

Estructuras de datos
2024-06-11

Matrices esparcidas

¡ Buenos días !

$$T(N) = \cancel{T(\text{asig})} + T(\text{for}_x) + \cancel{T(\text{ret})} = 2t + \cancel{T(\text{ini}_x)} + v_x (\cancel{T(\text{cond}_x)} + T(\text{ cuerpo}_x) + \cancel{T(\text{fin}_x)})$$

$$= \cancel{2t} + \cancel{t} + v_x (2t + \cancel{T(\text{asig})} + T(\text{for}_y) + \cancel{T(\text{asig})})$$

$$= 3t + v_x (4t + \cancel{T(\text{ini}_y)} + v_y (\cancel{T(\text{cond}_y)} + T(\text{ cuerpo}_y) + \cancel{T(\text{fin}_y)}))$$

$$= 3t + v_x (5t + v_y (3t)) = 3t + 5v_x t + 3v_x v_y t$$

$$v_x = ? = K$$

$$v_y = ? = K-1$$

$$= 3t + 5Kt + 3K(K-1)t = 3t + 5Kt + 3K^2t - 3Kt$$

$$T(N) = 3 + 2K + 3K^2$$

$$\Rightarrow O(N) = O(3 + 2K + 3K^2)$$

* R. suma

$$= \max(O(3), O(2K), O(3K^2)) = O(3K^2)$$

* R. constantes

$$O(N) = K^2$$

constante #

$$\Rightarrow O(N) = K$$

$$\begin{aligned}
 \text{Loc}(A[i_1, i_2, \dots, i_k]) &= \alpha + \xrightarrow{\hspace{10em}} \\
 &\quad (i_1 - n_1) (m_2 - n_2 + 1) (m_3 - n_3 + 1) \dots (m_{k-1} - n_{k-1} + 1) (m_k - n_k + 1) \\
 &\quad + (i_2 - n_2) \quad \xrightarrow{\hspace{10em}} \\
 &\quad + \vdots \quad \xrightarrow{\hspace{10em}} \\
 &\quad + (i_{k-1} - n_{k-1}) \quad \xrightarrow{\hspace{10em}} \\
 &\quad + (i_k - n_k) \quad (1)
 \end{aligned}$$

The diagram illustrates the calculation of the memory location of an element in a multi-dimensional array. The main expression on the left shows the accumulation of offsets from a base address α . The terms are grouped by vertical arrows pointing to the right, indicating that each term contributes to the final result. The final term, $(i_k - n_k) (1)$, is circled in green. On the right, the components of the product terms are shown separately, with horizontal arrows indicating their contribution to the overall product. The term $(m_k - n_k + 1)$ is circled in green.

$$\begin{aligned}
T(N) &= \cancel{T(\text{asig})} + \cancel{T(\text{asig})} + T(\text{for}_x) + \cancel{T(\text{ret})} \\
&= 3t + \cancel{T(\text{init}_x)} + v_x (T(\text{cond}_x) + T(\text{ cuerpo}_x) + \cancel{T(\text{fin}_x)}) \\
&= 4t + v_x (2t + \cancel{T(\text{asig})} + \cancel{T(\text{asig})}) = 4t + v_x 4t \\
v_x &= K-1
\end{aligned}$$

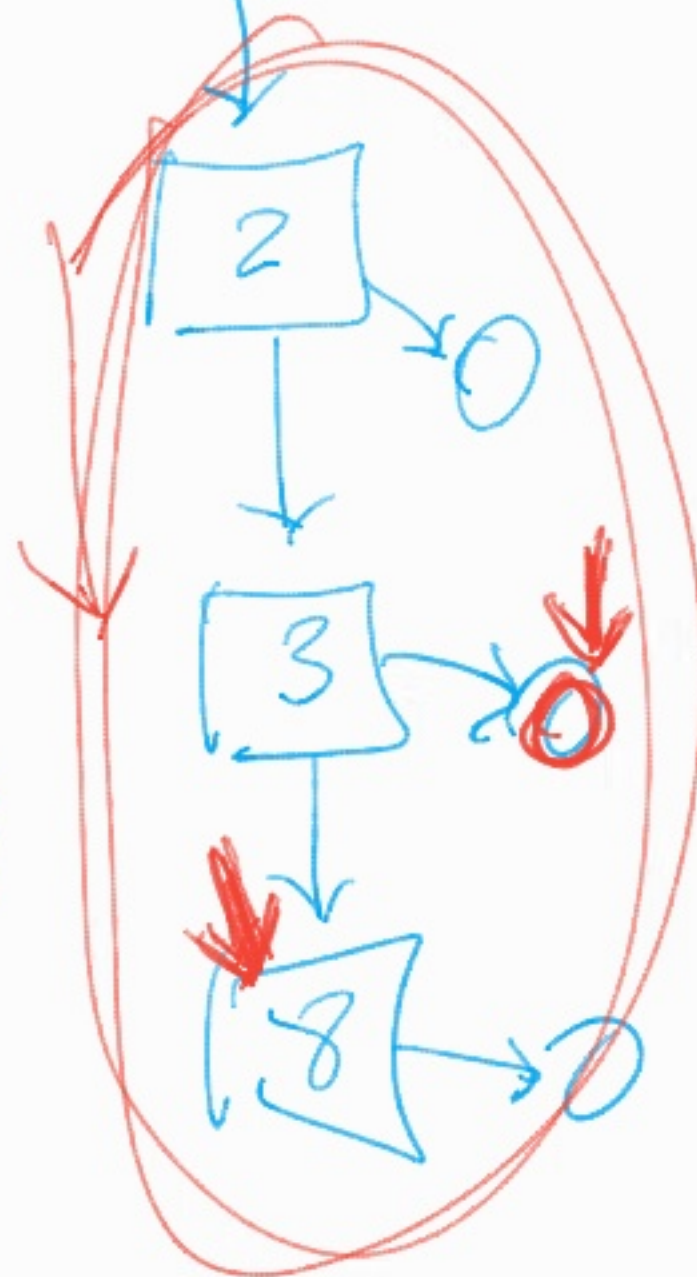
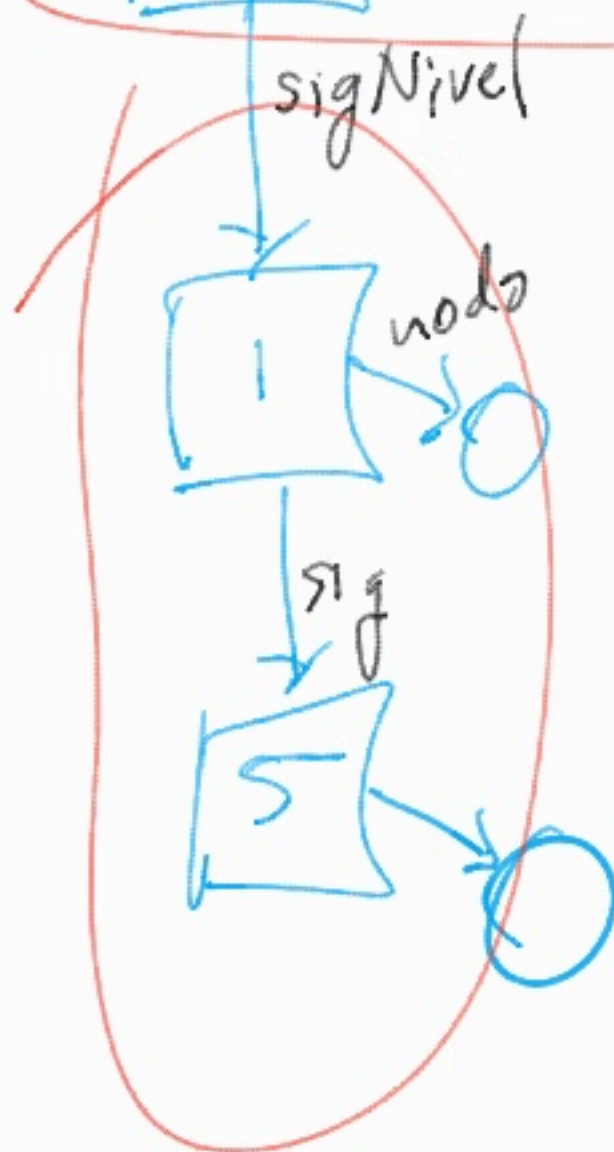
$$\Rightarrow T(N) = 4t + (K-1)4t = \cancel{3t} + 4Kt - \cancel{4t} = 4Kt$$

$$O(4K) = K \neq$$

initial



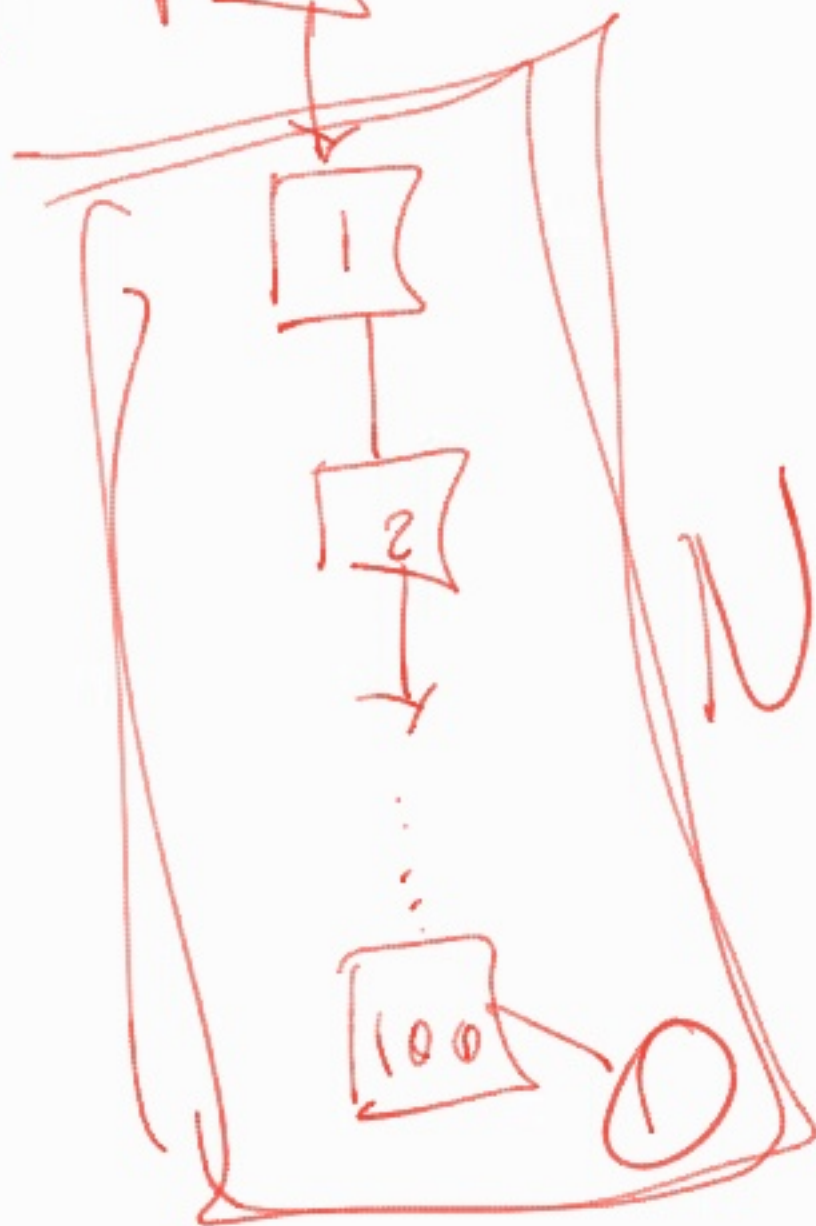
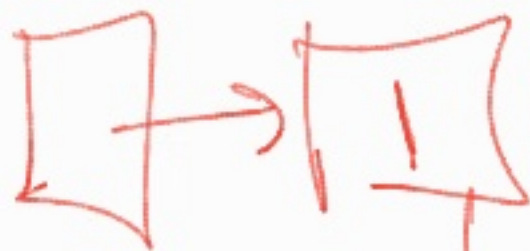
$[3, 3]$
 $\uparrow \quad \uparrow$
 $i[0] \quad i[1]$



$[3, 4]$

N/C

$[1..1 \neq 1..100]$



$[1, 100]$

$$\begin{aligned}
T(N) &= T(\text{sig}) + T(\text{for}) + T(\text{sig}) + T(\text{ret}) = 3t + T(\text{ini}) + V(T(\text{cond}) + T(\text{loop}) + T(\text{fin})) \\
&= 4t + V(2t + T(\text{sig}) + T(\text{while}) + T(\text{if})) \\
&= 4t + V(3t + V_w(T(\text{cond}_w) + T(\text{loop}_w))) + T(\text{cond}_{if}) + \max(T(t), T(e)) \\
&= 3t + V(3t + 4V_w t)
\end{aligned}$$

$$T(N) = 3 + 3V + 4V V_w$$

$$V = k$$

$$V_w = N/c$$

$$\Rightarrow T(N) = 3 + 3k + 4kN$$

$$\boxed{\Theta(N) = kN/c}$$

sublinear.