

Binary Index Tree – Sample Problem

Consider that there are 100,000 candies, numbered 0 through 99,999. We start eating the candies in some random order. We might eat candy number 34,567, followed by candy number 12,980, etc. At any point however, we might be asked how many candies are still available from some range. For example, after eating several candies, we might be asked to determine the number of candies that aren't eaten in between candy number 12,000 and candy number 12,999, inclusive. If we had eaten candy number 12,980 already, then the answer to the query would be 999.

A binary index tree is the perfect data structure to allow us to update which candies have been eaten and answer many queries of this nature in sequence.

One way to solve the problem is as follows:

- 1) Start with an empty binary index tree.
- 2) Whenever an item is eaten add 1 to that specific slot in the binary index tree.
- 3) Whenever there is a query, you can query a range to see how many candies in that range were eaten. Just subtract this value from the total number of values in that range.