

NAG Library Routine Document

F16DPF

Note: before using this routine, please read the Users' Note for your implementation to check the interpretation of ***bold italicised*** terms and other implementation-dependent details.

1 Purpose

F16DPF computes the smallest component of an integer vector, along with the index of that component.

2 Specification

```
SUBROUTINE F16DPF(N, X, INCX, K, I)
INTEGER          N, X(1+(N-1)*ABS(INCX)), INCX, K, I
```

3 Description

F16DPF computes the smallest component, i , of an n -element integer vector x , and determines the smallest index, k , such that

$$i = x_k = \min_j x_j.$$

4 References

Basic Linear Algebra Subprograms Technical (BLAST) Forum (2001) *Basic Linear Algebra Subprograms Technical (BLAST) Forum Standard* University of Tennessee, Knoxville, Tennessee URL: <http://www.netlib.org/blas/blast-forum/blas-report.pdf>

5 Parameters

- | | | |
|----|--|---------------|
| 1: | N – INTEGER | <i>Input</i> |
| | <i>On entry:</i> n , the number of elements in x . | |
| 2: | $X(1 + (N - 1) \times INCX)$ – INTEGER array | <i>Input</i> |
| | <i>On entry:</i> the vector x . Element x_i is stored in $X(1 + (i - 1) \times INCX)$, for $i = 1, 2, \dots, n$. | |
| 3: | INCX – INTEGER | <i>Input</i> |
| | <i>On entry:</i> the increment in the subscripts of X between successive elements of x . | |
| | <i>Constraint:</i> $INCX \neq 0$. | |
| 4: | K – INTEGER | <i>Output</i> |
| | <i>On exit:</i> k , the index, from the set $\{1, 1 + INCX , \dots, 1 + (N - 1) \times INCX \}$, of the smallest component of x . If $N \leq 0$ on input then K is returned as 0. | |
| 5: | I – INTEGER | <i>Output</i> |
| | <i>On exit:</i> i , the smallest component of x . If $N \leq 0$ on input then I is returned as 0. | |

6 Error Indicators and Warnings

If $INCX = 0$, an error message is printed and program execution is terminated.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

This example computes the smallest component and index of that component for the vector

$$x = (1, 10, 11, -2, 9)^T.$$

9.1 Program Text

```
*      F16DPF Example Program Text
*      Mark 22 Release. NAG Copyright 2007.
*      .. Parameters ..
      INTEGER          NIN, NOUT
      PARAMETER        (NIN=5,NOUT=6)
      INTEGER          NMAX, INCMAX
      PARAMETER        (NMAX=10,INCMAX=NMAX)
*      .. Local Scalars ..
      INTEGER          I, INCX, J, K, N
*      .. Local Arrays ..
      INTEGER          X(1+(NMAX-1)*ABS(INCMAX))
*      .. External Subroutines ..
      EXTERNAL         F16DPF
*      .. Intrinsic Functions ..
      INTRINSIC        ABS
*      .. Executable Statements ..
      CONTINUE

      WRITE (NOUT,*) 'F16DPF Example Program Results'
*
*      Skip heading in data file
*
      READ (NIN,*)
*
*      Read N and INCX from data file
*
      READ (NIN,*) N, INCX
*
      IF (N.LE.NMAX .AND. ABS(INCX).LE.INCMAX) THEN
*
*          Read X from data file
*
          READ (NIN,*) (X(J),J=1,1+(N-1)*ABS(INCX),INCX)
*
*          Find K = ARGMIN(X) and I = MIN(X).
*
          CALL F16DPF(N,X,INCX,K,I)
*
          WRITE (NOUT,*)
          WRITE (NOUT,99999) K
          WRITE (NOUT,99998) I
      END IF
*
99999 FORMAT (1X,'Index of smallest component of X is',I3)
99998 FORMAT (1X,'Smallest component of X is',I12)
      END
```

9.2 Program Data

F16DPF Example Program Data

5	1					: N and INCX
1	10	11	-2	9		: Array X

9.3 Program Results

F16DPF Example Program Results

```
Index of smallest component of X is  4
Smallest component of X is          -2
```
