

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 <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 n -element vector x . | |
| | If $INCX > 0$, x_i must be stored in $X((i - 1) \times INCX + 1)$, for $i = 1, 2, \dots, N$. | |
| | If $INCX < 0$, x_i must be stored in $X((N - i) \times INCX + 1)$, for $i = 1, 2, \dots, N$. | |
| | Intermediate elements of X are not referenced. If $N = 0$, X is not referenced. | |
| 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

The BLAS standard requires accurate implementations which avoid unnecessary over/underflow (see Section 2.7 of Basic Linear Algebra Subprograms Technical (BLAST) Forum (2001)).

8 Parallelism and Performance

Not applicable.

9 Further Comments

None.

10 Example

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

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

10.1 Program Text

```

Program f16dpfe
!      F16DPF Example Program Text
!
!      Mark 25 Release. NAG Copyright 2014.
!
!      .. Use Statements ..
!      Use nag_library, Only: f16dpf
!      .. Implicit None Statement ..
!      Implicit None
!      .. Parameters ..
!      Integer, Parameter          :: nin = 5, nout = 6
!      .. Local Scalars ..
!      Integer                     :: i, incx, j, k, n
!      .. Local Arrays ..
!      Integer, Allocatable        :: x(:)
!      .. Intrinsic Procedures ..
!      Intrinsic                  :: abs
!      .. Executable Statements ..
!      Write (nout,*) 'F16DPF Example Program Results'
!
!      Skip heading in data file
!      Read (nin,*)
!
!      Read (nin,*) n, incx
!      Allocate (x(1+(n-1)*abs(incx)))
!
!      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
!
99999 Format (1X,'Index of smallest component of X is',I3)
99998 Format (1X,'Smallest component of X is',I12)
End Program f16dpfe

```

10.2 Program Data

F16DPF Example Program Data

```
5 1
1 10 11 -2 9
```

```
: N and INCX
: Array X
```

10.3 Program Results

F16DPF Example Program Results

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