Python Lists vs Linked Lists — Revision Guide

Core Idea
The real difference between Python lists and linked lists is not indexes. It is how memory is organized.

Python List
A Python list stores elements contiguously in memory. Because the start address and element size are known, the computer can calculate the location of any element directly.

Access Time: O(1)

Linked List
A linked list is made of nodes scattered across memory. Each node contains data and a pointer to the next node. There is no predictable relationship between position and memory address.

Access Time: O(n)

Index vs Memory Address
Index: logical position used by programmers (0, 1, 2...)
Memory Address: physical location in RAM

Indexes only work when memory is contiguous. Linked lists cannot use indexes because nodes are scattered.

Why This Matters
Python lists are fast for access but slow for insertions at the beginning. Linked lists are slow for access but fast for insertions and deletions.

Key Insight
Memory layout determines performance. Data structures are trade-offs, not winners.