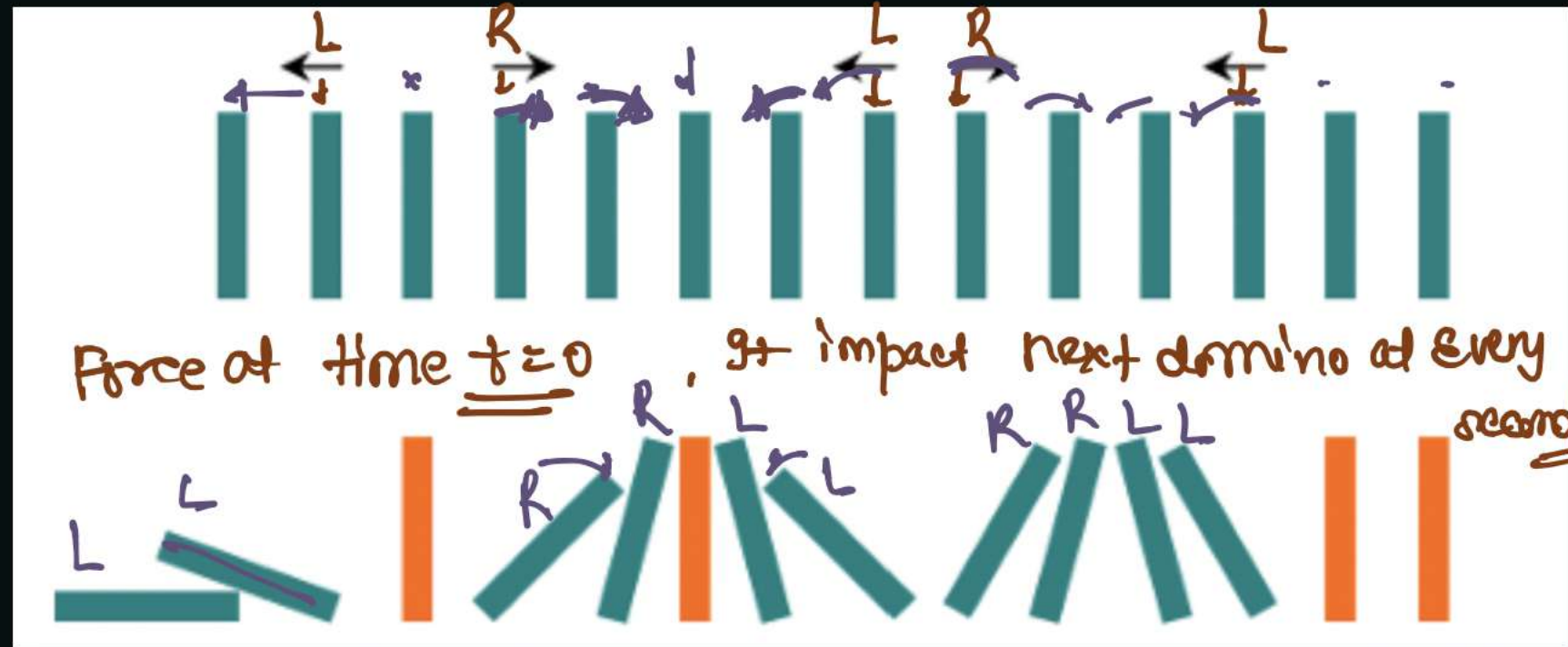


# ✓ Push Dominoes

Saturday, 11 September 2021 10:17 AM

# No class in Evening #

✓ Input → ". L . R . . . L R . . L . ."



✓ Output → " L L . R R . L L R R L L . . "

Input → Position of Domino with direction of force applied at time  $t=0$   
Output → final position of Domino

④ Webinar @ 4:00

- Test Prep
- ① DP → Counting.
  - ② Graph → DFS, BFS, Dijkstra's Prims.
  - ③ Trees → L-L vertical order + Path sum.
- 2 hrs.

case-I  $\rightarrow$   $\begin{array}{c} \curvearrowright \\ L \dots L \\ \curvearrowleft \end{array} \rightarrow "L L L L L L L L" \quad || \checkmark$

case-II  $\rightarrow$   $\begin{array}{c} \curvearrowleft \\ R \dots R \\ \curvearrowright \end{array} \rightarrow "R R R R R R R R" \quad || \checkmark$

case-III  $\rightarrow$   $\begin{array}{c} \curvearrowleft \\ L \dots R \\ \curvearrowright \end{array} \rightarrow L \dots R$  Remain some do Nothing to do

case-IV  $\rightarrow$   $\begin{array}{c} \curvearrowright \\ R \dots L \\ \curvearrowleft \end{array} \rightarrow R \dots L$

odd " " even " "

case-a  $\begin{array}{c} \curvearrowright \\ R \dots L \\ \curvearrowleft \end{array}$  case-b  $\begin{array}{c} \curvearrowright \\ R \dots L \\ \curvearrowleft \end{array}$

force balance from Left & Right

$\begin{array}{ccccccc} +\infty & +\infty & 2 & 3 & 1 & 1 & +\infty \\ R & R & R & R & L & L & L \\ \uparrow & & & & & & \\ R & & & & & & L \end{array}$

Balance  $\rightarrow$

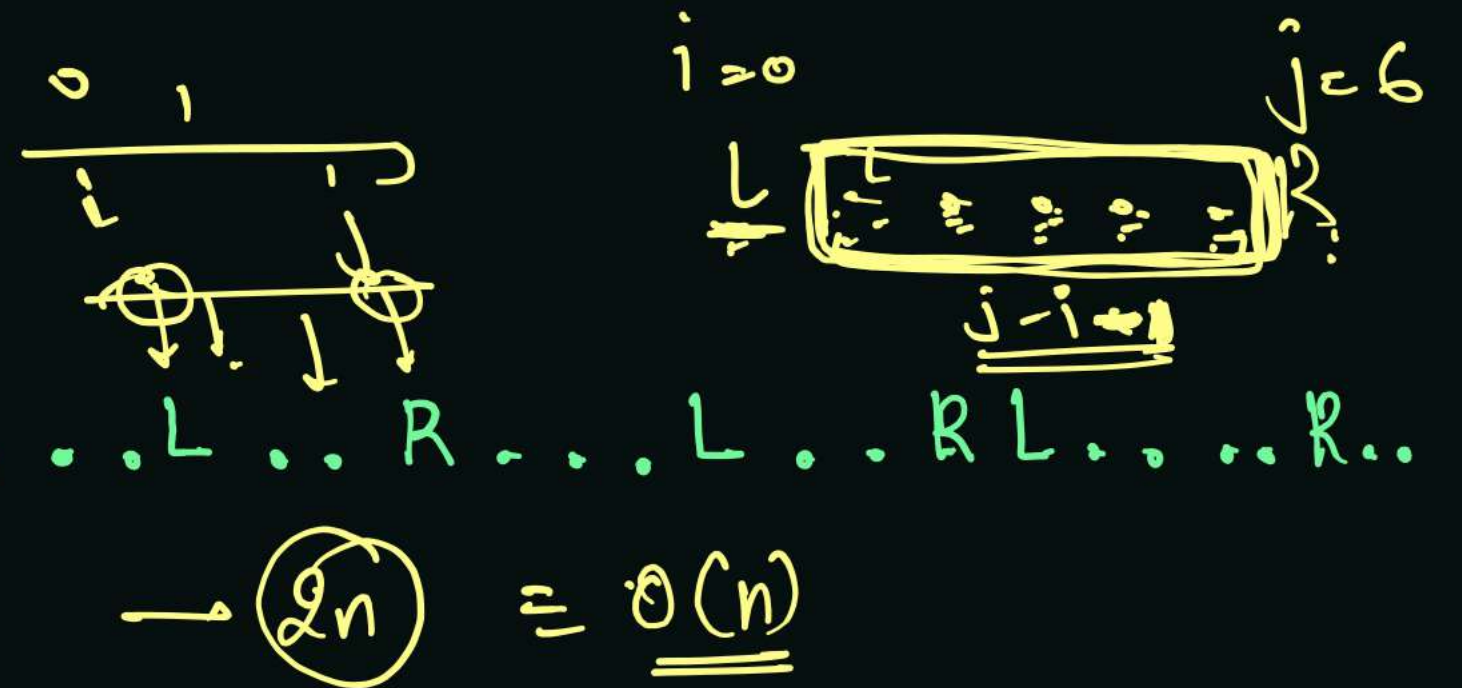
$\begin{array}{ccccccc} R & R & R & L & L & L & L \\ \curvearrowright & & & & & & \curvearrowleft \end{array}$



How to deal with Edge case? →

← position →

~~Pract~~  $\text{str} += \text{char}$  →  $\text{str.push\_back(char)}$   
 $\text{str} = \text{str} + \text{char}$  →  $\text{position} \rightarrow$   
 Character  $\xrightarrow{\text{copy}}$   $\text{+ char}$



→ Insertion by us to solve  
 → if can't create impact on initial position

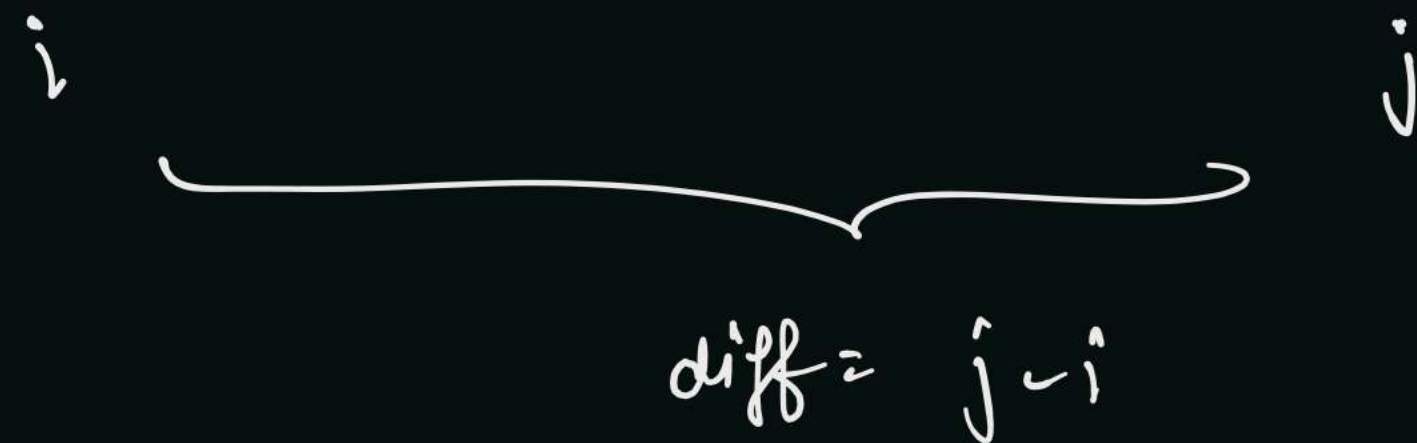
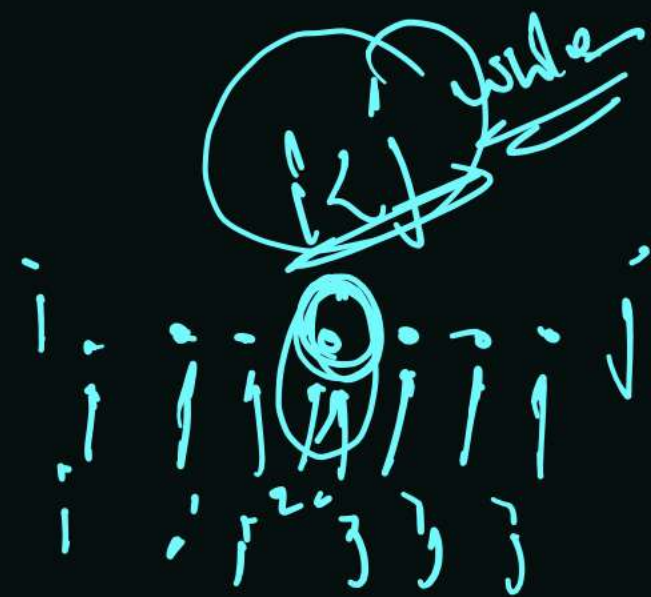
array →  $[L] \dots L \dots R \dots L \dots R \dots R \dots L \dots R$

Final output → "LLLL...RR.LL...RRRRLLL..."  
 $i \quad i+1 \quad i+2 \quad i+3 \quad i+4 \quad i+5 \quad i+6$   
 $\boxed{\dots} \quad \boxed{\dots}$   $\text{diff} = 4+6 = 10$   
 $= \boxed{6} - 1$

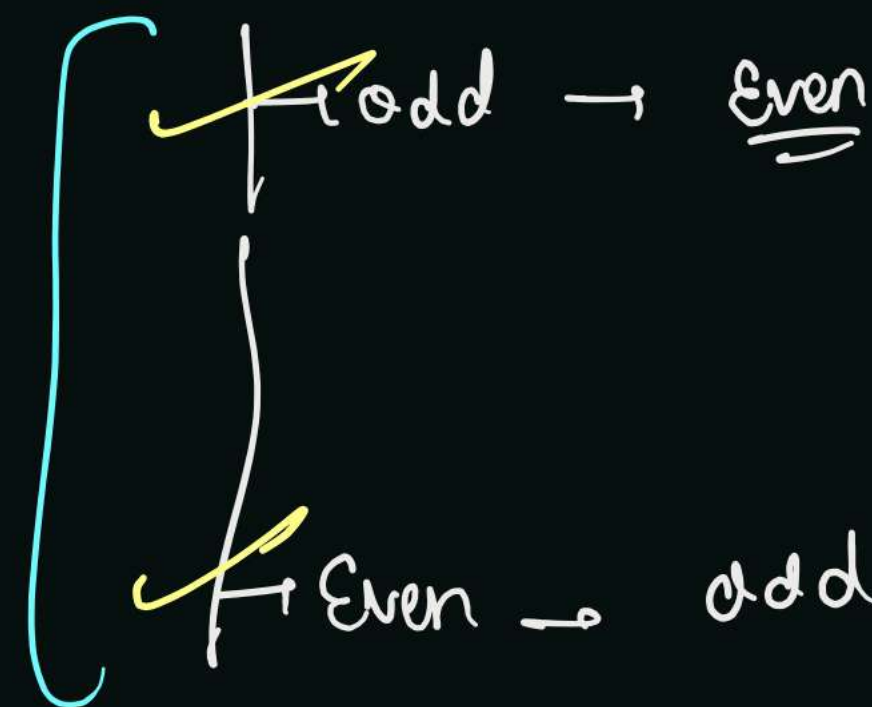
- Case I → L...L → L
- Case II → R...R → R
- Case III → L...R → Nothing to do
- Case IV → R...L → Depend on odd and Even

diff =  $j-i = 4$  Index base diff  
 → diff Even → odd no. of dots  
 diff =  $j-i = 5$  →  
 → diff odd → Even no. of dots





Managed in  
single loop



for1  $i+1$  to  $mid$   $\rightarrow R$   
for2  $mid+1$  to  $j-1$   $\rightarrow L$  } Don't skip  
any dom's

for1  $i+1$  to  $mid-1$   $\rightarrow R$   
for2  $mid+1$  to  $j-1$   $\rightarrow L$  } skip middle dom's  
 $i++$ ;  $j--$



while( $i < j$ ) {  
     $i++$ ;  
     $j--$ ;  
}

## Consecutive Number Sum

Saturday, 11 September 2021

11:57 AM

$$n = 15$$

No. of possible way to make 15 with consecutive number sum.

$$\text{I} \rightarrow \underline{15} = 15$$

$$\text{II} \rightarrow \underline{7+8} = 15$$

$$\text{III} \quad \underline{4+5+6} = 15$$

$$\text{IV} \quad \underline{1+2+3+4+5} = 15$$

$$\text{total no. of ways} = \textcircled{4}$$

I  $\rightarrow$  No. of ways for k-length consecutive sequence.

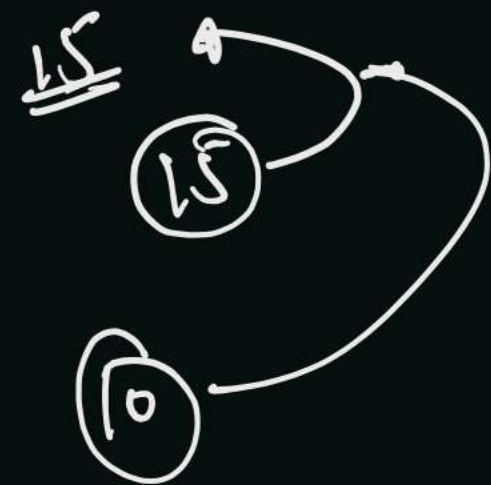
# atleast single possibility is always available.  $\rightarrow$  no. itself.

either  
present

or  
not



II  $\rightarrow N = 15$



$k_{max} \Rightarrow$

$\rightarrow k_{max}$

$k=1 \rightarrow$  if num - 15  $\rightarrow$  count 2 + Count +.

$k=2 \rightarrow$  "  $\rightarrow 7+8$

$k=3 \rightarrow$  "  $\rightarrow 4+5+6$

$k=4 \rightarrow$  "  $\rightarrow$  No possible

$\rightarrow 1+2+3+4+5$

$R_0 = 4$

there is always single possibility for  $k$  length

Seq.

$k=5$

$1+2+3+4+5 = 15$

$4+5+6$   $[k=3]$

$k =$  no. of different Elements

III  $\rightarrow$  How to find  $k_{max}$  [max. no. of elements whose sum is  $n$ ]

$$= \underline{x} + (x+1) + (x+2) + (x+3) + \dots + [x + (k-1)] = N$$

$\rightarrow$  sum of  $k$  Elements.

$$\sum n = \frac{n(n+1)}{2}$$

$$\sum n^2 = \frac{n(n+1)(2n+1)}{6} = \underline{kx} + [0 + 1 + 2 + 3 + \dots + (k-1)] = N$$

$$\sum n^3 = \left[ \frac{n(n+1)}{2} \right]^2$$

$$\sum_{i=0}^{n-1} n_i = \frac{n(n-1)}{2}$$

$$\underline{kx} + \frac{k(k-1)}{2} = N$$

$$kx = N - \frac{k(k-1)}{2}$$



$$kx = N - \frac{k(k-1)}{2}$$

linear Equation in 2 variable, 'k' and 'x'

① Either we have two Equation

② hit and try, hit value of first variable and get second one.

for k

find x

put value of k and find(x) → ✓

$$kx = n - \frac{k(k-1)}{2}$$

$$2kx = 2n - k(k-1)$$

$$k^2 - k + 2kx - 2n = 0$$

$$k^2 + k(2x-1) - 2n = 0$$

$$k = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$k = \frac{-(-ve) \pm \sqrt{(2x-1)^2 - 4 \times 1 \times (-2n)}}{2 \times 1}$$

Can't consider it -ve

Single solution for k  
 $k = -ve$  Not possible  
 $k = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$k_{max}$

$$k=1$$

$$k=2$$

$$k=3$$

$$k=4$$

⋮

$$kx = N - \frac{k(k-1)}{2}$$

As we know all integers are even

$$x = \left[ N - \frac{k(k-1)}{2} \right] / k$$

$$\Rightarrow x \geq 0$$

$$\Rightarrow \left[ N - \frac{k(k-1)}{2} \right] / k > 0$$

$$N > \frac{k(k-1)}{2}$$

$$\Rightarrow 2N > k(k-1)$$

$\Rightarrow$  upper Range of  $k$ ,

$$k(k-1) < 2N$$

$$k^2 < 2N \Rightarrow \underline{\underline{k < \sqrt{2N}}}$$



Loop of  $k$  from 1 to  $k(k-1) < 2N$

$k=1$  find  $x=?$   
 $k=2$  find  $x=?$  if  $x$  is  
 $k=3$  " Integral  
 $k=4$  " Count++  
 $\vdots$   
 $\vdots$

$$kx = N - \frac{k(k-1)}{2}$$

$\Rightarrow x = \left[ N - \frac{k(k-1)}{2} \right] / k$

$\boxed{1.5}$  2.5 3.5 4.5  
 7 3 2  
 $x$  is starting of sequence

' $x$ ' is only valid the solution of ' $x$ ' will be on Integral value.

→ if ' $x$ ' is an integer then it hold eqn-

$$\left( N - \frac{k(k-1)}{2} \right) \% k == 0$$

Numerator must be divisible by  $k$  (i.e. denominator).

→ Count in final Result

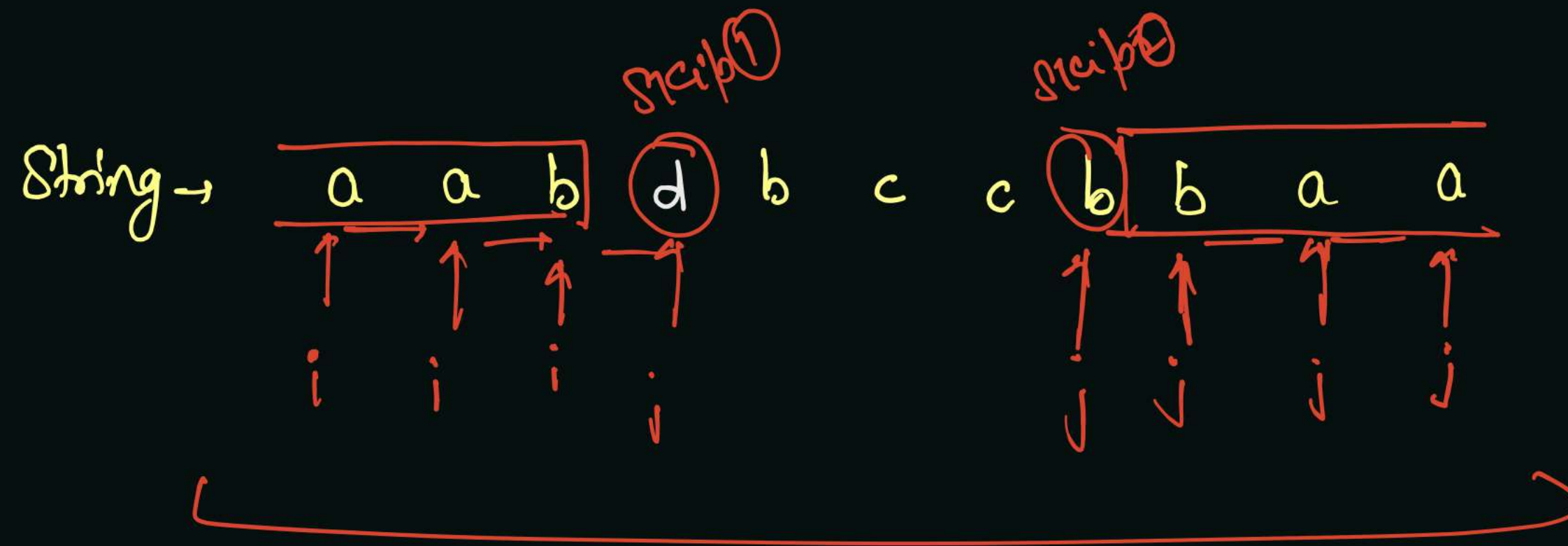
→ No. of ways

$$k < \sqrt{N} \quad k \neq k < N$$

## Valid Palindrome 2

Saturday, 11 September 2021

1:11 PM



d b c c b

d b c c ~~b~~

b c c b

True  
return

i = 0;  
j = length - 1;

```
while (i < j) {  
    if (char[i] == char[j]) {  
        i++;  
        j--;  
    } else {  
        return isPalindrome(  
            str, i + 1, j) ||  
            isPalindrome(str,  
                i, j - 1);  
    }  
}
```

return false;



# Arithmetic Operator in Strings

Saturday, 11 September 2021

1:21 PM

