CS & IT ENGINEERING

Data Structures

Arrays in Data Structure

DPP 01 Discussion Notes

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01 Question

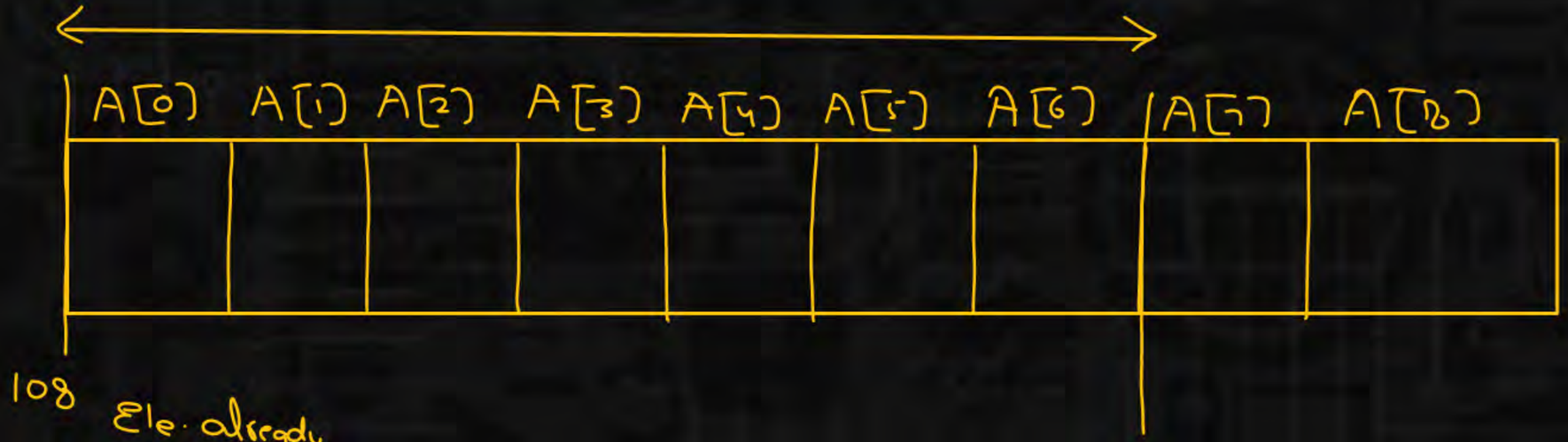
02 Discussion

Q.1

Consider a 1D array a with 9 elements. If the base address of the array is 108 and the size of each array element is 4 bytes, the address of a[7] is- 136

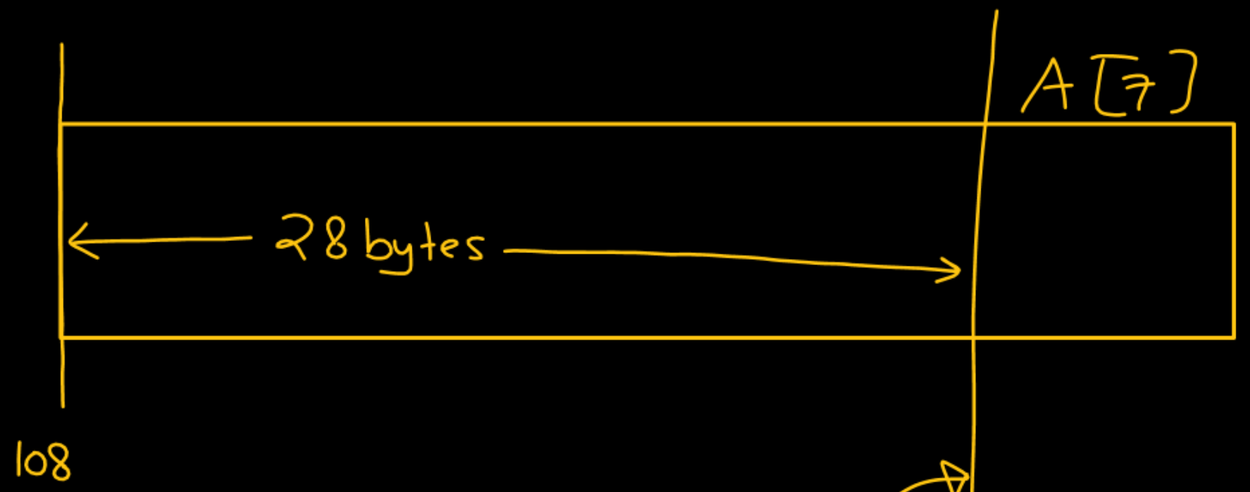
(Assume array index starts from 0)

[NAT]



Ele. already filled before A[7] = index from 0 to 6 = 6-0+1 = 7 elements

Memory already filled before A[7] = 7 x 4 byte = 28 bytes



Gdd(A[7]) = 108 + 28

= 136

Q.2 Consider a 1D array a[-127.....,+255] where -127 and +255 are the starting index and ending index of the array respectively. The number of elements in the array is 383. **[NAT]**

a[-127 .. +255]

-127 → Smallest

+255 → largest index

-127 to +255

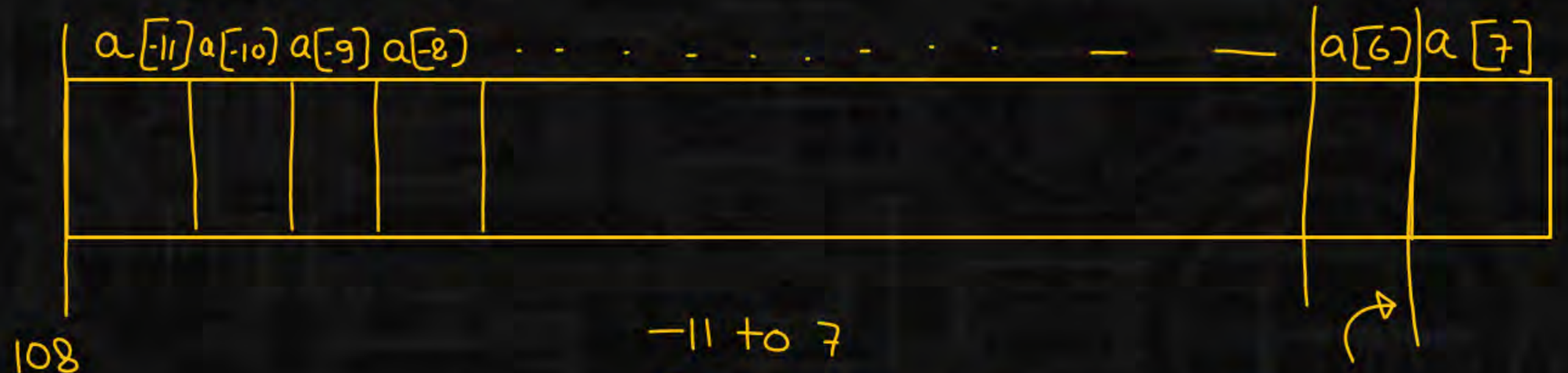
$= 255 - (-127) + 1$

$= 255 + 127 + 1$

$= 255 + 128$

$= 383$

Q.3 Consider a 1D array a with 19 elements. If the base address of the array is 108 and the size of each array element is 4 bytes, the address of a[7] is- (Assume array index starts from -11) 180 **[NAT]**

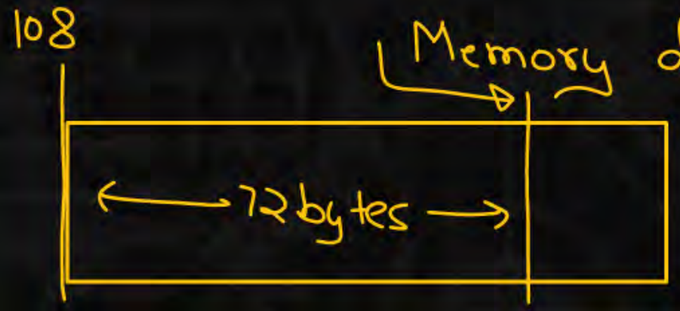


-11 to 7

$7-(-11)+1 = 7+11+1 = 19$

(1) No. of elements already filled before a[7] $\Rightarrow$ -11 to 6

$= 6-(-11)+1 = 18$ elements



$\Rightarrow 108+72 = 180$

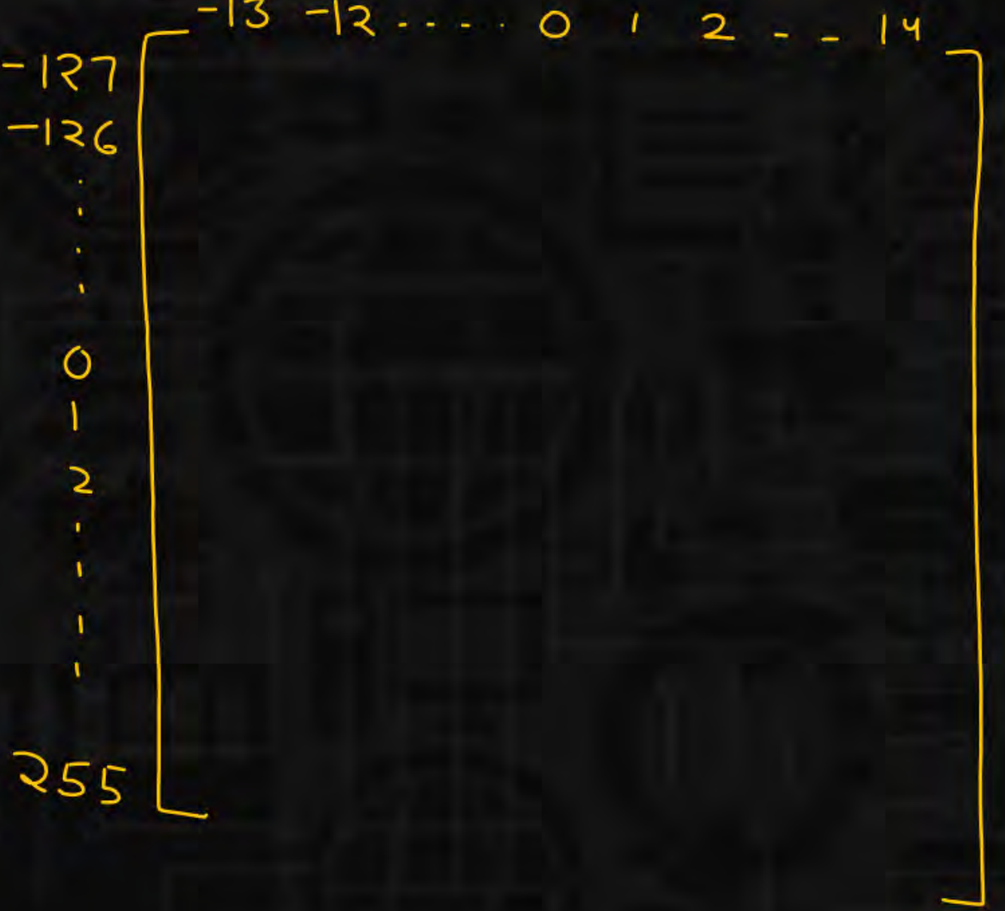
Q.4 Consider a 2D array a[-127 to +255][-13 to +14]. The number of elements in the array is _____. **[NAT]**

612
383
28
+
3064
766x
10724

No. of rows = -127 to 255
= 255 - (-127) + 1
= 255 + 127 + 1
= 255 + 128
= 383

No. of col = -13 to +14
= 14 - (-13) + 1
= 28

Total Elements = 383 × 28 = 10724



Q.5 Consider the natural numbers from 1 to 256 are stored in a 2D array arr[-28 to 3][-3 to 3]. Find the element present at location arr[-16][1]. (Suppose, the elements are stored in row-major order) 89 **[NAT]**

No. of rows = $3-(-28)+1 = 32$

No. of cols = $3-(-3)+1 = 7$

arr[-28 .. 3][-3 to 3]

7

Each index in this dim = 7 elem

$a_{-16,1}$

rows already filled = -28 to -17

$= -17-(-28)+1$

$= -17+29$

$= 12$ rows

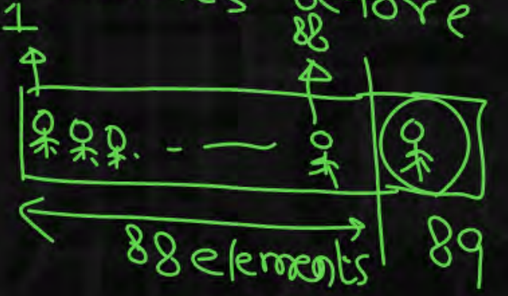
$12 \times 7 = 84$ elements

-3 to 0

$0-(-3)+1$

$= 4$

88 elements before



Q.6 Consider the natural numbers from 1 to 256 are stored in a 2D array arr[-28 to 3][-3 to 3]. Find the address of the location arr[-16][1] if the starting address of the array is 625 and size of each element is 4 bytes. (Suppose, the elements are stored in row-major order) **[NAT]**

977

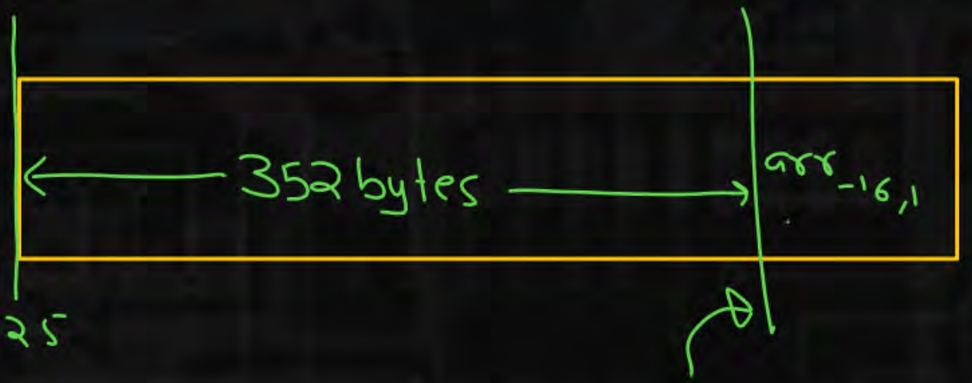
Total no. of elements already filled before arr[-16][1] = 88

Memory already filled before arr[-16][1] = 88 × 4 = 352 bytes

add(arr[-16][1])

= 625 + 352

= 977



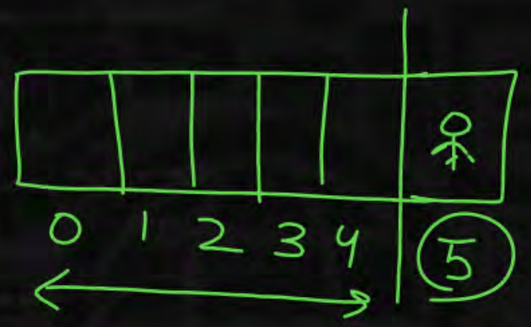
Q.7 Consider the whole numbers from 0 to 127 are stored in a 2D array arr[0 to 15][0 to 7]. Find the element present at location arr[6][4]. (Suppose, the elements are stored in column-major order) **[NAT]**

70

arr[0..15][0..7]

16 8

Each index = 16 ele.



arr 6, 4

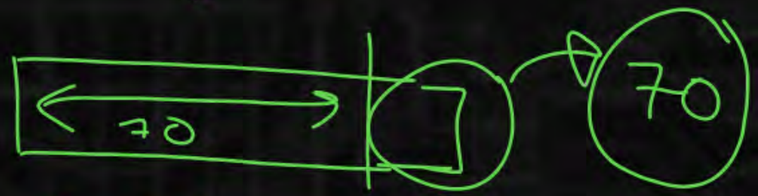
0 to 5

5 - 0 + 1

6

# of col. filled = 0 to 3 = 3 - 0 + 1 = 4 cols

4 × 16 = 64 elements



Total 70 elements are already filled before arr[6][4]

Q.8 Consider a 2D array arr[-15 to 15][-7 to 7]. Find the address of the location arr[-1][5] if the starting address of the array is 500 and size of each element is 4 bytes. (Suppose, the elements are stored in column-major order)

[NAT]

$$\begin{array}{r} 386 \\ \times\ 4 \\ \hline 1544 \end{array}$$

2044

arr[-15..15][-7..7]

31 15

1 col = 31 elements

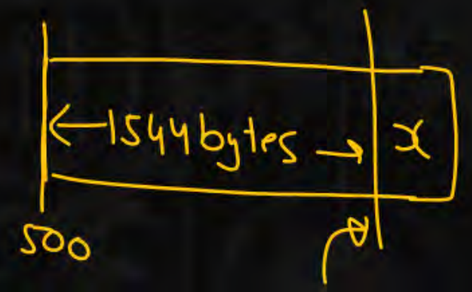
arr[-1][5]

Total ele = 372 + 14
= 386 ele.

Memory = 386 × 4
= 1544 bytes

-15 to -2
= -2 - (-15) + 1
= -2 + 16
= 14

cols ⇒ -7 to 4
= 4 - (-7) + 1
= 12 cols
= 12 × 31 elements
= 372 elements



500 + 1544 = 2044

THANK YOU GW
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