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 (•).

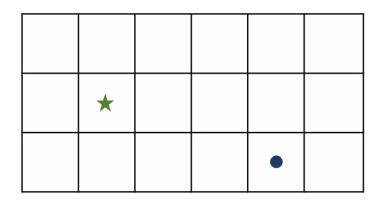
1.
$$B = 158$$

 $w = 27$

$$i^* = 1$$
$$i \bullet = 2$$

$$c = 6$$

 $r = 3$



Row Major System(*):

$$A[i][j] = baseAddress + w(i * c + j)$$

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

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

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

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

$$A[1][1] = 347$$

Column Major System(•):

$$A[i][j] = baseAddress + w(i + r * j)$$

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

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

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

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

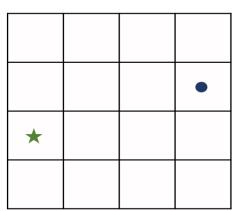
$$A[2][4] = 536$$

$$i^* = 2$$

$$j^* = 0$$

$$C = 4$$

$$r = 4$$



Row Major System(*):

$$A[i][j] = baseAddress + w(i * c + j)$$

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

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

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

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

$$A[2][0] = 835$$

Column Major System(•):

$$A[i][j] = baseAddress + w(i + r * j)$$

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

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

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

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

$$A[1][3] = 1120$$

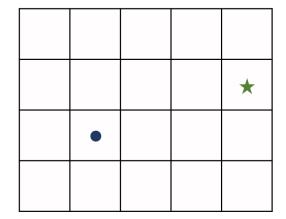
3.
$$B = 234$$

 $W = 17$

$$i^* = 1$$

$$c = 5$$

$$r = 4$$



Row Major System(*):

$$A[i][j] = baseAddress + w(i * c + j)$$

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

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

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

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

$$A[1][4] = 387$$

Column Major System(•):

$$A[i][j] = baseAddress + w(i + r * j)$$

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

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

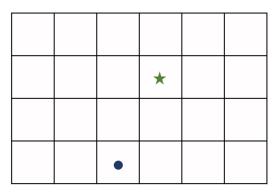
$$A[2][1] = 234 + 17(6)$$

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

$$A[2][1] = 336$$

$$w = 29$$
 i

$$C = 6$$



Row Major System(*):

$$A[i][j] = baseAddress + w(i * c + j)$$

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

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

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

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

$$A[1][3] = 811$$

Column Major System(•):

$$A[i][j] = baseAddress + w(i + r * j)$$

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

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

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

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

$$A[3][2] = 869$$

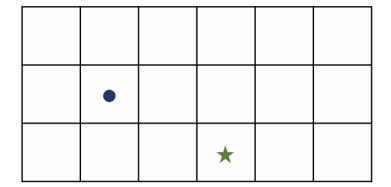
$$w = 16$$

$$i^* = 2$$

$$j^* = 3$$

$$C = 6$$

$$r = 3$$



Row Major System(*):

$$A[i][j] = baseAddress + w(i * c + j)$$

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

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

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

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

$$A[2][3] = 1597$$

Column Major System(•):

$$A[i][j] = baseAddress + w(i + r * j)$$

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

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

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

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

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

 $A[1][1] = 1421$