

Single Dimensional Array

Address Calculation in a Single Dimension Array:

Example 2: An Array A [-15-----64] is stored in computer memory whose base address is 459, word size is 2 byte.

a. How many numbers of elements are there?

Solution:

No of Elements = Size of Array

$$= U_b - L_b + 1$$

$$= 64 - (-15) + 1$$

$$= 64 + 15 + 1$$

$$= 80.$$

b. Total memory size?

Solution:

Total memory size = Size of Array * word size

$$= 80 * 2$$

$$= 160.$$

c. Find memory location of A [10].

Solution:

$$\text{Address of A [I]} = B + W * (I - L_b)$$

Here,

$$B = 459$$

$$W = 2 \text{ bytes}$$

$$I = 10$$

$$L_b = -15$$

$$\begin{aligned}
 \text{Address of } A[10] &= 459 + 2 * (10 - (-15)) \\
 &= 459 + 2 * (10 + 15) \\
 &= 459 + 2 * (25) \\
 &= 459 + 50 \\
 &= 509.
 \end{aligned}$$

d. Which element is located at memory address 589?

Solution:

$$\text{Address of } A[I] = B + W * (I - L_b)$$

Here, we find I.

$$589 = 459 + 2 * (I - (-15))$$

$$130 = (I + 15) * 2$$

$$65 = I + 15$$

$$I = 50.$$

Practice Question

1. Consider the linear array A[-10;10], B[1925:1990], C[25].

(a) Find the number of elements in each array

(b) Suppose base (A)=400 and word size (A)=2 words, find the addresses of A[-3], A[0], A[3]