: HARDWARE FACILITIES ON THE TEN.
A1083: [WRITES "SLOW W/O SPECIAL HARDWARE"]
S1084: YOU CAN DO THAT IF I SUPPOSE YOU HAD A HIGHSPEED
S1085: GRAPHICS UNIT CONNECTED TO THE MEMORY OR SOMETHING.
S1086: OKAY.
S1087: LET'S SEE WHERE WE.
S1088: ALL RIGHT, GIVEN THAT I HAVE DECIDED TO DO A TECO
S1089: TYPE COMMAND INTERFACE THEN THE SCANNER IS FAIRLY
S1090: SIMPLE.
S1091: AH,
S1092: LET'S SEE, ELEVEN, COMMAND EVALUATOR.
A1093: [WRITES "COMMAND EVALUATOR"]
S1094: THAT'S PRETTY WELL DICTATED AH
S1095: BY THE NATURE OF THE THING.
S1096: WE HAVE A SCANNER, AH
S1097: WITH AH AH EXECUTE AH
S1098: NO EXECUTE FLAG.
S1099: AHMM FOR THE, THE NO EXECUTE IS FOR SKIPPING
A1100: [WRITES "SCANNER WITH EXECUTE/NO EXECUTE"]
A1101: [WRITES "FLAG (FOR SKIPPING COMMANDS)"]
S1102: COMMANDS.
S1103: I HAVE SEEN SOME TECOS THAT DON'T HAVE THAT AND THEY
S1104: GET THEN THEN THE SEMANTICS GET QUITE COMPLICATED
S1105: THERE ARE ALOT OF COMPLICATIONS THAT YOU CAN AVOID
S1106: OTHERWISE.
S1107: THE SCANNING ISN'T CONSISTENT IF YOU DON'T HAVE IT.
S1108: COMMANDS AND CONDITIONALS.
S1109: AH. BRANCH ON COMMAND.
A1110: [WRITES "BRANCH ON COMMAND AND STATE"]
S1111: COMMAND CHARACTER AND AH STATE.
S1112: NEED A FEW STATES. VERY FEW STATES.
A1113: [WRITES "VERY FEW STATES"]
S1114: AH USE A TRANSLATION TABLE FOR CHARACTER PROBABLY.
S1115: WE CAN ALL PACK THAT INTO WORDS.
A1116: [WRITES "TRANSLATION TABLE (PACK IN WORDS?)"]
S1117: OKAY SO THAT IS PRETTY SIMPLE.
S1118: AH. THEN I GUESS
S1119: SINCE THOSE ARE ALL AH THE BASIC TECO COMMANDS ARE
S1120: PRETTY SIMPLE THEN ALL WE NEED TO
S1121: DO TO WRITE THOSE IS TO DEFINE OUR
S1122: BASIC DATA ACCESSING FUNCTIONS.
A1123: [WRITES "DATA ACCESSING FUNCTIONS"]
S1124: AND AFTER THAT WE COULD WORK OUT AH
S1125: THEN AH WRITE COMMANDS AND UPDATE THE
A1126: [WRITES "WRITE COMMANDS"]
S1128: FUNCTION SPECIFICATIONS BASED ON THAT.
S1129: CF DEFINITIONS.
S1130: AND THEN IT WOULD BE TIME TO AH WRITE AH
A1131: [WRITES "WRITE ACF'S AND"]
S1132: ACF'S AND DEFINE THE AH
S1133: FINAL DATA STRUCTURES.
A1134: [WRITES "DEFINE FINAL DATA STRUCTURES"]
S1135: OKAY I GUESS THAT IS THE APPROACH.
S1136: OF COURSE I AM NOT DOING THIS IN DETAIL
S1137: BUT AH I THINK THIS IS PROBABLY THE CRITICAL
S1138: POINT AND AH AND IF THOSE ARE WELL SPECIFIED
S1139: THEN IT'S SIMPLY A MATTER THESE CAN
S1140: BE PRETTY MUCH CAN THAT STEP CAN BE DONE
S1141: THE DECISIONS CAN BE DONE PRETTY WELL BY LOOKING
S1142: AT AH THE WAY IN WHICH THESE USE THE DATA
S1143: ACCESSING FUNCTIONS.
S1144: ONE ARG I WANT TO WRITE DOWN IS THAT I WANT
3.0 Encoding for Protocol A1

This section contains the encoding statements and constraint/problem relations for Protocol A1.

(STRATEGY (DEFINE CLASS-OF-EDITORS)
  (DECIDE (TYPE-OF EDITOR)))

(SELECTION)
(CONSTRAINT (DESCRIPTION NUMBER-OF-FUNCTIONS CONSTRAINED))
(CONSTRAINT (DESCRIPTION FUNCTIONS CONSTRAINED-BY (APPROACH-TO FILE)))
(SELECTION)
(CONSTRAINT (DESCRIPTION PDP-10
  HAS-ONLY
  (SEQUENTIAL FILES))
  (DEFVALUE . 10))
(CONSTRAINT (DESCRIPTION PDP-10 HAS-NO (STRUCTURED FILES))
  (DEFVALUE . 10))
(CONSTRAINT (DESCRIPTION (MOST PDP-10)
  HAVE
  (VIRTUAL MEMORY))
  (DEFVALUE . 10))
(CONSTRAINT (DESCRIPTION VM USE-OF (IS EFFICIENT))
  (DEFVALUE . 6))
(DECISION USE VM (TYPE-OF OPERATING-SYSTEM))
(PROBLEM-STMT MANAGEMENT OF FILE-IO)
(SELECTION)
(CONSTRAINT (DESCRIPTION DESIGNER
  PREFERENCE
  (TECO-LIKE EDITORS))
  (DEFVALUE . 10))
(DECISION BUILD TECO-LIKE (TYPE-OF EDITOR))
(SELECTION)
(CONSTRAINT (DESCRIPTION USE (AVAILABLE MEMORY-MGT)))
(CONSTRAINT (DESCRIPTION PAGE-SIZE INITIALIZATION PROHIBITIVE))
(CONSTRAINT (DESCRIPTION (MOST EDITING) PERFORMED-ON (SMALL FILES)))
(SELECTION)
(CONSTRAINT (DESCRIPTION (IMPLEMENTATION-DETAILS) UNIMPORTANT))
(DECISION BUILD
  (CHARACTER ELABORATE PROGRAMMING-LANGUAGE)
  (TYPE-OF EDITOR))
(PROBLEM-STMT FUNCTIONS
  CONSISTS-OF
  (SEARCH ADDRESSING
  INSERTION
  DELETION)
CHANGING
LISTING
MACROS
CONDITIONALS))
(SELECTION)
(CONSTRAINT
(DESCRIPTION SEARCHING MOST-IMPORTANT OPERATION))
(DECISION INCLUDE PATTERN-MATCHING)
(CONSTRAINT
(DESCRIPTION GENERAL-SEARCH-ALGS ARE NON-LINEAR))
(DECISION ELIMINATE GENERAL-ALGS FOR SEARCHING)
(SELECTION)
(CONSTRAINT
(DESCRIPTION INPUT FROM (SOURCE (OR USER-FILE))))
(CONSTRAINT (DESCRIPTION INPUT DEPENDS-ON SOURCE))
(CONSTRAINT (DESCRIPTION (INPUT FILE) IS SEQUENTIAL))
(CONSTRAINT (DESCRIPTION (INPUT USER) IS RANDOM))
(CONSTRAINT
(DESCRIPTION (MOST MODIFICATIONS) ARE (INTERNAL-TO TEXT)))
(CONSTRAINT (DESCRIPTION INPUT-TYPES INFLUENCE TEXT-REPRESENTATION))
(SELECTION)
(CONSTRAINT
(DESCRIPTION TREE-STRUCTURES REQUIRE BALANCING))
(CONSTRAINT (DESCRIPTION (LARGE-FILE IN-CORE) USE LINKED-STRUCTURE))
(CONSTRAINT (DESCRIPTION (LARGE-FILE IN-CORE) USE TREE-STRUCTURES))
(CONSTRAINT (DESCRIPTION SMALL-FILES PROVIDE-FOR LINKED-STRUCTURES))
(CONSTRAINT (DESCRIPTION STRUCTURES DEPEND-ON (TYPE-OF DATA)))
(SELECTION)
(CONSTRAINT (DESCRIPTION DATA WILLBE (MODERATELY LARGE-FILES)))
(CONSTRAINT (DESCRIPTION EDITOR SHOULDHAVE
GOOD-SPEED (FILES LESSTHAN 30 K)))
(CONSTRAINT (DESCRIPTION EDITOR-SPEED
DECLINES
AS FILE-SIZE INCREASES))
(CONSTRAINT (DESCRIPTION FILE-SIZE AFFECTS (SPEED OF SEARCHES)))
(CONSTRAINT (DESCRIPTION EDITOR SHOULD-HAVE
GOOD-SPEED FOR TEXT-OPERATIONS))
(DECISION FINISHES SPECIFICATION-FOR (TYPE-OF FILE))
(SELECTION)
(CONSTRAINT
Statement Encodings

\begin{verbatim}
(DESCRIPTION EDITOR
   SHOULD-HAVE
   (FAST LOCAL-MODIFICATION)))
(CONSTRAINT
  (DESCRIPTION EDITOR
   SHOULD-HAVE
   (REASONABLE GLOBAL-MODIFICATIONS)))
(CONSTRAINT
  (DESCRIPTION EDITOR SHOULD-HAVE (REASONABLE FILE-SETUP)))
(CONSTRAINT
  (DESCRIPTION FILE-SETUP SHOULD-BE (REASONABLE SPEED)))
(DECISION FINISHES SPECIFICATION-FOR (EDITOR PERFORMANCE))
(SELECTION)
(CONSTRAINT
  (DESCRIPTION SEARCHING REQUIRES (LINEAR-PASS OVER DATA)))
(CONSTRAINT
  (DESCRIPTION SEARCHING SHOULD-BE FORWARDS-BACKWARDS))
(CONSTRAINT
  (DESCRIPTION LINKED-STRUCTURE
   SHOULD-PROVIDE
   (FAST-ACCESS FROM GIVEN-POINT)))
(CONSTRAINT
  (DESCRIPTION LOCAL-SEARCHES SHOULD-BE FAST))
(CONSTRAINT
  (DESCRIPTION LOCAL-SEARCHES NOTREQUIRE
   (STARTING AT BEGINNING OF FILE)))
(CONSTRAINT
  (DESCRIPTION LISTING REQUIRES INDEXING))
(CONSTRAINT
  (DESCRIPTION DATA-STRUCTURE
   SHOULD-PROVIDE
   (FAST LOCAL MOVEMENT)))
(CONSTRAINT
  (DESCRIPTION DATA-STRUCTURE SHOULD-PROVIDE INDEXING))
(CONSTRAINT
  (DESCRIPTION DATA-STRUCTURE SHOULD-PROVIDE
   (FAST INSERTION)))
(CONSTRAINT
  (DESCRIPTION (MOST TIME) USED (MODIFYING FILE)))
(CONSTRAINT
  (DESCRIPTION (FAST MODIFICATION)
   PREFERRED-TO
   (SPACE AND IO-TIME)))
(SELECTION)
(CONSTRAINT
  (DESCRIPTION (FAST-I0 AVOID BYTE-PROCESSING)))
(SELECTION)
(CONSTRAINT
  (DESCRIPTION (MOST DATA-STRUCTURES)
   PRECLUDE
   SIMPLE-LINEAR-ARRAYS))
(DECISION DIRECT-I0 FOR SIMPLE-LINEAR-ARRAYS)
(CONSTRAINT
\end{verbatim}
(DESCRIPTION DIRECT-IO
REQUIRES
(SAME INTERNAL-EXTERNAL-FORMATS)))

(CONSTRAINT
(DESCRIPTION (PACKED FILE-FORMAT)
SLOWS
(LARGE-FILE OPERATIONS)))

(CONSTRAINT
(DESCRIPTION (PACKED FILE-FORMAT)
REQUIRES
(SLOW BLOCK-TRANSFERS)))

(CONSTRAINT
(DESCRIPTION SIMPLE-ARRAYS CONSTRAIN CHARACTER-MOVEMENT))
(COMMENT (PROB = CALCULATING CHARACTER MOVEMENT TIME))
(SELECTION)

(CONSTRAINT
(DESCRIPTION EVEN-NUMBEROF-CHARACTERS AIDS TEXT-MOVEMENT))
(DECISION FINISHES CALCULATING TEXT-MOVEMENT-TIME)
(COMMENT (PROB = RETURNS TO DATA STRUCTURE PROBLEM))
(SELECTION)

(CONSTRAINT
(DESCRIPTION DATA-STRUCTURE
SHOULD-HAVE
(COMMON-STRUCTURE FOR MAINFILE-AND-BUFFER)))

(PROBLEM-STMT DATA-STRUCTURE-CHOICES
CONSISTS-OF
(SIMPLE-VECTOR LINKED-BLOCKS))

(DEcision DONOT USE UNPACKED-LINKED-BLOCKS)

(CONSTRAINT
(DESCRIPTION UNPACKED-LINKED-BLOCKS
REQUIRE
(TOO-MUCH SPACE)))

(CONSTRAINT
(DESCRIPTION UNPACKED-LINKED-BLOCKS
CONSTRAIN
(SIZE-OF INPUT-FILE)))

(PROBLEM-STMT DATA-STRUCTURE-CHOICE
LINKED-BLOCKS-WITH-POINTER)

(CONSTRAINT
(DESCRIPTION LINKED-BLOCKS-WITH-POINTER
ALLOW
STORING-LINE-COUNTERS))

(CONSTRAINT
(DESCRIPTION LINKED-BLOCKS-WITH-POINTER
ALLOW
FAST-INDEXING))

(SELECTION)

(CONSTRAINT
(DESCRIPTION LINKED-BLOCKS-WITH-POINTER
ALLOW
FAST-SEARCHES))
(DESCRIPTION SEARCH IS (CPU-INTENSIVE ACTIVITY))
(PROBLEM-STMT DETERMINE ALTERNATIVE-DATA-STRUX SIMPLE-VECTOR-WITH-NULLS)
(SELECTION)
(CONSTRAINT (DESCRIPTION SIMPLE-VECTOR-WITH-NULLS REQUIRES (INCREASED-TIME FOR INDEXING)))
(CONSTRAINT (DESCRIPTION DATA-STRUCTURE SHOULD PROVIDE LINE-SPLITTING))
(PROBLEM-STMT DETERMINE ALTERNATIVE-DATA-STRUX HASH-TABLE)
(SELECTION)
(CONSTRAINT (DESCRIPTION HASH-TABLE LIMITS SEQUENTIAL-SEARCH))
(DECISION DONOT USE HASH-TABLE)
(CONSTRAINT (DESCRIPTION LINE-SPLITTING CONSTRAINS LINKED-BLOCKS))
(CONSTRAINT (DESCRIPTION MODIFICATION-TIMES CONSTRAIN ALTERNATIVE-DATA-STRUX))
(SELECTION)
(STRATEGY (CONSIDER ALTERNATIVE-DATA-STRUCTURE SIMPLE-VECTORS-WITH-NULLS))
(CONSTRAINT (DESCRIPTION SEQUENTIAL-SEARCH REQUIRES (MOST EFFORT)))
(CONSTRAINT (DESCRIPTION SUBBLOCKS COMPLICATE (ALTERNATIVE LINKED-BLOCKS)))
(CONSTRAINT (DESCRIPTION MODIFICATION-TIMES AMONGST DATA-STRUCTURE-ALTERNATIVES))
(SELECTION)
(CONSTRAINT (DESCRIPTION RELATIVE-TIMES FOR (MOVING-TEXT VERSUS MAINTAINING-LINKED-BLOCKS)))
(DECISION USE POINTER-ARRAYS WITH LINKED-BLOCKS)
(CONSTRAINT (DESCRIPTION SIMPLE-BLOCKS HAVE (TOOMANY PAGE-FAULTS)))
(CONSTRAINT (DESCRIPTION DATA-STRUCTURE SHOULD (MINIMIZE PAGE-FAULTS)))
(CONSTRAINT
Statement Encodings

(DESCRIPTION LINKED-BLOCKS-POINTER SHOULD
(MINIMIZE PAGE-FAULTS))

(SELECTION)
(CONSTRAINT
(DESCRIPTION DATA-STRUCTURE EFFECT ON INDEXING))
(DECISION SIMPLE-VECTOR FASTER-FOR MODERATE-FILES)
(CONSTRAINT
(DESCRIPTION DATA-STRUCTURE REQUIREMENTS-FOR
TEXT-MOVEMENT))

(SELECTION)
(CONSTRAINT
(DESCRIPTION SIMPLE-VECTOR-WITH-NULLS HAS HIGH-OVERHEAD))
(CONSTRAINT
(DESCRIPTION SIMPLE-VECTOR-WITH-NULLS HAS
(SLOW INTERPRETIVE-EXECUTION)))

(SELECTION)
(CONSTRAINT (DESCRIPTION (MOST FILES) LESS THAN 100 K))
(DECISION DONT USE SIMPLE-VECTOR-WITH-NULLS)
(CONSTRAINT
(DESCRIPTION SIMPLE-VECTOR-WITH-NULLS HAS SLOW INDEXING))
(CONSTRAINT
(DESCRIPTION SIMPLE-VECTOR HAS ADEQUATE INDEXING))
(DECISION USE SIMPLE-VECTOR)

(SELECTION)
(DECISION LINKED-BLOCKS-WITH-POINTER)

(CONSTRAINT
(DESCRIPTION LINKED-BLOCKS-WITH-POINTER
BETTER THAN
SIMPLE-LINKED-BLOCKS))

(CONSTRAINT
(DESCRIPTION (ALTERNATIVES BEHAVIOR) FOR LARGE-FILES))
(SELECTION)

Relational Information for Protocol A1

(FILE TYPE-OF OPERATING-SYSTEM)
(TEXT-REPRESENTATION DATA-STRUCTURES)
(DATA TYPE OF FILE)
(SPEED PERFORMANCE)
(GOOD-SPEED PERFORMANCE)
(IO-TIME DATA-FORMATS)
(MODIFICATION-TIMES RELATIVE
DATA-STRUCTURE
MODIFICATION-TIMES)
CHARACTER-MOVEMENT TEXT-MOVEMENT-TIME)
(FAST-INDEXING SEARCHING-TIMES)
SYSINIT: Enter source for information: *A1
Extension= INI
Print external information trace? Y
Print detailed internal trace? Y
Where should the trace be printed? TTY:
Enter external input source: (A1 . EXT)
File for memory inputs is: (A1 . MEM)

Start of simulation

External input: STRATEGY
Elems:
   ((DEFINE CLASS-OF-EDITORS) (DECIDE (TYPE-OF EDITOR)))

External input: SELECTION

   ACTION in LOCAL-CONSTRAINTS-AGENT
   Attempt to find problem based on local constraints.

   ACTION in STRATEGY-AGENT
   Attempt to find problem via the strategy agent.

   ACTION in SELECT
   Next problem selected. Add to WS.
   Prob: (DEFINE CLASS-OF-EDITORS)

***** Selection No. 1 *****

Problem to be selected is: (DEFINE CLASS-OF-EDITORS)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: (NUMBER-OF-FUNCTIONS CONSTRAINED)

   ACTION in CONSTRAINT-PROCESSOR
   Add constraint to WS.

External input: CONSTRAINT
Desc: (FUNCTIONS CONSTRAINED-BY (APPROACH-TO FILE))
Program Output

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in FIND-CONSTRAINT-PROB-GEN
Problem found by local constraints agent.

ACTION in SELECT
Next problem selected. Add to WS.

Prob: (DETERMINE TYPE-OF OPERATING-SYSTEM)

***** Selection No. 2 *****

Problem to be selected is: (DETERMINE TYPE-OF OPERATING-SYSTEM)
CORRECT SELECTION? (Y,N OR B): B

----> Simulation break

>(PRINTSTM)

Position: 1
Item: (CONSTRAINT (DEFVALUE . 5)
(SOURCE DEFINE CLASS-OF-EDITORS)
(TYPE . NONLOCAL)
(STATE . ACTIVE)
(EFFECT . 0)
(DESCRIPTION FUNCTIONS CONSTRAINED-BY (APPROACH-TO FILE)))

Position: 2
Item: (CONSTRAINT (DEFVALUE . 5)
(SOURCE DEFINE CLASS-OF-EDITORS)
(TYPE . NONLOCAL)
(STATE . ACTIVE)
(EFFECT . 0)
(DESCRIPTION NUMBER-OF-FUNCTIONS CONSTRAINED))

Position: 3
Item: (PROBLEM (DESCRIPTION DEFINE CLASS-OF-EDITORS) (SOURCE . STRATEGY) (STATE . 0))

Position: 4
Item: (STRATEGY (DESCRIPTION (DEFINE CLASS-OF-EDITORS)
(DECIDE (TYPE-OF EDITOR)))
(STRATEGY-PTR . 1)
Program Output

(STATE . INACTIVE))

>GO

External input: CONSTRAINT
Desc: (PDP-10 HAS-ONLY (SEQUENTIAL FILES))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (PDP-10 HAS-NO (STRUCTURED FILES))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: ((MOST PDP-10) HAVE (VIRTUAL MEMORY))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (VM USE-OF (IS EFFICIENT))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: DECISION
Desc: (USE VM (TYPE-OF OPERATING-SYSTEM))

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Problem found in WS. Change solution state to SOLVED.

Prob: (DETERMINE TYPE-OF OPERATING-SYSTEM)

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: (VM USE-OF (IS EFFICIENT))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: ((MOST PDP-10) HAVE (VIRTUAL MEMORY))
ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.
Desc: (PDP-10 HAS-NO (STRUCTURED FILES))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.
Desc: (PDP-10 HAS-ONLY (SEQUENTIAL FILES))

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.

ACTION in DECISION-PROCESSOR
Decision does not cause a currently unsolved problem to be solved.

External input: PROBLEM-STMT
Prob: (MANAGEMENT OF FILE-IO)

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
Attempt to find problem via the strategy agent.

ACTION in SELECT
Next problem selected. Add to WS.
Prob: (DECIDE (TYPE-OF EDITOR))

***** Selection No. 3 *****

Problem to be selected is: (DECIDE (TYPE-OF EDITOR))
CORRECT SELECTION? (Y,N OR B): B

--> Simulation break

>(PRINTSTM)

Position: 1
Item: (PROBLEM (DESCRIPTION MANAGEMENT OF FILE-IO) (SOURCE . STMT) (STATE . 0))

Position: 2
Item: (DECISION USE VM (TYPE-OF OPERATING-SYSTEM))

Position: 3
Program Output

Item: (CONSTRAINT (DEFVALUE . 6)
  (SOURCE DETERMINE TYPE-OF OPERATING-SYSTEM)
  (TYPE . NONLOCAL)
  (STATE . INACTIVE)
  (EFFORT . 0)
  (DESCRIPTION VM USE-OF (IS EFFICIENT)))

Position: 4

Item: (CONSTRAINT (DEFVALUE . 8)
  (SOURCE DETERMINE TYPE-OF OPERATING-SYSTEM)
  (TYPE . NONLOCAL)
  (STATE . INACTIVE)
  (EFFORT . 0)
  (DESCRIPTION (MOST PDP-10) HAVE (VIRTUAL MEMORY)))

Position: 5

Item: (CONSTRAINT (DEFVALUE . 8)
  (SOURCE DETERMINE TYPE-OF OPERATING-SYSTEM)
  (TYPE . NONLOCAL)
  (STATE . INACTIVE)
  (EFFORT . 0)
  (DESCRIPTION PDP-10 HAS-NO (STRUCTURED FILES)))

Position: 6

Item: (CONSTRAINT (DEFVALUE . 8)
  (SOURCE DETERMINE TYPE-OF OPERATING-SYSTEM)
  (TYPE . NONLOCAL)
  (STATE . INACTIVE)
  (EFFORT . 0)
  (DESCRIPTION PDP-10 HAS-ONLY (SEQUENTIAL FILES)))

Position: 7

Item: (PROBLEM (DESCRIPTION DETERMINE TYPE-OF OPERATING-SYSTEM)
  (SOURCE . CONSTRAINT) (STATE . 5))

Position: 8

Item: (CONSTRAINT (DEFVALUE . 5)
  (SOURCE DEFINE CLASS-OF-EDITORS)
  (TYPE . NONLOCAL)
  (STATE . ACTIVE)
  (EFFORT . 0)
  (DESCRIPTION FUNCTIONS CONSTRAINED-BY (APPROACH-TO FILE)))

Position: 9
Item: (CONSTRAINT (DEFVALUE . 5)
(SOURCE DEFINE CLASS-OF-EDITORS)
(TYPE . NONLOCAL)
(STATE . ACTIVE)
(EFFORT . 0)
(DESCRIPTION NUMBER-OF-FUNCTIONS
CONstrained)))
Position: 10
Item: (PROBLEM (DESCRIPTION DEFINE CLASS-OF-EDITORS) (SOURCE . STRATEGY) (STATE . 0))
Position: 11
Item: (STRATEGY (DESCRIPTION (DEFINE CLASS-OF-EDITORS)
(DECIDE (TYPE-OF EDITOR)))
(STRATEGY-PTR . 1)
(STATE . INACTIVE))
T
>GO

External input: CONSTRAINT
Desc: (DESIGNER PREFERENCE (TECO-LIKE EDITORS))
ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: DECISION
Desc: (BUILD TECO-LIKE (TYPE-OF EDITOR))
ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Problem found in WS. Change solution state to SOLVED.
Prob: (DECIDE (TYPE-OF EDITOR))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.
Desc: (DESIGNER PREFERENCE (TECO-LIKE EDITORS))

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.

ACTION in DECISION-PROCESSOR
Decision does not cause a currently unsolved problem to be solved.
External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
   Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
   Attempt to find problem via the strategy agent.

ACTION in SELECT-UNSOLVED-PROBLEM
   Found unsolved problem in WS.

ACTION in SELECT
   Next problem selected. Add to WS.

   Prob: (MANAGEMENT OF FILE-IO)

***** Selection No. 4 *****

Problem to be selected is: (MANAGEMENT OF FILE-IO)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
   Desc: (USE (AVAILABLE MEMORY - MGT))

ACTION in CONSTRAINT-PROCESSOR
   Add constraint to WS.

External input: CONSTRAINT
   Desc: (PAGE-SIZE INITIALIZATION PROHIBITIVE)

ACTION in CONSTRAINT-PROCESSOR
   Add constraint to WS.

External input: CONSTRAINT
   Desc: ((MOST EDITING) PERFORMED-ON (SMALL FILES))

ACTION in CONSTRAINT-PROCESSOR
   Add constraint to WS.

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
   Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
   Attempt to find problem via the strategy agent.

ACTION in SELECT-UNSOLVED-PROBLEM
   Found unsolved problem in PS.

ACTION in SELECT
   Next problem selected. Add to WS.
**Selection No. 5**

Problem to be selected is: (DEFINE CLASS-OF-EDITORS)
CORRECT SELECTION? (Y,N OR B): N
Enter correct problem: (DETERMINE TYPE-OF EDITOR)

--- > Simulation break

>GO

External input: CONSTRAINT
Desc: ((IMPLEMENTATION-DETAILS) UNIMPORTANT)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: DECISION
Desc: (BUILD (CHARACTER ELABORATE PROGRAMMING-LANGUAGE) (TYPE-OF EDITOR))

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Problem found in WS. Change solution state to SOLVED.

Prob: (DETERMINE TYPE-OF EDITOR)

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.
Desc: ((IMPLEMENTATION-DETAILS) UNIMPORTANT)

ACTION in SEARCH-SOLVED-PROB
Problem found in WS. Change solution state to SOLVED.

Prob: (DECIDE (TYPE-OF EDITOR))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.
Desc: (DESIGNER PREFERENCE (TECO-LIKE EDITORS))

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.
Program Output

ACTION in DECISION-PROCESSOR
Decision does not cause a currently unsolved problem to be solved.

External input: PROBLEM-STMT
Prob: (FUNCTIONS CONSISTS-OF (SEARCH ADDRESSING INSERTION DELETION CHANGING LISTING MACROS CONDITIONALS))

External input: STRATEGY
Elems:
     ((DETERMINE FUNCTIONS SEARCH)
      (DETERMINE FUNCTIONS ADDRESSING)
      (DETERMINE FUNCTIONS INSERTION)
      (DETERMINE FUNCTIONS DELETION)
      (DETERMINE FUNCTIONS CHANGING)
      (DETERMINE FUNCTIONS LISTING)
      (DETERMINE FUNCTIONS MACROS)
      (DETERMINE FUNCTIONS CONDITIONALS))

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
Attempt to find problem via the strategy agent.

ACTION in SELECT
Next problem selected. Add to WS.
Prob: (DETERMINE FUNCTIONS SEARCH)

***** Selection No. 6 *****

Problem to be selected is: (DETERMINE FUNCTIONS SEARCH)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: (SEARCHING MOST-IMPORTANT OPERATION)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: DECISION
Desc: (INCLUDE PATTERN-MATCHING)

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.
ACTION in DECISION-PROCESSOR  
Decision does not cause a currently unsolved problem to be solved.

External input: CONSTRAINT  
Desc: (GENERAL-SEARCH-ALGS ARE NON-LINEAR)

ACTION in CONSTRAINT-PROCESSOR  
Add constraint to WS.

External input: DECISION  
Desc: (ELIMINATE GENERAL-ALGS FOR SEARCHING)

ACTION in SEARCH-SOLVED-PROB  
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB  
Attempt to find problem in PS solved by decision.

ACTION in DECISION-PROCESSOR  
Decision does not cause a currently unsolved problem to be solved.

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT  
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT  
Attempt to find problem via the strategy agent.

ACTION in SELECT  
Next problem selected. Add to WS.

Prob: (DETERMINE FUNCTIONS ADDRESSING)

***** Selection No. 7 *****

Problem to be selected is: (DETERMINE FUNCTIONS ADDRESSING)  
CORRECT SELECTION? (Y,N OR B): N  
Enter correct problem: (DETERMINE FUNCTIONS INSERTION)

----> Simulation break

>GO

External input: CONSTRAINT  
Desc: (INPUT FROM (SOURCE (OR USER-FILE)))

ACTION in CONSTRAINT-PROCESSOR  
Add constraint to WS.
Program Output

External input: CONSTRAINT
Desc: (INPUT DEPENDS-ON SOURCE)
    ACTION in CONSTRAINT-PROCESSOR
    Add constraint to WS.

External input: CONSTRAINT
Desc: ((INPUT FILE) IS SEQUENTIAL)
    ACTION in CONSTRAINT-PROCESSOR
    Add constraint to WS.

External input: CONSTRAINT
Desc: ((INPUT USER) IS RANDOM)
    ACTION in CONSTRAINT-PROCESSOR
    Add constraint to WS.

External input: CONSTRAINT
Desc: ((MOST MODIFICATIONS) ARE (INTERNAL-TO TEXT))
    ACTION in CONSTRAINT-PROCESSOR
    Add constraint to WS.

External input: CONSTRAINT
Desc: (INPUT-TYPES INFLUENCE TEXT-REPRESENTATION)
    ACTION in CONSTRAINT-PROCESSOR
    Add constraint to WS.

External input: SELECTION
    ACTION in LOCAL-CONSTRAINTS-AGENT
    Attempt to find problem based on local constraints.
    ACTION in FIND-CONSTRAINT-PROB-GEN
    Problem found by local constraints agent.
    ACTION in SELECT
    Next problem selected. Add to WS.
    Prob: (DETERMINE DATA-STRUCTURES)

***** Selection No. 8 *****

Problem to be selected is: (DETERMINE DATA-STRUCTURES)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: (TREE-STRUCTURES REQUIRE BALANCING)
    ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: ((LARGE-FILE IN-CORE) USE LINKED-STRUCTURE)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: ((LARGE-FILE IN-CORE) USE TREE-STRUCTURES)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (SMALL-FILES PROVIDE-FOR LINKED-STRUCTURES)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (STRUCTURES DEPEND-ON (TYPE-OF DATA))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in FIND-CONSTRAINT-PROB-GEN
Problem found by local constraints agent.

ACTION in SELECT
Next problem selected. Add to WS.
Prob: (DETERMINE TYPEOF FILE)

***** Selection No. 9 *****

Problem to be selected is: (DETERMINE TYPEOF FILE)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: (DATA WILLBE (MODERATELY LARGE-FILES))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (EDITOR SHOULDHAVE (GOOD-SPEED (FILES LESSTHAN 30
ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (EDITOR-SPEED DECLINES (AS FILE-SIZE INCREASES))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (FILE-SIZE AFFECTS (SPEED OF SEARCHES))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (EDITOR SHOULD-HAVE (GOOD-SPEED FOR TEXT-OPERATIONS))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: DECISION
Desc: (FINISHES SPECIFICATION-FOR (TYPE-OF FILE))

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Problem found in WS. Change solution state to SOLVED.

Prob: (DETERMINE TYPEOF FILE)

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: (EDITOR SHOULD-HAVE (GOOD-SPEED FOR TEXT-OPERATIONS))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: (FILE-SIZE AFFECTS (SPEED OF SEARCHES))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.
Desc: (EDITOR-SPEED DECLINES (AS FILE-SIZE INCREASES))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: (EDITOR SHOULDHAVE (GOOD-SPEED (FILES LESSTHAN 30 K)))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: (DATA WILLBE (MODERATELY LARGE-FILES))

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Problem found in PS. Change solution stated to SOLVED.

Prob: (DECIDE (TYPE-OF EDITOR))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in PS is now INACTIVE because of a recent decision.

Desc: (DESIGNER PREFERENCE (TECO-LIKE EDITORS))

ACTION in DECISION-PROCESSOR
Decision does not cause a currently unsolved problem to be solved.

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
Attempt to find problem via the strategy agent.

ACTION in SELECT-UN SOLVED-PROBLEM
Found unsolved problem in PS.

ACTION in SELECT
Next problem selected. Add to WS.

Prob: (DETERMINE DATA-STRUCTURES)

******* Selection No. 10 ******
Program Output

Problem to be selected is: (DETERMINE DATA-STRUCTURES)
CORRECT SELECTION? (Y,N OR B): N
Enter correct problem: (DETERMINE EDITOR PERFORMANCE)

----> Simulation break

GO

External input: CONSTRAINT
Desc: (EDITOR SHOULD-HAVE (FAST LOCAL-MODIFICATION))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (EDITOR SHOULD-HAVE (REASONABLE GLOBAL-MODIFICATIONS))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (EDITOR SHOULD-HAVE (REASONABLE FILE-SETUP))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (FILE-SETUP SHOULD-BE (REASONABLE SPEED))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: DECISION
Desc: (FINISHES SPECIFICATION-FOR (EDITOR PERFORMANCE))

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Problem found in WS. Change solution state to SOLVED.

Prob: (DETERMINE EDITOR PERFORMANCE)

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: (FILE-SETUP SHOULD-BE (REASONABLE SPEED))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: (EDITOR SHOULD-HAVE (REASONABLE FILE-SETUP))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: (EDITOR SHOULD-HAVE (REASONABLE GLOBAL-MODIFICATIONS))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: (EDITOR SHOULD-HAVE (FAST LOCAL-MODIFICATION))

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Problem found in PS. Change solution stated to SOLVED.

Prob: (DETERMINE TYPE-OF EDITOR)

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in PS is now INACTIVE because of a recent decision.

Desc: ((IMPLEMENTATION-DETAILS) UNIMPORTANT)

ACTION in SEARCH-SOLVED-PROB
Problem found in PS. Change solution stated to SOLVED.

Prob: (DECIDE (TYPE-OF EDITOR))

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in PS is now INACTIVE because of a recent decision.

Desc: (DESIGNER PREFERENCE (TECO-LIKE EDITORS))

ACTION in DECISION-PROCESSOR
Decision does not cause a currently unsolved problem to be solved.

External input: SELECTION
Program Output

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
Attempt to find problem via the strategy agent.

ACTION in SELECT-UNSOLVED-PROBLEM
Found unsolved problem in PS.

ACTION in SELECT
Next problem selected. Add to WS.
Prob: (DETERMINE DATA-STRUCTURES)

***** Selection No. 11 *****

Problem to be selected is: (DETERMINE DATA-STRUCTURES)
CORRECT SELECTION? (Y, N OR B): Y

External input: CONSTRAINT
Desc: (SEARCHING REQUIRES (LINEAR-PASS OVER DATA))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (SEARCHING SHOULD BE FORWARDS-BACKWARDS)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (LINKED-STRUCTURE SHOULD PROVIDE (FAST-ACCESS FROM GIVEN-POINT))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (LOCAL-SEARCHES SHOULD BE FAST)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (LOCAL-SEARCHES NOT REQUIRE (STARTING AT BEGINNING OF FILE))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (LISTING REQUIRES INDEXING)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (DATA-STRUCTURE SHOULD PROVIDE (FAST LOCAL MOVEMENT))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (DATA-STRUCTURE SHOULD PROVIDE INDEXING)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (DATA-STRUCTURE SHOULD PROVIDE (FAST INSERTION))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: ((MOST TIME) USED (MODIFYING FILE))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: ((FAST MODIFICATION) PREFERRED-TO (SPACE AND IO-TIME))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in FIND-CONSTRAINT-PROB-GEN
Problem found by local constraints agent.

ACTION in SELECT
Next problem selected. Add to WS.

Prob: (DETERMINE DATA-FORMATS)

***** Selection No. 12 *****
Problem to be selected is: (DETERMINE DATA-FORMATS)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: ((FAST-IO AVOID BYTE-PROCESSING))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
Attempt to find problem via the strategy agent.

ACTION in SELECT-UNSOLVED-PROBLEM
Found unsolved problem in PS.

ACTION in SELECT
Next problem selected. Add to WS.

Prob: (DETERMINE DATA-STRUCTURES)

***** Selection No. 13 *****

Problem to be selected is: (DETERMINE DATA-STRUCTURES)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: ((MOST DATA-STRUCTURES) PRECLUDE SIMPLE-LINEAR-ARRAYS)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: DECISION
Desc: (DIRECT-IO FOR SIMPLE-LINEAR-ARRAYS)

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.

ACTION in DECISION-PROCESSOR
Decision does not cause a currently unsolved problem to be solved.

External input: CONSTRAINT
Desc: (DIRECT-IO REQUIRES (SAME
INTERNAL-EXTERNAL-FORMATS))

ACTION in CONSTRAINT-PROCESSOR
  Add constraint to WS.

External input: CONSTRAINT
Desc: ((PACKED FILE-FORMAT) SLOWS (LARGE-FILE OPERATIONS))

ACTION in CONSTRAINT-PROCESSOR
  Add constraint to WS.

External input: CONSTRAINT
Desc: ((PACKED FILE-FORMAT) REQUIRES (SLOW BLOCK-TRANSFERS))

ACTION in CONSTRAINT-PROCESSOR
  Add constraint to WS.

External input: CONSTRAINT
Desc: (SIMPLE-ARRAYS CONSTRAIN CHARACTER-MOVEMENT)

ACTION in CONSTRAINT-PROCESSOR
  Add constraint to WS.

Comment: (PROB = CALCULATING CHARACTER MOVEMENT TIME)

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
  Attempt to find problem based on local constraints.

ACTION in FIND-CONSTRAINT-PROB-GEN
  Problem found by local constraints agent.

ACTION in SELECT
  Next problem selected. Add to WS.

  Prob: (DETERMINE TEXT-MOVEMENT-TIME)

***** Selection No. 14 *****

Problem to be selected is: (DETERMINE TEXT-MOVEMENT-TIME)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: (EVEN-NUMBEROF-CHARACTERS AIDS TEXT-MOVEMENT)

ACTION in CONSTRAINT-PROCESSOR
  Add constraint to WS.

External input: DECISION
Program Output

Desc: (FINISHES CALCULATING TEXT-MOVEMENT-TIME)

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Problem found in WS. Change solution state to SOLVED.

Prob: (DETERMINE TEXT-MOVEMENT-TIME)

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.

Desc: (EVEN-NUMBEROF-CHARACTERS AIDS TEXT-MOVEMENT)

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.

ACTION in DECISION-PROCESSOR
Decision does not cause a currently unsolved problem to be solved.

Comment: (PROB = RETURNS TO DATA STRUCTURE PROBLEM)

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
Attempt to find problem via the strategy agent.

ACTION in SELECT-UNSOLVED-PROBLEM
Found unsolved problem in WS.

ACTION in SELECT
Next problem selected. Add to WS.

Prob: (DETERMINE DATA-STRUCTURES)

***** Selection No. 15 *****

Problem to be selected is: (DETERMINE DATA-STRUCTURES)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: (DATA-STRUCTURE SHOULD-HAVE (COMMON-STRUCTURE FOR MAINFILE-AND-BUFFER))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: PROBLEM-STMT
Prob: (DATA-STRUCTURE-CHOICES CONSISTS-OF (SIMPLE-VECTOR LINKED-BLOCKS))

External input: STRATEGY
Elems:
  (DETERMINE DATA-STRUCTURE-CHOICES SIMPLE-VECTOR)
  (DETERMINE DATA-STRUCTURE-CHOICES LINKED-BLOCKS))

External input: DECISION
Desc: (DONOT USE UNPACKED-LINKED-BLOCKS)

ACTION in SEARCH-SOLVED-PROB
  Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
  Attempt to find problem in PS solved by decision.

ACTION in DECISION-PROCESSOR
  Decision does not cause a currently unsolved problem to be solved.

External input: CONSTRAINT
Desc: (UNPACKED-LINKED-BLOCKS REQUIRE (TOO-MUCH SPACE))

ACTION in CONSTRAINT-PROCESSOR
  Add constraint to WS.

External input: CONSTRAINT
Desc: (UNPACKED-LINKED-BLOCKS CONSTRAIN (SIZE-OF INPUT-FILE))

ACTION in CONSTRAINT-PROCESSOR
  Add constraint to WS.

External input: PROBLEM-STMT
Prob: (DATA-STRUCTURE-CHOICE LINKED-BLOCKS-WITH-POINTER)

External input: CONSTRAINT
Desc: (LINKED-BLOCKS-WITH-POINTER ALLOW STORING-LINE-COUNTERS)

ACTION in CONSTRAINT-PROCESSOR
  Add constraint to WS.

External input: CONSTRAINT
Desc: (LINKED-BLOCKS-WITH-POINTER ALLOW FAST-INDEXING)

ACTION in CONSTRAINT-PROCESSOR
  Add constraint to WS.
External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
   Attempt to find problem based on local constraints.

ACTION in FIND-CONSTRAINT-PROB-GEN
   Problem found by local constraints agent.

ACTION in SELECT
   Next problem selected. Add to WS.
   Prob: (DETERMINE SEARCHING-TIMES)

****** Selection No. 16 ******

Problem to be selected is: (DETERMINE SEARCHING-TIMES)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
   Desc: (LINKED-BLOCKS-WITH-POINTER ALLOW FAST-SEARCHES)

ACTION in CONSTRAINT-PROCESSOR
   Add constraint to WS.

External input: CONSTRAINT
   Desc: (SEARCH IS (CPU-INTENSIVE ACTIVITY))

ACTION in CONSTRAINT-PROCESSOR
   Add constraint to WS.

External input: PROBLEM-STATEMENT
   Prob: (DETERMINE ALTERNATIVE-DATA-STRUCTURES
   SIMPLE-VECTORS-WITH-NULLS)

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
   Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
   Attempt to find problem via the strategy agent.

ACTION in SELECT
   Next problem selected. Add to WS.
   Prob: (DETERMINE DATA-STRUCTURE-CHOICES SIMPLE-VECTOR)

****** Selection No. 17 ******

Problem to be selected is: (DETERMINE DATA-STRUCTURE-CHOICES SIMPLE-VECTOR)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: (SIMPLE-VECTOR-WITH-NULLS REQUIRES (INCREASED-TIME FOR INDEXING))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (DATA-STRUCTURE SHOULD PROVIDE LINE-SPLITTING)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: PROBLEM-STM
Prob: (DETERMINE ALTERNATIVE-DATA-STRUX HASH-TABLE)

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
Attempt to find problem via the strategy agent.

ACTION in SELECT-UNSOLVED-PROBLEM
Found unsolved problem in WS.

ACTION in SELECT
Next problem selected. Add to WS.

Prob: (DETERMINE ALTERNATIVE-DATA-STRUX HASH-TABLE)

***** Selection No. 18 *****

Problem to be selected is: (DETERMINE ALTERNATIVE-DATA-STRUX HASH-TABLE)
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: (HASH-TABLE LIMITS SEQUENTIAL-SEARCH)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: DECISION
Desc: (DONOT USE HASH-TABLE)

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.
ACTION in SEARCH-SOLVED-PROB
Problem found in WS. Change solution state to SOLVED.
Prob: (DETERMINE ALTERNATIVE-DATA-STRUX HASH-TABLE)

ACTION in MARK-INACTIVE-CONSTRAINTS
The following constraint in WS is now INACTIVE because of a recent decision.
Desc: (HASH-TABLE LIMITS SEQUENTIAL-SEARCH)

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.

ACTION in DECISION-PROCESSOR
Decision does not cause a currently unsolved problem to be solved.

External input: CONSTRAINT
Desc: (LINE-SPLITTING CONSTRAINTS LINKED-BLOCKS)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (MODIFICATION-TIMES CONSTRAIN ALTERNATIVE-DATA-STRUX)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in FIND-CONSTRAINT-PROB-GEN
Problem found by local constraints agent.

ACTION in SELECT
Next problem selected. Add to WS.
Prob: (DETERMINE RELATIVE DATA-STRUCTURE MODIFICATION-TIMES)

***** Selection No. 19 *****

Problem to be selected is: (DETERMINE RELATIVE DATA-STRUCTURE MODIFICATION-TIMES)
CORRECT SELECTION? (Y,N OR B): Y
Program Output

External input: STRATEGY
  Elems:
    ((CONSIDER ALTERNATIVE-DATA-STRUCTURE
      SIMPLE-VECTORS-WITH-NULLS))

External input: CONSTRAINT
  Desc: (SEQUENTIAL-SEARCH REQUIRES (MOST EFFORT))
    ACTION in CONSTRAINT-PROCESSOR
    Add constraint to WS.

External input: CONSTRAINT
  Desc: (SUBLOCKS COMPLICATE (ALTERNATIVE LINKED-BLOCKS))
    ACTION in CONSTRAINT-PROCESSOR
    Add constraint to WS.

External input: CONSTRAINT
  Desc: (MODIFICATION-TIMES AMONGST DATA-STRUCTURE-ALTERNATIVES)
    ACTION in CONSTRAINT-PROCESSOR
    Add constraint to WS.

External input: SELECTION

  ACTION in LOCAL-CONSTRAINTS-AGENT
  Attempt to find problem based on local constraints.

  ACTION in FIND-CONSTRAINT-PROB-GEN
  Problem found by local constraints agent.

  ACTION in SELECT
  Next problem selected. Add to WS.
    Prob: (DETERMINE RELATIVE DATA-STRUCTURE MODIFICATION-TIMES)

***** Selection No. 20 *****

Problem to be selected is: (DETERMINE RELATIVE DATA-STRUCTURE MODIFICATION-TIMES)
CORRECT SELECTION? (Y,N OR B): N
Enter correct problem: (ANALYZE ALTERNATIVE VECTOR-SCHEMES)

----> Simulation break

>GO

External input: CONSTRAINT
  Desc: (RELATIVE-TIMES FOR (MOVING-TEXT VERSUS MAINTAINING-LINKED-BLOCKS))
**Program Output**

**ACTION in CONSTRAINT-PROCESSOR**
Add constraint to WS.

**External input: DECISION**
Desc: (USE POINTER-ARRAYS WITH LINKED-BLOCKS)

**ACTION in SEARCH-SOLVED-PROB**
Attempt to find problem in WS solved by decision.

**ACTION in SEARCH-SOLVED-PROB**
Attempt to find problem in PS solved by decision.

**ACTION in DECISION-PROCESSOR**
Decision does not cause a currently unsolved problem to be solved.

**External input: CONSTRAINT**
Desc: (SIMPLE-BLOCKS HAVE (TOOMANY PAGE-FAULTS))

**ACTION in CONSTRAINT-PROCESSOR**
Add constraint to WS.

**External input: CONSTRAINT**
Desc: (DATA-STRUCTURE SHOULD (MINIMIZE PAGE-FAULTS))

**ACTION in CONSTRAINT-PROCESSOR**
Add constraint to WS.

**External input: CONSTRAINT**
Desc: (LINKED-BLOCKS-POINTERS SHOULD (MINIMIZE PAGE-FAULTS))

**ACTION in CONSTRAINT-PROCESSOR**
Add constraint to WS.

**External input: SELECTION**

**ACTION in LOCAL-CONSTRAINTS-AGENT**
Attempt to find problem based on local constraints.

**ACTION in STRATEGY-AGENT**
Attempt to find problem via the strategy agent.

**ACTION in SELECT**
Next problem selected. Add to WS.

Prob: (CONSIDER ALTRNATIVE-DATA-STRUCTURE SIMPLE-VECTORS-WITH-NULLS)

***** Selection No. 21 *****

Problem to be selected is: (CONSIDER
ALTERNATIVE-DATA-STRUCTURE SIMPLE-VECTORS-WITH-NULLS
CORRECT SELECTION? (Y,N OR B): Y

External input: CONSTRAINT
Desc: (DATA-STRUCTURE EFFECTSON INDEXING)
 ACTION in CONSTRAINT-PROCESSOR
 Add constraint to WS.

External input: DECISION
Desc: (SIMPLE-VECTOR FASTER-FOR MODERATE-FILES)
 ACTION in SEARCH-SOLVED-PROB
 Attempt to find problem in WS solved by decision.
 ACTION in SEARCH-SOLVED-PROB
 Attempt to find problem in PS solved by decision.
 ACTION in SEARCH-SOLVED-PROB
 Problem found in PS. Change solution
 stated to SOLVED.
 Prob: (DETERMINE DATA-STRUCTURE-CHOICES
 SIMPLE-VECTOR)
 ACTION in MARK-INACTIVE-CONSTRAINTS
 The following constraint in PS is now INACTIVE
 because of a recent decision.
 Desc: (DATA-STRUCTURE SHOULD-PROVIDE
 LINE-SPLITTING)
 ACTION in MARK-INACTIVE-CONSTRAINTS
 The following constraint in PS is now INACTIVE
 because of a recent decision.
 Desc: (SIMPLE-VECTOR-WITH-NULLS REQUIRES
 (INCREASED-TIME FOR INDEXING))
 ACTION in DECISION-PROCESSOR
 Decision does not cause a currently unsolved
 problem to be solved.

External input: CONSTRAINT
Desc: (DATA-STRUCTURE REQUIREMENTS-FOR TEXT-MOVEMENT)
 ACTION in CONSTRAINT-PROCESSOR
 Add constraint to WS.

External input: SELECTION
 ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
Attempt to find problem via the strategy agent.

ACTION in SELECT-UNSOLVED-PROBLEM
Found unsolved problem in WS.

ACTION in SELECT
Next problem selected. Add to WS.

Prob: (ANALYZE ALTERNATIVE VECTOR-SCHEMES)

***** Selection No. 22 *****

Problem to be selected is: (ANALYZE ALTERNATIVE VECTOR-SCHEMES)
CORRECT SELECTION? (Y,N OR B): N
Enter correct problem: (DETERMINE TEXT-MOVEMENT-TIME WITH NULLS)

--> Simulation break

>GO

External input: CONSTRAINT
Desc: (SIMPLE-VECTOR-WITH-NULLS HAS HIGH-OVERHEAD)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: (SIMPLE-VECTOR-WITH-NULLS HAS (SLOW INTERPRETIVE-EXECUTION))

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
Attempt to find problem via the strategy agent.

ACTION in SELECT-UNSOLVED-PROBLEM
Found unsolved problem in WS.

ACTION in SELECT
Next problem selected. Add to WS.
Program Output

Prob:  (CONSIDER ALTERNATIVE-DATA-STRUCTURE SIMPLE-VECTORS-WITH-NULLS)

****** Selection No. 23 ******

Problem to be selected is: (CONSIDER ALTERNATIVE-DATA-STRUCTURE SIMPLE-VECTORS-WITH-NULLS) CORRECT SELECTION? (Y,N OR B): N
Enter correct problem: (DETERMINE PERCENTAGEOF NULLS)

----> Simulation break

>GO

External input: CONSTRAINT
Desc:  ((MOST FILES) LESSTHAN 100 K)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: DECISION
Desc:  (DONT USE SIMPLE-VECTOR-WITH-NULLS)

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Problem found in PS. Change solution stated to SOLVED.

Prob:  (DETERMINE ALTERNATIVE-DATA-STRUX SIMPLE-VECTOR-WITH-NULLS)

ACTION in DECISION-PROCESSOR
Decision does not cause a currently unsolved problem to be solved.

External input: CONSTRAINT
Desc:  (SIMPLE-VECTOR-WITH-NULLS HAS SLOW-INDEXING)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc:  (SIMPLE-VECTOR HAS ADEQUATE-INDEXING)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.
External input: DECISION
   Desc: (USE SIMPLE-VECTOR)

   ACTION in SEARCH-SOLVED-PROB
      Attempt to find problem in WS solved by decision.

   ACTION in SEARCH-SOLVED-PROB
      Attempt to find problem in PS solved by decision.

   ACTION in SEARCH-SOLVED-PROB
      Problem found in PS. Change solution stated to SOLVED.

      Prob: (DETERMINE DATA-STRUCTURE-CHOICES SIMPLE-VECTOR)

   ACTION in MARK-INACTIVE-CONSTRAINTS
      The following constraint in PS is now INACTIVE because of a recent decision.

      Desc: (DATA-STRUCTURE SHOULD PROVIDE LINE-SPLITTING)

   ACTION in MARK-INACTIVE-CONSTRAINTS
      The following constraint in PS is now INACTIVE because of a recent decision.

      Desc: (SIMPLE-VECTOR-WITH-NULLS REQUIRES (INCREASED-TIME FOR INDEXING))

   ACTION in DECISION-PROCESSOR
      Decision does not cause a currently unsolved problem to be solved.

External input: SELECTION

   ACTION in LOCAL-CONSTRAINTS-AGENT
      Attempt to find problem based on local constraints.

   ACTION in STRATEGY-AGENT
      Attempt to find problem via the strategy agent.

   ACTION in SELECT-UNSOLVED-PROBLEM
      Found unsolved problem in WS.

   ACTION in SELECT
      Next problem selected. Add to WS.

      Prob: (DETERMINE TEXT-MOVEMENT-TIME WITH NULLS)

****** Selection No. 24 ******
Problem to be selected is: (DETERMINE TEXT-MOVEMENT-TIME WITH NULLS)
CORRECT SELECTION? (Y,N OR B): N
Enter correct problem: (ANALYZE SIMPLE-VECTOR-WITH-NULLS VERSUS LINKED-BLOCKS)

----> Simulation break

>GO

External input: DECISION
Desc: (LINKED-BLOCKS-WITH-POINTERS)

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in WS solved by decision.

ACTION in SEARCH-SOLVED-PROB
Attempt to find problem in PS solved by decision.

ACTION in DECISION-PROCESSOR
Decision does not cause a currently unsolved problem to be solved.

External input: CONSTRAINT
Desc: (LINKED-BLOCKS-WITH-POINTERS BETTER THAN SIMPLE-LINKED-BLOCKS)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: CONSTRAINT
Desc: ((ALTERNATIVES BEHAVIOR) FOR LARGE-FILES)

ACTION in CONSTRAINT-PROCESSOR
Add constraint to WS.

External input: SELECTION

ACTION in LOCAL-CONSTRAINTS-AGENT
Attempt to find problem based on local constraints.

ACTION in STRATEGY-AGENT
Attempt to find problem via the strategy agent.

ACTION in SELECT-UNSOLVED-PROBLEM
Found unsolved problem in WS.

ACTION in SELECT
Next problem selected. Add to WS.

Prob: (DETERMINE PERCENTAGE OF NULLS)
Program Output

***** Selection No. 25 *****

Problem to be selected is: (DETERMINE PERCENTAGEOF NULLS)
CORRECT SELECTION? (Y,N OR B): N
Enter correct problem: (DETERMINE BEHAVIOR FOR LARGE-FILES)

----> Simulation break

>GO

End of file encountered reading external inputs file in solver.

End of simulation.

********** Simulation statistics **********

Number of selections: 25.
Number of correct selections: 17.
Percentage of correct selections: 68.0

CONSTRAINTS SELECTED ON FIRST CONSTRAINT: 7.
CONSTRAINT SELECTED ON SECOND CONSTRAINT: 0.
CONSTRAINTS SELECTED ON NTH CONSTRAINT: 0.
TOTAL LOCAL CONSTRAINTS: 8.

Frequency of agent usage.

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LOCAL-CONSTRAINTS-AGENT: 8.
STRATEGY-AGENT: 5.
UNSOLVED-PROBLEMS-AGENT: 5.
OPERATOR-ACTION: 8.
NONLOCAL-CONSTRAINTS-AGENT: 0.

Frequency of different information inputs.

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CONSTRAINT-PROCESSOR: 79.
DECISION-PROCESSOR: 16.
STRATEGY-PROCESSOR: 4.
REHEARSAL-PROCESSOR: 0.

History of problem selection.

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1. Problem: (DEFINE CLASS-OF-EDITORS)
Source: STRATEGY
State: 0.
Possible choices: 2.
Probability of selection: 0.5

2. Problem: (DETERMINE TYPE-OF OPERATING-SYSTEM)
Source: CONSTRAINT
State: 5.
Possible choices: 5.
Probability of selection: 0.19999999

3. Problem: (DECIDE (TYPE-OF EDITOR))
Source: STRATEGY
State: 5.
Possible choices: 6.
Probability of selection: 0.16666666

4. Problem: (MANAGEMENT OF FILE-IO)
Source: STMT
State: 0.
Possible choices: 4.
Probability of selection: 0.25

5. Problem: (DETERMINE TYPE-OF EDITOR)
Source: OPERATOR
State: 5.
Possible choices: 4.
Probability of selection: 0.25

6. Problem: (DETERMINE FUNCTIONS SEARCH)
Source: STRATEGY
State: 0.
Possible choices: 12.
Probability of selection: 0.83333332E-1

7. Problem: (DETERMINE FUNCTIONS INSERTION)
Source: OPERATOR
State: 0.
Possible choices: 13.
Probability of selection: 0.76923076E-1

8. Problem: (DETERMINE DATA-STRUCTURES)
Source: CONSTRAINT
State: 0.
Possible choices: 9.
Probability of selection: 0.11111111

9. Problem: (DETERMINE TYPEOF FILE)
Source: CONSTRAINT
State: 5.
Possible choices: 12.
Probability of selection: 0.83333332E-1

10. Problem: (DETERMINE EDITOR PERFORMANCE)
Program Output

Source: OPERATOR
State: 5.
Possible choices: 12.
Probability of selection: 0.83333332E-1

11. Problem: (DETERMINE DATA-STRUCTURES)
Source: CONSTRAINT
State: 0.
Possible choices: 12.
Probability of selection: 0.83333332E-1

12. Problem: (DETERMINE DATA-FORMATS)
Source: CONSTRAINT
State: 0.
Possible choices: 20.
Probability of selection: 0.5E-1

13. Problem: (DETERMINE DATA-STRUCTURES)
Source: CONSTRAINT
State: 0.
Possible choices: 21.
Probability of selection: 0.47619047E-1

14. Problem: (DETERMINE TEXT-MOVEMENT-TIME)
Source: CONSTRAINT
State: 5.
Possible choices: 23.
Probability of selection: 0.43478260E-1

15. Problem: (DETERMINE DATA-STRUCTURES)
Source: CONSTRAINT
State: 0.
Possible choices: 23.
Probability of selection: 0.43478260E-1

16. Problem: (DETERMINE SEARCHING-TIMES)
Source: CONSTRAINT
State: 0.
Possible choices: 27.
Probability of selection: 0.37037036E-1

17. Problem: (DETERMINE DATA-STRUCTURE-CHOICES SIMPLE-VECTOR)
Source: STRATEGY
State: 5.
Possible choices: 29.
Probability of selection: 0.34482758E-1

18. Problem: (DETERMINE ALTERNATIVE-DATA-STRUX HASH-TABLE)
Source: STMT
State: 0.
Possible choices: 29.
Probability of selection: 0.34482758E-1

19. Problem: (DETERMINE RELATIVE DATA-STRUCTURE MODIFICATION-TIMES)
Source: CONSTRAINT
State: 0.
Possible choices: 31.
Probability of selection: 0.32258064E-1

20. Problem: (ANALYZE ALTERNATIVE VECTOR-SCHEMES)
Source: OPERATOR
State: 0.
Possible choices: 36.
Probability of selection: 0.27777777E-1

21. Problem: (CONSIDER ALTERNATIVE-DATA-STRUCTURE SIMPLE-VECTORS-WITH-NULLS)
Source: STRATEGY
State: 0.
Possible choices: 37.
Probability of selection: 0.27027026E-1

22. Problem: (DETERMINE TEXT-MOVEMENT-TIME WITH NULLS)
Source: OPERATOR
State: 0.
Possible choices: 36.
Probability of selection: 0.27777777E-1

23. Problem: (DETERMINE PERCENTAGEOF NULLS)
Source: OPERATOR
State: 0.
Possible choices: 37.
Probability of selection: 0.27027026E-1

24. Problem: (ANALYZE SIMPLE-VECTOR-WITH-NULLS VERSUS LINKED-BLOCKS)
Source: OPERATOR
State: 0.
Possible choices: 37.
Probability of selection: 0.27027026E-1

25. Problem: (DETERMINE BEHAVIOR FOR LARGE-FILES)
Source: OPERATOR
State: 0.
Possible choices: 38.
Probability of selection: 0.26315789E-1

Average probability over all selections: 0.94952911E-1

NIL