

06_Array_Location of Memory

1. Collection of data of same type in contiguous memory.
2. Random Access(Access any element with $O(1)$)

Location of Memory:

1) 1D Array

$$\text{Location} = \text{Base address} + (m - l) \times \text{size of each element of any Element (1D Array)}$$

eg)

Q

index	0	1	2	3	4	5	6	7									
arr	[2	,	4	,	6	,	7	,	9	,	12	,	20	,	27]

arr[6] = 20
↳ Random access

Base address = 1000
int = 2 Byte

Loc(arr[5]) = ??

$$1000 + (5 - 0) \times 2$$
$$1000 + 10 = 1010$$

2	→	1000
4	→	1002
6	→	1004
7	→	1006
9	→	1008
✓ 12	→	1010

2) 2D Array:

$$\left\{ \begin{array}{l} \text{Base address} + \\ \left[(\underline{i} - \underline{lb_r}) \times \underline{nc} + (\underline{j} - \underline{lb_c}) \right] \times \underline{\text{size}} \\ \text{of} \\ \text{each element} \end{array} \right.$$

eg)

4x5 a[i][j] in matrix = 2B

Loc(a[2][4]) = lb_r, lb_c

$$1000 + [(2 - 0) \times 5 + (4 - 0)] \times 2B$$

$$1000 + [(2 \times 5) + 4] \times 2B$$

$$1000 + (10 + 4) \times 2$$

$$1000 + (14 \times 2)$$