

Solution Review: Is Circular Linked List

This lesson contains the solution review for the challenge of determining whether a given linked list is circular or not.

WE'LL COVER THE FOLLOWING ^

- Implementation
- Explanation

In this lesson, we investigate how to determine whether a given linked list is either a singly linked list or a circular linked list.

Implementation

Have a look at the coding solution below:

```
def is_circular_linked_list(self, input_list):  
    cur = input_list.head  
    while cur.next:  
        cur = cur.next  
        if cur.next == input_list.head:  
            return True  
    return False
```



Explanation

Let's discuss the class method `is_circular_linked_list`. On **line 2**, we initialize `cur` to `input_list.head` so that we are able to traverse `input_list` that has been passed to `is_circular_linked_list`. On **line 3** we set up a `while` loop which runs until `cur.next` becomes `None`. If `cur.next` becomes `None`, it implies that `input_list` must not be a circular linked list and therefore, if the `while` loop terminates, we return `False` on **line 7**. On the other hand, we update `cur` to `cur.next` in the `while` loop on **line 4**, and if we reach a node while traversing such that the next node is the head node, then this confirms that `input_list` is indeed a `circular_linked_list`. Hence, if the condition on

line 5 turns out to be `True`, we return `True` from the method on **line 6**.

As you can see, the `is_circular_linked_list` method was pretty straightforward. Below we test it on a singly linked list and on a circular linked list:

```
class Node:
    def __init__(self, data):
        self.data = data
        self.next = None

class LinkedList:
    def __init__(self):
        self.head = None

    def print_list(self):
        cur_node = self.head
        while cur_node:
            print(cur_node.data)
            cur_node = cur_node.next

    def append(self, data):
        new_node = Node(data)

        if self.head is None:
            self.head = new_node
            return

        last_node = self.head
        while last_node.next:
            last_node = last_node.next
        last_node.next = new_node

class CircularLinkedList:
    def __init__(self):
        self.head = None

    def prepend(self, data):
        new_node = Node(data)
        cur = self.head
        new_node.next = self.head

        if not self.head:
            new_node.next = new_node
        else:
            while cur.next != self.head:
                cur = cur.next
            cur.next = new_node
        self.head = new_node

    def append(self, data):
        if not self.head:
            self.head = Node(data)
            self.head.next = self.head
        else:
            new_node = Node(data)
```

```

        new_node = Node(data)
        cur = self.head
        while cur.next != self.head:
            cur = cur.next

        cur.next = new_node
        new_node.next = self.head

def print_list(self):
    cur = self.head

    while cur:
        print(cur.data)
        cur = cur.next
        if cur == self.head:
            break

def __len__(self):
    cur = self.head
    count = 0
    while cur:
        count += 1
        cur = cur.next
        if cur == self.head:
            break
    return count

def split_list(self):
    size = len(self)

    if size == 0:
        return None
    if size == 1:
        return self.head

    mid = size//2
    count = 0

    prev = None
    cur = self.head

    while cur and count < mid:
        count += 1
        prev = cur
        cur = cur.next
    prev.next = self.head

    split_cllist = CircularLinkedList()
    while cur.next != self.head:
        split_cllist.append(cur.data)
        cur = cur.next
    split_cllist.append(cur.data)

    self.print_list()
    print("\n")
    split_cllist.print_list()

def remove(self, key):
    if self.head:
        if self.head.data == key:
            cur = self.head
            while cur.next != self.head:
                cur = cur.next
            if self.head == self.head.next:

```

```

        self.head = None
    else:
        cur.next = self.head.next
        self.head = self.head.next
    else:
        cur = self.head
        prev = None
        while cur.next != self.head:
            prev = cur
            cur = cur.next
            if cur.data == key:
                prev.next = cur.next
                cur = cur.next

```

```

def remove_node(self, node):
    if self.head:
        if self.head == node:
            cur = self.head
            while cur.next != self.head:
                cur = cur.next
            if self.head == self.head.next:
                self.head = None
            else:
                cur.next = self.head.next
                self.head = self.head.next
        else:
            cur = self.head
            prev = None
            while cur.next != self.head:
                prev = cur
                cur = cur.next
                if cur == node:
                    prev.next = cur.next
                    cur = cur.next

```

```

def josephus_circle(self, step):
    cur = self.head

    while len(self) > 1:
        count = 1
        while count != step:
            cur = cur.next
            count += 1
        print("REMOVED: " + str(cur.data))
        self.remove_node(cur)
        cur = cur.next

```

```

def is_circular_linked_list(self, input_list):
    cur = input_list.head
    while cur.next:
        cur = cur.next
        if cur.next == input_list.head:
            return True
    return False

```

```

cclist = CircularLinkedList()
cclist.append(1)
cclist.append(2)
cclist.append(3)
cclist.append(4)

```

```
l1list = LinkedList()
l1list.append(1)
l1list.append(2)
l1list.append(3)
l1list.append(4)

print(c1list.is_circular_linked_list(c1list))
print(c1list.is_circular_linked_list(l1list))
```



That was all we had about circular linked lists in this course. In the next chapter, we'll explore another type of linked list: Doubly Linked Lists.

Hope you are enjoying the lessons and challenges!