

L39

## Linked List : Classical Problems 1

Join Discord - <https://bit.ly/ly-discord>

$$a + b$$

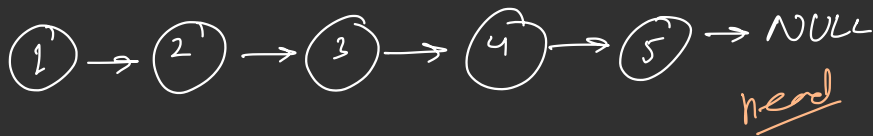
$$6 + 7$$

7

## Recap

1. Discussed how contiguous memory in Arrays:
  - a. Helps in a fast random access
  - b. But insertion/deletion in between is a nightmare
2. Felt the need for linked list so that no shifting of elements is required
3. Implemented Singly Linked List
4. Discussed the idea for:
  - a. Double Linked List
  - b. Circular Linked List
5. Did you folks implement the Doubly Linked List? 😊

Let's dive into the problems.  
A caveat: They're weird and interesting at the same time.



Find the middle node of a given Linked List

Method 1: A straightforward one

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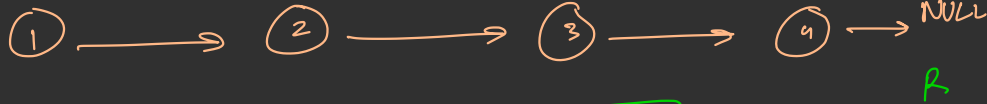
T

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R

Method 2 : Remember the Tortoise and Rabbit story?

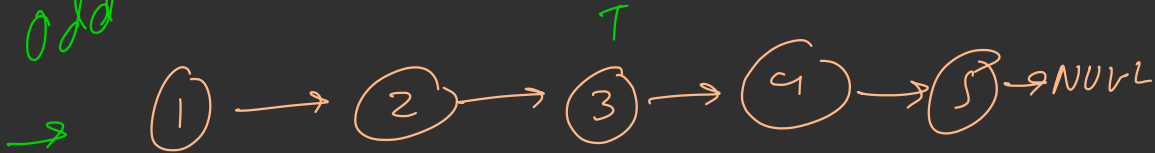
Even



$R = \text{NULL}$

Intuition

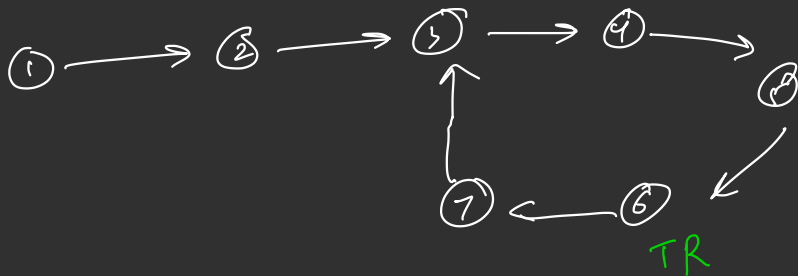
odd



$R \rightarrow \text{next} = \text{NULL}$

Let's implement





Detect Cycle in a Linked List

Think in a similar direction  
as the previous problem

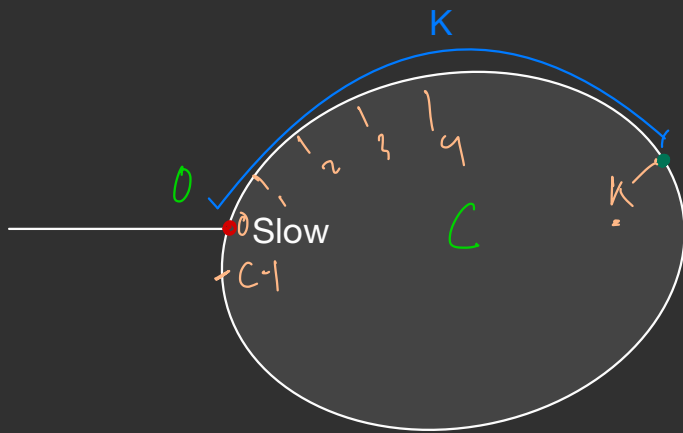
The scenario when there is no cycle

The scenario when there is a cycle

Where will be *fast* when *slow* reaches the start of the cycle?

Will they always meet?

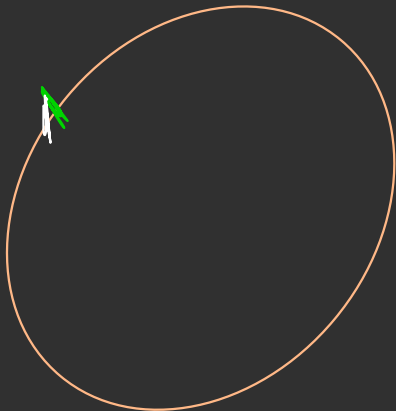
## Intuition / Proof



$S$		$F$
0	$\frac{K}{}$	$K$
1	$\frac{K+1}{}$	$K+2$
2	$\frac{K+2}{}$	$K+4$
3	$\frac{K+3}{}$	$K+6$

$K$   
Fast

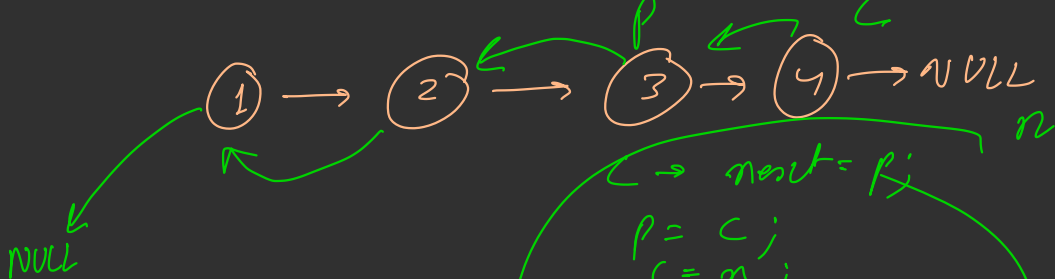
$K \ 0, 2, 2, \dots, G-1$   
 $\uparrow$





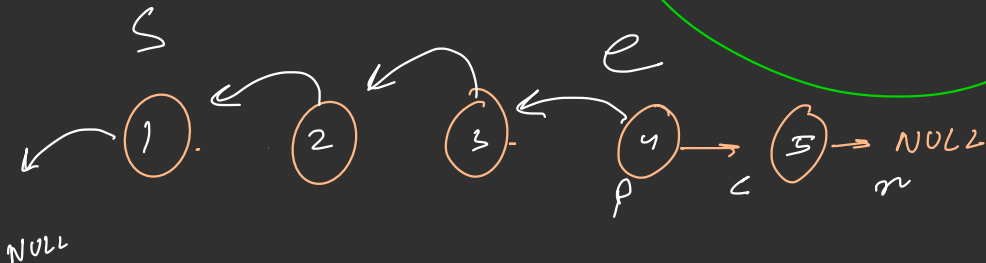
Let's Implement

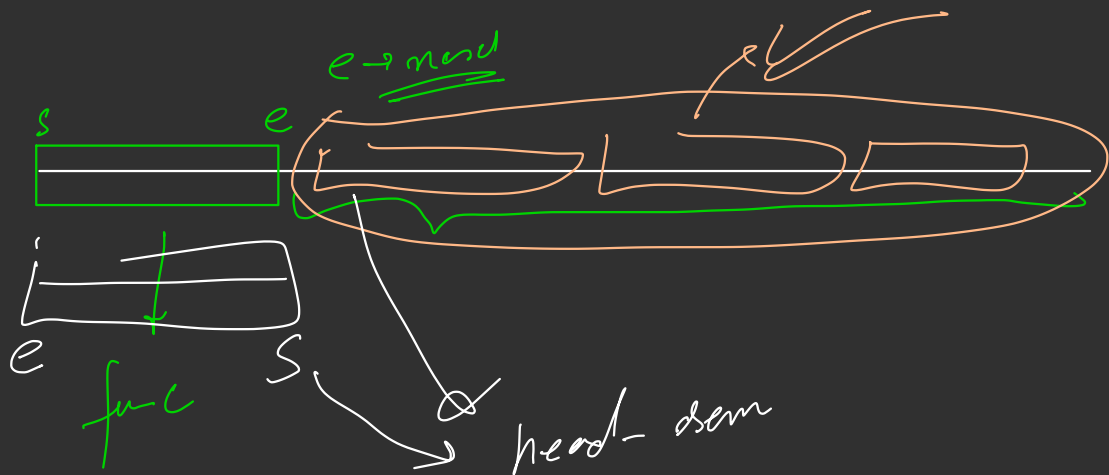
Next Problem : Reverse in parts of K  
(A good one)



What if it was just reversing the whole linked list?  
 Did you do the homework? :)

$n = n \rightarrow next;$





## Reversing a Linked List : Idea

Let's come to the original question now.

What if we just think about finding  
and reversing the first  $k$ -group?

The rest - we'll delegate to our own magical recursion.



Intuition

Let's Implement

# Thank You!

Reminder: Going to the gym & observing the trainer work out can help you know the right technique, but you'll muscle up only if you lift some weights yourself.

So, PRACTICE, PRACTICE, PRACTICE!