Linked Lists

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- Nodes are created/destroyed as necessary. When adding a new element, a new node is created, and linked into the linked list. When removing an element, the node containing the element is destroyed.

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- Linked lists are better for manipulating data, while array lists are better for storing/accessing data.

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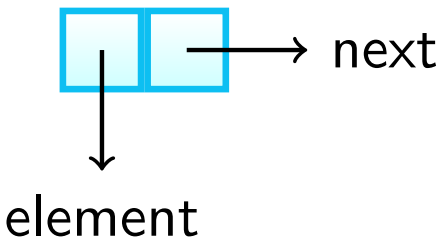
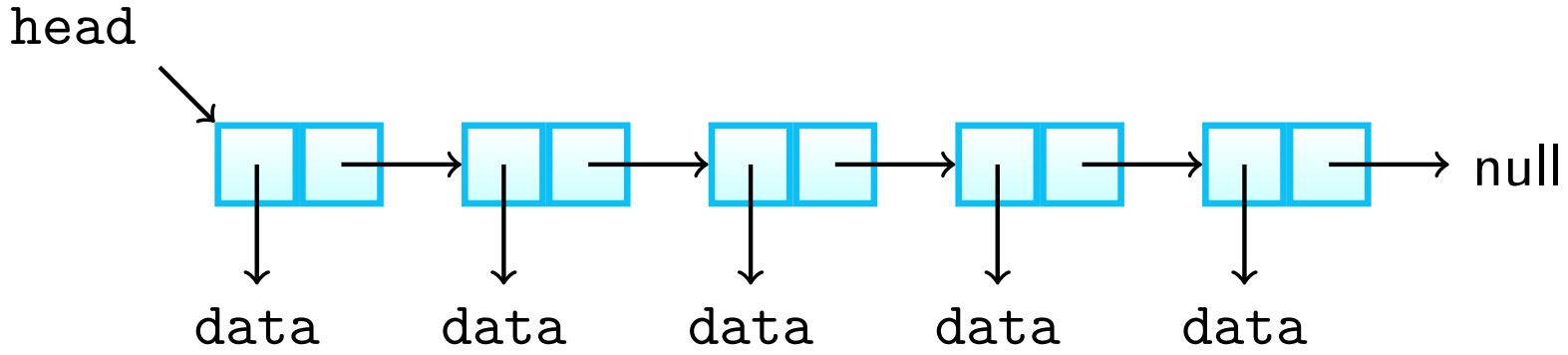


Singly Linked List

In this course, we refrain from creating "dummy" nodes that lead to null references at the end of a singly linked list. We just have the next reference of the last node point to null.

Example of a singly linked list:



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- Update the head reference to point to new node.

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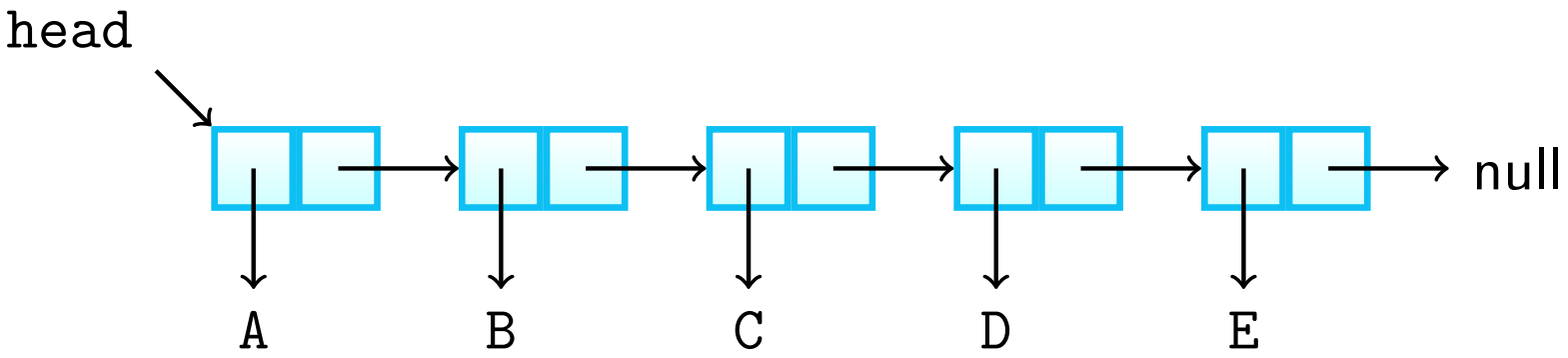

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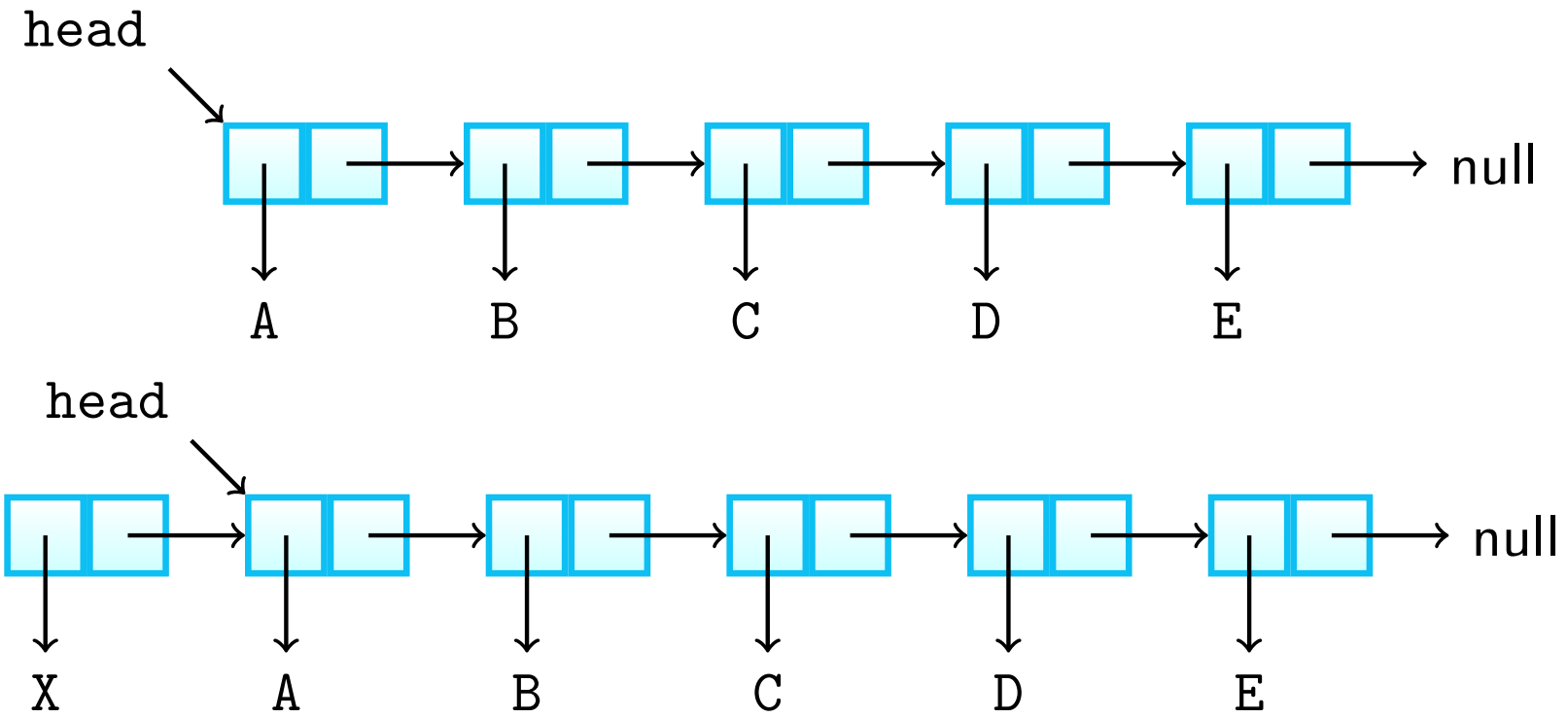

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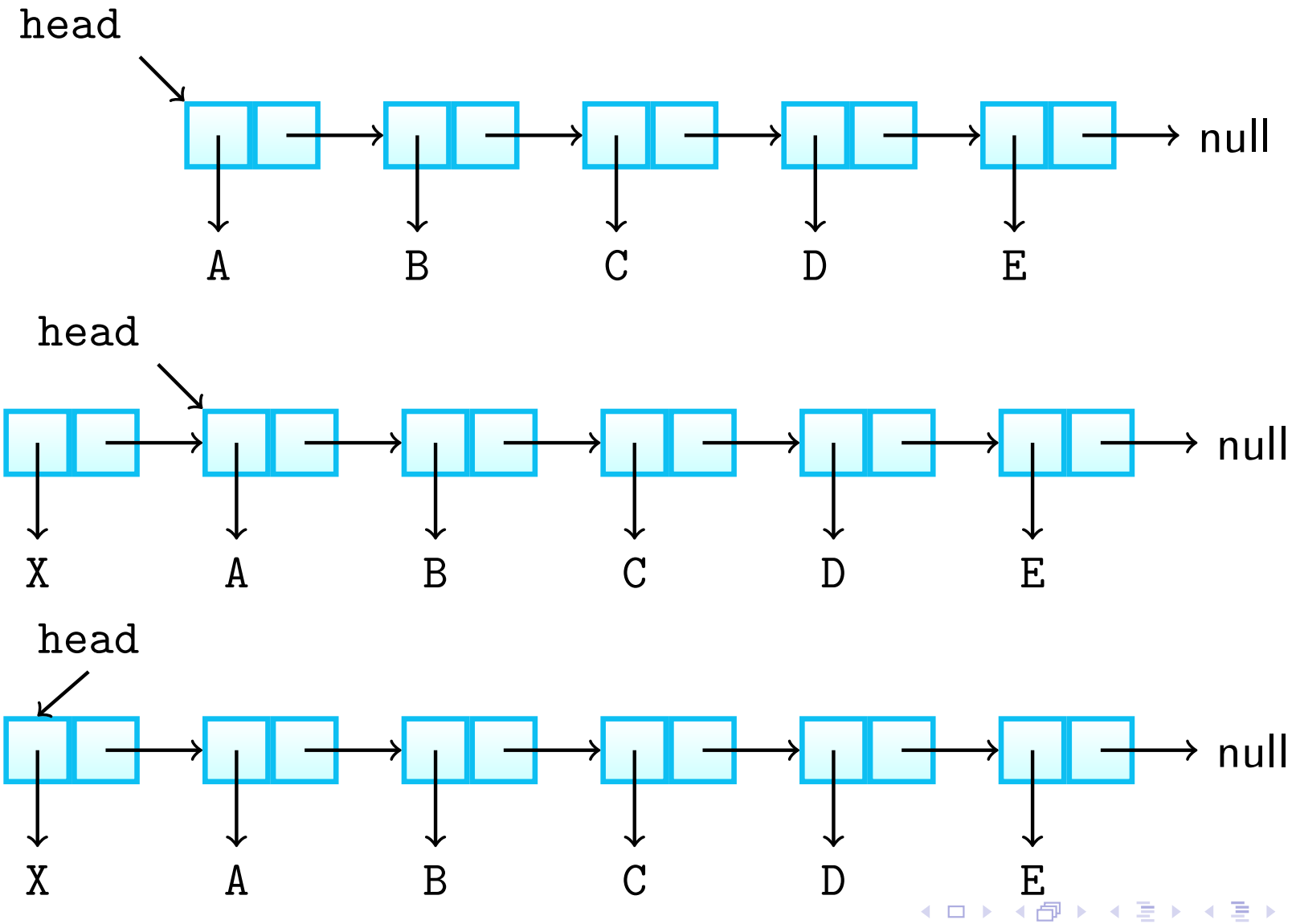

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- Update tail (if there is a tail pointer) to point to new node.

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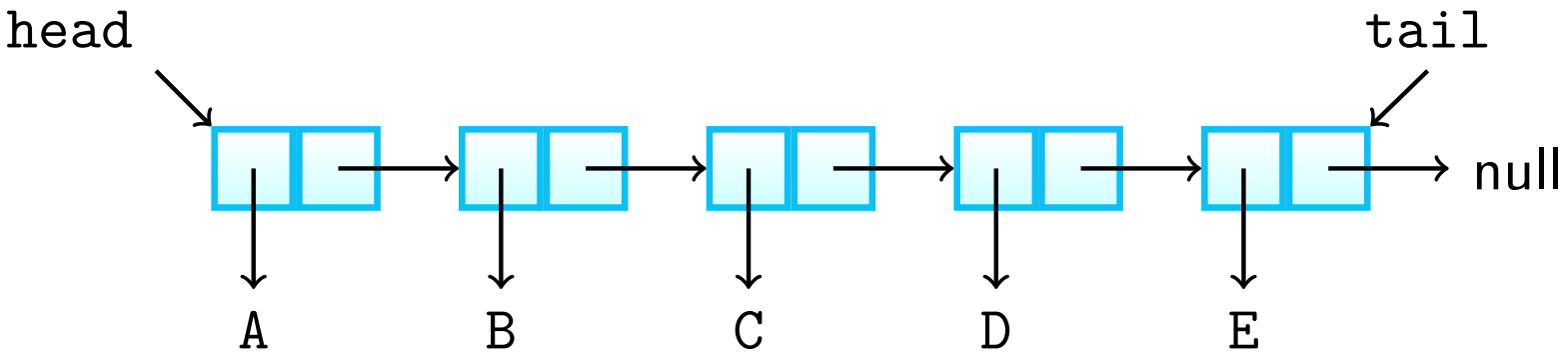

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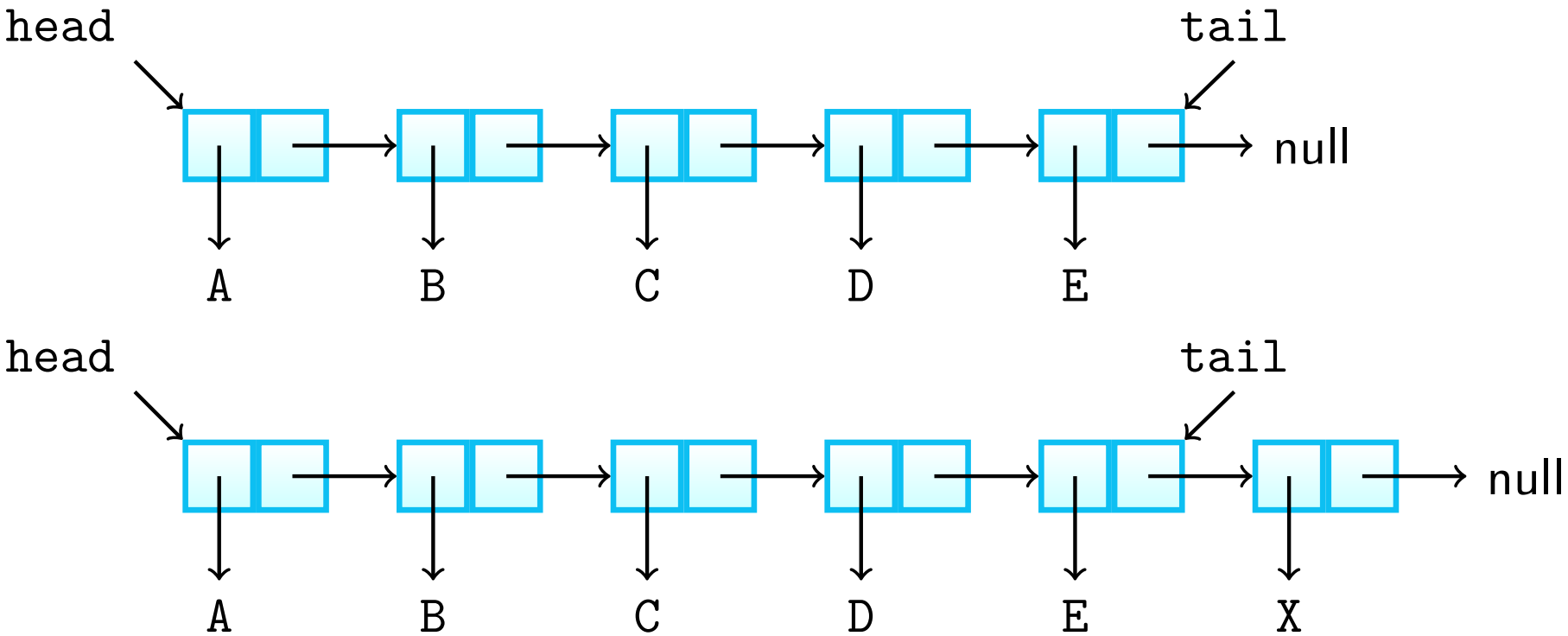

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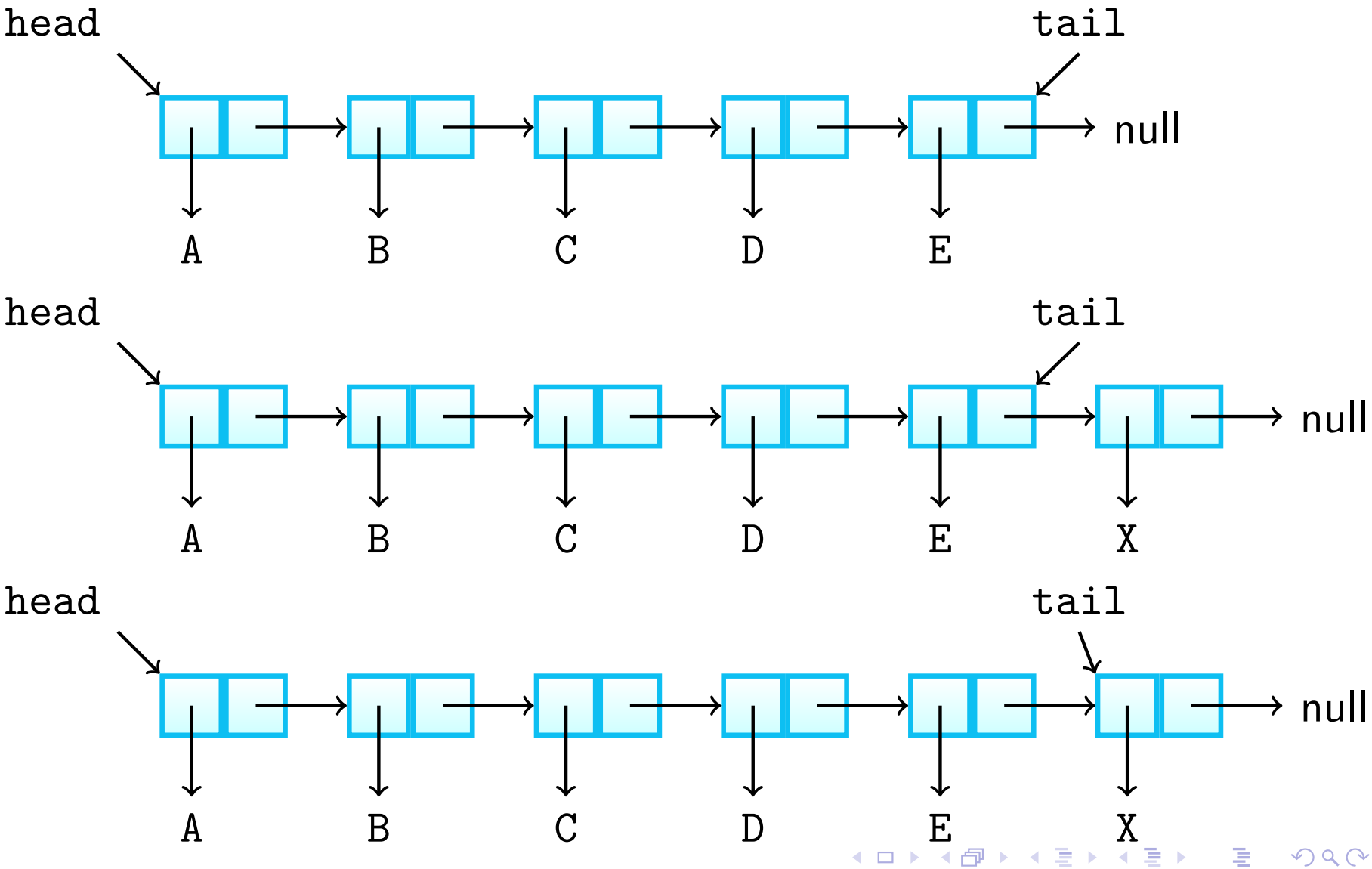

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- Allow garbage collector to reclaim the former first node.

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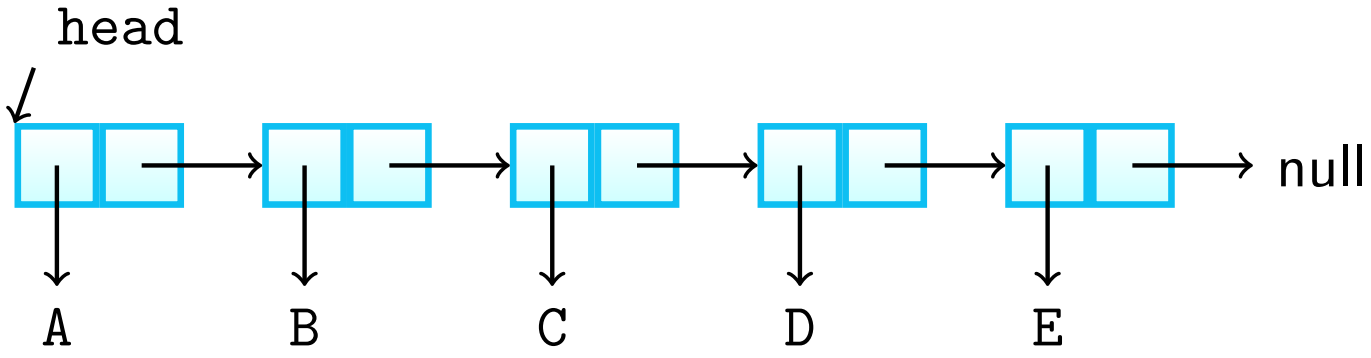

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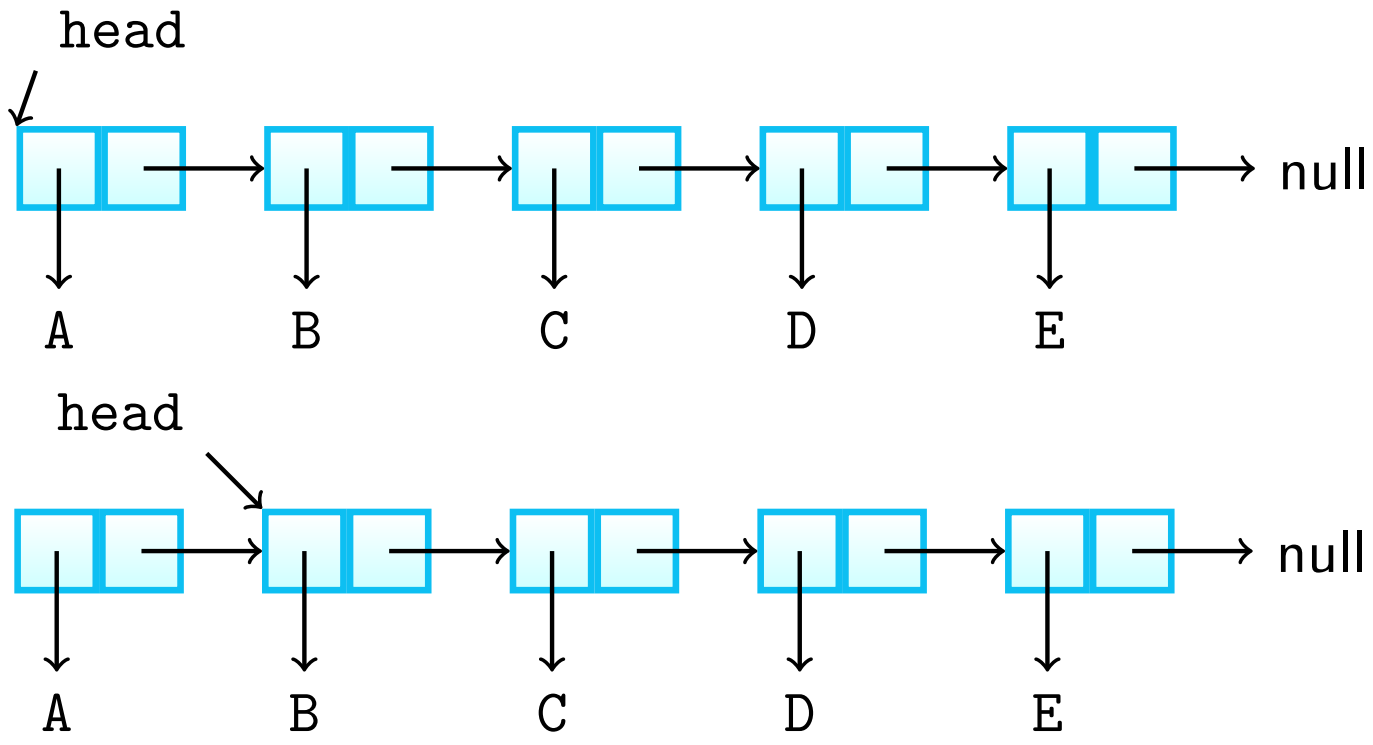

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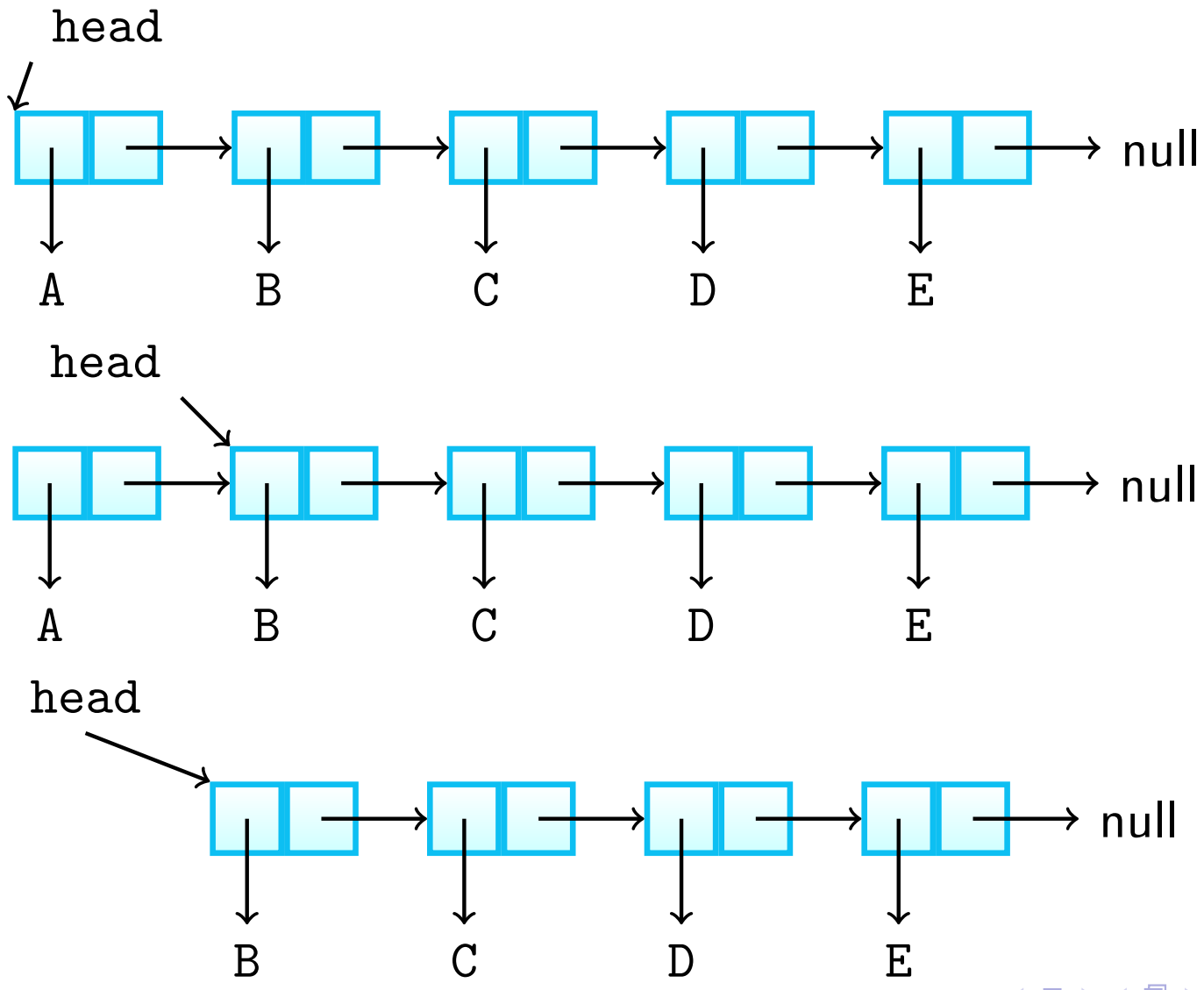

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- Iterate to the node before the last node.
- Update tail (if there is a tail pointer).
- Set the current node's next reference to `null`

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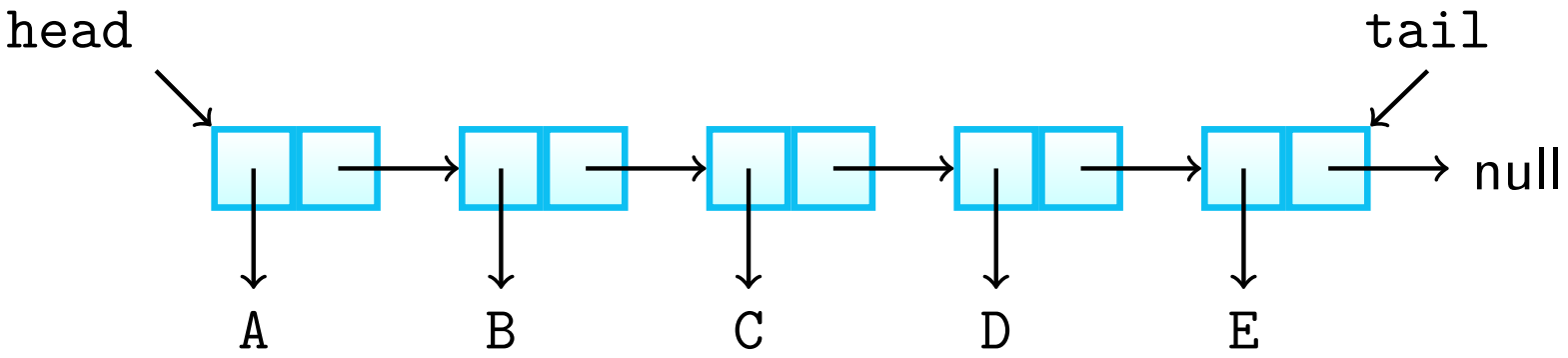

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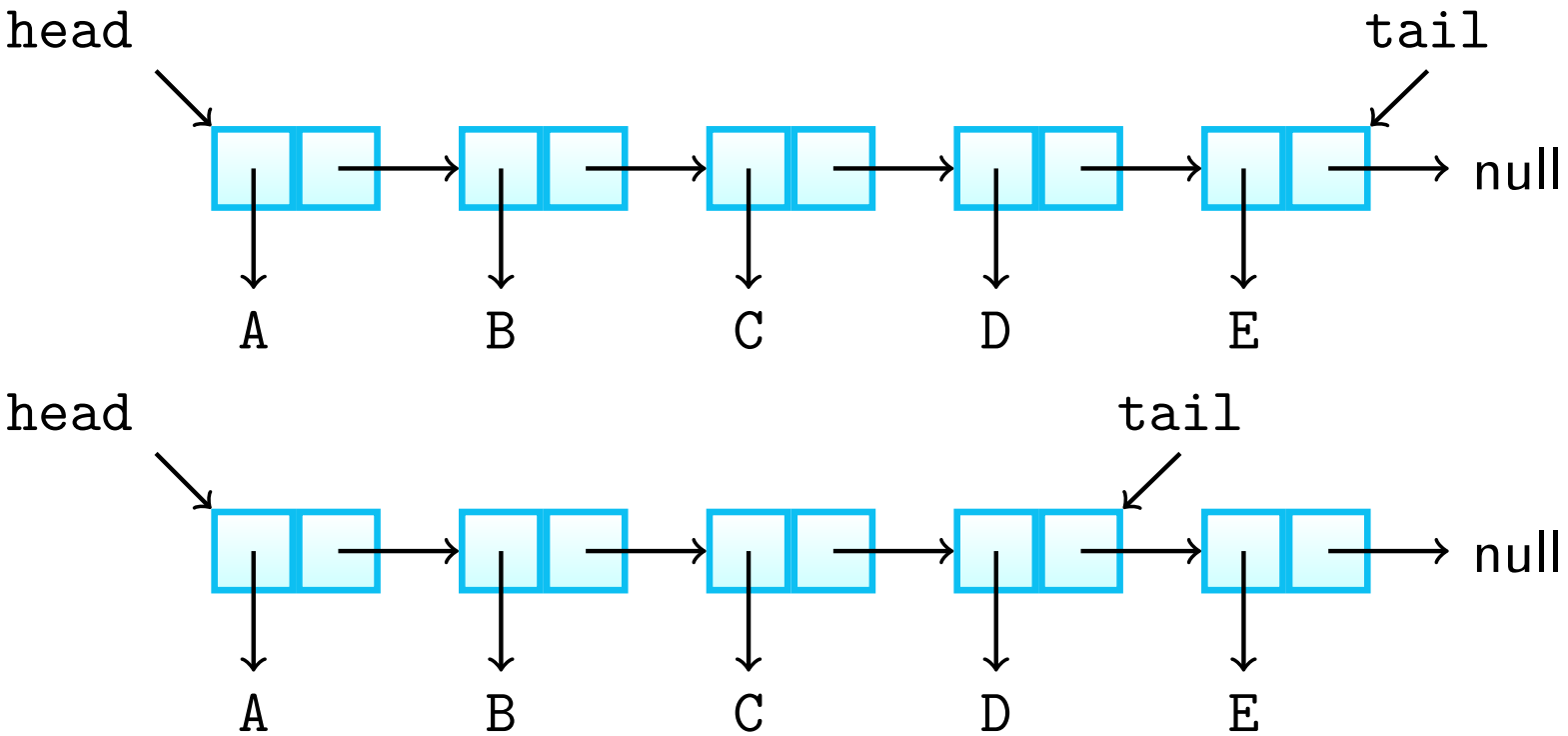

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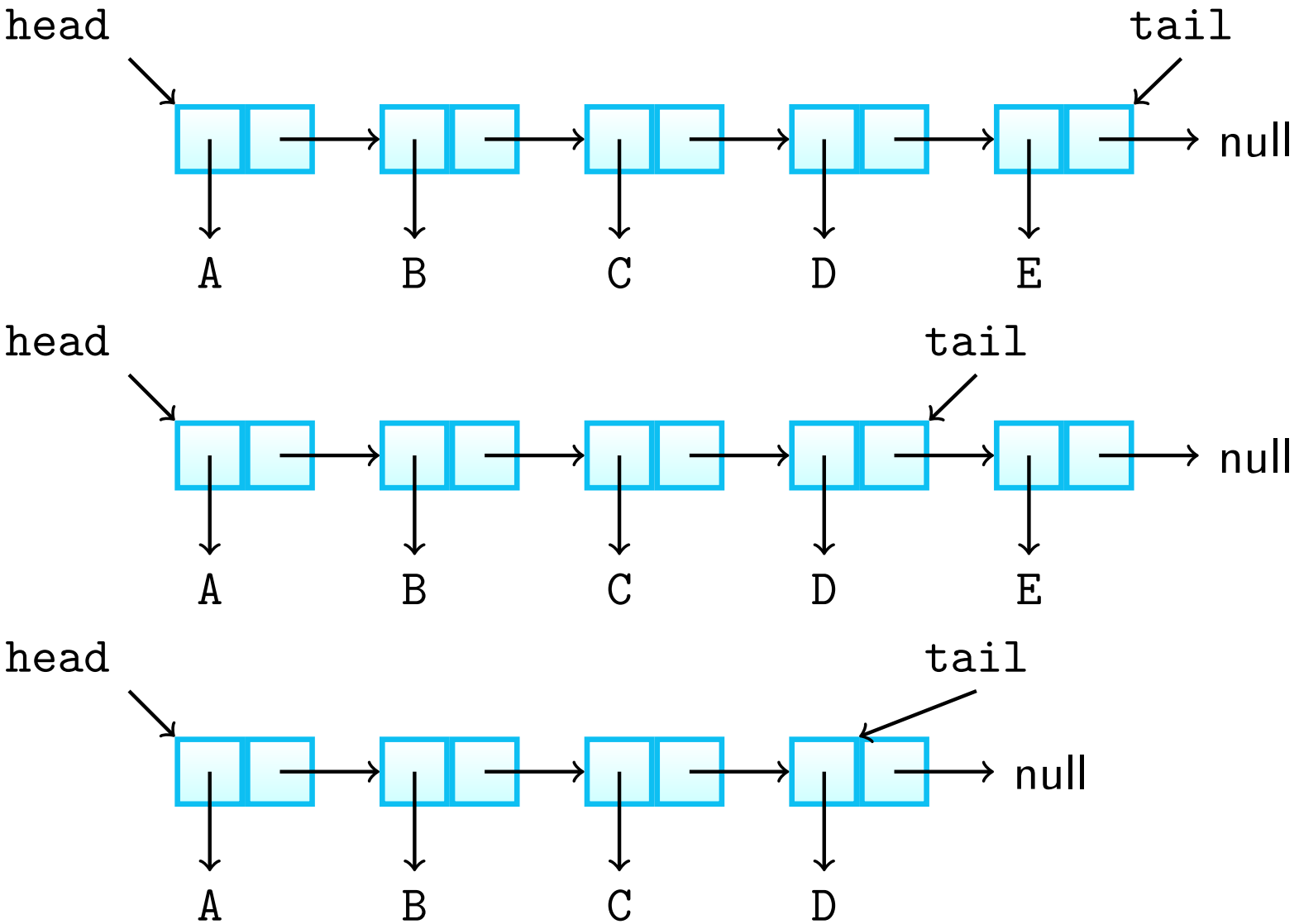

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- Examples of these are shown for doubly-linked lists.

Pseudocode For Inserting/Removing

procedure AddFirst(e)
    node $\leftarrow$ Create a new `Node` object, and have its data be *e*, and the next node be *head*
    head $\leftarrow$ *node*
    if list is empty **then**
        tail $\leftarrow$ *node*
    end if
    size $\leftarrow$ *size* $+ 1$
end procedure

Pseudocode For Inserting/Removing

procedure AddLast(e)
    node ← Create a new `Node` object, and have its data be *e*
    if list is empty **then**
        head ← *node*
    else
        tail.*next* ← *node*
    end if
    tail ← *node*
    size ← *size* + 1
end procedure

Pseudocode For Inserting/Removing

procedure REMOVEFIRST(e)
    $node \leftarrow head$
    $head \leftarrow head.next$
    $size \leftarrow size - 1$
    return *node*
end procedure