
Data Structures and Algorithms in Java™

Sixth Edition

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Study Guide: Hints to Exercises

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Chapter 15

Memory Management and B-Trees

Hints

Reinforcement

- R-15.1)** Perform an Internet search to determine a good estimate on the number of atoms on earth.
- R-15.2)** Draw the memory cache and manually process the requests using a pencil with a good eraser.
- R-15.3)** Draw the memory cache and manually process the requests using a pencil with a good eraser.
- R-15.4)** Draw the memory cache and manually process the requests using a pencil with a good eraser.
- R-15.5)** Start with the description provided in the book.
- R-15.6)** Revisit the definition of an (a, b) tree.
- R-15.7)** The definition of an order- d deals with the minimum and maximum number of children an internal node can have. Please see the book for details.
- R-15.8)** Use a pencil with a good eraser.

Creativity

- C-15.9)** Review the external-memory sorting algorithm.
- C-15.10)** Keep the top one or two blocks of the stack in main memory.
- C-15.11)** Keep queue runs in blocks.
- C-15.12)** Consider an alternate linked list implementation that uses “fat” nodes.
- C-15.13)** Note that each valid node v and its children in a $(2,4)$ tree correspond to a red-black subtree of height 2. In a $(4,8)$ tree, you will need bigger subtrees.
- C-15.14)** Consider the extreme cases.

- C-15.15)** Try to block order- B sized sub “trees” in the skip list.
- C-15.16)** Start from sequence solution for the union-find problem.
- C-15.17)** A single scan suffices.
- C-15.18)** Each request can “see into the future” to see when is the next time existing blocks will be accessed next.
- C-15.19)** In an initial scan, keep track of the best candidate majority value, x , and a counter that keeps track of the number of times you have seen a copy of x versus some other integer.
- C-15.20)** Consider what happens to a page that is accessed a lot and then never accessed again.
- C-15.21)** The answer just uses some simple logarithm identities.

Projects

- P-15.22)** Let a and b be definable parameters or constants. And let insertion be the first update method you program.
- P-15.23)** Start with insertion as the first update operation you code up, and use a simple uniform distribution of keys to perform the experiments.