

This is the partial-sums problem.
Binary Indexed Tree. $O(n \log n)$.
lower bound: $\Omega(n \log n)$ in the cell-probe model [1, 2].

References

- [1] Mihai Pătraşcu and Erik D Demaine. Tight bounds for the partial-sums problem. In *Proceedings of the fifteenth annual ACM-SIAM symposium on Discrete algorithms*, pages 20–29. Society for Industrial and Applied Mathematics, 2004.
- [2] Mihai Patrascu and Erik D Demaine. Logarithmic lower bounds in the cell-probe model. *SIAM Journal on Computing*, 35(4):932–963, 2006.