

Exponential Search

The name of this searching algorithm may be misleading as it works in $O(\log n)$ time. The name comes from the way it searches an element. The name arises as a result of the algorithm jumping elements with steps equal to exponents of 2.

In computer science, an exponential search is an algorithm, created by Jon Bentley and Andrew Chi-Chih Yao in 1976, for searching sorted, unbounded/infinite lists. There are numerous ways to implement this with the most common being to determine a range that the search key resides in and performing a binary search within that range. This takes $O(\log i)$ where i is the position of the search key in the list, if the search key is in the list, or the position where the search key should be, if the search key is not in the list.

Exponential search can also be used to search in bounded lists. Exponential search can even outperform more traditional searches for bounded lists, such as binary search, when the element being searched for is near the beginning of the array. This is because exponential search will run in $O(\log i)$ time, where i is the index of the element being searched for in the list, whereas binary search would run in $O(\log n)$ time, where n is the number of elements in the list.