國立中央大學100學年度碩士班考試入學試題卷

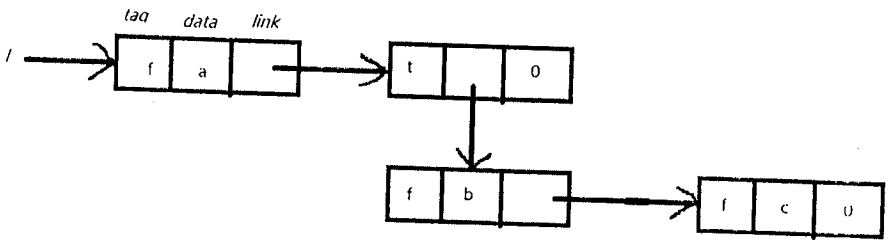
所別：企業管理學系碩士班 企業電子化戊組(一般生)　科目：資料結構　共 2 頁 第 1 頁

本科考試禁用計算器

＊請在試卷答案卷（卡）內作答

1. (25 points) Invent a data structure mapping a stack s and a queue q into a single array $M[n]$.
   (1) (10 points) Write algorithms to add and delete elements from these two data objects.
   (2) (5 points) What portion of your algorithm need to be changed if your mission is to create another new data structure mapping two stacks s into a single array $M[n]$. Please put labels in front of your algorithms in (1) to highlight the portions to be changed. Please do not re-write the whole algorithm again, just highlight the changed portion with explanation.
   (3) (5 points) Briefly describe your idea if you need to invent the third data structure mapping four stacks.
   (4) (5 points) Highlight the common advantage and disadvantage for your three data structures in (1), (2), and (3).

2. (25 points) Given the linear format of a list as atoms, commas, blanks, and parentheses, design an algorithm that produces the structural representation of the linear-represented list. For example, for the input l=(a,(b,c)), your algorithm should produce the following structure (please design all the required functions for completion). The *tag* field has two possible values where *f* represents an atom and *t* represents a deeper sub-structure.



3. (30 points) Given a forest,
   (1) (10 points) Write non-recursive algorithm(s) to traverse the associated binary tree of the given forest in forest post-order.
   (2) (10 points) Explain your algorithm, and give an example to illustrate your answer.
   (3) (10 points) Explain and describe the time and space complexities of your function?

注意:背面有試題

參考用

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4. (20 points) You need to sort a file that does not fit into memory. Suggest a way, using algorithms you know, to sort this file using only O(n log n) read/write operations. (You need to proof your answer indeed only use O(n log n) read/write operations, and better illustrate it by picture for ease of understanding)