Exercises Week 5: B+ Trees

Exercise 5.1 Consider the B+ tree index of order d = 2 shown in Figure 10.1. Perform the following operations, each time starting with this tree. The resulting trees should be valid B+ trees themselves.

1. Show the tree that would result from inserting a data entry with key 9.
2. Show the tree that would result from inserting a data entry with key 3. How many page reads and page writes does the insertion require?
3. Show the tree that would result from deleting the data entry with key 8, assuming the left sibling is checked for possible redistribution.
4. Show the tree that would result from deleting the data entry with key 8, assuming the right sibling is checked for possible redistribution.
5. Show the tree that would result from starting with the original tree, inserting a data entry with key 46 and then deleting the data entry with key 52.
6. Show the tree that would result from deleting the data entry with key 91.
7. Show the tree that would result from inserting a data entry with key 59, and then deleting the data entry with key 91.
8. Show the tree that would result from successively deleting the data entries with keys 32, 39, 41, 45, and 73.
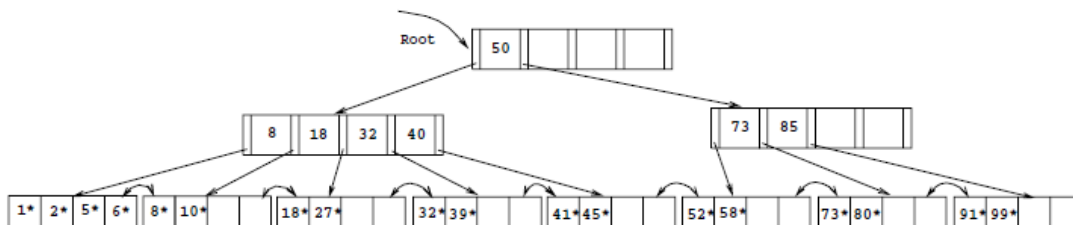

Figure 10.1   Tree for Exercise 10.1

Exercise 5.2 Answer the following questions:

1. What is the minimum space utilization for a B+ tree index?
2. If your database system supported both a static and a dynamic tree index, would you ever consider using the static index in preference to the dynamic index?