Permutations - 1

Thursday, 15 July 2021 7:12 PM

n- boxes, r → non-identical item, print all possible arrangement of r items in n- boxes.

To find. $^nP_r = n \times (n-1) \times (n-2) \times (n-3) \times \cdots \times (n-(r-1))$

$^nP_r = \frac{n!}{(n-r)!}$

Level and options:

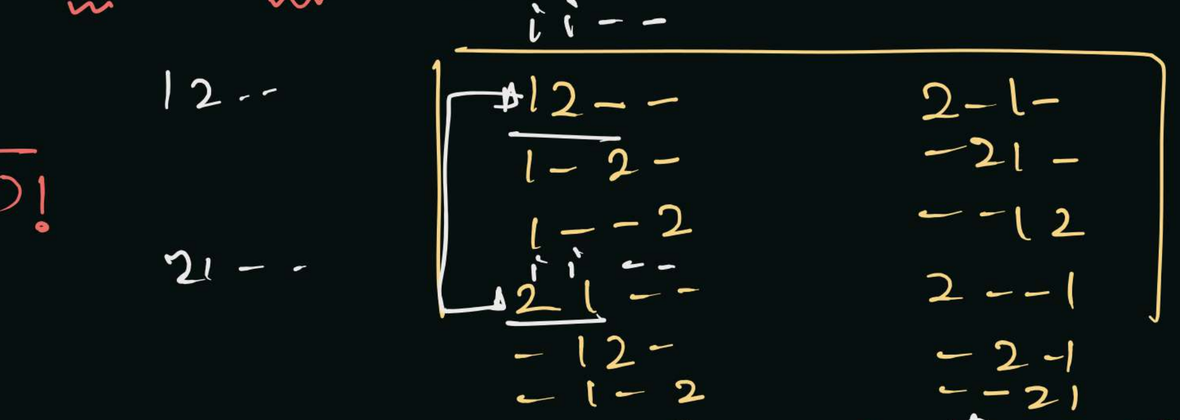
Level → items

options → boxes

n = 4 boxes

r = 2 {1, 2}

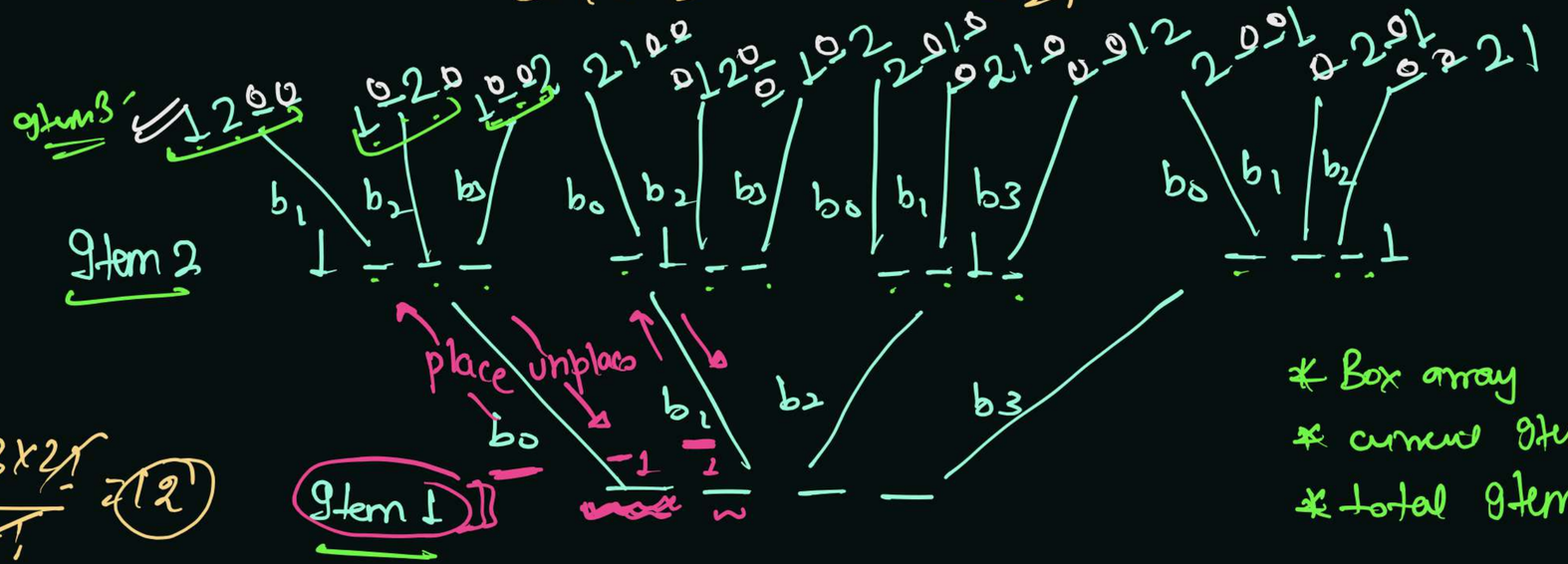
$^4P_2 = \frac{4!}{2!} = \frac{4 \times 3 \times 2!}{2!} = 12$



Base case

item over

At base case, every result is answer



Combinations - 1

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n boxes, r - identical items, print all possible arrangements of r items in n boxes.

$n = 4, \; r = 2.$

$${}^{n}C_{r} = \frac{n!}{(n-r)!\,r!}$$

option → choices of item Yes or No

level → box

$${}^{4}C_{2} = \frac{4!}{2!\,2!} = \frac{4 \times 3 \times 2!}{2 \times 2!} = 6$$

Permutation:

1 2 0 0
1 0 2 0
1 0 0 2
0 1 2 0
0 1 0 2
0 0 1 2

$${}^{4}P_{2} \quad \frac{4!}{2!} = 12$$

2 1 0 0
2 0 1 0
2 0 0 1
0 2 1 0
0 2 0 1
0 0 2 1

Combination:

i i - -
i - i -
i - - i
- i i -
- i - i
- - i i

$${}^{4}C_{2} = 6$$

Combinations

$$2^n = {}^nC_0 + {}^nC_1 + {}^nC_2 + {}^nC_3 + \cdots + {}^nC_n$$

$$2^4 = {}^4C_0 + {}^4C_1 + {}^4C_2 + {}^4C_3 + {}^4C_4$$

$n=4$, $r=2$.

level → box 8.

option → choice of item i.e. Yes or No.

box 3

box 2.

box 1

box 0

${}^4C_4 \rightarrow 1$ way

${}^4C_3 \rightarrow 4$ way

${}^4C_2 \rightarrow 6$ way

${}^4C_1 \rightarrow 4$ way

${}^4C_0 \rightarrow 1$ way

current box

total box

ssf, ts

as

i i - -

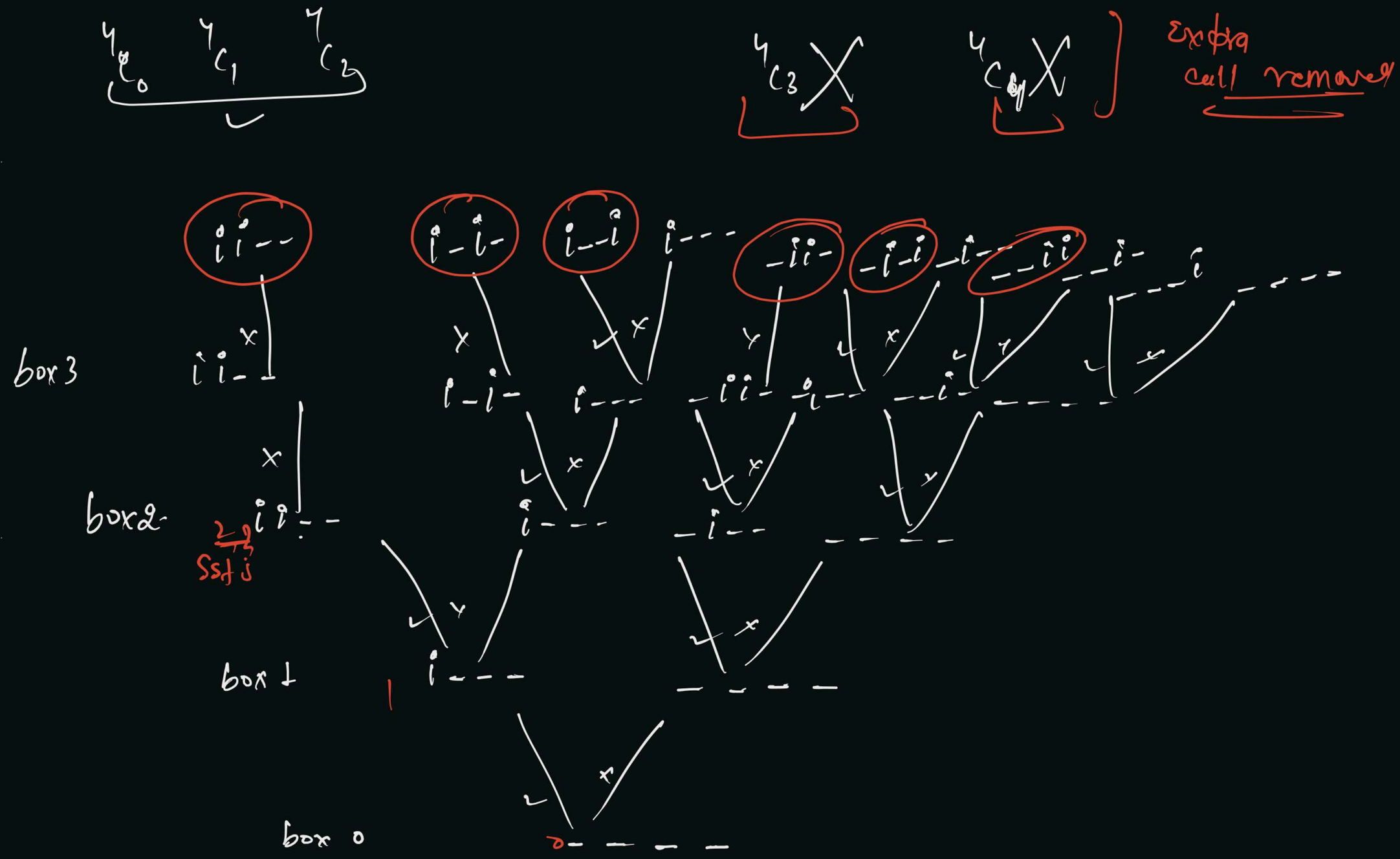
i - i -

i - - i

- i i -

- i - i

- - i i


Extra call removed
box 3
box 2
box 1
box 0
Sst j

Permutations - 2

Thursday, 15 July 2021 7:13 PM

n- boxes, r- non identical items, print all possible arrangement of r-items in n-boxes.

$${}^{n}C_r = \frac{n!}{(n-r)!\,r!}$$

$${}^{n}P_r = \frac{n!}{(n-r)!}$$

$${}^{n}P_r = {}^{n}C_r \times r!$$

Base: or

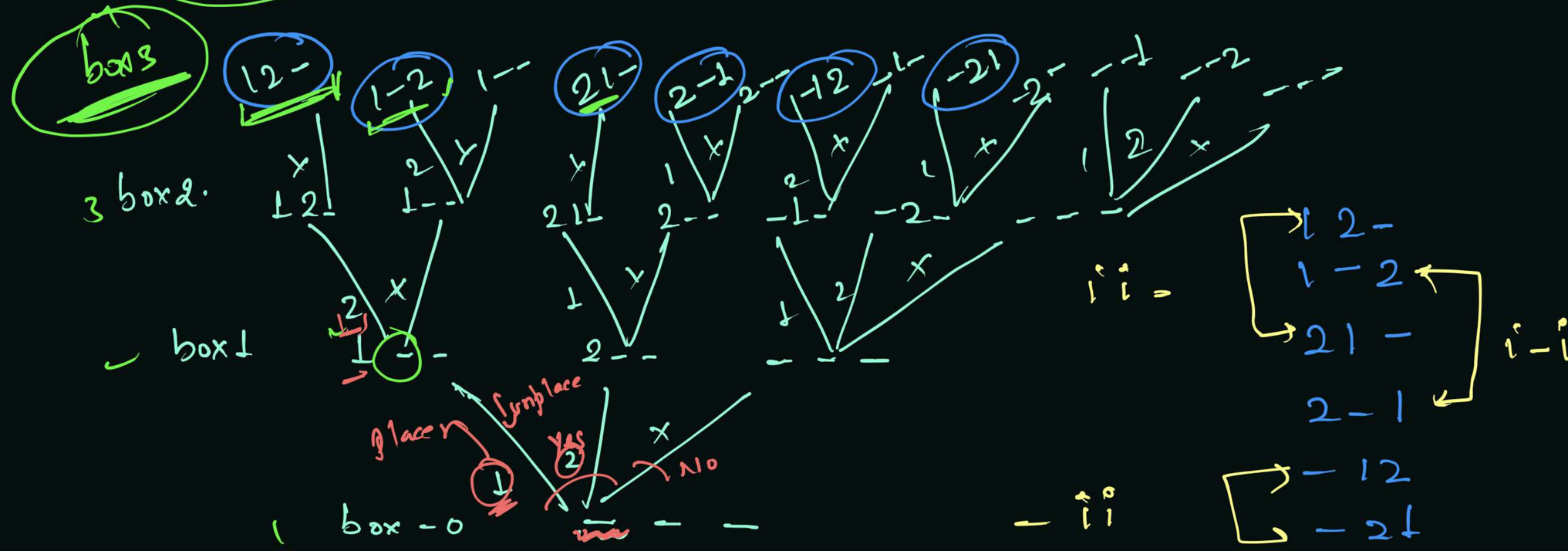
cb>tb items - array, asf, ssf, ts, ch, tb

n=3 (boxes)
r=2 (1,2)

level → boxes

option → choice of elem.

Yes OR No



$${}^{3}P_2 = \frac{3!}{1!} = 6$$

Combinations - 2

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$n \rightarrow$ boxes, r - identical items. print all possible arrangements to place r items in n boxes.

level → items

options → boxes

Permutation:

$n = 3$, item $= 2$

$${}^nP_r = \frac{n!}{(n-r)!} = \frac{3!}{1!} = 3 \times 2 = 6$$

1 2 0

1 0 2

0 1 2

2 1 0

2 0 1

0 2 1

$${}^nC_r = \frac{n!}{(n-r)!\,r!}$$

$${}^nP_r = \frac{n!}{(n-r)!}$$

Combination

$n = 3$, item $= 2$.

$${}^nC_r = \frac{n!}{(n-r)!\,r!} = \frac{3!}{1!\,2!} = 3$$

i i -

i - i

- i i

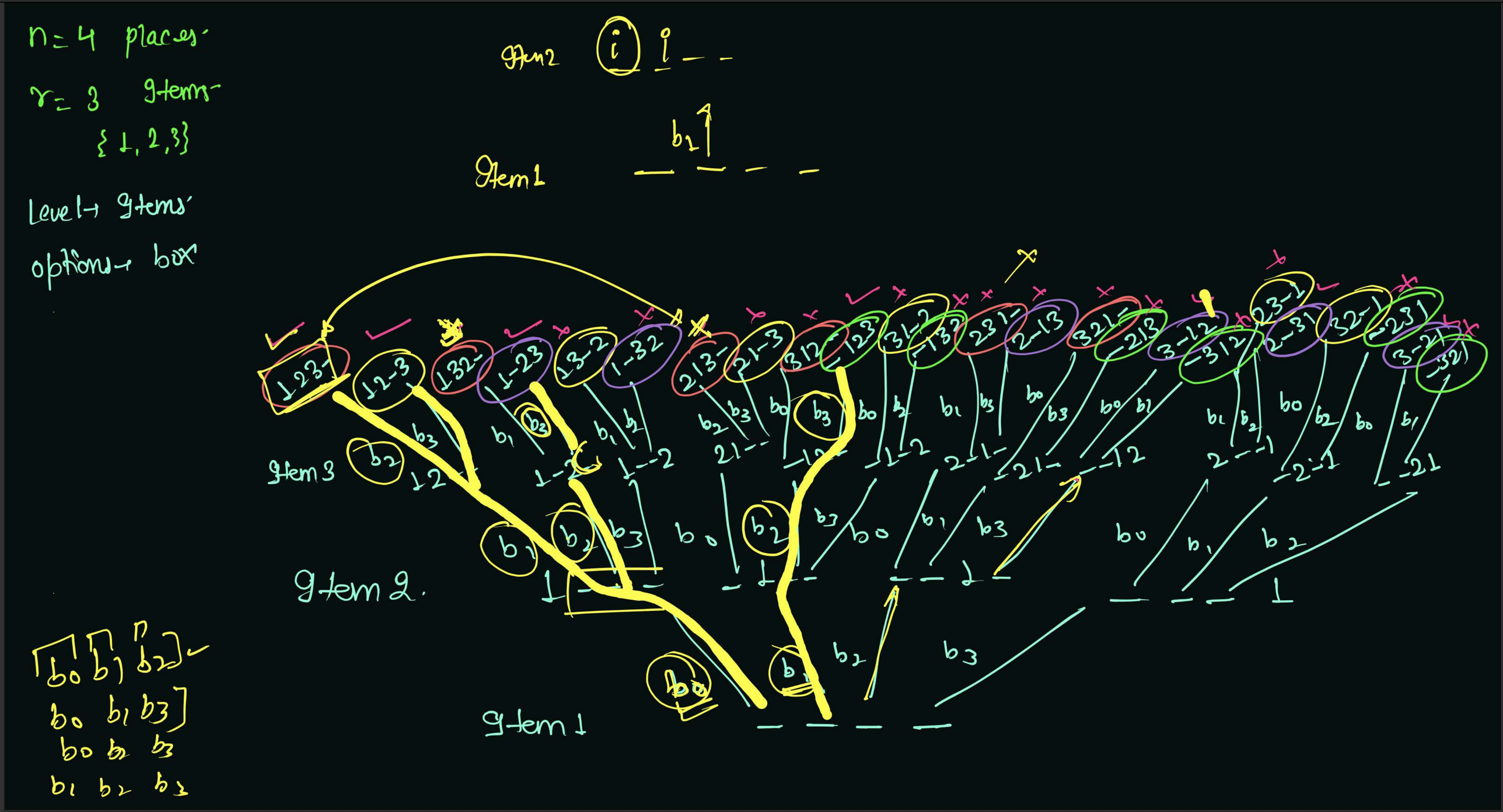
$${}^nC_r = \frac{{}^nP_r}{r!}$$ Combination

4 places , 3 objects $\{1,2,3\}$ ⟶

4 places , 3 objects $\{i,i,i\}$ ⟶

$^4P_3 = \frac{4!}{1!} = \frac{4\times3\times2\times1}{1} = 24.$

$^4C_3 = \frac{4!}{1!\,3!} = \frac{4\times3!}{3!} = 4$


n = 4 places.
r = 3 items
{1, 2, 3}
Level → items
options → box
item 2
item 1
item 3
item 2.
item 1
[b0 b1 b2]
b0 b1 b3
b0 b2 b3
b1 b2 b3

n = 4 boxes

r = 3 items

level - item

options - boxes

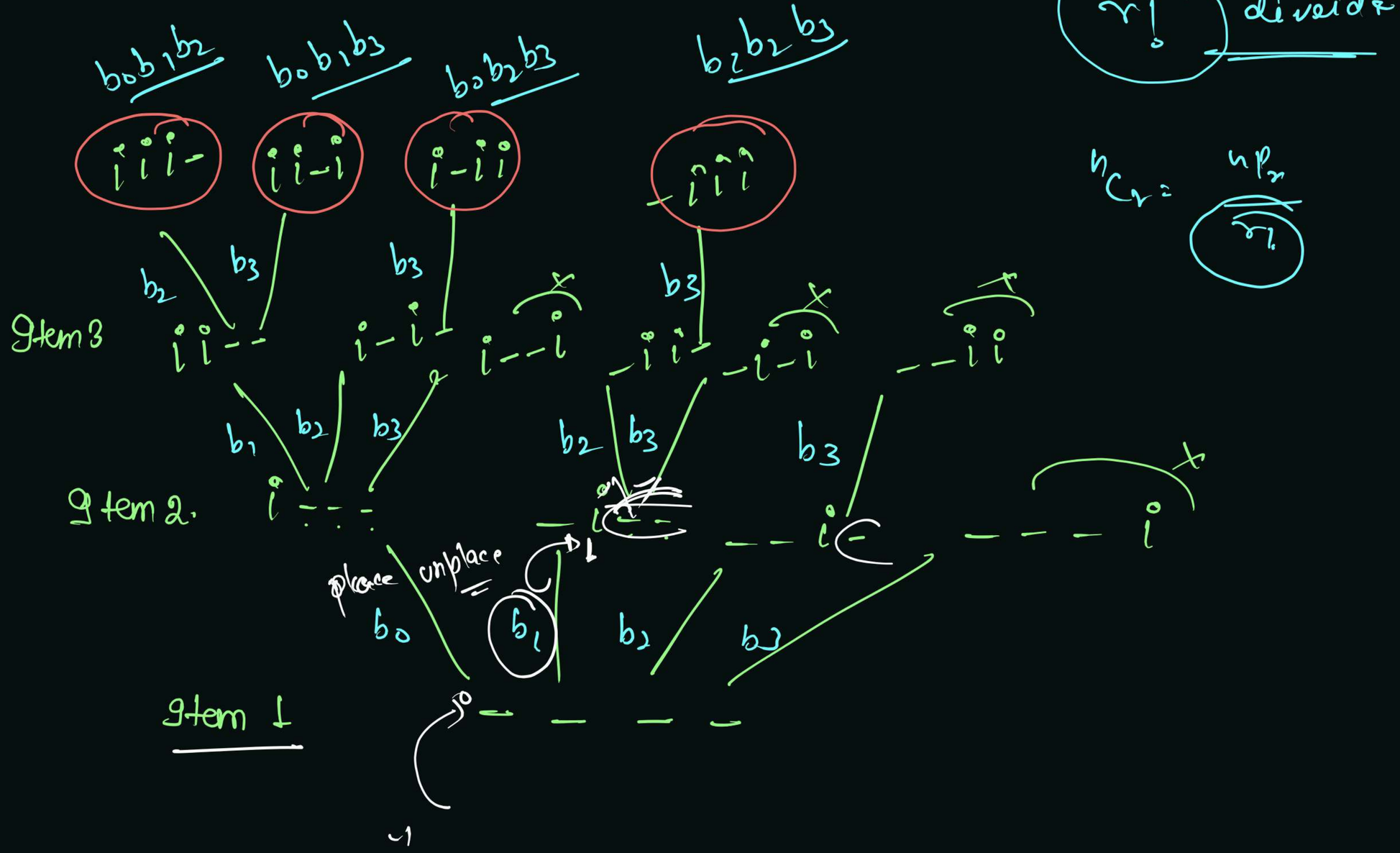
boxes - array

ci

ti

lb

tb



r! divide

$^nC_r = \frac{^nP_r}{r!}$