

Advanced Data Structures (COP5536)

Exam 3, Sample 2

Note. All answers will be graded on correctness, efficiency, clarity, elegance and other normal criteria that determine quality. The points assigned to each question are provided in parentheses.

1. (10) Insert the following keys into an initially empty Patricia.

1000, 0010, 1001, 1100, 0000, 0001

Draw the Patricia following each insertion.

2. (10) B-tree question

(b) (5) Assuming that a B-tree (of height h) is kept on disk and one node may be fetched at a time, how many disk accesses are needed to insert a new element? Give an explanation of how you arrived at that number.

(b) (5) Show all B-trees of order 4 or less that contains the keys 1, 2, 3, 4, 5.

3. (10) Give pseudo code to insert a string into a Trie. Use the sampling function, $\text{sample}(x, j) = j\text{th character of } x$.

4. (9) Give an application (and describe how the structure is used to satisfy the application needs in 2-3 sentences each) for:

(a) Suffix Tree:

(b) Bloom Filter:

(c) Quad Tree:

5. (10) Describe how to use a Priority Search Tree to implement a memory management scheme which includes methods to allocate memory by best-fit and first-fit (a special case of resource allocation). You need to give any relevant functions and their purposes.

[Solutions](#)