

$$\text{(3) } \text{Loc}[A[i][j]] = \text{base} + W[n(i - \text{LB}_R) + j - \text{LB}_C]$$

$$= 2100 + 4[6 \times 2 + 4]$$

$$= 2164$$

Jaypee University of Engineering and Technology

18B11CI311 – Data Structures

B.Tech -3rd Semester

Tutorial – 3

(Arrays)

$$\text{(1) } \text{Loc}(A(k)) = \text{base} + W(k - \text{LB})$$

$$= 200 + 2(10 - 3)$$

$$= 214$$

$$\text{(2) } \text{Loc}(A(h)) = 3000 + 4(13)$$

$$= 3052$$

1. Consider an array of 20 elements is stored in the memory of 40 bytes from 200 to 238. Assume array index starts from 3. Find out the address of 10th index element. **214**

2. Consider an array of 30 elements is stored in the memory of 120 bytes from 3000 to 3116. Find out the address of 13th index element. **3052**

3. Consider a 2D array A of 30 (5x6) elements is stored in the memory of 120 bytes from 2100 to 2216. Find out the address of A[2][4] element in row-major and column-major order. **2164** **2188**

2100 to 2210. Find out the address of $A[2][4]$ element in row-major and column-major order.

$$m = UBR - LBR + 1 = 7 + 3 + 1 = 11$$

$$n = UBC - LBC + 1 = 14 - 6 + 1 = 9$$

4. In a 2D (integer) array TD, assume that the row indices range from -3 to 7 and column indices range from 6 to 14. An element TD [-3, 6] stored at address 3220. Find out the dimension of TD and address of an element TD [2, 10], if TD stores the elements in column major order.

$m \times n$
 11×9

$$Loc[TD[2, 10]] = 3220 + 4[11(10 - 6) + 2 + 3] = 3416$$

5. Assume you have given an array $A[15][20]$. Each element needs 'W' bytes of storage. If the address of $A[6][8]$ is 4440 and the base address at $A[1][1]$ is 4000, find the width 'W' of each cell in the array A when the array is stored as Column Major Wise.

$$4440 = 4000 + W[15(8 - 1) + 6 - 1] \Rightarrow W = 4$$

6. Consider a 2D array $A[m][m]$, each element takes 4 bytes of storage. If the base address at $A[1][1]$ is 1500 and the address of $A[4][5]$ is 1608, determine the order of the matrix when it is stored in Column Major Wise.

$$1608 = 1500 + 4[m * [5 - 1] + 4 - 1] \Rightarrow m = 6$$

7. Represent following matrix as triplet form (3-tuple form) using array. Also calculate the amount of memory that can be saved or wasted. Assume each element occupies 4 bytes in memory.

when it is stored in Column Major Wise.

7. Represent following matrix as triplet form (3-tuple form) using array. Also calculate the amount of memory that can be saved or wasted. Assume each element occupies 4 bytes in memory.

$$(k+1) \times 3$$

$$m = 6$$

$$n = 6$$

$$k = 8$$

$$(k+1) \times 3 < m \times n$$

$$(8+1) \times 3 < 6 \times 6$$

$$27 < 36$$

$$36 \times 4 = 144 \text{ B}$$

$$27 \times 4 = 108 \text{ B}$$

$$36 \text{ B}$$

$$9 \times 3$$

15	0	0	22	0	-15
0	11	3	0	0	0
0	0	0	-6	0	0
0	0	0	0	0	0
91	0	0	0	0	0
0	0	28	0	0	0

6	6	8
1	1	15
1	4	22
1	6	-15
2	2	11
2	3	3
3	4	-6
5	1	91
6	3	28