1. Memory Representation of Arrays

Array allocate a memory location and each location's size is the size of the data type.

Suppose it is integer which is of 4 bytes and arrays byte is 5 then it holds 5 adjacent contiguous memory location with indexes.

In Single Dimensional Array:

4 bytes	4bytes	4bytes	4bytes	4bytes
elem = 1	elem = 2	elem = 3	elem = 4	<i>elem</i> = 5
0	1	2	3	4

$$arr[0] = 1$$

$$arr[1] = 2$$

$$arr[2] = 3$$

$$arr[3] = 4$$

$$arr[4] = 5$$

Here elements = 1, 2, 3, 4, 5 and index = 0, 1, 2, 3, 4. And each index is sized 4 bytes each = 20 bytes.

Two-Dimensional Array:

where ,row = 3 and column = 4.

elem = 1	elem = 2	elem = 3	elem = 4
[0][0]{4 bytes}	[0][1]{4 bytes}	[0][2]{4bytes}	[0][3]{4bytes}
elem = 5	elem = 6	elem = 7	elem = 8
[1][0]{4bytes}	[1][1]{4 bytes}	[1][2]{4 bytes}	[1][3]{4 bytes}
elem = 9	elem = 10	elem = 11	elem = 12
[2][0]{4 bytes}	[2][1]{4 bytes}	[2][2]{4 bytes}	[2][3]{4 bytes}

Hence Total Memory taken by the Array $= 4 \times 3 \times 4$ bytes = 48 bytes.

Three-Dimensional Array:

where $,page\ size=2,row=3\ and\ column=4.$

Page 1

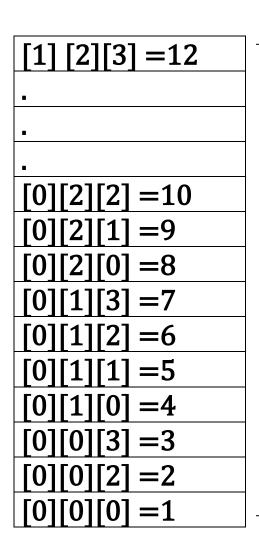
elem = 1 [0][0][0]{4 bytes}	elem = 2 [0][0][1]{4 bytes}	elem = 3 [0][0][2]{4bytes}	$elem = 4$ $[0][0][3]{4bytes}$
$elem = 5$ $[0][1][0]{4bytes}$	$elem = 6$ [0][1][1]{4 bytes}	elem = 7 [0][1][2]{4 bytes}	$elem = 8$ [0][1][3]{4 bytes}
elem = 9 [0][2][0]{4 bytes}	$elem = 10$ [0][2][1]{4 bytes}	$elem = 11$ [0][2][2]{4 bytes}	$elem = 12$ [0][2][3]{4 bytes}

Page 2

elem = 1 [1][0][0]{4 bytes}	elem = 2 [1][0][1]{4 bytes}	$elem = 3$ $[1][0][2]{4bytes}$	$elem = 4$ $[1][0][3]{4bytes}$
$elem = 5$ $[1][0]{4bytes}$	elem = 6 [1][1][1]{4 bytes}	$elem = 7$ [1][1][2]{4 bytes}	$elem = 8$ [1][1][3]{4 bytes}
elem = 9 [1][2][0]{4 bytes}	$elem = 10$ [1][2][1]{4 bytes}	$elem = 11$ [1][2][2]{4 bytes}	$elem = 12$ [1][2][3]{4 bytes}

Total memory it takes: $2 \times 3 \times 4 \times 4bytes = 96 \ bytes$.

Note: As it takes adjacent contiguous memory location it looks like this:



Contiguous

Memory

Location.