# 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?

```
1  void print() {
2      for (ListNode node = head; node != null; node = node.next) {
3          System.out.print(node.val);
4          System.out.print("->");
5      }
6      System.out.println("null");
7  }
8
9  void main() {
10     ListNode node1 = new ListNode(1);
11     ListNode node2 = new ListNode(2);
12     ListNode node3 = new ListNode(3);
13     ListNode head = node1;
14
15     node1.next = node2;
16     node2.next = node3;
17
18     print(head);
19
20     node1 = node2;
21
22     print(head);
23 }
```

# 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/