IBM

IBM 1401 Decision Logic Translator (1401-SE-05X)

Application Description

Input to this program consists of decision tables written in
a FORTRAN-oriented language. The program automatically
translates these tables into a FORTRAN II source program,
giving pertinent diagnostics in the process. It shortens the
implementation time required for the installation of Auto-
mated Design Engineering systems.

APPLICATION ABSTRACT

The IBM 1401 Decision Logic Translator accepts as input decision tables written in a FORTRAN-oriented language. It automatically translates these tables into a FORTRAN II source program, giving pertinent diagnostics in the process. It shortens considerably the implementation time required for the installation of Automated Design Engineering systems.

In short, the translator saves time and money in implementing Automated Design Engineering systems, it requires a minimal amount of user coding, and it is applicable to other scientific/engineering application areas with logical cause-and-effect relationships.

The source language used for the Decision Logic Translator is 1401 Autocoder.

GENERAL DESCRIPTION OF APPLICATION

The Decision Logic Translator reads, lists and validity-checks each condition row. Extended entry rows are reduced to limited entry. The "don't care" cells in each row are counted. The rows are sorted so that the rows with the fewest "don't care" cells are first. However, extended entry rows are sorted to the top unless there is only one nonempty cell in the row. Treating each Y as a 1, N as a 2, and . or E as a 3, the columns are sorted according to their value. These sorts bring together similar groups of conditions within two or more columns. Insofar as possible, only one set of IF statements is generated for each pattern of conditions even though the pattern appears in more than one column. This process minimizes the size of the object program and maximizes its efficiency.

To process the action area, the Decision Logic Translator reads, lists, and validity-checks each action row. Extended entry rows are reduced to limited entry, and the action area as a whole is validity-checked. Each formula and list is read, edited and stored on tape. The relationship between the sorted and unsorted columns of the condition area is stored within the computer. Each action rule can then be correlated with the proper condition rule without sorting the actions. One or more FORTRAN statements are generated for each nonempty cell in the action area. To conserve space in the FORTRAN object program, complicated formulas and all I/O operations are coded out-of-line if they appear more than once. The RETURN action is also coded out-of-line.

When all tables have been processed, the user must supply FORTRAN control cards, correct nonfatal errors, supply FORMAT statements where necessary, and compile the object program.

Purpose and Objectives

The application was designed to ease the programming burden placed upon persons who are responsible for implementing an Automated Design Engineering system. The Decision Logic Translator will substantially reduce the time and cost required to implement such systems by

minimizing the amount of programming required to convert from decision tables to FORTRAN program.

Control and Audit Techniques

The Decision Logic Translator has complete error routines for tape read/write errors and card read/punch errors. These routines are hand-coded to conserve storage. No audit trails are kept in the strict sense; however, counts are kept of the number of records written on tape and the number of tape errors encountered.

Timing

After a program load time of 40 seconds, each table takes between five seconds and four minutes to translate. The average time per decision table is one minute. Most errors are detected within the first quarter of the processing time for a table.

Restrictions and Range

- The number of columns (rules) must be less than or equal to 40.

- After reduction of extended entry rows to limited entry, the number of condition rows and the number of action rows must be less than or equal to 99.

- After reduction to limited entry, the net size of the condition area and the action area must be less than 1,000 cells.

- No more than 50 references to any table may be made by the DO TABLE instruction.

- No more than 100 FORTRAN statement numbers may be required by the object code. If more than 100 numbers are needed, alphabetic symbols are used.

- The number of closed tables requested in one run must be less than or equal to 20.

BIBLIOGRAPHY

"Decision Tables, A Systems Analysis and Documentation Technique" (F20-8102)

"FORTRAN", general information manual (F28-8074)