

6.851 ADVANCED DATA STRUCTURES (SPRING'12)

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Problem 7 *Due: Thursday, Apr. 12*

Be sure to read the instructions on the assignments section of the class web page. Remember to keep your solutions to one page!

Speeding up static van Emde Boas. In this problem we will develop a static data structure matching the $O\left(\lg \frac{w - \lg n}{a}\right)$ predecessor time bound mentioned in class.

1. Develop and analyze a data structure that supports successor and predecessor queries in the word-RAM model in $O(\lg(w - \lg n))$ worst-case time using $O(n)$ space.
2. Develop and analyze a data structure that supports successor and predecessor queries in the word-RAM model in $O\left(\lg \frac{w}{\lg \lg n}\right)$ worst-case time using $O(n \log n)$ space.

Neither of your data structures needs to support insertions or deletions.