

2d data decomposition

parametric description

global number of grid points
nx,ny,nz

decomposition of coordinates across processors

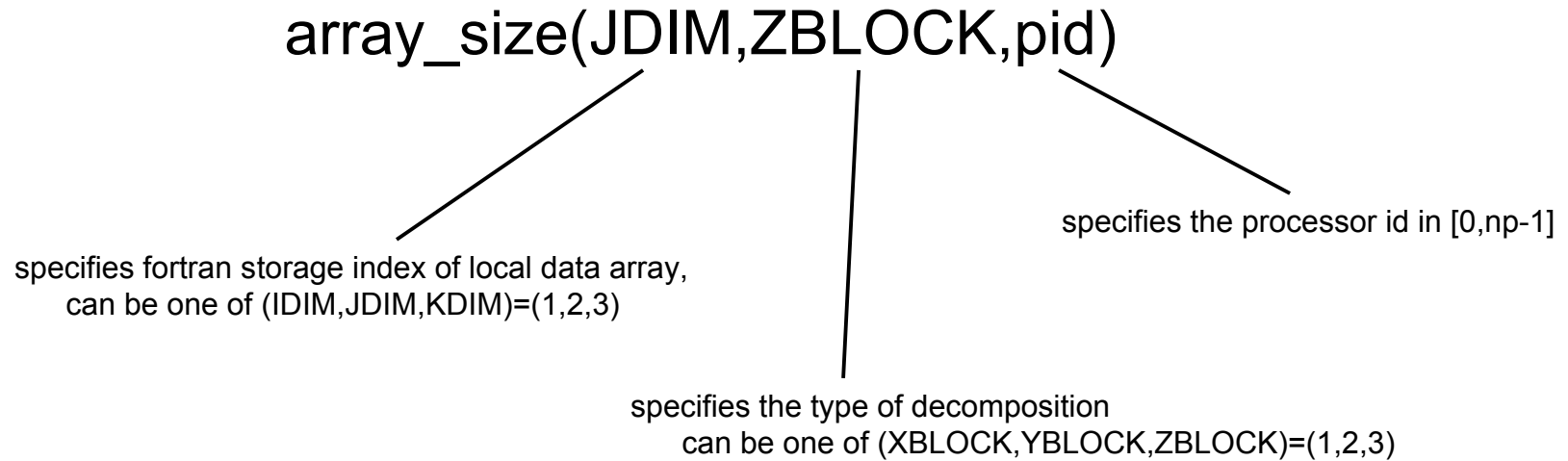
layout(:,XBLOCK) = (/1,p1,p2/) ==> y coordinate split by p1, z coordinate by p2
layout(:,YBLOCK) = (/p1,1,p2/) ==> x coordinate split by p1, z coordinate by p2
layout(:,ZBLOCK) = (/p1,p2,1/) ==> x coordinate split by p1, y coordinate by p2

assignment of coordinates in local data arrays

mem_order(:,XBLOCK) = (XCOORD,YCOORD,ZCOORD) (i,j,k) <==> (x,y,z)
mem_order(:,YBLOCK) = (YCOORD,XCOORD,ZCOORD) (i,j,k) <==> (y,x,z) (HOME)
mem_order(:,ZBLOCK) = (ZCOORD,XCOORD,YCOORD) (i,j,k) <==> (z,x,y)

2d data decomposition

parametric description



`array_size(JDIM,ZBLOCK,pid)` gives the number of elements in the second fortran array dimension for a local data array `f(:, :, :)` stored on processor `pid` in ZBLOCK format.

2d data decomposition

parametric description

`global_x_indices(START,YBLOCK,pid)`

specifies first or last global index,
can be one of (START,END)=(1,2)

specifies the processor id in $[0, np-1]$

specifies the type of decomposition
can be one of (XBLOCK,YBLOCK,ZBLOCK)=(1,2,3)

`global_x_indices(:,YBLOCK,pid)` gives the first and last logical, global x indices corresponding to the subset of the x coordinate dimension for a local data array `f(:, :, :)` stored on processor `pid` in YBLOCK format. The arrays `global_y_indices` and `global_z_indices` are also initialized in `src/decomposition2d.f90`.

XBLOCK example:

$(nx, ny, nz) = (512, 256, 129)$
 $(np, p1, p2) = (8, 2, 4)$

mem_order=(xcoord,ycoord,zcoord)

layout=(1,p1,p2)

y, 2nd storage index,
p1, processor row

x, 1st storage index

ROW

<p>pid=1</p> <p>f(512,128,32) (i,j,k)<==>(x,y,z)</p> <p>logical x indices 1:512 logical y indices 129:256 logical z indices 1:32</p>	<p>pid=3</p> <p>f(512,128,32) (i,j,k)<==>(x,y,z)</p> <p>logical x indices 1:512 logical y indices 129:256 logical z indices 33:64</p>	<p>pid=5</p> <p>f(512,128,32) (i,j,k)<==>(x,y,z)</p> <p>logical x indices 1:512 logical y indices 129:256 logical z indices 65:96</p>	<p>pid=7</p> <p>f(512,128,33) (i,j,k)<==>(x,y,z)</p> <p>logical x indices 1:512 logical y indices 129:256 logical z indices 97:129</p>
<p>pid=0</p> <p>f(512,128,32) (i,j,k)<==>(x,y,z)</p> <p>logical x indices 1:512 logical y indices 1:128 logical z indices 1:32</p>	<p>pid=2</p> <p>f(512,128,32) (i,j,k)<==>(x,y,z)</p> <p>logical x indices 1:512 logical y indices 1:128 logical z indices 33:64</p>	<p>pid=4</p> <p>f(512,128,32) (i,j,k)<==>(x,y,z)</p> <p>logical x indices 1:512 logical y indices 1:128 logical z indices 65:96</p>	<p>pid=6</p> <p>f(512,128,33) (i,j,k)<==>(x,y,z)</p> <p>logical x indices 1:512 logical y indices 1:128 logical z indices 97:129</p>

COL

z, 3rd storage index,
p2, processor column

YBLOCK example:

$(nx, ny, nz) = (512, 256, 129)$
 $(np, p1, p2) = (8, 2, 4)$

mem_order=(ycoord,xcoord,zcoord)

layout=(p1,1,p2)

x, 2nd storage index,
p1, processor row

y, 1st storage index

ROW

<p>pid=1</p> <p>f(256,256,32) (i,j,k)<==>(y,x,z)</p> <p>logical x indices 257:512 logical y indices 1:256 logical z indices 1:32</p>	<p>pid=3</p> <p>f(256,256,32) (i,j,k)<==>(y,x,z)</p> <p>logical x indices 257:512 logical y indices 1:256 logical z indices 33:64</p>	<p>pid=5</p> <p>f(256,256,32) (i,j,k)<==>(y,x,z)</p> <p>logical x indices 257:512 logical y indices 1:256 logical z indices 65:96</p>	<p>pid=7</p> <p>f(256,256,33) (i,j,k)<==>(y,x,z)</p> <p>logical x indices 257:512 logical y indices 1:256 logical z indices 97:129</p>
<p>pid=0</p> <p>f(256,256,32) (i,j,k)<==>(y,x,z)</p> <p>logical x indices 1:256 logical y indices 1:256 logical z indices 1:32</p>	<p>pid=2</p> <p>f(256,256,32) (i,j,k)<==>(y,x,z)</p> <p>logical x indices 1:256 logical y indices 1:256 logical z indices 33:64</p>	<p>pid=4</p> <p>f(256,256,32) (i,j,k)<==>(y,x,z)</p> <p>logical x indices 1:256 logical y indices 1:256 logical z indices 65:96</p>	<p>pid=6</p> <p>f(256,256,33) (i,j,k)<==>(y,x,z)</p> <p>logical x indices 1:256 logical y indices 1:256 logical z indices 97:129</p>

COL

z, 3rd storage index,
p2, processor column

ZBLOCK example:

$(nx, ny, nz) = (512, 256, 129)$
 $(np, p1, p2) = (8, 2, 4)$

mem_order=(zcoord,xcoord,ycoord)

layout=(p1,p2,1)

x, 2nd storage index,
p1, processor row

z, 1st storage index

ROW

<p>pid=1</p> <p>f(129,256,64) (i,j,k) <==>(z,x,y)</p> <p>logical x indices 257:512</p> <p>logical y indices 1:64</p> <p>logical z indices 1:129</p>	<p>pid=3</p> <p>f(129, 256,64) (i,j,k) <==>(z,x,y)</p> <p>logical x indices 257:512</p> <p>logical y indices 65:128</p> <p>logical z indices 1:129</p>	<p>pid=5</p> <p>f(129, 256,64) (i,j,k) <==>(z,x,y)</p> <p>logical x indices 257:512</p> <p>logical y indices 129:192</p> <p>logical z indices 1:129</p>	<p>pid=7</p> <p>f(129, 256,64) (i,j,k) <==>(z,x,y)</p> <p>logical x indices 257:512</p> <p>logical y indices 193:256</p> <p>logical z indices 1:129</p>
<p>pid=0</p> <p>f(129, 256,64) (i,j,k) <==>(z,x,y)</p> <p>logical x indices 1:256</p> <p>logical y indices 1:64</p> <p>logical z indices 1:129</p>	<p>pid=2</p> <p>f(129, 256,64) (i,j,k) <==>(z,x,y)</p> <p>logical x indices 1:256</p> <p>logical y indices 65:128</p> <p>logical z indices 1:129</p>	<p>pid=4</p> <p>f(129, 256,64) (i,j,k) <==>(z,x,y)</p> <p>logical x indices 1:256</p> <p>logical y indices 129:192</p> <p>logical z indices 1:129</p>	<p>pid=6</p> <p>f(129, 256,64) (i,j,k) <==>(z,x,y)</p> <p>logical x indices 1:256</p> <p>logical y indices 193:256</p> <p>logical z indices 1:129</p>

COL

y, 3rd storage index,
p2, processor col