

## Permutations - Words - 1

word = "aabbb"

all possible permutation

length of word is  $n'$ .  $n'!$  is possible arrangement

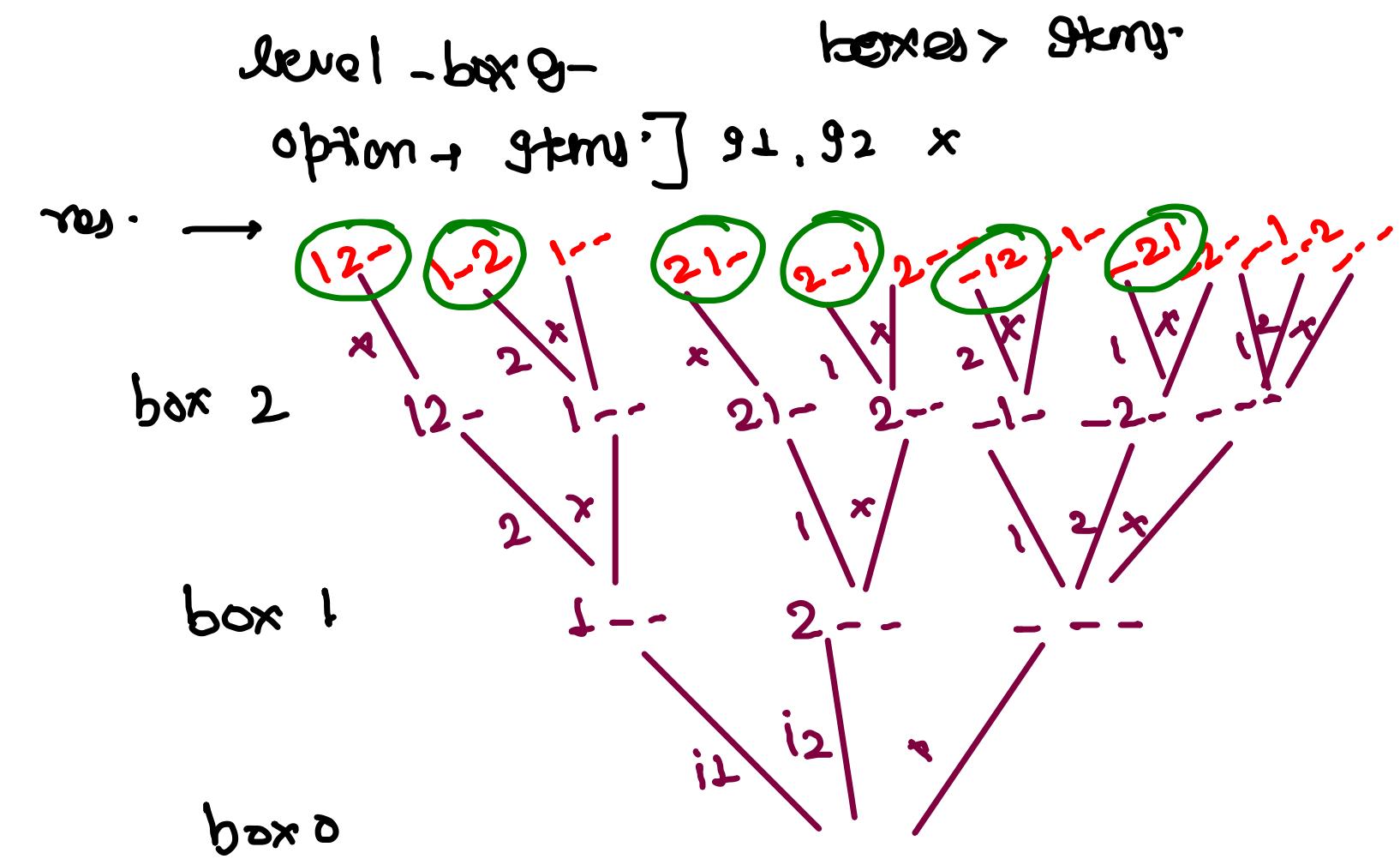
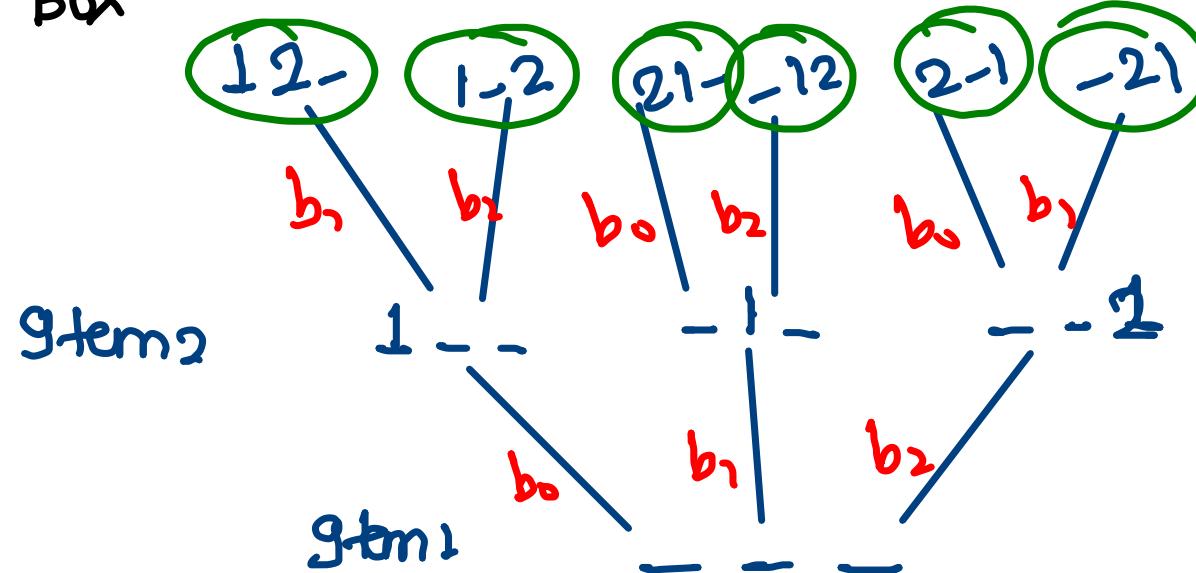
But due to repetition.

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

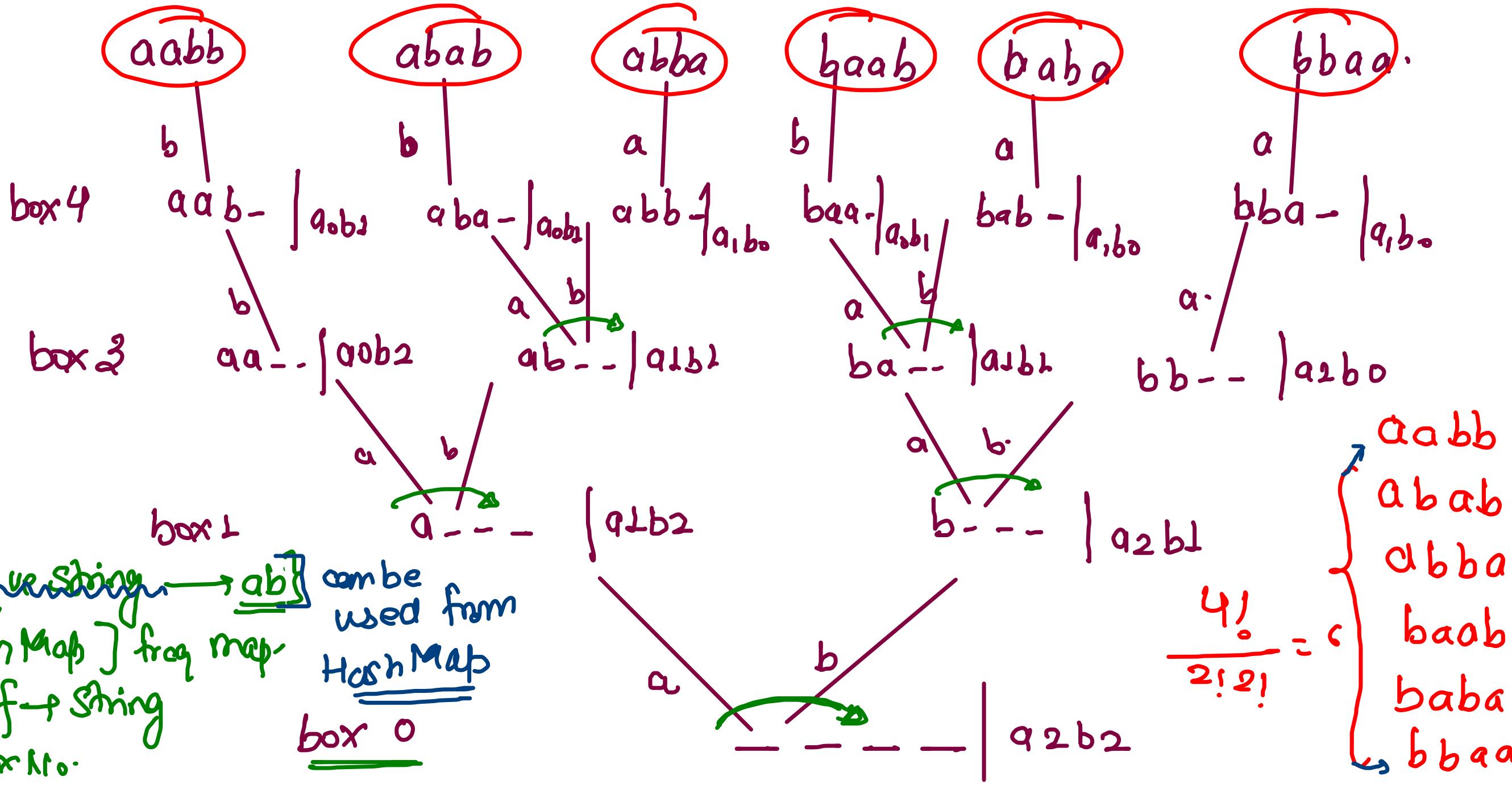
Revision: 3 box, 2 distinct items (1, 2)

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

level - items  
options - Box



word → a.a.b.b  
 NOTE: There is no chance for "No call" Because characters  
 level → box  
 and boxes are equal.  
 option → character

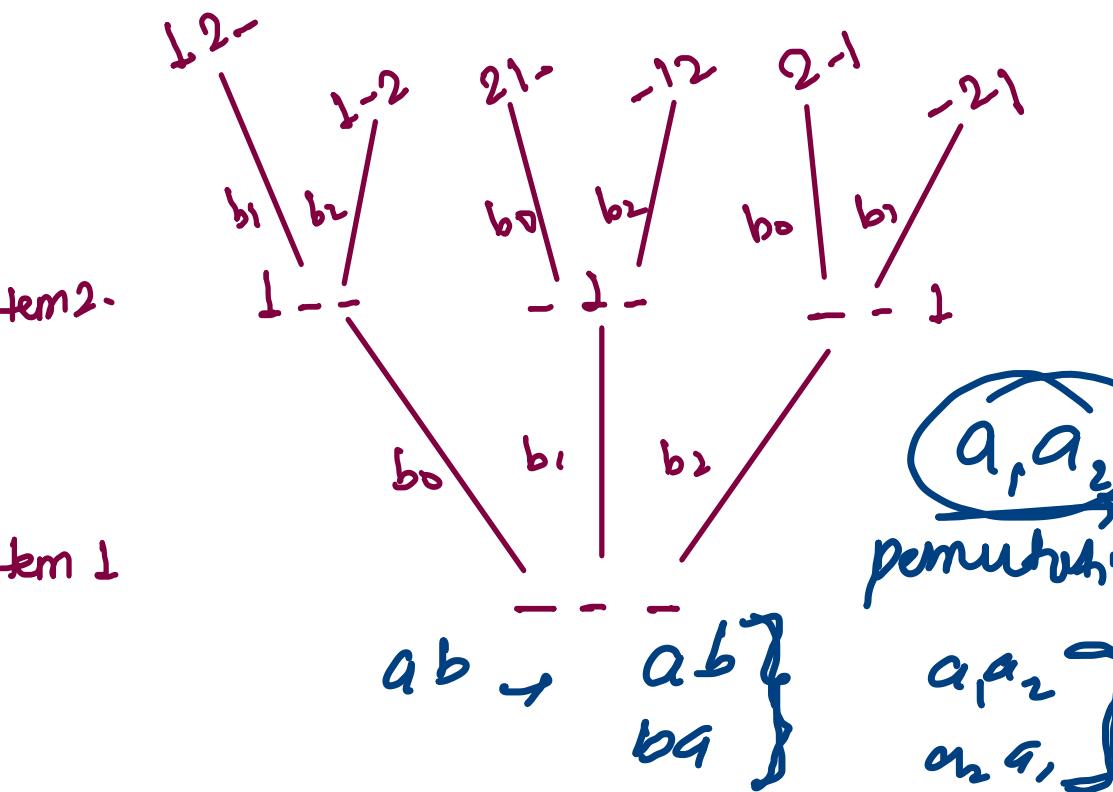


## Permutations - Words - 2 : String str= a a b b

Revision → 3 box, 2 distinct items.

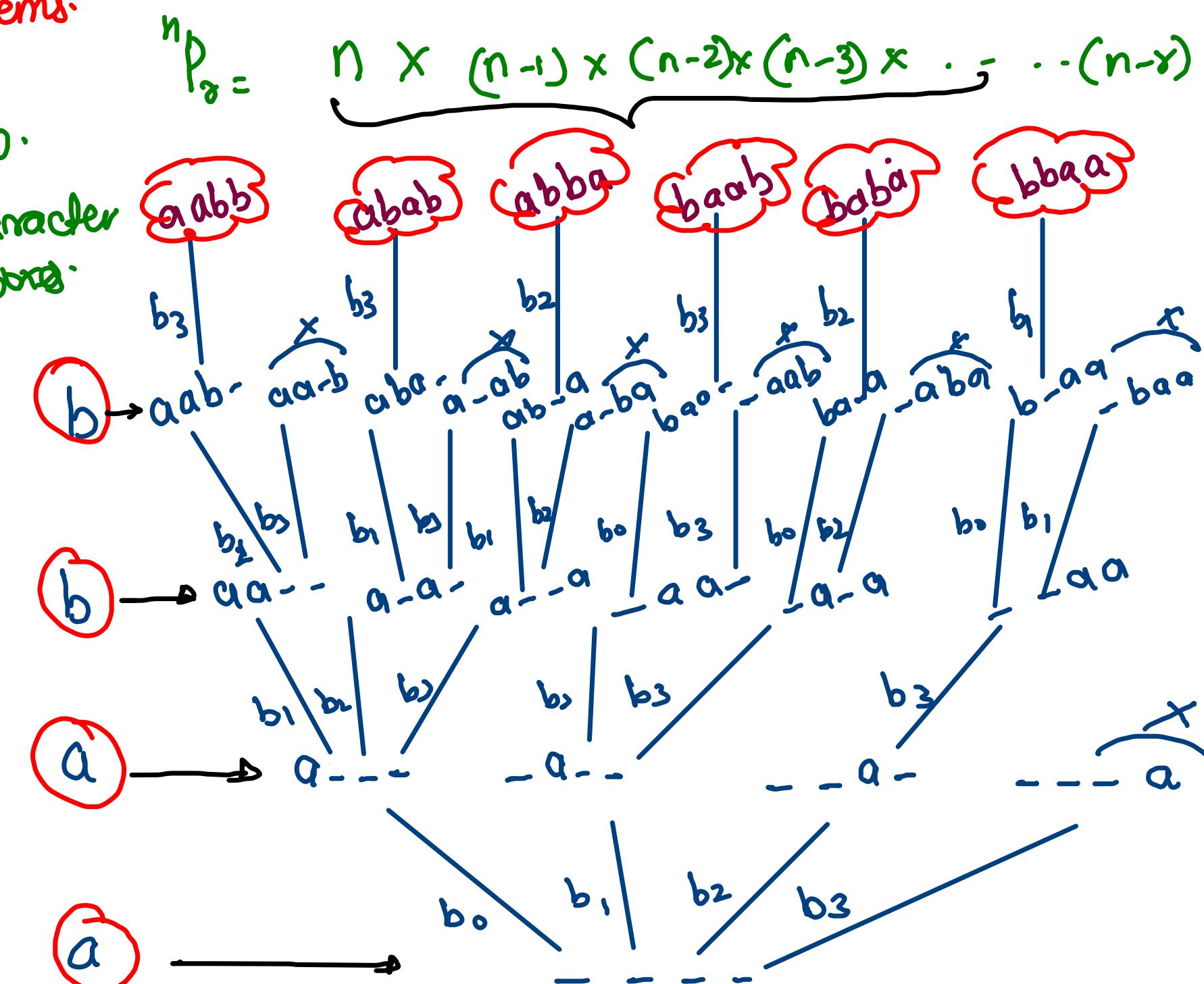
$$3P_2 = \frac{3!}{1!} = 6$$

$$\begin{array}{r} 1 \ 2 \ 0 \\ - \ 2 \ - \\ \hline 1 \ 0 \ 0 \end{array} \quad \begin{array}{r} 2 \ 1 \ 0 \\ - \ 1 \ - \\ \hline 1 \ 0 \ 1 \end{array}$$



String: aabb.

level → character  
option → box.



String = abab

$$\frac{4!}{2! \cdot 2!} = 6$$

a →  
b →

abab  
abba  
aabb  
baab

$$bab = \frac{4!}{2! \cdot 2!}$$

bbaa

level → character,

option → boxes

$a \rightarrow 2$   
 $b \rightarrow 3$

$b \rightarrow 2$   
 $a \rightarrow 2$   
 $b \rightarrow 1$

$a \rightarrow 1$   
 $b \rightarrow 2$

$b \rightarrow 1$

$a \rightarrow 2$

$a \rightarrow 2$   
 $b \rightarrow 3$

$b \rightarrow 2$   
 $a \rightarrow 2$   
 $b \rightarrow 1$

$a \rightarrow 1$   
 $b \rightarrow 2$

$b \rightarrow 1$

$a \rightarrow 2$

Set  
last  
occurrence  
in HashMap:

$[a \rightarrow -1]$   
 $b \rightarrow -1$

- ① H.Map last occ.
- ② idx
- ③ String.
- ④ box → array[]

C char[]

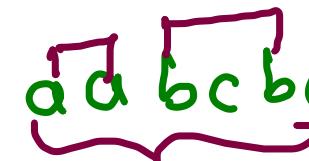
b-a-b-a-b-a

HashMap

Character, ordering.

Words - K Selection - 1 Given a string. print all possible ways to pick K unique character (No need to arrange them)

String → abcabc,

 → abc } → 2 piec

$$\frac{3!}{2!} = 3$$

→ select 2 character ) x Not arrange just select

aab

(a)

ab

~~aaX~~  
Same  
charact

Actual possible character → abc

→ { combination

bax  
cax  
cbx

ab  
ab b-

Every selection is unique  
and In every selection

Every character is also  
unique -

Selection → a, b

Xba

Xca

Xcb

Selection2 → a, c

b, c

Selection3 → ,

{ }

In all selection, Every character is  
unique ]

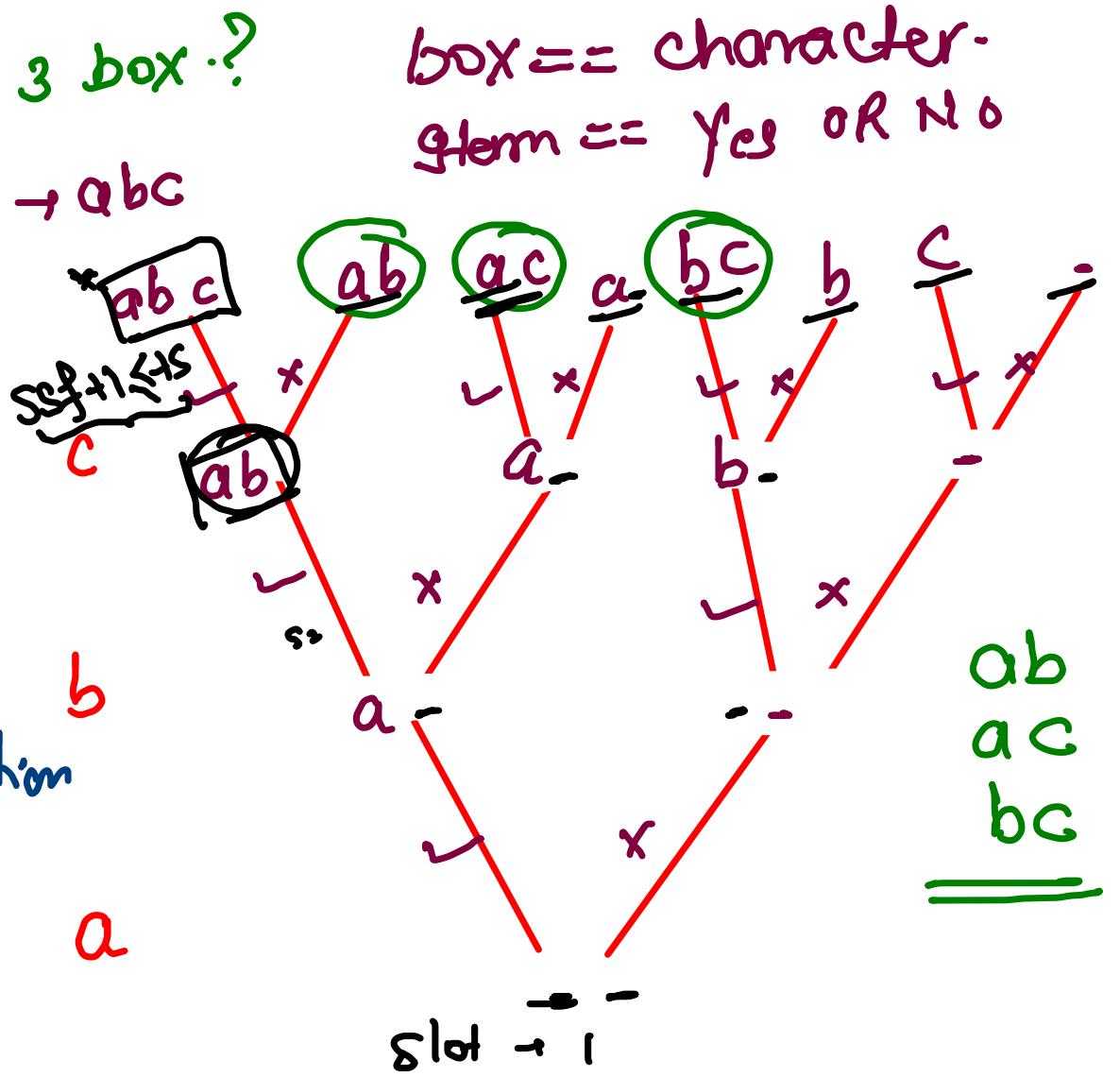
3 box , 2 similar stem (i,i)

$$3C_2 = \frac{3!}{2! 1!} = 3$$

$\begin{matrix} ii \\ i \\ - \\ ii \\ - \\ i \\ - \\ i \end{matrix}$ } } no. of possible ways to select 2 box out of 3 box?

unique string  
selection of & character out of 3 character

NOTE: To avoid repetition we consider unique string.



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

NOTE: Selection of 2 box out of 3 box  $\rightarrow$

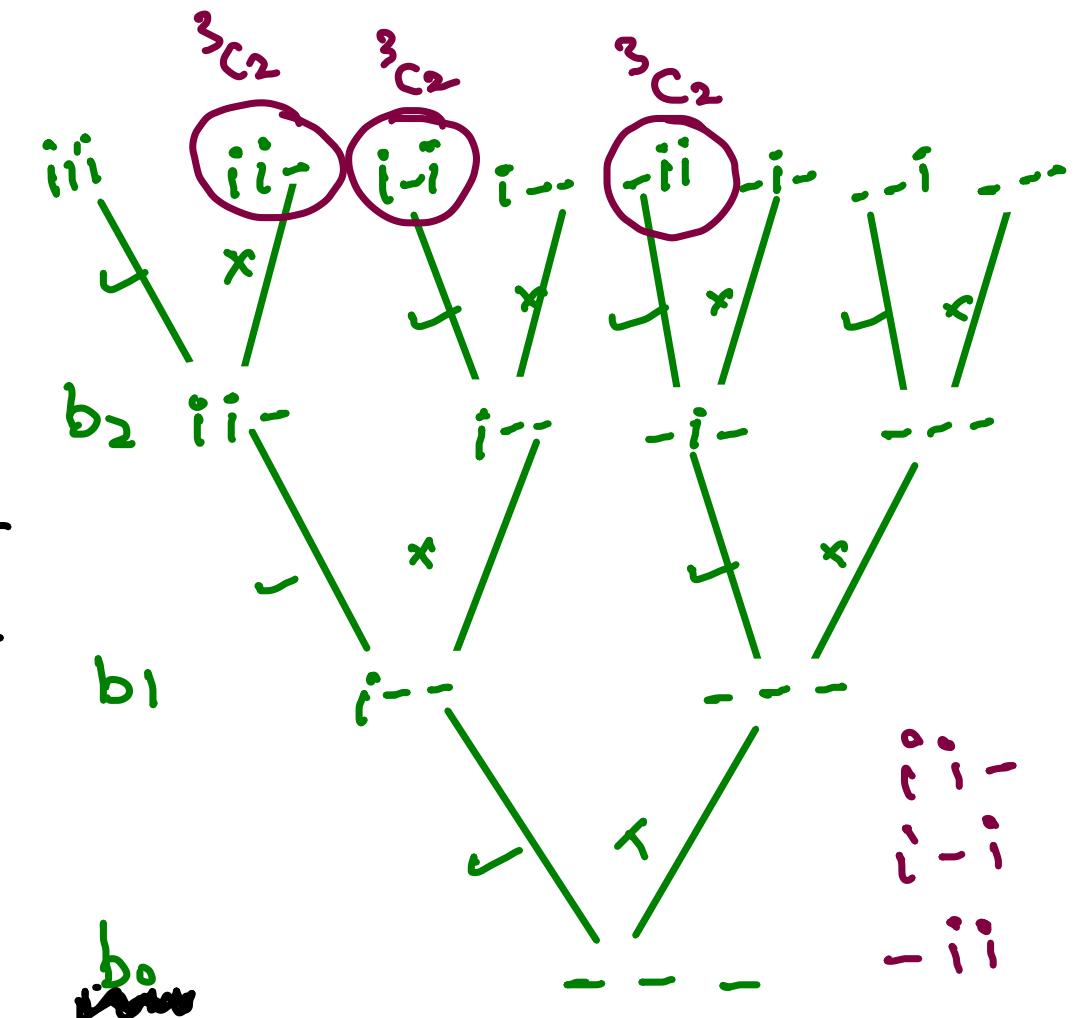
$$\sum_{r=0}^n {}^n C_r = {}^n C_0 + {}^n C_1 + {}^n C_2 + {}^n C_3 + \dots + {}^n C_n$$

$$\sum_{r=0}^3 {}^3 C_r = {}^3 C_0 + {}^3 C_1 + {}^3 C_2 + {}^3 C_3$$

box  $\rightarrow$  level  
stem  $\rightarrow$  option  
↓  
Yes  
OR  
No

### Requirement

- ① uniq. Strig.
- ② asf
- ③ S-S-f
- ④ f-s  $\rightarrow$  K
- ⑤ gndex



## Words - K Selection - 2 Given a string. Select 2 distinct character.

3 box, 2 similar stems (i,i)

$$C_2 = \frac{3!}{2!1!} = 3 \quad \begin{matrix} ii \\ i-i \\ -ii \end{matrix}$$

problem is about select & box out of 3 box

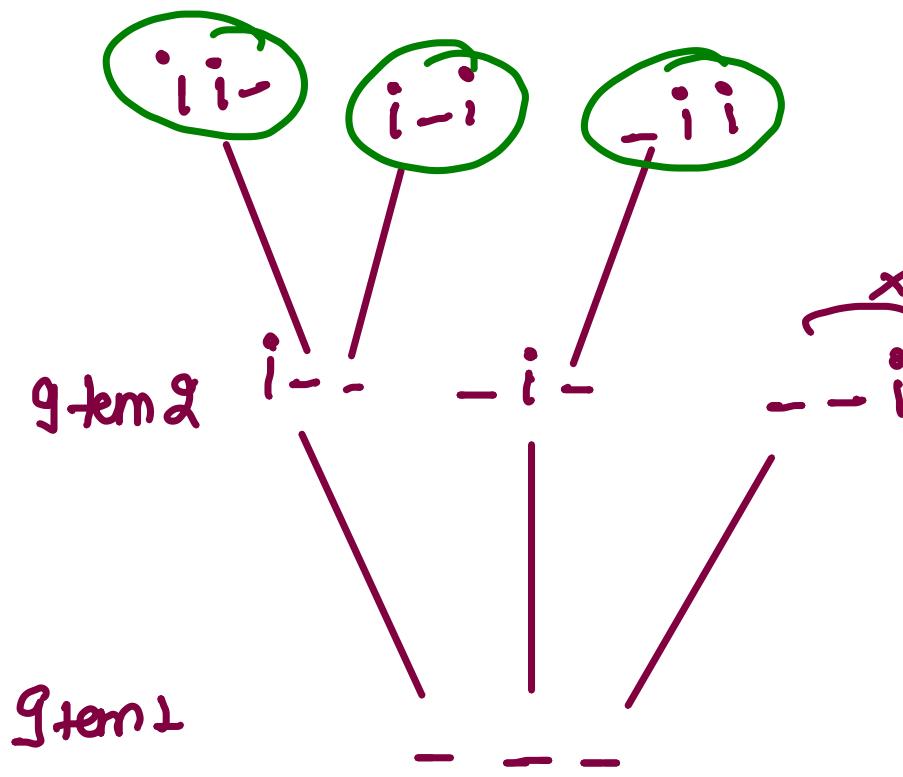
we have string  $\rightarrow$  abcabc, unique string  $\rightarrow$  abc

so question is about select & character out of 3 type character. (k character out of n-dist. character)

### Revision.

stem = level

box  $\rightarrow$  option.



level  $\rightarrow$  select 2d character.

option  $\rightarrow$  character.

### Requirement

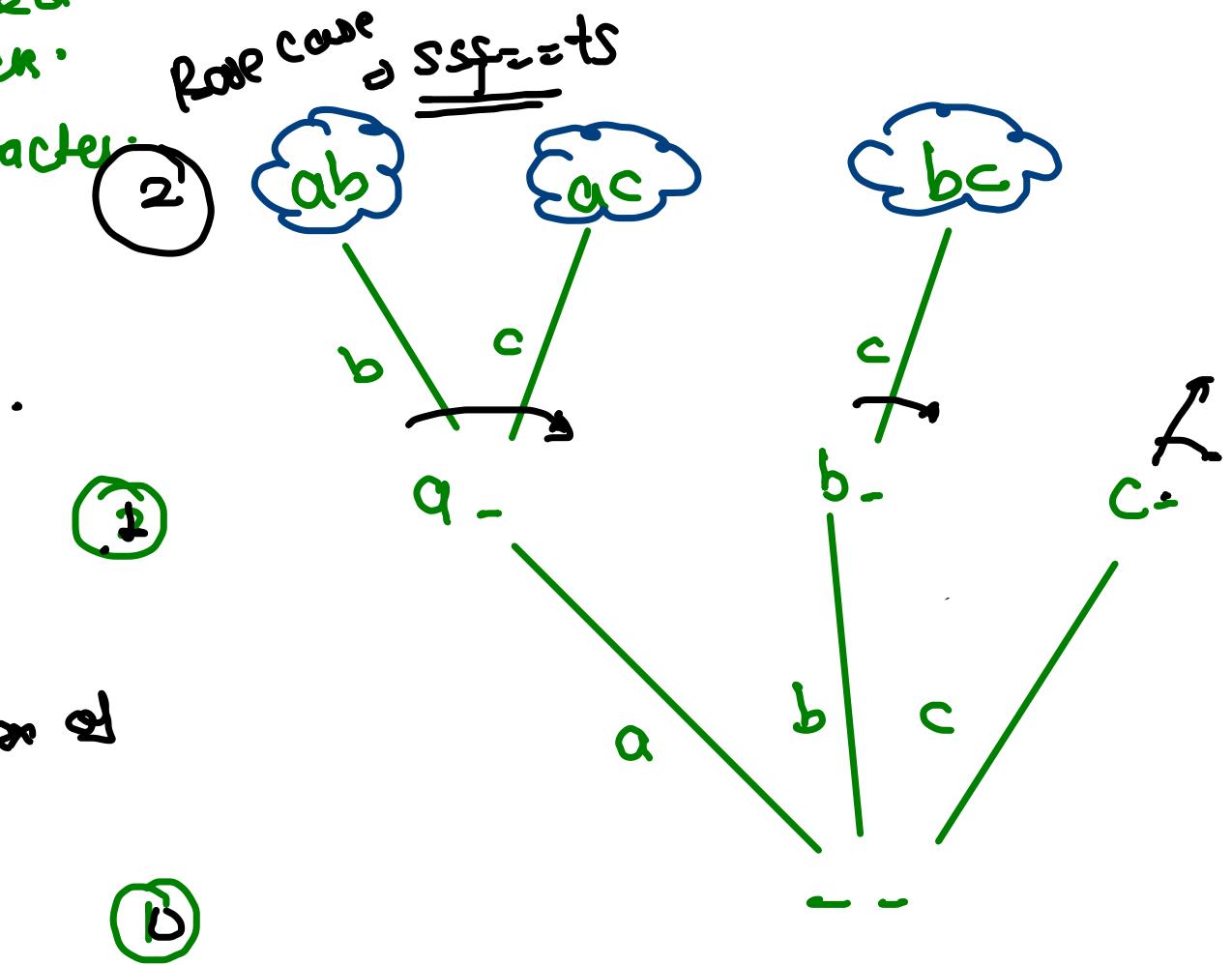
① Unique string.

② SSF

③ +S  $\rightarrow$  K

④ last 2nd char of character.

⑤ ASF



## Words - K Length Words - 1

Given a string (may have repeated elements)  
print all possible word of length 'k'.

string → abc abc

of length = 2. unique string → abc

ab      ba  
ac      ca  
bc      cb

Revise → 3 boxes, 2 distinct gms (1,2)

1 2 -      2 1 -  
1 - 2      2 - 1  
- 1 2

box      item.  
b1      i1  
b2      i2  
b3

box = char.  
Item = slot

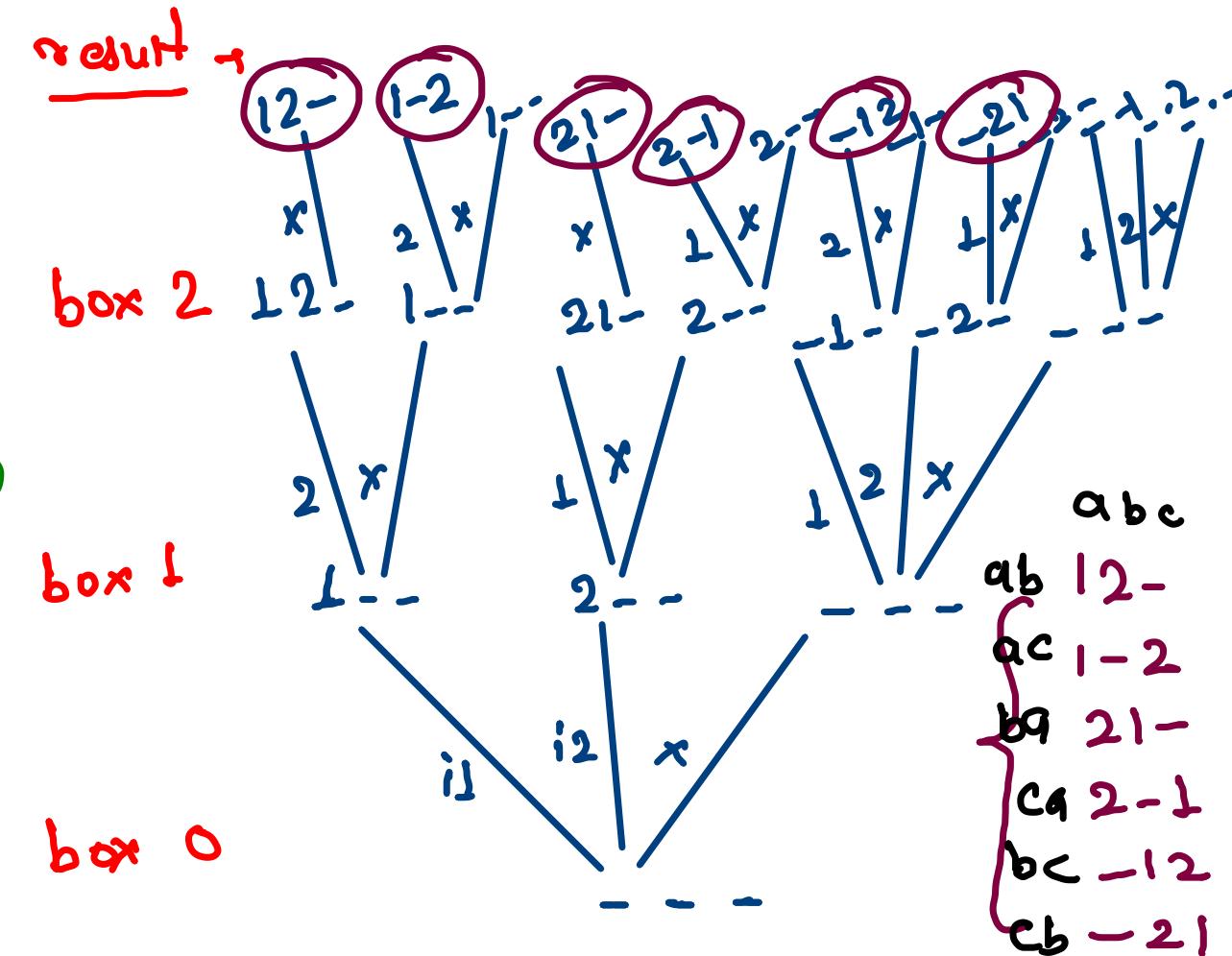
| <u>Character</u> | <u>Slots</u> . |
|------------------|----------------|
| a                | S1             |
| b                | S2             |
| c                |                |

0b  
ac  
bc  
ba  
ca  
cb

Arrangement of Selection

Selected → 0,N  
arrangement  
(word) → no

Revise - level → box  
options → gms. (i1, i2, x)



box  
b<sub>0</sub>  
b<sub>1</sub>  
b<sub>2</sub>

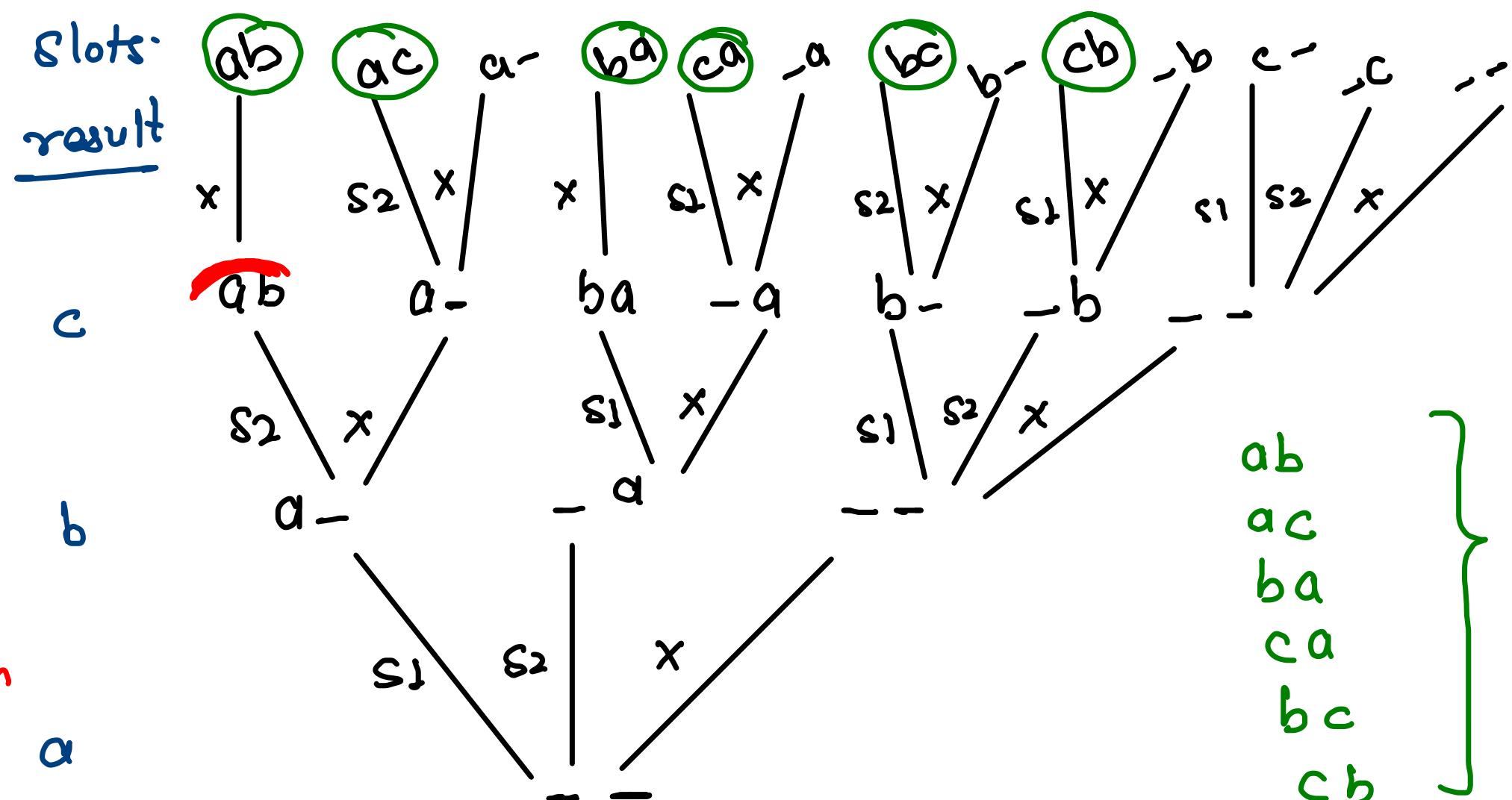
g-item  
i<sub>1</sub>  
i<sub>2</sub>

Character  
a  
b  
c

Slots  
s<sub>1</sub>  
s<sub>2</sub>

level → character

options → slots



① Unique string

② Slot[] char array

③ gindex

④ SSF

4S → slot.length