链表

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内容

链表概念

节点

链表操作

概念

例子

幼儿园的老师带领孩子出来散步，老师牵着第1个小孩的手，第1个小孩的另一只手牵着第2个孩子 ……

这就是一个“链”，最后一个孩子有一只手空着，他就是“链尾”。

概念

数组的不足

大小不可变

插入一项要移动数组中其他数据

概念

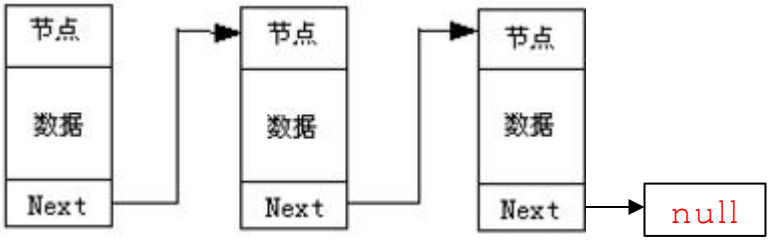
链表

动态地进行存储分配的一种结构

链表内容通常存储于内存中分散的位置

链表由节点组成

使用引用将存储数据元素的节点依次串联在一起



内容

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概念

节点 (Node)

每一个节点结构都相同

定义描述节点的类

数据域 & 链域

数据域： 存放节点的数据元素

链　域： 存放对下一个节点的引用

节点

Node类

```
class Node{
    StudentRecord data;  //数据域

    Node next;           //链域
}
//节点存放的数据类
class StudentRecord{
    public int studentID;
    public String name;
    public double gpa;

    public StudentRecord(int studentID, String name, double gpa){
        this.studentID = studentID;
        this.name = name;
        this.gpa = gpa;
    }
}
```

Node类的完善

```
class Node{
    StudentRecord data;
    Node next;

    //构造函数
      public Node(StudentRecord data){
       setData(data);
       setNext(null);
    }

    public void setData(StudentRecord data){
       this.data = data;
    }

    public void setNext(Node next){
       this.next = next;
    }
}
```

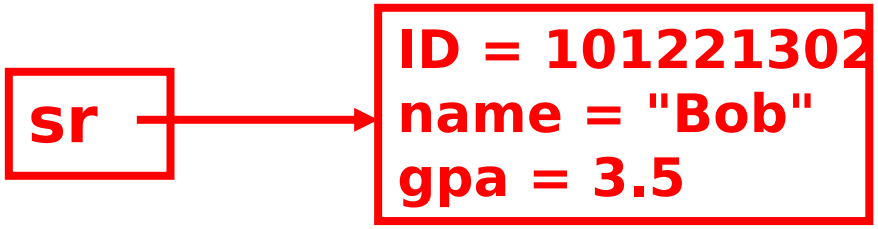
节点 -- Test

```
public static void main(String args[]) {
    StudentRecord sr =
            new StudentRecord(101221302, "Bob", 3.5);

    Node n1 = new Node(null);
    System.out.println("Empty node test\n" + n1);

    n1.setData(sr);
    System.out.println("Bob: "+n1);

    sr = new StudentRecord(101221303, "Mary", 3.7);
    Node n2 = new Node(sr);
    n1.setNext(n2);
    System.out.println("Bob: "+n1);
    System.out.println("Mary: "+n2);
}
```

节点 -- Test

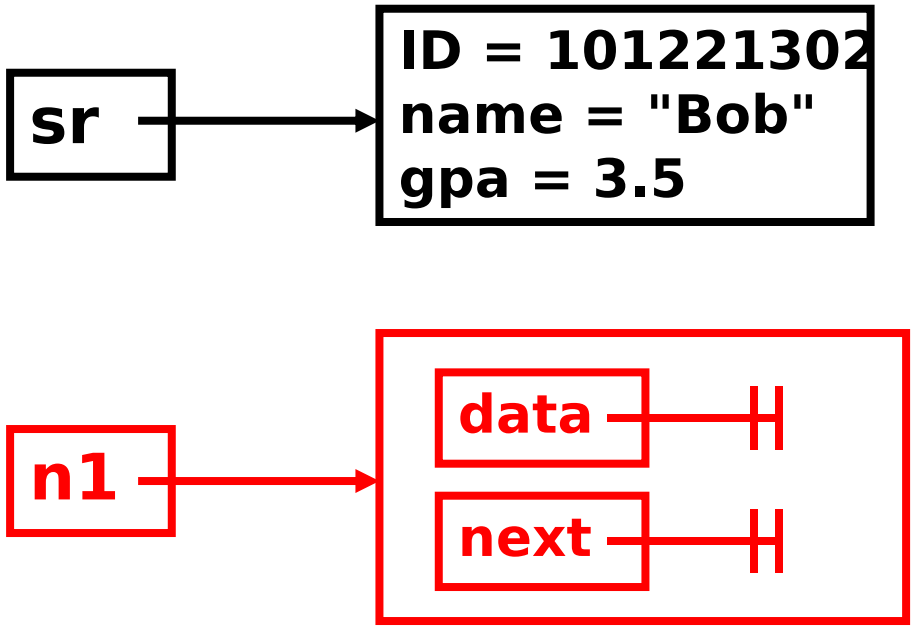
Let's see what's happening!

```
StudentRecord sr =
        new StudentRecord(101221302, "Bob", 3.5);
```



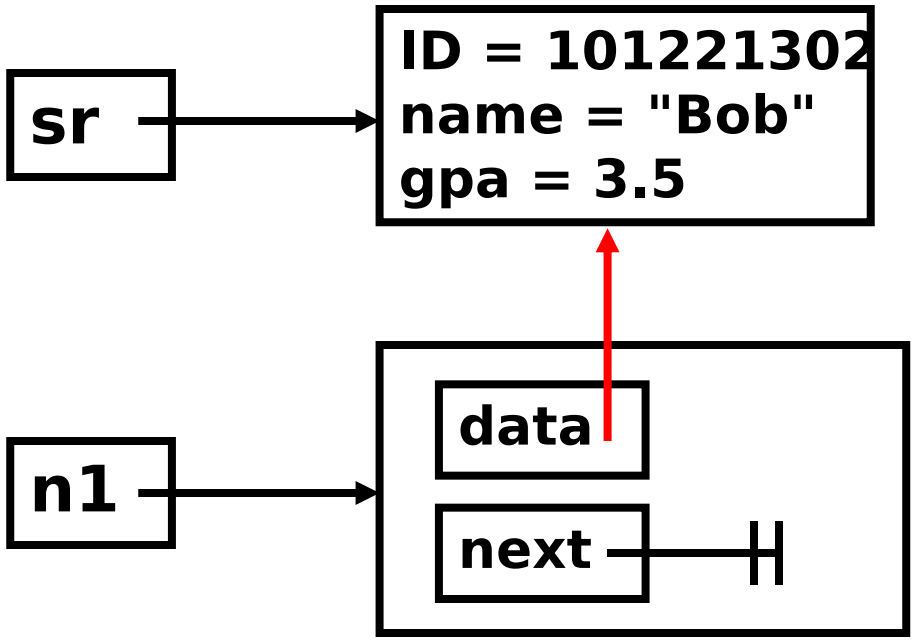
节点 -- Test

```
Node n1 = new Node(null);
```



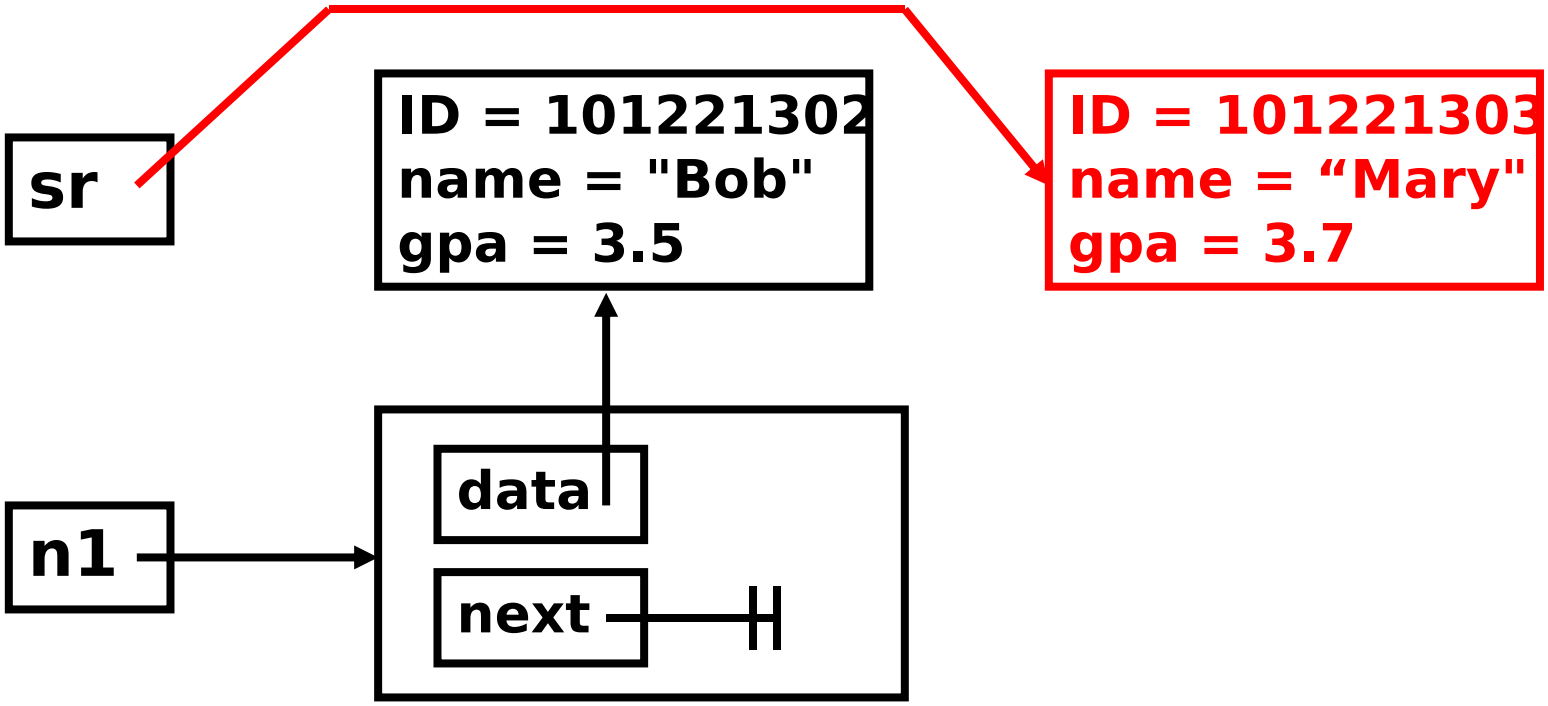
节点 -- Test

n1.setData(sr);



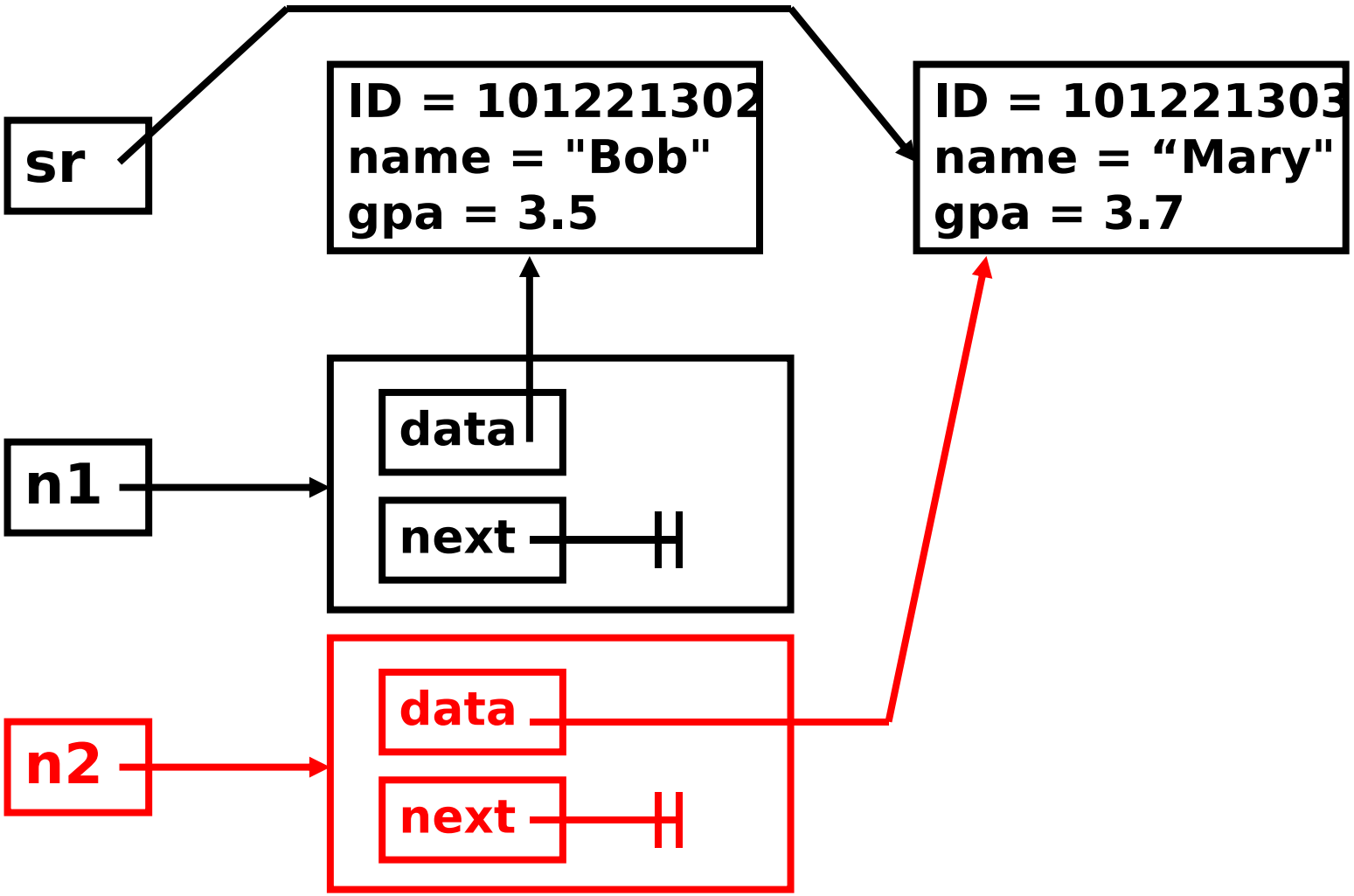
节点 -- Test

```
sr = new StudentRecord(101221303, "Mary", 3.7);
```



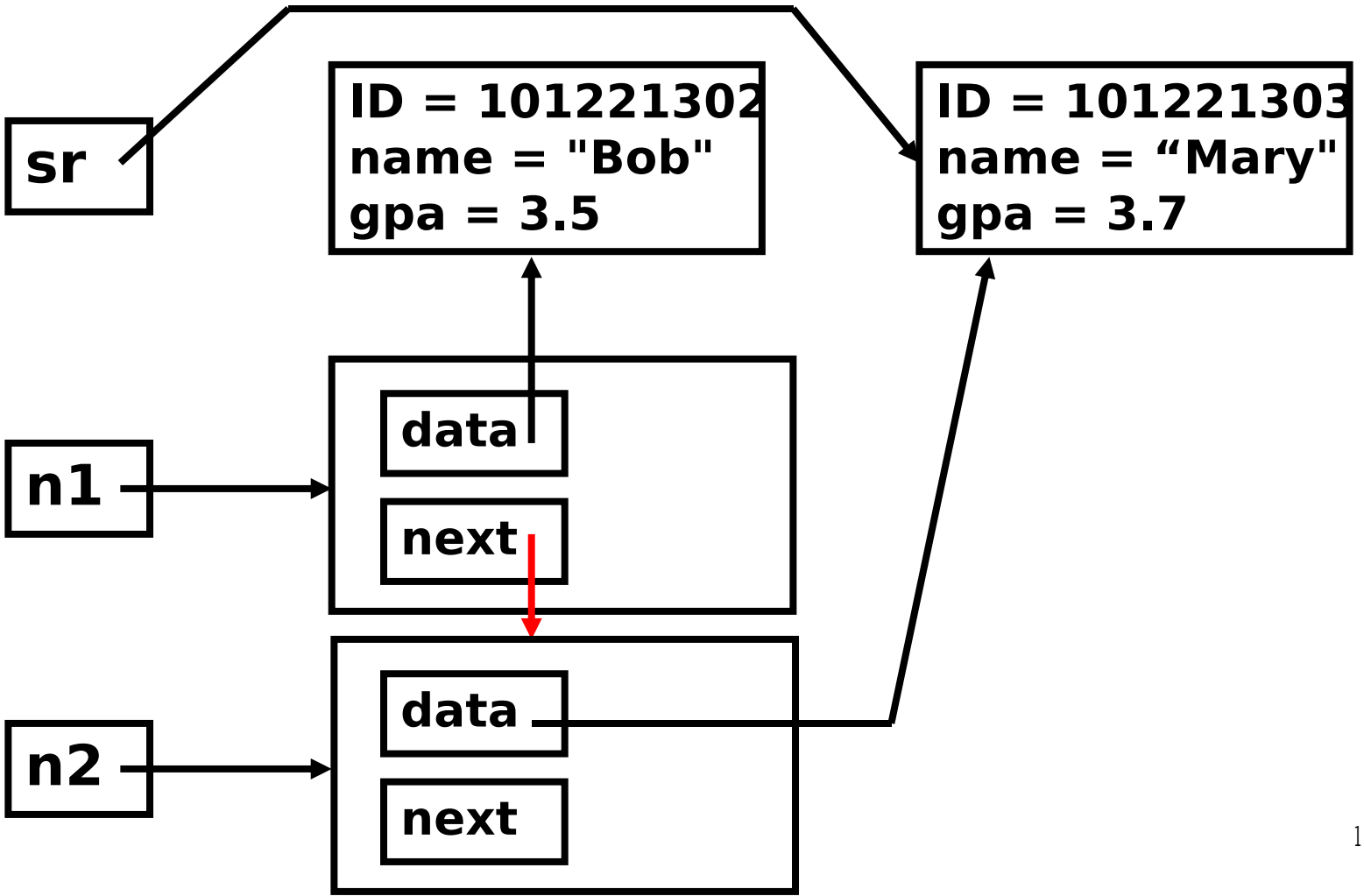
节点 -- Test

Node n2 = new Node(sr);



节点 -- Test

n1.setNext(n2);



内容

链表概念

节点

链表操作

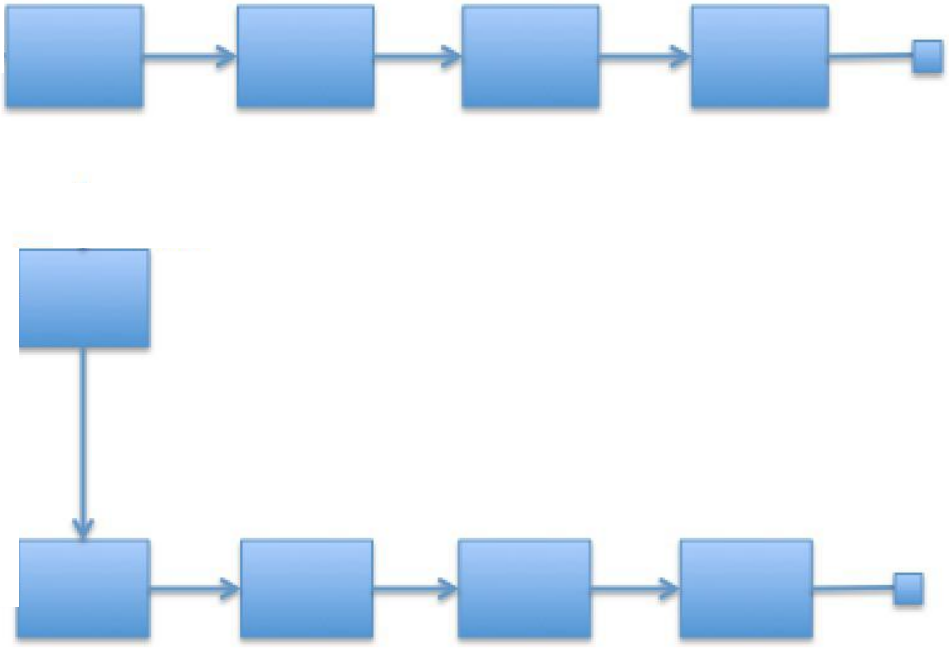
链表的操作 -- 构建

创建链表

```
public class LinkedList {

    private Node head;

    public LinkedList(){
        setHead(null);
    }

    private void setHead(Node head){
        this.head = head;
    }

    private Node getHead(){
        return head;
    }
}
```

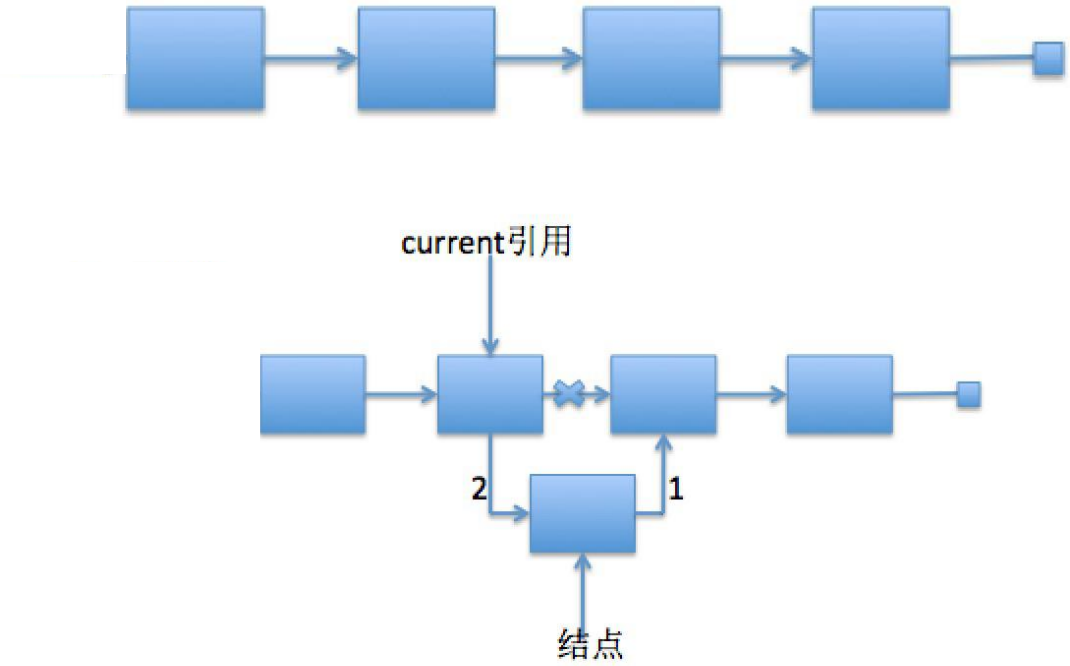
链表的操作 -- 插入

在首部插入节点



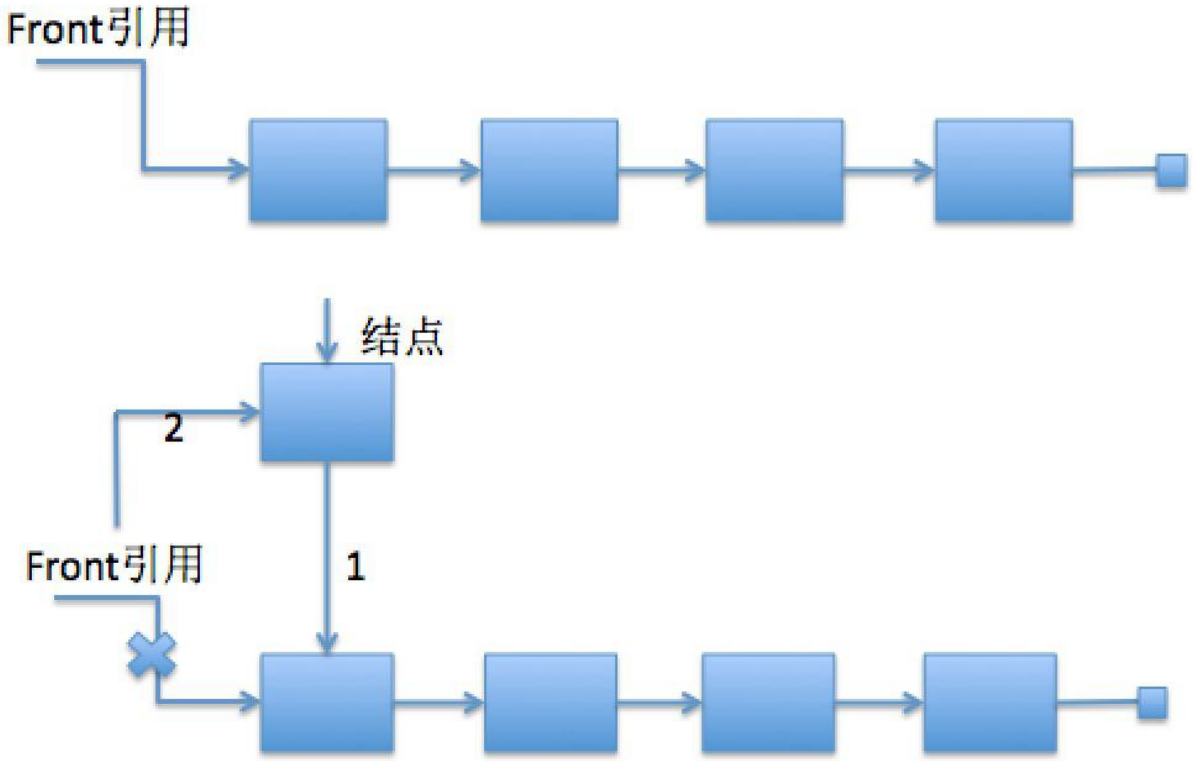
链表的操作 -- 插入

在其他部分插入节点



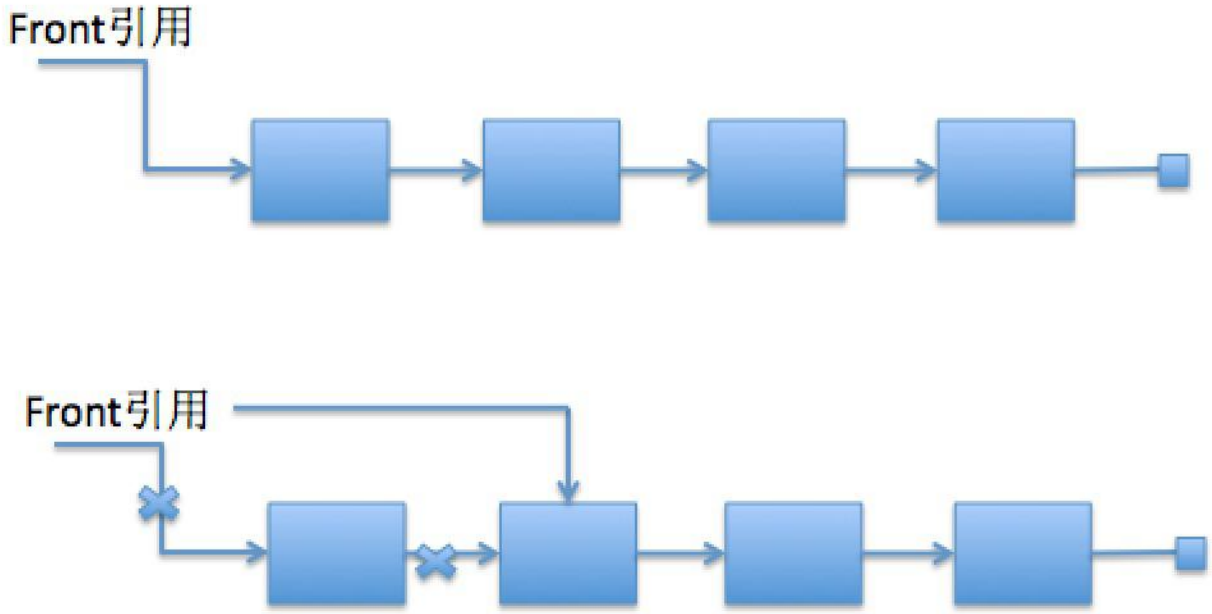
链表的操作 -- 插入

在首部插入节点 -- 添加哨兵



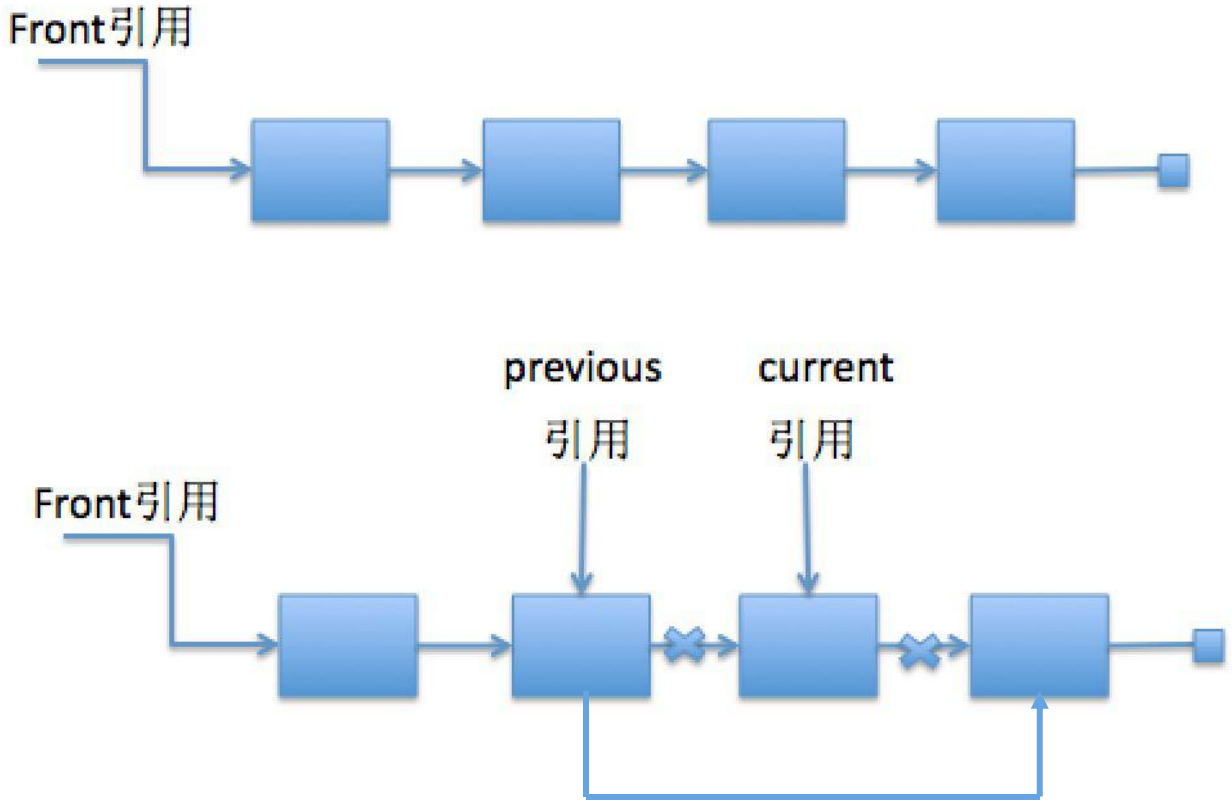
链表的操作 -- 删除

删除第一个节点



链表的操作 -- 删除

删除内部节点



拓展

JDK提供了链表数据结构：

java.util.LinkedList

https://docs.oracle.com/javase/7/docs/api/java/util/LinkedList.html