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program DGESV_ex
implicit none
!# Serial Declatations
integer, parameter :: N=8, NRHS=1, LDA=N, LDB=N, LDX=N , LWORK=3*N
integer           :: i,j,IPIV(N), INFO
double precision  :: a(N,N), a0(N,N), b(N), b0(N), X(LDX), WORK(LWORK)
data a/
-2.0,  1.0,  0.0,  0.0,  0.0,  0.0,  0.0,  0.0, &
 1.0, -2.0,  1.0,  0.0,  0.0,  0.0,  0.0,  0.0, &
 0.0,  1.0, -2.0,  1.0,  0.0,  0.0,  0.0,  0.0, &
 0.0,  0.0,  1.0, -2.0,  1.0,  0.0,  0.0,  0.0, &
 0.0,  0.0,  0.0,  1.0, -2.0,  1.0,  0.0,  0.0, &
 0.0,  0.0,  0.0,  0.0,  1.0, -2.0,  1.0,  0.0, &
 0.0,  0.0,  0.0,  0.0,  0.0,  1.0, -2.0,  1.0, &
 0.0,  0.0,  0.0,  0.0,  0.0,  0.0,  1.0, -2.0 /
!# Parallel Declarations
integer :: NPROW=2, NPCOL=2, MB=N/2, NB=N/2, MXLLDA=N/2, MXLLDB=N/2
integer :: IAM, NPROCS, ICTXT, MYROW, MYCOL, DESCA(9), DESCB(9)
integer :: NBRHS=1, RSRC=0, CSRC=0, IRWRIT=0, ICWRIT=0
double precision :: asub(N/2,N/2), asub0(N/2,N/2), bsub(N/2), Xsub(LDX/2)
!# Setting up (serial) A and B
a =transpose(a)
do i=1,N
  b(i) = dble(i)
enddo
a0=a ; b0=b ; X=B
!# Parallel Setup and Calculations
CALL BLACS_PINFO( IAM, NPROCS )
CALL BLACS_GET( -1, 0, ICTXT )
CALL BLACS_GRIDINIT( ICTXT, 'Row-major', NPROW, NPCOL )
CALL BLACS_GRIDINFO( ICTXT, NPROW, NPCOL, MYROW, MYCOL )
write(*,*) "I am ", IAM, " of ", NPROCS, " and ", MYROW, MYCOL

if(iam==0) then
  call DGESV( N, NRHS, A, LDA, IPIV, X, LDB, INFO )
  do i=1,N
    write(*,"(8(1x,F6.2),3x,'|',F6.2,'|'=',F6.2)") (a0(i,j),j=1,N),x(i),b(i)
  end do
endif

if (myrow==0 .and. mycol==0) then ; asub(:,:) = a0(1:4,1:4) ; bsub(:)=b(1:4)
elseif(myrow==0 .and. mycol==1) then ; asub(:,:) = a0(1:4,5:8)
elseif(myrow==1 .and. mycol==0) then ; asub(:,:) = a0(5:8,1:4) ; bsub(:)=b(5:8)
elseif(myrow==1 .and. mycol==1) then ; asub(:,:) = a0(5:8,5:8)
endif
asub0 = asub

CALL DESCINIT( DESCA, N, N, MB, NB, RSRC, CSRC, ICTXT, MXLLDA, INFO )
CALL DESCINIT( DESCB, N, NRHS, MB, NBRHS, RSRC, CSRC, ICTXT, MXLLDB, INFO )
CALL PDGESV ( N, NRHS, Asub, 1, 1, DESCA, IPIV, Bsub, 1, 1, DESCB, INFO )
CALL PDLAWRITE( "Xvec.dat", N, 1, Bsub, 1, 1, DESCB, IRWRIT, ICWRIT, WORK )

CALL BLACS_GRIDEXIT( ICTXT )
CALL BLACS_EXIT( 0 )

stop
end

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