

CS 522: Data Structures and Algorithms II

Homework 1

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1. **Solution:** If both INCREMENT and DECREMENT operations were included in the k -bit counter, an amortized analysis of the cost of n operations would cost as much as $\Theta(nk)$ time because we would no longer be able to consider each operation as a consecutive INCREMENT, but rather as any combination of INCREMENTS and DECREMENTS. Thus, in a worse-case scenario, it would be possible to alternate n times between two operations which cost $O(k)$ each, resulting in a total cost of $\Theta(nk)$.
2. **Solution:**
3. **Solution:**
4. **Solution:**
5. **Solution:**
6. **Solution:**
7. **Solution:**
8. **Solution:**