链表
Linked List

令狐冲

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大纲 Outline

- Dummy Node in Linked List
- Basic Linked List Skills
- Two Pointers in Linked List (Fast-slow pointers)

Basic Knowledge Test

- What's the output of the following code?

```
void print() {
    for (ListNode node = head; node != null; node = node.next) {
        System.out.print(node.val);
        System.out.print("->");
    }
    System.out.println("null");
}

void main() {
    ListNode node1 = new ListNode(1);
    ListNode node2 = new ListNode(2);
    ListNode node3 = new ListNode(3);
    ListNode head = node1;

    node1.next = node2;
    node2.next = node3;

    print(head);

    node1 = node2;

    print(head);
}
```


Remove Duplicates from Sorted List II

http://www.lintcode.com/problem/remove-duplicates-from-sorted-list-ii/
http://www.jiuzhang.com/solutions/remove-duplicates-from-sorted-list-ii/

Reverse Linked List II

http://www.lintcode.com/problem/reverse-linked-list-ii/
http://www.jiuzhang.com/solutions/reverse-linked-list-ii/

独孤九剑 —— 破索式

链表结构发生变化时
就需要 Dummy Node

Dummy Node

- 什么时候使用 Dummy Node?
  - 当链表的结构发生变化时
  - 也就是当需要返回的链表的头不确定的时候
- Related Questions:
  - Merge Two Sorted Lists
  - Partition List
  - ...

Partition List

http://www.lintcode.com/problem/partition-list/
http://www.jiuzhang.com/solutions/partition-list/

Basic Skills in Linked List

1. Insert a Node in Sorted List
2. Remove a Node from Linked List
3. Reverse a Linked List
4. **Merge Two Linked Lists**
5. **Middle of a Linked List**

Sort List

http://www.lintcode.com/problem/sort-list/
http://www.jiuzhang.com/solutions/sort-list/
Merge Sort vs Quick Sort

Reorder List

http://www.lintcode.com/problem/reorder-list/
http://www.jiuzhang.com/solutions/reorder-list/

Take a break

5 minutes

Fast-slow Pointers

1. Middle of Linked List
2. Remove Nth Node From End of List
3. Linked List Cycle I, II
4. Rotate List

Linked List Cycle

http://www.lintcode.com/problem/linked-list-cycle/
http://www.jiuzhang.com/solutions/linked-list-cycle/

Rotate List

http://www.lintcode.com/problem/rotate-list/
http://www.jiuzhang.com/solutions/rotate-list/

Merge k Sorted Lists

http://www.lintcode.com/problem/merge-k-sorted-lists/
http://www.jiuzhang.com/solutions/merge-k-sorted-lists/

Priority Queue (Heap)
Divide Conquer
Merge lists two by two

Copy List with Random Pointer

http://www.lintcode.com/problem/copy-list-with-random-pointer/
http://www.jiuzhang.com/solutions/copy-list-with-random-pointer/

总结

- 凡是链表结构发生变化的，都需要 Dummy Node
- 链表常用基本功
  - 反转 Reverse
  - 归并 Merge
  - 找中点 Median
  - 增删查改 CRUD
- Linked List Cycle，知道怎么做，理解
- Linked List Cycle II，知道怎么做，课后分析一下为什么，背下程序
- Copy List with Random Pointers
  - 自己能写得出 Hash Map的方法
  - No extra space的方法能够实现正确就可以了，想不到没关系
- Merge k Sorted Lists
  - K 路归并算法一定要掌握！
  - 三种实现方式，分别实现，并熟练理解和掌握！
  - 顺便做一下 Merge k Sorted Arrays

Related Questions

- http://www.lintcode.com/problem/convert-sorted-list-to-balanced-bst/
- http://www.lintcode.com/problem/reverse-nodes-in-k-group/
- http://www.lintcode.com/problem/delete-node-in-the-middle-of-singly-linked-list/
- http://www.lintcode.com/problem/convert-binary-search-tree-to-doubly-linked-list/