Estructuras de datos

2024-06-07

A-1.1

Arreglos

¡Buenos días!

$T(1/3) = T(\emptyset)$

$(\lfloor 1/3 \rfloor) = T(\emptyset)$

tam(s)

strupr(char *s) = T(n)

BBin(int A[], int ini, int fin)

$\hookrightarrow [T(N)]$

$\hookrightarrow$ tam A[]

A-1.1

```
int fibonacci(int n) {
        if (n <=0 )
                return 0 ;
        else if (n ==1)
                return 1 ;
        else
                return fibonacci(n-1) + fibonacci(n-2) ;
}
```

cond₁ ret₁ cond₂ ret₂ ret₃

$$T(N) = \begin{cases} n=0: T(cond_1) + T(ret_1) = t + t = 2t \\ n=1: T(cond_1) + T(cond_2) + T(ret_2) = 3t \\ n>1: \cancel{T(cond_1)} + \cancel{T(cond_2)} + \cancel{T(ret_3)} + T(N-1) + T(N-2) = 3t + T(N-1) + T(N-2) \end{cases}$$

$T($

$$T(N) = 3t + \underline{T(N-1)} + \underline{T(N-2)}$$

$$= 3t + \boxed{3t + T(N-2) + T(N-3)} + [3t + T(N-3) + T(N-4)] = 3(3t) + T(N-2) + 2T(N-3) + T(N-4)$$

$[3t + T($

$$= 3\cdot 3t + [3t + \cancel{T(N-3)} + \cancel{T(N-4)}] + 2[3t + \cancel{T(N-4)} + \cancel{T(N-5)}] + [3t + \cancel{T(N-5)} + \cancel{T(N-6)}] = 7\cdot 3t + T(N-3) + 2T(N-4) + 2T(N-5) + T(N-6)$$

$\nexists$ patrón

Si $T(N-1) > T(N-2)$

$$\Rightarrow T(N-1) + T(N-1) > T(N-1) + T(N-2)$$

$$\Rightarrow O(T(N-1) + T(N-1)) \equiv \Theta(T(N-1) + T(N-2))$$

$$T(N) = 3t + T(N-1) + T(N-1) = 3t + 2T(N-1) \qquad (1)$$

$$= 3t + 2\left[3t + 2T(N-2)\right] = (1+2)3t + 2^2 T(N-2) \qquad (2)$$

$$= (1+2)3t + 2^2\left[3t + 2T(N-3)\right] = (1+2+2^2)3t + 2^3 T(N-3) \qquad (3)$$

$$= (1+2+2^2)3t + 2^3\left[3t + 2T(N-3)\right] = (1+2+2^2+2^3)3t + 2^4 T(N-4) \qquad (4)$$

$$= (2^0+2^1+2^2+\dots+2^{K-1})3t + 2^K T(N-K) \qquad (K)$$

Si $T(0) = 2t$

$$N - K = 0 \Rightarrow N = K$$

$$T(N) = (2^0+2^1+2^2+\dots+2^{N-1})3t + 2^N + \cancel{T(N-N)}\ 2t$$

$$T(N) = 3(2^0+2^1+2^2+\dots+2^{N-1}) + 2^{N+1}$$

$$T(N) = 3\left(2^0 + 2^1 + 2^2 + \ldots + 2^{N-1}\right) + 2^{N+1}$$

$$O(T(N)) = O(N) = O\left(3\left(2^0 + 2^1 + 2^2 + \ldots + 2^{N-1}\right) + 2^{N+1}\right)$$

Regla de la suma

$$O(N) = \max\left(O\left(3\cdot 2^0\right), O\left(3\cdot 2^1\right), O\left(3\cdot 2^2\right), \ldots, O\left(3\cdot 2^{N-1}\right), O\left(2^{N+1}\right)\right)$$

$$= O\left(2^{N+1}\right) = O\left(2\cdot 2^N\right)$$

Regla de constantes

$O(N) = 2^N$ // exponencial.

Tipos de $O(N)$

$N \rightarrow$ lineal

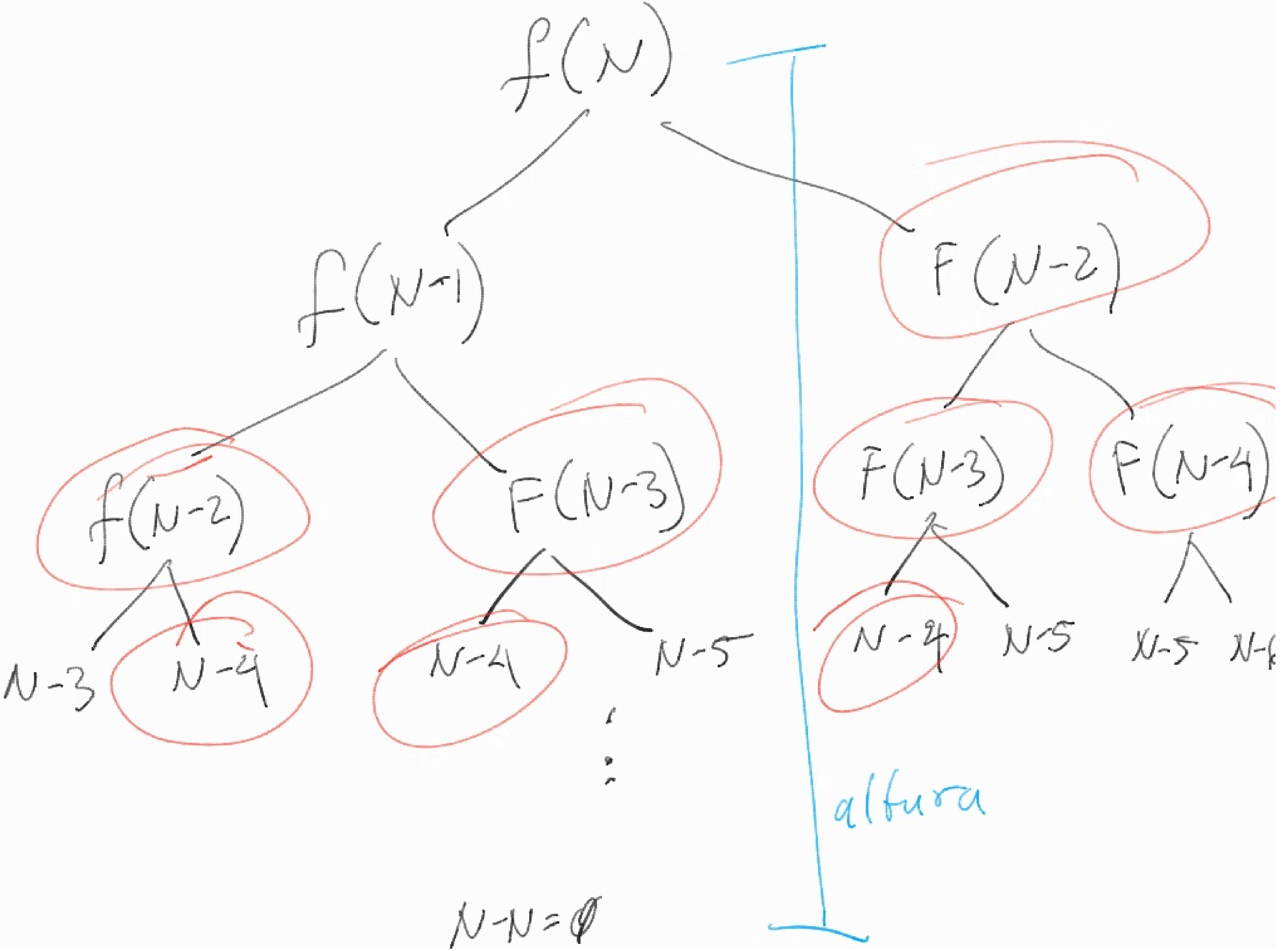
$N/c \rightarrow$ sublineal

$C^N \rightarrow$ exponencial

$N^c \rightarrow$ " / progresivos

$\log(N)$ logarítmicos

C constantes


f(N)
f(N-1)
F(N-2)
f(N-2)
F(N-3)
F(N-3)
F(N-4)
N-3
N-4
N-4
N-5
N-4
N-5
N-5
altura
N-N=Ø

$$
T(N) = \begin{cases} N=0: & T(cond) + T(asig) + T(ret) = 3t \\ N=1: & 4t \\ N>1: & T(cond) + T(cond) + T(asig) \\ & + T(N-1) + T(retur) \\ & = 4t + T(N-1) \end{cases}
$$

Pr-2.1

$i \leq j$

$\alpha \rightarrow$ A[1,1]			1
A[2,1]	A[2,2]		2
A[3,1]	A[3,2]	A[3,3]	3

$$Loc(A[i,j]) = \alpha + avanzoAFila(i) + avanzoACol(j)$$

$$tam\cancel{Filas *}(i-1)$$

A[1,1]	A[2,1]	A[2,2]	A[3,1]	A[3,2]	A[3,3]

$$= \alpha + TamFila(1) + TamFila(2) + \dots + TamFila(i-1) + (j-1)$$

$$= \alpha + 1 + 2 + \dots + (i-1) + (j-1)$$

$Loc(A[i,j])$

```
int loc(int i, int j){
// Loc(A[i,j]) = α + (1+2+3+...+(i-1)) + (j-1)
  int sum = 0;   int x=1;
  while( x <= i-1 ){
       sum += x ;
  }
  return alfa + sum + (j-1);
}
```

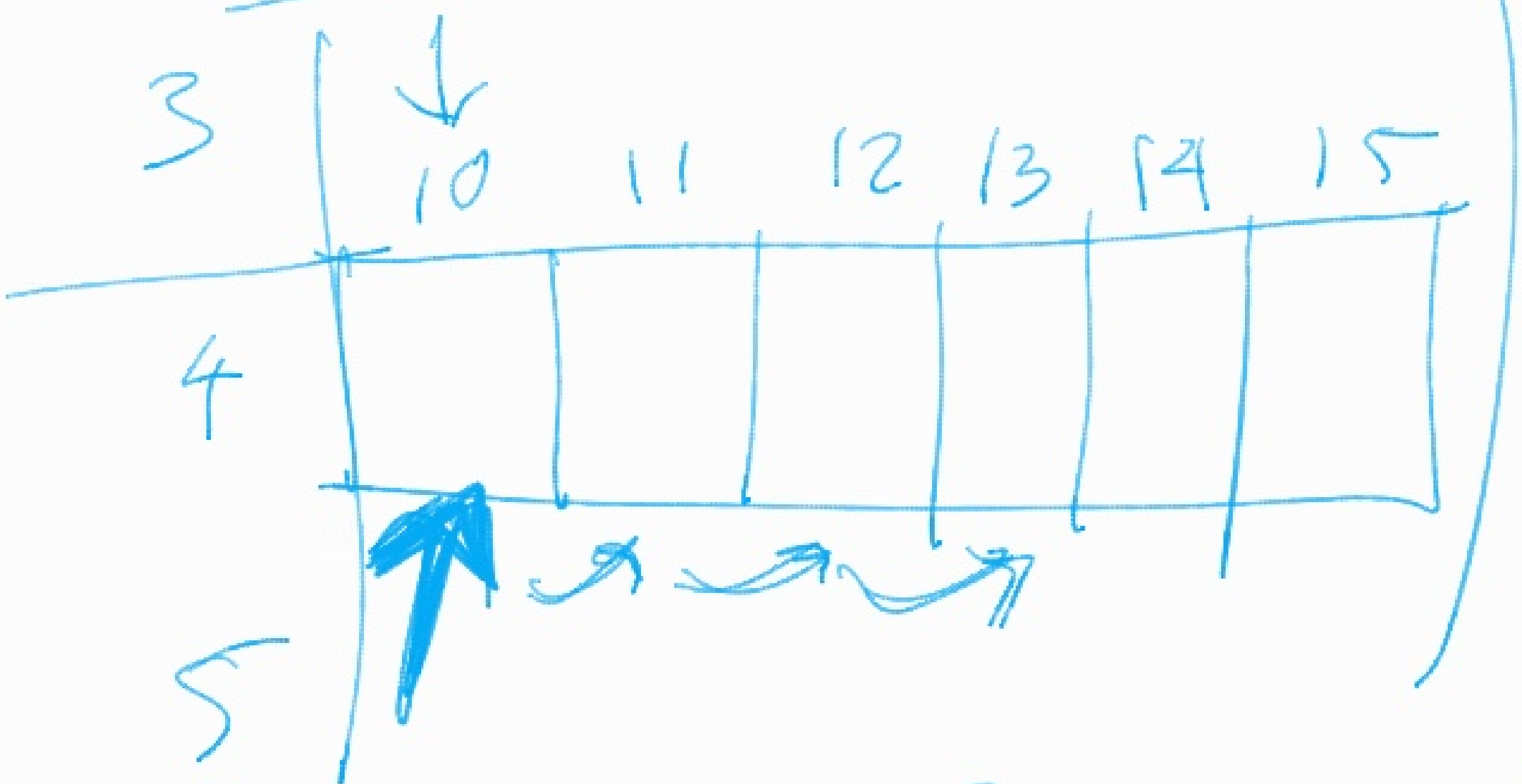
(i-1)*i/2

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$

$$\frac{(i-1)(i)}{2}$$

$\&A[1,1]$;

$$Loc(A[i,j]) = \alpha + \frac{(i-1)(i)}{2} + (j-1)$$



$[4, 13]$

$i \quad j$

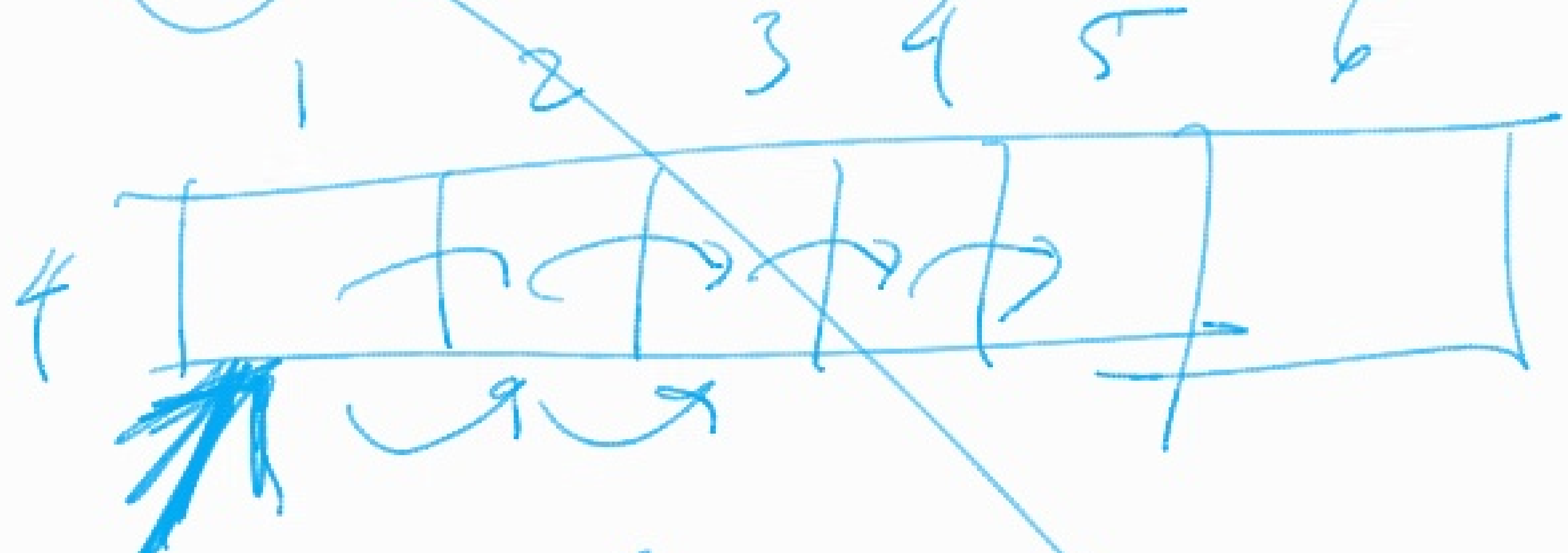
$f(13-1)$

$13-10$

$[4, 10]$

$(10-10)$

1 .. n



$\alpha + filas$

$A[4,3] = \alpha + filas + (3-1)$

$A[4,5] = (5-1)$

int vector[10];