

Common Runtimes

2 min

Before we delve into the multiple runtime cases, let's see the different common runtimes a program could have. Below is a list of common runtimes that run from fastest to slowest.

- **$\Theta(1)$** . This is *constant* runtime. This is the runtime when a program will always do the same thing regardless of the input. For instance, a program that only prints "hello, world" runs in $\Theta(1)$ because the program will always just print "hello, world".
- **$\Theta(\log N)$** . This is *logarithmic* runtime. You will see this runtime in search algorithms.
- **$\Theta(N)$** . This is *linear* runtime. You will often see this when you have to iterate through an entire dataset.
- **$\Theta(N \log N)$** . You will see this runtime in sorting algorithms.
- **$\Theta(N^2)$** . This is an example of a *polynomial* runtime. When **N** is raised to the **2nd** power, it's known as a *quadratic* runtime. You will see this runtime when you have to search through a two-dimensional dataset (like a matrix) or nested loops.
- **$\Theta(2^N)$** . This is *exponential* runtime. You will often see this runtime in recursive algorithms (Don't worry if you don't know what that is yet!).
- **$\Theta(N!)$** . This is *factorial* runtime. You will often see this runtime when you have to generate all of the different permutations of something. For instance, a program that generates all the different ways to order the letters "abcd" would run in this runtime.

