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ABSTRACT: Two MAP (Macro Assembly Program) language routines are described. They permit Fortran IV programs to read binary tapes generated by Fortran II programs, on the IBM 7090 and 7094 computers. One routine is for use with 7040/44-IBSYS, the other for 7090/94-IBSYS.

A MAP Read-Routine for IBM 7094 Fortran II Binary Tapes

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Binary tapes written under one computer system usually cannot be read directly by a program using another system--even on the same machine. This incompatibility arises from the difference in control-word format. Development of a special read-routine is one way to circumvent this difference. By using such a routine--two are described in this note--extensive editing and rewriting of tape files can be avoided, with large savings of time and funds.

A case in point are binary tapes written by Fortran II programs for use on the IBM 7090/7094 computers. They cannot be directly read by Fortran IV programs, on either the 7090/7094 or the 7040/7044 computers.

In the 7090/7094 Fortran II system, each physical record is preceded by a flagword. This word is zero for all but the last physical record in each logical record. This physical record contains, in the address part of this flagword, the number of physical records in the logical record. This provision was necessary because the input/output buffer in the FMS monitor was only 128 words long, restricting tape records to this length.

In the 7040/7044 Fortran IV system, a similar flagword is used. The decrement of each flagword contains the number of words in each physical record; the address, which is zero for all but the last physical record, contains the total number of physical records in the logical record. However, besides this flagword, another control word precedes every physical record. This word, used only by IØCS, has the format:

5	N	2		2	6

in which N is the word count, excluding the IØCS control word itself, but including the Fortran flagword. A similar system is used in the 7090/7094 Fortran IV system.

The problem of reading Fortran II tapes with Fortran IV programs thus entails either skipping or simulating these control words to reach the actual data items within each record. Changes can be incorporated in IØCS and in the Fortran reading routines (.FRDB on the 7090/7094, TSBIØ. on the 7040/7044). However, such a change means that Fortran II *and* Fortran IV tapes could not be read by the same program.

The easiest method of reading such tapes is a simple routine to read one record at a time. The programer must know the word-count in each record, but this is usually easily determined. This note describes two such routines, called F2TRD4 and F2TRD9. They are written in MAP and designed for 7040/7044 and 7090/7094 Fortran IV programs, respectively.

The Routines

After initializing argument references, the routines call on the appropriate system read-routines (S.IØØP/7040,.READ/7090) to read one record from the requested tape unit. If the data are fixed point, as indicated by the truth value of the last argument in the calling sequence, conversion is made from Fortran II decrement-integers to Fortran IV address-integers. Then the data are stored in the array named in the calling sequence.

If an error occurs while it is reading, S.IØØP/7040 or .READ/7090 will attempt 10 re-reads. If the final attempt is unsuccessful, these system routines take an error-return to F2TRD4 (F2TRD9), which then writes a message and ends the program through the system exit routine (S.JXIT/7040, .XIT/7090).

If an illegal word count, illegal unit number, or end-of-file is detected during the read, an error message is written and the program is ended.

Using the Routines

The calling sequence is

CALL F2TRD4 / F2TRD9 (Buffer name, word count, unit number, control)

in which

Buffer name. . .is an array in which the data read from the tape will be stored.

Word count. . .is the number of words of data in the record.

Unit number. . .is the number of the Fortran IV utility drive on which the tape is mounted (e.g., UT1, use 1; UT2, use 2, etc.).

Control. . .is a logical variable or constant whose value is .TRUE. if the data are fixed point and .FALSE. if floating point.

The word count must not exceed 256, and must not be greater than the dimension assigned to the "buffer name." The routine skips the 1st word (flagword) in the record; the word count does *not* include the flagword. The unit number must be greater than 0 and less than 5.[1]

The three Fortran-IV program segments below illustrate typical use of F2TRD4 or F2TRD9. In the first example, an ID record of two words appears first on the tape, which is mounted on unit 3. Following this first record are 100 records of 23 words each. The integer data in these records are to be stored in the 100X23 array called VAR.

```
   DIMENSIØN VAR (100,23), DUM(23), ID(2)
   INTEGER VAR, DUM
   CALL F2TRD4 (ID, 2, 3, .TRUE.)
   DØ 50 I=1,100
   CALL F2TRD4 (DUM, 23, 3, .TRUE.)
   DØ 50 K=1,23
   VAR (I,K)=DUM (K)
50 CØNTINUE
```

In the second example, the tape contains 1500 records of eight words each. The floating-point data are to be stored in the 1500X8 array called NUM. The tape is on unit 4.

```
   DIMENSIØN NUM (1500,8), NVAR (8)
   REAL NUM, NVAR
   DØ 50 I=1,1500
   CALL F2TRD9 (NVAR, 8, 4, .FALSE.)
   DØ 50 K=1,8
   NUM (I,K)=NVAR (K)
50 CØNTINUE
```

In the last example the tape contains 10 logical records of 213 words each. In the Fortran II system, there would be

[1] This corresponds to the standard Fortran IV-IBJOB IØBASE in which utility drives 1-4 are logical units 1-4.

two physical records per logical record, with 128 words in the first and 85 in the second. The integer data, read from tape unit 2, are to be stored in the 10X213 word array VAR.

```
      DIMENSIØN VAR (10,213), NVAR (128)
      INTEGER VAR
      DØ 50 I=1,10
      CALL F2TRD9 (NVAR, 128, 2, .TRUE.)
      DØ 45 K=1,128
      VAR (I,K)=NVAR(K)
45    CØNTINUE
      CALL F2TRD9 (NVAR, 85, 2, .TRUE.)
      DØ 46 K=1,85
      VAR (I,K+128)=NVAR (K)
46    CØNTINUE
50    CØNTINUE
```

Listings and symbolic or binary decks or both, described in this note, are available by writing to the Director, Pacific Southwest Forest and Range Experiment Station, P. O. Box 245, Berkeley, California 94701.

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