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Subject & Section: CC4, INTL A

CC4-INTL Data Structures and Algorithms

LECTURE ACTIVITY 1: ARRAY ADDRESS CALCULATIONS

Instructions: From our previous lecture, please calculate the addresses for the given arrays using the **Row Major System** for the star symbol (*) and the **Column Major System** for the circle symbol (●).

1. **B = 158**
w = 27

$i^* = 1$
 $i_{\bullet} = 2$

$j^* = 1$
 $j_{\bullet} = 4$

$c = 6$
 $r = 3$

	★				
				●	

Row Major System(*):

$$A[i][j] = \text{baseAddress} + w(i * c + j)$$

$$A[1][1] = 158 + 27(1 * 6 + 1)$$

$$A[1][1] = 158 + 27(6 + 1)$$

$$A[1][1] = 158 + 27(7)$$

$$A[1][1] = 158 + 189$$

$$\underline{A[1][1] = 347}$$

Column Major System(●):

$$A[i][j] = \text{baseAddress} + w(i + r * j)$$

$$A[2][4] = 158 + 27(2 + 3 * 4)$$

$$A[2][4] = 158 + 27(2 + 12)$$

$$A[2][4] = 158 + 27(14)$$

$$A[2][4] = 158 + 378$$

$$\underline{A[2][4] = 536}$$

2. **B = 379**
w = 57

$i^* = 2$
 $i_{\bullet} = 1$

$j^* = 0$
 $j_{\bullet} = 3$

$c = 4$
 $r = 4$

			●
★			

Row Major System(*):

$$A[i][j] = \text{baseAddress} + w(i * c + j)$$

$$A[2][0] = 379 + 57(2 * 4 + 0)$$

$$A[2][0] = 379 + 57(8 + 0)$$

$$A[2][0] = 379 + 57(8)$$

$$A[2][0] = 379 + 456$$

$$\underline{A[2][0] = 835}$$

Column Major System(●):

$$A[i][j] = \text{baseAddress} + w(i + r * j)$$

$$A[1][3] = 379 + 57(1 + 4 * 3)$$

$$A[1][3] = 379 + 57(1 + 12)$$

$$A[1][3] = 379 + 57(13)$$

$$A[1][3] = 379 + 741$$

$$\underline{A[1][3] = 1120}$$

3. B = 234**w = 17**

$i^* = 1$

$i_{\bullet} = 2$

$j^* = 4$

$j_{\bullet} = 1$

$c = 5$

$r = 4$

				★
	●			

Row Major System(*):

$$A[i][j] = \text{baseAddress} + w(i * c + j)$$

$$A[1][4] = 234 + 17(1 * 5 + 4)$$

$$A[1][4] = 234 + 17(5 + 4)$$

$$A[1][4] = 234 + 17(9)$$

$$A[1][4] = 234 + 153$$

$$\underline{A[1][4] = 387}$$

Column Major System(●):

$$A[i][j] = \text{baseAddress} + w(i + r * j)$$

$$A[2][1] = 234 + 17(2 + 4 * 1)$$

$$A[2][1] = 234 + 17(2 + 4)$$

$$A[2][1] = 234 + 17(6)$$

$$A[2][1] = 234 + 102$$

$$\underline{A[2][1] = 336}$$

4. B = 550**w = 29**

$i^* = 1$

$i_{\bullet} = 3$

$j^* = 3$

$j_{\bullet} = 2$

$c = 6$

$r = 4$

			★		
		●			

Row Major System(*):

$$A[i][j] = \text{baseAddress} + w(i * c + j)$$

$$A[1][3] = 550 + 29(1 * 6 + 3)$$

$$A[1][3] = 550 + 29(6 + 3)$$

$$A[1][3] = 550 + 29(9)$$

$$A[1][3] = 550 + 261$$

$$\underline{A[1][3] = 811}$$

Column Major System(●):

$$A[i][j] = \text{baseAddress} + w(i + r * j)$$

$$A[3][2] = 550 + 29(3 + 4 * 2)$$

$$A[3][2] = 550 + 29(3 + 8)$$

$$A[3][2] = 550 + 29(11)$$

$$A[3][2] = 550 + 319$$

$$\underline{A[3][2] = 869}$$

5. B = 1357**w = 16****i* = 2****i● = 1****j* = 3****j● = 1****c = 6****r = 3**

	●				
			★		

Row Major System(*):

$$A[i][j] = \text{baseAddress} + w(i * c + j)$$

$$A[2][3] = 1357 + 16(2 * 6 + 3)$$

$$A[2][3] = 1357 + 16(12 + 3)$$

$$A[2][3] = 1357 + 16(15)$$

$$A[2][3] = 1357 + 240$$

$$\underline{A[2][3] = 1597}$$

Column Major System(●):

$$A[i][j] = \text{baseAddress} + w(i + r * j)$$

$$A[1][1] = 1357 + 16(1 + 3 * 1)$$

$$A[1][1] = 1357 + 16(1 + 3)$$

$$A[1][1] = 1357 + 16(4)$$

$$A[1][1] = 1357 + 64$$

$$\underline{A[1][1] = 1421}$$