

# Exercise

## Advanced database technology

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This problem considers the String B-tree, as described in [KärkkäinenRao03]. Theorem 7.3 states that search among  $N$  strings for strings with prefix  $P$  can be done in

$$O(\text{search}(N) + \text{scan}(|P| + Z)) \text{ I/Os,}$$

where  $Z$  is the number of results. However, it is not clear from the description how one avoids having to compare  $P$  to each of the  $Z$  results, which would take  $O(\text{scan}(|P|)Z)$  I/Os.

1. In the description of the search algorithm on page 160 one case is left out, which was also not discussed at the lecture. What is the missing detail? (**Hint:** Is it always the case that only one child contains strings with prefix  $P$ ?)
2. Given a Patricia trie and a leaf in the trie having prefix  $P$ , how does one identify all leaves with prefix  $P$ , without accessing  $P$  or any string in the Patricia trie? The length of  $P$  is known.
3. Show that search in a String B-tree can be done in  $O(\text{search}(N) + \text{scan}(|P| + Z))$  I/Os. Note that results may span several nodes in the String B-tree.