

Exercise No. 9
Algorithms and Methods for Distributed Storage
Winter 2008/2009

Exercise 13 *DHT with copies*

Consider n nodes and m data items with $m > cn \log n$. For each of the n nodes, we place $c \log n$ copies into the distributed hash table. Assume that the size of the ranges of the copies are independent random variables and that the size of a range of all copies of a node is in $[\frac{1}{2n}, \frac{2}{n}]$ with high probability.

1. Prove that for every node the range size is in $[\frac{1}{2n}, \frac{2}{n}]$ with high probability.
2. Prove that every node receives at most $4\frac{m}{n}$ and at least $\frac{m}{4n}$ data items with high probability. Estimate the probability using both Chernoff bounds.