

# What is a Queue?

This lesson is about Queues, their different uses, and their types. We will also go through the working of a Queue by briefly discussing each of its functions.

## We'll cover the following

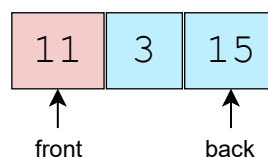


- Introduction
- What are Queues used for?
- How does a Queue work?
- Example
- Types of Queues
  - Circular Queue:
  - Priority Queue

## Introduction #

Similar to Stack, Queue is another linear data structure that stores the elements in a sequential manner. The only significant difference between Stack and Queue is that instead of using the LIFO principle, Queue implements the FIFO method, which is short for **First in First Out**.

According to *FIFO*, the first element inserted is the one that comes out first. You can think of a queue as a pipe with both ends open. Elements enter from one end ( *back* ) and leave from the other ( *front* ). The following animation illustrates the structure of a queue.



Queues are slightly trickier to implement compared to stacks, as we have to keep track of both ends of the array. The elements are inserted from the back and removed from the front.

A perfect real-life example of Queue is a line of people waiting to get a ticket from the booth. If a new person comes, he will join the line from the end; meanwhile, the person standing at the front will be the first to get the ticket and leave the line.

## What are Queues used for? #



Most operating systems also perform operations based on a Priority Queue—a kind of queue that allows operating systems to switch between appropriate processes. They are also used to store packets on routers in a certain order when a network is congested. Implementing a cache also heavily relies on queues. We generally use queues in the following situations:

- We want to prioritize something over another
- A resource is shared between multiple devices (e.g., Web Servers and Control Units)

## How does a Queue work? #

A typical queue contains the following set of methods to work perfectly:

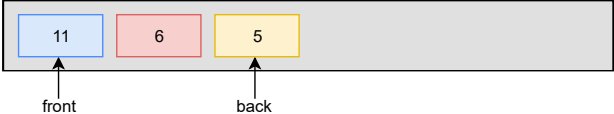
Function	Description
enqueue	Inserts element to the end of the queue
dequeue	Removes an element from the start of the queue
top	Returns the first element of the queue

isEmpty Function	Checks if the queue is empty Description		
isFull	Checks if the queue is full		

The entire functionality of Queue depends on the enqueue and dequeue methods; the rest are just helper methods to produce simple, understandable code.

## Example #

Take a look at the animation below to understand the working of a Queue. The variables that store the positions of front and back of the array will have to be updated accordingly whenever you will enqueue or dequeue an element from the queue.



1 of 19



## Types of Queues #

There are three common types of queues which cover a wide range of problems:

- Linear Queue
- Circular Queue
- Priority Queue

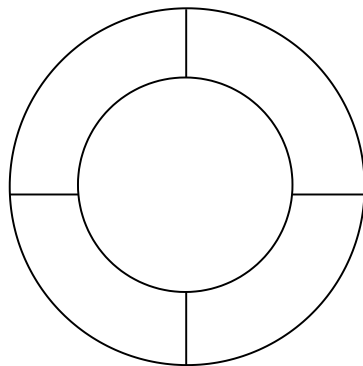
The queue that we have discussed so far was *Linear Queue*. Let's look at the last two types and see how they are different from the *Linear Queue*.

### Circular Queue: #

Circular Queues are almost similar to Linear Queues with only one exception. As the name itself suggests, circular queues are circular in the structure; this means that both ends are connected to form a circle. Initially, the front and rear parts of the queue point to the same location and eventually move apart as more elements are inserted into the queue. Circular queues are generally used in the following ways:

- Simulation of objects
- Event handling (do something when a particular event occurs)

The following illustration shows how circular queues work.



1 of 9


## Priority Queue #

In Priority Queues, elements are sorted in a specific order. Based on that order, the most prioritized object appears at the front of the queue, the least prioritized object appears at the end, and so on. These queues are widely used in an operating system to determine which programs should be given more priority.

Now that we have covered all the basics of Queues let's try to implement them on Java. See you in the next lesson!



 **Back**

**Next** 

Stack (Implementation)

Queue (Implementation)

 **Mark as Completed**



Report an  
Issue



Ask a Question

([https://discuss.educative.io/tag/what-is-a-queue\\_\\_stackqueues\\_\\_data-structures-for-coding-interviews-in-java](https://discuss.educative.io/tag/what-is-a-queue__stackqueues__data-structures-for-coding-interviews-in-java))