

❖ FUNDAMENTALS OF DATA STRUCTURE

TWO-DIMENSIONAL ARRAY

Two ways to represent 2D Array

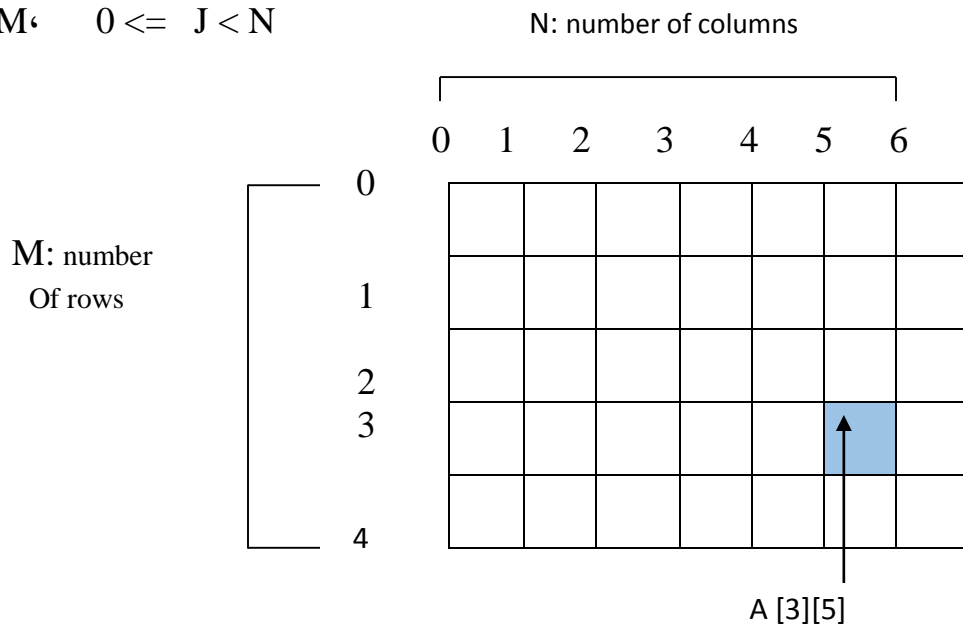
- Row Wise Method :(Row by Row)

-Column Wise Method :(Column by Column)

Let int A [M][N] we need two index I and J to arrive elements in the array

Where M= number of rows and N= number of columns

$$0 \leq I < M, \quad 0 \leq J < N$$



- **Row -Wise method**

$$\text{Location (aa [I][J])} = \text{base address} + [(N * I + j) * \text{size}]$$

Base address: is the starting address

N: is the number of columns

EX.: let A[6][8]; What is the address of the element A[4][6]? if the base address (BA=300), suppose that each element of the array requires a single unit of storage.

$$\begin{aligned}\text{Location (A [4][6])} &= \text{BA} + (4*8+6)*1 \\ &= 300 + 38*1 \\ &= 300 + 38 \\ &= 338\end{aligned}$$

- EX.: let int A[6][8]; What is the address of the element A[4][6]? if the base address (BA=300).

$$\begin{aligned}\text{Location (A [4][6])} &= \text{BA} + (4*8+6)*2 \\ &= 300 + 38*2 \\ &= 300 + 76 \\ &= 376\end{aligned}$$

- **Column -Wise method**

$$\text{Location (A[I][J])} = \text{Base Address} + [(M * J + I) * \text{size}]$$

M: is the number of Rows

EX.: let A [6][8]; What is the address of the element A[4][6]? if the base address (BA=300), suppose that each element of the array requires a single unit of storage.

$$\begin{aligned}\text{Location (A [4][6])} &= \text{BA} + (6*6+4)*1 \\ &= 300 + 40*1\end{aligned}$$

$$=300+40$$

$$=340$$

H.w.

- 1-Let int a [4][5]; How you can compute the address of the general element a[2][2] using Row-wise method?
- 2-Let float a [5][5]; How you can compute the address of the general element a[3][2] using Colum -wise method?
- 3- write program to compute Colum -wise method ?
- 4- write program to compute row -wise method ?