General Assembly

STUDY GUIDE

STACKS AND QUEUES

What Are Stacks and Queues?

Stacks and queues in computer science are a lot like stacks and queues in real life.

» A **stack** is like a stack of pancakes.
- The last, most recently added item is the first to be removed.
- This is "last-in, first-out" behavior, or **LIFO**.

» A **queue** is like a queue of people.
- The first thing that's added to a queue will be the first thing removed from it.
- This is "first-in, first-out" behavior, or **FIFO**.

Stacks and Queues in Programming

Stacks and queues are behind a lot of common computer functionalities.

Examples of stacks (LIFO):
- Back button on a browser
- "Undo" commands
- Function call stacks

Examples of queues (FIFO):
- Documents waiting to be printed
- Computer processing unit (CPU) scheduling

Queue Variations

Queues come in a few other flavors:

» A **priority queue** is a queue with three additional rules that govern its behavior:
- Every item has a priority associated with it.
- An element with high priority is dequeued before an element with low priority.
- Elements with the same priority are served according to their order in the queue.

» A **double-ended queue** (or deque) is a queue that performs insertions and deletions at both ends.
- Typically implemented with a doubly linked list or a dynamic array
- Used for task-scheduling algorithms

Comparing Stacks and Queues

Stacks and queues have a lot in common:
- Ability to be implemented as an array or a linked list
- Limited functionality
- Efficient runtimes

This table displays the functions that can be performed on stacks and queues:

Function	Name in a Stack	Name in a Queue	Big O Complexity
Access	**Peek**	**Peek**	**O(1)**
Insert	**Push**	**Enqueue**	**O(1)**
Delete	**Pop**	**Dequeue**	**O(1)**
Check empty	**isEmpty**	**isEmpty**	**O(1)**

Additional Resources

If stacks or queues come up in an interview, you'll likely be asked to perform operations such as sorting, inserting, and finding values.

Use the visualization tools below to practice building stacks and queues.
- Stack array implementation
- Stack linked list implementation
- Queue array implementation
- Queue linked list implementation