B+ Tree Index Example

(Problem 10.1 from our book)
1. Show the tree that would result from inserting a data entry with key 9 into this tree.

2. Show the B+ tree that would result from inserting a data entry with key 3 into the original tree.

3. Show the B+ tree that would result from deleting the data entry with key 8 from the original tree, assuming that the left sibling is checked for possible redistribution.

4. Show the B+ tree that would result from deleting the data entry with key 8 from the original tree, assuming that the right sibling is checked for possible redistribution.

5. Show the B+ 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 B+ tree that would result from deleting the data entry with key 91 from the original tree.

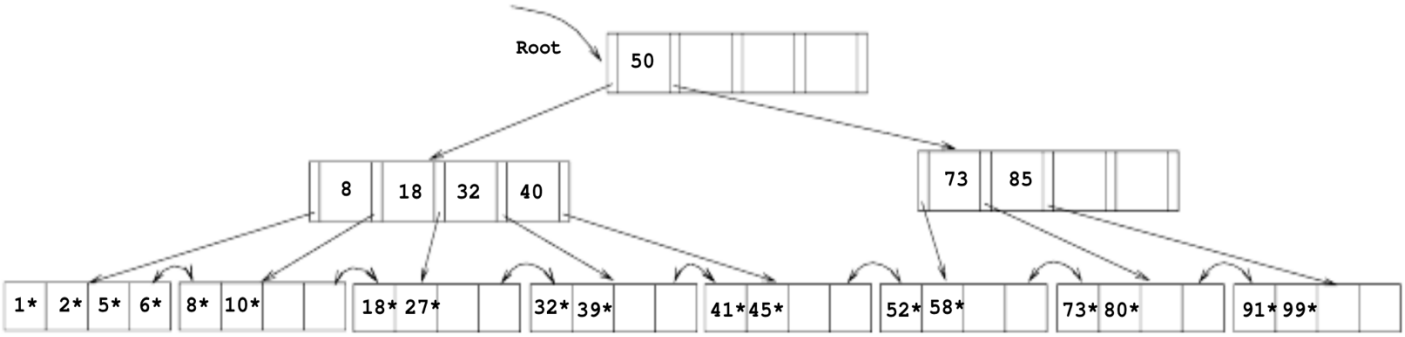
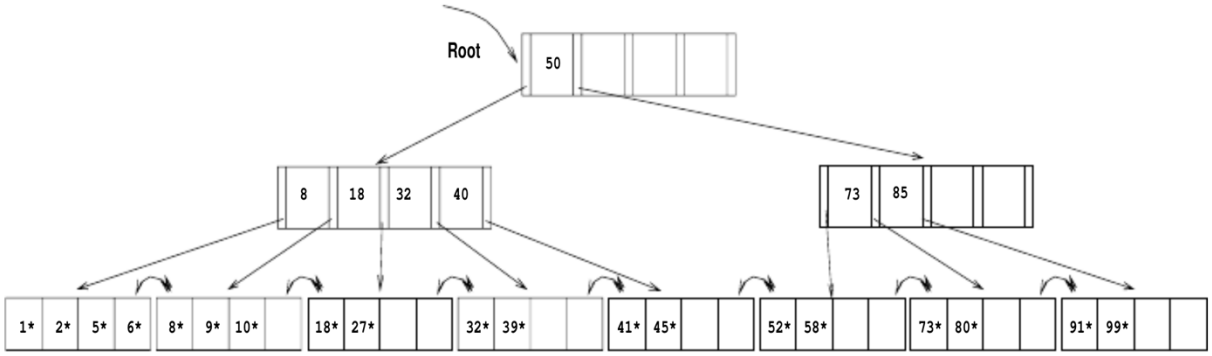


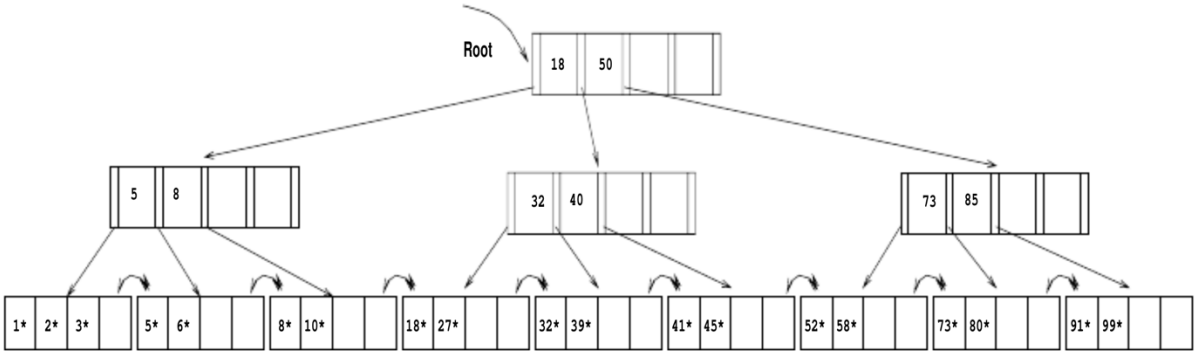
Figure 10.1 Tree for Exercise 10.1

1. Show the tree that would result from inserting a data entry with key 9 into this tree.



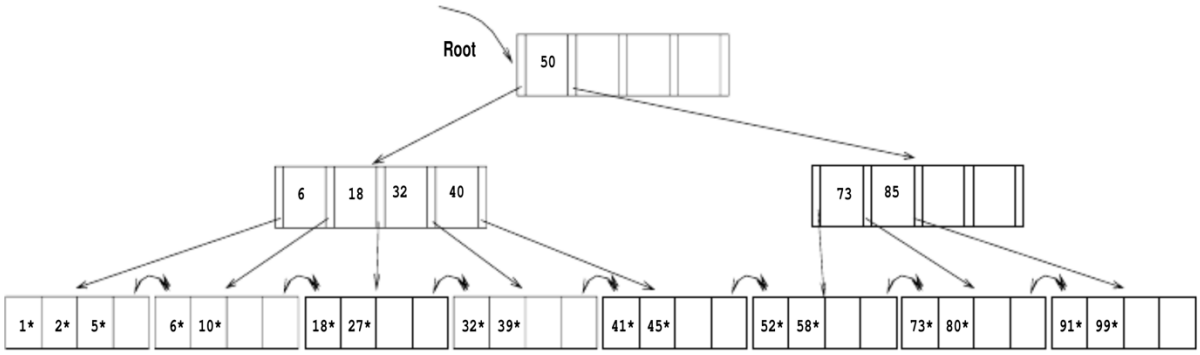
2. Show the B+ tree that would result from inserting a data entry with key 3 into the original tree.

The data entry with key 3 goes on the first leaf page F. F can accommodate at most four data entries (d = 2 , F splits. The lowest data entry of the new leaf is given up to the ancestor which also splits.



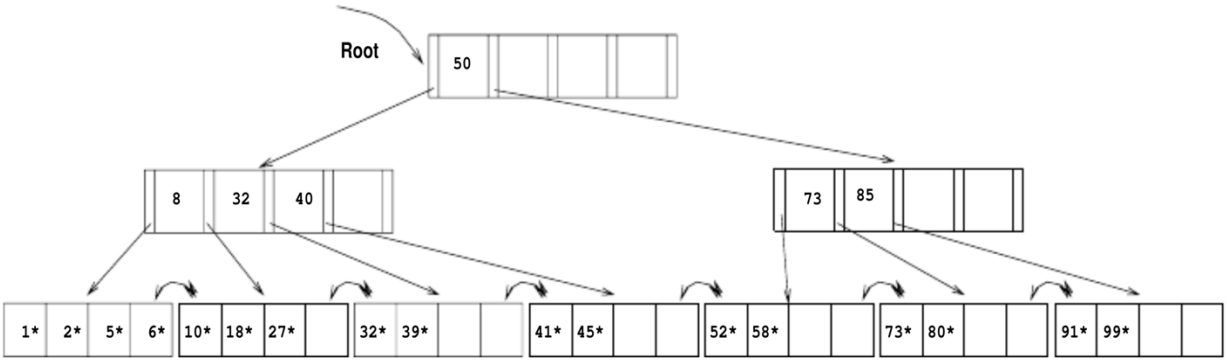
3. Show the B+ tree that would result from deleting the data entry with key 8 from the original tree, assuming that the left sibling is checked for possible redistribution.

The data entry with key 8 is deleted, resulting in a leaf page N with less than two data entries. The left sibling L is checked for redistribution. Since L has more than two data entries, the remaining keys are redistributed between L and N.



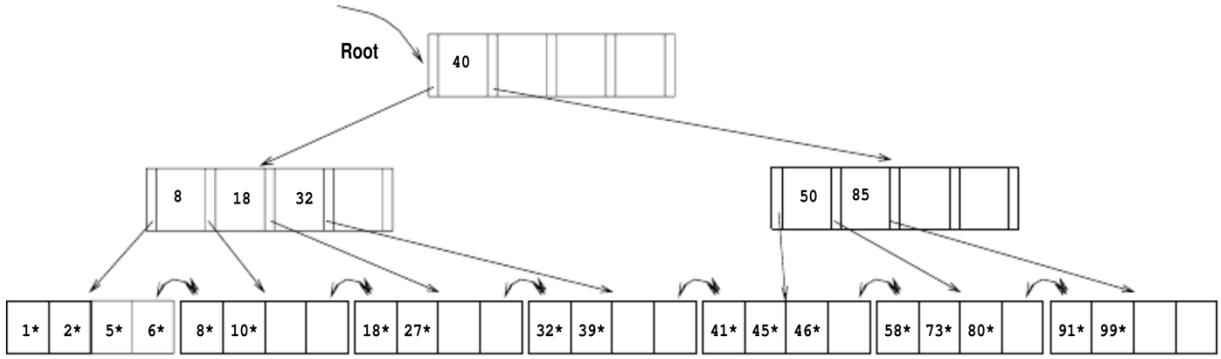
4. Show the B+ tree that would result from deleting the data entry with key 8 from the original tree, assuming that the right sibling is checked for possible redistribution.

As is part 3, the data entry with key 8 is deleted from the leaf page N ,. N's right sibling R is checked for redistribution, but R has the minimum number of keys. Therefore, the two siblings merge. The key in the ancestor w h ich distinguished between the newly merged leaves is deleted.



5. Show the B+ 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.

The data entry with key 46 can be inserted without any structural changes in the tree. But the removal of the data entry with key 52 causes its leaf page L to merge with a sibling (we chose the right sibling). This results in the removal of a key in the ancestor A of L and thereby lowering the number of keys on A below the minimum number of keys. Since t h e left sibling B of A has more than the minimum n.



6. Show the B+ tree that would result from deleting the data entry with key 91 from the original tree.