Assignment 3

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Problem

Consider that you have two databases named A and B. Each database contains n values. Without loss of generality, you can assume that all these $2n$ values are distinct. The median value is defined as the n-th smallest value among these $2n$ values.
You need to find the median by sending queries to these two databases. In each query, you specify a value k so that the database returns you the k-th smallest value in that database. For example, if A has the values $1, 2, \ldots, n$, and if you send a query with value 10, then A sends the value 10 to you.
Since each query is expensive, you want to minimize the number of queries sent to these two databases. Give an algorithm that finds the median value using at most $O(\log n)$ queries. Show this algorithm and show its running time analysis.