Insert Element at a given position in array – Mechanism

9. Shifting of Data in Array[Left Shift].

Static – Insert Element At Position In Array

```
size = size + 1;

for (int i = size - 1; i > pos; i--)
{
    a[i] = a[i - 1];
}

a[pos] = element;
```

Say size is : $\mathbf{5}$, ***and we have array*** , $a[0] = 1, a[1] = 2, a[2] = 3, a[3] = 4$, $a[4] = 5$ ***and we can view it physically***:

5	$0x5010$	$a[4]$ ***or*** $a + 4$
4	$0x500C$	$a[3]$ ***or*** $a + 3$
3	$0x5008$	$a[2]$ ***or*** $a + 2$
2	$0x5004$	$a[1]$ ***or*** $a + 1$
1	$0x5000$	$a[0]$ ***or*** $a + 0$

Say we want to insert : $\mathbf{10}$ ***at pos***: $\mathbf{2}$ ***i.e.*** $a[2] = 10$.

$\therefore \boldsymbol{size = size + 1 = 6}.$

$\boldsymbol{Hence\ there\ will\ be : a[0], a[1], a[2], a[3], a[4], a[5]}$

$\boldsymbol{and\ we\ need\ to\ insert\ at\ a[2]}.$

$\boldsymbol{i = size - 1 = 6 - 1 = 5\ \ and\ i = 5 > pos = 2\ :}$

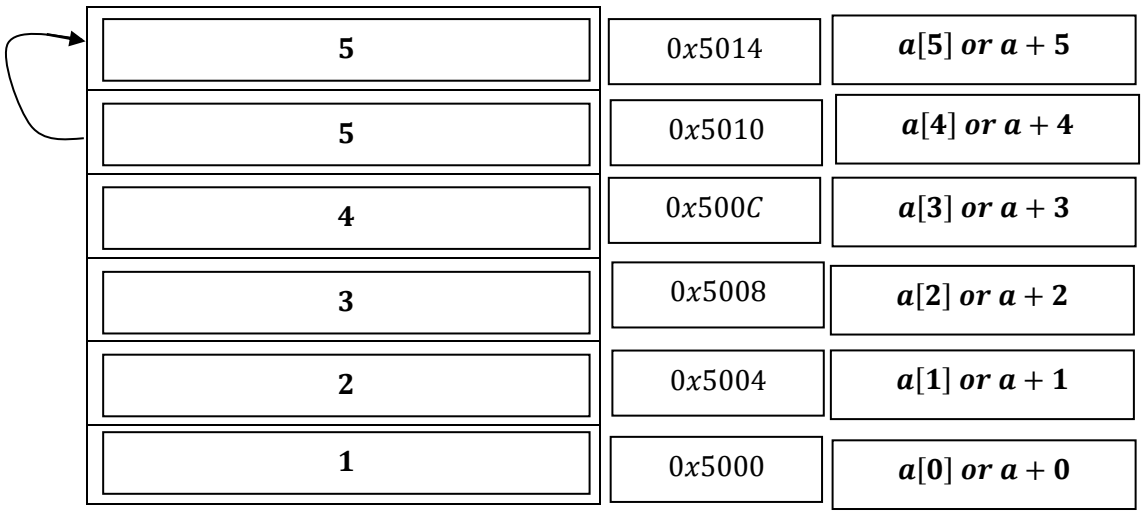
$\boldsymbol{a[5] = a[5 - 1 = 4] = 5}$

$\boldsymbol{a + 5 = 0x5000 + 5 \times 4\ bytes = 0x5000 + 20_{10} = 0x5000 + 14_{16} = 0x5014}$

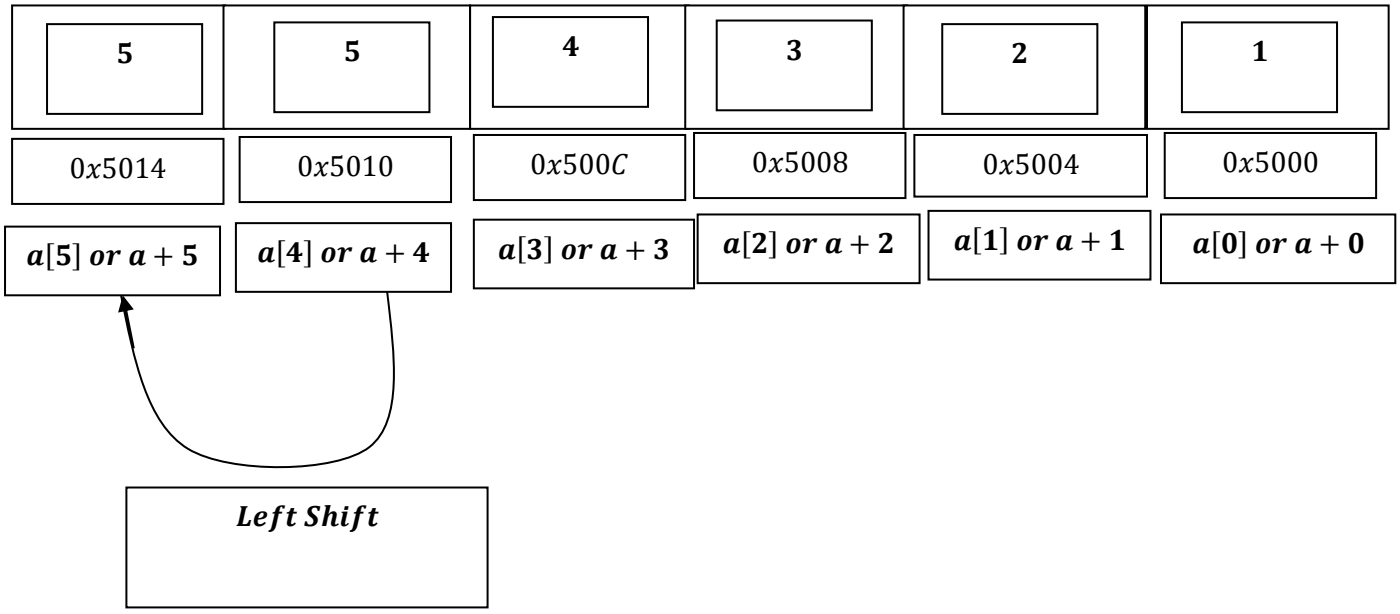
$=$

$\boldsymbol{a + 4 = 0x5000 + 4 \times 4\ bytes = 0x5000 + 16_{10} = 0x5000 + 10_{16} = 0x5010}$

$= \mathbf{5}$



If we view it in this way:



$\boldsymbol{i--\Rightarrow i = i - 1 \Rightarrow i = 5 - 1 = 4}$ [***Post Decrement***].

$\boldsymbol{i = 4}$ ***and*** $\boldsymbol{i = 4 > pos = 2}$:

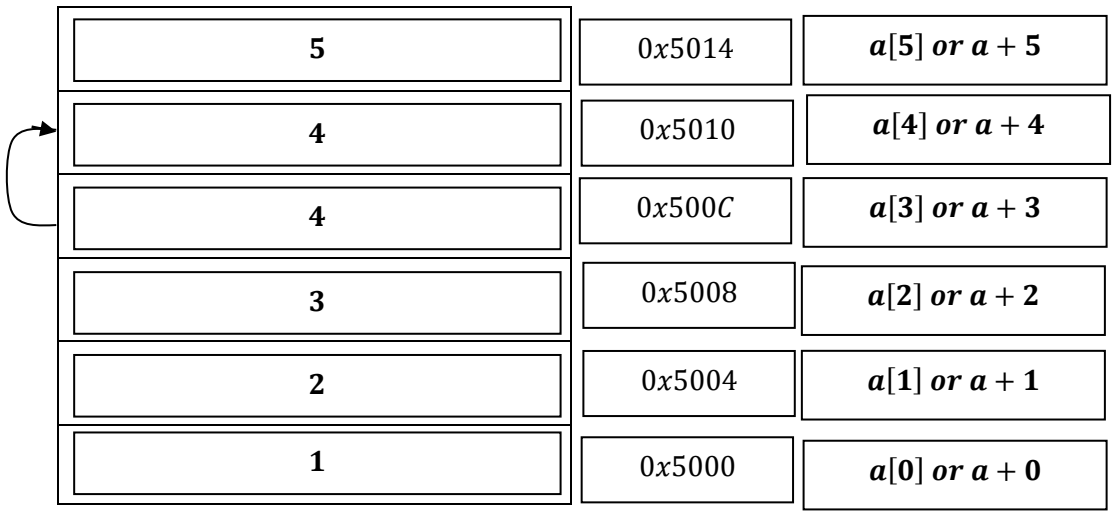
$\boldsymbol{a[4] = a[4 - 1 = 3] = 4}$

$\boldsymbol{a + 4 = 0x5000 + 4 \times 4\ bytes = 0x5000 + 16_{10} = 0x5000 + 10_{16} = 0x5010}$

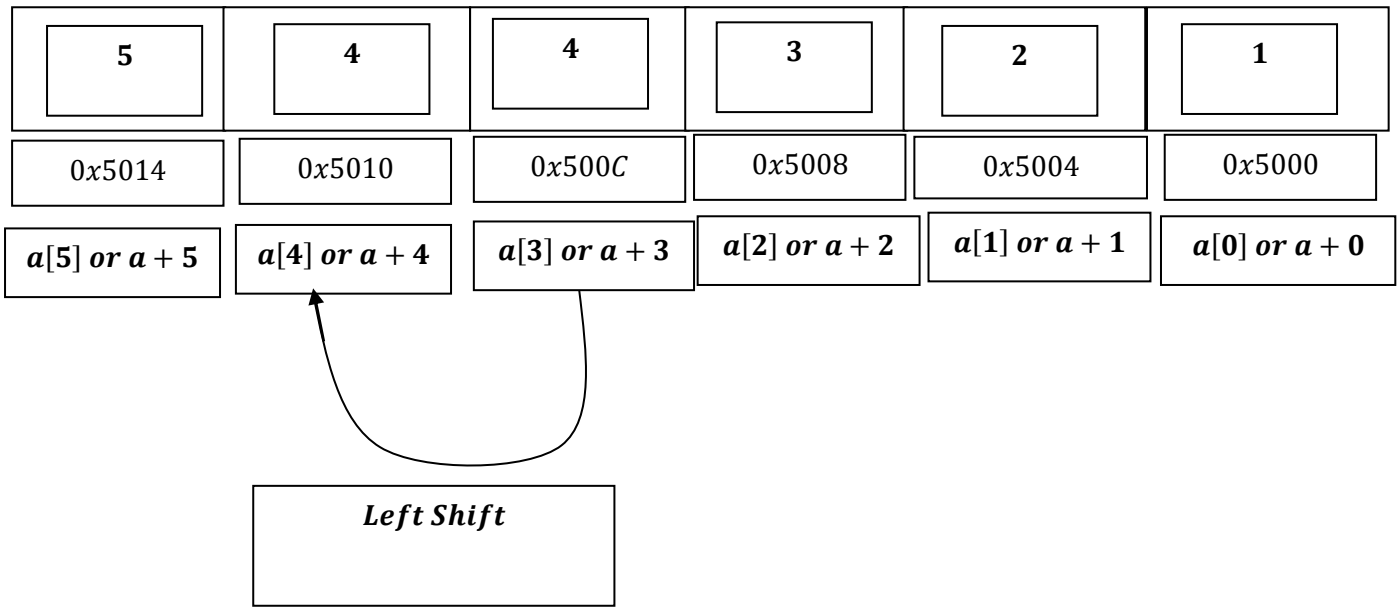
$=$

$\boldsymbol{a + 3 = 0x5000 + 3 \times 4\ bytes = 0x5000 + 12_{10} = 0x5000 + C_{16} = 0x500C}$

$\boldsymbol{= 4}$



If we view it in this way:



$i--\Rightarrow i = i - 1 \Rightarrow i = 4 - 1 = 3$ [***Post Decrement***].

$\boldsymbol{i = 3\ and\ i = 3 > pos = 2}$:

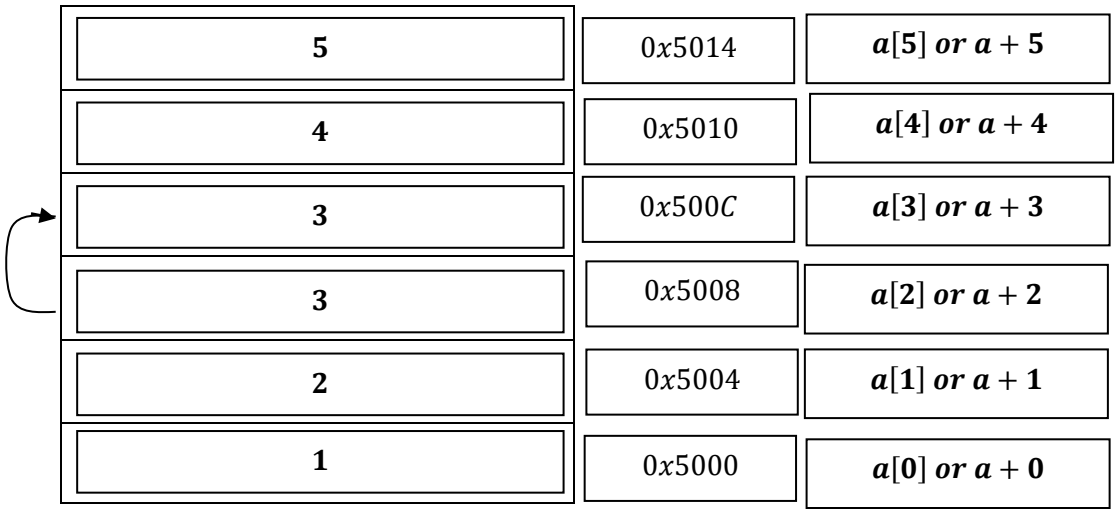
$\boldsymbol{a[3] = a[3 - 1 = 2] = 3}$

$\boldsymbol{a + 3 = 0x5000 + 3 \times 4\ bytes = 0x5000 + 12_{10} = 0x5000 + C_{16} = 0x500C}$

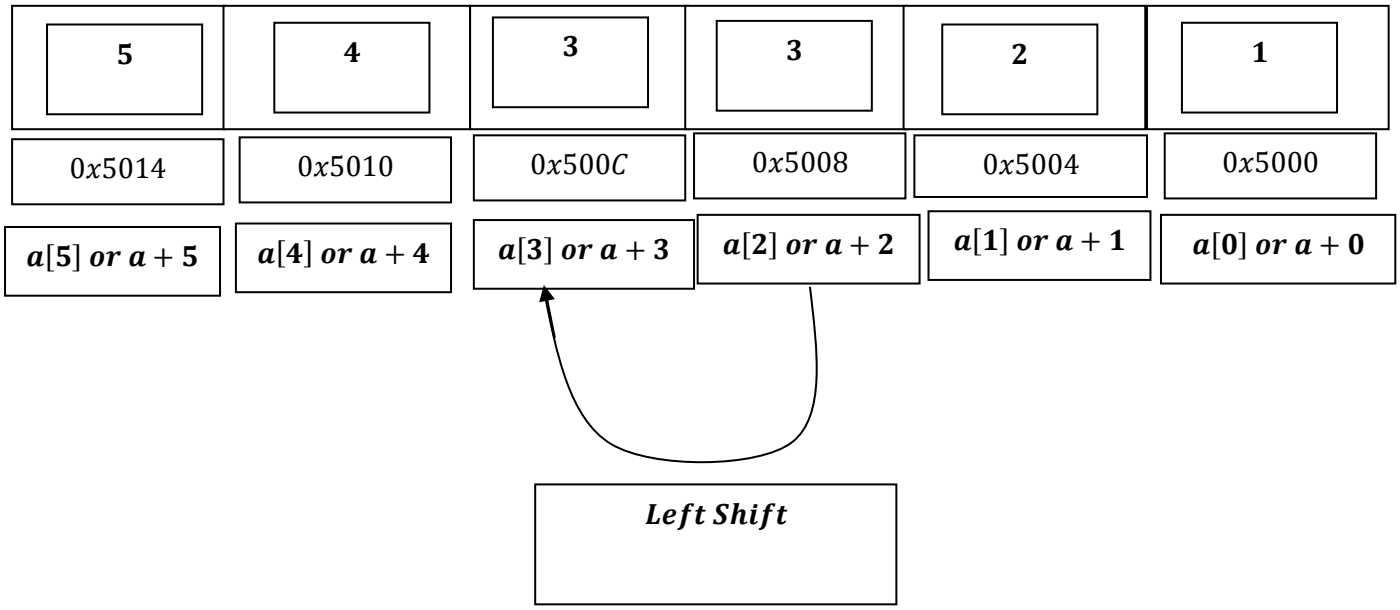
$=$

$\boldsymbol{a + 2 = 0x5000 + 2 \times 4\ bytes = 0x5000 + 8_{10} = 0x5000 + 8_{16} = 0x5008}$

$\boldsymbol{= 3}$



If we view it in this way:



$\boldsymbol{i--\Rightarrow i=i-1\Rightarrow i=3-1=2\ [Post\ Decrement]}$.

$\boldsymbol{i=2\ \ and\ i=2>pos=2\ ,the\ condition\ is\ false\ ,hence\ loop\ exits}$.

$$\boldsymbol{Now, a[2]=10\ i.e.\ a+2=0x5000+2\times 4\ bytes=0x5008=10, we\ get}:$$

5	$0x5014$	$\boldsymbol{a[5]\ or\ a+5}$
4	$0x5010$	$\boldsymbol{a[4]\ or\ a+4}$
3	$0x500C$	$\boldsymbol{a[3]\ or\ a+3}$
10	$0x5008$	$\boldsymbol{a[2]\ or\ a+2}$
2	$0x5004$	$\boldsymbol{a[1]\ or\ a+1}$
1	$0x5000$	$\boldsymbol{a[0]\ or\ a+0}$

If we view it in this way:

5	**4**	**3**	**10**	**2**	**1**
$0x5014$	$0x5010$	$0x500C$	$0x5008$	$0x5004$	$0x5000$
$\boldsymbol{a[5]\ or\ a+5}$	$\boldsymbol{a[4]\ or\ a+4}$	$\boldsymbol{a[3]\ or\ a+3}$	$\boldsymbol{a[2]\ or\ a+2}$	$\boldsymbol{a[1]\ or\ a+1}$	$\boldsymbol{a[0]\ or\ a+0}$