Decision Table to
COBOL Translator

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With IBM MVS information

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Introduction

In the development of data processing procedures the most important and most difficult tasks are that of logical accumulation of the alternatives presented, the desired results, and the procedures necessary to attain those results. The problem is made greater through lack of adequate communication methods between the analyst and the programmer who will adapt the problem to a computer's capabilities.

Computer languages are of little use to the analyst as they require the problems to be defined in too much detail. Flow charts are a significant step forward but the complexity of the problem tends to increase the confusion factor in a flowchart.

Decision tables offer a simple, graphic means of defining all variables in question, the desired results, and the pertinent combinations of variables that may be presented to the problem. Decision tables provide a standard means of communication between the systems analyst and the programmers, and also provides an excellent documentation device. And these are often used with and in Design Use Cases. The benefits of decision tables are:

1. Programming is much faster.
2. Debug time is reduced.
3. Program maintenance is simpler.
4. Use of tables leads to greater accuracy and completeness in problem formulation.
5. Decision tables are a useful communication and documentation device.

Structure of a Decision Table

     A decision table can be logically divided into four sections (see Figure 1 below). The upper two sections (Condition Stub and Condition Entry) describe the set or string of conditions that is to be tested. The lower two sections (Action Stub and Action Entry) describe the set or string of actions that is to be taken upon the satisfaction of the above set of conditions. A rule consists of a set of conditions plus the actions to be performed upon satisfaction of those conditions, and a decision table typically consists of several rules.
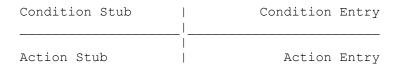
```
Condition Stub        |          Condition Entry
_____|_____
                      |
Action Stub           |           Action Entry
```

Figure 1

    The three types of decision table in current use are the limited-, extended-, and mixed-entry (see Figure 2 below).

```
      R1  R2                       R1   R2                      R1   R2
C1    10  20              C1      -50   XX            C1        Y    Y
C2    AA  BB              C2       Y    N             C2        Y    N
A1    X                   A1       X                  A1        X
A2    X   X               A2             X

 LIMITED-ENTRY             EXTENDED-ENTRY              MIXED-ENTRY
```

Figure 2

    A more detailed example of limited and extended entry tables follows:

```
        CREDIT-APPROVAL           R1    R2    R3   ELS
SPECIAL-CLEARANCE = 1                               Y
SALARY = ACCEPTABLE                      Y    N
CREDIT-LIMIT > COST              Y       N    N
PERFORM APPROVAL                 X       X    X
PERFORM ORDER-REJECT                                X
```

Figure 3. A limited entry table

```
INSURANCE-APPROVAL           RULE 1       RULE 2       RULE 3      ELS
AGE >                        25           35           65
AGE IS LESS THAN             35           65
PHYSICAL CONDITION =         EXCELLENT    AVERAGE      AVERAGE
COMPUTE RATE-PER-1000 =      1.57         1.72         5.92
COMPUTE POLICY-LIMIT =       200000       100000       50000
PERFORM APPLICATION-REJECT                                         X
```

Figure 4. An example of an extended table

    Note that the form of the individual conditions and actions is somewhat different between Figure 3 & 4. In a limited entry table, the entire condition or action is written in the stub and the condition entry is limited to "Y", "N" or blank, that is, asserting the presence of a true condition, the presence of a false condition, or the ignoring of a specified condition, respectively. An action entry is limited to "X" or blank. That is, executing (X) or skipping (blank) an action. In contrast, an extended entry form has part of the condition or action extended directly into

the condition or action entry area. In mixed entry tables, both forms may be used within the same table, but any one horizontal row (condition) or action) must be entirely limited or entirely extended.

Figure 4 is an example of a typical decision table. The use of such a table is illustrated in the following statements about Rule 1:

Rule 1 says: If age is greater than 25, and age is less than 35, and health is excellent, then rate per thousand is 1.57, and policy limit is 200,000. The underlined words are implied by the table layout. Each rule of a decision table is an alternative to each other rule. Therefore, logically it does not matter which rule is examined first; at most, one rule can be satisfied by a single set of conditions.

The program must still be told what to do if all rules have been considered and the set of conditions that exist do not satisfy any of them. Therefore, the last rule in every decision table is the ELS-rule in which we tell the program what "else" to do if no rule is satisfied. An ELS is written in the rule header entry as the last rule in the table.

The Decision Table Translator represents the next step in development of table use by providing quick and accurate conversion of the graphic solution (Decision Table) to a COBOL source program.

Description of DECTRANS

Dectrans is written in Cobol and generates the same. Dectrans utilises three files. The input file is the user's program containing the decision tables. It is immaterial to the program whether the input is a whole Cobol program or a group of disassociated tables. Any number of tables may be processed in one run. The first of two output files will be a file containing all of the source statements that were on the input file with the tables being replaced by Cobol statements. The second output file is a listing showing all decision tables read, the source code produced from each table, and any warning or error messages. (See sample listing)

Program Format

The format for a Cobol program containing decision tables must conform to the requirements for any Cobol program, except that each decision table is inserted in the PROCEDURE DIVISION at the point where it is to be referenced.

The processor inserts the appropriate coding at the point where the table is encountered. The coding generated is in the form of a SECTION containing 4 or more paragraphs, therefore, the entire table can be executed by a PERFORM statement, a GO statement or an implied "fall through" to the first instruction in the SECTION.

If the output from Dectrans is to be in a compilable form, all data names or procedure names referenced in a decision table must be defined in the appropriate Division in the program.

If a decision table is followed by user coding, a new SECTION header should follow the decision table. (EODT entry)

The decision tables are placed in the PROCEDURE DIVISION at the point where the coding is to be executed. This is the only difference between a Cobol program with decision tables and the usual Cobol program.

```
    IDENTIFICATION DIVISION.
    DATA DIVISION.
    FD  . . .


    PROCEDURE DIVISION.
    SECTION-NAME-L SECTION.
    ABC.
        ADD
        MOVE

THDR TABLE-2                             002001004
RHDR              001 002 003 ELS.
    A = B             Y   N   Y
    C = D             N   N   Y
    PERFORM XYZ    X   X   X
    PERFORM ERROR                X
EODT
  NEXT-SECTION SECTION.
  PAR-1.
        ADD
        MOVE
        IF
THDR
      etc.
```

Table Linkage

The coding generated by Dectrans will be in the form of a unique SECTION for each table translated. Each routine will be complete with a section-name consisting of the table name with the word "SECTION" added. Each routine will be terminated by an "EXIT" paragraph called "END000n" where n is 1 for the first table, 2 for the second table, etc. Each string of actions will be terminated by a "GO TO END000n" providing normal exit from the routine. It is permissible for the user to provide his own "GO TO ..." as an action entry if he so desires. In this case a "G" must be in column 52 of the THDR entry. A "PERFORM ..." may be included in action entries referencing another table or a user provided routine.

The generated routine may be entered by use of (1) a "PERFORM" statement, (2) a "GO TO" statement, or (3) a fall through to the first instruction of the Section. If the user provides his own "GO TO .." in an action entry of a table, the table should NOT be PERFORMED.

```
    GO TO TABLE-1        (2)

        .

        .

    PERFORM TABLE-1.    (1)

    MOVE A TO B.

    ADD C TO B.          (3)
TABLE-1 SECTION.

PAR0001.

    IF_____
```

Table Header Entry THDR

The Header entry provides Dectrans with a unique name which will be used in the SECTION header. The number of condition-stubs, action-stubs, and rules are indicated as follows:

The entry format is:

Columns	Contents
1 - 3	Blank
4 - 7	THDR
9 - 38	Table name (30 chars)
41 - 43	Number of conditions (3 digits)
44 - 46	Number of actions (3 digits)
47 - 49	Number of rules (3 digits) This must include the ELS Rule
50 - 51	Blank
52	GO TO Indicator. "G" will cause no GO TO END000n statement to be generated and the user must provide the GO TO statement to leave the table.

```
                                        4         5
  4     9                               1         2

  THDR TABLE-1                          007005004  G
```

Initialisation INIT (optional)

Actions that are always to be performed prior to the execution of the table can be specified by using the INIT entry followed by the statements to be executed. There is no limitations as to the coding that may appear in the INIT section except that another decision table may not appear.

The INIT entry follows the THDR entry and is terminated by the ENIT entry. The RHDR entry then follows the ENIT entry.

```
                                        4
  4     9                               1

  THDR XYZ                              001001001
  INIT
          MOVE     SPACES TO DATA-NAME.
          ADD      1 TO COUNTER-A.
          SET      A UP BY 1.
          PERFORM  A THRU B.
  ENIT

  RHDR                   001  002  003  ELS.
```

Rule Header RHDR

The rule header entry specifies the format of the body of the table. The data area will begin in column 9. Rule numbers will be entered to define the stub and entry fields. The stub area extends from column 9 to the first character of the first rule number. The stub area must not be more than 72 characters or less than 10 characters.

The rule entry areas start at the first character of their respective numbers and extend to the first character of the next number. The rules must not be less than 3 nor more than 18 characters in length.

The last or ELSE rule is designated by an ELS rather than a rule number. A period (full stop) terminates the ELS rule. If ELS is not present, the last rule number is treated as the ELS rule. Even though the table may be complete, the ELS rule is expected by the processor.

If more than one entry is needed to specify the table size, the information continues in column 9 of subsequent entries.

It is not necessary for all rules to contain the same number of characters, but all entries within a rule must be the same length.

The Rule Header entry will be identified by a RHDR in columns 4 - 7.

```
4     9

RHDR                            001                 002
      stub                      at least 3 and
      up to 72 characters    nor more than 18
```

001, 002, 003, etc, may be replaced by other characters if the user keeps in mind the not less than 3 and not greater than 18 rule. Example:

```
001002003...009010011
1  2  3      9  10 11

001         002         003         ELS.

1           2           3
A           B           C
01          02          03
```

Body entries

The body entries will contain the body of the table and will correspond to the format specified on the Rule Header. The placement of entries within a specified field is free form. If more than one entry is needed for each Condition or Action, sequence numbers should be used in columns 1 to 4. Columns 1 - 2 indicate the Condition/Action number and Columns 3 - 4 indicate the entry number within the Condition/Action.

```
     RHDR TABLE-A

                        001        002        003        004        005
          006       007       ELS

0101     A = B         Y          N          Y          Y          N
0102      N        Y
0201     FF > AX       N          Y          N          Y          N
0202      Y        N
```

Termination of the Decision Table EODT

The EODT entry signifies the end of the decision table and is formatted as follows:

Columns	Contents
1 - 3	Blank
4 - 7	EODT
8	Blank
9 - 80	Comments

Example

Col
 4

 EODT   end of validation check three

Discussion on Blank Entries

It has been stated earlier, that a blank entry in the condition entry portion of the table expresses a desire to ignore the indicated condition for the rule in question. In the case of an extended or mixed entry table, this is true. However, this cannot be taken so literally with limited entry tables as some user experiences have demonstrated.

In limited table processing, a blank entry causes the translator to assume that the rule may be satisfied regardless of whether the condition is true or false. This does not mean that the condition will be ignored. In some cases, it is possible that a blank entry will cause more coding to be generated than the normal rule. This philosophy burdens the user with the task of ensuring that a table contains logical and exclusive rules.

In the following examples, some common errors are demonstrated.

	R1	R2	R3	ELS
C1	Y	Y	Y	
C2	Y	Y		
C3		Y	N	

Example 1

In example 1, the user's intention is fairly clear but the rules are not logically unique. Rules 1 and 2 will be interpreted as being identical because the blank entry may be true or false, and the true state would not be unique. Rule 2 and 3 are unique, but 1 and 3 are not.

	R1	R2	R3	ELS
X=1	Y			
X=2		Y		
X=3			Y	

Example 2

Again, in example 2, it is clear what the user intends, since the conditions are mutually exclusive. The translator cannot interpret the condition and therefore can never assume that the rules are unique. This table can be corrected by inserting "N"s into the blank entries.

The problem can be avoided by mentally inserting Y/N into all blank entries & then comparing all cases of all rules for being unique (example 3).

	R1	R2	R3	ELS
X=1	Y	Y/N	Y/N	
X=2	Y/N	Y	Y/N	
X=3	Y/N	Y/N	Y	

Example 3

Conventions and Restrictions

a. When using DECTRANS the following should be considered as reserved words:

    1. PARn   where n is any 4 digit number
    2. RULn   where n is any 4 digit number
    3. ACTn   where n is any 4 digit number
    4. ELSn   where n is any 4 digit number
    5. ENDn   where n is any 4 digit number

b. Maximum of 25 entries in Condition-Entry.

c. Maximum of 25 entries in Action-Entry.

d. Maximum of 25 rules including ELSE rule.

e. Maximum of 18 and minimum of 3 columns in a rule.

f. Maximum of 72 and minimum of 10 columns in condition and action stubs.

g. ELS rule must be present or last rule will be treated as ELS rule.
    (A period must follow the last rule or ELS rule on the RHDR entry in order to define the length of the field)

h. Do not use periods to terminate table names, condition or action stubs.

Implementation Considerations

DECTRANS utilises three files

    1. Source Input file in fixed format only
    2. Output listing
    3. Source Output file

1.   The input file contains the tables to be translated to Cobol. The program accepts non associated tables or complete Cobol source programs with embedded tables. The processing of a table begins with a THDR entry and stops upon recognising a EODT entry. Tables **must** be in fixed format and the program outputs Cobol code in fixed format only.

2.   The output listing contains all table statements read from the input file, all of the statements generated from the tables and any diagnostic messages concerning the tables processed.

3.   The output file contains all of the COBOL source statements read from the input file and the COBOL statements generated from the tables. This output will be input to the COBOL compiler.

4.   If using GNU/Open Cobol run Dectrans with the following parameters:

    1:    Input FileName   (Mandatory), eg dec-run1.cbl
    2:    Output FileName   (Mandatory if not IFN.cpy)   [IFN = Input FileName]
    3:    Report FileName   (Mandatory if not IFN.lst)

Minimum required params 1. The other two if omitted, will take their name from param 1 with (.cpy) and (.lst) as file extentions added to the name (without extention) used in parameter 1.
At completion, program will display a caution if any warning or error messages have occurred.

5.   If using IBM MVS system or similar use the supplied JCL as a model for your JCL.
    Note that the case of messages is reversed to help them stand out on listing.

Dectrans Processor Diagnostics

The following error messages are produced by Dectrans:

WARNING messages (translation will continue)

W01   SEQUENCE ERROR
The sequence numbers of the decision table are not in ascending order. Although this will not affect the condition entries, the action entries may not be executed in the proper sequence.
ACTION TAKEN: None, processing continues.

W02   LAST RULE WAS NOT ELSE RULE, TREATED AS SUCH
The last rule which must be "ELS" was not found. The last rule found will be considered the ELSE rule and any entries will be ignored.
ACTION TAKEN: The entries in the last rule will not be processed. Source code will be generated.

W03   TABLE IS LIMITED BUT LOGICALLY INCOMPLETE
A limited table is being processed and one or more combinations of the conditions will cause the   ELSE path to be taken. All of the possible rules are not present.
ACTION TAKEN: None. This is only to indicate to the user that he has not covered all possibilities. The table is legal, he should be aware of the ELSE action that will result when one of the rules is not satisfied.

W04   ENIT ENTRY NOT FOUND, RHDR ENTRY TERMINATES INIT SECTION.
While processing the INIT section, a RHDR entry was encountered. Although the ENIT entry is missing, the processor can recover and finish processing the table.
ACTION TAKEN: Table will be processed correctly.

W05   AUTO GOTO SUPPRESSED, GOTO MUST BE PROVIDED TO LEAVE EACH SET OF ACTIONS
The "GO TO ENDnnn" will not be generated. The user must specify a "GO TO" in the actions to   leave the table. This table should not be PERFORMED since return to the exit may not be likely.
ACTION TAKEN: None.

FATAL messages.   (Processing continues with the next table)

E01   TABLE DELETED, ENTRY SIZE GREATER THAN RULE-ENTRY-LIMIT FOR RULE NUMBER n
As a rule header was being processed, an entry greater than 18 characters for an entry was found.
ACTION TAKEN: Processing is discontinued for this table - no source code will be generated. The internal table limitations prevent the holding of all the information in the rule numbered n, therefore processing would be meaningless.

E02   STUB FIELD > 72 CHARACTERS
The first rule was not encountered within 72 positions from column 9. The maximum allowable length for the stub is 72 characters.
ACTION TAKEN: Processing deleted - Correct table and retry.

E03   STUB FIELD < 10 CHARACTERS, TABLE DELETED
The first rule was encountered less than 10 positions from column 9. The minimum allowable length for the stub entry is 10.
ACTION TAKEN: Source code will be generated but is probably in error. Correct and retry for correct results.

E04   NUMBER OF RULES ON RHDR EXCEEDS INDICATOR ON THDR
The number of rules specified on the THDR entry is less than the number of rules found on the   RHDR entry.
ACTION TAKEN: Processing is deleted until the next table is encountered.
POSSIBLE CAUSES: (1) Period missing following ELS rule or last rule specified. (2) The field in the THDR entry indicating the number of rules does not begin in column 47.

E05   NUMBER OF ENTRIES < OR > THAN THDR INDICATORS, OR MISSING EODT
       After processing the number of condition and action entries indicated on the THDR, the next record
       read was not an EODT.
       ACTION TAKEN: Table will not be processed.
       POSSIBLE CAUSES: (1) EODT is missing.
                          (2) The fields in the THDR indicating the number of conditions and
                          actions do not start in columns 41 and 44 respectively.
                          (3) The numbers of conditions and/or actions do not correspond to the
                          THDR indicators.

E06   REDUNDANT OR CONTRADICTORY RULES HAVE BEEN FOUND, TABLE DELETED
       Two or more rules are implicitly or implicitly equivalent and therefore the table must be incorrect. If
       the intention was for the two rules to be equal then the desired action should all be indicated under
       one of the rules and the others deleted.
       ACTION TAKEN: Table deleted. Correct and retry.
       POSSIBLE CAUSES: (1) Two or more rules are identical.
                          (2) Due to the "ignoring" option, two or more rules could be interpreted
                           as equal. (Check blank conditions.)

E07   SOURCE CODE GENERATION BYPASSED, CORRECT AND RETRY.
       As stated, processing stops until next table. Also see any other message.

E08   MAXIMUM NUMBER OF CONDITIONS EXCEEDED
       The number of conditions on the THDR is > than the limit allowed (25).
       ACTION TAKEN: Table deleted. Correct and retry.
       POSSIBLE CAUSE: (1) If the number does not exceed the limit, check the starting column (41).

E09   MAXIMUM NUMBER OF ACTIONS EXCEEDED
       The number of actions on the THDR is > than the limit allowed (25).
       ACTION TAKEN: Table deleted. Correct and retry.
       POSSIBLE CAUSE: (1) If the number does not exceed the limit, check the starting column (44).

E10   MAXIMUM NUMBER OF RULES EXCEEDED
       The number of rules on the THDR is > than the limit allowed (25).
       ACTION TAKEN: Table deleted. Correct and retry.
       POSSIBLE CAUSE: (1) If the number does not exceed the limit, check the starting column (47).

E11   EODT ENCOUNTERED PRIOR TO END OF TABLE LENGTH, ENTRY MISSING
       The total of the number of conditions and actions does not agree with the number of conditions and
       actions found.
       ACTION TAKEN: Table is not processed. Incorrect information. would cause a meaningless
                              code generation.
       POSSIBLE CAUSES: (1) The number of conditions and/or actions is not specified correctly.
                          (2) Each condition and action does not consist of the same number of
                          entries, i.e. If three entries are used to define the RHDR then each
                          condition and action must be made up of three entries even though one
                          or two of the three might contain no information.

E12   TABLE DELETED, ENTRY SIZE < 3 CHARACTERS
       See (E01)

E13   RULES nn AND nn ARE EQUAL, CHECK FOR REDUNDANT AND BLANK ENTRIES
       See (E07)

E14   NO RULE HEADER (RHDR) FOUND, TABLE DELETED
       The RHDR was not found immediately following the THDR or ENIT entries. The format of the table is
       unknown and cannot be processed.
       ACTION TAKEN: Table deleted. Correct and retry.

E15   CONTROLS NOT IN SEQUENCE, PROCESSING DISCONTINUED UNTIL NEXT THDR

A processor table control entry (THDR, INIT, EODT) was encountered while processing the INIT section and is logically incorrect. If both the ENIT and RHDR were missing and the EODT was detected, garbage will have been written to the source output file. If a THDR or INIT were read   before the ENIT or RHDR, the results are unpredictable.

ACTION TAKEN: Processing will be deleted until the next THDR is found. Correct and retry.

Sample programs

Table being processed is - TEST-003

```
   THDR TEST-003                          003001009

000010 TEST-003 SECTION.
000020 PAR0001.
   RHDR                001002003004005006007008ELS.
             C-1        Y  Y  Y  N  Y  N  N  N
             C-2        Y  Y  N  Y  N  N  Y  N
             C-3        Y  N  Y  Y  N  Y  N  N
        ACTION-1        X  X  X  X  X  X  X  X  X
   EODT
000030     IF C-1 GO TO RUL0001.
000040     IF C-2 GO TO RUL0002.
000050     IF C-3 GO TO ACT0006 ELSE GO TO ACT0008.
000060 RUL0002.
000070     IF C-3 GO TO ACT0004 ELSE GO TO ACT0007.
000080 RUL0001.
000090     IF C-2 GO TO RUL0003.
000100     IF C-3 GO TO ACT0003 ELSE GO TO ACT0005.
000110 RUL0003.
000120     IF C-3 GO TO ACT0001 ELSE GO TO ACT0002.
000130 ELS0001.
000140     ACTION-1.
000150      GO TO END0001.
000160 ACT0001.
000170     ACTION-1.
000180      GO TO END0001.
000190 ACT0002.
000200     ACTION-1.
000210      GO TO END0001.
000220 ACT0003.
000230     ACTION-1.
000240      GO TO END0001.
000250 ACT0004.
000260     ACTION-1.
000270      GO TO END0001.
000280 ACT0005.
000290     ACTION-1.
000300      GO TO END0001.
000310 ACT0006.
000320     ACTION-1.
000330      GO TO END0001.
000340 ACT0007.
000350     ACTION-1.
000360      GO TO END0001.
000370 ACT0008.
000380     ACTION-1.
000390      GO TO END0001.
000400 END0001.
000410     EXIT.
```

```
   THDR TEST-C                          003004006  G

* W05 AUTO GOTO SUPPRESSED, GOTO MUST BE PROVIDED TO LEAVE EACH SET OF ACTIONS
000420 TEST-C SECTION.
000430 PAR0002.
   RHDR                  001 002 003 004 005 006 .
* W02 LAST RULE WAS NOT ELSE RULE, TREATED AS SUCH
         CONDITION-1          Y   Y   Y   N   N
         CONDITION-2          Y   Y   N   Y   N
         CONDITION-3          Y   N
         ACTION-1             X   X   X
         ACTION-2                         X   X
         NEVER-HAPPEN                             X
         GO TO PROCEDURE-NAME X   X   X   X   X   X
   EODT
000440     IF CONDITION-1 GO TO RUL0005.
000450     IF CONDITION-2 GO TO ACT0013 ELSE GO TO ACT0014.
000460 RUL0005.
000470     IF CONDITION-2 GO TO RUL0007 ELSE GO TO ACT0012.
000480 RUL0007.
000490     IF CONDITION-3 GO TO ACT0010 ELSE GO TO ACT0011.
000500 ELS0002.
000510      NEVER-HAPPEN.
000520      GO TO PROCEDURE-NAME.
000530 ACT0010.
000540      ACTION-1.
000550      GO TO PROCEDURE-NAME.
000560 ACT0011.
000570      ACTION-1.
000580      GO TO PROCEDURE-NAME.
000590 ACT0012.
000600      ACTION-1.
000610      GO TO PROCEDURE-NAME.
000620 ACT0013.
000630      ACTION-2.
000640      GO TO PROCEDURE-NAME.
000650 ACT0014.
000660      ACTION-2.
000670      GO TO PROCEDURE-NAME.
000680 END0002.
000690     EXIT.
```

```
     THDR CREDIT-APPROVAL                  003002004

000700 CREDIT-APPROVAL SECTION.
000710 PAR0003.
     RHDR                                  001002003ELS.
          CREDIT-LIMIT IS GREATER THAN COST   Y   N   N
          SALARY ID EQUAL TO ACCEPTABLE          Y   N
          SPECIAL-CLEARANCE = 1                      Y
          PERFORM APPROVAL                   X   X   X
          PERFORM ORDER-REJECT                           X
     EODT  LIMITED ENTRY TEST 1
000720     IF CREDIT-LIMIT IS GREATER THAN COST GO TO ACT0016.
000730     IF SALARY ID EQUAL TO ACCEPTABLE GO TO ACT0017.
000740     IF SPECIAL-CLEARANCE = 1 GO TO ACT0018 ELSE GO TO
000750        ELS0003.
000760 ELS0003.
000770     PERFORM ORDER-REJECT.
000780     GO TO END0003.
000790 ACT0016.
000800     PERFORM APPROVAL.
000810     GO TO END0003.
000820 ACT0017.
000830     PERFORM APPROVAL.
000840     GO TO END0003.
000850 ACT0018.
000860     PERFORM APPROVAL.
000870     GO TO END0003.
000880 END0003.
000890     EXIT.
```

```
   THDR TEST-DECTRANS-EXTENDED           008004004


000900 TEST-DECTRANS-EXTENDED SECTION.
000910 PAR0004.
   RHDR                          001       002       003       ELS   .
        FEMALE                    Y         Y         Y
        AGE GREATER THAN          21        25        18
        AGE <                     35        38        23
        HAIR IS EQUAL TO       BLONDE      RED       BLACK
        EYES =                  BLUE       RED       BLACK
        WEIGHT >                 100       100       100
        WEIGHT <                 140       140       130
        I/Q =                   110       115       100
        GO TO WINNER              X
        GO TO SO-SO                                            X
        GO TO POSSIBILITY                   X
        GO TO DOG                                                    X
   EODT TEST FOR NO GO TO IN THDR
000920     IF FEMALE NEXT SENTENCE ELSE GO TO ELS0004.
000930     IF WEIGHT > 100 NEXT SENTENCE ELSE GO TO ELS0004.
000940     IF AGE GREATER THAN 21 NEXT SENTENCE ELSE GO TO RUL0012.
000950     IF AGE < 35 NEXT SENTENCE ELSE GO TO RUL0012.
000960     IF HAIR IS EQUAL TO BLONDE NEXT SENTENCE ELSE GO
000970         TO RUL0012.
000980     IF EYES = BLUE NEXT SENTENCE ELSE GO TO RUL0012.
000990     IF WEIGHT < 140 NEXT SENTENCE ELSE GO TO RUL0012.
001000     IF I/Q = 110 GO TO ACT0020.
001010 RUL0012.
001020     IF AGE GREATER THAN 25 NEXT SENTENCE ELSE GO TO RUL0013.
001030     IF AGE < 38 NEXT SENTENCE ELSE GO TO RUL0013.
001040     IF HAIR IS EQUAL TO RED NEXT SENTENCE ELSE GO TO
001050         RUL0013.
001060     IF EYES = RED NEXT SENTENCE ELSE GO TO RUL0013.
001070     IF WEIGHT < 140 NEXT SENTENCE ELSE GO TO RUL0013.
001080     IF I/Q = 115 GO TO ACT0021.
001090 RUL0013.
001100     IF AGE GREATER THAN 18 NEXT SENTENCE ELSE GO TO ELS0004.
001110     IF AGE < 23 NEXT SENTENCE ELSE GO TO ELS0004.
001120     IF HAIR IS EQUAL TO BLACK NEXT SENTENCE ELSE GO TO
001130         ELS0004.
001140     IF EYES = BLACK NEXT SENTENCE ELSE GO TO ELS0004.
001150     IF WEIGHT < 130 NEXT SENTENCE ELSE GO TO ELS0004.
001160     IF I/Q = 100 GO TO ACT0022.
001170 ELS0004.
001180      GO TO DOG.
001190      GO TO END0004.
001200 ACT0020.
001210      GO TO WINNER.
001220      GO TO END0004.
001230 ACT0021.
001240      GO TO POSSIBILITY.
001250      GO TO END0004.
001260 ACT0022.
001270      GO TO SO-SO.
001280      GO TO END0004.
001290 END0004.
001300     EXIT.
```

```
   THDR TEST-B                          003003008

001310 TEST-B SECTION.
001320 PAR0005.
   RHDR                    1   2   3   4   5   6   7   E   .
        CONDITION-1        Y   Y   Y   N   N   N   N
        CONDITION-2        Y   N   N   N   N   Y   Y
        CONDITION-3            Y   N   N   Y   N   Y
        ACTION-1           X   X   X
        ACTION-2                       X   X   X   X
        NEVER-HAPPEN                                   X
   EODT
001330     IF CONDITION-1 GO TO RUL0015.
001340     IF CONDITION-2 GO TO RUL0016.
001350     IF CONDITION-3 GO TO ACT0028 ELSE GO TO ACT0027.
001360 RUL0016.
001370     IF CONDITION-3 GO TO ACT0030 ELSE GO TO ACT0029.
001380 RUL0015.
001390     IF CONDITION-2 GO TO ACT0024.
001400     IF CONDITION-3 GO TO ACT0025 ELSE GO TO ACT0026.
001410 ELS0005.
001420      NEVER-HAPPEN.
001430      GO TO END0005.
001440 ACT0024.
001450      ACTION-1.
001460      GO TO END0005.
001470 ACT0025.
001480      ACTION-1.
001490      GO TO END0005.
001500 ACT0026.
001510      ACTION-1.
001520      GO TO END0005.
001530 ACT0027.
001540      ACTION-2.
001550      GO TO END0005.
001560 ACT0028.
001570      ACTION-2.
001580      GO TO END0005.
001590 ACT0029.
001600      ACTION-2.
001610      GO TO END0005.
001620 ACT0030.
001630      ACTION-2.
001640      GO TO END0005.
001650 END0005.
001660     EXIT.
```

```
   THDR TEST-012                          003001009

001670 TEST-012 SECTION.
001680 PAR0006.
   RHDR               001002003004005006007008ELS.
          C-1          N  N  N  N  Y  Y  Y  Y
          C-2          N  N  Y  N  Y  N  N  Y
          C-3          N  Y  N  Y  N  Y  N  Y
       ACTION-1        X  X  X  X  X  X  X  X  X
   EODT  E06 E07 TEST FAIL
**E06 REDUNDANT OR CONTRADICTORY RULES HAVE BEEN FOUND, TABLE DELETED
**E07 SOURCE CODE GENERATION BYPASSED, CORRECT AND RETRY
```

```
   THDR TEST-D                          003001009

001690 TEST-D SECTION.
001700 PAR0007.
   INIT
001710     MOVE     SPACES TO BETA-NAMES.
001720     PERFORM  AA000-RESTART.
001730     SET      MASTER-CNT UP BY 1.
001740     INITIALIZE TOTALISERS.
001750*
001760*  ABOVE WILL BE FIRST SET OF CODE
001770*
   ENIT
   RHDR              0010020030040050060070080ELS.
         C-1         N  N  N  N  Y  Y  Y  Y
         C-2         N  N  Y  Y  N  N  Y  Y
         C-3         N  Y  N  Y  N  Y  N  Y
      ACTION-1       X  X  X  X  X  X  X  X  X
   EODT  TEST FOR INIT
001780     IF C-1 GO TO RUL0023.
001790     IF C-2 GO TO RUL0022.
001800     IF C-3 GO TO ACT0034 ELSE GO TO ACT0033.
001810 RUL0022.
001820     IF C-3 GO TO ACT0036 ELSE GO TO ACT0035.
001830 RUL0023.
001840     IF C-2 GO TO RUL0024.
001850     IF C-3 GO TO ACT0038 ELSE GO TO ACT0037.
001860 RUL0024.
001870     IF C-3 GO TO ACT0040 ELSE GO TO ACT0039.
001880 ELS0006.
001890     ACTION-1.
001900     GO TO END0006.
001910 ACT0033.
001920     ACTION-1.
001930     GO TO END0006.
001940 ACT0034.
001950     ACTION-1.
001960     GO TO END0006.
001970 ACT0035.
001980     ACTION-1.
001990     GO TO END0006.
002000 ACT0036.
002010     ACTION-1.
002020     GO TO END0006.
002030 ACT0037.
002040     ACTION-1.
002050     GO TO END0006.
002060 ACT0038.
002070     ACTION-1.
002080     GO TO END0006.
002090 ACT0039.
002100     ACTION-1.
002110     GO TO END0006.
002120 ACT0040.
002130     ACTION-1.
002140     GO TO END0006.
002150 END0006.
002160     EXIT.
```

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