

# Problem 24: Swap Nodes in Pairs

## Problem Information

**Difficulty:** Medium

**Acceptance Rate:** 0.00%

**Paid Only:** No

## Problem Description

Given a linked list, swap every two adjacent nodes and return its head. You must solve the problem without modifying the values in the list's nodes (i.e., only nodes themselves may be changed.)

Example 1:

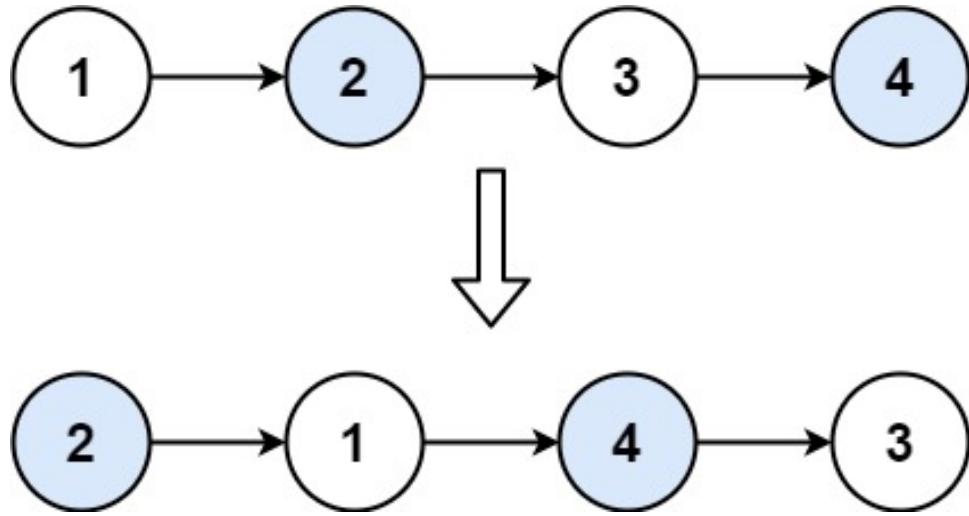
Input:

head = [1,2,3,4]

Output:

[2,1,4,3]

Explanation:



Example 2:

Input:

```
head = []
```

Output:

```
[]
```

Example 3:

Input:

```
head = [1]
```

Output:

```
[1]
```

Example 4:

Input:

```
head = [1,2,3]
```

Output:

[2,1,3]

Constraints:

The number of nodes in the list is in the range

[0, 100]

.

$0 \leq \text{Node.val} \leq 100$

## Code Snippets

C++:

```
/**
 * Definition for singly-linked list.
 * struct ListNode {
 *     int val;
 *     ListNode *next;
 *     ListNode() : val(0), next(nullptr) {}
 *     ListNode(int x) : val(x), next(nullptr) {}
 *     ListNode(int x, ListNode *next) : val(x), next(next) {}
 * };
 */
class Solution {
public:
    ListNode* swapPairs(ListNode* head) {
        }
    };
}
```

Java:

```
/**
 * Definition for singly-linked list.
 * public class ListNode {
 *     int val;
 *     ListNode next;
 * }
```

```

* ListNode() {}
* ListNode(int val) { this.val = val; }
* ListNode(int val, ListNode next) { this.val = val; this.next = next; }
*
*
class Solution {
public ListNode swapPairs(ListNode head) {

}
}

```

### Python3:

```

# Definition for singly-linked list.
# class ListNode:
#     def __init__(self, val=0, next=None):
#         self.val = val
#         self.next = next
class Solution:
    def swapPairs(self, head: Optional[ListNode]) -> Optional[ListNode]:

```

### Python:

```

# Definition for singly-linked list.
# class ListNode(object):
#     def __init__(self, val=0, next=None):
#         self.val = val
#         self.next = next
class Solution(object):
    def swapPairs(self, head):
        """
        :type head: Optional[ListNode]
        :rtype: Optional[ListNode]
        """

```

### JavaScript:

```

/**
 * Definition for singly-linked list.
 * function ListNode(val, next) {
*     this.val = (val===undefined ? 0 : val)
*     this.next = (next===undefined ? null : next)

```

```

* }
*/
/** 
 * @param {ListNode} head
 * @return {ListNode}
 */
var swapPairs = function(head) {
};

}

```

### TypeScript:

```

/**
 * Definition for singly-linked list.
 * class ListNode {
 *   val: number
 *   next: ListNode | null
 *   constructor(val?: number, next?: ListNode | null) {
 *     this.val = (val===undefined ? 0 : val)
 *     this.next = (next===undefined ? null : next)
 *   }
 * }
 */

function swapPairs(head: ListNode | null): ListNode | null {
};

}

```

### C#:

```

/**
 * Definition for singly-linked list.
 * public class ListNode {
 *   public int val;
 *   public ListNode next;
 *   public ListNode(int val=0, ListNode next=null) {
 *     this.val = val;
 *     this.next = next;
 *   }
 * }
 */

public class Solution {

```

```
public ListNode SwapPairs(ListNode head) {  
    }  
    }  
}
```

## C:

```
/**  
 * Definition for singly-linked list.  
 * struct ListNode {  
 *     int val;  
 *     struct ListNode *next;  
 * };  
 */  
struct ListNode* swapPairs(struct ListNode* head) {  
  
}
```

## Go:

```
/**  
 * Definition for singly-linked list.  
 * type ListNode struct {  
 *     Val int  
 *     Next *ListNode  
 * }  
 */  
func swapPairs(head *ListNode) *ListNode {  
  
}
```

## Kotlin:

```
/**  
 * Example:  
 * var li = ListNode(5)  
 * var v = li.`val`  
 * Definition for singly-linked list.  
 * class ListNode(var `val`: Int) {  
 *     var next: ListNode? = null  
 * }  
 */
```

```
class Solution {  
    fun swapPairs(head: ListNode?): ListNode? {  
        //  
        //  
    }  
}
```

## Swift:

```
/**  
 * Definition for singly-linked list.  
 *  
 * public class ListNode {  
 *     public var val: Int  
 *     public var next: ListNode?  
 *     public init() { self.val = 0; self.next = nil; }  
 *     public init(_ val: Int) { self.val = val; self.next = nil; }  
 *     public init(_ val: Int, _ next: ListNode?) { self.val = val; self.next =  
 *         next; }  
 * }  
 */  
class Solution {  
    func swapPairs(_ head: ListNode?) -> ListNode? {  
        //  
        //  
    }  
}
```

## Rust:

```
// Definition for singly-linked list.  
// #[derive(PartialEq, Eq, Clone, Debug)]  
// pub struct ListNode {  
//     pub val: i32,  
//     pub next: Option<Box<ListNode>>  
// }  
//  
// impl ListNode {  
//     #[inline]  
//     fn new(val: i32) -> Self {  
//         ListNode {  
//             next: None,  
//             val  
//         }  
//     }  
// }
```

```

    // }

impl Solution {
pub fn swap_pairs(head: Option<Box<ListNode>>) -> Option<Box<ListNode>> {
}
}

```

## Ruby:

```

# Definition for singly-linked list.
# class ListNode
# attr_accessor :val, :next
# def initialize(val = 0, _next = nil)
#   @val = val
#   @next = _next
# end
# end
# @param {ListNode} head
# @return {ListNode}
def swap_pairs(head)

end

```

## PHP:

```

/**
 * Definition for a singly-linked list.
 * class ListNode {
 *     public $val = 0;
 *     public $next = null;
 *     function __construct($val = 0, $next = null) {
 *         $this->val = $val;
 *         $this->next = $next;
 *     }
 * }
 */
class Solution {

/**
 * @param ListNode $head
 * @return ListNode
 */

```

```
function swapPairs($head) {  
}  
}  
}
```

### Dart:

```
/**  
 * Definition for singly-linked list.  
 * class ListNode {  
 * int val;  
 * ListNode? next;  
 * ListNode([this.val = 0, this.next]);  
 * }  
 */  
class Solution {  
ListNode? swapPairs(ListNode? head) {  
  
}  
}
```

### Scala:

```
/**  
 * Definition for singly-linked list.  
 * class ListNode(_x: Int = 0, _next: ListNode = null) {  
 * var next: ListNode = _next  
 * var x: Int = _x  
 * }  
 */  
object Solution {  
def swapPairs(head: ListNode): ListNode = {  
  
}  
}
```

### Elixir:

```
# Definition for singly-linked list.  
#  
# defmodule ListNode do  
# @type t :: %__MODULE__{
```

```

# val: integer,
# next: ListNode.t() | nil
# }
# defstruct val: 0, next: nil
# end

defmodule Solution do
@spec swap_pairs(head :: ListNode.t | nil) :: ListNode.t | nil
def swap_pairs(head) do

end
end

```

### Erlang:

```

%% Definition for singly-linked list.

%% -record(list_node, {val = 0 :: integer(),
%% next = null :: 'null' | #list_node{}}).

-spec swap_pairs(Head :: #list_node{} | null) -> #list_node{} | null.
swap_pairs(Head) ->
.
.
```

### Racket:

```

; Definition for singly-linked list:
#| 

; val : integer?
; next : (or/c list-node? #f)
(struct list-node
  (val next) #:mutable #:transparent)

; constructor
(define (make-list-node [val 0])
  (list-node val #f))

|#
(define/contract (swap-pairs head)
  (-> (or/c list-node? #f) (or/c list-node? #f)))

```

```
)
```

## Solutions

### C++ Solution:

```
/*
 * Problem: Swap Nodes in Pairs
 * Difficulty: Medium
 * Tags: linked_list
 *
 * Approach: Optimized algorithm based on problem constraints
 * Time Complexity: O(n) to O(n^2) depending on approach
 * Space Complexity: O(1) to O(n) depending on approach
 */

/**
 * Definition for singly-linked list.
 * struct ListNode {
 *     int val;
 *     ListNode *next;
 *     ListNode() : val(0), next(nullptr) {}
 *     ListNode(int x) : val(x), next(nullptr) {}
 *     ListNode(int x, ListNode *next) : val(x), next(next) {}
 * };
 *
 class Solution {
public:
    ListNode* swapPairs(ListNode* head) {

    }
};
```

### Java Solution:

```
/**
 * Problem: Swap Nodes in Pairs
 * Difficulty: Medium
 * Tags: linked_list
 *
```

```

* Approach: Optimized algorithm based on problem constraints
* Time Complexity: O(n) to O(n^2) depending on approach
* Space Complexity: O(1) to O(n) depending on approach
*/

```

```

/**
 * Definition for singly-linked list.
 * public class ListNode {
 *     int val;
 *     ListNode next;
 *     ListNode() {
 *         // TODO: Implement optimized solution
 *         return 0;
 *     }
 *     ListNode(int val) { this.val = val; }
 *     ListNode(int val, ListNode next) { this.val = val; this.next = next; }
 * }
 */
class Solution {
    public ListNode swapPairs(ListNode head) {
        }
    }
}

```

### Python3 Solution:

```

"""
Problem: Swap Nodes in Pairs
Difficulty: Medium
Tags: linked_list

Approach: Optimized algorithm based on problem constraints
Time Complexity: O(n) to O(n^2) depending on approach
Space Complexity: O(1) to O(n) depending on approach
"""

# Definition for singly-linked list.
# class ListNode:
#     def __init__(self, val=0, next=None):
#         self.val = val
#         self.next = next

```

```
class Solution:

def swapPairs(self, head: Optional[ListNode]) -> Optional[ListNode]:
    # TODO: Implement optimized solution
    pass
```

## Python Solution:

```
# Definition for singly-linked list.

# class ListNode(object):
#     def __init__(self, val=0, next=None):
#         self.val = val
#         self.next = next

class Solution(object):
    def swapPairs(self, head):
        """
        :type head: Optional[ListNode]
        :rtype: Optional[ListNode]
        """

    """
```

## JavaScript Solution:

```
/** 
 * Problem: Swap Nodes in Pairs
 * Difficulty: Medium
 * Tags: linked_list
 *
 * Approach: Optimized algorithm based on problem constraints
 * Time Complexity: O(n) to O(n^2) depending on approach
 * Space Complexity: O(1) to O(n) depending on approach
 */

/** 
 * Definition for singly-linked list.
 * function ListNode(val, next) {
 *     this.val = (val===undefined ? 0 : val)
 *     this.next = (next===undefined ? null : next)
 * }
 */
/** 
 * @param {ListNode} head
 * @return {ListNode}
```

```
*/  
var swapPairs = function(head) {  
};
```

### TypeScript Solution:

```
/**  
 * Problem: Swap Nodes in Pairs  
 * Difficulty: Medium  
 * Tags: linked_list  
 *  
 * Approach: Optimized algorithm based on problem constraints  
 * Time Complexity: O(n) to O(n^2) depending on approach  
 * Space Complexity: O(1) to O(n) depending on approach  
 */  
  
/**  
 * Definition for singly-linked list.  
 * class ListNode {  
 * val: number  
 * next: ListNode | null  
 * constructor(val?: number, next?: ListNode | null) {  
 * this.val = (val===undefined ? 0 : val)  
 * this.next = (next===undefined ? null : next)  
 * }  
 * }  
 */  
  
function swapPairs(head: ListNode | null): ListNode | null {  
};
```

### C# Solution:

```
/*  
 * Problem: Swap Nodes in Pairs  
 * Difficulty: Medium  
 * Tags: linked_list  
 *  
 * Approach: Optimized algorithm based on problem constraints
```

```

* Time Complexity: O(n) to O(n^2) depending on approach
* Space Complexity: O(1) to O(n) depending on approach
*/

```

```

/**
 * Definition for singly-linked list.
 * public class ListNode {
 *     public int val;
 *     public ListNode next;
 *     public ListNode(int val=0, ListNode next=null) {
 *         this.val = val;
 *         this.next = next;
 *     }
 * }
 */
public class Solution {
    public ListNode SwapPairs(ListNode head) {
}
}

```

## C Solution:

```

/*
 * Problem: Swap Nodes in Pairs
 * Difficulty: Medium
 * Tags: linked_list
 *
 * Approach: Optimized algorithm based on problem constraints
 * Time Complexity: O(n) to O(n^2) depending on approach
 * Space Complexity: O(1) to O(n) depending on approach
*/

```

```

/**
 * Definition for singly-linked list.
 * struct ListNode {
 *     int val;
 *     struct ListNode *next;
 * };
 */
struct ListNode* swapPairs(struct ListNode* head) {

```

```
}
```

## Go Solution:

```
// Problem: Swap Nodes in Pairs
// Difficulty: Medium
// Tags: linked_list
//
// Approach: Optimized algorithm based on problem constraints
// Time Complexity: O(n) to O(n^2) depending on approach
// Space Complexity: O(1) to O(n) depending on approach

/**
 * Definition for singly-linked list.
 * type ListNode struct {
 *     Val int
 *     Next *ListNode
 * }
 */
func swapPairs(head *ListNode) *ListNode {

}
```

## Kotlin Solution:

```
/**
 * Example:
 * var li = ListNode(5)
 * var v = li.`val`
 *
 * Definition for singly-linked list.
 * class ListNode(var `val`: Int) {
 *     var next: ListNode? = null
 * }
 */
class Solution {
    fun swapPairs(head: ListNode?): ListNode? {
        }

}
```

## Swift Solution:

```
/**
 * Definition for singly-linked list.
 */
public class ListNode {
    public var val: Int
    public var next: ListNode?
    public init() { self.val = 0; self.next = nil; }
    public init(_ val: Int) { self.val = val; self.next = nil; }
    public init(_ val: Int, _ next: ListNode?) { self.val = val; self.next =
next; }
}
class Solution {
    func swapPairs(_ head: ListNode?) -> ListNode? {
}
}
```

## Rust Solution:

```
// Problem: Swap Nodes in Pairs
// Difficulty: Medium
// Tags: linked_list
//
// Approach: Optimized algorithm based on problem constraints
// Time Complexity: O(n) to O(n^2) depending on approach
// Space Complexity: O(1) to O(n) depending on approach

// Definition for singly-linked list.
// #[derive(PartialEq, Eq, Clone, Debug)]
// pub struct ListNode {
//     pub val: i32,
//     pub next: Option<Box<ListNode>>
// }
//
// impl ListNode {
//     #[inline]
//     fn new(val: i32) -> Self {
//         ListNode {
//             next: None,
//             val
//         }
//     }
// }
```

```

    // }
    // }

impl Solution {
pub fn swap_pairs(head: Option<Box<ListNode>>) -> Option<Box<ListNode>> {
}
}

```

### Ruby Solution:

```

# Definition for singly-linked list.
# class ListNode
# attr_accessor :val, :next
# def initialize(val = 0, _next = nil)
#   @val = val
#   @next = _next
# end
# end
# @param {ListNode} head
# @return {ListNode}
def swap_pairs(head)

end

```

### PHP Solution:

```

/**
 * Definition for a singly-linked list.
 * class ListNode {
 *   public $val = 0;
 *   public $next = null;
 *   function __construct($val = 0, $next = null) {
 *     $this->val = $val;
 *     $this->next = $next;
 *   }
 * }
 */
class Solution {

/**
 * @param ListNode $head

```

```
* @return ListNode
*/
function swapPairs($head) {
}

}
```

### Dart Solution:

```
/**
 * Definition for singly-linked list.
 * class ListNode {
 *   int val;
 *   ListNode? next;
 *   ListNode([this.val = 0, this.next]);
 * }
 */
class Solution {
ListNode? swapPairs(ListNode? head) {
}

}
```

### Scala Solution:

```
 /**
 * Definition for singly-linked list.
 * class ListNode(_x: Int = 0, _next: ListNode = null) {
 *   var next: ListNode = _next
 *   var x: Int = _x
 * }
 */
object Solution {
def swapPairs(head: ListNode): ListNode = {

}
```

### Elixir Solution:

```

# Definition for singly-linked list.

#
# defmodule ListNode do
# @type t :: %__MODULE__{
#   val: integer,
#   next: ListNode.t() | nil
# }
# defstruct val: 0, next: nil
# end

defmodule Solution do
@spec swap_pairs(ListNode.t() | nil) :: ListNode.t() | nil
def swap_pairs(head) do

end
end

```

### Erlang Solution:

```

%% Definition for singly-linked list.

%%
%% -record(list_node, {val = 0 :: integer(),
%% next = null :: 'null' | #list_node{}}).

-spec swap_pairs(Head :: #list_node{} | null) -> #list_node{} | null.
swap_pairs(Head) ->
.
```

### Racket Solution:

```

; Definition for singly-linked list:
#| 

; val : integer?
; next : (or/c list-node? #f)
(struct list-node
  (val next) #:mutable #:transparent)

; constructor
(define (make-list-node [val 0])
  (list-node val #f))

```

```
| #  
  
(define/contract (swap-pairs head)  
(-> (or/c list-node? #f) (or/c list-node? #f))  
)
```