

Tutorial 7: June 27

1. Consider an empty compressed multiway trie T . Suppose our alphabet is the standard lowercase English alphabet *plus* the end-of-word character ($\$$).
 - a) Insert the following words into T : attack\$, zenith\$, atlas\$, zebra\$, bolt\$, zen\$
 - b) Search for 'at\$' and 'zenith\$' in T
 - c) Delete 'zebra\$' from T

2. Consider a hash table of size 7. For each of the scenarios below, insert the keys 14, 10, 20, 13, 7, 17, then delete 14 and search for 13.
 - a) Linear Probing with $h(k) = k \bmod 7$.
 - b) Double Hashing with $h_1(k) = k \bmod 7$ and $h_2(k) = (k \bmod 5) + 1$.
 - c) Cuckoo Hashing with $h_1(k) = k \bmod 7$ and $h_2(k) = (k \bmod 5) + 1$.

3. Design a dictionary data structure to store key-value-pairs with uniformly distributed integer keys such that the operations for search, insert, and delete have $O(\log n)$ runtime and $O(1)$ expected runtime.

4. Discussion on Questions 2(c), 2(e), and 4(a) from the midterm.