

# Parallelismo: Prefixos em Paralelo

$\mathcal{K}_1, \dots, \mathcal{K}_n$

S

$$y_1 = \mathcal{K}_1$$

$$y_2 = \mathcal{K}_1 \times \mathcal{K}_2$$

$$y_{\dots} = \dots$$

$$y_n = \mathcal{K}_1 \times \dots \times \mathcal{K}_n$$

$O(n)$

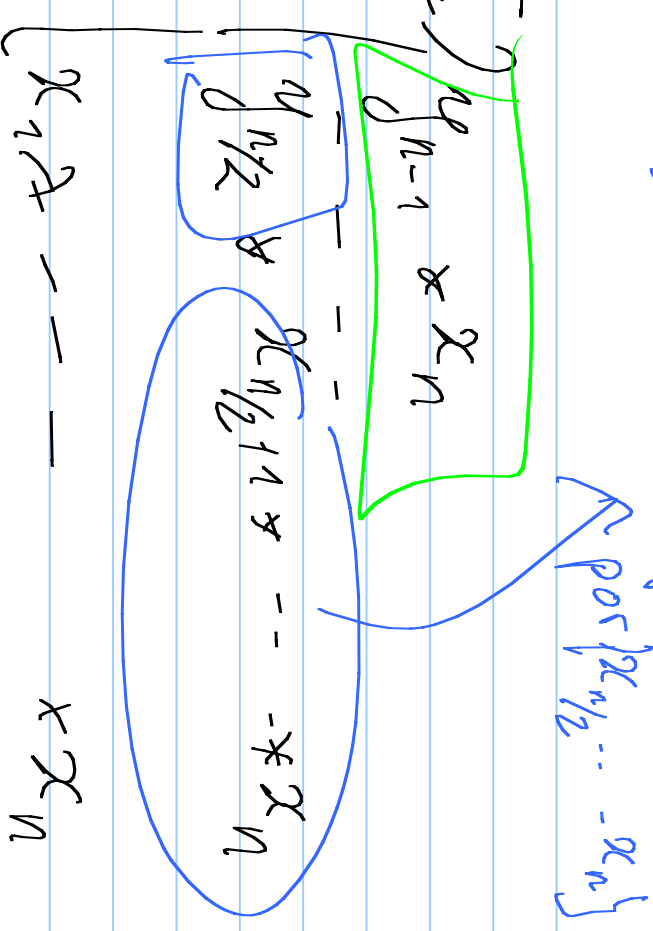
Sequencial.

# Algoritmo Paralelo 1

Solucion del problema

Observacion

$$g_n = g_{n-1} * x_n$$



Decomposicion del problema en dos partes:

Recursivamente calcular  $g_2, \dots, g_{n/2}$  con  $n/2$  procesadores

2  $g_{n/2+1}, x_{n/2} * x_{n/2+1}, \dots, x_{n/2} * \dots * x_n$

3  $x_n$  parallel multiplicar  $g_{n/2}$  por  $g_{n/2}$  con  $n/2$  procesadores

# Analysis

$$T(n) = T(n/2) + 1 \quad \in \mathcal{O}(\lg n)$$

$$W(n) = 2 * W(n/2) + n/2 \in$$

$$W(n) = n \lg n + \boxed{\quad} \quad (\text{Case Walker})$$

$$n \lg n \stackrel{?}{=} \sum_{i=0}^{\lg n} \frac{n}{2^i} + \boxed{\quad} + 1 \quad ?$$

$$W(n) \in \mathcal{O}(n \lg n) \quad n \lg n - n + 1 + \boxed{\quad}$$

# Algoritmo Paralelo 2

Division Par / impar  $\begin{matrix} 1 & 3 & 5 & 7 \\ \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \end{matrix}$

$$y_n = y_{n-1} * x_n$$

En paralelo, en la última etapa

$$y_{2i} = y_{2i-1} * x_{2i} \quad \text{en paralelo.}$$

En paralelo, en la etapa penúltima

$$y_{2i-1} = y_{2i-3} * x_{2i-1} * x_{2i-2}$$