Problem 2046: Sort Linked List Already Sorted Using Absolute Values

Problem Information

Difficulty: Medium
Acceptance Rate: 0.00%
Paid Only: No

Problem Description

Given the

head

of a singly linked list that is sorted in

non-decreasing

order using the

absolute values

of its nodes, return

the list sorted in

non-decreasing

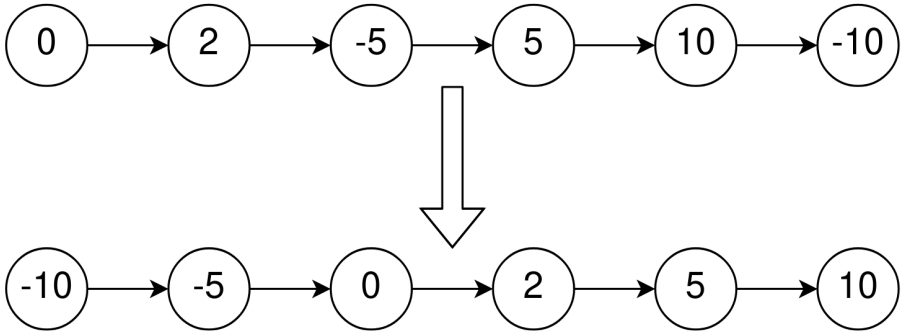
order using the

actual values

of its nodes

.

Example 1:



Input:

head = [0,2,-5,5,10,-10]

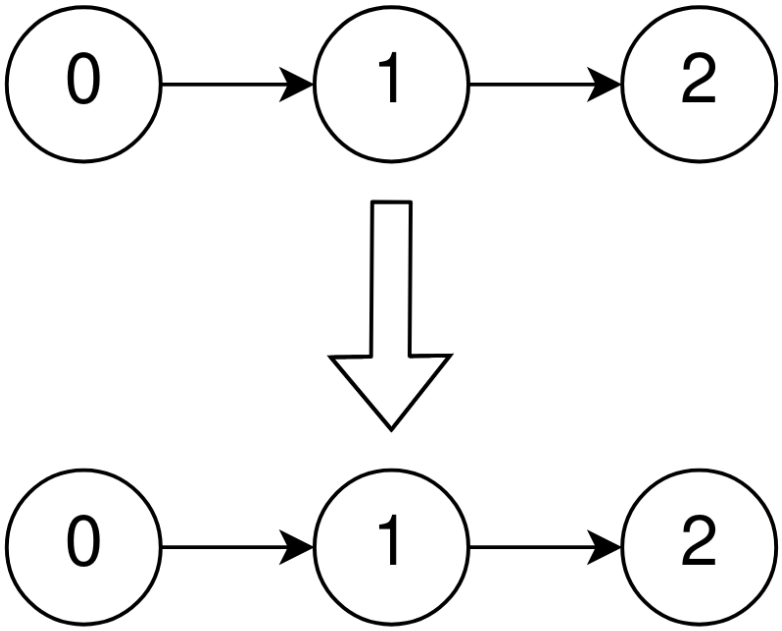
Output:

[-10,-5,0,2,5,10]

Explanation:

The list sorted in non-descending order using the absolute values of the nodes is [0,2,-5,5,10,-10]. The list sorted in non-descending order using the actual values is [-10,-5,0,2,5,10].

Example 2:



Input:

head = [0,1,2]

Output:

[0,1,2]

Explanation:

The linked list is already sorted in non-decreasing order.

Example 3:

Input:

head = [1]

Output:

[1]

Explanation:

The linked list is already sorted in non-decreasing order.

Constraints:

The number of nodes in the list is the range

[1, 10

5

]

.

-5000 <= Node.val <= 5000

head

is sorted in non-decreasing order using the absolute value of its nodes.

Follow up:

Can you think of a solution with

O(n)

time complexity?

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* sortLinkedList(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 sortLinkedList(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 sortLinkedList(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 sortLinkedList(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 sortLinkedList = 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 sortLinkedList(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 SortLinkedList(ListNode head) {

}
}
```

C:

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

}
```

Go:

```
/**
* Definition for singly-linked list.
* type ListNode struct {
* Val int
```

```
* Next *ListNode
* }
*/
func sortLinkedList(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 sortLinkedList(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 sortLinkedList(_ 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 sort_linked_list(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 sort_linked_list(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 $head
* @return ListNode
*/
function sortLinkedList($head) {

}
}
```

Dart:

```
/**
* Definition for singly-linked list.
* class ListNode {
* int val;
* ListNode? next;
* ListNode([this.val = 0, this.next]);
* }
*/
class Solution {
ListNode? sortLinkedList(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 sortLinkedList(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 sort_linked_list(head :: ListNode.t | nil) :: ListNode.t | nil
def sort_linked_list(head) do

end
end
```

Erlang:

```
%% Definition for singly-linked list.
%%
%% -record(list_node, {val = 0 :: integer(),
%% next = null :: 'null' | #list_node{}}).

-spec sort_linked_list(Head :: #list_node{} | null) -> #list_node{} | null.
sort_linked_list(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 (sort-linked-list head)
(-> (or/c list-node? #f) (or/c list-node? #f))
)
```

Solutions

C++ Solution:

```
/*
* Problem: Sort Linked List Already Sorted Using Absolute Values
* Difficulty: Medium
* Tags: array, sort, linked_list
*
* Approach: Use two pointers or sliding window technique
* Time Complexity: O(n) or O(n log n)
* 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* sortLinkedList(ListNode* head) {

}
};
```

Java Solution:

```
/**
* Problem: Sort Linked List Already Sorted Using Absolute Values
* Difficulty: Medium
* Tags: array, sort, linked_list
*
* Approach: Use two pointers or sliding window technique
* Time Complexity: O(n) or O(n log n)
* 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 sortLinkedList(ListNode head) {

}
}
```

Python3 Solution:

```
"""
Problem: Sort Linked List Already Sorted Using Absolute Values
Difficulty: Medium
Tags: array, sort, linked_list

Approach: Use two pointers or sliding window technique
Time Complexity: O(n) or O(n log n)
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 sortLinkedList(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 sortLinkedList(self, head):
"""
:type head: Optional[ListNode]
:rtype: Optional[ListNode]
"""
```

JavaScript Solution:

```
/**
* Problem: Sort Linked List Already Sorted Using Absolute Values
* Difficulty: Medium
* Tags: array, sort, linked_list
*
* Approach: Use two pointers or sliding window technique
```

```
* Time Complexity: O(n) or O(n log n)
* 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 sortLinkedList = function(head) {

};
```

TypeScript Solution:

```
/**
* Problem: Sort Linked List Already Sorted Using Absolute Values
* Difficulty: Medium
* Tags: array, sort, linked_list
*
* Approach: Use two pointers or sliding window technique
* Time Complexity: O(n) or O(n log n)
* 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 sortLinkedList(head: ListNode | null): ListNode | null {

};
```

C# Solution:

```
/*
* Problem: Sort Linked List Already Sorted Using Absolute Values
* Difficulty: Medium
* Tags: array, sort, linked_list
*
* Approach: Use two pointers or sliding window technique
* Time Complexity: O(n) or O(n log n)
* 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 SortLinkedList(ListNode head) {

}
}
```

C Solution:

```
/*
* Problem: Sort Linked List Already Sorted Using Absolute Values
* Difficulty: Medium
* Tags: array, sort, linked_list
```

```
*
* Approach: Use two pointers or sliding window technique
* Time Complexity: O(n) or O(n log n)
* Space Complexity: O(1) to O(n) depending on approach
*/

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

}
```

Go Solution:

```
// Problem: Sort Linked List Already Sorted Using Absolute Values
// Difficulty: Medium
// Tags: array, sort, linked_list
//
// Approach: Use two pointers or sliding window technique
// Time Complexity: O(n) or O(n log n)
// Space Complexity: O(1) to O(n) depending on approach

/**
* Definition for singly-linked list.
* type ListNode struct {
* Val int
* Next *ListNode
* }
*/
func sortLinkedList(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 sortLinkedList(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 sortLinkedList(_ head: ListNode?) -> ListNode? {

}
}
```

Rust Solution:

```
// Problem: Sort Linked List Already Sorted Using Absolute Values
// Difficulty: Medium
// Tags: array, sort, linked_list
//
// Approach: Use two pointers or sliding window technique
// Time Complexity: O(n) or O(n log n)
```

```
// 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 sort_linked_list(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 sort_linked_list(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 $head
* @return ListNode
*/
function sortLinkedList($head) {

}
}
```

Dart Solution:

```
/**
* Definition for singly-linked list.
* class ListNode {
* int val;
* ListNode? next;
* ListNode([this.val = 0, this.next]);
* }
*/
class Solution {
ListNode? sortLinkedList(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 sortLinkedList(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 sort_linked_list(head :: ListNode.t | nil) :: ListNode.t | nil
def sort_linked_list(head) do

end
end
```

Erlang Solution:

```
%% Definition for singly-linked list.
%%
%% -record(list_node, {val = 0 :: integer(),
%% next = null :: 'null' | #list_node{}}).

-spec sort_linked_list(Head :: #list_node{} | null) -> #list_node{} | null.
sort_linked_list(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 (sort-linked-list head)
(-> (or/c list-node? #f) (or/c list-node? #f))
)
```