Stack, Queue, Heap

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Stack Example

- **Problem**: Track books on a desk, add/remove from top.
- **Step-by-Step**:
  1. Push Book1, Book2: Stack = [Book1, Book2].
  2. Pop: Remove Book2.

Queue Example

- **Problem**: Manage bus line: Person1, Person2.
- First in, first out.
- **Step-by-Step**:
  1. Enqueue Person1, Person2.
  2. Dequeue: Remove Person1.

Heap Example

- **Problem**: Schedule tasks by priority: [3, 1].
- Always process highest priority (smallest number).
- **Step-by-Step**:
  1. Push 3, 1: Heap = [1, 3].
  2. Pop: Remove 1.

Stack, Queue, Heap

- **Stack**: Last In, First Out (LIFO). $O(1)$ push/pop.
- **Queue**: First In, First Out (FIFO). $O(1)$ enqueue/dequeue.
- **Heap**: Maintains min/max element. $O(\log n)$ push/pop.
- **Space Complexity**: $O(n)$ for all.