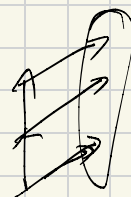


(a) for $i=1$ to 100 do:
 for $j=1$ to 100 do:

$H(i, j) = \dots$
 end for
 end for



(更可使用列向量)

$$\begin{aligned} k_1 &= 2i + j \\ k_2 &= j \end{aligned}$$

$$L^T \begin{pmatrix} i \\ j \end{pmatrix} = \begin{pmatrix} k_1 \\ k_2 \end{pmatrix}$$

因此依赖向量为 $L^T \begin{pmatrix} 1 \\ -1 \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$ $L^T \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$

内层循环不携带依赖, 可并行

(b) $L^T \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = L^T = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$ 内层可并行.

$$k_1 = i + j + k$$

$$k_2 = j$$

$$k_3 = i$$

$$\therefore 1 \leq k_1 - k_2 - k_3 \leq 100$$

$$1 \leq k_2 \leq 100$$

$$1 \leq k_3 \leq 100$$

\Rightarrow 消去 k_2

$$1 \leq k_3$$

$$k_3 \leq 100$$

$$\Rightarrow \max(1, k_1 - k_2 - 100) \leq k_3 \leq \min(k_1 - k_2, 100)$$

$$k_1 - k_2 - 100 \leq k_3 \leq k_1 - k_2 - 1$$

$$\Rightarrow \begin{cases} k_1 - k_2 - 100 \leq 100 \\ 1 \leq k_1 - k_2 - 1 \end{cases} \Rightarrow \max(1, k_1 - 200) \leq k_2 \leq \min(k_1 - 2, 100)$$

$$1 \leq k_2 \leq 100$$

$$\Rightarrow \begin{cases} k_1 - 200 \leq 100 \\ 1 \leq k_1 - 2 \end{cases} \Rightarrow 3 \leq k_1 \leq 300$$

六、变换后的循环：

for $k_1 = 3$ to 300 do:

for $k_2 = \max(1, k_1 - 200)$ to $\min(k_1 - 2, 100)$ do:

for $k_3 = \max(1, k_1 - k_2 - 100)$ to $\min(100, k_1 - k_2 - 1)$ do:

$H'(k_1, k_2, k_3)$:

endfor
endfor
endfor