Z01CFFP
NAG Parallel Library Routine Document

Note: before using this routine, please read the Users' Note for your implementation to check for implementation-dependent details. You are advised to enclose any calls to NAG Parallel Library routines between calls to Z01AAFP and Z01ABFP.

1 Description

Z01CFFP computes the number of rows of a row block distributed matrix owned by a given processor. This utility routine is useful, for example, in the routines of Chapter F01.

2 Specification

```
INTEGER FUNCTION Z01CFFP(P, M, I)
INTEGER                  P, M, I
```

3 Usage

3.1 Definitions

The following definitions are used in describing the data distribution within this document:

m_p	–	the number of rows in the Library Grid.
n_p	–	the number of columns in the Library Grid.
p	–	the total number of processors in the Library Grid.
p_d	–	the number of logical processors which hold rows of the matrix A
p_d	–	the number of logical processors which hold columns of the matrix A.
M_b	–	the blocking factor for the distribution of the rows of the matrix.
M_ℓ	–	the actual number of rows of the matrix A held locally on a logical processor where $0 \leq M_x \leq M_b$.
$\lceil x \rceil$	–	the ceiling function of x, which gives the smallest integer greater than or equal to x.

3.2 Global and Local Arguments

The global input (output) arguments must (will) have the same value on entry (on exit) to (from) the routine on each processor:

Global input arguments: P, M

The remaining arguments are local.

The return value of the function is M_ℓ.

3.3 Distribution Strategy

Rows of the matrix A are allocated to logical processors on the 2-d grid row by row (i.e., in the row major ordering of the grid) starting from the {0,0} logical processor. Each logical processor that contains rows of the matrix contains $M_b = \lceil m/p \rceil$ rows, except the last processor that actually contains data, for which the number of rows held may be less than M_b. This processor will contain $\mathrm{mod}(m, M_b)$ rows if $\mathrm{mod}(m, M_b) \neq 0$, and will contain M_b rows otherwise. Some logical processors may not contain any rows of the matrix if m is not large relative to p, but if $m > (p-1)^2$ then all processors will certainly contain rows of the matrix.

The number of logical processors that contain rows of the matrix is given by $p_d = \lceil n/M_b \rceil$.

4 Arguments

1: P — INTEGER *Global Input*

On entry: p, the number of processors.

2: M — INTEGER *Global Input*

On entry: m, the number of rows of the matrix A.

3: I — INTEGER *Local Input*

On entry: the identity of the local processor.

5 Errors and Warnings

Not applicable.

6 Further Comments

An example of the use of this routine is given in the example program for routine F01ZNFP, row block distribution of a two dimensional matrix.

7 References

None.

8 Example

None.