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CS2210



J

0 1 2 3 4 5

0

1

2

i 3

4

5

6

1. Distance vector: (-1, 1), every dependence is drawn on the iteration space.

c. If we exchange i and j, we will iterate the matrix by column. Then we cannot guarantee that in every dependence, the source is accessed before the target, meaning that the source and target are not in the correct lexicographical order. And thus the permutation is not legal. The resulting distance vector will still be [-1, 1].

d. The only type of dependence is flow (true) dependence.



Loop boundaries:

1 <= i -> -i <= -1

i <= n -> i <= n

i+1 <= j -> i-j <= -1

j <= m -> j <= m

Permutation:

A: [-1 0; 1 0; 1 -1; 0 1]

b: [1; n; -1; m]

[u;v] <= [0 1;1 0] \* [i; j]

A \* [0 1;1 0] \* [u;v] <= b

[0 -1; 0 1; 1 -1; 1 0] \* [u;v] <= b

New bounds:

1 <= v <= min(u-1, n)

2 <= u <= m

b.

do u = 2, m

do v = 1, min(u-1, n)

A(u,v) = A(u-1,v-2)+1

end do

end do

The distance vector is [1;2]

The transformation is legal, all dependence sources are read before the targets.