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from: S. C. Wynn

subject: PORDER, a FORTRAN Routine to Pack and Order Data -- Case 310

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MEMORANDUM FOR FILE

PORDER will pack and order up to 95,000 strings of data. Under the present configuration each string can contain three integers defining dimensions and/or characteristics of points or events. Minor modifications will allow use of longer strings. The data set is ordered using any two elements of the string. The list of strings is ordered based on the magnitude of the integers in a selected position of the string (ICONS). A set of strings that have a common value of the ICONS element are ordered based on the value in another selected position (IVARY). The length of computer running time depends on the number of strings to be packed and ordered and on the percentage that are duplicates. On the UNIVAC 1108 it took 33 minutes of CPU time to pack and order 77,000 strings down to 75,000 strings.

The input to PORDER is a tape. The first record of each file of the tape is an identifying record consisting of three real numbers. The second record contains two integers which are read into dummy locations and the remaining records are the strings of data which are to be packed and ordered. PORDER will pack and order together a specified number of files (IEOFST) from the input tape.

PORDER reads the input tape (from unit 8) in blocks of up to 5000 strings. These 5000 strings are then packed, ordered and written on a scratch file. The next group of 5000 strings is then read in, packed, ordered and written on a different scratch file. This is repeated until IEOFST end-of-file marks have been read or nineteen scratch files have been written. These scratch files are then merged, packed and written out on the output tape. The PORDER program is capable of ordering and packing 19 x 5000 or 95,000 strings.

(NASA-CR-126121) PORDER, A FORTRAN ROUTINE TO PACK AND ORDER DATA (Bellcomm, Inc.) 7 p

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At the completion of a run, the first record of the output tape contains the same identifying record as the first file of the input tape. The second record contains ICONS and IVARY and the remaining records contain the ordered strings of data.

The inputs to PORDER other than the input tape are via a namelist read of DATA. The allowable variables and their definitions are listed in Appendix A. Appendix B contains a listing of the program.

MAX, NCOL and IFIRST are defined to be 5000, 3, and 3 respectively by a PARAMETER statement. To change the length of a string (NCOL), the length of the identifying record (IFIRST) or the number of strings that can be handled at one time (MAX), just the PARAMETER statement would have to be changed. If the total number of input strings is greater than 2000, computer running time can be optimized by setting MAX such that 19 times MAX is equal to or slightly larger than the total number of strings to be packed and ordered. The program as it presently exists takes up 23,500 words of memory during execution. As MAX and NCOL are changed the amount of memory used varies in proportion to MAX times NCOL.

The author wishes to acknowledge Al Schreiber for his help in developing the algorithm for ordering the strings.

SC Wynn

2013-SCW-jab

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Attachments
Appendices A and B

APPENDIX A

OPTIONS FOR PORDER

ICONS and IVARY	The strings of data are ordered such that the ICONSth position in the string is minimized first and then the IVARYth.
NUNIT	The unit the ordered data is to be written on (cannot be 5-8 or 11-29).
ISTOP	= 1 Terminate program. $\neq$ 1 Continue.
IEOFST	The number of files on the input tape that are to be packed and ordered together.
IREWIN	= 1 Rewind the input tape before reading from it. $\neq$ 1 Continue.

APPENDIX B

PORDER

```
C
      PARAMETER MAX=5000,NCOL=3,IFIRST=3
      DIMENSION IB(MAX,NCOL),IBB(19,NCOL),LCOUNT(19),A(IFIRST),
     . DUM(IFIRST),IDUM(2)
      NAMELIST DATA/ICONS,IVARY,NUNIT,ISTOP,IEOFST,IREWIN/
C
C               READ IN NAMELIST DATA
C
C               ICONS AND IVARY - THE STRINGS OF DATA ARE ORDERED SUCH
C                     THAT THE ICONS TH POSITION IN THE STING IS
C                     MINIMIZED FIRST AND THEN THE IVARY TH.
C               NUNIT - THE UNIT THE ORDERED DATA IS WRITTEN ON
C                     (NOT 5 THRU 8, OR 11 THRU 29).
C               ISTOP - =1 TERMINATE PROGRAM
C                       NOT =1 CONTINUE
C               IEOFST - THE NUMBER OF FILES ON THE INPUT TAPE THAT ARE
C                     TO BE PACKED AND ORDERED TOGETHER.
C               IREWIN - =1 REWIND UNIT 8 BEFORE READING FROM IT
C                        NOT =1 CONTINUE
C
 5    READ(5,DATA)
      IF(ISTOP.EQ.1)CALL EXIT
      WRITE(6,DATA)
      IF(IREWIN.EQ.1)REWIND 8
C
C               READ IN IDENTIFYING RECORD
C
      READ(8) A
      READ(8) IDUM
      IEOF=0
C
C               READ IN VISIBLE POINTS IN GROUPS OF MAX
C
      DO 80 IUNIT=11,29
      K=1
 9    DO 10 I=K,MAX
 10   READ(8,END=20) (IB(I,J),J=1,NCOL)
      N=MAX
      GO TO 30
C
C               AN END-OF-FILE MARK HAS BEEN READ
C
 20   N=I-1
      IEOF=IEOF+1
      IF(IEOF.EQ.IEOFST)GO TO 30
      READ(8) DUM
      READ(8) IDUM
      K=I
      GO TO 9
C
C               ORDER AND PACK ONE GROUP
C
 30   I=1
 33   MINCON=IB(I,ICONS)
```

```
      MINVAR=IB(I,IVARY)                                                PORD0055
      IT=I                                                              PORD0056
      II=I+1                                                            PORD0057
      GO TO 39                                                          PORD0058
 35   II=K                                                              PORD0059
      DO 37 K=1,NCOL                                                    PORD0060
 37   IB(II,K)=IB(N,K)                                                  PORD0061
      N=N-1                                                             PORD0062
      IF(II.EQ.N+1)GO TO 55                                             PORD0063
 39   DO 50 K=II,N                                                      PORD0064
      IF(IB(K,ICONS)-MINCON)40,,50                                      PORD0065
      IF(IB(K,IVARY)-MINVAR)40,35,50                                    PORD0066
 40   MINCON=IB(K,ICONS)                                                PORD0067
      MINVAR=IB(K,IVARY)                                                PORD0068
      IT=K                                                              PORD0069
 50   CONTINUE                                                          PORD0070
 55   DO 60 K=1,NCOL                                                    PORD0071
      ISAVE=IB(IT,K)                                                    PORD0072
      IB(IT,K)=IB(I,K)                                                  PORD0073
 60   IB(I,K)=ISAVE                                                     PORD0074
      I=I+1                                                             PORD0075
      IF(I.LE.N-1)GO TO 33                                              PORD0076
C                                                                       PORD0077
 65   IF(IEOF.EQ.IEOFST.AND.IUNIT.EQ.11)GO TO 100                       PORD0078
C                                                                       PORD0079
C              WRITE THE ORDERED GROUP ONTO A SCRATCH FILE              PORD0080
C                                                                       PORD0081
      DO 70 I=1,N                                                       PORD0082
 70   WRITE(IUNIT) (IB(I,J),J=1,NCOL)                                   PORD0083
      END FILE IUNIT                                                    PORD0084
      REWIND IUNIT                                                      PORD0085
      WRITE(6,71)IUNIT,N                                                PORD0086
 71   FORMAT('0UNIT',I3,' HAS',I8,' DATA POINTS')                       PORD0087
 30   IF(IEOF.EQ.IEOFST)GO TO 109                                       PORD0088
      NMAX=MAX*19                                                       PORD0089
      WRITE(6,81) NMAX                                                  PORD0090
 81   FORMAT(' MORE THAN',I15,' POINTS.  ORDERING THESE POINTS ONLY.')  PORD0091
      IUNIT=29                                                          PORD0092
      GO TO 109                                                         PORD0093
C                                                                       PORD0094
C              WRITE OUT ON OUPUT TAPE FOR CASE WHERE THERE ARE FEWER   PORD0095
C                 THAN MAX POINTS                                       PORD0096
C                                                                       PORD0097
 100  WRITE(NUNIT) A                                                    PORD0098
      WRITE(NUNIT)ICONS,IVARY                                           PORD0099
      DO 101 I=1,N                                                      PORD0100
 101  WRITE(NUNIT) (IB(I,J),J=1,NCOL)                                   PORD0101
      IUNIT=0                                                           PORD0102
      WRITE(6,71)IUNIT,N                                                PORD0103
      NCOUNT=N                                                          PORD0104
 102  END FILE NUNIT                                                    PORD0105
      WRITE(6,71)NUNIT,NCOUNT                                           PORD0106
      GO TO 5                                                           PORD0107
C                                                                       PORD0108
C              MERGE AND PACK THE DATA FROM THE SCRATCH FILES AND WRITE PORD0109
C                 ON OUTPUT TAPE                                        PORD0110
C                                                                       PORD0111
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 109    WRITE(NUNIT) A                                                  PORD0112
        WRITE(NUNIT)ICONS,IVARY                                         PORD0113
        NCOUNT=0                                                        PORD0114
        DO 110 IU=11,IUNIT                                              PORD0115
        READ(IU) (IBB(IU-10,J),J=1,NCOL)                                PORD0116
 110    LCOUNT(IU-10)=1                                                 PORD0117
 115    DO 117 IU=11,IUNIT                                              PORD0118
 117    IF(LCOUNT(IU-10).LE.MAX)GO TO 118                               PORD0119
        GO TO 102                                                       PORD0120
 118    MINCON=IBB(IU-10,ICONS)                                         PORD0121
        MINVAR=IBB(IU-10,IVARY)                                         PORD0122
        MIN=IU                                                          PORD0123
        II=IU+1                                                         PORD0124
        IF(II.GT.IUNIT)GO TO 135                                        PORD0125
        DO 130 I=II,IUNIT                                               PORD0126
 119    IF(LCOUNT(I-10).GT.MAX)GO TO 130                                PORD0127
        IF(IBB(I-10,ICONS)-MINCON)120,,130                              PORD0128
        IF(IBB(I-10,IVARY)-MINVAR)120,,130                              PORD0129
C                                                                       PORD0130
        READ(I,END=121)(IBB(I-10,J),J=1,NCOL)                           PORD0131
        LCOUNT(I-10)=LCOUNT(I-10)+1                                     PORD0132
        GO TO 119                                                       PORD0133
 121    LCOUNT(I-10)=MAX+1                                              PORD0134
        REWIND I                                                        PORD0135
        GO TO 130                                                       PORD0136
C                                                                       PORD0137
 120    MINCON=IBB(I-10,ICONS)                                          PORD0138
        MINVAR=IBB(I-10,IVARY)                                          PORD0139
        MIN=I                                                           PORD0140
 130    CONTINUE                                                        PORD0141
C                                                                       PORD0142
 135    WRITE(NUNIT)(IBB(MIN-10,J),J=1,NCOL)                            PORD0143
        NCOUNT=NCOUNT+1                                                 PORD0144
        READ(MIN,END=140)(IBB(MIN-10,J),J=1,NCOL)                       PORD0145
        LCOUNT(MIN-10)=LCOUNT(MIN-10)+1                                 PORD0146
        GO TO 115                                                       PORD0147
C                                                                       PORD0148
 140    LCOUNT(MIN-10)=MAX+1                                            PORD0149
        REWIND MIN                                                      PORD0150
        GO TO 115                                                       PORD0151
C                                                                       PORD0152
        END                                                             PORD0153
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