CMSC 132: Object-Oriented Programming II

Doubly Linked List

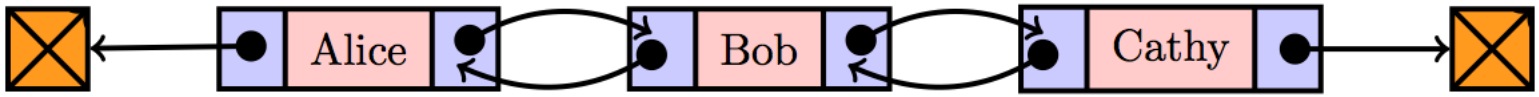
Doubly Linked List Node

```
private class Node<E>{
  private E data;
  private Node previous;
  private Node next;
  Node(E item){
    data = item;
  }
}
```

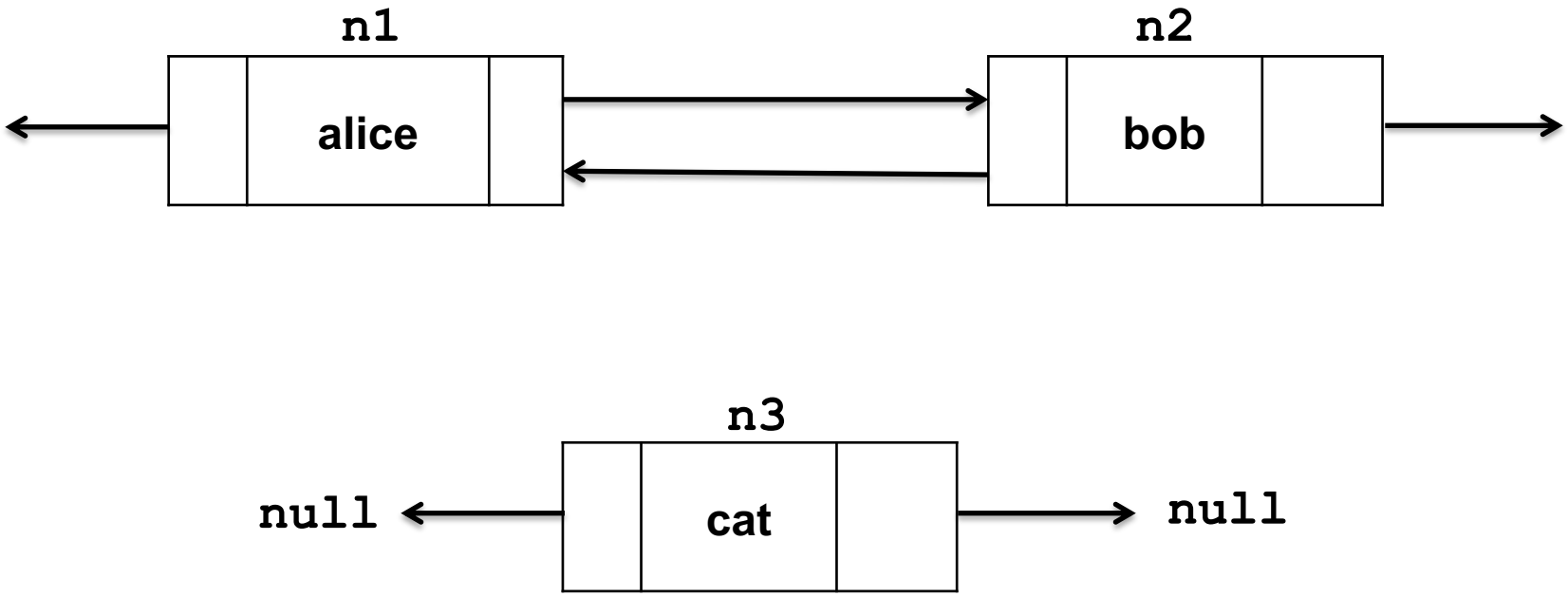

```
Node<String> n1 = new Node<>("alice");
```

Doubly Linked List

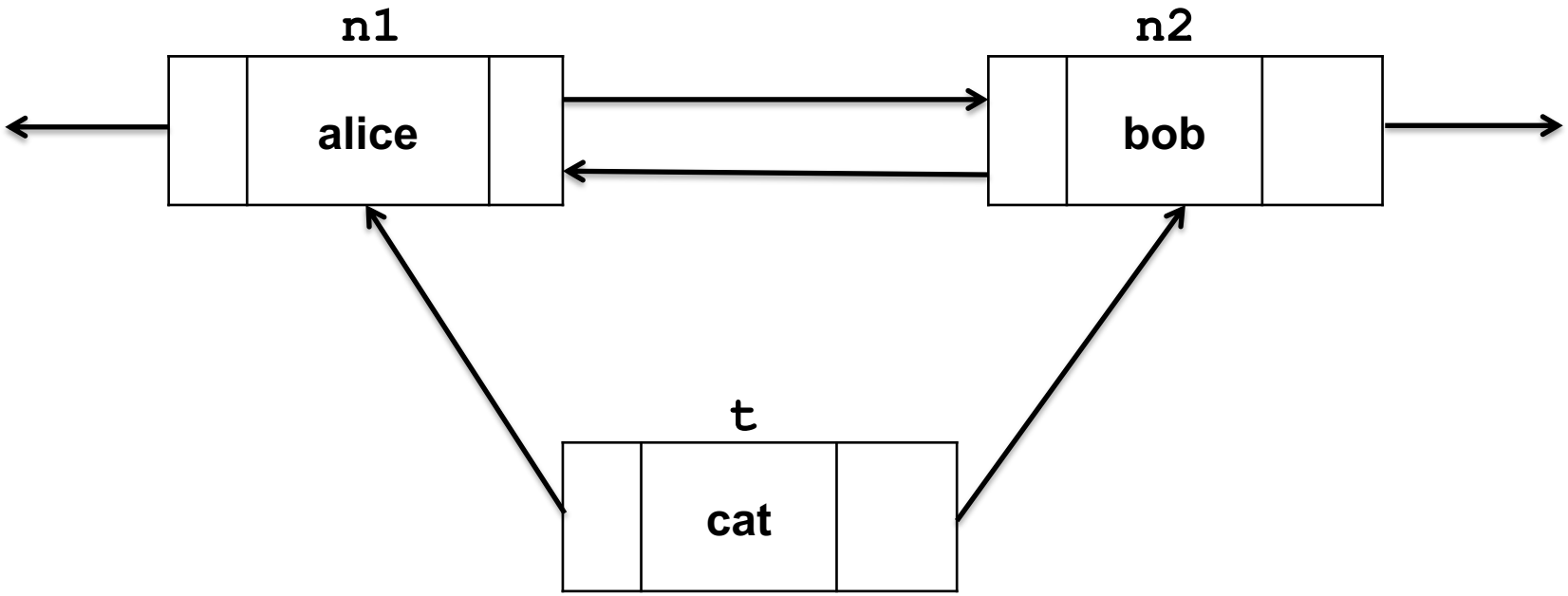
```
Node<String> n1 = new Node("Alice");
Node<String> n2 = new Node("Bob");
Node<String> n3 = new Node("Cathy");
n1.next = n2;
n2.previous = n1;
n2.next = n3;
n3.previous = n2;
```



Insert a Node

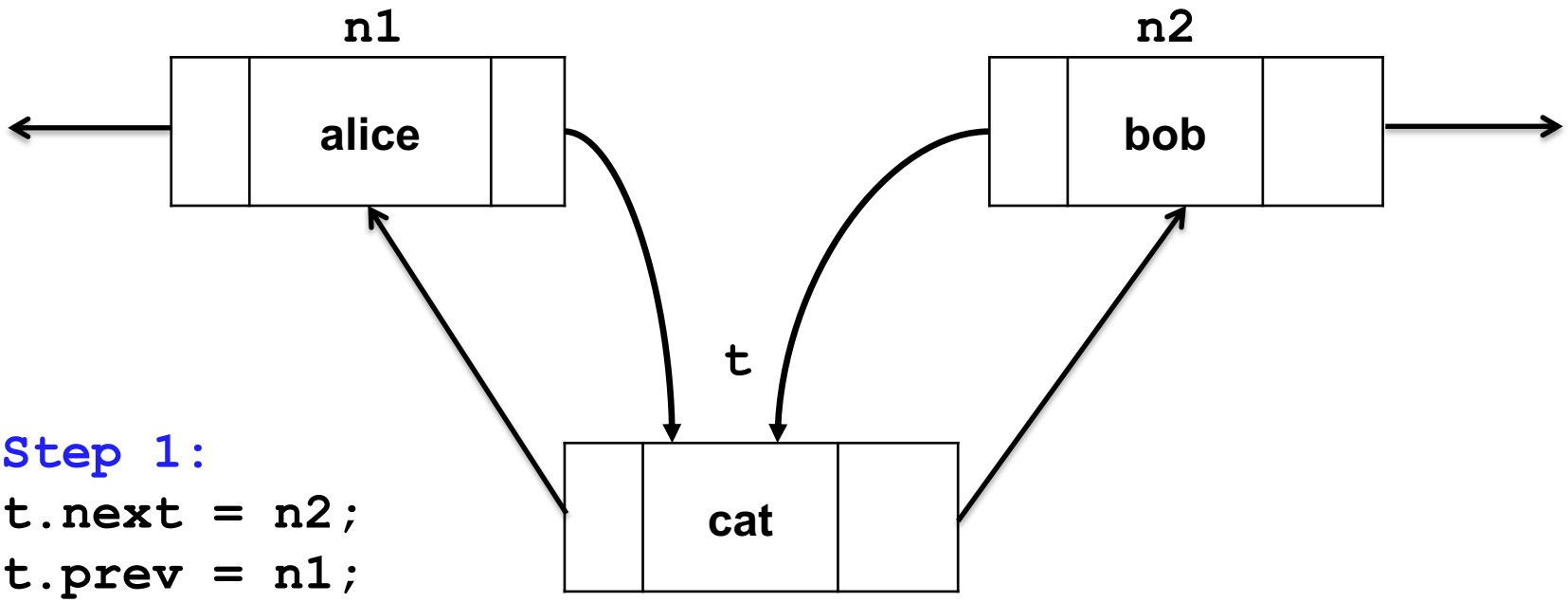


Insert a Node




```
Step 1:
t.next = n2;
t.prev = n1;
```

Insert a Node



Step 1:

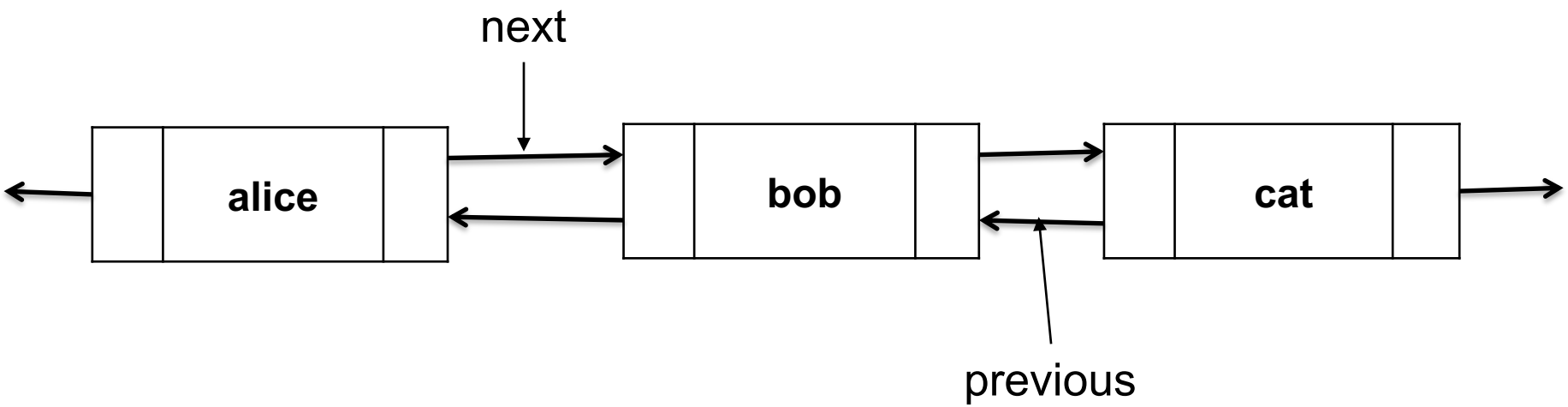
```
t.next = n2;
t.prev = n1;
```

Step 2:

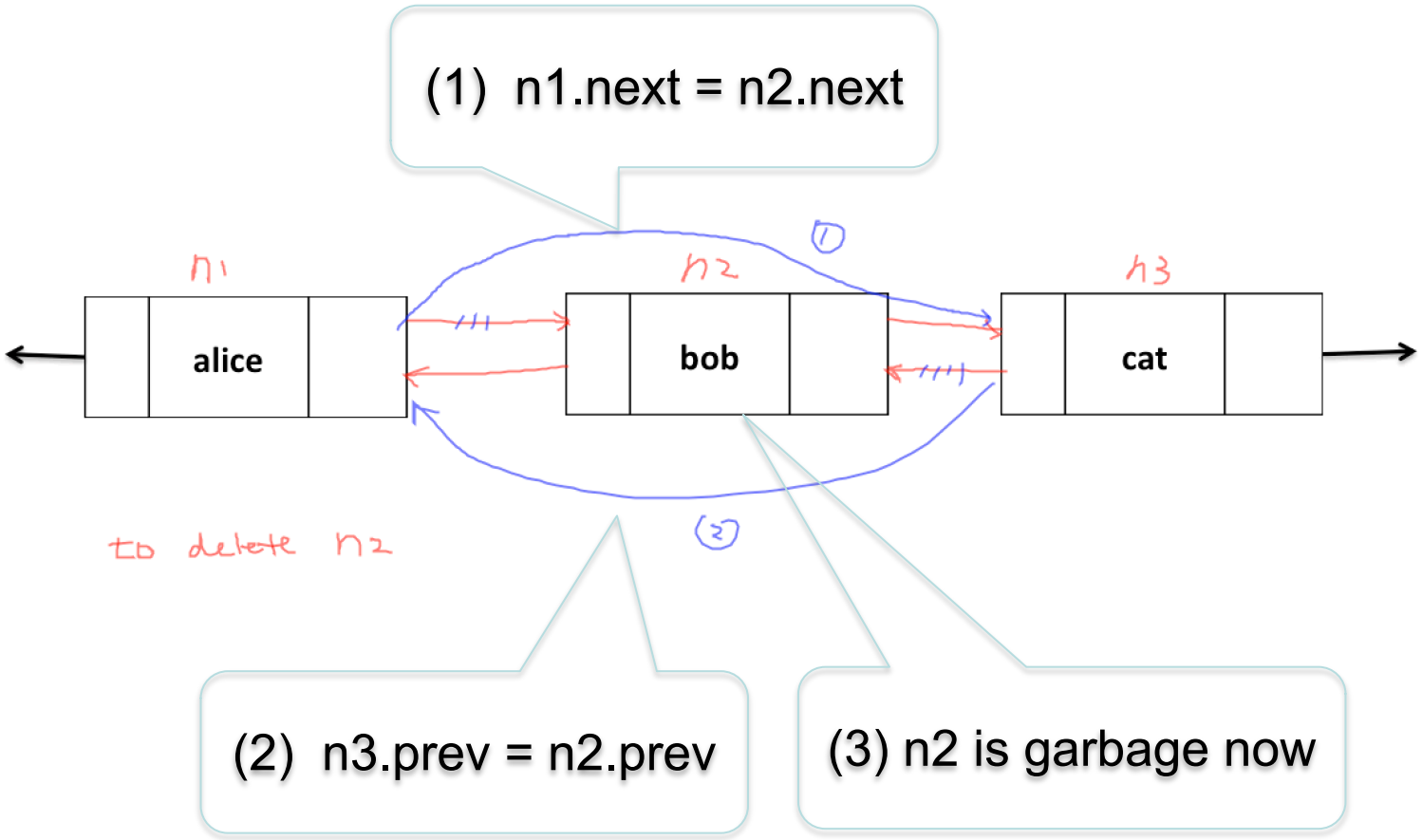
```
n1.next = t;
n2.prev = t;
```

Delete a Node

- We update two references to delete a node:
  - Next
  - Previous



Delete a node n2

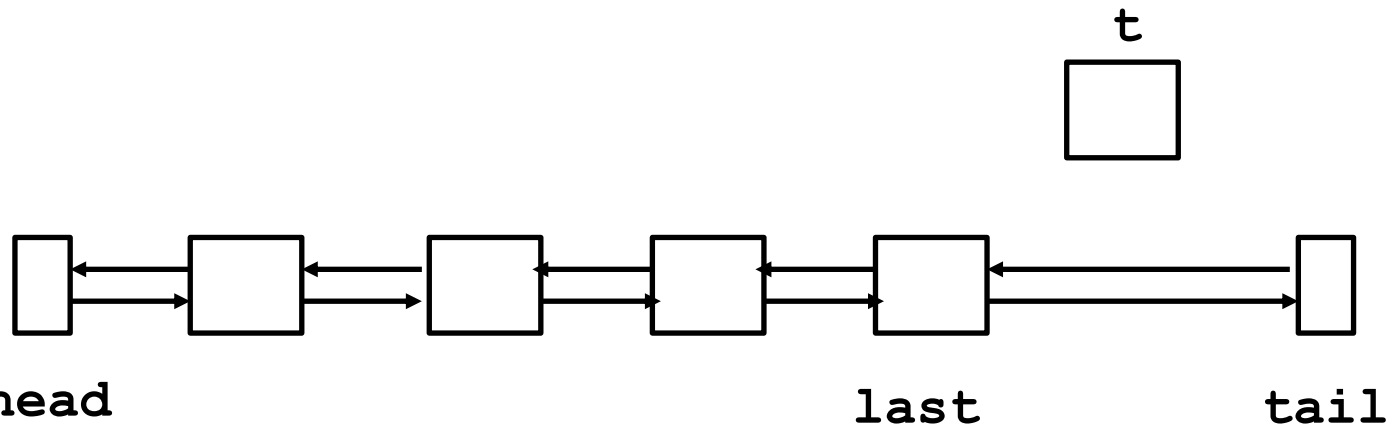


Double Linked List Class

```
public class DoublyLinkedList<E> implements Iterable<E>{
  private int N;  //number of nodes
  private Node head;  //sentinel before the first node
  private Node tail;  //sentinel after the last node;
  DoublyLinkedList(){
    head = new Node();
    tail = new Node();
    head.next = tail;
    tail.previous = head;
  }
  private class Node{
    //Node class body here
 }
}
```

Insert a Node

```
public void insert(E item){
   Node last = tail.previous;
   Node t = new Node(item);
   t.next = tail;
   t.previous = last;
   tail.previous = t;
   last.next = t;
   N++;
}
```



Insert a Node

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   Node t = new Node(item);
   t.next = tail;
   t.previous = last;
   tail.previous = t;
   last.next = t;
   N++;
}
```