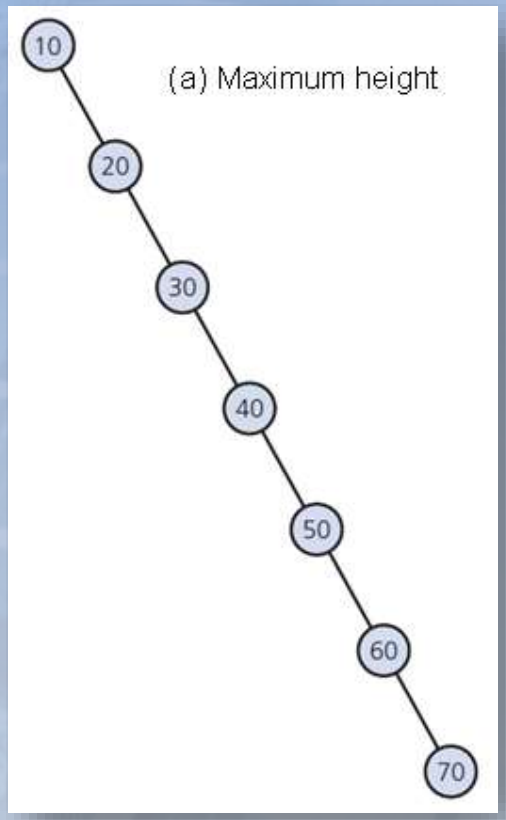
Balanced Search Trees

Chapter 19

Balanced Search Trees

- Height of binary search tree
  - Sensitive to order of additions and removals
- Various search trees can retain balance
  - Despite additions and removals

Balanced Search Trees



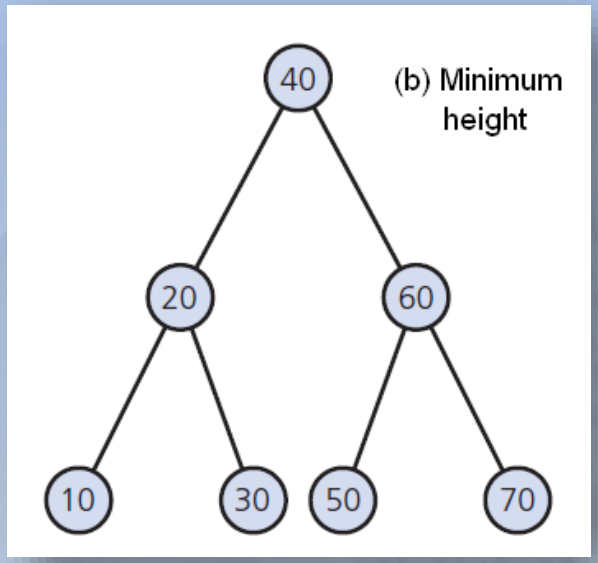


FIGURE 19-1 The tallest and shortest binary search trees containing the same data

AVL Trees

- An AVL tree
  - A balanced binary search tree
- Maintains its height close to the minimum
- Rotations restore the balance

AVL Trees

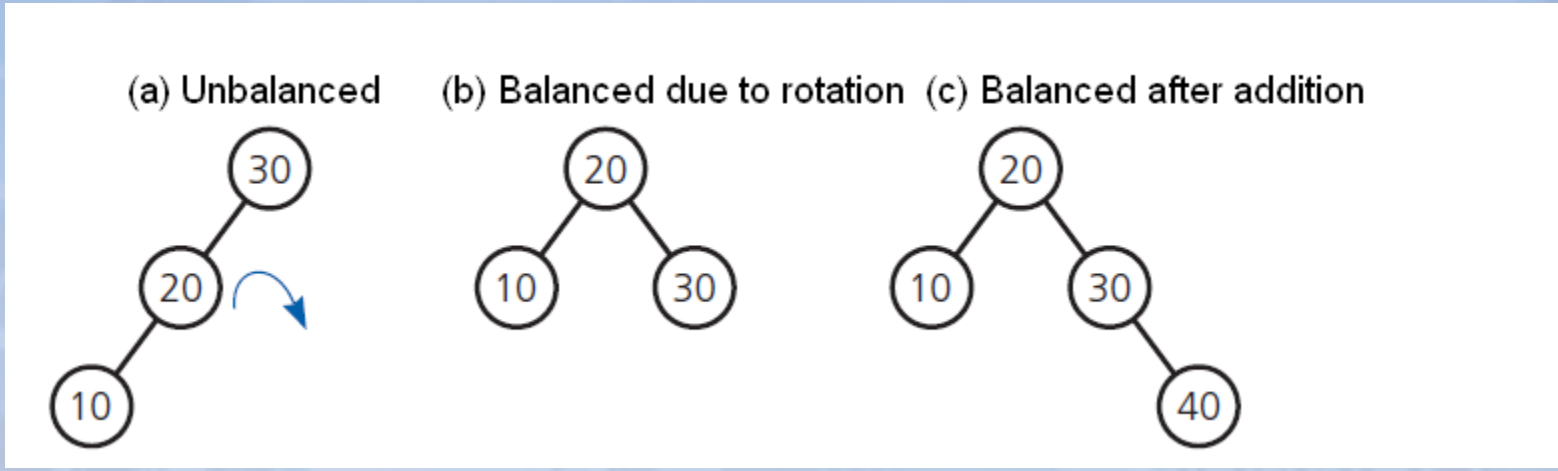


FIGURE 19-2 An unbalanced binary search tree

AVL Trees

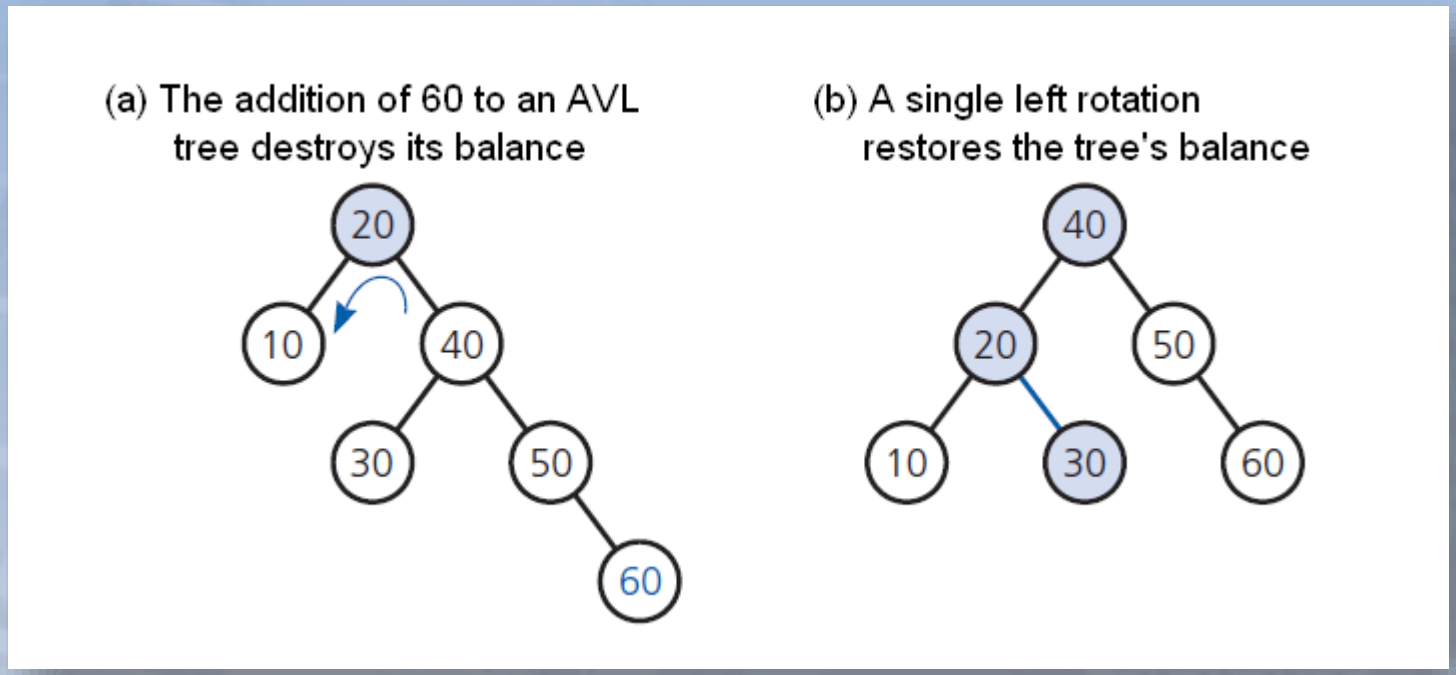
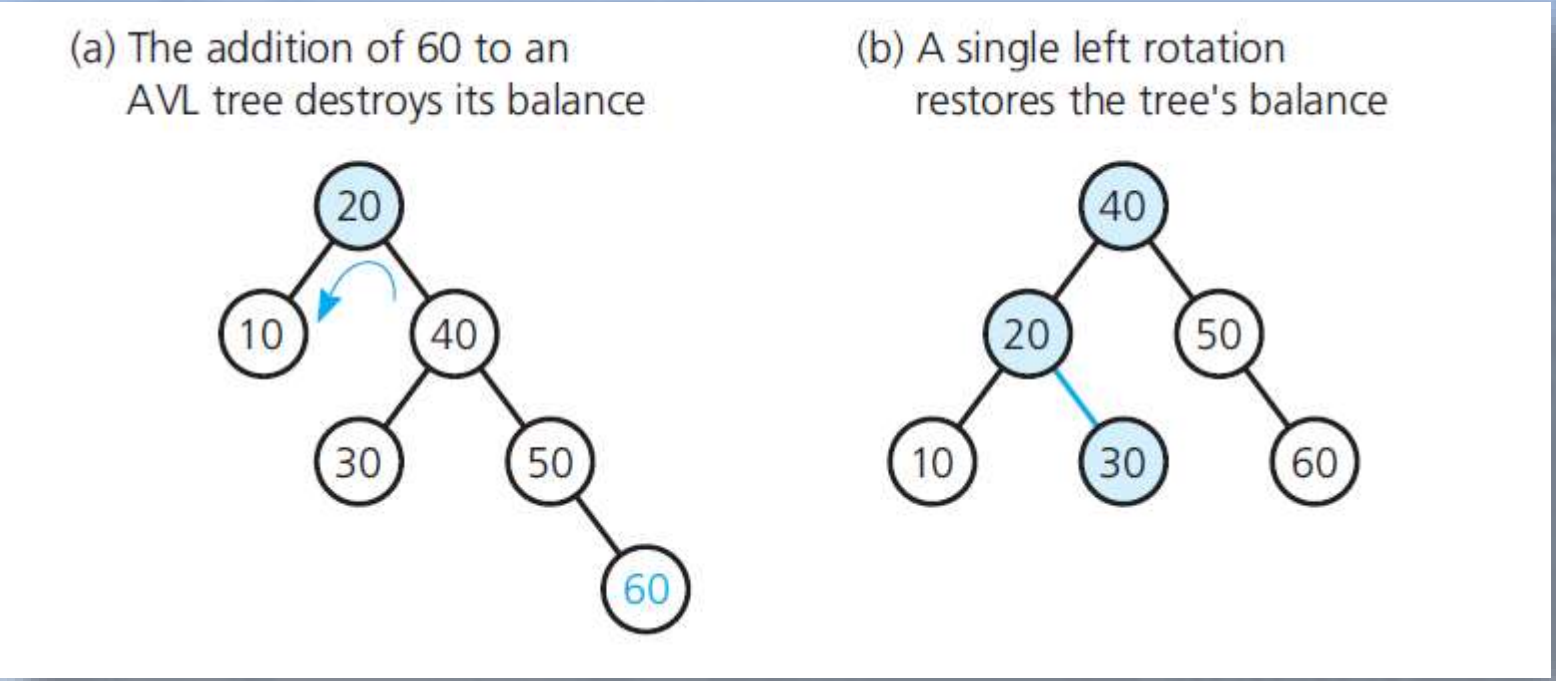


FIGURE 19-3 Correcting an imbalance in an AVL tree due to an addition by using a single rotation to the left

AVL Trees



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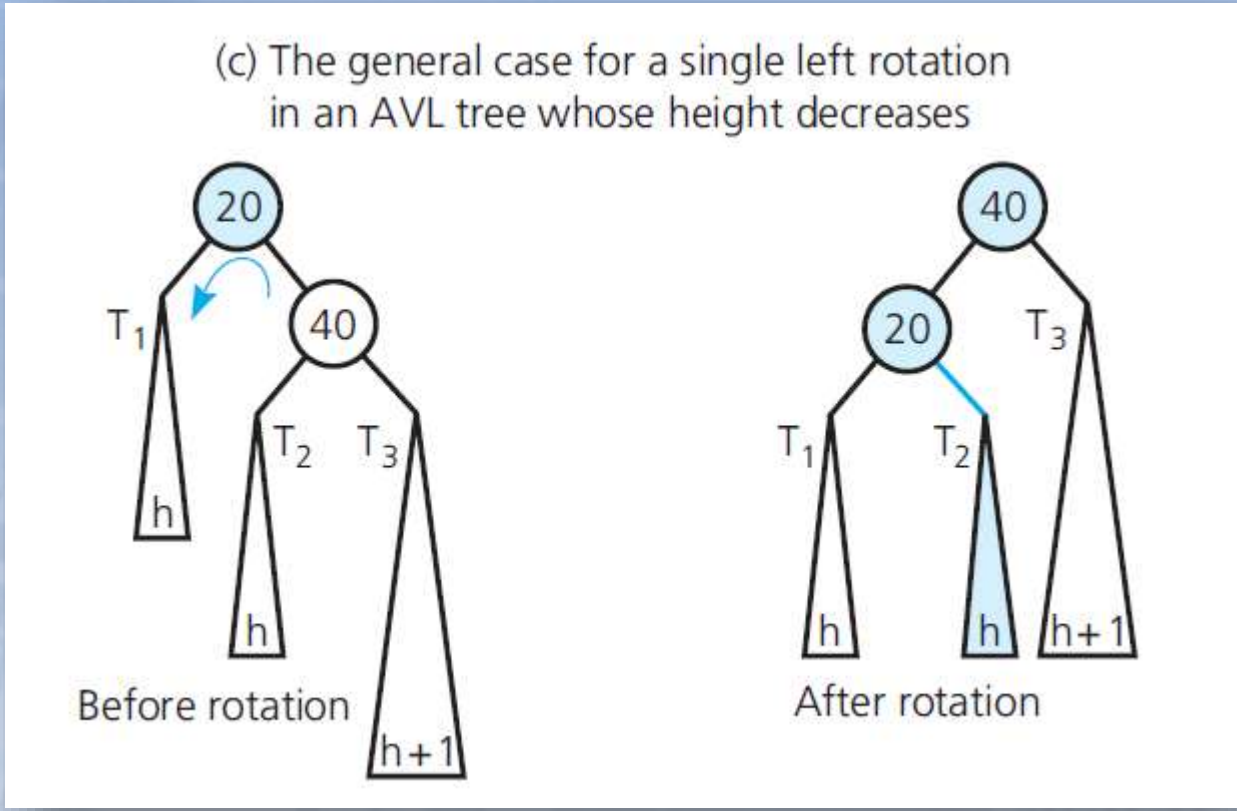
AVL Trees



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AVL Trees

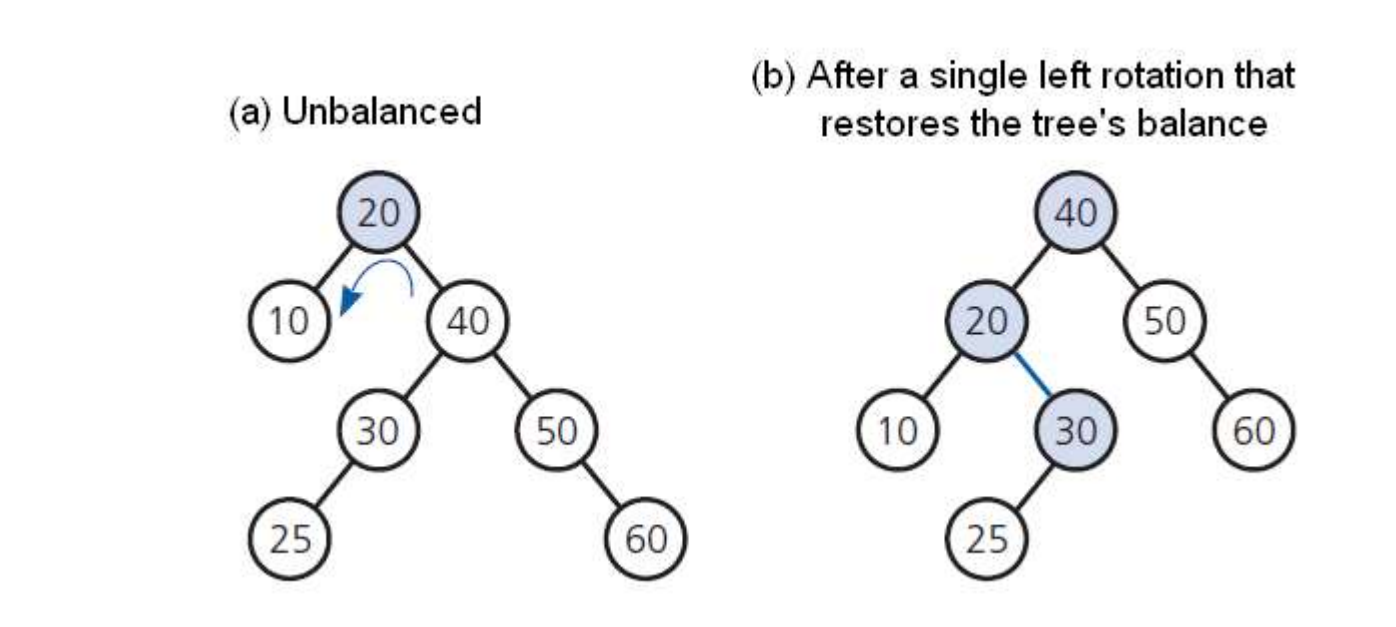
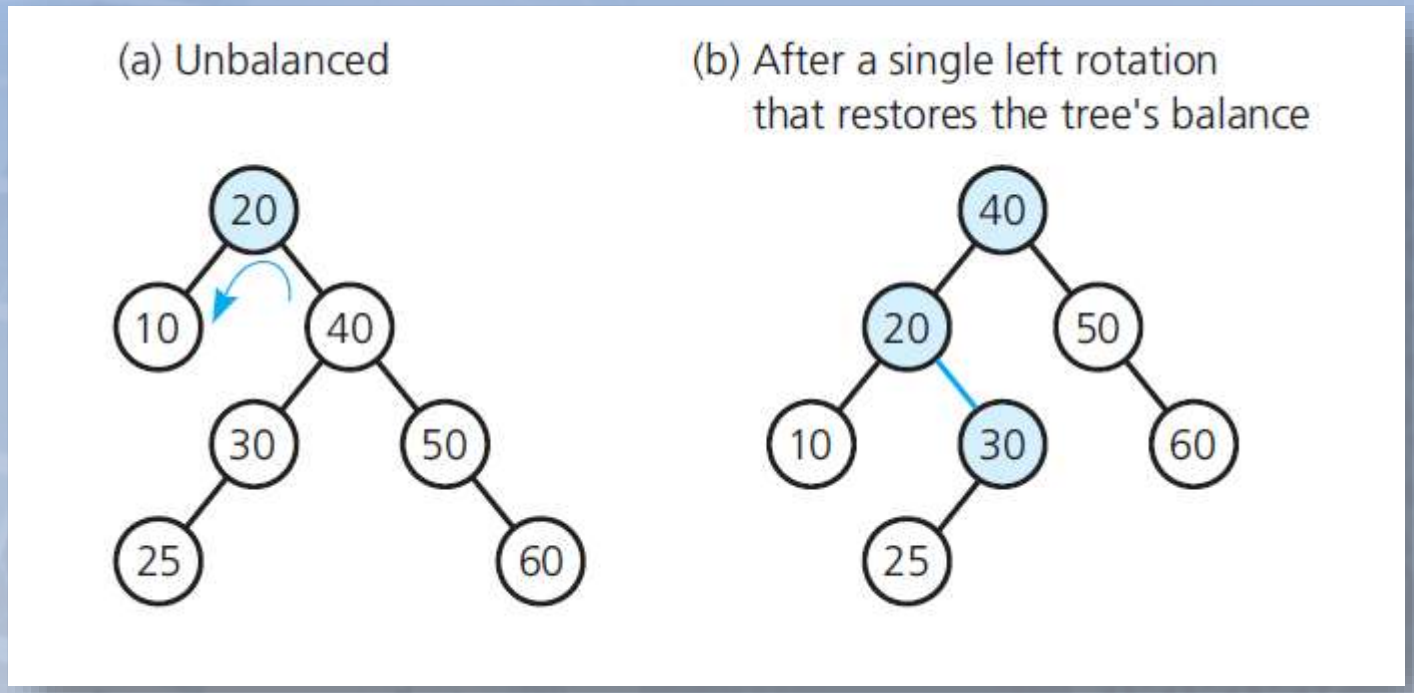


FIGURE 19-4 A single rotation to the left that does not affect the height of an AVL tree

AVL Trees



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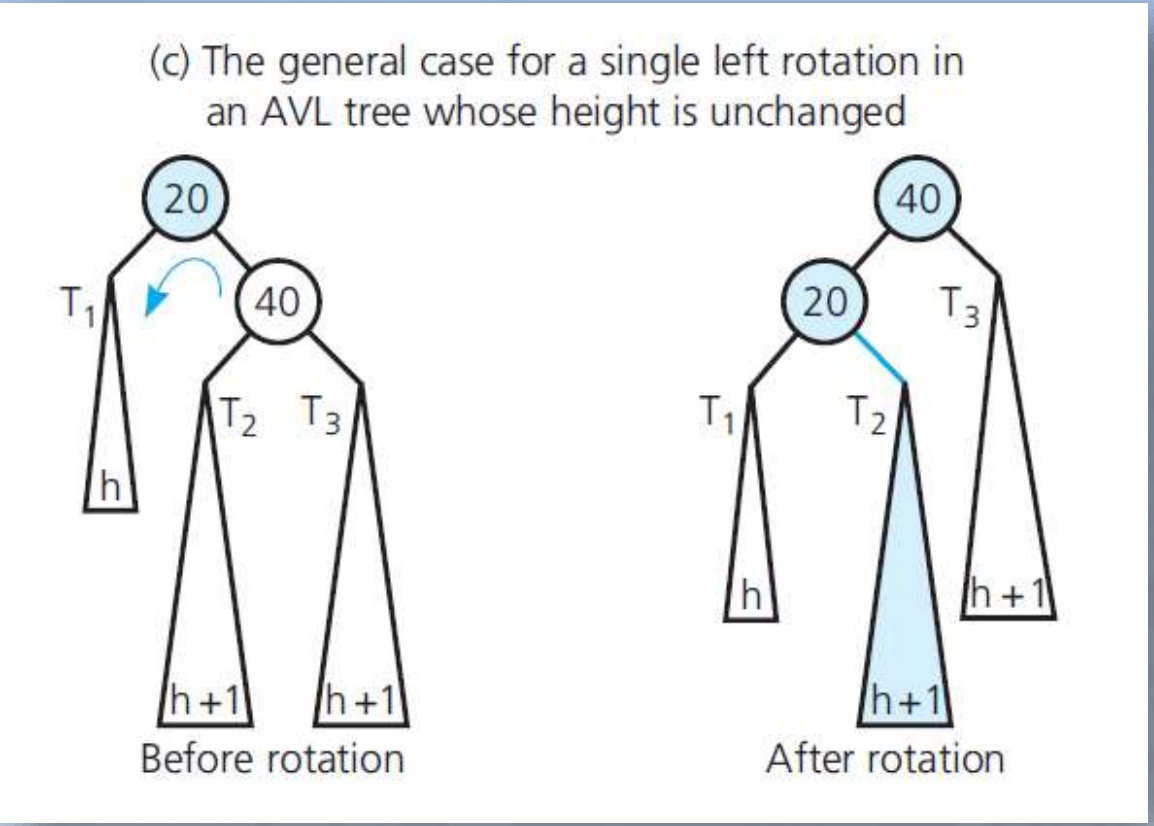
AVL Trees



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AVL Trees

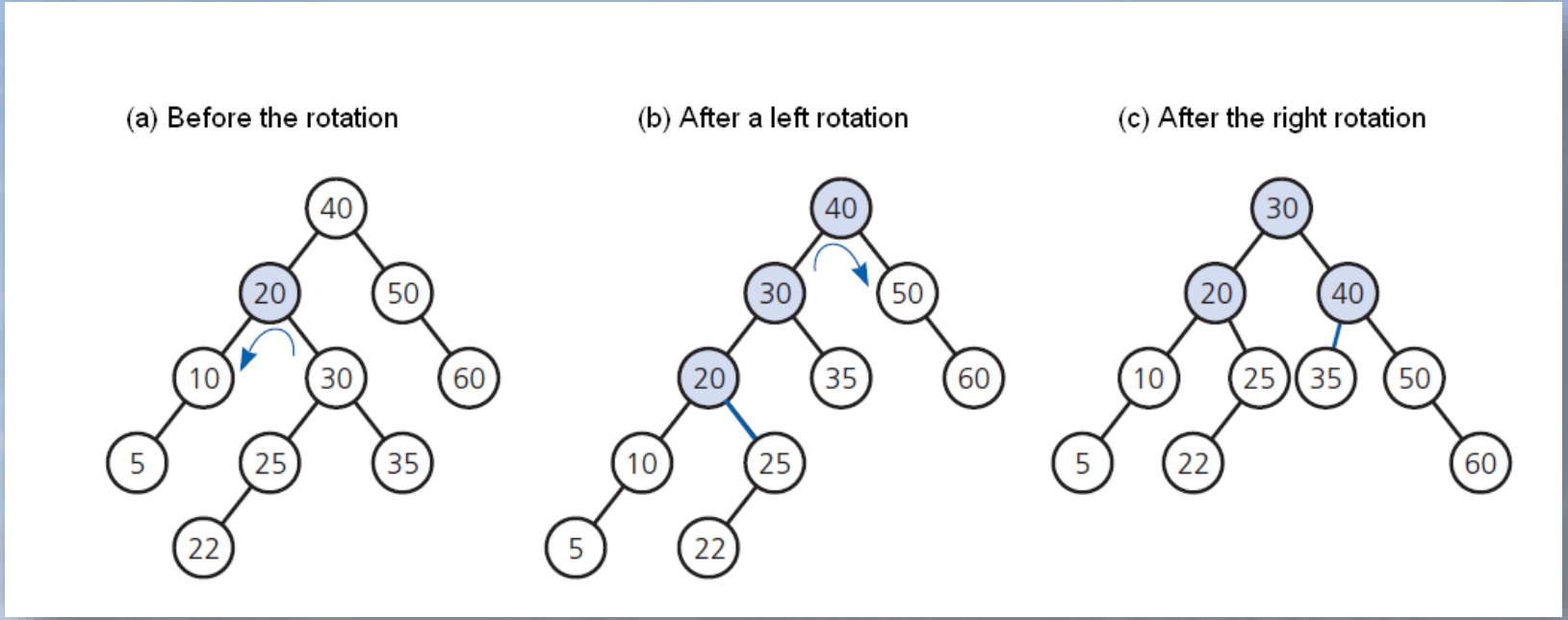
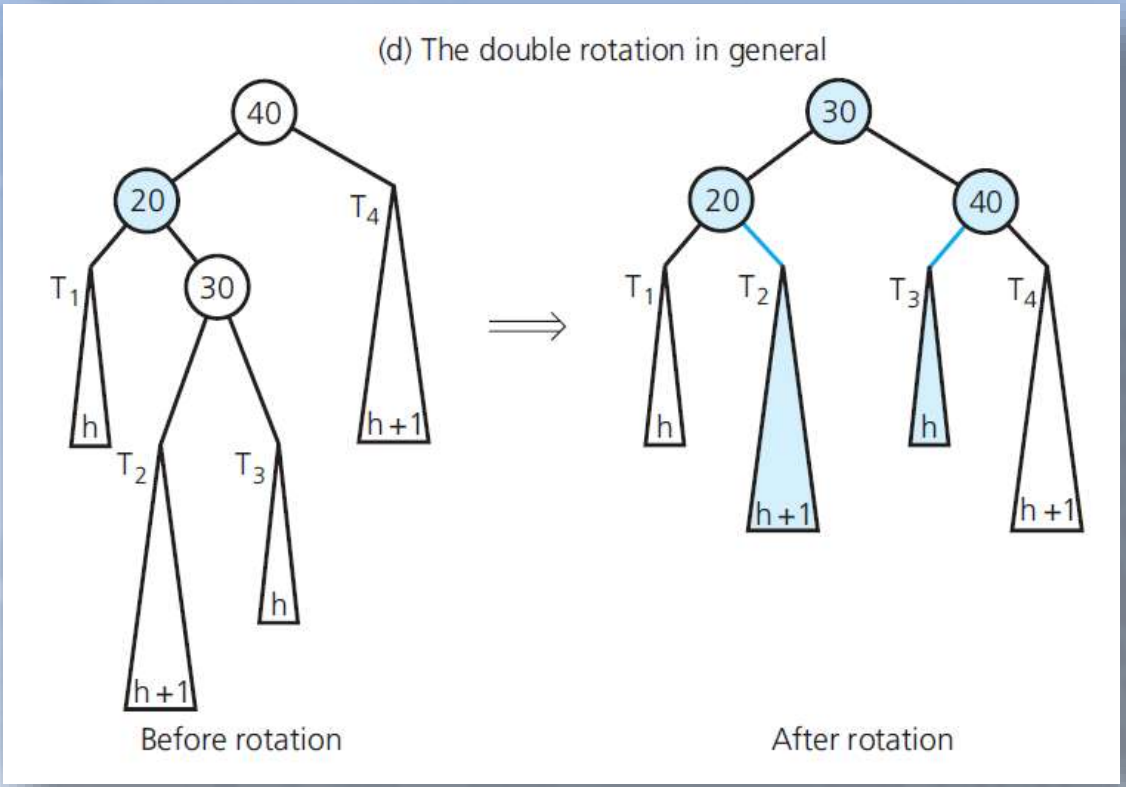


FIGURE 19-5 A double rotation that decreases the height of an AVL tree

AVL Trees



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