

Linked Nodes

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Agenda

- References Review
- Linked Nodes
- Practice w/ ListNode

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References (sli.do)

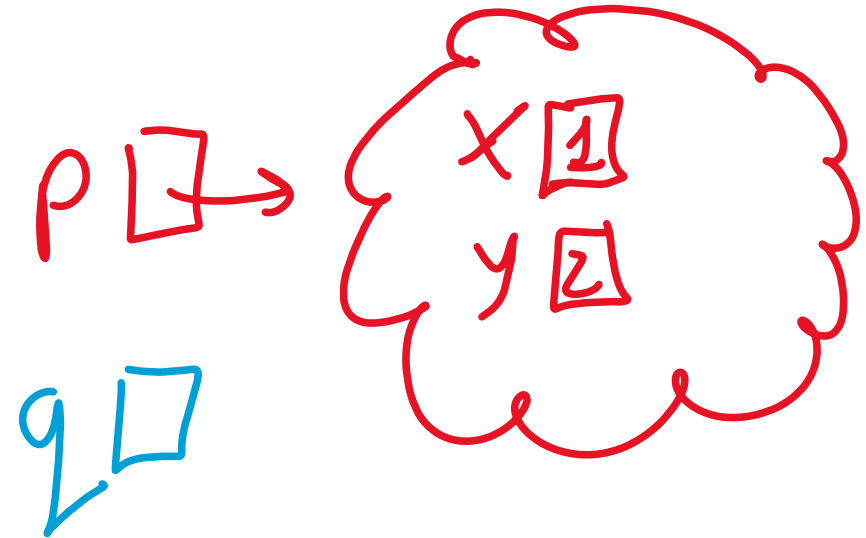
sli.do

code: #su_cse123

```
Point p = new Point(1, 2);
```

```
Point q = p;
```

How does the picture change when the second line is executed?



References

- Recall that variables store references
- Don't store the actual object
- Can think of references as “phone numbers”

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- Practice w/ ListNode



Contiguous vs. Non Contiguous Memory

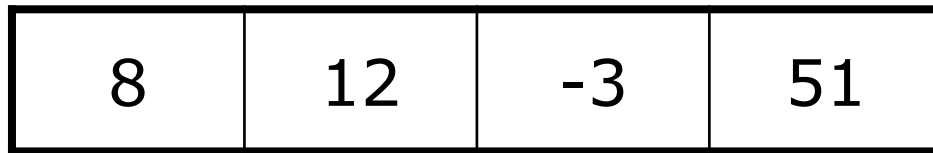
- **Contiguous**
 - Sequential, implicitly connected together

8	12	-3	51
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Contiguous vs. Non Contiguous Memory

- **Contiguous**

- Sequential, implicitly connected together



- **Non-contiguous**

- Disconnected, spread out

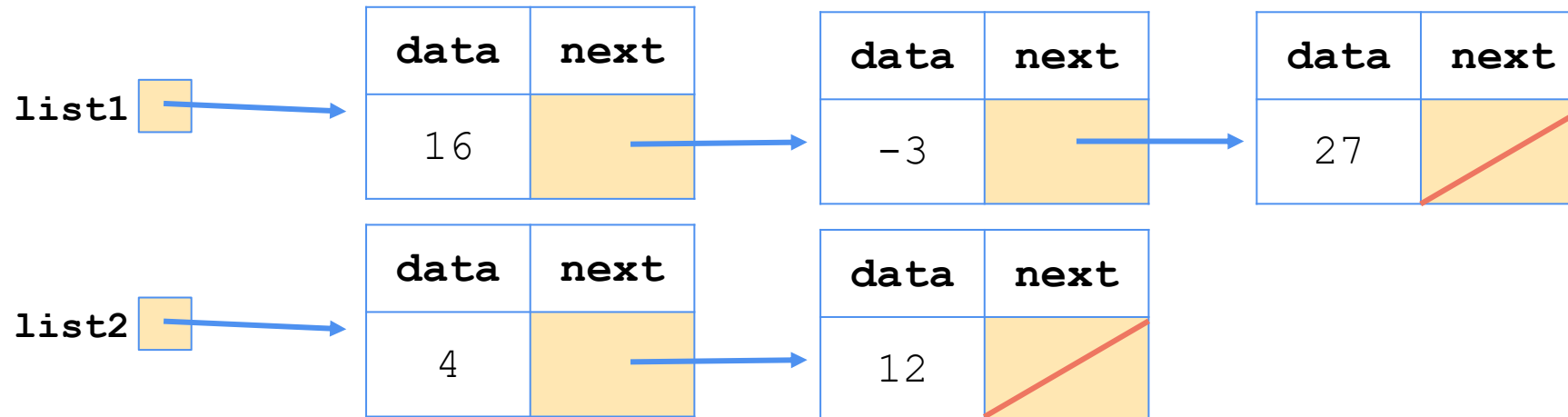


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Linked Nodes Problem 1

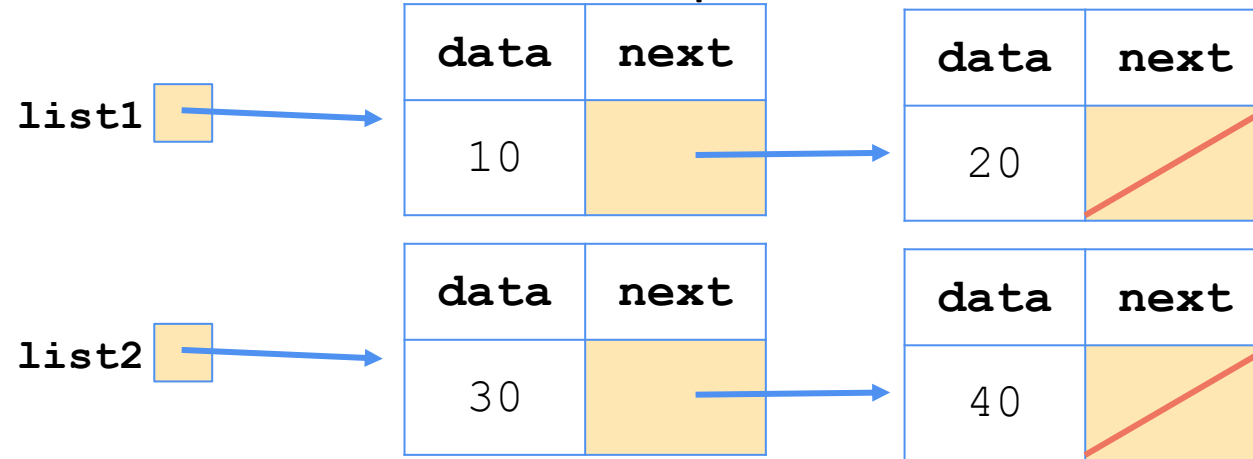
- Suppose we had the following ListNodes:



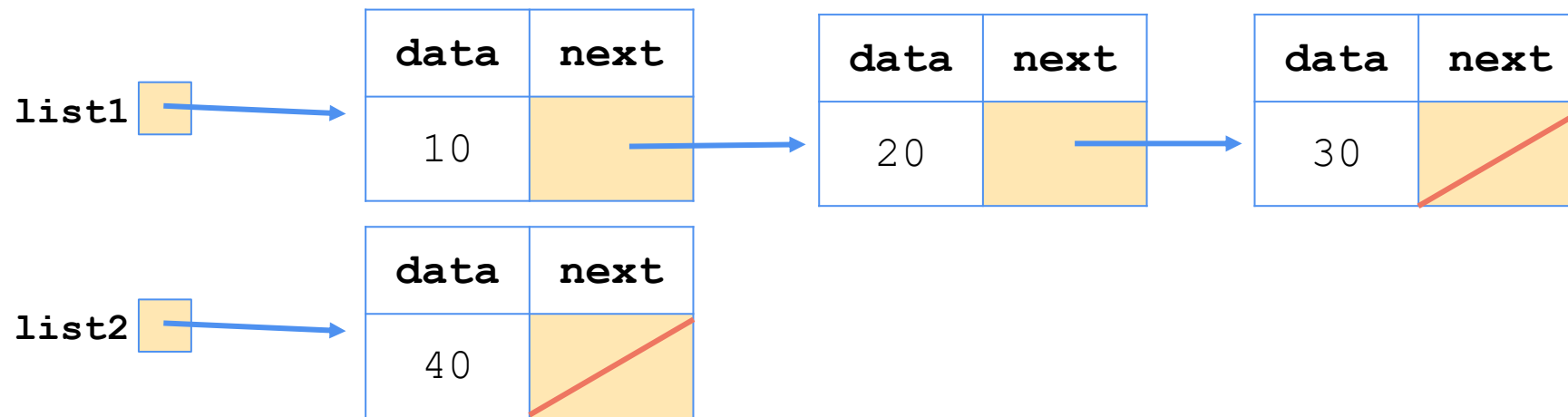
- What happens when we execute: `list1.next = list2.next`?

Linked Nodes Problem 2

- What statements turn this picture:

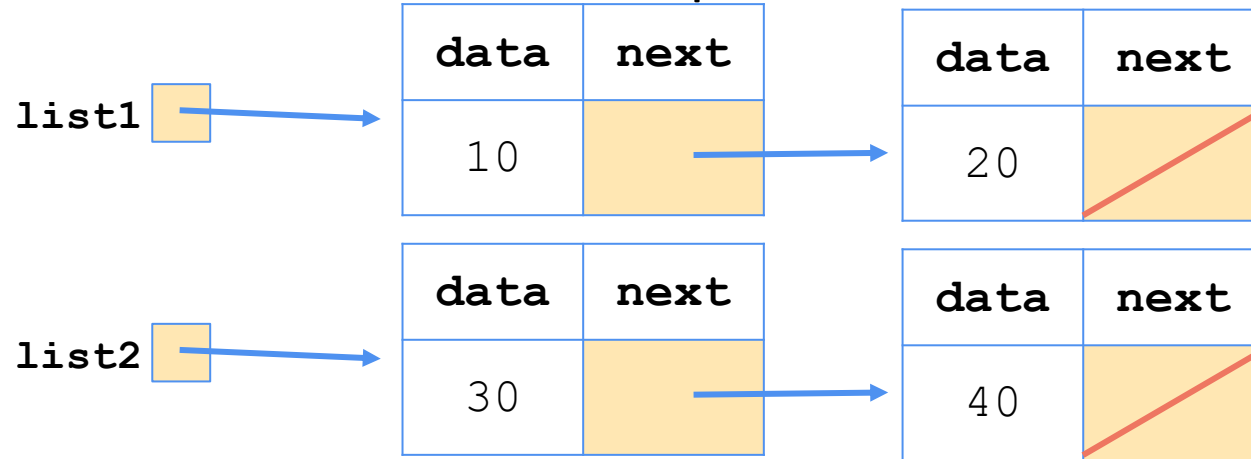


- Into this picture?



Linked Nodes Problem 2

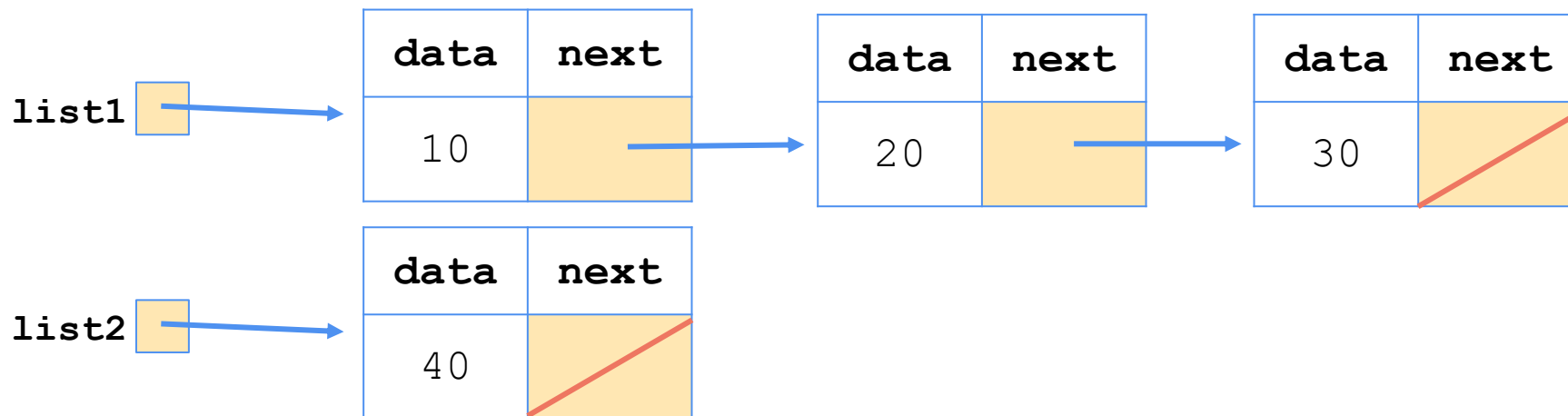
- What statements turn this picture:



Answer:

```
list1.next.next = list2;  
list2 = list2.next;  
list1.next.next.next = null;
```

- Into this picture?

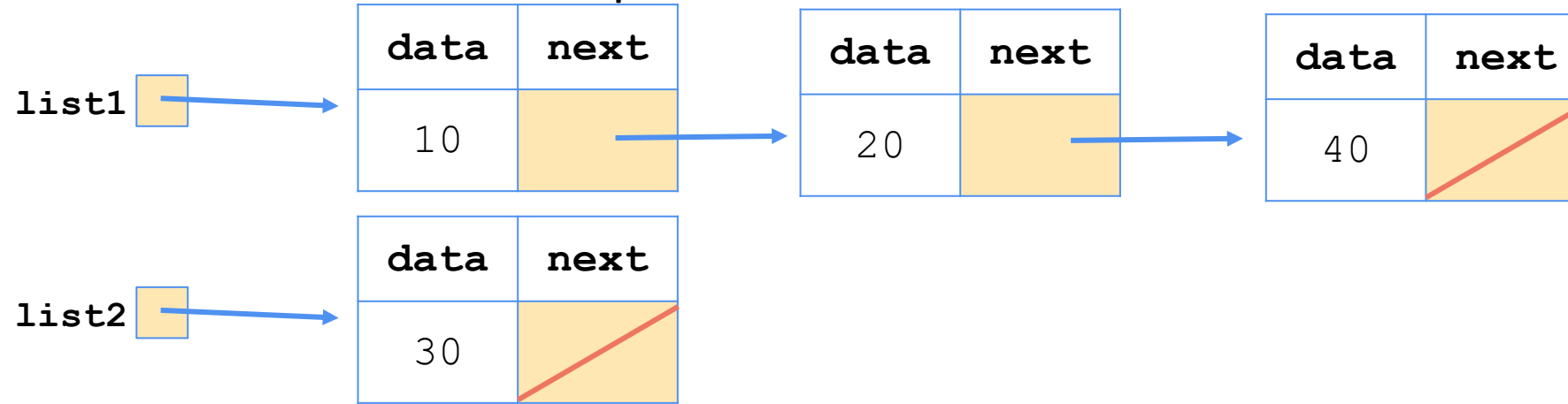


General Linked Nodes Steps

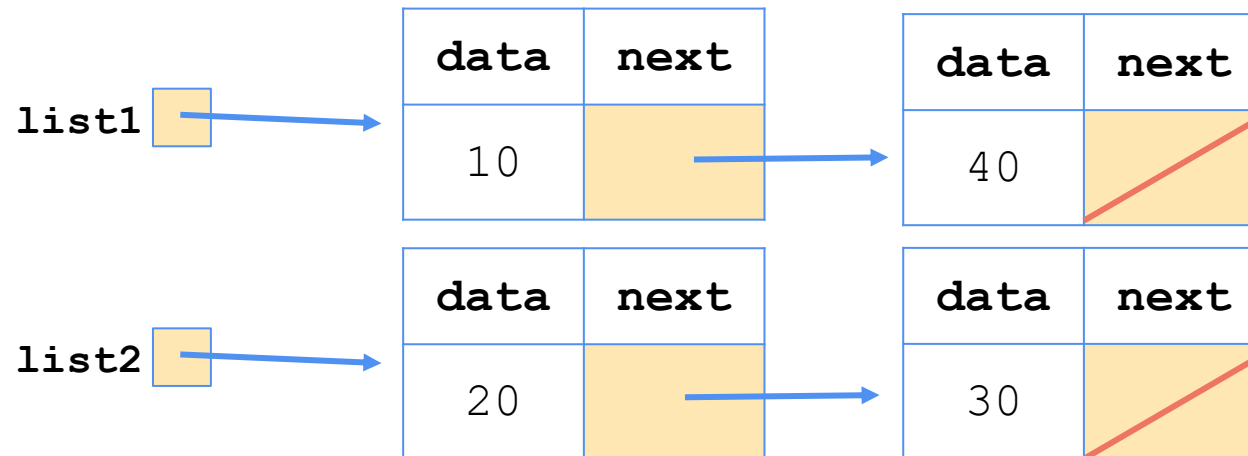
1. Determine what references need to change
2. Find which references are “safe changes”
 - Set to null
 - Redundant reference
3. Make safe changes
4. Repeat steps 2-3 until all references are updated

Linked Nodes Problem 3

- What statements turn this picture:

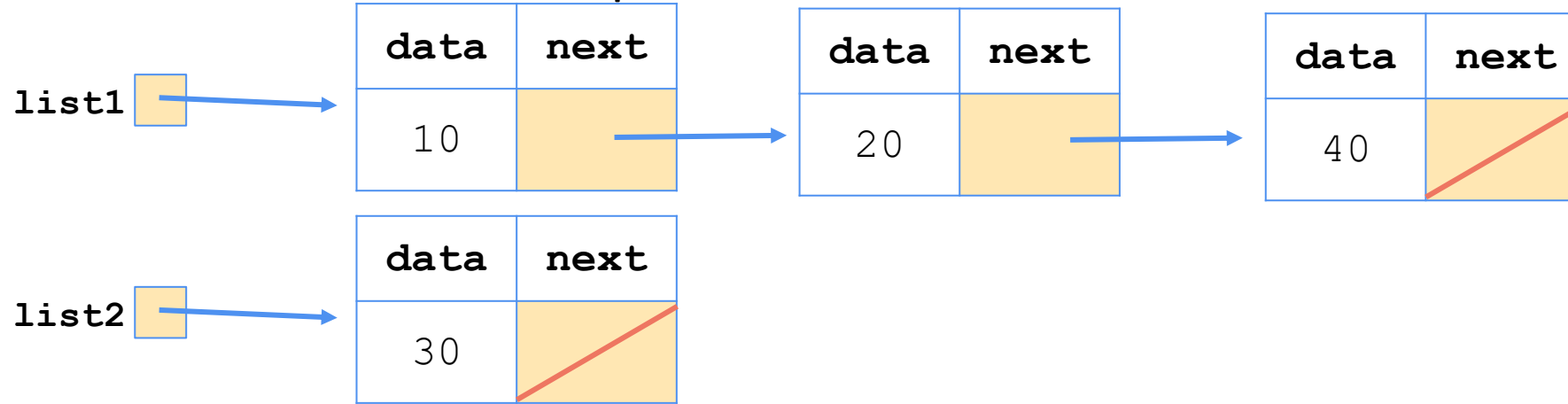


- Into this picture?

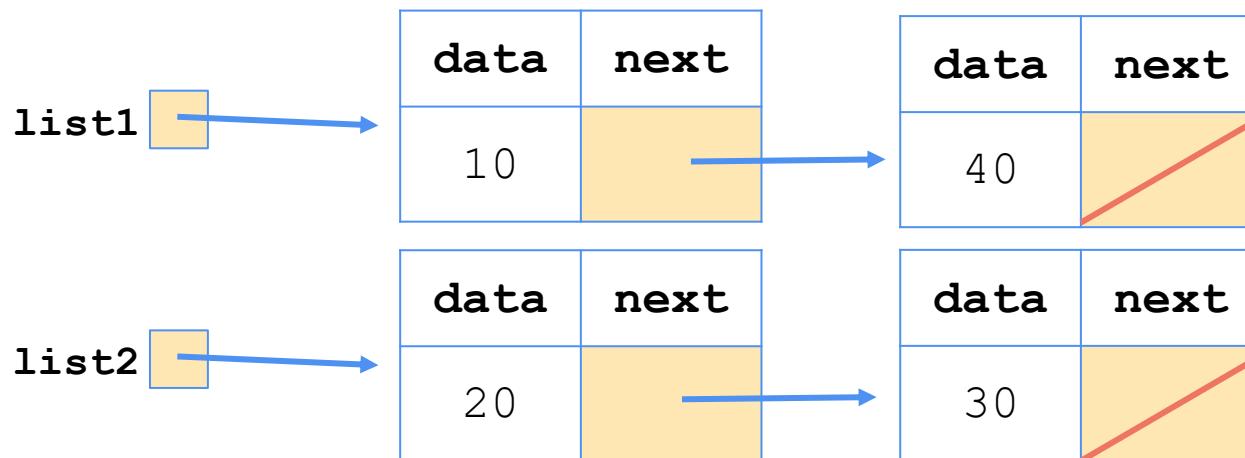


Linked Nodes Problem 3

- What statements turn this picture:



- Into this picture?



(1 Possible) Answer:

```
ListNode temp = list1.next;  
list1.next = list1.next.next;  
temp.next = list2;  
list2 = temp;
```

General Linked Nodes Steps

1. Determine what references need to change
2. Find which references are “safe changes”
 - Set to null
 - Redundant reference
3. Make safe changes
 - If none exist, introduce temp variable
4. Repeat steps 2-3 until all references are updated