Quick sort

Quick sort is an efficient exchange-based algorithm that uses a divide and conquer strategy.

What is a divide and conquer algorithm?

1. Divide – spilt the problem into subproblems
2. Conquer – solve each subproblem recursively
3. Unite – combine the solutions to each subproblem to get the answers t othe problem

The divide algorithm in quicksort is called partition. We pick a value from the subarray called the pivot. In terms of correctness, it doesn’t matter which value you pick.

We think rearrange the contents of the subarray by swapping values such that after partitioning the subarray looks like the following.

There are many partition algorithms.

Big-o run time of partition is O(n), where n is the size of the subarray

Best: O(nlogn)

Average: O(nlogn)

Worst: O(n^2)

Space overhead： O(logn) or O(n)

Stable? No!

Let’s assume we always pick the median as the pivot.

Eventually, it will becomes a bunch of arrays of size of 1🡪 O(nlogn)

Let’s assume the pivot is always the max value in the subarray🡪O(n^2)