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DECUS NO.	8-493
TITLE	LINE TO BLOCK CONVERSION
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SOURCE LANGUAGE	PAL-D

LINE TO BLOCK CONVERSION

DECUS Program Library Write-up DECUS NO. 8-493

ABSTRACT

The program assumes k variables with n samples stored in k blocks of DECtape each containing n lines. Particular lines of one block correspond with the appropriate lines of other blocks. For data manipulation in particular in connection with DECUS NO. 8-137 "Programs for Storage, Manipulation and Calculation of Data Using DECtape" the program converts the array of k blocks with n lines to an array of n blocks with k lines. Floating-point number representation is used and the size of the array may be k = 23 and n = 42 at maximum.

REQUIREMENTS

Storage

The program occupies core locations 20 - 43, 200 - 1657. Core locations 1600 - 7577 are used for data storage.

USAGE

Loading

The program is loaded by the Binary Loader.

Calling Sequence

The program cannot be called as a subroutine.

Switch Settings

The switch register is used to enter the starting address (2ØØ) only.

Start up and/or Entry

Assuming the program has been loaded properly and a properly formatted data tape has been mounted on DECtape unit 1 with remote control and write enabled proceed as follows:

Load the starting address (2ØØ) into the switch register, press LOAD ADDRESS and START. The program will respond with a CR-LF combination and begins with the dialog.

Errors in Usage

A) All block numbers entered have to be within the range of 0 - 1473_{10} inclusive. If on input an unsigned number is larger than 4095_{10} or a signed number is larger than + 2047_{10} the result of the decimal to binary conversion is unspecified and an error occurs without indication. All other errors are recognized and the input is restarted then.

B) On output an error may occur if the number of blocks required exceeds the number of remaining blocks on the magtape. Then the magtape stops with an "End of Tape" error.

Recovery from such Errors

A) If the limits shown above are exceeded, no recovery is possible and the content of the magtape can be destroyed if "WRITE" is enabled. Restart the program at 2ØØ.

B) Restart the program at 2ØØ and select a lower number of the "First Output Block."

DESCRIPTION

Discussion

On input the program assumes data arranged in a format of k variables with n samples stored in k blocks of DECtape each containing n lines of corresponding data samples. Up to 23 variables (blocks) and 42 data samples (lines) per variable are allowed at maximum. Data of each block has to be terminated by a dollar sign (code 244). The format is compatible with the DATRIT-format and the program is intended to be used in connection with DECUS NO. 8-137. After the program has been started it types "READ BLOCKS:" and waits for input of the blocks to be converted. The blocks are treated according to the sequence of input. Input of a block number is in decimal form and terminated by a non-numerical character. After input the block number is checked whether it is negative or greater than 1473_{10} which is the number of the last block of DECtape. In both cases the program is restarted. Otherwise the block number is stored in a table (INBLTB). Succeeding block numbers can be entered by typing the starting and final block number separated by a comma. In this case the program fills up the table by the appropriate block numbers following the starting block number. Otherwise a comma is treated as a terminator. If more than 23_{10} block numbers are entered the program restarts. Input of block numbers is completed by terminating the input of the last block number by a form-feed.

The program then types "FIRST OUTPUT BLOCK:" and waits for input of the number of the first output block. If the number entered is greater than or equal to zero and equal to or less than 1473_{10} the program proceeds. Otherwise the last question is repeated. As long as the number of the first output block has not been accepted by the program it is possible to return to the tape system (jump to 76ØØ) by typing CTRL/C.

After termination of input the specified blocks are read into the buffers (see BUFTAB) according to their sequence in the table (INBLTB). According to this order the first data sample of each block (first line) is read and stored one after another in a buffer (BUFF). The buffer is terminated by a dollar sign (code 244) and stored on DECtape in the first output block. Following lines are disassembled accordingly and stored in succeeding output blocks. Conversion is terminated at the occurrence of the dollar sign ("end of file") in one of the input blocks or after 42_{10} lines have been processed. The number of lines processed is typed on the teletype as well as the last block used for output. The program restarts then.

FORMAT

Input Data

Max. 23_{10} blocks of DECtape each containing max. 42_{10} floating-point numbers terminated by a dollar sign.

Output Data

Max. 42_{10} blocks of DECtape each containing max. 23_{10} floating-point numbers terminated by a dollar sign.

```
                /DFVLR-BRG.-L-LA
                /USE 14-04
                /LINE TO BLOCK CONVERSION
                /5 JANUARY 1971
                /BASIC PDP8 AND DECTAPE

                /MAX.NO.OF INPUT BLOCKS: 23 (DECIMAL)
                /
                /INPUT UNIT: #1
                /
                *20
0020  0667      P1,       INBLTB
0021  0717      P2,       BUFTAB
0022  1000      P3,       BUFF
0023  0000      PTR,      0
0024  0000      INVAL,    0
0025  7564      MFORM,    -214
0026  7524      MCOMMA,   -254
0027  0000      TEM,      0
0030  0000      OUTBLO,   0
0031  2701      BLAST,    2701
0032  7575      MCTRL,    -203
0033  7600      TAPE,     7600
0034  0000      NOINBL,   0
0035  0000      CNTR,     0
0036  0000      BUFPTR,   0
0037  0000      BLPTR,    0
0040  0000      LCTR,     0
0041  7534      MDOL,     -244
0042  0244      DOL,      244
0043  7602      M176,     -176
                *200
0200  7200      START,    CLA
0201  6046                TLS
0202  1020                TAD P1              /INBLTB
0203  3023                DCA PTR
0204  4777      INPUT,    JMS MESAGE
0205  4543                TEXT /%#
0206  4322      #R
0207  0501      EA
0210  0440      D
0211  0214      BL
0212  1703      OC
0213  1323      KS
0214  7240      :
0215  0000      /

0216  4312      IN1,      JMS CONV
0217  5204                JMP INPUT
0220  1024                TAD INVAL
0221  3423                DCA I PTR
0222  2023                ISZ PTR
0223  4340                JMS CHECK
0224  1776                TAD SISAVE
0225  1025                TAD MFORM
0226  7650                SNA CLA             /LAST BLOCK #?
0227  5266                JMP IN3             /YES
0230  1776                TAD SISAVE          /NO
0231  1026                TAD MCOMMA
0232  7640                SZA CLA             /COMMA?
0233  5216                JMP IN1             /NO
0234  4312      IN2,      JMS CONV            /YES
```

```
0235  5200            JMP START
0236  7240            CLA CMA
0237  1023            TAD PTR
0240  3027            DCA TEM
0241  1427            TAD I TEM         /PREVIOUS VALUE
0242  7041            CIA
0243  1024            TAD INVAL
0244  7750            SPA SNA CLA       /PRESENT-PREVIOUS <=0?
0245  5200            JMP START         /YES
0246  1427            TAD I TEM         /NO
0247  3027            DCA TEM
0250  2027            ISZ TEM
0251  1027            TAD TEM
0252  3423            DCA I PTR
0253  2023            ISZ PTR
0254  4340            JMS CHECK
0255  1027            TAD TEM
0256  7041            CIA
0257  1024            TAD INVAL
0260  7640            SZA CLA           /TABLE FILLED UP?
0261  5250            JMP .-11
0262  1776            TAD SISAVE        /YES
0263  1025            TAD MFORM
0264  7640            SZA CLA           /LAST BLOCK #?
0265  5216            JMP IN1           /NO
0266  4777  IN3,      JMS MESAGE        /YES
0267  4543            TEXT /%#
0270  4306  #F
0271  1122  IR
0272  2324  ST
0273  4017   O
0274  2524  UT
0275  2025  PU
0276  2440  T
0277  0214  BL
0300  1703  OC
0301  1372  K:
0302  4000   /

0303  4312            JMS CONV
0304  5266            JMP IN3
0305  1024            TAD INVAL
0306  3030            DCA OUTBLO
0307  1030            TAD OUTBLO
0310  3775            DCA BLOCKW
0311  5774            JMP OPERAT
0312  0000  CONV,     0
0313  4773            JMS SICONV
0314  3024            DCA INVAL
0315  1776            TAD SISAVE
0316  1032            TAD MCTRL
0317  7650            SNA CLA           /RETURN TO TAPE SYSTEM?
0320  5433            JMP I TAPE        /YES
0321  1772            TAD SISET1+1
0322  7041            CIA
0323  1771            TAD SIXSW1
0324  7650            SNA CLA           /WAS THERE A CONVERSION?
0325  5712            JMP I CONV        /NO
0326  1024            TAD INVAL         /YES
0327  7710            SPA CLA           /POSITIVE NUMBER?
0330  5712            JMP I CONV        /NO
0331  1024            TAD INVAL
```

```
0332  7041          CIA
0333  1331          TAD BLAST       /1473 DEC.(2701)
0334  7710          SPA CLA         /MAX.BLOCK # EXCEEDED?
0335  5712          JMP I CONV      /YES
0336  2312          ISZ CONV
0337  5712          JMP I CONV
0340  0000  CHECK,   0
0341  1023          TAD PTR
0342  7041          CIA
0343  1021          TAD P2
0344  7000          NOP
0345  7640          SZA CLA         /MAX.NO.OF INPUT BLOCKS EXCEEDED?
0346  5740          JMP I CHECK     /NO
0347  5200          JMP START       /YES
0371  1224
0372  1274
0373  1200
0374  0400
0375  0664
0376  1307
0377  1600
                    PAGE
0400  1020  OPERAT, TAD P1          /INBLTB
0401  7000          NOP
0402  7041          CIA
0403  1023          TAD PTR
0404  3034          DCA NOINBL      /NO.OF INPUT BLOCKS
0405  1034          TAD NOINBL
0406  7041          CIA
0407  3035          DCA CNTR
0410  7240          CLA CMA
0411  3023          DCA PTR
0412  2023  RAGN,    ISZ PTR
0413  1023          TAD PTR
0414  1020          TAD P1          /INBLTB
0415  3027          DCA TEM
0416  1427          TAD I TEM
0417  3777          DCA BLOCKR
0420  1023          TAD PTR
0421  1021          TAD P2          /BUFTAB
0422  3027          DCA TEM
0423  1427          TAD I TEM
0424  3776          DCA CORER
0425  4775          JMS READ
0426  2035          ISZ CNTR        /ALL BLOCKS READ?
0427  5212          JMP RAGN        /NO
0430  7200          CLA
0431  3040          DCA LCTR
0432  1022  T2,     TAD P3          /BUFF
0433  3036          DCA BUFPTR
0434  1034          TAD NOINBL
0435  7041          CIA
0436  3035          DCA CNTR
0437  1021          TAD P2          /BUFTAB
0440  3037          DCA BLPTR
0441  1437  T1,     TAD I BLPTR
0442  1040          TAD LCTR
0443  3027          DCA TEM
0444  1427          TAD I TEM
0445  1041          TAD MDOL
0446  7650          SNA CLA         /END OF BLOCK?
0447  5774          JMP END         /YES
```

```
0450  1427          TAD I TEM        /NO
0451  2027          ISZ TEM
0452  3436          DCA I BUFPTR
0453  2036          ISZ BUFPTR
0454  1427          TAD I TEM
0455  2027          ISZ TEM
0456  3436          DCA I BUFPTR
0457  2036          ISZ BUFPTR
0460  1427          TAD I TEM
0461  3436          DCA I BUFPTR
0462  2036          ISZ BUFPTR
0463  2037          ISZ BLPTR
0464  2035          ISZ CNTR         /1 LINE OF ALL BLOCKS PROCESSED?
0465  5241          JMP T1           /NO
0466  1042          TAD DOL          /YES
0467  3436          DCA I BUFPTR
0470  4773          JMS WRITE
0471  2772          ISZ BLOCKW
0472  2040          ISZ LCTR
0473  2040          ISZ LCTR
0474  2040          ISZ LCTR
0475  1040          TAD LCTR
0476  1043          TAD M176
0477  7710          SPA CLA          /MORE THAN 42(DEC.)LINES?
0500  5232          JMP T2           /NO
0501  5774          JMP END          /YES
0572  0664
0573  0661
0574  0600
0575  0653
0576  0657
0577  0656

                    PAGE
0600  4777  END,     JMS MESAGE
0601  4543          TEXT /%#
0602  4316  #N
0603  1756  O.
0604  1706  OF
0605  4014   L
0606  1116  IN
0607  0523  ES
0610  4020   P
0611  2217  RO
0612  0305  CE
0613  2323  SS
0614  0504  ED
0615  7240  :
0616  0000  /

0617  7240          CLA CMA
0620  1264          TAD BLOCKW
0621  3027          DCA TEM
0622  1030          TAD OUTBLO
0623  7041          CIA
0624  7001          IAC
0625  1027          TAD TEM
0626  4776          JMS DECPRT
0627  4777          JMS MESAGE
0630  4543          TEXT /%#
0631  4314  #L
0632  0123  AS
0633  2440  T
```

```
0634  0214  BL
0635  1703  OC
0636  1340  K
0637  2523  US
0640  0504  ED
0641  7240  :
0642  0000  /

0643  1027          TAD TEM
0644  4776          JMS DECPRT
0645  4777          JMS MESAGE
0646  4543          TEXT /%#
0647  4343  ##
0650  4343  ##
0651  4300  #/

0652  5775          JMP START
0653  0000  READ,   0
0654  4774          JMS RWTAPE
0655  1201          1201
0656  0000  BLOCKR, 0
0657  0000  CORER,  0
0660  5653          JMP I READ
0661  0000  WRITE,  0
0662  4774          JMS RWTAPE
0663  1401          1401
0664  0000  BLOCKW, 0
0665  1000  COREW,  BUFF
0666  5661          JMP I WRITE
0667  0000  INBLTB, 0
0670  0000          0
0671  0000          0
0672  0000          0
0673  0000          0
0674  0000          0
0675  0000          0
0676  0000          0
0677  0000          0
0700  0000          0
0701  0000          0
0702  0000          0
0703  0000          0
0704  0000          0
0705  0000          0
0706  0000          0
0707  0000          0
0710  0000          0
0711  0000          0
0712  0000          0
0713  0000          0
0714  0000          0
0715  0000          0
0716  0000          0                /OVERFLOW STORAGE
0717  2000  BUFTAB, 2000
0720  2200          2200
0721  2400          2400
0722  2600          2600
0723  3000          3000
0724  3200          3200
0725  3400          3400
0726  3600          3600
0727  4000          4000
```

```
0730  4200            4200
0731  4400            4400
0732  4600            4600
0733  5000            5000
0734  5200            5200
0735  5400            5400
0736  5600            5600
0737  6000            6000
0740  6200            6200
0741  6400            6400
0742  6600            6600
0743  7000            7000
0744  7200            7200
0745  7400            7400
0774  1400
0775  0200
0776  1312
0777  1600
                      PAGE
1000  0000  BUFF,     0
            /NEXT COME STANDARD SUBROUTINES SICONV,DECPRT,
            /RWTAPE(SEE DECUS 8-137),MESAGE
            /WHICH ARE NOT LISTED IN PASS3
            PAGE
            XLIST
1660  0000            0000     /END OF PROGRAM+1

ADDRZA 1346
ARROW  1325
BLAST  0031
BLOCKR 0656
BLOCKW 0664
BLPTR  0037
BUFF   1000
BUFPTR 0036
BUFTAB 0717
CHECK  0340
CNTR   0035
CNTRZA 1347
CNTRZB 1357
CONV   0312
CORER  0657
COREW  0665
C212   1654
C215   1656
C245   1657
C340   1652
DECPRT 1312
DIGIT  1356
DOL    0042
END    0600
INBLTB 0667
INPUT  0204
INVAL  0024
IN1    0216
IN2    0234
IN3    0266
K260   1354
LCTR   0040
MASK77 1650
MCOMMA 0026
MCTRL  0032
```

```
MDOL    0041
MESAGE  1600
MFORM   0025
MSRGHT  1616
MTP     1643
M176    0043
M2      1655
M3      1653
M40     1651
NOINBL  0034
OPERAT  0400
OUTBLO  0030
PTR     0023
P1      0020
P2      0021
P3      0022
RAGN    0412
READ    0653
RWADBN  1532
RWADCA  1530
RWADWC  1531
RWAGN   1465
RWBCNT  1527
RWBGN   1416
RWBLK   1526
RWBN    1523
RWCLOC  1525
RWFWD   1443
RWM12   1522
RWM200  1542
RWREGA  1524
RWREV   1430
RWTAPE  1400
RWTCNT  1521
RWWAIT  1477
RWWOUT  1517
RW0070  1541
RW0077  1540
RW0110  1536
RW0200  1537
RW0210  1535
RW0610  1534
RW7000  1533
SICONV  1200
SICTRL  1232
SIEND   1264
SIHOLD  1310
SIMASK  1300
SIMMNS  1306
SIMPLS  1305
SIMSPC  1304
SIM260  1302
SIM271  1303
SINEG1  1311
SINMBR  1246
SINPUT  1257
SIPROC  1211
SIRBUT  1301
SISAVE  1307
SISET1  1273
SIXSW1  1224
START   0200
```

```
TAPE    0033
TEM     0027
TENPWR  1350
TYPECH  1617
T1      0441
T2      0432
VALUE   1355
WRITE   0661
```