

Yung Chi Lin

A20364639.

Problem 1.

real a(5,5) b(5,5) c(5,5) d(5).

$$a = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 3 & 4 & 5 \end{bmatrix} \quad b = \begin{bmatrix} 10 & 10 & 10 & 10 & 10 \\ 20 & 20 & 20 & 20 & 20 \\ 30 & 30 & 30 & 30 & 30 \\ 40 & 40 & 40 & 40 & 40 \\ 50 & 50 & 50 & 50 & 50 \end{bmatrix} \quad c = \begin{bmatrix} 10 & 1 & 1 & 1 & 1 \\ 2 & 20 & 2 & 2 & 2 \\ 3 & 3 & 30 & 3 & 3 \\ 4 & 4 & 4 & 40 & 4 \\ 5 & 5 & 5 & 5 & 50 \end{bmatrix} \quad d = [-1, -2, -3, -4, -5]$$

(a.) $a(2,:) = d$.

$$a = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ -1 & -2 & -3 & -4 & -5 \\ 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 3 & 4 & 5 \end{bmatrix}$$

(b.) $a(1:3,:) = b(2:4,:)$

$$a = \begin{bmatrix} 20 & 20 & 20 & 20 & 20 \\ 30 & 30 & 30 & 30 & 30 \\ 40 & 40 & 40 & 40 & 40 \\ 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 3 & 4 & 5 \end{bmatrix}$$

(c.) where (b.eq.c) $a = c$.

$$a = \begin{bmatrix} 10 & 2 & 3 & 4 & 5 \\ 1 & 20 & 3 & 4 & 5 \\ 1 & 2 & 30 & 4 & 5 \\ 1 & 2 & 3 & 40 & 5 \\ 1 & 2 & 3 & 4 & 50 \end{bmatrix}$$

(d.) forall (i=2:4, j=2:5).

$a(i,j) = b(i-1, j-1) + c(i+1, j)$.

$$a = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & 13 & 40 & 13 & 13 \\ 1 & 24 & 24 & 60 & 24 \\ 1 & 35 & 35 & 35 & 80 \\ 1 & 2 & 3 & 4 & 5 \end{bmatrix}$$

(e.) forall (i=1:5, j=1:5)

$b(i,j) = (i+j-1)$

$$b = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \\ 5 & 6 & 7 & 8 & 9 \end{bmatrix}$$

(f.) forall (j=1:5).

$d(j) = \text{sum}(c(1:4, j), \text{dim}=1)$

$$c = \begin{bmatrix} 10 \\ 2 \\ 3 \\ 4 \\ 5 \end{bmatrix} \quad d = [19, 28, 37, 46, 10]$$

(g.) $a = \text{spread}(d, \text{dim}=2, \text{ncopies}=5)$

$$a = \begin{bmatrix} -1 & -1 & -1 & -1 & -1 \\ -2 & -2 & -2 & -2 & -2 \\ -3 & -3 & -3 & -3 & -3 \\ -4 & -4 & -4 & -4 & -4 \\ -5 & -5 & -5 & -5 & -5 \end{bmatrix}$$

(h.) $b = \text{spread}(d, \text{dim}=1, \text{ncopies}=5)$

$$b = \begin{bmatrix} -1 & -2 & -3 & -4 & -5 \\ -1 & -2 & -3 & -4 & -5 \\ -1 & -2 & -3 & -4 & -5 \\ -1 & -2 & -3 & -4 & -5 \\ -1 & -2 & -3 & -4 & -5 \end{bmatrix}$$

(i.) $a = c \text{shift}(b, \text{dim}=1, \text{shift}=3)$

$$a = \begin{bmatrix} 40 & 40 & 40 & 40 & 40 \\ 50 & 50 & 50 & 50 & 50 \\ 10 & 10 & 10 & 10 & 10 \\ 20 & 20 & 20 & 20 & 20 \\ 30 & 30 & 30 & 30 & 30 \end{bmatrix}$$

(j.) $d = \text{sum}(\text{spread}(d, \text{dim}=1, \text{ncopies}=5), \text{dim}=2)$

$$\text{temp} = \begin{bmatrix} -1 & -2 & -3 & -4 & -5 \\ -1 & -2 & -3 & -4 & -5 \\ -1 & -2 & -3 & -4 & -5 \\ -1 & -2 & -3 & -4 & -5 \\ -1 & -2 & -3 & -4 & -5 \end{bmatrix}$$

$$d = [-15, -15, -15, -15, -15]$$

Problem 2.

(a.)

DO I=1, 100.

DO J=1, 100

$a(I, J) = 0$.

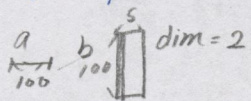
(b.)

forall (I=1:100, J=1:100).

$b(I, J) = a(J, I)$.

(c).

$b = \text{spread}(a, \text{dim} = 2, \text{ncopies} = 5).$



(d) $b = a$ move left 2, down 1 ! +2 left. -1 down

$b = \text{cshift}(a, \text{shift} = 2, \text{dim} = 2).$

$b = \text{cshift}(b, \text{shift} = -1, \text{dim} = 1).$

(e) $a(8)$ assign to $b(4)$

Do ($I = 1:4$).

$b(I) = a(I * 2)$

ENDDO.

Problem 3:

(a.) !HPF\$ PROCESSOR PR(4).

!HPF\$ DISTRIBUTE $a(\text{Block}(5))$ onto PR

(b.) !HPF\$ PROCESSOR PR(4).

!HPF\$ ALIGN $a(:, :)$ with $b(*, :)$.

!HPF\$ DISTRIBUTE $b(*, \text{Block})$ onto PR.

Problem 4:

real muti

20 !paralleize the loop.

FORALL (norm = 1:n-1)

FORALL (row = norm+1:n, col = norm:n)

muti = $A(\text{row}, \text{norm}) / A(\text{norm}, \text{norm})$.

$A(\text{row}, \text{col}) = A(\text{row}, \text{col}) - A(\text{norm}, \text{col}) * \text{muti}$.

$B(\text{row}) = B(\text{row}) - B(\text{norm}) * \text{muti}$.

ENDFORALL

ENDFORALL.