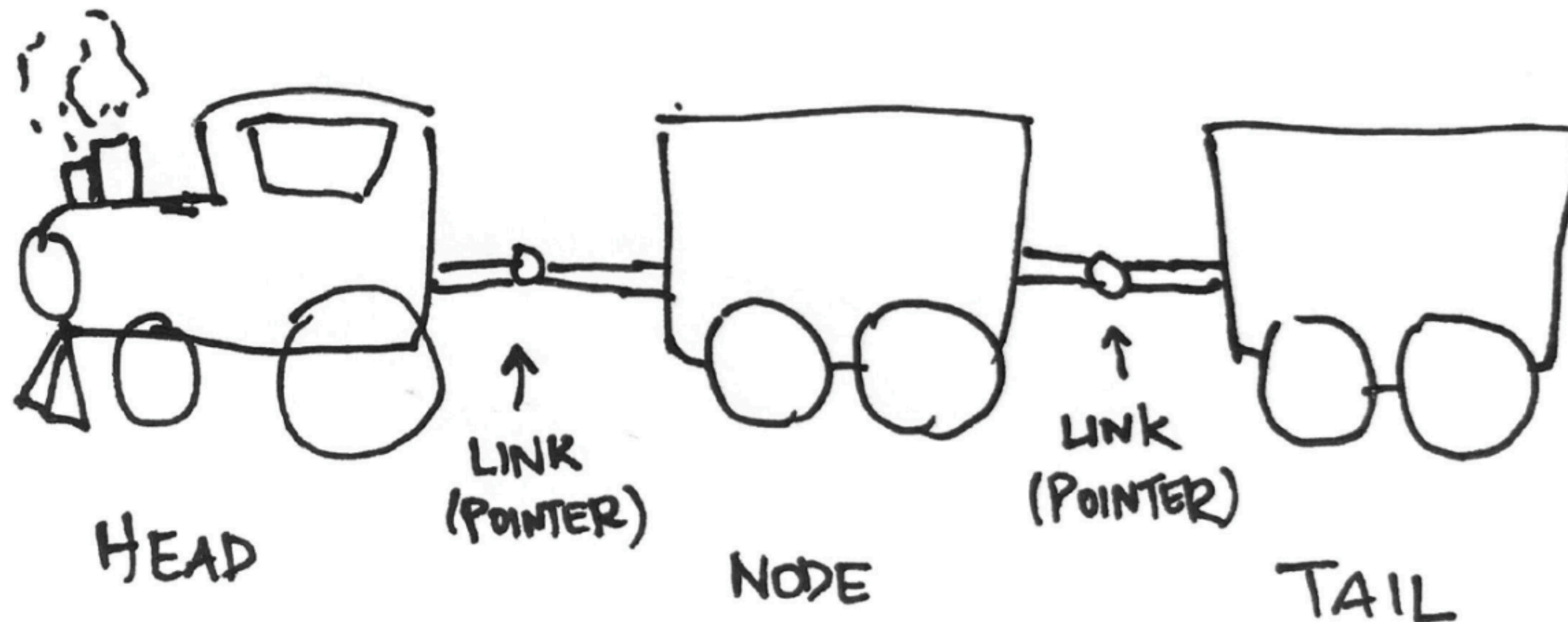


COSC 2436: Linked List

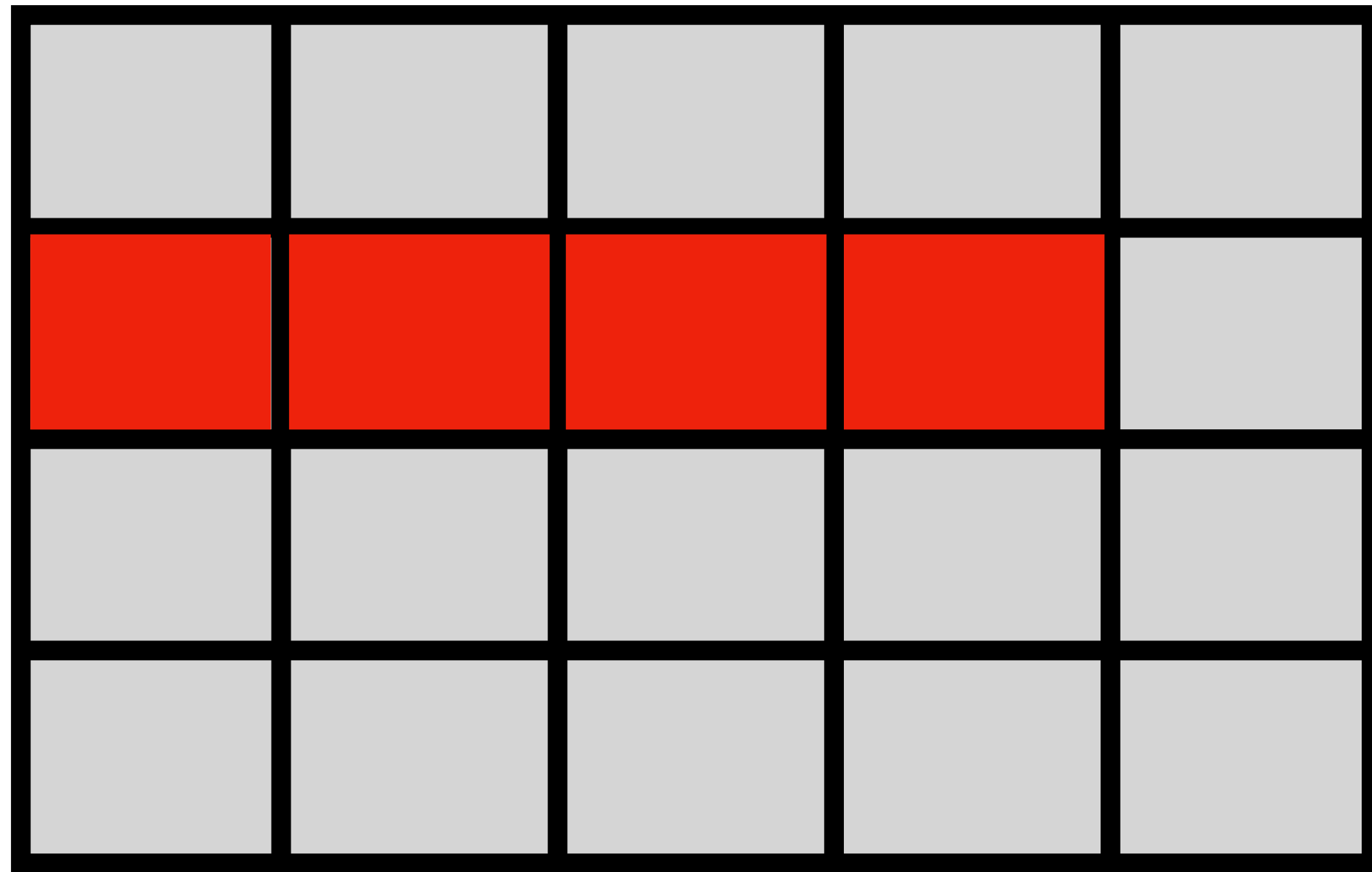
What is a linked list?

A linked list is a linear data structure which is made up of nodes. Each node contains data and a reference to the next node in the list.

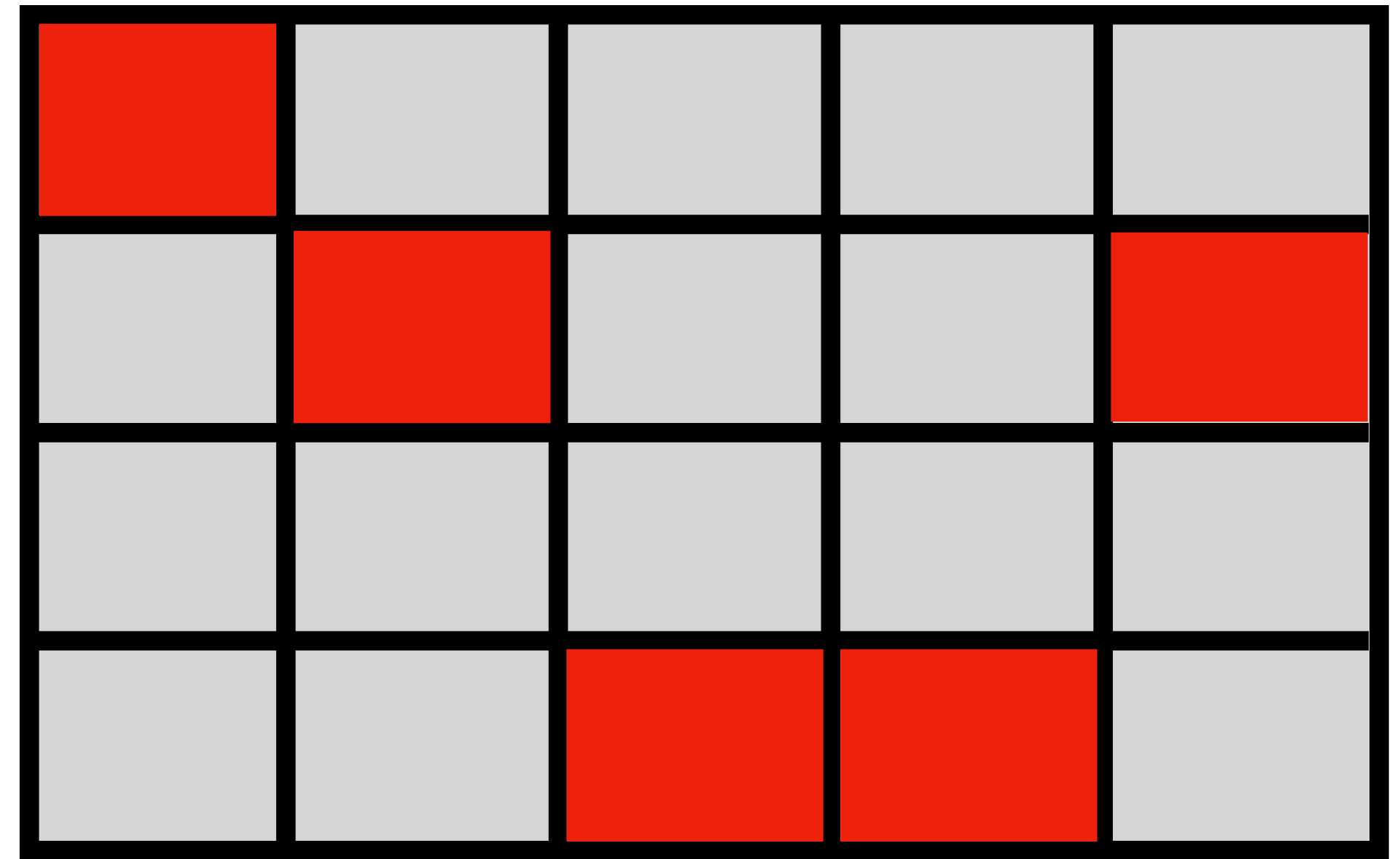


Linked list advantages

- Size can dynamically grow and shrink
- Efficient insertion and deletion (no shifting like with arrays)
- Does not require contiguous memory allocation (no wasted memory)



array



linked list

Linked list disadvantages

- No random access (sequential access)
- More memory usage than an array
- Traversal can sometimes be more time-consuming

✗ `linkedList[3]` ✗

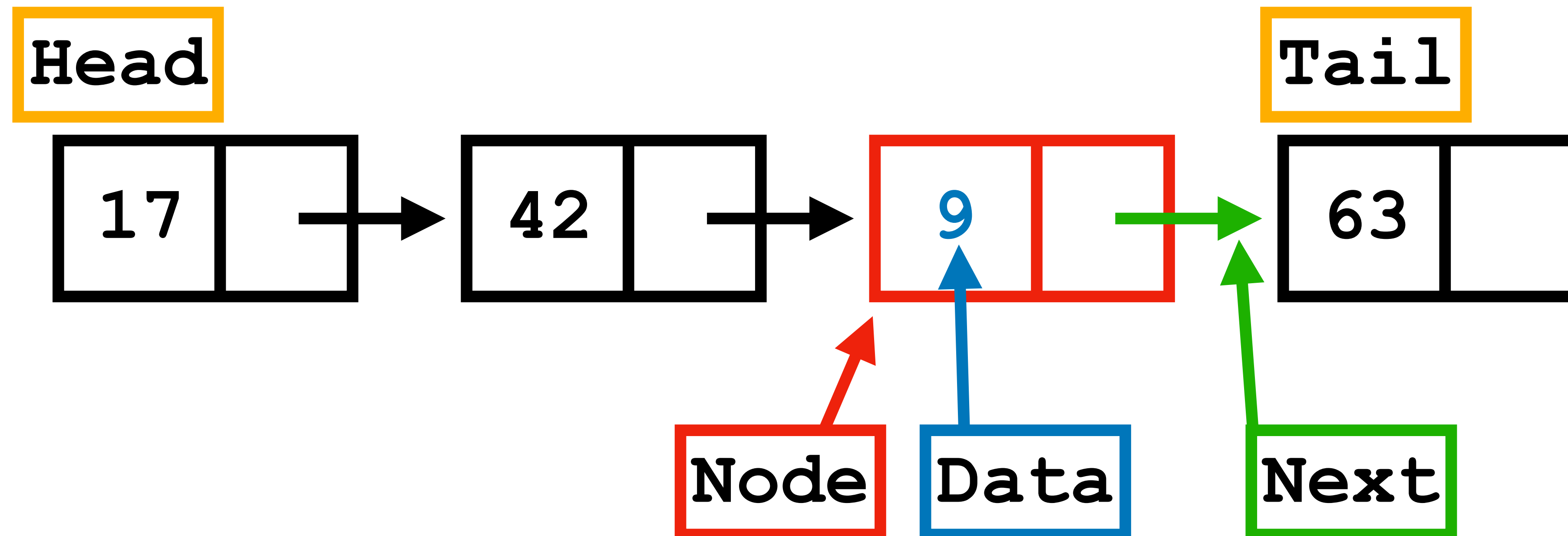
wrong

✓ `cu = cur->next;` ✓

right

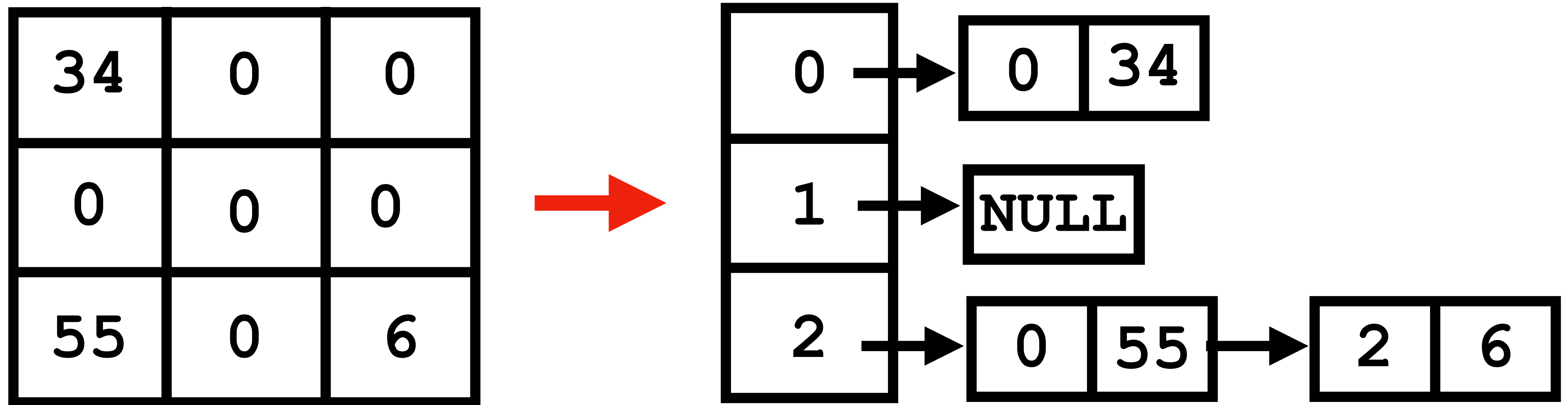
Linked list common terms

- **Node** - basic unit of a linked list
- **Head** - first node in linked list
- **Tail** - last node in linked list
- **Next** - the reference (pointer) to the next node in a linked list



What are some applications of linked lists?

- Implement other Data Structures (Stacks, Queues, Graphs, etc.)
- Task Scheduling (used by Operating Systems)
- Sparse Matrices



Sparse Matrix as Linked List

Different types of linked list

- **Singly Linked List - each node is connected by one next pointer**
- **Doubly Linked List - each node is connected with one previous pointer and one next pointer**
- **Circular Linked List - the tail of the linked list points to the head**