CS & IT ENGINEERING

Programming in C

Arrays and Pointers

Lec- 03

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TOPICS TO BE COVERED

Arrays and Pointers-3

1. array name : address of 1st element

→ not an address with { & , sizeof }

2. $a + 1$

a is value → value

→ a add.

(i) जिसका address है

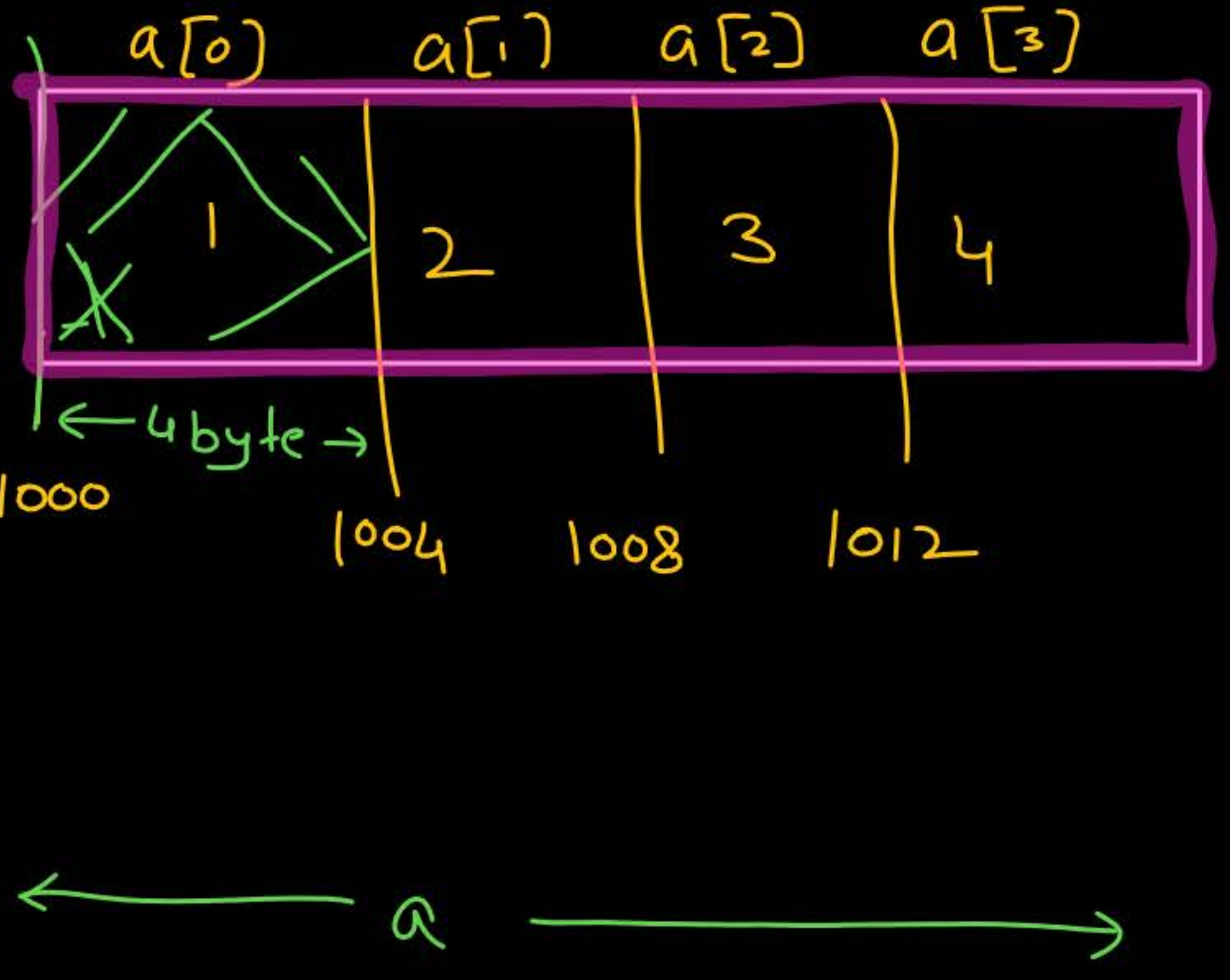
(ii) उसका size

3) $*(a+i) = *(i+a) = a[i] = i[a]$

```
void main(){

    int a[4] = {1,2,3,4};

1000  printf("%u", a);     → array_name: &a[0]
1000  printf("%u", &a);    → whole array
1004  printf("%u", a+1);
1016  printf("%u", &a+1);

}
```

4 byte

16 byte



$a+1 \Rightarrow \&a[0]+1$

$\Rightarrow \&a[0]+1\times 4$

$\Rightarrow 1000+4$

$= 1004$

$\&a+1$

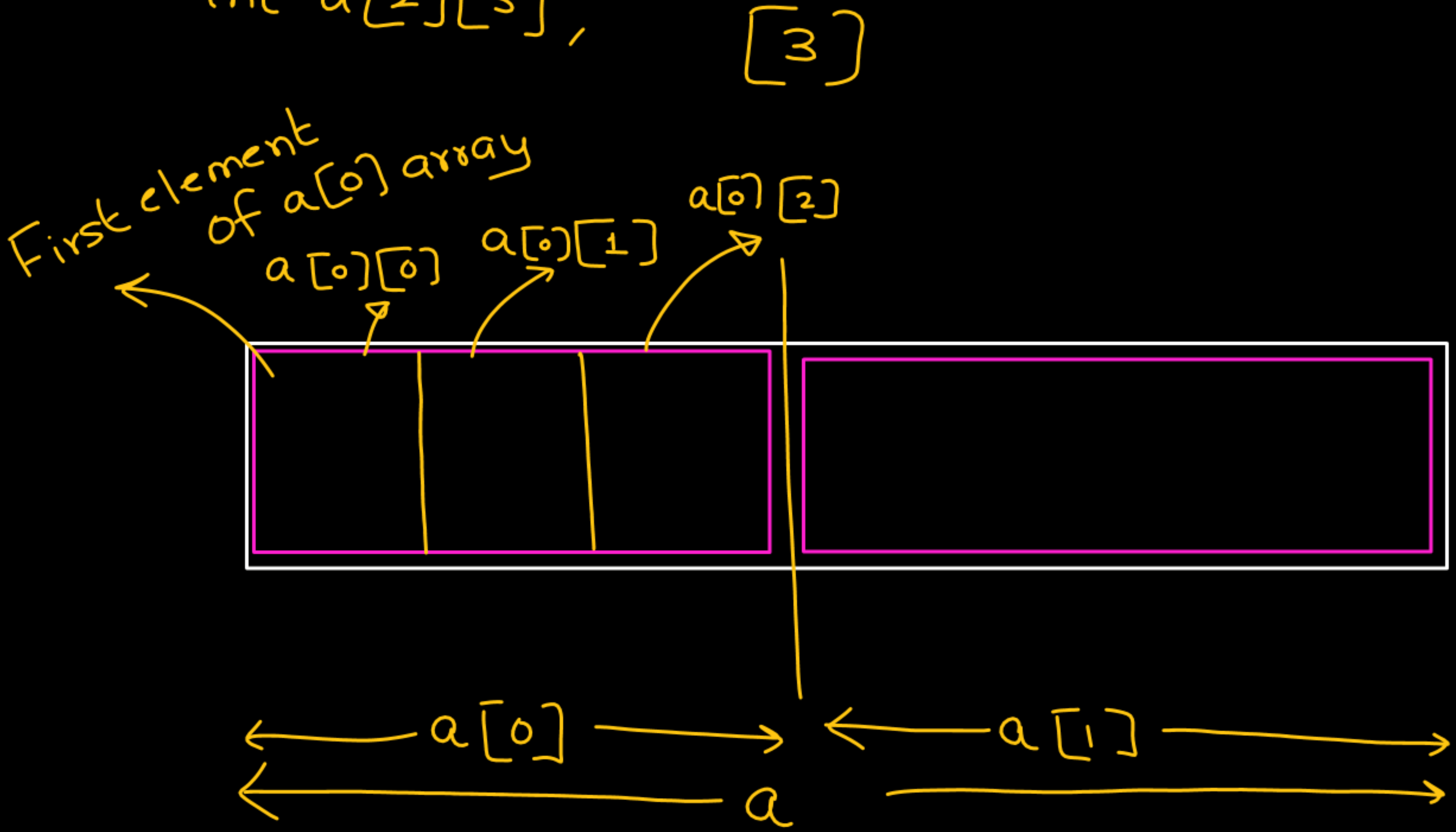
$\&a+1\times 16$

$= 1000+16$

$= 1016$

2-D arrays

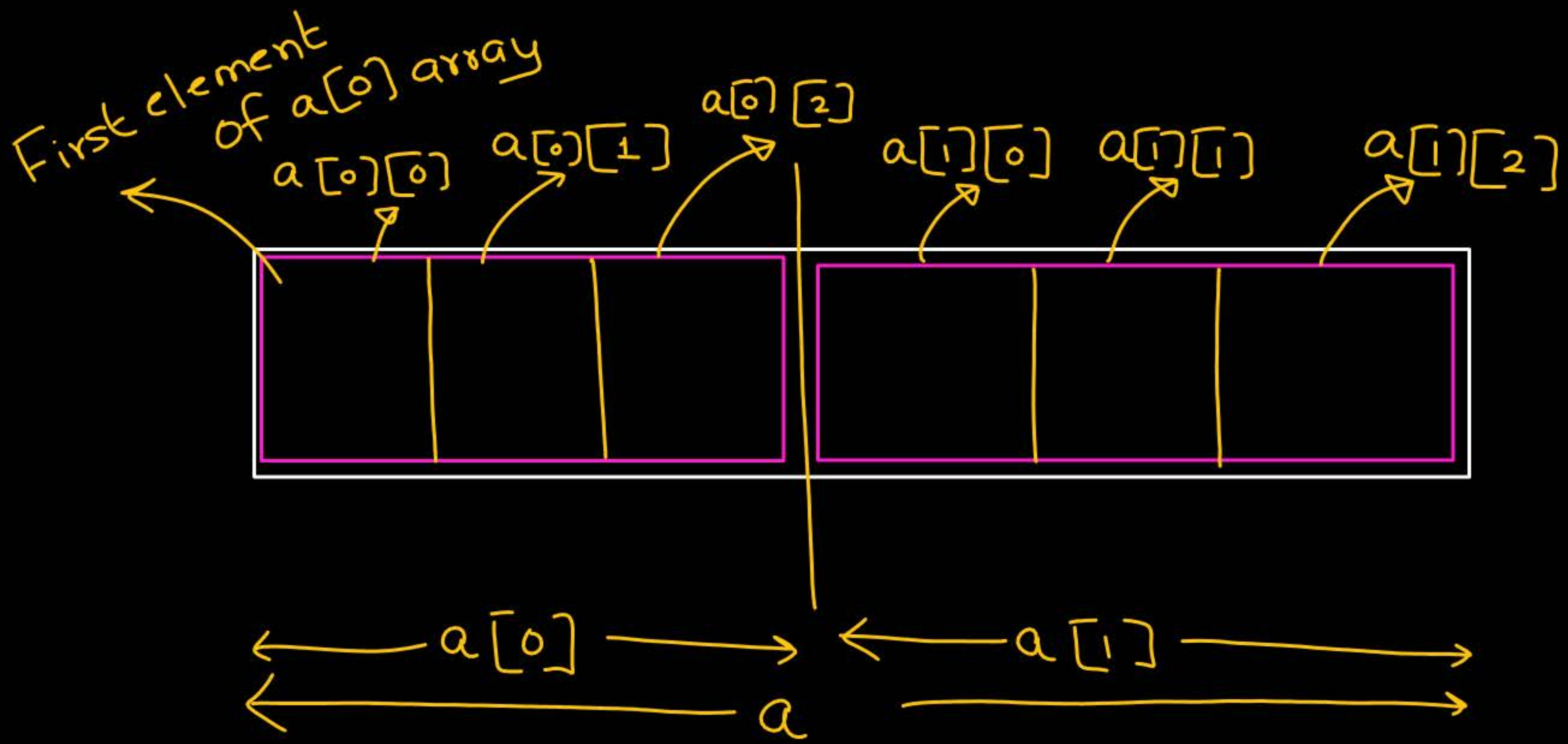
int a[2][3];



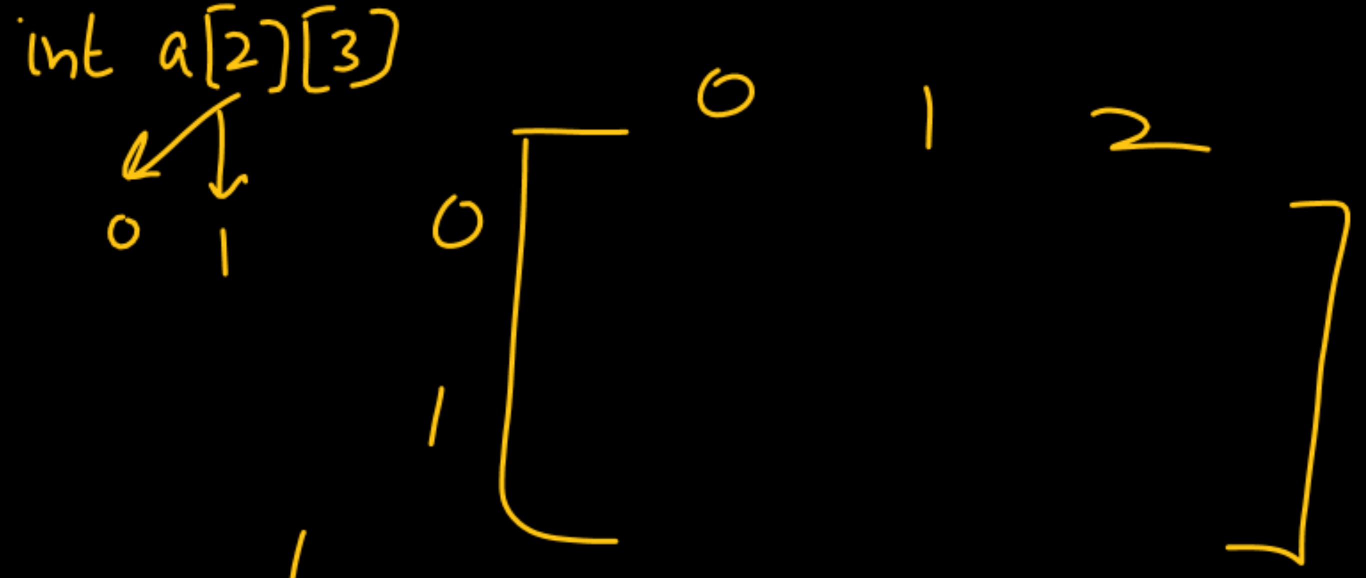
2-D arrays

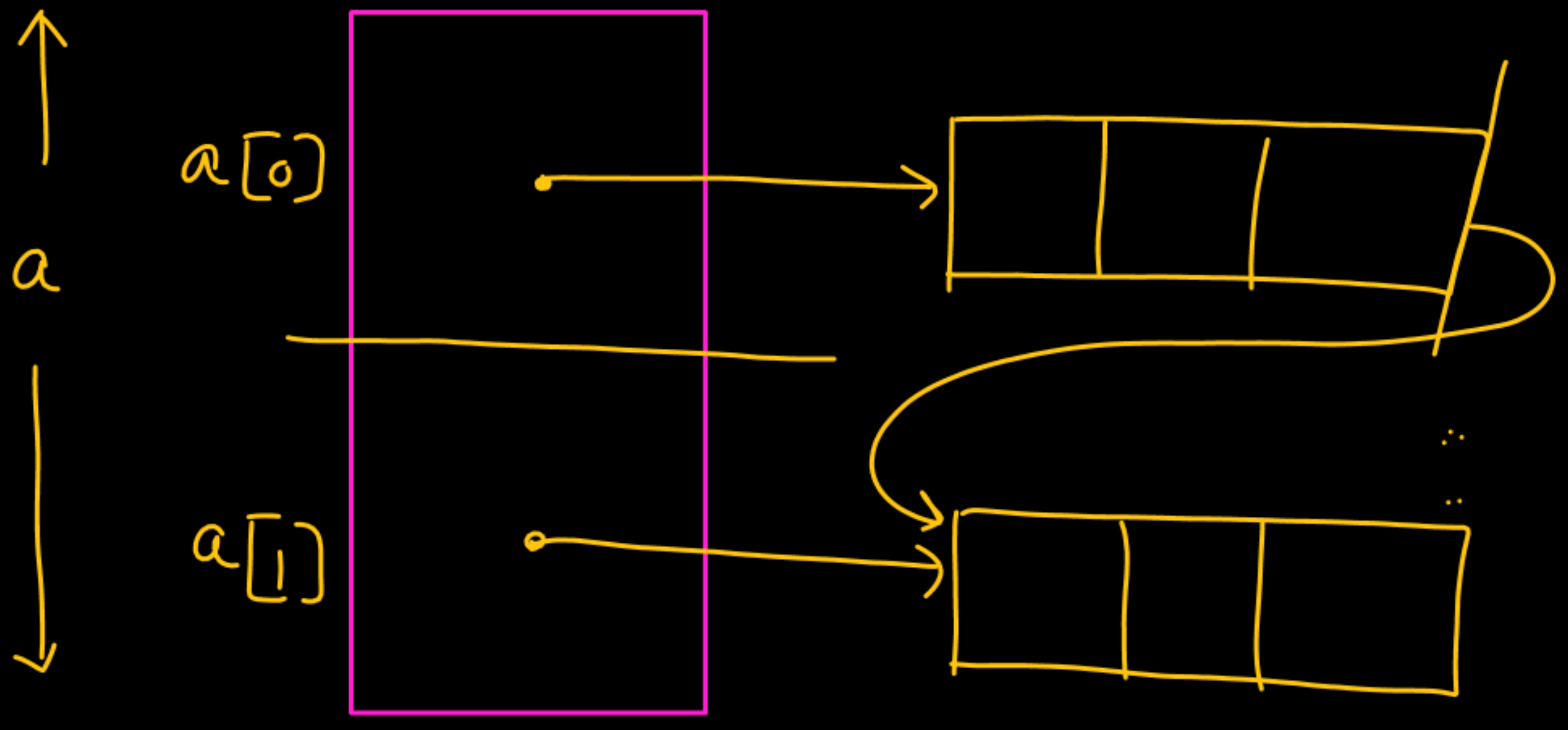
int a[2][3];

[3]



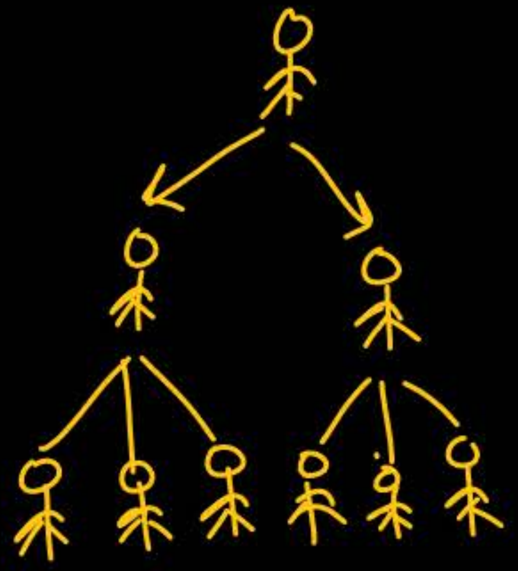
int a[2][3] ;

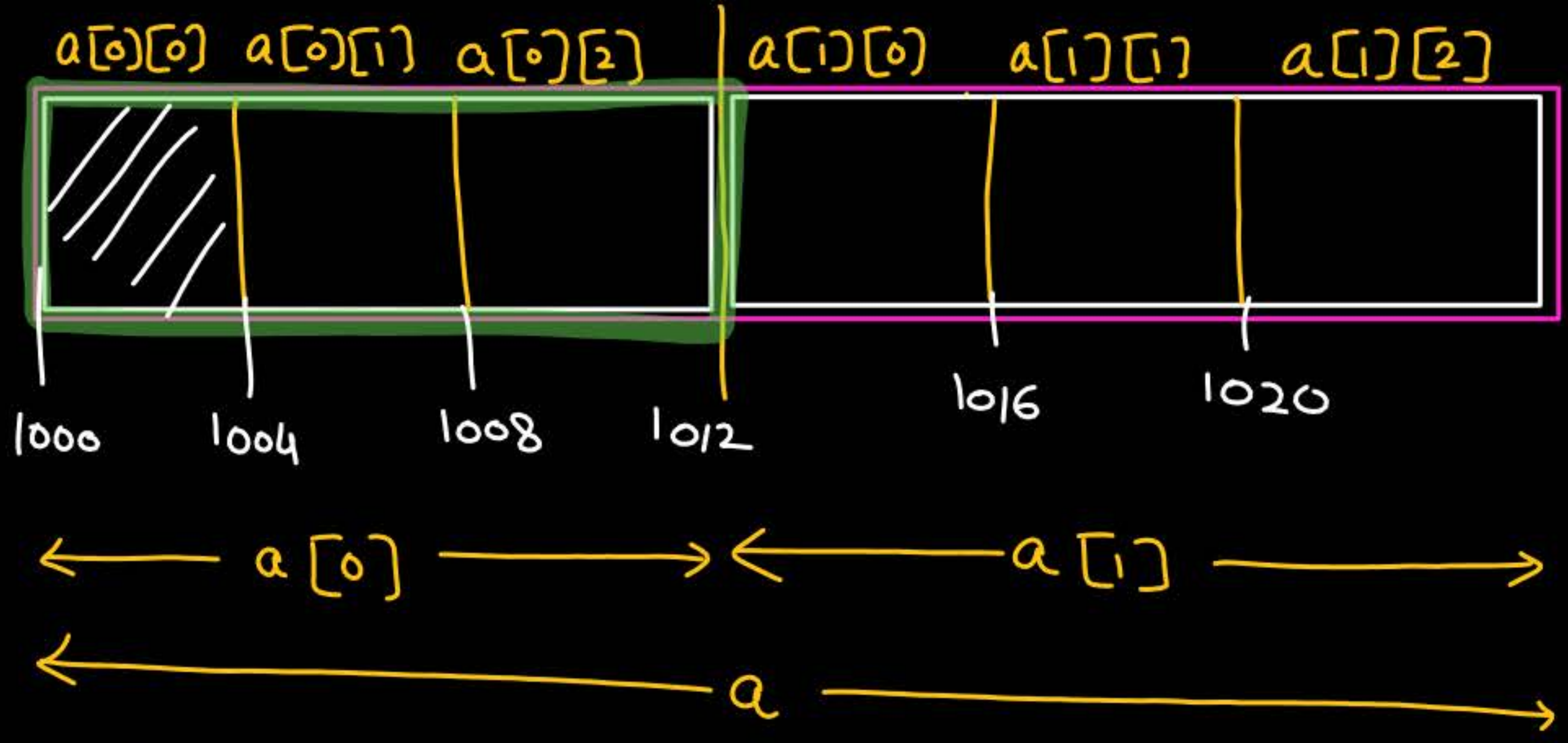




जहाँ a[0]
finish
⇒ a[1]
Start
Seq. store

int a[2][3] = {1,2,3,4,5,6};





① a : array of 2 elements a[0], a[1]

a : array_name ⇒ First element address ⇒ &a[0]

② a[0] : address

→ is an array of 3 element a[0][0], a[0][1], a[0][2]

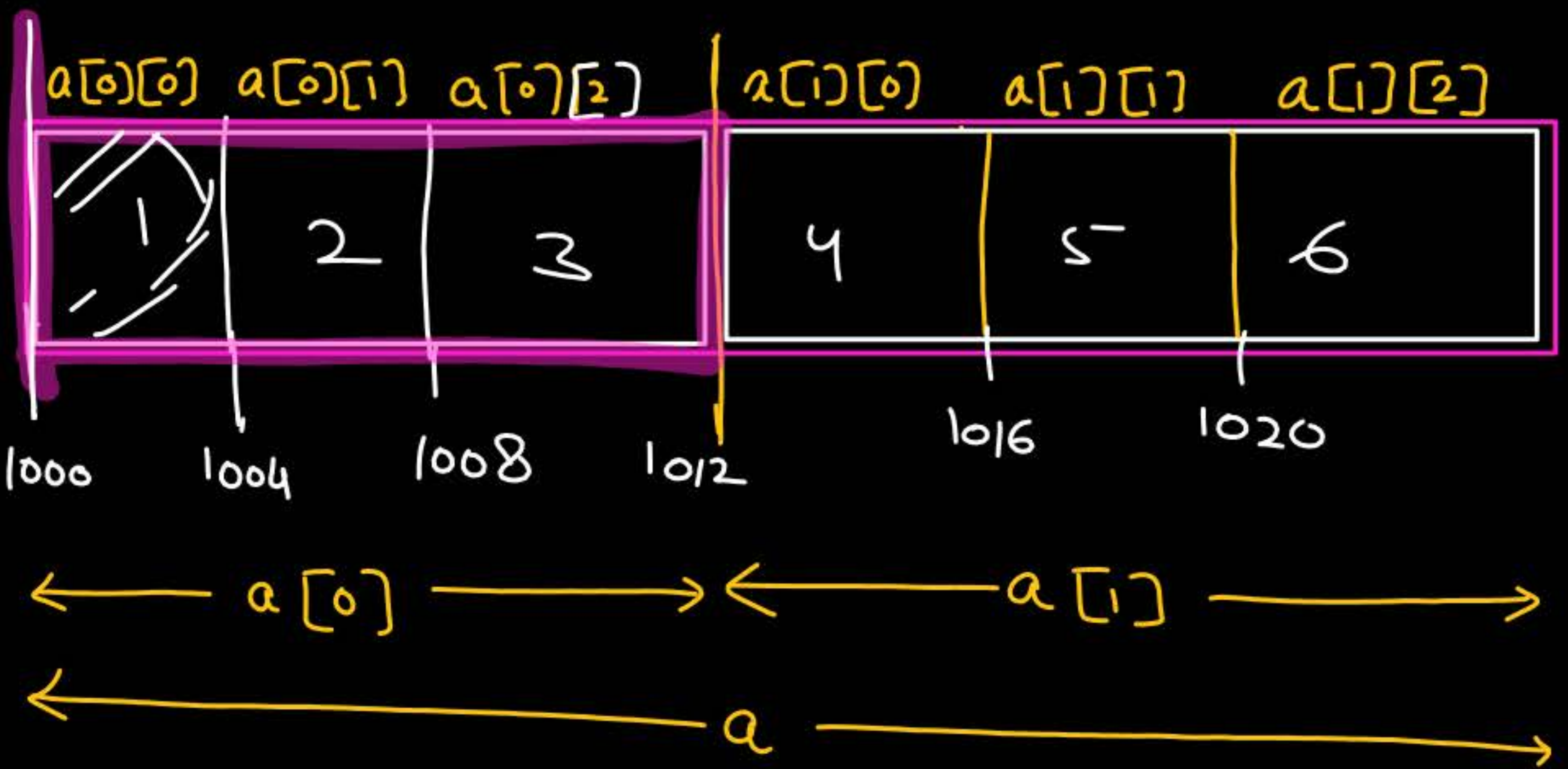
→ array-name : a[0] = add. of its first elem = &a[0][0]

int a[2][3] = {1,2,3,4,5,6};

printf("%u", a); &a[0] → 1000

printf("%u", a[0]); → &a[0][0] 1000

printf("%u", &a); → whole array 1000



printf("%u", a+1);

&a[0] + 1

&a[0] + 1×12

1000 + 12

= 1012

printf("%u", a[0]+1);

add

&a[0][0] + 1

&a[0][0] + 1×4

1000 + 4

= 1004

printf("%u", &a+1);

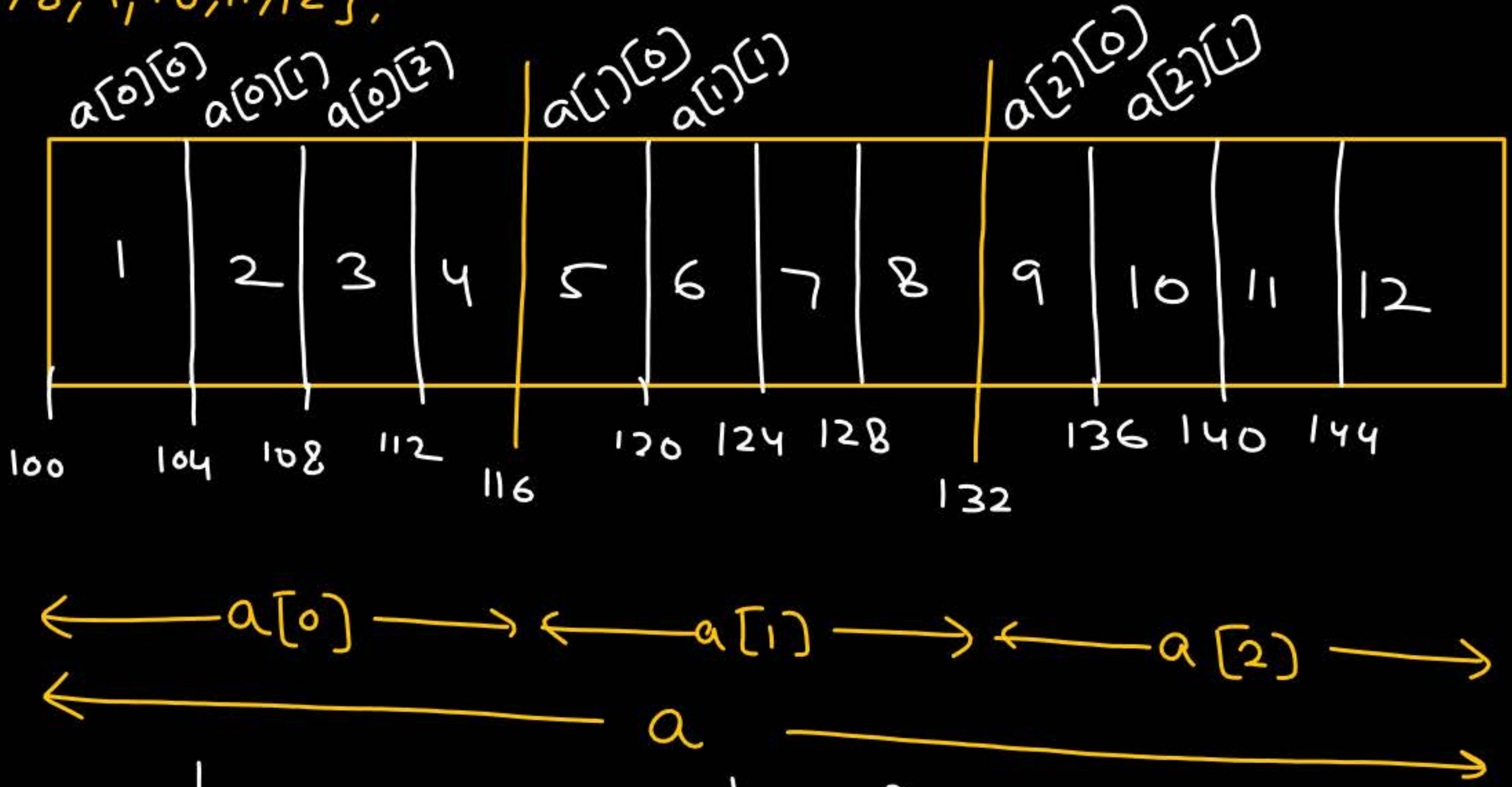
&a + 1

&a + 1×24

1000 + 24

1024

```
2. void main(){
     int a[3][4] = {1,2,3,4,5,6,7,8,9,10,11,12};

     printf("%u",a);       100

     printf("%u",a[0]);    100

     printf("%u",&a);      100

     pf("%u",a+1);         116 ✓
     pf("%u",a[0]+1);
     pf("%u",&a+1);
   }
```

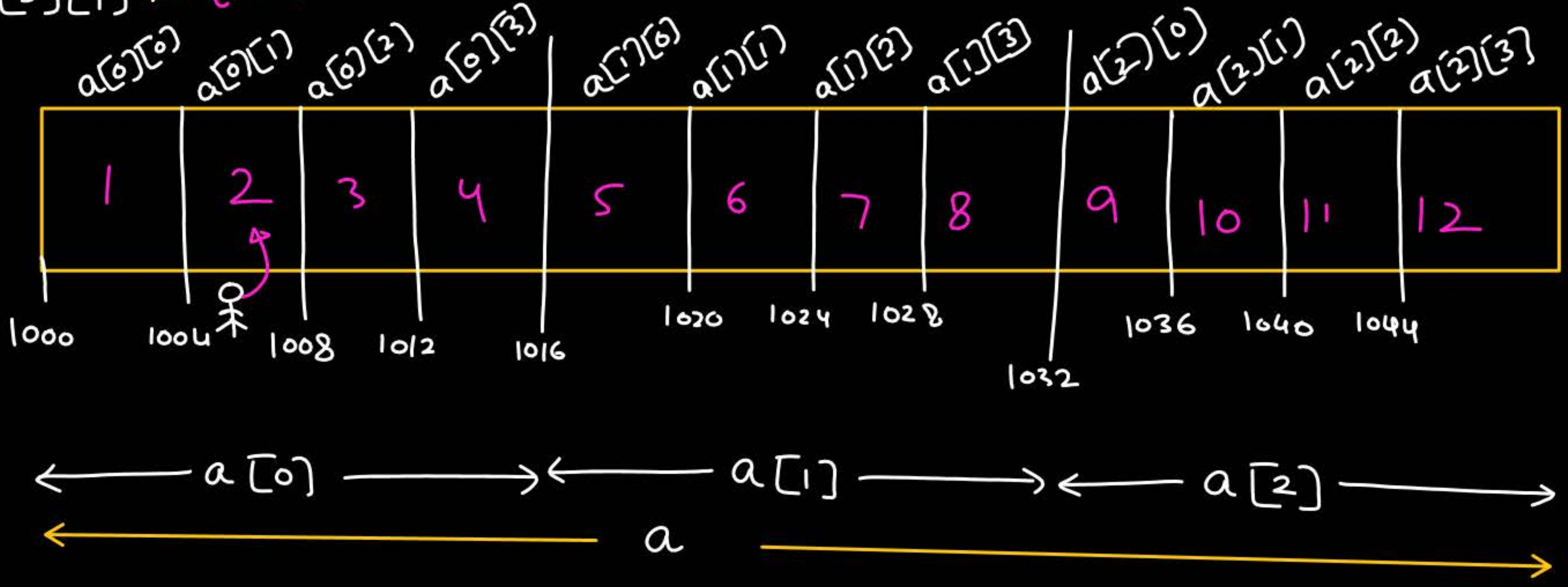


a+1
&a[0]+1
&a[0]+1×16
100+16
116

a[0]+1
&a[0][0]+1
&a[0][0]+1×4
100+4
=104

&a+1
&a+1×48
100+48
=148

int a[3][4] = {1,2,3,4,5,6,7,8,9,10,11,12}



(i) a[0] + 1

&a[0][0] +1

&a[0][0] +1×4

1004

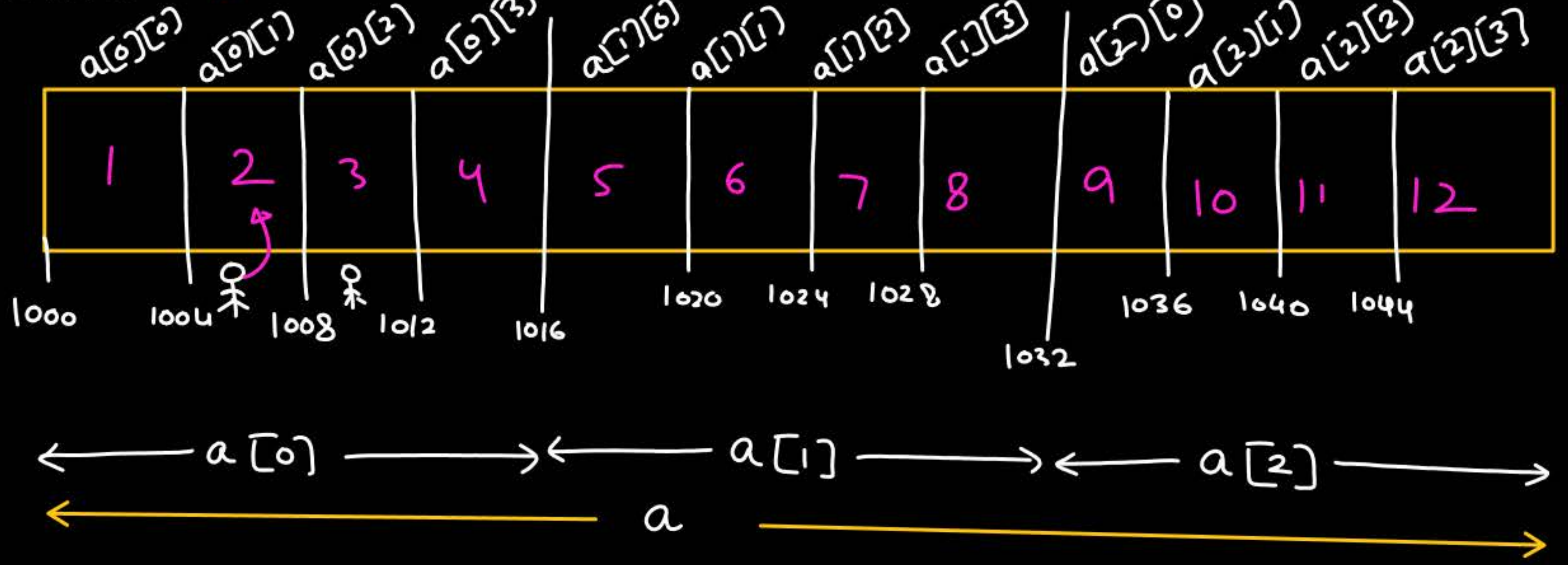
a[0]+1 = Memory location 1004 = &a[0][1]

a[0]+1 = Memory location 1004 = &a[0][1]

(a[0]+1) = value at (Memory location 1004) = ~~&~~a[0][1]

*(a[0]+1) = a[0][1]

int a[3][4] = {1,2,3,4,5,6,7,8,9,10,11,12}



(ii) $a[0] + 2$

$\underbrace{\&a[0]}[0] + 2$

$\&a[0][0] + 2 \times 4$

$1000 + 8$

$= 1008$

$a[0]+2 = \underset{1008}{\text{Memory location}} = \&a[0][2]$

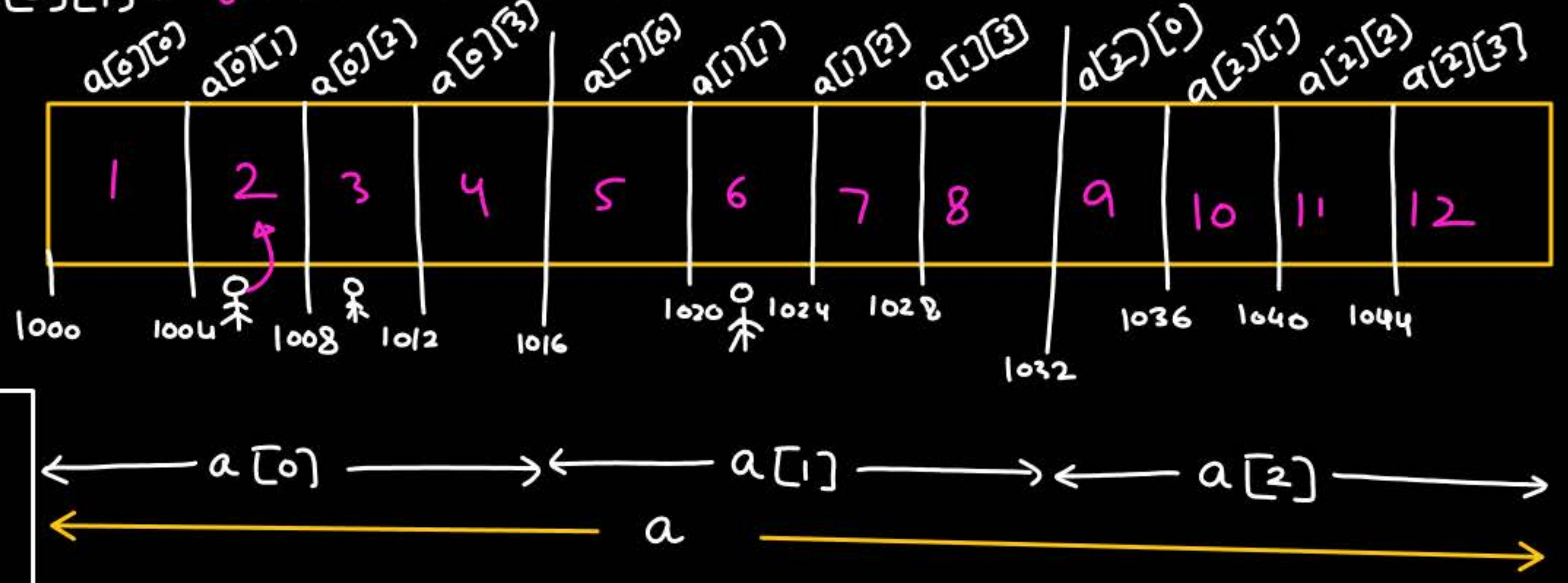
$*(a[0]+2) = \text{valueat}\left(\underset{1008}{\text{Memory location}}\right) = \cancel{*}\cancel{\&}a[0][2]$

$*(a[0]+2) = a[0][2]$

int a[3][4] = {1,2,3,4,5,6,7,8,9,10,11,12}

$*(a[0]+1) = a[0][1]$

$*(a[0]+2) = a[0][2]$



$$\boxed{*(a[0]+j) = a[0][j]}$$

(i) $a[1]+1$

$\underbrace{\&a[1][0]} + 1$

$\&a[1][0] + 1 \times 4$

$1016 + 4$

$= 1020$

$a[1]+1 =$ Memory location $= \&a[1][1]$

1020

$*(a[1]+1) =$ value at (Memory location 1020) $= \cancel{*}\cancel{\&}a[1][1]$

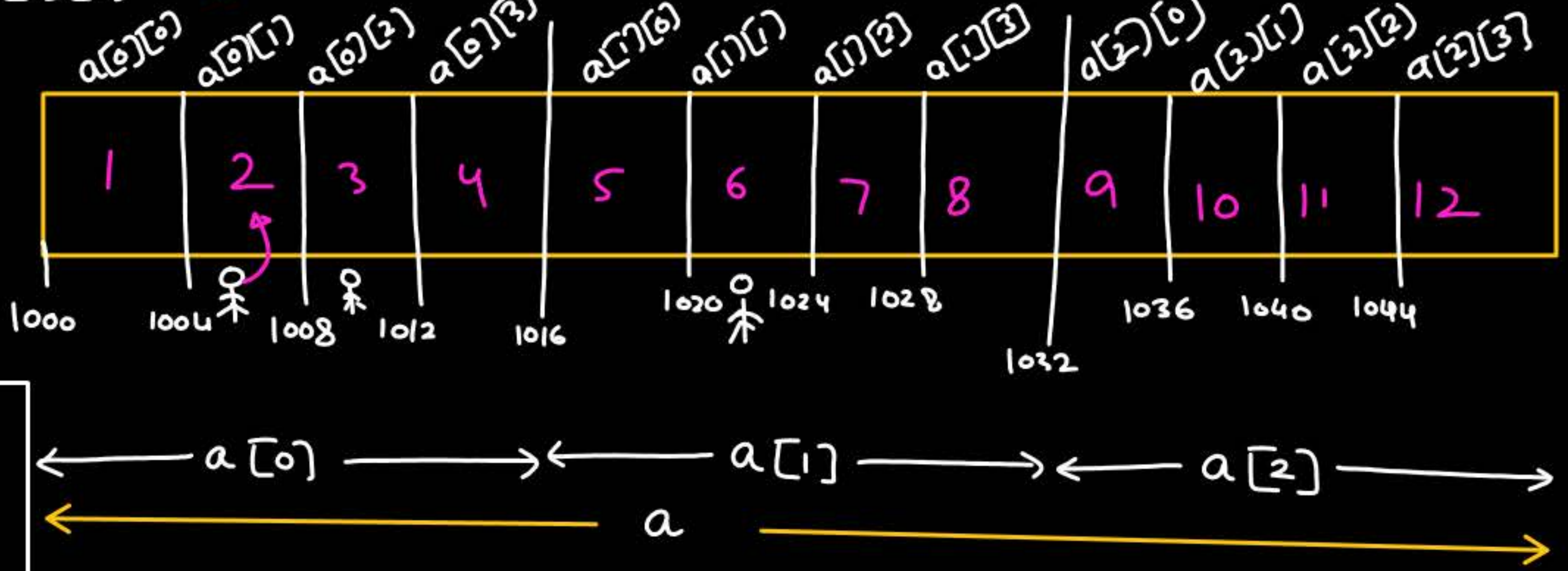
$*(a[1]+1) = a[1][1]$

int a[3][4] = {1,2,3,4,5,6,7,8,9,10,11,12}

$*(a[0]+1) = a[0][1]$

$*(a[0]+2) = a[0][2]$

$$\boxed{*(a[0]+j) = a[0][j]}$$



$*(a[1]+2) = a[1][2]$

$a[1] + 2 =$

$\&a[1][0] + 2$

$\&a[1][0] + 2 \times 4$

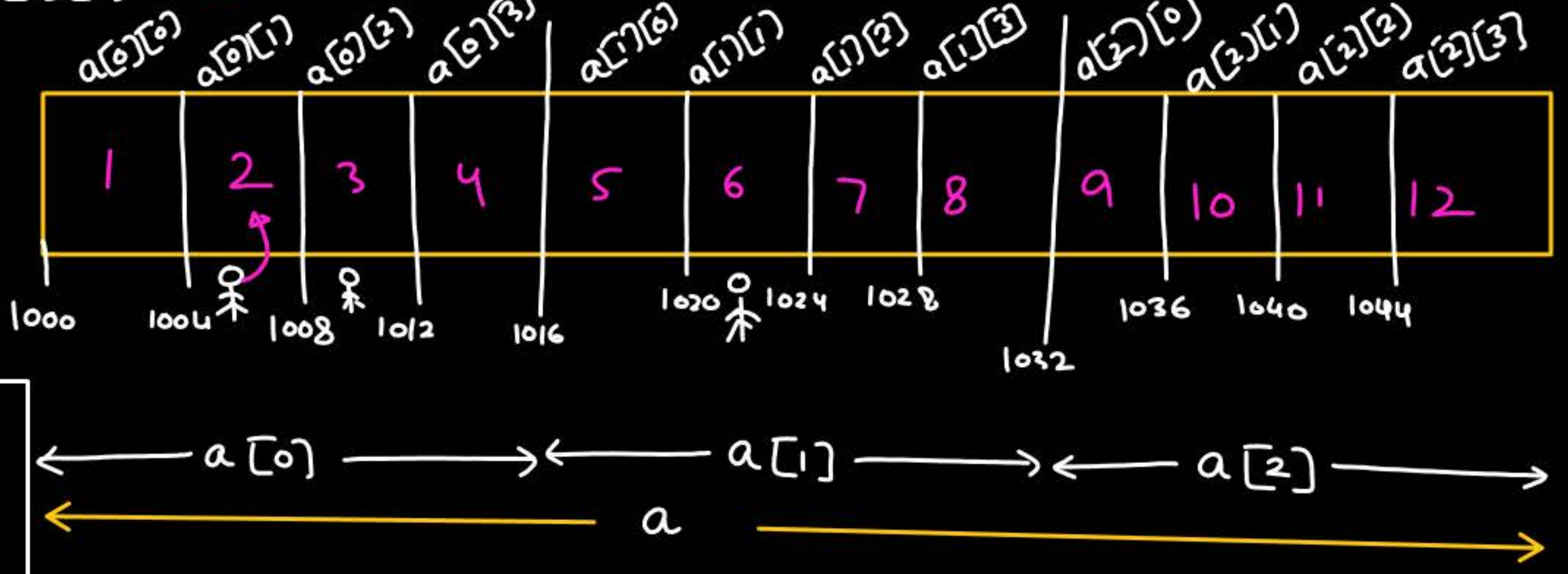
$1016 + 8$

1024

$a[1]+2 =$ Mem location 1024 $= \&a[1][2]$

$*(a[1]+2) =$ val. at $(1024) = \cancel{*}\cancel{\&}a[1][2]$

int a[3][4] = {1,2,3,4,5,6,7,8,9,10,11,12}



$$*(a[0]+1) = a[0][1]$$

$$*(a[0]+2) = a[0][2]$$

$$\boxed{*(a[0]+j) = a[0][j]}$$

$$*(a[1]+2) = a[1][2]$$

$$*(a[1]+1) = a[1][1]$$

$$\boxed{*(a[1]+j) = a[1][j]}$$

$$*(a[i]+j) = a[i][j] = *(*(a+i)+j)$$

int a[2][3] = {{1, 2, 3},{4, 5, 6}};

pf("%u", a);

pf("%u", &a);

pf("%u", a[0]); } 1000

1000 pf("%u", *a); → $*a = \cancel{*}\cancel{\&}a[0]$

$= a[0]$

$= \&a[0][0]$

1 pf("%u", **a); → $*a = \&a[0][0]$

$**a = \cancel{*}\cancel{\&}a[0][0] = 1$

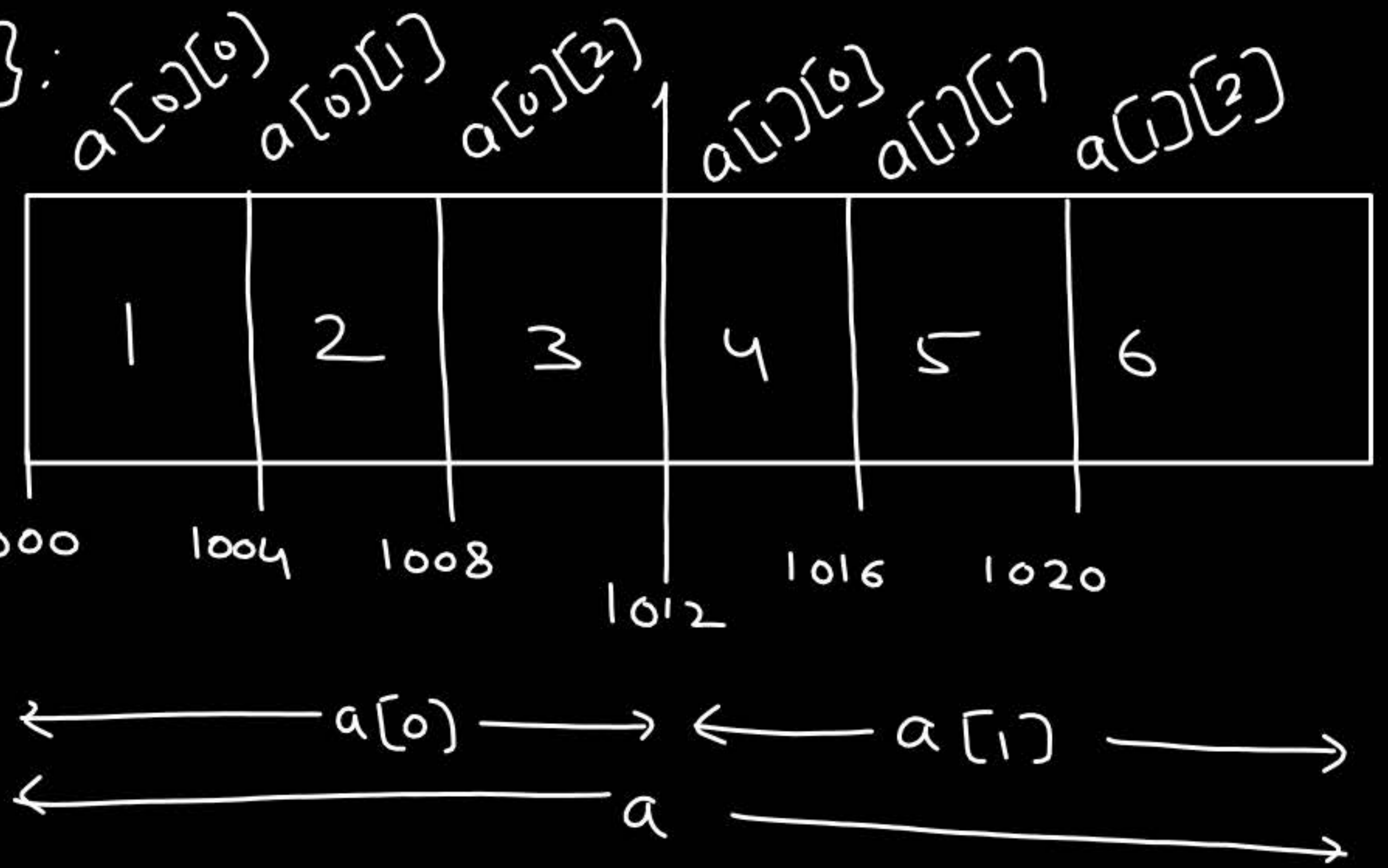
pf("%u", *a[0]); → $\cancel{*}\cancel{\&}a[0][0] = 1$

1004 pf("%u", *a+1);

pf("%u", **a+1); 2

1+1

}



$*a+1 \Rightarrow \cancel{*}\cancel{\&}a[0]+1$

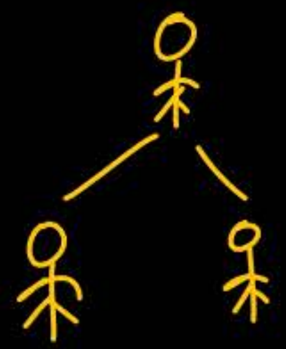
$= a[0]+1$

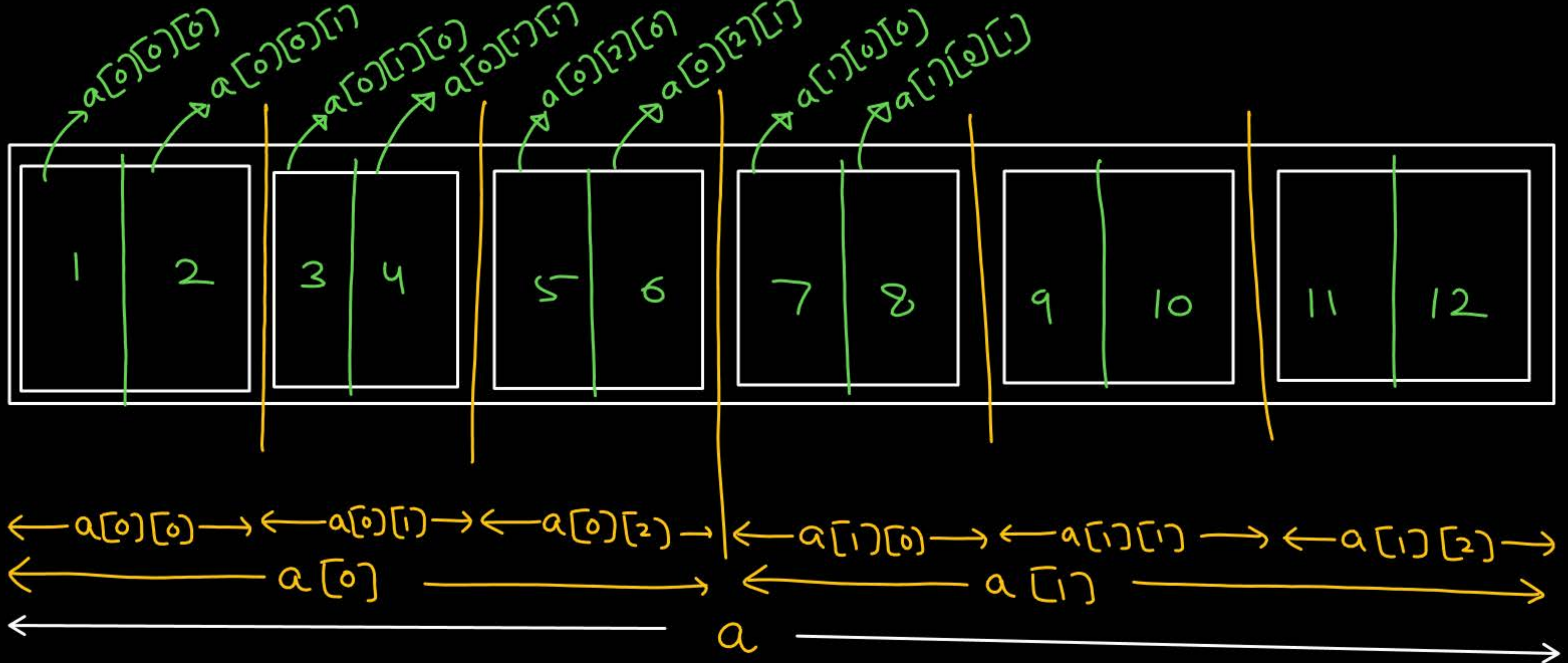
$= \&a[0][0]+1$

$= \&a[0][0]+1 \times 4$

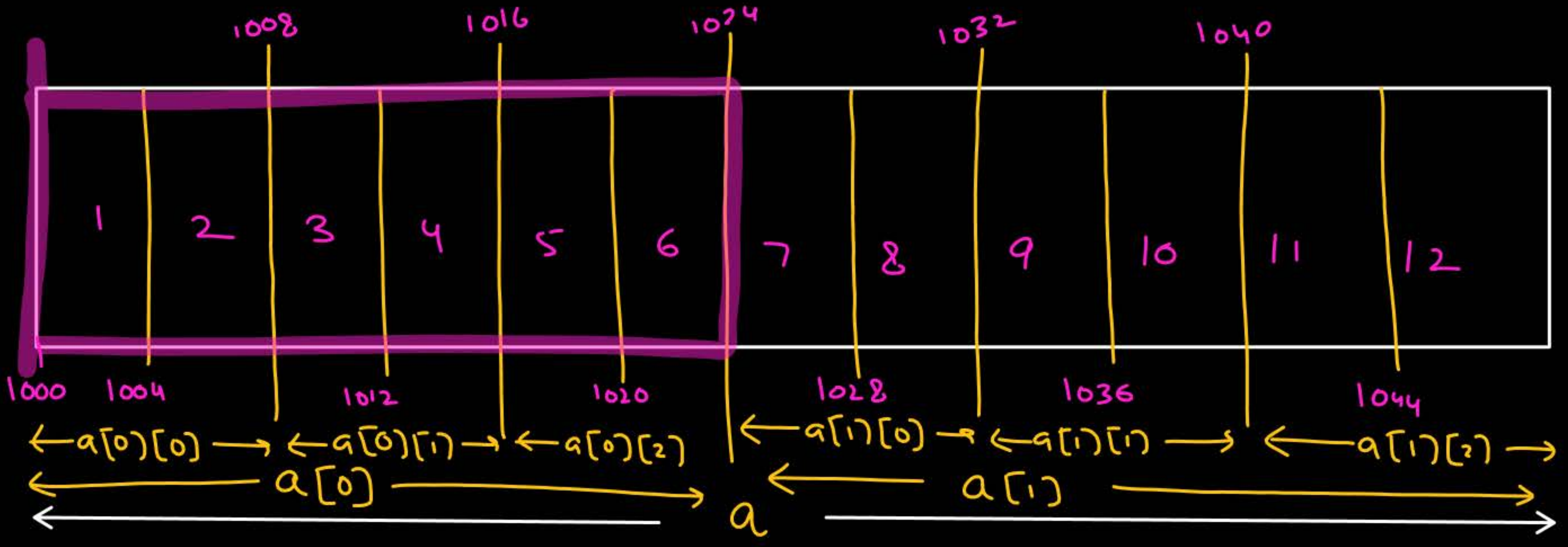
$= 1004$

```
int a[2][3][2] = {1,2,3,4,5,6,7,8,9,10.11,12};
```





```
int a[2][3][2] = {1,2,3,4,5,6,7,8,9,10,11,12};
```



```
pf("%u", a);
pf("%u", a[0]);
pf("%u", a[0][0]);
pf("%u", &a);
```

} 1000

(5) pf("%u", a+1);

&a[0]+1

&a[0]+1×24

1000+24

1024

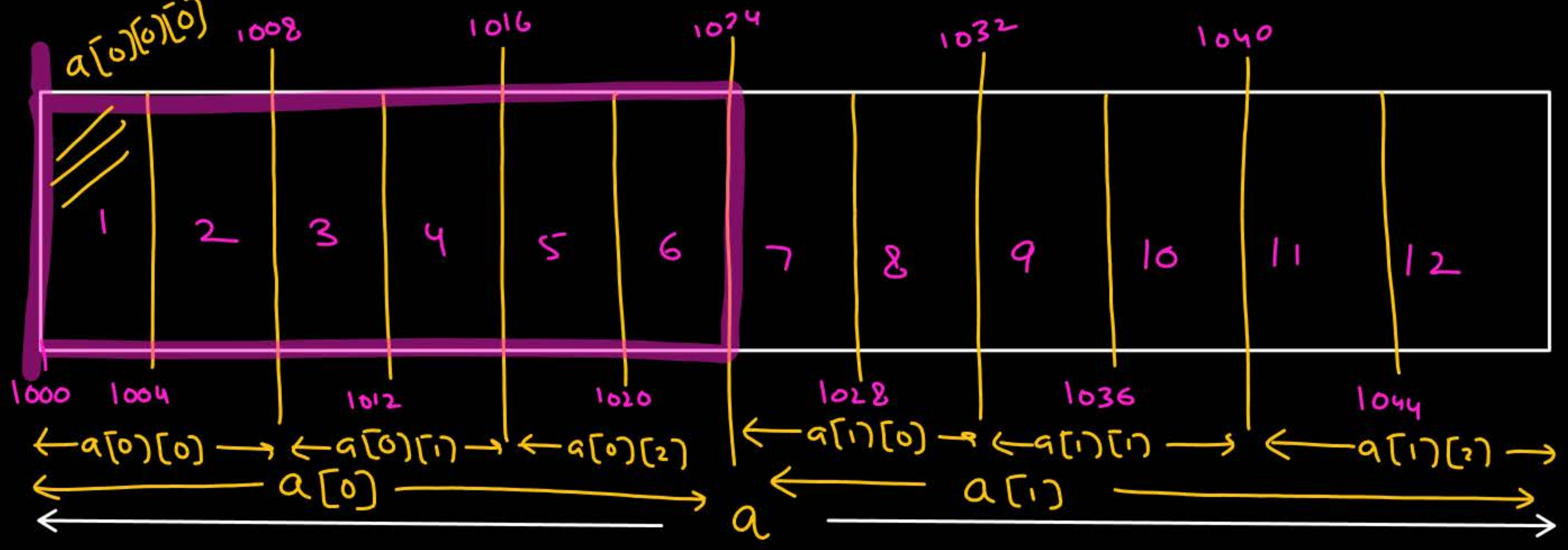
6) pf("%u", a[0]+1);

$\underbrace{\&a[0][0]}+1$

1000+1×8

=1008

int a[2][3][2] = {1,2,3,4,5,6,7,8,9,10,11,12};



pf("%u", a[0][0]+1);

↓

$\underbrace{\&a[0][0][0]}_{1000} + 1$

1000 +1 × 4

= <u>1004</u>

pf("%u", &a+1);

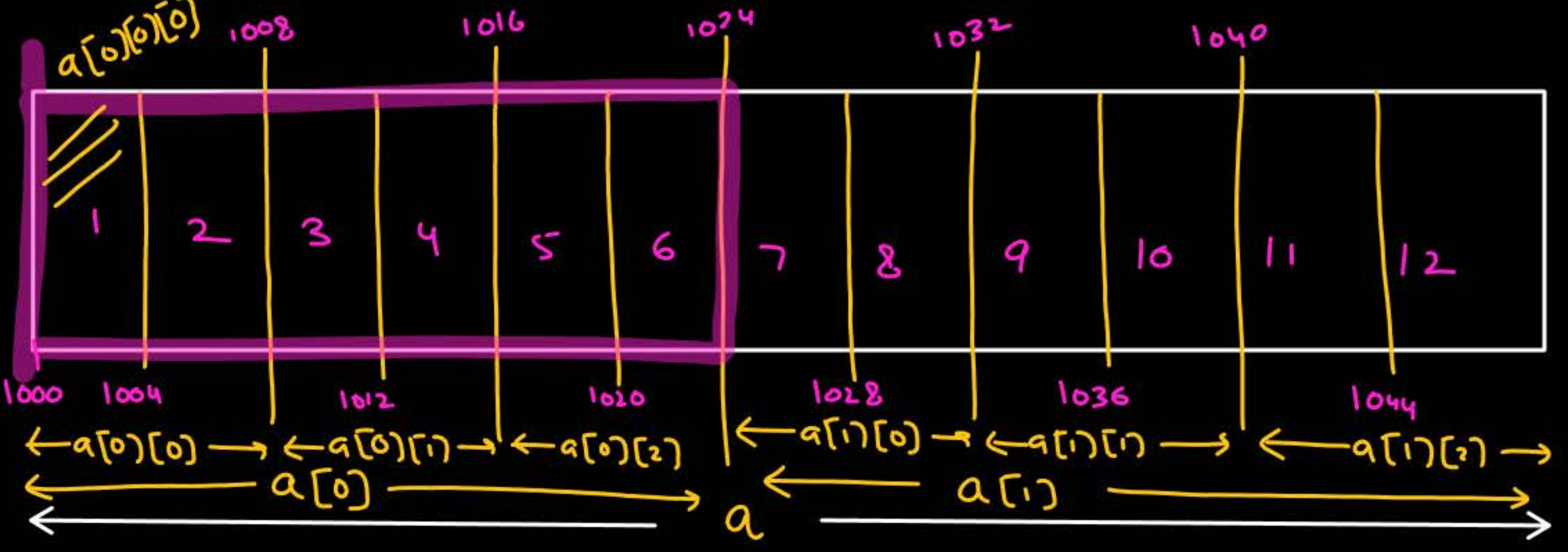
&a+1×48

1000+48

= 1048

int a[2][3][2] = {1,2,3,4,5,6,7,8,9,10,11,12};

a[2][3][2]



a + 1

$\&a[0]+1\times 24$

1024

$a[0]+1$

$\&\underbrace{a[0][0]}+1$

$1000+1\times 8$

$=1008$

$a[0][0]+1$

$\&\underbrace{a[0][0][0]}+1\times 4$

$1000+4$

$=\underline{1004}$

start
→ 1000
4byte

int a[3][2][3] = { 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18};

(i) $*a \rightarrow *\&a[0] \rightarrow a[0] \rightarrow \&a[0][0]$

(ii) $*a+1 \rightarrow *\&a[0]+1 \Rightarrow a[0]+1 \Rightarrow \&a[0][0]+1$

→ 1012

(iii) $*a[0]+1 \rightarrow \cancel{*}\cancel{\&}a[0][0]+1 = a[0][0]+1 = \&a[0][0][0]+1$

= 1004

(iv) $*a[0][0]+1 \rightarrow \cancel{*}\cancel{\&}a[0][0][0]+1 = a[0][0][0]+1 = 2$

1000 (v) $**a$

$\rightarrow *\cancel{*}\cancel{\&}a[0]$

$*a[0]$

$\cancel{*}\cancel{\&}a[0][0]$

$a[0][0] \Rightarrow \&a[0][0][0]$

Extra class

08:30 PM

Random access

THANK YOU GW SOLDIERS !