6.851 Advanced Data Structures (Spring'12)

Prof. Erik Demaine   TAs: Tom Morgan, Justin Zhang

$\boxed{\text{Problem 4}}$ *Due: Thursday, Mar. 15*

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

Cache-oblivious median finding.   Given an unordered array of N elements, develop and analyze a cache-oblivious algorithm to find the median of the array in $O(\lceil N/B \rceil)$ memory transfers. In your solution, you may assume knowledge of the standard median-of-medians deterministic selection algorithm.

Cache-oblivous queue.   Develop and analyze a cache-oblivious FIFO queue. Both the `enqueue` and the `dequeue` operation should take $O(1/B)$ amortized memory transfers. Your data structure should only use external memory indices in $\{0, 1, \cdots, O(N)\}$, where N is the maximum number of elements stored in the queue at once.