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淡江大學 106 學年度日間部轉學生招生考試試題

系別：資訊管理學系三年級

科目：資料結構

3-58

考試日期：7 月 21 日(星期五) 第 2 節

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Notice : Please make your answers as clear and readable as possible. You can answer in Chinese.

1. The quadtree is a data structure for representing images in the area of image processing. It is defined as follows. There is a root in the quadtree and each nonterminal node has either four or no children. It is assumed that there are T terminal nodes in the tree. Please prove that the number of nodes (including the terminal and nonterminal nodes) in the tree is $(4 * T - 1) / 3$. (10%)
2. (a) Please give the idea of merger sort. (no algorithm or function required)
(b) Please give the idea of quick sort. (no algorithm or function required) (20%)
3. (a) Please explain sequential search and binary search.
(b) Please discuss their time complexities. (20%)
4. Regarding hashing, if overflows in a static hash table is handled by linear probing, please describe the most efficient way to determine if the key to search is or is not in the table, and discuss the drawback of linear probing. (15%)
5. (a) Show the result of inserting 12, 1, 16, 18, 34, 5, 17, 29 sequentially into an initially empty binary search tree.
(b) Show the new tree after deleting the root. (15%)
6. (a) Nine integers are inserted into an empty max heap in the following order. Please draw the final max heap. The properties of the max heap must be kept after each integer is inserted. 34, 43, 38, 82, 93, 16, 29, 45, 26.
(b) With the following array-based declaration for the max heap, please give the algorithm for inserting an integer (a node) into a max heap. You may define and use the necessary parameters.
`int heap[MAX_SIZE]; /* MAX_SIZE-1 is the maximum heap size */` (20%)