Data Structures and Algorithms : CS210/CS210A

Practice problems on Complete Binary Trees

Date: *8 November, 2014.*

1. You are given a sequence $\langle x_0, \ldots, x_{n-1} \rangle$ of n numbers. Design a suitable data structure which can perform each of the following operations in $O(\log n)$ time for any $0 \leq i \leq j < n$.

   - *Report_sum*(i, j): Report the sum of all numbers $\{x_i, ..., x_j\}$.
   - *Update*(i, Δ): Add Δ to the current value of x_i.

2. You are given a sequence $S = \langle b_0, \ldots, b_{n-1} \rangle$ of n bits. Design a suitable data structure which can perform each of the following operations in $O(\log n)$ time for any $0 \leq i < n$.

   - *Report_longest_sequence*: Report the length of the longest contiguous subsequence of 1s in the sequence S.
   - *Flip_bit*(i): Flip bit b_i.